

APPLICANT:



PREPARED BY:



Environmental Site Sensitivity and Verification Report

Site ID:	Tetra4 Cluster 2 Gas Production Project	Consultant	Environmental Impact Management Services (Pty) Ltd (EIMS)
Location:	Virginia area, Free State Province	EAP	Brian Whitfield
Client representative:	Gerhard Muller	Inspection Date:	24 & 25 March 2022

1. Background

Background of the project:	Tetra4 wishes to expand the natural gas operations, to be located within the approved production right area and around the Cluster 1 project. This expansion will involve additional 300 production wells, gas transmission pipelines, 3 compressor stations, an expansion to the Liquid Natural Gas (LNG) and Liquid Helium (LHe) plant ("LNG/LHe Plant") and associated Infrastructure as part of Cluster 2 of the Project to meet the future production requirements. The proposed project is located on various farm portions within the Lejweleputswa District Municipality, Free State Province.		
Project Aspects:	Details (provide specifications)	Location (DD MM SS)	
		Latitude	Longitude
❖ Production Wells	A maximum of 300 new production wells will be added to the gas production network. 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 and therefore the EIA will follow the approach of assessing well corridors/transects (600m wide or 300m on either side of known target fault lines). Exploration drilling entails the use of a truck, trailer or skid mounted percussion or diamond drill rig to drill to varying depths (~380m to ~880m) along known fault lines in order to strike the gas reserve. 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 to prevent any interplay 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. 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 1,4m x 1,1m and the manhole surface height will be 0,25m.	To be determined after exploration drilling within various well transects shown in the site layout plan in Section 2 below.	To be determined after exploration drilling within various well transects shown in the site layout plan in Section 2 below.



❖ Pipelines	Pipelines will be 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 below the plough line. The pipeline will be installed using 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 will be utilised instead. Approximately 480km of pipelines will be constructed for the project.	Within various pipeline 300m corridors shown in the site layout plan in Section 2 below.	Within various pipeline 300m corridors shown in the site layout plan in Section 2 below.
❖ Compressor Stations	A total of 3 new compressor stations (CS) will be constructed. Raw gas received at the compressor stations will be filtered to remove dust and moisture using a combination of 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.	Centre point of 300m diameter buffer area: CS1: 28° 7'24.99"S CS2: 28°11'11.09"S CS3: 28°13'16.65"S	Centre point of 300m diameter buffer area: CS1: 26°43'13.04"E CS2: 26°44'8.81"E CS3: 26°45'18.76"E
❖ Booster 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 14m and a total of 28 booster stations may be constructed.	As the location of booster stations is linked to production well clusters, the coordinates are not set. Booster stations will be located within the 600m production well transects as shown in the site layout plan in Section 2 below.	As the location of booster stations is linked to production well clusters, the coordinates are not set. Booster stations will be located within the 600m production well transects as shown in the site layout plan in Section 2 below.
❖ LNG/LHe Plant	Feed gas from the 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, LHe and to provide fuel gas for future power generation. The power generation will be a separate project and is not included in this application process. 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. The Plant and temporary laydown area will occupy approximately 25.4ha. The LNG and LHe products will be loaded to trucks for distribution to users. The plant will contain storage tanks for a total of 200m ³ of LHe and 3300m ³ of LNG.	Centre Point: 28° 7'41.91"S	Centre Point: 26°43'8.32"E
❖ Other:	<ul style="list-style-type: none"> ❖ Approximately 240 low point drains. ❖ Pigging stations: Inline pigging stations (Figure 3) are installed to allow for regular cleaning and inspection of the pipelines. The pigging stations allow for insertion of probes or cleaning pigs (plugs) at regular intervals in order to perform regular maintenance. Approximately 14 pig launcher/receiver pairs will be installed. ❖ Approximately 100km of access roads to the various project infrastructure. 	Various locations within the pipeline or well transects.	Various locations within the pipeline or well transects.

