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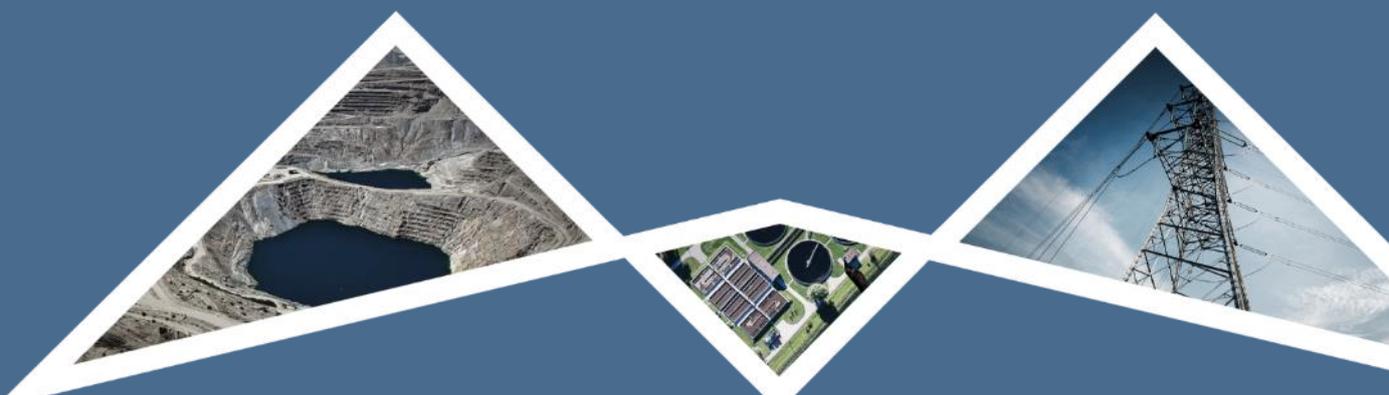
ENVIRONMENTAL MANAGEMENT PROGRAMME

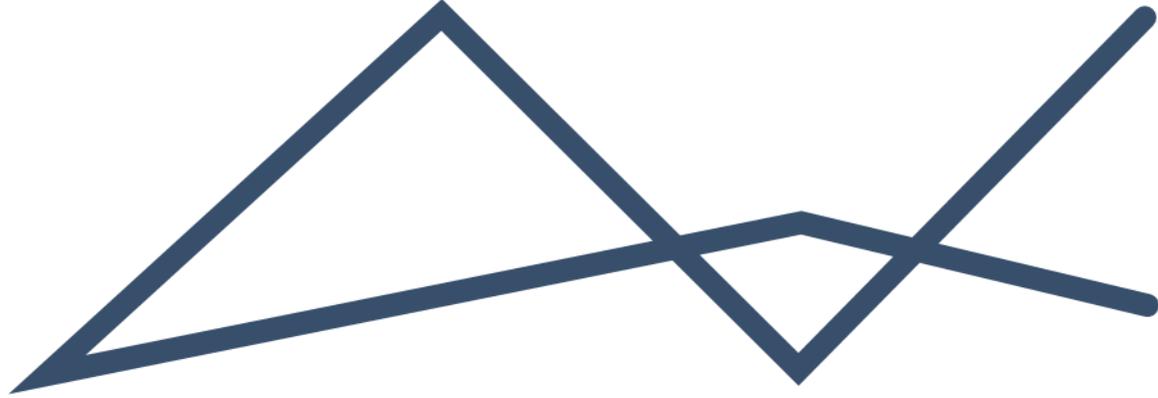
TETRA4 VIRGINIA PRODUCTION RIGHT

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Appendix 1: Generic EMPr for Gas Pipeline Infrastructure

Appendix 2: EAP CV

Appendix 3: Sensitivity Mapping

Appendix 4: Well closure, sealing and rehabilitation guideline

Appendix 5: EMPr Amendment Change Register (2024)





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). The extension of the Production Right by consolidation of Exploration Rights ER32 and ER94 into the existing Production Right, necessitated the development of additional mitigation measures. These measures are incorporated into this holistic Environmental Management Program (EMPr).

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 applications for Environmental Authorisations (EA) to the Petroleum Agency of South Africa. The Cluster 2 application supports Tetra4's plans to expand natural gas production operations within the existing Production Right (PASA Reference: 12/4/1/07/2/2) and the Production Right Extension application supports Tetra4's plans to extend the Production Right's boundaries by incorporating Exploration Rights ER32 and ER94 (PASA Reference: 12/4/007). The proposed project activities are situated within the Matjhabeng and Masilonyana Local Municipalities, near Virginia, Free State Province. A comprehensive 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 Liquefied 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 1 was the first, Cluster 2 the second, and the Production Right Extension the third of these site-specific EMPr's. 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 table also provides detailed information regarding the properties encompassed by the two exploration rights areas designated for consolidation into the production rights area, as well as the specific locations of these exploration rights. The locality and extent of the Cluster 1 and Cluster 2 study areas within the production right area are presented in Figure 1, and in Figure 2 for ER32 and ER94 in relation to the Production Right area.

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	<p>Cluster 1: Located is approximately 20 km southwest of the town of Virginia, in the Free State Province.</p> <p>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.</p> <p>Production Right Extension: ER32 located north of the Production Right area, is approximately 7.2 km Northwest of Welkom and the ER94, located to the south of the Production Right, is approximately 19.2 km South of Virginia.</p>	
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)	F0330000000000100001
	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
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Boschluis Spruit 278 (Portion 1)	F03300000000027800001
Boschluis Spruit 278 (Portion 2)	F03300000000027800002
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Braklaagte 41 (Portion 1)	F03300000000004100001
Brakspruit 121 (Portion 0)	F03300000000012100000
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Bruintjes Hoogte 367 (Portion 2)	F03300000000036700002
Bruintjes Hoogte 367 (Portion 3)	F03300000000036700003
Bruintjes Hoogte 367 (Portion 4)	F03300000000036700004
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Bryan 561 (Portion 10)	F03300000000056100010
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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)	F03300000000002400000
Farm Welgelegen Station No 64 (Portion 0)	F03300000000006400000
Frisgewaag 550 (Portion 0)	F03300000000055000000
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Di Blesbokkantoor 1549 Portion 4	F04200000000154900004
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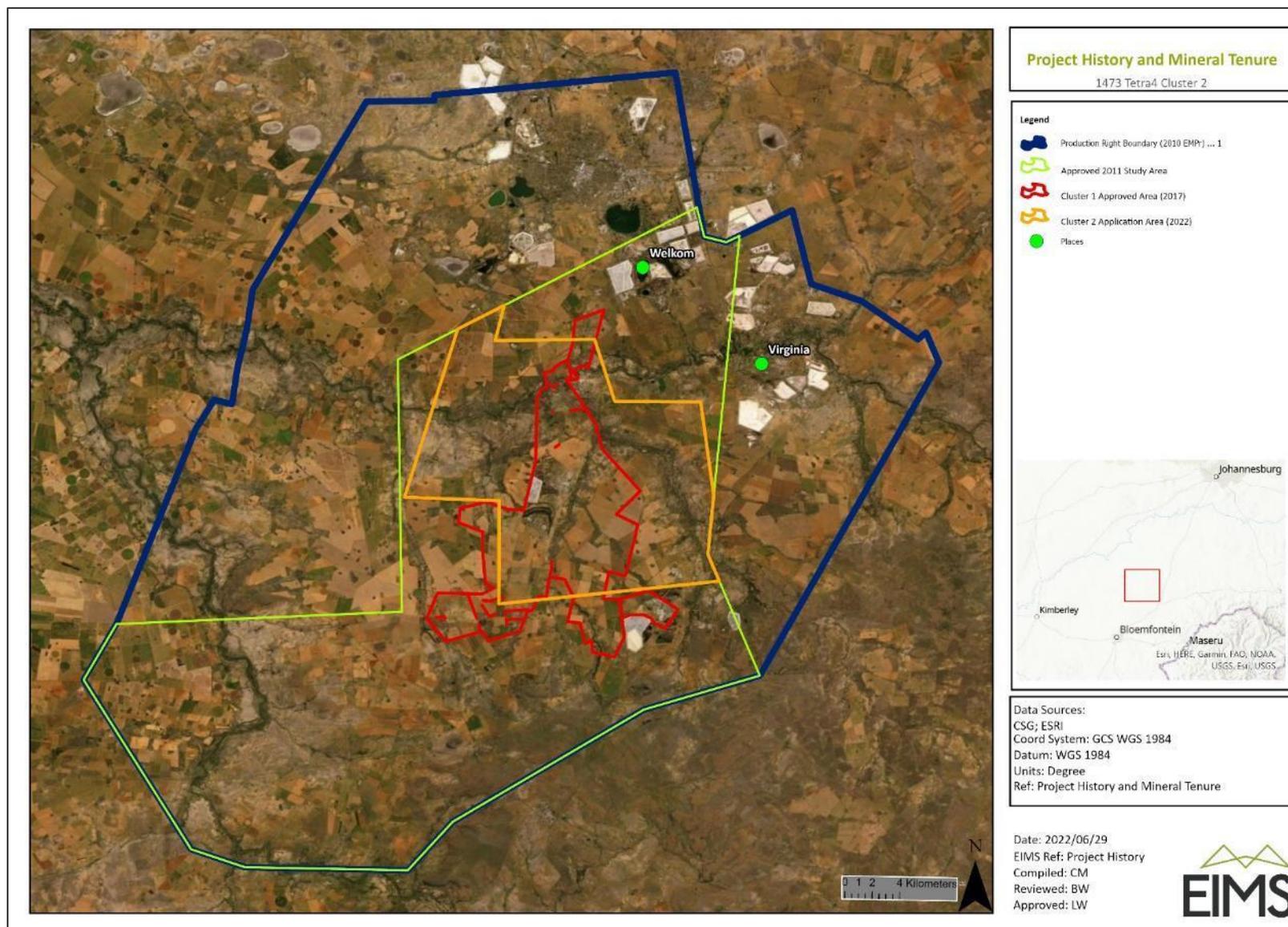


Figure 1: Cluster 1 and Cluster 2 locality in relation to the Production Right area.

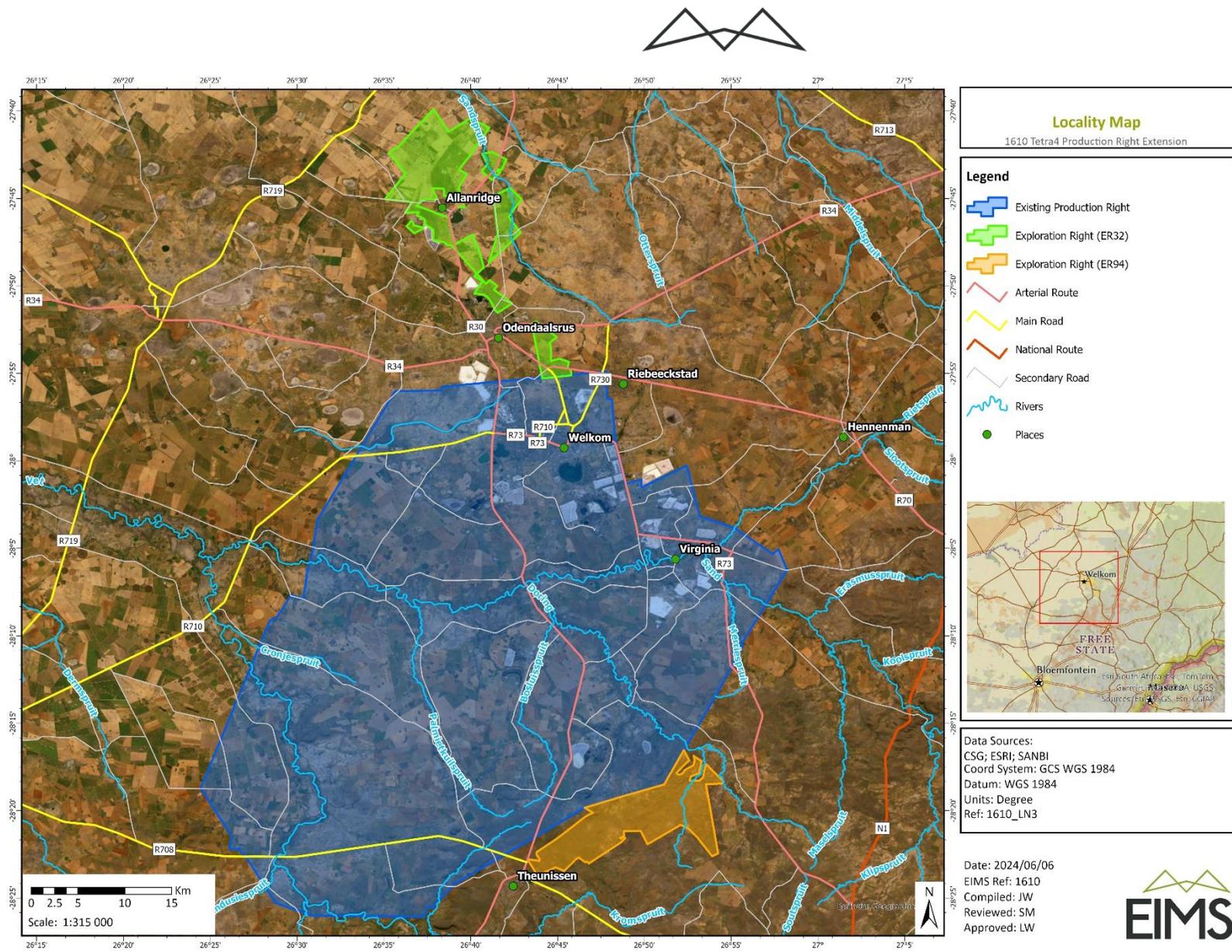


Figure 2: Production Right Extension Areas.



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. The consolidation of the two Exploration Rights (~18 733 Ha) into the Production Right will result in a total area of 205 733 Ha. 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 EMPr¹, 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 EO². 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.

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.



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 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 3 below for the simplified production method representation).

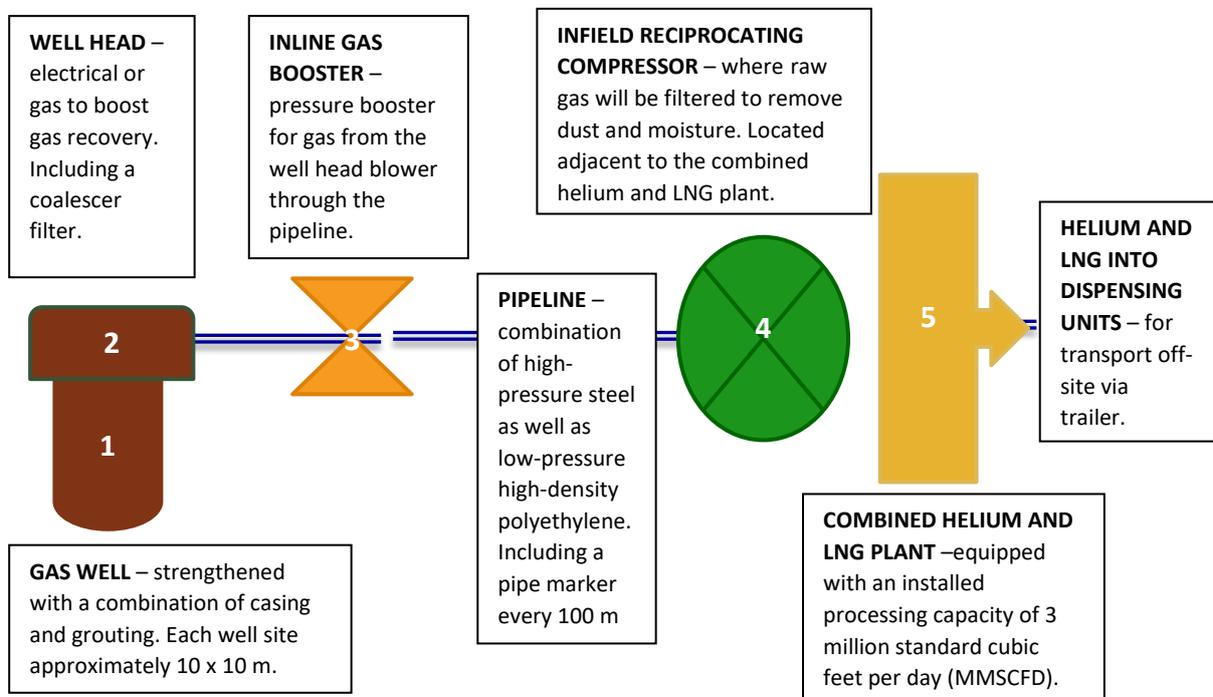


Figure 3: Flow Diagram of Simplified Production Method

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 4 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.

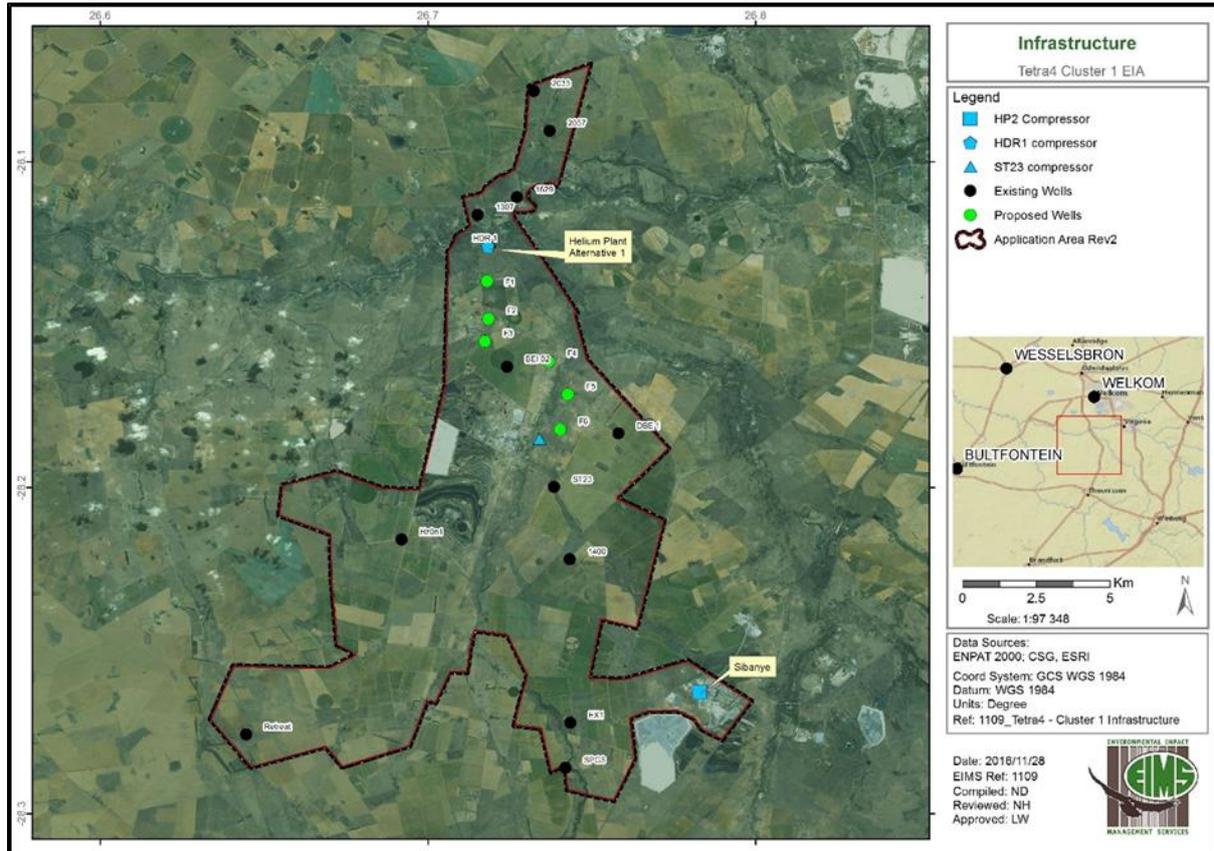


Figure 4: Location of Existing Wells (Black), New Wells (Green) and Other Cluster 1 Surface Infrastructure

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 5 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 6 for a schematic representation and layout of the helium recovery unit.

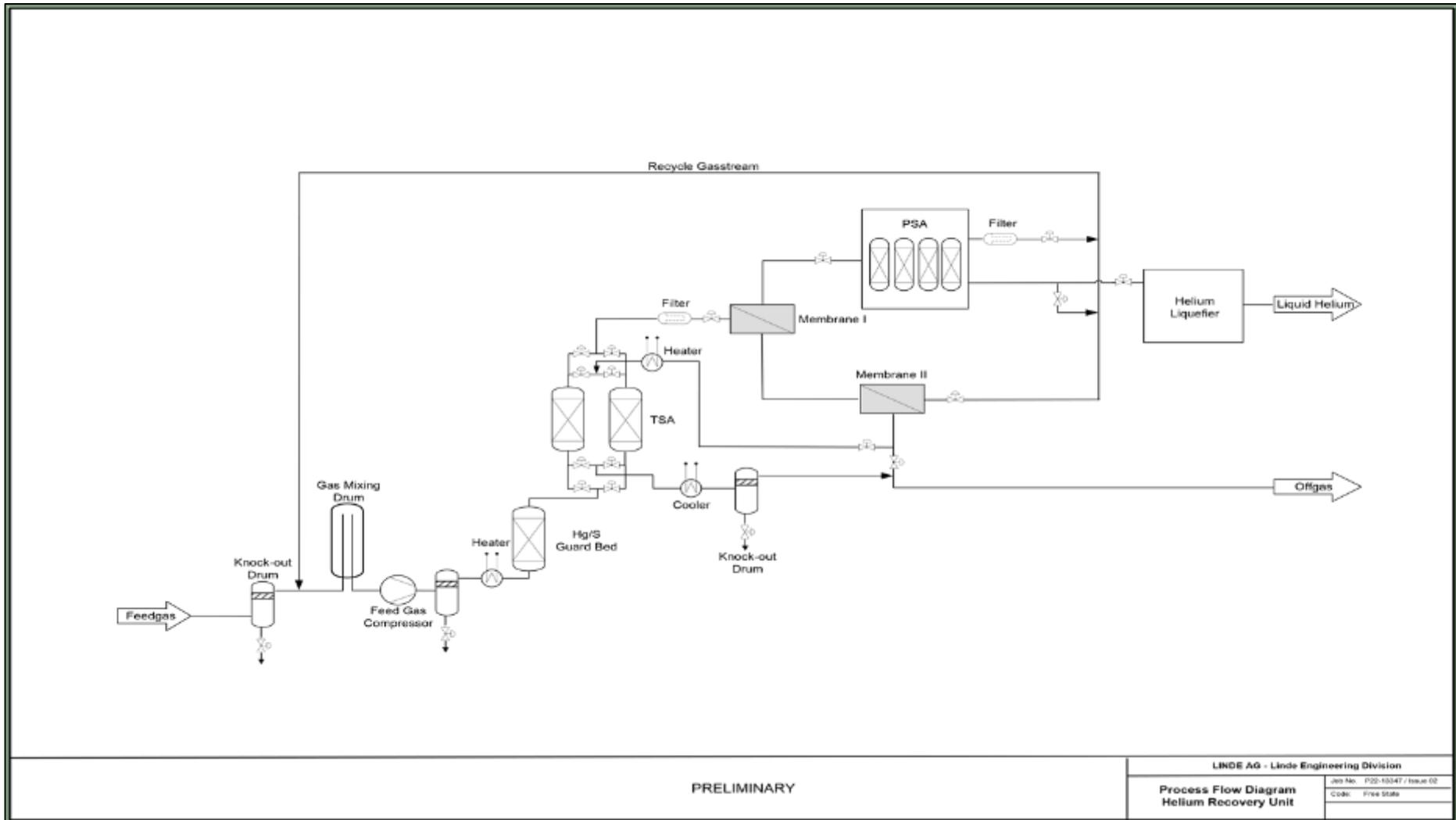


Figure 5: Cluster 1 Helium Recovery Unit Process Flow Diagram

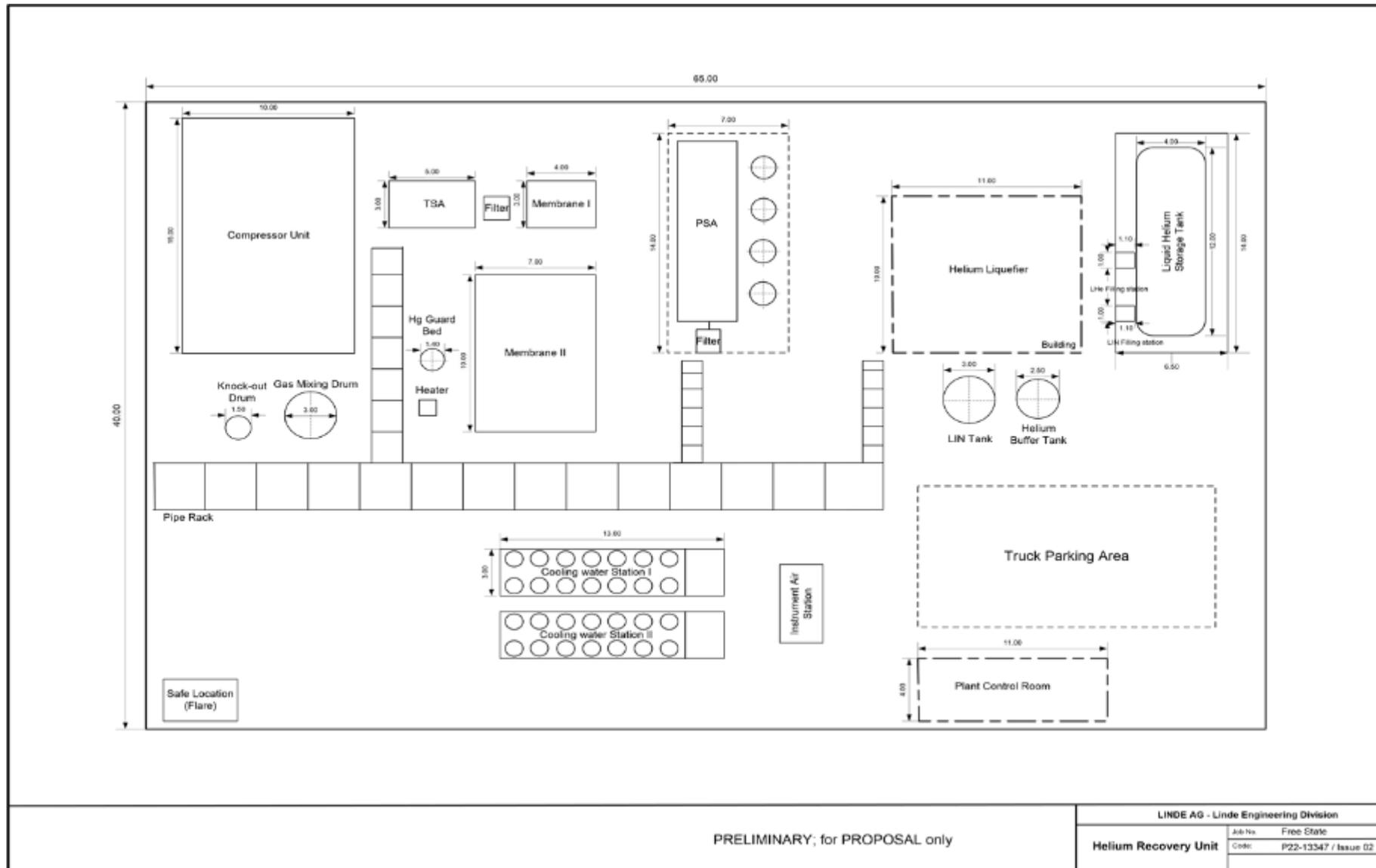


Figure 6: Schematic Representation of Helium Recovery Unit



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 7 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.

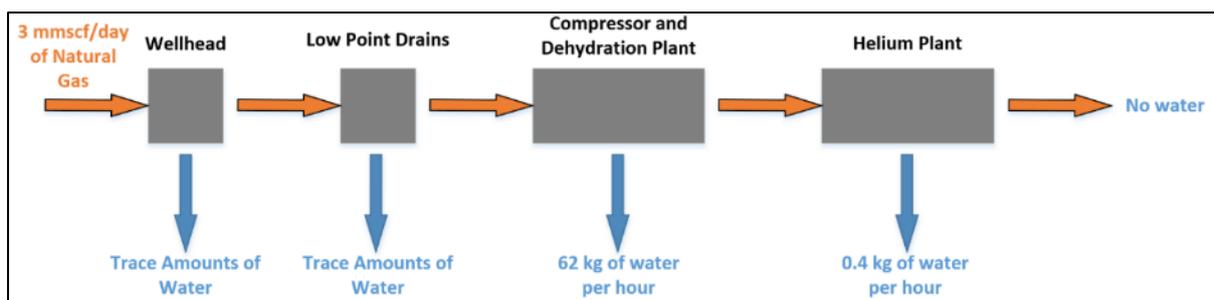


Figure 7: Schematic Diagram Representing the Potential Amount of Waste Water Produced During Gas Production and Processing

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 8.

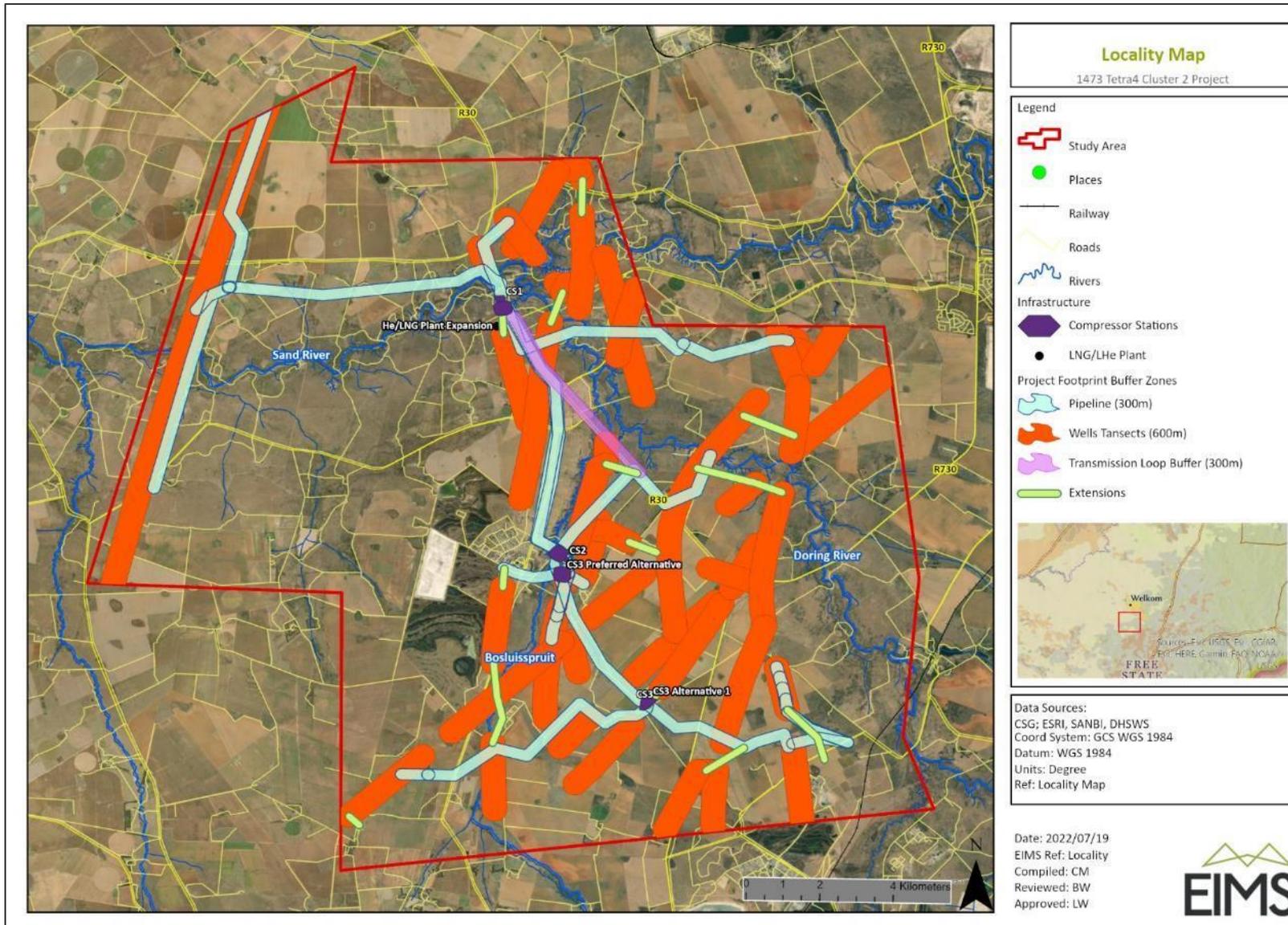


Figure 8: Cluster 2 study area and infrastructure footprint transects.



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 barg³ (gauge pressure) and with a temperature in the range between 10 °C and 30 °C. 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 8. 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 CO₂ 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 8 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 MMSCFD⁴. 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 guidelines⁵, 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 9) and adhere to ASME B31.8 (Section 851.7) and will have low point drains at strategic locations for testing and pipeline maintenance.



Figure 9: 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 15 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 16) and a total of 28 booster stations are expected to be constructed.

Inline pigging stations (Figure 10) 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 m²) each.

Low Point Drains (Figure 11) 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 m².



Figure 10: View of an existing pigging station constructed as part of Cluster 1.



Figure 11: 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 12 and Figure 17).



Figure 12: 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 m³);
- LNG Storage (~11x300 m³); 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 13.

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 13: 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 m³. 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.

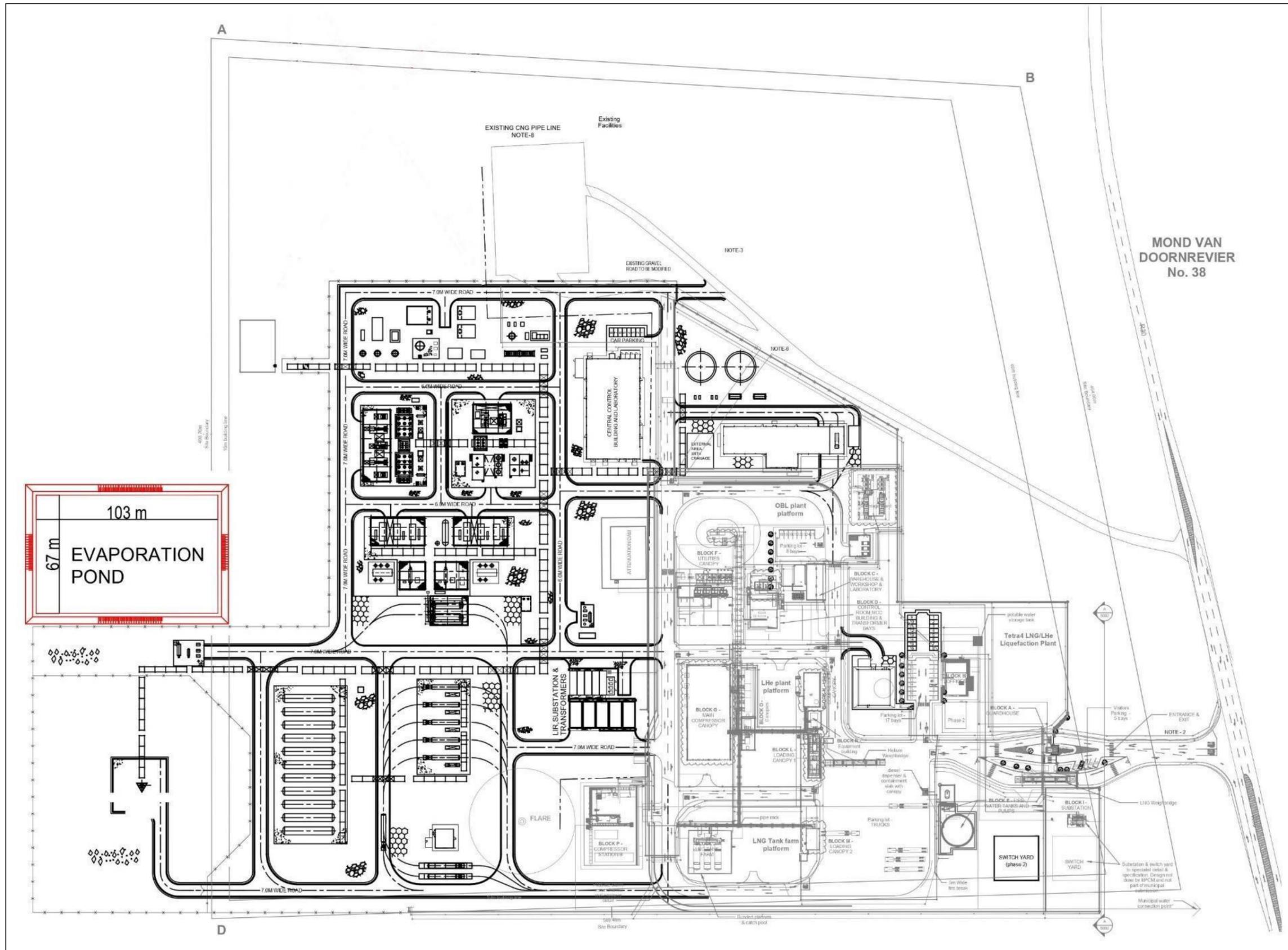


Figure 14: Preliminary layout of the Cluster 2 Plant extension to Cluster 1 Plant

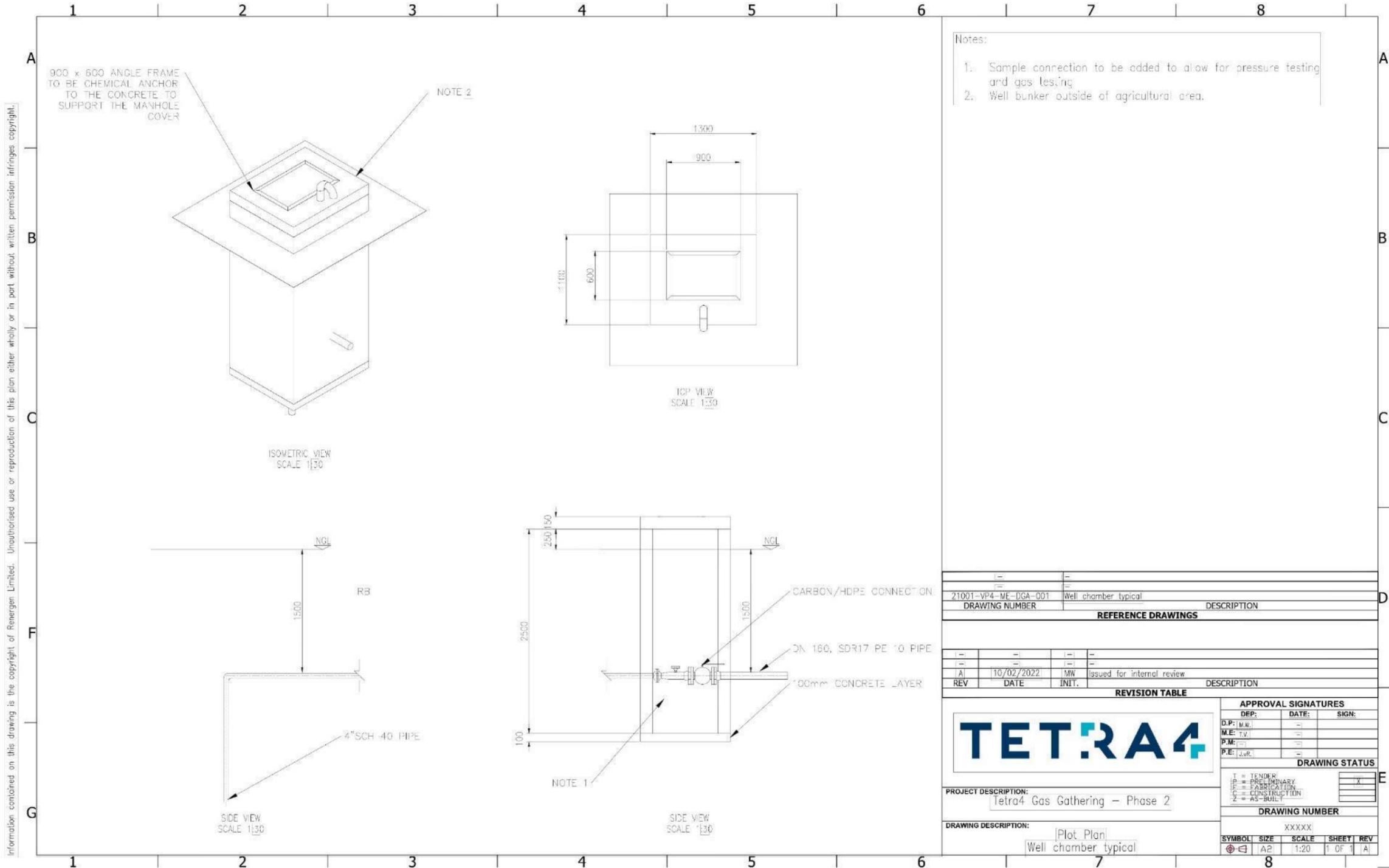


Figure 15: Typical subterranean precast well chamber layout

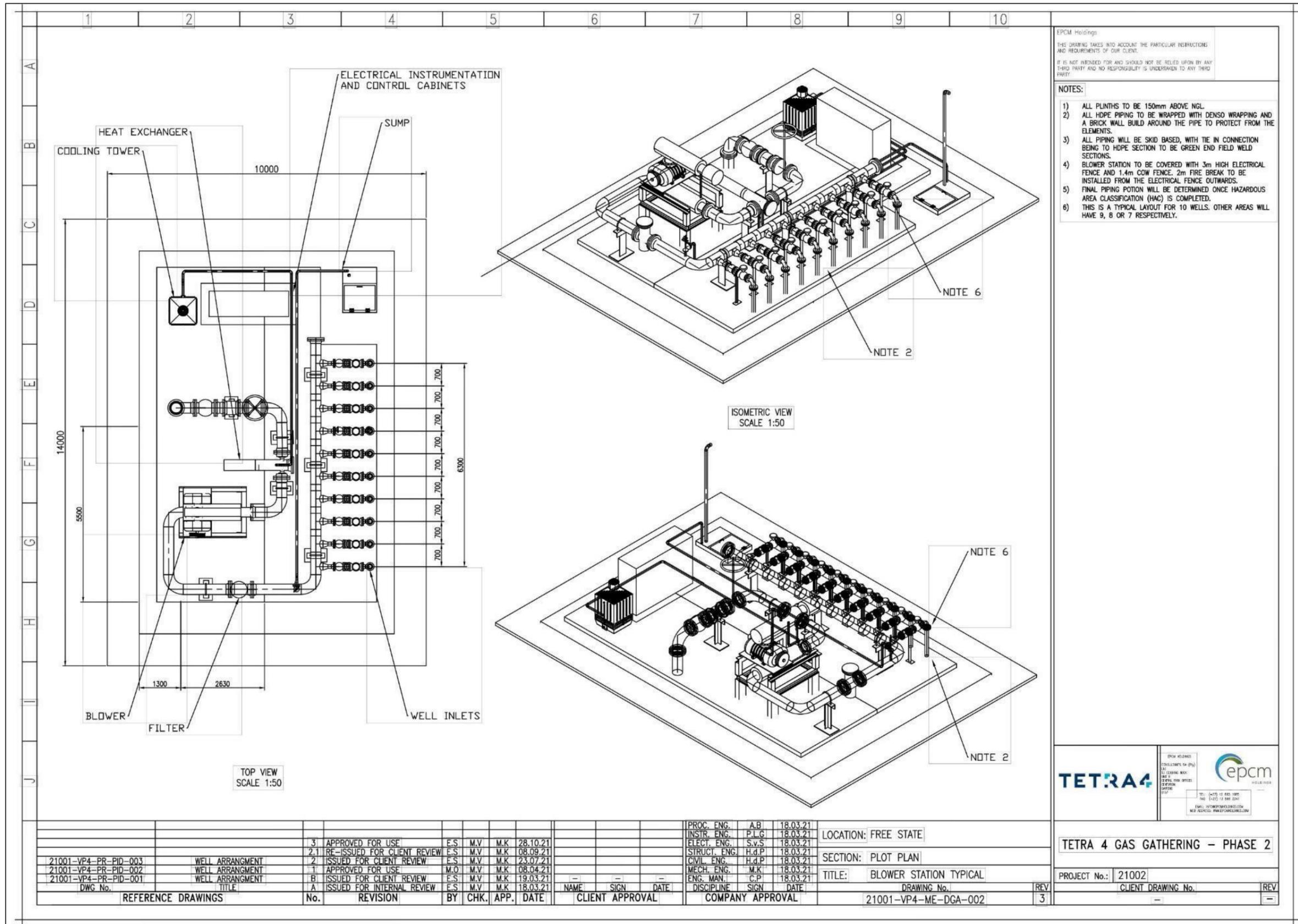
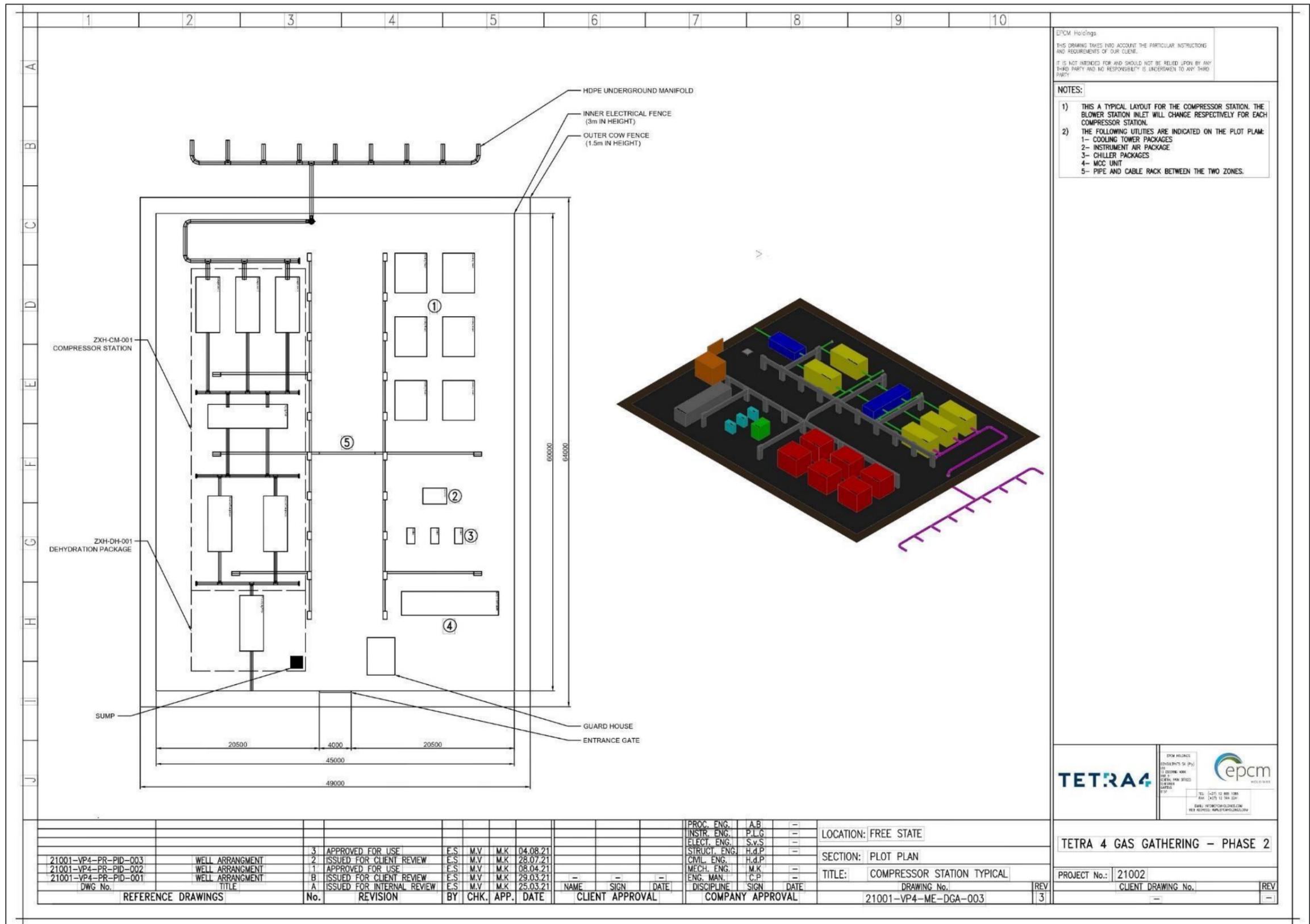


Figure 16: Typical booster station layout



EPCM Holdings
 THIS DRAWING TAKES INTO ACCOUNT THE PARTICULAR INSTRUCTIONS AND REQUIREMENTS OF OUR CLIENT.
 IT IS NOT INTENDED FOR AND SHOULD NOT BE RELIED UPON BY ANY THIRD PARTY AND NO RESPONSIBILITY IS UNDERTAKEN TO ANY THIRD PARTY.

- NOTES:**
- 1) THIS A TYPICAL LAYOUT FOR THE COMPRESSOR STATION. THE BLOWER STATION INLET WILL CHANGE RESPECTIVELY FOR EACH COMPRESSOR STATION.
 - 2) THE FOLLOWING UTILITIES ARE INDICATED ON THE PLOT PLAN:
 1- COOLING TOWER PACKAGES
 2- INSTRUMENT AIR PACKAGE
 3- CHILLER PACKAGES
 4- MCC UNIT
 5- PIPE AND CABLE RACK BETWEEN THE TWO ZONES.

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LOCATION:	FREE STATE
SECTION:	PLOT PLAN
TITLE:	COMPRESSOR STATION TYPICAL
PROJECT No.:	21002
CLIENT DRAWING No.:	
DRAWING No.:	21001-VP4-ME-DGA-003
REV	3

REF. DWG. No.	TITLE	No.	REVISION	BY	CHK.	APP.	DATE	CLIENT APPROVAL	COMPANY APPROVAL
21001-VP4-PR-PID-003	WELL ARRANGEMENT	3	APPROVED FOR USE	E.S.	M.V.	M.K.	04.08.21		
21001-VP4-PR-PID-002	WELL ARRANGEMENT	2	ISSUED FOR CLIENT REVIEW	E.S.	M.V.	M.K.	28.07.21		
21001-VP4-PR-PID-001	WELL ARRANGEMENT	1	APPROVED FOR USE	E.S.	M.V.	M.K.	08.04.21		
		B	ISSUED FOR CLIENT REVIEW	E.S.	M.V.	M.K.	29.03.21		
		A	ISSUED FOR INTERNAL REVIEW	E.S.	M.V.	M.K.	25.03.21		

DISCIPLINE	SIGN	DATE
PROC. ENG.	A.B.	-
INSTR. ENG.	P.L.G.	-
ELECT. ENG.	S.v.S.	-
STRUCT. ENG.	H.d.P.	-
CIVIL ENG.	H.d.P.	-
MECH. ENG.	M.K.	-
ENG. MAN.	C.P.	-

Figure 17: 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 20 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 14) 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 m³ of wastewater (i.e. pre-treated) and a maximum of 36 m³ of treated water at any one time. The SWTW can treat a maximum of 30 m³ on any given day as per design flow with normal operation only 20 m³ per day. A schematic representation of the SWTW is shown in Figure 18.

The main RO-WTW will have a 5 m³ feed tank which will be supplied with effluent from the evaporation pond (1005 m³). The brine/concentrate tank will be 100 litres while the product tank will be 5m³. Recovered effluent/service water will be pumped from the product tank to the Service/Fire water storage tank (clean water capacity 1407 m³). 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 19.

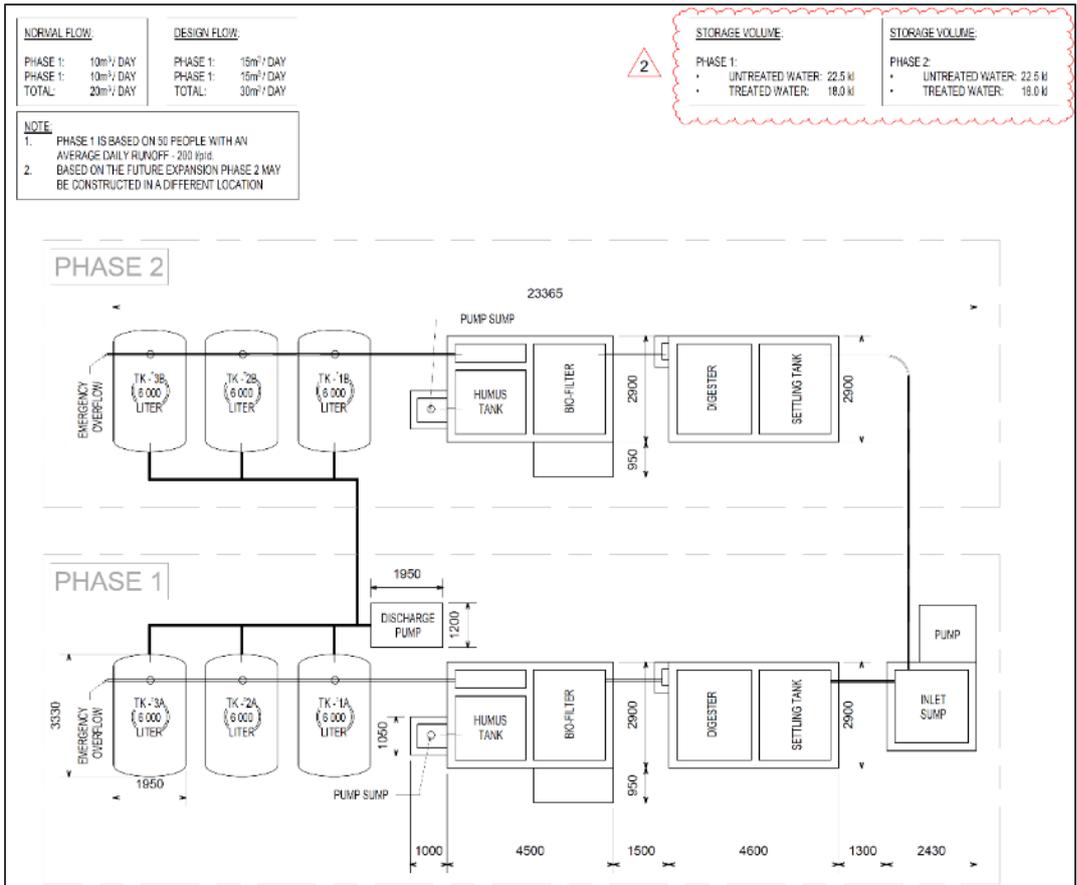


Figure 18: Typical schematic of the Cluster 2 sewage water treatment works.

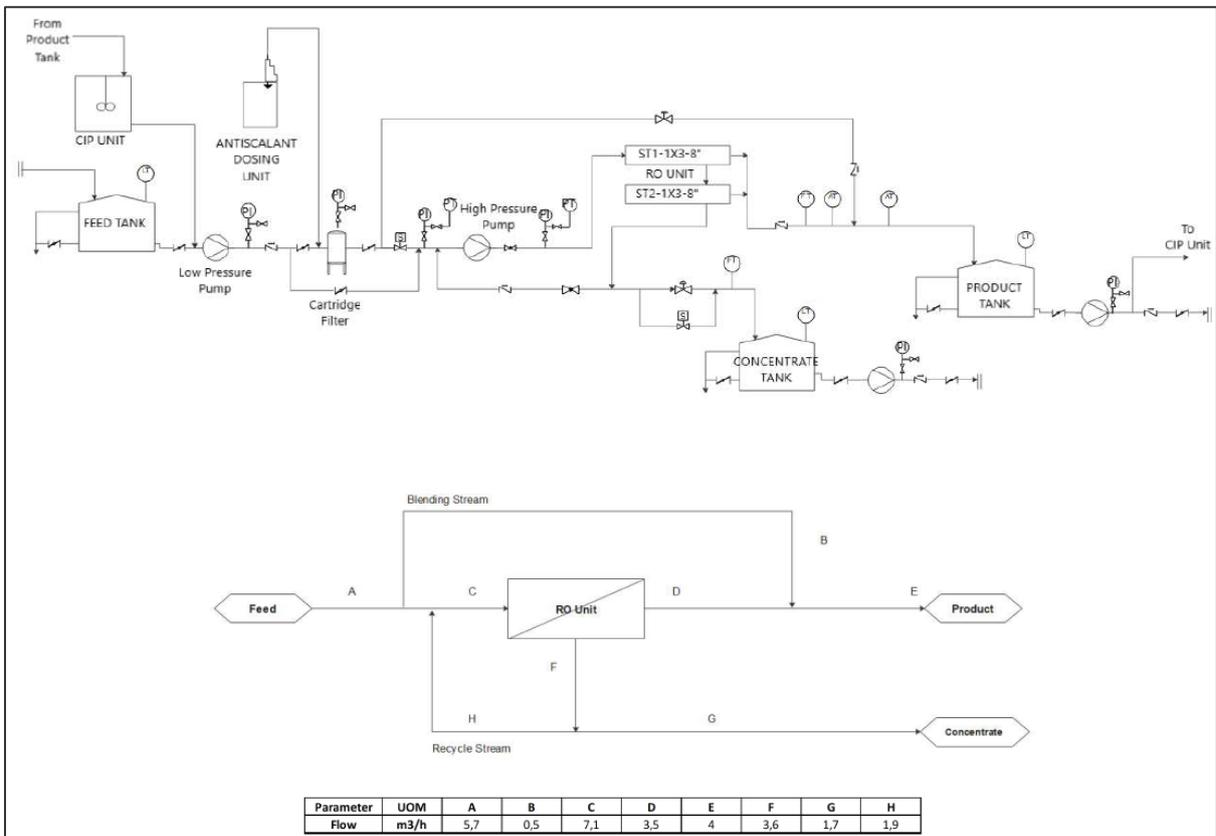


Figure 19: Typical schematic of the Cluster 2 reverse osmosis treatment works.

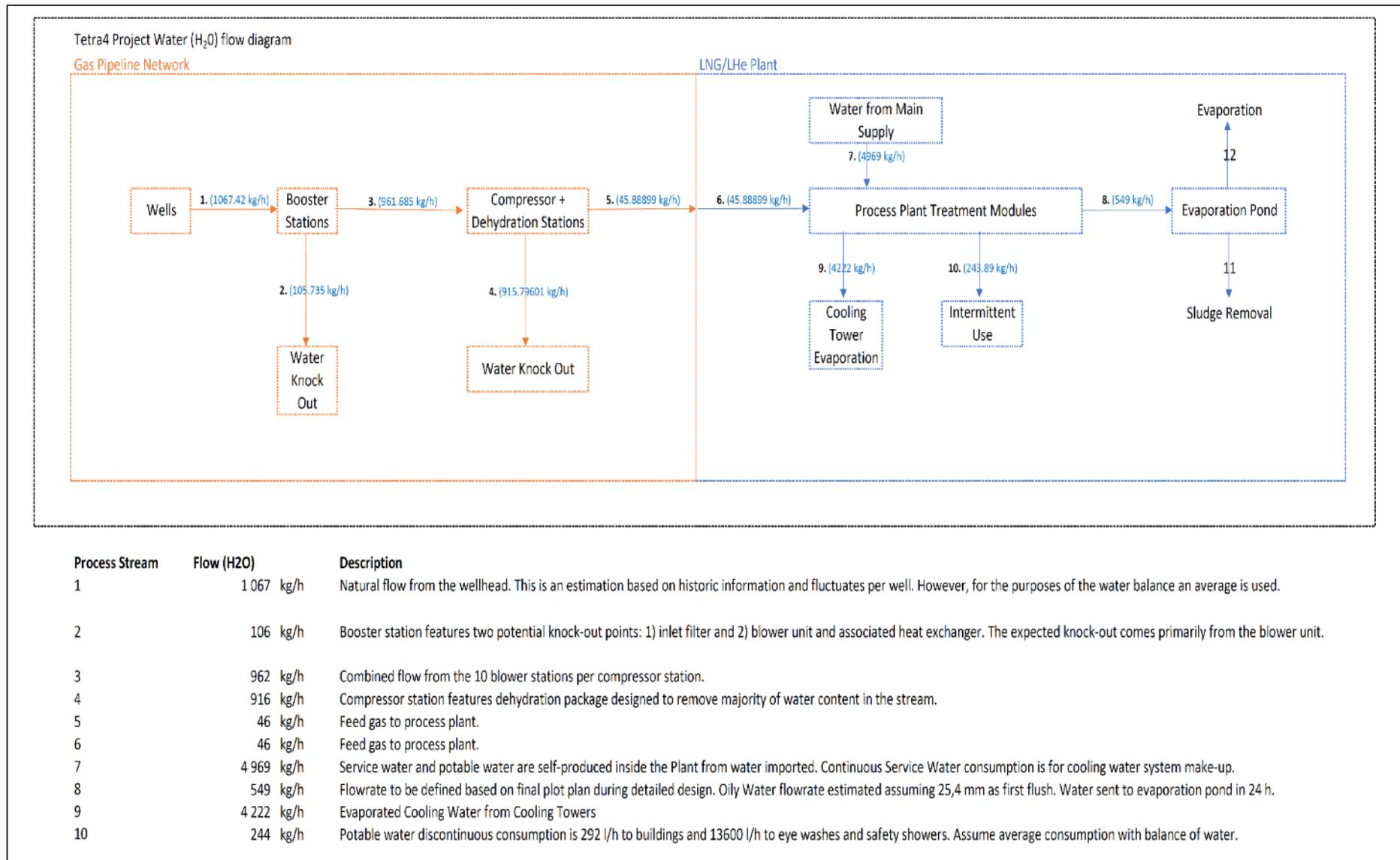


Figure 20: Water balance showing the potential amount of waste water produced during gas production and processing.



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).



4.3.3 PRODUCTION RIGHT EXTENSION ACTIVITIES

Tetra4 intends to consolidate the Exploration Rights (ER32 and ER94, including the activities such as drilling of up to 18 wells), within the Production Right (Figure 2). Tetra4 has appointed Environmental Impact Management Services (Pty) Ltd (EIMS) to prepare and submit an application for Environmental Authorisation (in accordance with the National Environmental Management Act- NEMA) to support Tetra4's application to extend their existing Production Right area in accordance with Section 102 of the Minerals and Petroleum Resources Development Act (MPRDA). The applications aim to incorporate the existing exploration rights (ER32 and ER94) into the existing Production Right.

The consolidation of the two ERs in the PR will result in a total area of 205 733 Ha which includes both the current PR area (187 000 Ha) and the two ER areas, ER32 and ER94 (collectively 18 733 Ha). This extension also includes exploration activities. Currently there is no plan to commence with the exploration of the 18 boreholes (Figure 2) within 12 months of the approval of the EA and EMPr for the Production Right Extension. Once exploration activities commence and the 18 exploration boreholes identified in the Production Right extension project are determined to be successful, an EIA must be conducted to apply for an EA and EMPr amendment to include conversion of the exploration wells into production wells.

Exploration wells will be drilled and, if successful, converted into production wells. A separate application for EA will be needed to connect production well, via gas gathering pipelines to the production network. Eighteen (18) borehole locations have been proposed in the two exploration right areas. The drilling of exploration boreholes is a temporary and short-duration activity and the equipment to be used during drilling activities includes the use of a truck, trailer or skid-mounted drill rig (Figure 21) to drill to varying depths (~380 m to ~880 m) along known fault lines in order to strike the gas reserve, as well as other equipment such as an excavator, dozer, grader, water cart, light motor vehicle for transport of personnel and chemical toilets

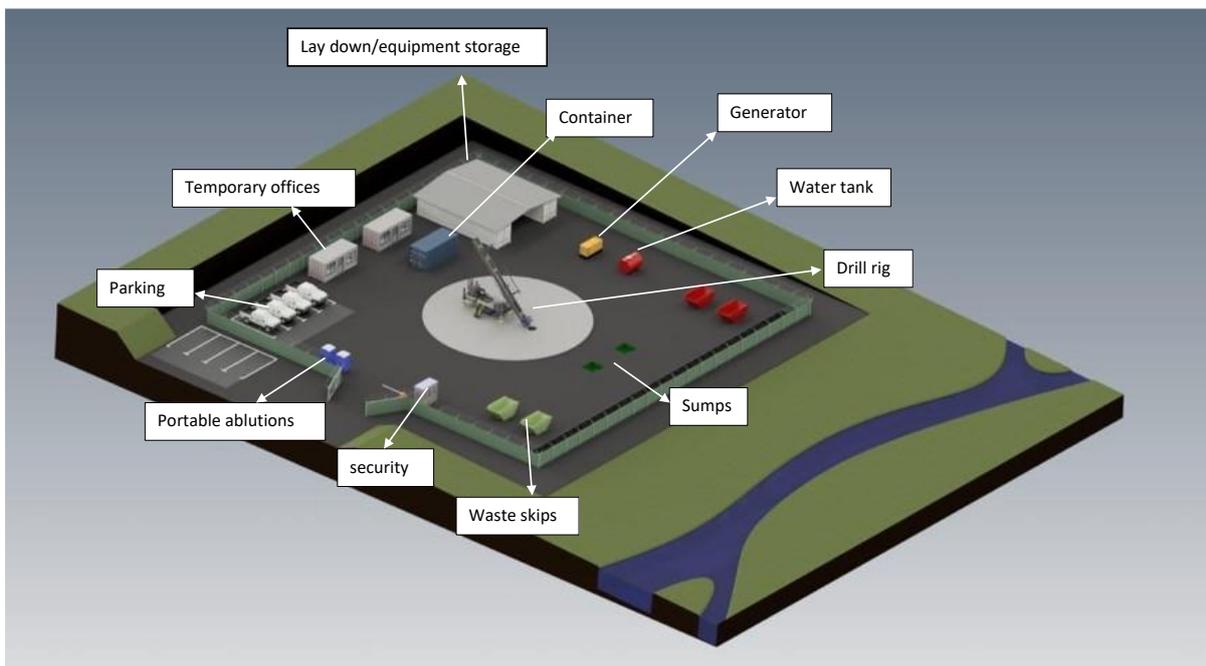


Figure 21: Drill site layout⁶.

Drill rigs typically require temporary clearance or disturbance of an area of 50 m x 50 m to set up the rig and begin drilling activities which take approximately 3 to 4 months per well. Immediately after the drilling, testing of the gas volumes and compositions is undertaken which takes approximately 7 to 14 days. All exploration

⁶ The container and temporary offices are allocated to one drill site and shared by all drill sites, minimizing the overall footprint of disturbance, therefore the site layout provided is the maximum footprint of disturbance for one drill site.



boreholes must be drilled and cased in accordance with applicable international standards and best practice guidelines and will be sealed with a combination of steel casing and grouting (cement) to ensure there is no mixing of gas or deep saline water with the shallower freshwater aquifers (groundwater).

Exploration boreholes that are successful (gas producing) will be turned into production wells, following a separate application for EA for the gas gathering pipelines and associated infrastructure to the production network. Unsuccessful exploration wells will be safely decommissioned and rehabilitated (refer to Appendix 4).



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 EMP. 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	Sikhumbuzo Mahlangu
Tel No:	+27 11 789 7170
Fax No:	+27 86 571 9047
Professional Registrations:	<ul style="list-style-type: none">• Professional Natural Scientist with the South African Council for Natural Scientific Professions - SACNASP (400429/13).• Registered EAP with the Environmental Assessment Practitioners Association of South Africa - EAPASA (2022/4554).

Sikhumbuzo holds a BSc. Master's degree in Zoology (Aquatic Health) from the University of Johannesburg. He is an aquatic and research scientist with over 2 years' experience, and over 13 years' experience as an environmental scientist. He has completed certificate courses in Environmental Management Systems (ISO 14001: 2015) and Environmental Law with the North-West University. He has also completed an advanced course on Tools for Wetland Assessments as well as Aquifer Hydraulics and Groundwater Monitoring. His expertise lies mainly in environmental impact assessments, environmental management, auditing, monitoring, surface and ground water quality assessments, biomonitoring, wetland assessments, reporting and project management.

Sikhumbuzo has played a vital role in providing advice on general environmental management issues on site to construction projects such as Transnet New Multi Product Pipeline (NMPP), Mokolo Crocodile Water Augmentation Project Phase 1 (MCWAP1), Enel Green Power Karusa and Soetwater Wind Farms and Eskom Kusile Power Station Project among others. He has also been involved on numerous projects in the energy, mining and infrastructure development sectors as well as management and preparation of documentation required for Integrated Water Use Licence Applications (IWULA). He has also played a role in assisting and advising various contractors and developers on the practical implementation of Water Use Licences, Environmental Management Plans, conditions of Environmental Authorisations and the South African Environmental Legislation in general. 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, 2, and the Production Right Extension 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 22) 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.

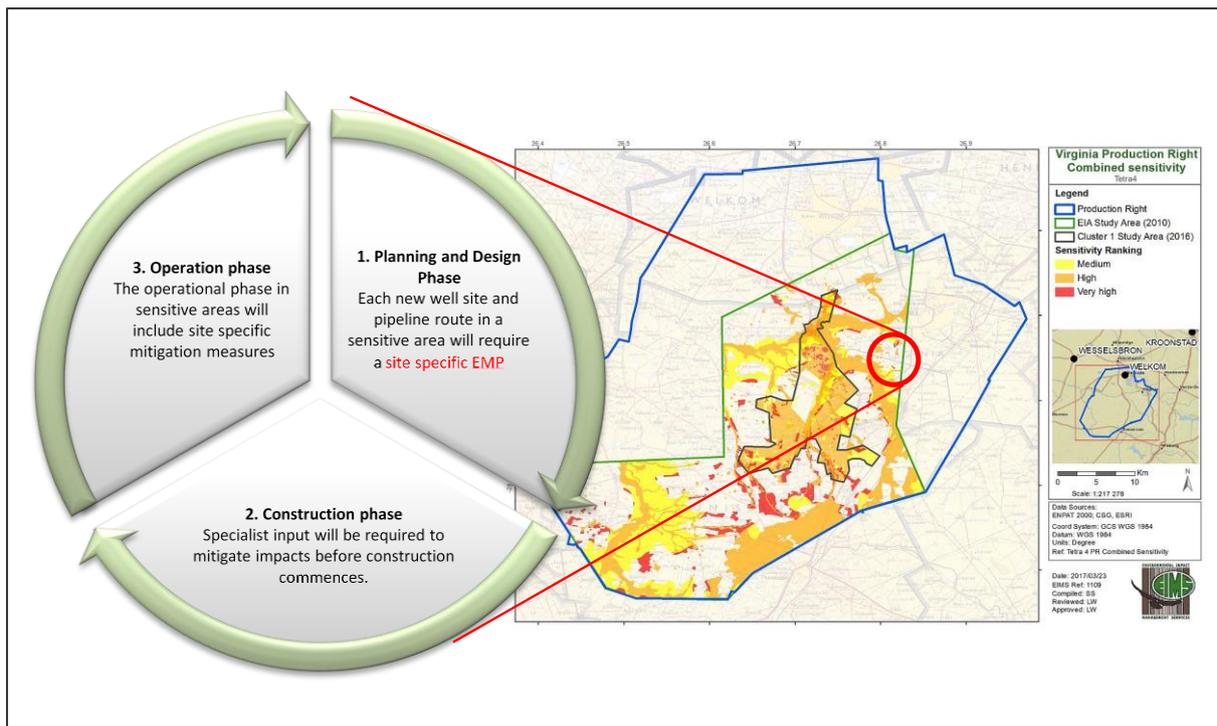


Figure 22: Sensitivity Implementation Cycle for the Production Application

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 EMP, 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 EMP 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 EMP 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 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 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 23. 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 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 Target	Indicator/ Roles and Responsibilities	Frequency	Reporting Mechanism
Planning	Drilling of exploration/ production boreholes	<ul style="list-style-type: none"> Hydrocensus/ baseline sampling to be conducted. <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>Monitoring parameters:</u> Full monitoring set included in Table 4 and in all hydrocensus boreholes listed in Table 6. <u>Physical parameters:</u> Groundwater level. 	<ul style="list-style-type: none"> Records of baseline water quality results 	Tetra4	Once-off prior to construction	Hydrocensus/ baseline water quality report
Construction	Post-construction of production wells and	<ul style="list-style-type: none"> Pressure testing on surface for well casing/cementation or integrity failure post drilling and prior to connection into 	<ul style="list-style-type: none"> Sustained well integrity. 	Tetra4.	As per well design report	Pressure test logs



Phase	Activity	Functional Requirements	Performance Target	Indicator/ Roles and Responsibilities	Frequency	Reporting Mechanism
	prior to production	production well - according to Tetra4 Internal Procedures.				
Production	Production Boreholes (Routine)	<ul style="list-style-type: none"> • <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 (hydrocensus borehole information) which are within the zone of influence of each production well. • <u>Monitoring parameters</u>: Parameters included in Table 4. <u>Physical parameters</u>: Groundwater level. • Internal Tetra4 Procedures 	<ul style="list-style-type: none"> • 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 Target	Indicator/ Roles and Responsibilities	Frequency	Reporting Mechanism
Production	Leaks identified at production boreholes	<ul style="list-style-type: none"> • <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>: All hydrocensus boreholes (equipped and unequipped) within the zone of influence of the affected production well. • <u>Monitoring parameters</u>: Parameters included in Table 4. <p><u>Physical parameters</u>: Groundwater level.</p>	<ul style="list-style-type: none"> • 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 Target	Indicator/ Roles and Responsibilities	Frequency	Reporting Mechanism
Closure, post-closure and rehabilitation	Production/ exploration boreholes post-closure	<ul style="list-style-type: none"> 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 6 which are within the zone of influence of each production well after that well's closure. Monitoring parameters: Parameters included in Table 5 (routine surface and groundwater monitoring parameters). 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.	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.

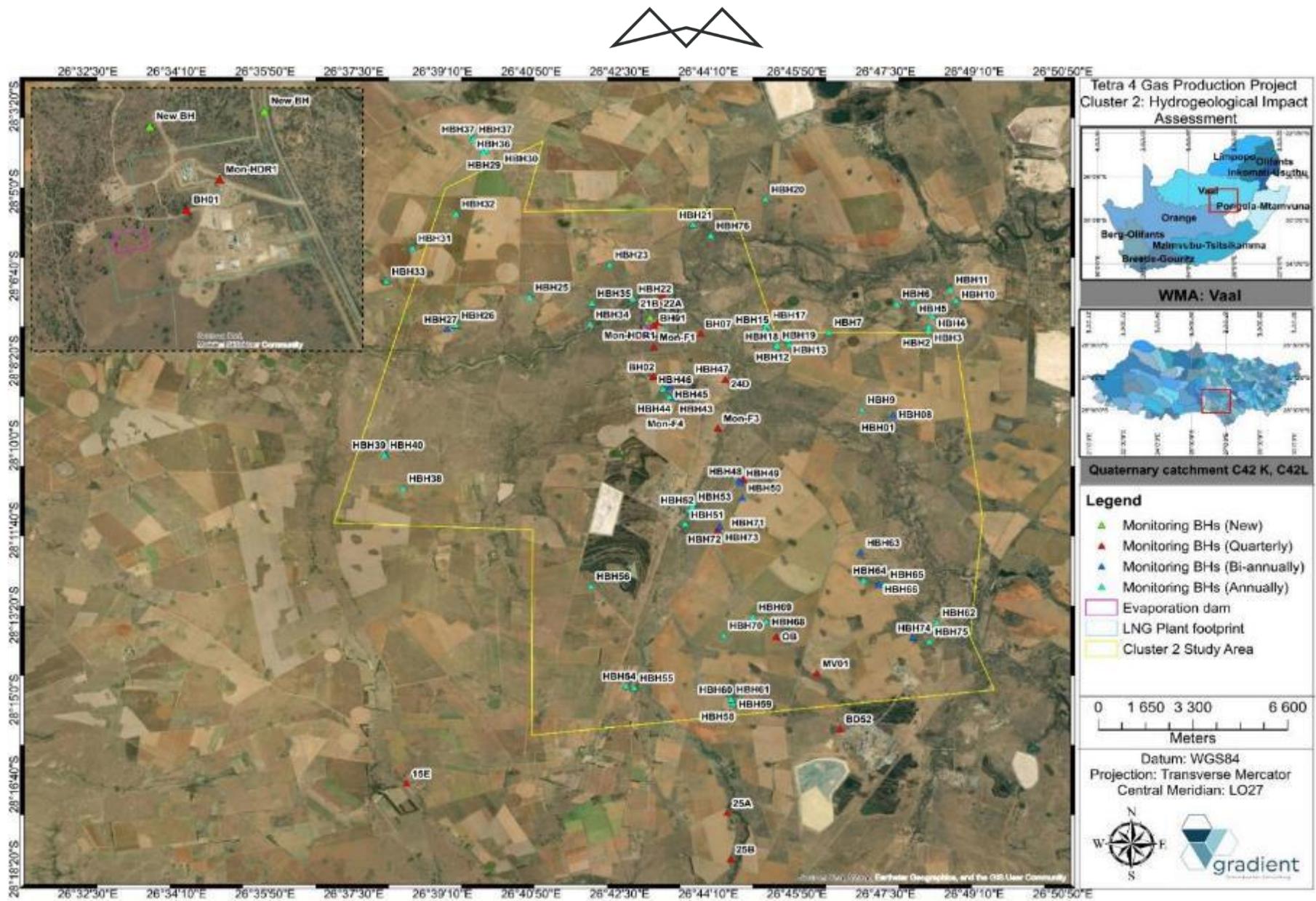


Figure 23: Updated integrated groundwater monitoring network.

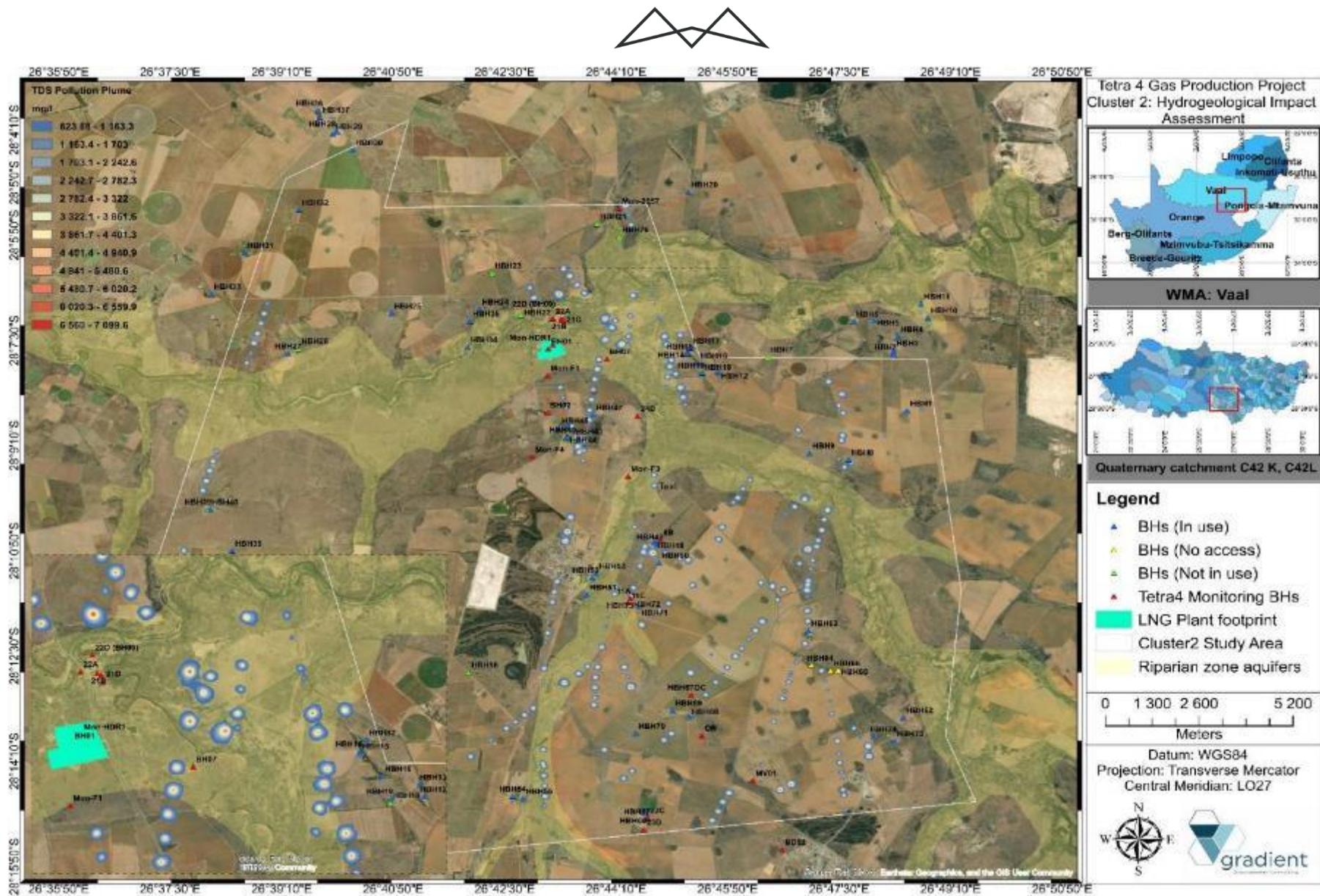


Figure 24: TDS pollution plume migration of contaminants originating from the deeper, fractured aquifer migrating through the intergranular aquifer (Operational phase).

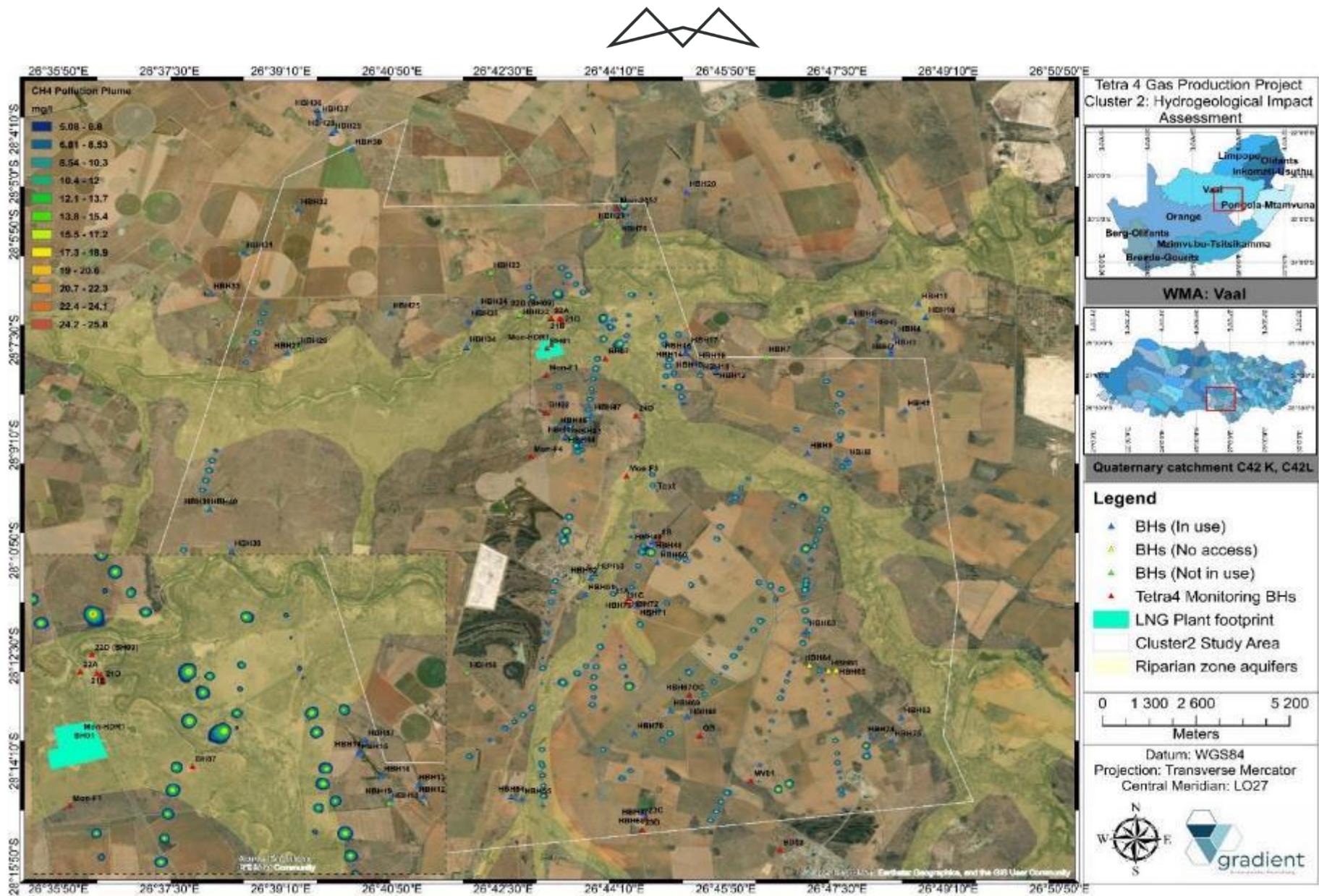


Figure 25: CH₄ pollution plume migration of contaminants originating from the deeper, fractured aquifer migrating through the intergranular aquifer (Operational phase).



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	<ul style="list-style-type: none"> • <u>Standards</u>: Aquatic Water Quality Standards as published in the Department of Environmental Affairs (DEA) (2014): Framework for the Management of Contaminated Land. • <u>Locations</u>: Within the zone of influence of compressors, plant and production wells for the Doring River, Sand River, Bosluisspruit. • <u>Parameters</u>: Full monitoring set in Table 4. 	<ul style="list-style-type: none"> • <u>Target</u>: None-establish baseline. 	Tetra4.	Prior to construction-preferably dry and wet season samples.	Baseline Water Quality Report.
Construction	Pipelines	<ul style="list-style-type: none"> • <u>Standards</u>: Aquatic Water Quality Standards as published in the Department of Environmental Affairs (DEA) (2014): Framework for the Management of Contaminated Land. • <u>Locations</u>: Upstream and downstream of active construction areas in pipeline crossings. • <u>Parameters</u>: Temp (C), Baro (mb), pH pHmV, ORP (REDOX), DO (% Sat), EC (uS/cm @25C), RES 	<ul style="list-style-type: none"> • <u>Target</u>: <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	<ul style="list-style-type: none"> • <u>Standards</u>: DWS Discharge Limits • <u>Locations</u>: Dirty water containment features; localised dirty water collections and temporary storage (as applicable). • <u>Parameters</u>: DWS Discharge parameters. 	<ul style="list-style-type: none"> • Compliance with DWS Discharge Limits. 	Tetra4.	Ad hoc- prior to planned discharge.	Monthly ECO Report.
Production	Plant, stations and production wells	<ul style="list-style-type: none"> • <u>Standards</u>: Aquatic Water Quality Standards as published in the Department of Environmental Affairs (DEA) (2014): Framework for the Management of Contaminated Land. • <u>Locations</u>: Within the zone of influence of compressors, plant and production wells for the Doring River, Sand River, Bosluisspruit. • <u>Parameters</u>: Full monitoring set in Table 4. 	<ul style="list-style-type: none"> • <u>Target</u>: 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	<ul style="list-style-type: none"> • <u>Standards</u>: DWS Discharge Limits • <u>Locations</u>: Dirty water containment features; localised dirty water collections and temporary storage (as applicable). • <u>Parameters</u>: DWS Discharge parameters. 	<ul style="list-style-type: none"> • Compliance with DWS Discharge Limits. 	Tetra4.	Ad hoc- prior to planned discharge.	Monthly ECO Report.
Closure, post-closure and rehabilitation	Plant, stations, production wells	<ul style="list-style-type: none"> • <u>Standards</u>: Aquatic Water Quality Standards as published in the Department of Environmental Affairs (DEA) (2014): Framework for the Management of Contaminated Land. • <u>Locations</u>: Within the zone of influence of compressors, plant and production wells for the Doring River, Sand River, Bosluisspruit. • <u>Parameters</u>: Full monitoring set in Table 4. 	<ul style="list-style-type: none"> • <u>Target</u>: 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 CH₄, SO₂, NO₂, PM_{2.5} 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 Target	Indicator/	Roles and Responsibilities	Frequency	Reporting Mechanism
Construction	Plant and compressor stations (Dust).	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Alignment with baseline dust fallout. Dust Fallout: <ul style="list-style-type: none"> <600mg/m²/day. <400 mg/m²/day (where agricultural activities take place). National Dust Control Regulations. No dust complaints from landowners. 		Tetra4.	<u>Monthly total dust fallout sampling</u> 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 Target	Indicator/	Roles and Responsibilities	Frequency	Reporting Mechanism
Production	Booster and compressor stations Combined helium and LNG plant	<ul style="list-style-type: none"> <u>Standards:</u> Passive diffusive sampling, National Ambient Air Quality Standards (GN1210/2009). <u>Locations:</u> <ul style="list-style-type: none"> Booster and compressor stations and Combined Helium and LNG Plant. <u>Parameters:</u> <ul style="list-style-type: none"> Combined Helium and LNG Plant: PM10, PM2.5, SO₂ and NO₂. GHG: Booster and compressor stations and plant. 	<ul style="list-style-type: none"> Comply with emissions limits or industry guidelines. Limit fugitive/unintended GHG emissions (incl. Methane). PM10, PM2.5, SO₂, and NO₂ GLCs should comply with their various NAAQS. VOCs GLCs should comply with the TCEQ guideline. 		Tetra4.	<ul style="list-style-type: none"> <u>PM10, PM2.5, SO₂, VOCs, and NO₂ GLCs:</u> Annually. <u>GHG:</u> Monthly inspections of booster and compressor stations and plant. 	Annual / Monthly monitoring report.



Phase	Activity	Functional Requirements	Performance Target	Indicator/	Roles and Responsibilities	Frequency	Reporting Mechanism
Production	Production wells	<ul style="list-style-type: none"> <u>Standards:</u> Passive diffusive sampling, National Ambient Air Quality Standards (GN1210/2009). <u>Locations:</u> Production well heads. <u>Parameters:</u> GHG and odour emissions (leakages). 	<ul style="list-style-type: none"> Comply with emissions limits or industry guidelines. Limit fugitive/unintended GHG emissions (incl. Methane). 		Tetra4.	<ul style="list-style-type: none"> <u>GHG:</u> Annually. 	Annual monitoring report.
Closure, post-closure and rehabilitation	Post Closure Phase	<ul style="list-style-type: none"> <u>Standards:</u> Passive diffusive sampling, National Ambient Air Quality Standards (GN1210/2009). <u>Locations:</u> At all closed production wells. <u>Parameters:</u> Methane 	<ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> <u>Standards:</u> 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). <u>Locations:</u> All production areas and adjacent area (~5m). <u>Parameters:</u> Plant community composition. Alien and invasive plant abundance (numbers, density, cover, frequency); Condition (measures of vigour, performance, 	<ul style="list-style-type: none"> <u>Target:</u> All alien invasive plant species effectively controlled. <u>Indicators:</u> 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.	<p>Quarterly in EO Reports.</p> <p>Annual monitoring report (summary of quarterly surveys).</p> <p>Vegetation clearing records.</p>



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.	<ul style="list-style-type: none"> • <u>Standards</u>: None • <u>Locations</u>: All impacted watercourses. • <u>Parameters</u>: Watercourse monitoring datasheet (refer to wetland and aquatic specialist study). 	<ul style="list-style-type: none"> • <u>Target</u>: no construction related erosion and /or watercourse degradation. 	Tetra4.	Bi-monthly in vicinity to watercourses.	Annual monitoring report.
Production	Production Surface Activities.	<ul style="list-style-type: none"> • <u>Standards</u>: 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). 	<ul style="list-style-type: none"> • <u>Target</u>: All alien invasive plant species effectively controlled. • <u>Indicators</u>: 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
		<ul style="list-style-type: none"> • <u>Locations</u>: All production areas and adjacent area (~5m). • <u>Parameters</u>: 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).	<ul style="list-style-type: none"> • <u>Standards</u>: None • <u>Locations</u>: All impacted watercourses. • <u>Parameters</u>: Watercourse monitoring datasheet (refer to wetland and aquatic specialist study). 	<ul style="list-style-type: none"> • <u>Target</u>: 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).	<ul style="list-style-type: none"> <u>Standards:</u> 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). <u>Locations:</u> All production areas and adjacent area (~5m). <u>Parameters:</u> Plant community composition. Alien and invasive plant abundance (numbers, density, cover, frequency); Condition (measures of vigour, performance, fecundity); Structure (size or 	<ul style="list-style-type: none"> <u>Target:</u> 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. <u>Indicators:</u> 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	<ul style="list-style-type: none"> ▪ The graves should be demarcated with a 50-meter buffer and should be avoided and left <i>in situ</i>. ▪ 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.	<p>need to be approved by SAHRA BGG.</p> <ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> ▪ 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
		<p>the site should be demarcated with a 50-meter no-go buffer zone and the grave should be avoided.</p> <ul style="list-style-type: none"> 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,	<ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> ▪ 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 IIC.						
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	<ul style="list-style-type: none"> 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 Target	Indicator/ Roles and Responsibilities	Frequency	Reporting Mechanism
Construction	<ul style="list-style-type: none"> <u>Standards</u>: National Noise Control Regulations (GNR 154 of 1992) and SANS 10103:2008. <u>Locations</u>: No pre-identified and/or routine site identified during EIA. Site locations to be identified in response to valid noise complaints. <u>Parameters</u>: 10-minute bins defining the 10-minute descriptors such as LAeq,l (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. 	<ul style="list-style-type: none"> <u>Target</u>: Compliance with National Noise Control Regulations (GNR 154 of 1992) and SANS 10103:2008. 	Tetra4.	Ad-hoc.	Annual Monitoring report.
Production	<ul style="list-style-type: none"> <u>Standards</u>: National Noise Control Regulations (GNR 154 of 1992) and SANS 10103:2008. <u>Locations</u>: No pre-identified and/or routine site identified during EIA. Site locations to be identified in response to valid noise complaints. 	<ul style="list-style-type: none"> <u>Target</u>: Compliance with National Noise Control Regulations (GNR 154 of 1992) and SANS 10103:2008. 	Tetra4.	Ad-hoc.	Annual Monitoring report.



	<ul style="list-style-type: none"> • <u>Parameters</u>: 10-minute bins defining the 10-minute descriptors such as LAeq,l (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	<ul style="list-style-type: none"> • <u>Standards</u>: National Noise Control Regulations (GNR 154 of 1992) and SANS 10103:2008. • <u>Locations</u>: No pre-identified and/or routine site identified during EIA. Site locations to be identified in response to valid noise complaints. • <u>Parameters</u>: 10-minute bins defining the 10-minute descriptors such as LAeq,l (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. 	<ul style="list-style-type: none"> • <u>Target</u>: 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 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.

Note: All references to "construction" in the EIA Report and EMPr shall be deemed to include commencement of a listed activity including all exploration related activities. The terms "construction" and "exploration" should be deemed to be synonymous in so far as they relate to temporary disturbance of the receiving environment.



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).	<i>(Variable responsibilities)</i>	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 these falls within the building restriction area of the National Road.						
<p>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</p>	Tetra4 CLO	Public consultation	During planning and design phase. Prior to construction.	Tetra4 EO	Ad hoc	<p>Minutes of meetings</p> <p>Attendance registers</p> <p>EO Reports</p>



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
<p>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.</p>						
<p>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.</p>	Tetra4 EO	Heritage screening	During planning and design phase	Tetra4 EO	Ad hoc	EO Reports
<p>7. Locate pipelines and trunkline alignments outside of buffered watercourses (sensitive watercourse habitat) as far as possible.</p>	Design / Planning Manager	Design and planning specific compliance	During planning and design phase	Tetra4 EO	Once off	EO Reports
<p>8. Watercourse buffers within 10m from construction footprints should be demarcated on site for the entire</p>	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
<p>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):</p> <p>a. Operation (daytime):</p> <p>i. Booster station: 50 m</p> <p>ii. Plant: 170 m</p> <p>iii. Compressors: 80 m</p> <p>b. Operation (night-time):</p> <p>i. Booster station: 150 m</p> <p>ii. Plant: 580 m</p> <p>iii. Compressors: 150 m</p>	Tetra4 CLO	Landowner negotiations	Prior to construction	Contractor EO and/or Tetra4 EO	Ad hoc	Written landowner agreements
<p>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.</p>	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
<p>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.</p>	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
<p>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.</p>	Tetra4 Project Manager	<p>Landowner consultations</p> <p>Compilation of asset register</p>	Prior to construction	<p>Contractor EO and/or Tetra4 EO</p>	Ad hoc	EO Reports
<p>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.</p>	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	Prepare construction	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
		method statement		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	Identify permanent access tracks/roads	Prior to construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
27. The power source designs and location for the booster stations (e.g. powerlines, solar PV, etc) must be discussed and agreed with the landowners prior to finalisation of the booster station locations to ensure that no adverse impacts occur on ongoing agricultural activities (e.g. aerial crop dusting, restriction of movement of ground-based farming implements, etc.).	Tetra4	Identify power source to booster stations and discuss and agree with landowner	Prior to construction	Tetra4	Monthly	EO Reports
28. Servitudes should only be registered for the life of the operations or as long as the well and pipeline in use are productive. At the end of the life of operations, or when a well or pipeline is no longer productive od used, servitudes must be de-registered at the cost of Tetra4. Servitudes cannot be seen as access routes unless it has been specified as such and agreed on by both parties.	Tetra4	Servitude registration	Prior to construction	Tetra4	Monthly	EO Reports
29. Temporary access and land arrangements must be made until there are more certainty on exactly where the wells will be. Servitudes should only be registered for productive wells.	Tetra4	Landowner agreements	Prior to construction	Tetra4	Monthly	EO Reports



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
<p>30. Tetra4 must provide detailed written information to the landowners to assist them with making informed decisions. The information must include:</p> <ul style="list-style-type: none"> • Depth and route of the pipeline • Timeframe associated with the drilling and installation process - when will Cluster 2 start and end. • A3 or A2 maps of the entire project area for each affected landowner • Information about well heads and boreholes: <ul style="list-style-type: none"> ○ How long does it take to drill a borehole? ○ Can more than one borehole be drilled with the same drill point? ○ What infrastructure are needed around the well heads and sketches of this infrastructure ○ Are all the drill points necessary? ○ What will happen if there is a change in the infrastructure presented to the landowners? ○ Can more than one wellhead be operated from one underground manhole? ○ Will the boreholes be left open for a period of time after the holes were drilled? 	Tetra4	Landowner agreements	Prior to construction	Tetra4	Monthly	EO Reports



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
<ul style="list-style-type: none"> ○ How are the wellheads connected to each other? ○ What happens if no gas is found at a borehole? ○ Will unproductive boreholes be investigated again later? ● Positions of blowers, booster stations and compressors, if any. Sketches of all associated infrastructure. ● Will there be overhead power lines or electric cables? Will cables be buried? ● What maintenance will be required, and how often will teams need access for maintenance? ● Where will the condensation wells be? ● How will condensation water be removed? The contract states it will be no more than once a week, but is it once a week per well, or once a week that the vehicle gets access? ● Who will be responsible for damage to Tetra4 property? 						
31. Any future expansion plans must be communicated to any landowner that will be influenced by the expansion.	Tetra4	Landowner agreements	Prior to construction	Tetra4	Monthly	EO Reports
32. The relevant specialists will provide scientific mitigation measures for this aspect. Practical, visible solutions such as putting shade nets against fences close to dwellings during	Tetra4	Landowner agreements	Prior to construction	Tetra4	Monthly	EO Reports



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
the construction phase should be investigated. No drilling or construction must take place on weekends or between sunset and sunrise.						
33. It may be unavoidable to change travel patterns. It is important to inform the affected stakeholders about the possibility of this impact as soon as possible. It will allow them time to get used to the idea and plan their activities accordingly. It is also important that locally affected parties give input in potential mitigation measures. Before construction and drilling commences Tetra4 must meet individually with each landowner to discuss their movement patterns and needs. Tetra4 must provide all the affected landowners with a construction and drilling schedule to ensure that they know when construction will take place on their properties. It is recommended that construction and drilling be done outside the peak planting and harvesting seasons. Any changes to the construction and drilling 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. Industrial vehicles should not travel during peak traffic times. 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.	Tetra4	Landowner agreements	Prior to construction	Tetra4	Monthly	EO Reports



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
<p>34. Before the project commences Tetra4 should compile an asset and infrastructure baseline of any landowner infrastructure such as fences, pipes, electricity lines, roads and troughs that may be affected by the project. 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. Tetra4 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 Tetra4's cost. Tetra4 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.</p>	Tetra4	Asset and infrastructure baseline	Prior to construction	Tetra4	Monthly	EO Reports
<p>35. 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. Toolbox talks must be designed to include social and environmental aspects. A fining system will be established to address transgressions affected by landowners. Specific details regarding the imposition of fines, including the types of transgressions subject to fines, will be communicated to all affected landowners and incorporated into the property access procedure. It is important to note that the fines may vary depending on the individual landowner and the nature of the proposed activity.</p>	Tetra4	Contractors code of conduct	Prior to construction	Tetra4	Monthly	EO Reports



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
36. A system to arrange access to properties must be devised and formalised. The landowners must agree to the system. Access must be arranged at least 24 hours prior, except in emergencies, when the landowners should also be informed immediately. Landowners have the right to refuse people access to their properties if it was not arranged in advance. If routine access is required, the landowners must be provided with a roster indicating dates and approximate times that access will be required. 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 a clause spelling out their liability should be included in their contracts.	Tetra4	Access arrangements to be formalised	Prior to construction	Tetra4	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).	<i>(Variable responsibilities)</i>	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	Design Planning Manager /	River crossing design methodology	Ad hoc	Contractor EO and/or Tetra4 EO	Ad hoc	River crossing



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
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.	Pipeline contractor					design methodology EO Reports
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	Monthly	EO Reports



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
				Tetra4 EO		
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 must be appointed to undertake the archaeological field surveys as well as the compilation of a heritage impact assessment report, which must be implemented.	Heritage specialist	Field survey	Ad hoc	Tetra4 EO	Ad hoc	EO Reports
9. Ensure that as much of the infrastructure as possible is sited away from agricultural lands. Where work in agricultural land is unavoidable this must be compensated accordingly, completed quickly and infrastructure placed underground as far as possible to allow continued land use post construction.	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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
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 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
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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
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 from 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 Tetra4 EO	Monthly	EO Reports
23. Retain vegetation where 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	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
		areas where possible				
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 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
29. Where it is suspected that the destruction of possible stillborn and unmarked graves may occur near historic buildings etc, the following mitigations apply: <ul style="list-style-type: none"> 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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
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 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
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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
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 method statements	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
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
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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
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
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	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
responsible person where any complaints can be lodged should there be an issue of concern.						
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 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
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	Contractor	Construction planning	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
damage to stabilised areas should be repaired timeously and maintained.				Tetra4 EO		
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
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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
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 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
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	Contractor	Adequate communication	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
and specific areas to be visited, should be provided in the notification.		with landowners		Tetra4 EO		
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. 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.	Contractor	Report snares	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
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
73. Limited topsoil stripping is conditional on the prevention of soil compaction by heavy motorised vehicles (HMsVs) 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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
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; Reinstatement 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 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
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	Contractor	Comply with revegetation and	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
<i>Eragrostis tef</i> , after construction and initial rehabilitation work (reinstatement of the geomorphological and topographical template) is completed.		rehabilitation plan		Tetra4 EO		
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
80. 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 them have preferential ways in which the roads must be maintained, for example if roads are only graded and not built up it turns into rivers when there is heavy rain. The road maintenance agreements must be formalised before construction and drilling commences to ensure all parties involved are protected and know their rights and responsibilities. Tetra4 must make sure that all compacting and rehabilitating of trenches are done to the specifications in the Environmental Management Plan. It is recommended that construction and drilling be planned for the dry season. Tetra4 must provide all the affected landowners with a construction and drilling schedule to ensure that they know when construction will take place on their properties. Any changes to the construction and drilling	Tetra4	Landowner agreements	Construction phase	Tetra4	Monthly	EO Reports



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
schedule must be communicated to the farmers at least a week in advance.						

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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
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 through reasonable negotiations 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.	Tetra4 Project Manager	Land valuation and servitude compensation	Ongoing	Tetra4 EO	Annually	Compensation proof
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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
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
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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
<p>19. 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 them have preferential ways in which the roads must be maintained, for example if roads are only graded and not built up it turns into rivers when there is heavy rain. The road maintenance agreements must be formalised before construction and drilling commences to ensure all parties involved are protected and know their rights and responsibilities. Tetra4 must make sure that all compacting and rehabilitating of trenches are done to the specifications in the Environmental Management Plan. It is recommended that construction and drilling be planned for the dry season. Tetra4 must provide all the affected landowners with a construction and drilling schedule to ensure that they know when construction will take place on their properties. Any changes to the construction and drilling schedule must be communicated to the farmers at least a week in advance.</p>	Tetra4	Landowner agreements	Construction phase	Tetra4	Monthly	EO Reports



5.1.4 DECOMMISSIONING 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 EMP 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 following rehabilitation until similar natural vegetation cover to surrounding areas has established 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 <i>Eragrostis tef</i> 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.						
<p>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</p>	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
<ul style="list-style-type: none"> i. Booster station: 50 m ii. Plant: 170 m iii. Compressors: 80 m d. Operation (night-time): <ul style="list-style-type: none"> i. Booster station: 150 m ii. Plant: 580 m iii. Compressors: 150 m 						
<p>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.</p>	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
<p>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</p>	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. Where work in agricultural land is unavoidable this must be compensated accordingly, completed quickly and infrastructure placed underground as far as possible to allow continued land use post construction.	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 from 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 where 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



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
<ul style="list-style-type: none"> 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				
<p>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.</p>	Contractor	Barricading / warning signage	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
<p>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.</p>	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: <ul style="list-style-type: none"> 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 period and any snares encountered must be reported to the EO for	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
immediate removal and the landowner must be informed. 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.				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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
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
61. Areas that have been cleared should be re-vegetated with indigenous species as agreed to by the landowner, such as <i>Eragrostis tef</i> , 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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
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 the campsite in such a way that they do not cause water pollution, odour or other forms of pollution.	Tetra4	Provide sufficient ablution facilities and maintain adequately	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports

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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
5. International Best Practice Standards in operation of LNG facilities must be implemented.	Tetra4 Plant Manager	Operate plant according to International Best Practice Standards	Ongoing during operational phase	Tetra4 EO	Monthly	EO Reports
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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
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.	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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
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
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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
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 detecting leaks and spills) of compressor stations and LNG/LHe Plant must be implemented.	Tetra4 EO	Emergency response protocol and emergency drills	Throughout operational phase	Tetra4 EO	Monthly	EO Reports
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 DECOMMISSIONING 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	Tetra4 EO	Monthly	EO Reports



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
			of decommissioning			
2. Rip compacted surfaces where necessary as part of the rehabilitation.	Tetra4	Rip compacted areas	Once off	Tetra4 EO	Monthly	EO Reports
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 following rehabilitation until similar natural vegetation cover to surrounding areas has established 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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
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
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
<p>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 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.</p>	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
<p>2. The identified drill site should, where possible, not infringe on the landowners' surface activities. Where impacts on landowners' surface activities are unavoidable this must be compensated accordingly, completed quickly and infrastructure placed underground as far as possible to allow continued land use post construction.</p>	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
<p>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.</p>	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
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
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 and agreed 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	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
<p>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.</p>						
<p>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</p>	<p>Design / Planning Manager for drilling operation</p>	<p>Design and planning specific compliance</p>	<p>During planning and design phase</p>	<p>Contractor EO and/or Tetra4 EO</p>	<p>As and when required</p>	<p>EO Reports</p>



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
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 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	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
	for drilling operation					
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 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 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
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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
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
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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
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
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
21. A township is proclaimed over Portion 3 of the farm Blaauwdrift 188 (Portion 3), and the township proclamation is dated 12 October 1956. No exploration drilling of any Cluster 2 wells on this property may take place until such time as the legal status of the township and rights of the landowner are adequately addressed.	Tetra4	Confirm legal status of the township proclamation and ensure rights of landowner	During planning and design phase	Contractor EO and/or Tetra4 EO	Ad hoc	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
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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
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
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 <i>in situ</i> 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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
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 where necessary	Ongoing during drilling operations	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
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. 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.	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	Monthly	EO Reports



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
				Tetra4 EO		
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
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 <i>Eragrostis tef</i> , 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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
41. A township is proclaimed over Portion 3 of the farm Blaauwdrift 188 (Portion 3), and the township proclamation is dated 12 October 1956. No exploration drilling of any Cluster 2 wells on this property may take place until such time as the legal status of the township and rights of the landowner are adequately addressed.	Tetra4	Confirm legal status of the township proclamation and ensure rights of landowner	During planning and design phase	Contractor EO and/or Tetra4 EO	Ad hoc	EO Reports
42. It is recommended that the use of above ground steel or plastic tanks must be used which should include a secondary containment barrier. The use of a pitless drilling, closed loop system, must be implemented in all circumstances where feasible, to contain and recycle drilling fluids in an above-ground container.	Tetra4	Installation of container above-ground to collect drill muds.	During planning and design, and construction phases.	Contractor EO / Tetra4 EO	Monthly	EO Reports
43. It should be made an offence for any staff to remove any indigenous plant species or to bring any alien species into the exploration areas outside of rehabilitation and AIP management activities.	Tetra4	General awareness of staff and their responsibility towards compliance the EMPr. Disciplinary action.	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
44. All laydown areas, chemical toilets etc. should be restricted to Very Low SEI areas. Any materials may not be stored for extended periods of time and must be removed from the area once the construction/closure phase has been concluded. No permanent structures should be permitted on site. No storage	Contractor	Restrict project infrastructure to the least sensitive area	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
of vehicles or equipment will be allowed outside of the designated project areas.						
45. Indigenous vegetation, including secondary growth outside the project area, must be fully protected. Vegetation clearing should be avoided or strictly minimized within the designated low-medium sensitivity zones. High sensitivity areas and their buffers are off-limits. Development areas must be clearly marked and limited to prevent unnecessary vegetation loss. Work should be phased to minimize disturbance and focus only on required areas.	Contractor	Comply with revegetation and rehabilitation plan	Ongoing during construction phase	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
46. Noise must be kept to an absolute minimum during the evenings and at night to minimise all possible disturbances to amphibian species and nocturnal mammals	Contractor	Work to be limited to hours agreed to by Tetra4 and the landowner	Ongoing during construction phase	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
47. Prior to commencing work each day, two individuals should traverse the working area in order to alert any fauna and so they have a chance to vacate.	Contractor	Include the requirement in DSTI and toolbox talks	Ongoing during construction phase	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
48. Schedule activities and operations during least sensitive periods, to avoid migration, nesting and breeding seasons.	Contractor	Comply with specialist recommendations	Ongoing during construction phase	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
49. <i>Eupodotis caerulescens</i> (Korhaan, Blue) breed from September to February, the project must avoid this period.	Contractor	Avoid construction during breeding seasons	Ongoing during construction phase	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		

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
<i>N/A – the exploration drilling process does not require any “operational” phase mitigation measures.</i>						

5.3.4 DECOMMISSIONING 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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
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
4. Any excavations should not be left open. Limiting the closure and rehabilitation activities to the footprint areas only. Avoid entry/access to previously undisturbed or already rehabilitated areas.	Contractor	Monitor for closure of all excavations and close access points post rehabilitation where possible.	Post drilling	Contractor EO and/or Tetra4 EO	Once off	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	During planning and design phase	Contractor EO and/or Tetra4 EO	Prior equipping	Well designs



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
		specific compliance			production well	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 isolating the shallow Karoo potable aquifer from the deep-seated gas production zone and the saline formation water associated with the production zone.	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
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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
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 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	Tetra4 Maintenance Crews	Ensure landowner access	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
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.		protocols are followed				
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 detecting leaks and spills) of production wells must be implemented.	Tetra4 EO	Emergency response protocol and emergency drills	Throughout operational phase	Tetra4 EO	Monthly	EO Reports



5.4.4 DECOMMISSIONING 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
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	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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
detected during this test, additional seals should be designed and implemented.						
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
10. Weed species should be eradicated at all disturbed areas. This must be monitored following rehabilitation until similar natural vegetation cover to surrounding areas has established 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	Tetra4 EO	Monthly	EO Reports



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
			of decommissioning			
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	Tetra4 EO	Heritage screening	During planning and design 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
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.						
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 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
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	Identify and manage sensitive species	Prior to construction	Contractor EO and/or Tetra4 EO	Ad hoc	Route deviation revisions or relocation plan and



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
	Contractor EO and/or Tetra4 EO					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
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	Tetra4 Project Manager	Landowner consultations Compilation of asset register	Prior to construction	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
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.						
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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
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
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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
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
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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
14. Tetra4 should engage with the relevant farmers about maintenance of farm roads used by the project, 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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
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 maintenance of farm roads used by the project, as some of landowners have preferential ways in which the roads must be maintained. The road maintenance agreements must be formalised before construction commences.	Tetra4 EO	Landowner negotiations and agreements	Ongoing during operational phase	Tetra4 EO	Monthly	Landowner agreements 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	Tetra4 EO	Apply dust suppression measures on access roads	During operational phase	Tetra4 EO	Monthly	MSDS where relevant



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
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.						EO Reports

5.5.4 DECOMMISSIONING 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
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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
5. Weed species should be eradicated at all disturbed areas. This must be monitored following rehabilitation until similar natural vegetation cover to surrounding areas has established 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 and market related 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: <ul style="list-style-type: none"> 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 / Tetra4	Landowner negotiations	During construction phase	Contractor EO / Tetra4 EO	Ad hoc	EO Reports
7. All fuel and other lubricants must be stored in sealed containers at least 100m from the nearest watercourse and all reasonable precautions must be taken to prevent any possible pollution.	Contractor / Tetra4	Hazardous storage areas	During construction phase	Contractor EO / Tetra4 EO	Ad hoc	EO Reports
8. Sanitary conveniences which cause or are likely to cause pollution of a water resource may not be located within the 1:100-year floodline or 100m from any watercourse or boreholes that are used or may be used for abstraction purposes.	Contractor / Tetra4	Chemical toilet location and management	During construction phase	Contractor EO / Tetra4 EO	Ad hoc	EO Reports
9. 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) except for security personnel in certain instances but with landowner agreement	Contractor / Tetra4	Safety and security	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 Officer	Landowner negotiations and agreements	During operational phase	Tetra4 EO	Ad hoc	Landowner agreements
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: <ul style="list-style-type: none"> 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 	Tetra4 EO	Tool box talks	During operational phase	Tetra4 EO	Ad hoc	Tool box talks records



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
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.						

5.6.4 DECOMMISSIONING 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: <ul style="list-style-type: none"> 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 	Tetra4 EO	Tool box talks	During decommissioning phase	Tetra4 EO	Ad hoc	Tool box talks records



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
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.						

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	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
<p>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 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.</p>						



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
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 sufficient capacity that filters and retains sediment before the water is released into the watercourses.	Contractor EO / Tetra4 EO	Silt traps installed and prevention of erosion to prevent sedimentation of watercourses	Ongoing	Contractor EO / Tetra4 EO	Monthly	EO Reports
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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
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 Safety Managers	All personnel issued correct PPE	As and when required	Contractor EO / Tetra4 EO	Monthly	EO Reports
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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
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
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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
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 a clause spelling out their liability should be included in their contracts.	Tetra4 Project Manager	Compensation to landowners for any damage caused by the project	Ad hoc	Tetra4 EO	Ad hoc	Proof of compensation where 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	Tetra4 Project Manager	Develop and implement incident procedure and grievance procedure	Ad hoc	Tetra4 EO	Ad hoc	Incident register / grievance register / EO Reports



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
related prices should be paid, and if anything is restored, it must be to the same or better standards than before.						
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
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	Tetra4 Safety / Security Manager	Ensure safety and security of affected parties is not negatively affected by	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
plan. Tetra4 should also become a member of these forums, and an existing WhatsApp group if permissible.		project activities				
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 properties, and therefore a system that considers the safety of both the Tetra4 infrastructure and the safety of the landowners must be implemented.	Tetra4 Safety / Security Manager	Provide landowners with security company schedules, etc.	Ongoing	Tetra4 EO	Monthly	EO Reports
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



Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
34. The Tetra4 community liaison officer (CLO) must continue to deal with the affected landowners throughout the life of the project.	Tetra4 CLO	Communication with landowners	Ongoing	Tetra4 EO	Monthly	EO Reports
35. In cases where there the landowner does not agree with the compensation offered by Tetra4 related to loss of potential income due to exploration, construction or operational activities, Tetra 4 must appoint a suitably experienced third party such as an agricultural economist, town planner, etc. at their cost to determine what the actual losses will be to the landowners due to the drilling and trenching activities on their properties. Landowners must be compensated for the actual losses for the entire period that they cannot use the land due to Tetra’s activities. This may be one or two years, depending on when in the season the drilling and trenching take place, and how long the property is affected. The principles explained in the IFC Handbook for Preparing a Resettlement Action Plan must be followed. This includes a land use/land capability inventory; an asset register and physical asset survey; an income stream analysis and entitlement matrix. Compensation must be determined with input from the landowners.	Tetra4	Fair compensation	Ongoing	Tetra4 EO	Monthly	EO Reports
36. If any existing livelihood activities will be affected negatively 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. If any new activities are planned for a property,	Tetra4	Fair compensation	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
Tetra4 must consult with the landowner and obtain his consent to execute the activity on his/her land.						
37. If any interference takes place and there are actual losses, the landowner should be compensated for their losses. Tetra4 must have a claims procedure that is communicated to all affected landowners. There must be specific timeframes dealing with response times and time it takes to close out complaints. 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.	Tetra4	Fair compensation	Ongoing	Tetra4 EO	Monthly	EO Reports
38. Servitudes should only be registered for the life of the operations or as long as the well and pipeline in use are productive. At the end of the life of operations, or when a well or pipeline is no longer productive or used, servitudes must be de-registered at the cost of Tetra4. Servitudes cannot be seen as access routes unless it has been specified as such and agreed on by both parties.	Tetra4	Servitude registration and deregistration	Ongoing	Tetra4 EO	Monthly	EO Reports
39. 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 them have preferential ways in which the roads must be maintained, for example if roads are only graded and not built up it turns into rivers when there is heavy rain. The road maintenance agreements must be formalised before construction and drilling commences to	Tetra4	Road maintenance	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
<p>ensure all parties involved are protected and know their rights and responsibilities. Tetra4 must make sure that all compacting and rehabilitating of trenches are done to the specifications in the Environmental Management Plan. It is recommended that construction and drilling be planned for the dry season. Tetra4 must provide all the affected landowners with a construction and drilling schedule to ensure that they know when construction will take place on their properties. Any changes to the construction and drilling schedule must be communicated to the farmers at least a week in advance.</p>						
<p>40. Tetra4 should work with the preferred farmers' security group (e.g. Erfenis Veiligheid) and implement the AgriSA farm access protocol for everybody that need to access the properties. 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. For scheduled and maintenance work Tetra4 should give a roster to the farmers stating dates and approximate times that contractors will be on the farms. Farmers emphasised that they need to know of people accessing the farm ahead of time. It is too late to inform them when entering the property. All access arrangements should be made at least 24 hours before access is required. Tetra4 must meet with the landowners before the construction and drilling phase commence and formalise security arrangements. This should be done in writing and include the existing forums that the landowners know and trust.</p>	Tetra4	Security arrangements	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
<p>41. All contractors and employees need to wear photo identification cards. Vehicles should be marked as construction vehicles and should have Tetra4's logo clearly exhibited. Entry and exit points of the site should be controlled during the construction and drilling phase. Areas where materials are stockpiled must be fenced. The schedules of the security company should be communicated to the farmers, especially to those farmers that have Tetra4 infrastructure that need to be guarded. It must be considered that guards changing shifts contribute to the impact of strangers accessing properties, and therefore a system that consider the safety of both the Tetra4 infrastructure and the safety of the landowners must be implemented. The necessary sanitation facilities must be made available, and some form of shelter from the elements. The security guards must not be allowed to make fires for cooking or heating purposes.</p>	Tetra4		Ongoing	Tetra4 EO	Monthly	EO Reports
<p>42. A system to arrange access to properties must be devised and formalised. The landowners must agree to the system. Access must be arranged at least 24 hours prior, except in emergencies, when the landowners should also be informed immediately. Landowners have the right to refuse people access to their properties if it was not arranged in advance. If routine access is required, the landowners must be provided with a roster indicating dates and approximate times that access will be required. 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</p>	Tetra4	Access arrangements to be managed	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
made aware of this and a clause spelling out their liability should be included in their contracts						
43. It is difficult to mitigate the impact on sense of place as it is experienced on a personal level. In general, the mitigation measures suggested in the visual, noise, ecological impact assessments and other relevant specialist studies should be adhered to. The relevant specialists will provide scientific mitigation measures for the aspects relevant to their studies. The direction and brightness of lights close to residences must be considered. Pipeline markers on game farms must be camouflaged by either painting it in a colour that blend in with the surrounding areas or putting natural materials such as branches or wooden poles around it. This must be done in consultation with the affected landowners. Sense of place is a personal experience, but successful rehabilitation will go a long way in recreating a rural sense of place. The public perception would be negative or positive depending on the successful implementation of the rehabilitation.	Tetra4	Minimise impact on sense of place	Ongoing	Tetra4 EO	Monthly	EO Reports
44. Tetra4 has a dedicated person that communicate with the landowners with whom they have a positive relationship. It is important that this relationship is extended to the Cluster 2 landowners. Information sharing, frequent communication and quick responses to issues/complaints/enquiries will assist Tetra4 with maintaining their SLO.	Tetra4	Dedicated person for landowner contact	Ongoing	Tetra4 EO	Monthly	EO Reports
45. Tetra4 should compile a background information document (BID) explaining the process and potential risks in laymen terms. This should be distributed to local stakeholders. Special	Tetra4	Distribute a BID to relevant stakeholders	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
sessions to inform the farm workers in their native languages must be conducted. They can also consider a media awareness campaign on local radio stations and press statements to local papers.						
46. Tetra4 must become a member of the local firefighting association. Access routes and procedures in case of any veld fire must be determined and shared with the firefighting association, farm owners and Tetra4 staff.	Tetra4	Fire preventions and management	Ongoing	Tetra4 EO	Monthly	EO Reports
47. Wells and pipelines must be kept away from residences as far as possible.	Tetra4	Well and pipeline location determination	Ongoing	Tetra4 EO	Monthly	EO Reports
48. Tetra4 should ensure that a good proportion of secondary economic opportunities are given to local contractors. Services and goods must be procured locally as far as reasonably possible. Aspects of this positive impact will occur by default when the construction force lives locally and they utilise local services and support local shops.	Tetra4	Implement SLP and appoint local where possible	Ongoing	Tetra4 EO	Monthly	EO Reports
49. Tetra4 should liaise with local training institutions to determine whether there are any opportunities to offer internships and practical experience for their students. Tetra4 must ensure that skills development requirements form part of their contracts with sub-consultants. The skills development requirements in their Social and Labour Plan (SLP) must be implemented. Tetra4 can liaise with local schools to participate	Tetra4	Identify intern opportunities	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
in science classes or bring science pupils to visit the facility once it is operational.						
50. Tetra4's activities will cause a certain level of economic displacement for some of the affected landowners. In the event that the landowner disagrees with the compensation offered, the actual impact on their livelihoods must be assessed by a suitably experienced third party such as an agricultural economist, town planner, etc. Compensation must be done according to international best practice or market related land value.	Tetra4	Provide compensation for income displacement to landowners	Ongoing	Tetra4 EO	Monthly	EO Reports



APPENDICES



Appendix 1: Generic EMPr for Gas Pipeline Infrastructure



Appendix 2: EAP CV



Appendix 3: Sensitivity Mapping



Appendix 4: Well closure, sealing and rehabilitation guideline



Appendix 5: EMPr Amendment Change Register (2024)