2. Site Layout Plan

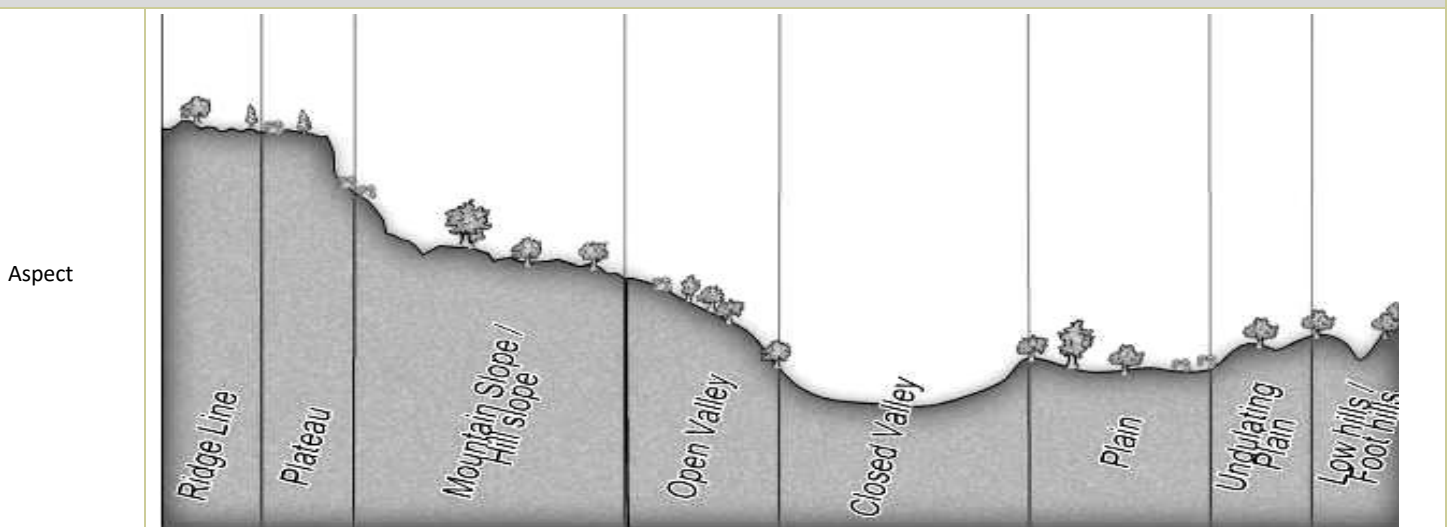


2. DEA Screening Tool Assessment

Aspect	Very High	High	Medium	Low
Agriculture Theme		X		
Animal Species Theme			X	
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme		X		
Civil Aviation Theme		X		
Defence Theme				X
Palaeontology Theme	X			
Plant Species Theme				X
Terrestrial Biodiversity Theme	X			

3. Site Assessment

3.1 Gradient (indicate the general gradient characteristics of site)



Study area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
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Is the site located on or in the immediate vicinity of any of the following:

	Yes	No	Comment
Erosion Channels or areas of severe erosion/ destabilized soils	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Existing agricultural lands occur within the study area.
Wetlands (within 32m)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wetlands and rivers are crossed by pipelines.
Unstable slopes or geological features (rocky outcrops)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Rocky outcrops occur in isolated areas.
Bare areas	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Some bare areas in the form of agricultural lands occur within the study area.
Other Sensitive or risk areas?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Existing roads, powerlines, farmhouses, and mining areas occur within the study area.

Are any existing servitudes and structures directly or indirectly affected by the proposed sites and routes (e.g. Eskom, public road servitudes and restrictions- 60m from National Road, farmer's water/irrigation supplies, etc.)?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Existing roads, powerlines, farmhouses, and mining areas occur within the study area.
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3.2 Vegetation



Which of the listed descriptions best describes the general groundcover on and around the site?

Natural veld - good condition <input checked="" type="checkbox"/>	Natural veld with scattered aliens <input checked="" type="checkbox"/>	Natural veld with heavy alien infestation <input checked="" type="checkbox"/>	Veld dominated by alien species <input checked="" type="checkbox"/>	Gardens <input type="checkbox"/>
Sport field <input type="checkbox"/>	Cultivated land <input checked="" type="checkbox"/>	Paved surface <input checked="" type="checkbox"/>	Building or other structure <input checked="" type="checkbox"/>	Bare soil <input checked="" type="checkbox"/>

Comments on vegetation composition: The study area and proposed project infrastructure covers a large area and as such various project infrastructure such as pipelines, wells, plant and powerlines will impact on different vegetation units.

Comments on weed species/type: Certain areas within the proposed development footprint will contain alien and invasive plant species. The exact type and species will be confirmed during the specialist study.

Land cover/ use description: Describe the land uses on the site

Cluster production infrastructure	2	The study area contains various land uses with agriculture being the predominant use. The Harmony Beatrix mine is also located within the study area as well as some residential areas, farmsteads, roads, powerlines, game area, etc.
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4. General Comments and Recommendations

The proposed development includes infrastructure which is geographically spread out over a relatively large area and therefore the development may impact on the biodiversity, aquatic and socio-economic environment. A detailed impact assessment will therefore be undertaken which will be informed by various specialist studies as well as a public consultation process.



Site Photos

Adamsonsvlei Community: 24/03/2022; GPS Coordinates: -28.095339, 26.732130



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SW



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NW



Surroundings: 24/03/2022; GPS Coordinates: -28.129839, 26.727582



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NW



Surroundings: 24/03/2022; GPS Coordinates: -28.184527, 26.733535



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Surroundings: 24/03/2022; GPS Coordinates: -28.250182, 26.706571



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Surroundings: 24/03/2022; GPS Coordinates: -28.247787, 26.687260



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Surroundings: 24/03/2022; GPS Coordinates: -28.216997, 26.703176



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LNG/LHe Plant Surroundings: 24/03/2022; GPS Coordinates: -28.126929, 26.723155



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Sandrivier/R30 Surroundings: 24/03/2022; GPS Coordinates: -28.109529, 26.715618



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Surroundings: 24/03/2022; GPS Coordinates: -28.097408, 26.753173



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Surroundings: 24/03/2022; GPS Coordinates: -28.077524, 26.711889



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Surroundings: 25/03/2022; GPS Coordinates: -28.203226, 26.824368



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Surroundings: 25/03/2022; GPS Coordinates: -28.227983, 26.808743



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Surroundings: 25/03/2022; GPS Coordinates: -28.245147, 26.781427



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Surroundings: 25/03/2022; GPS Coordinates: -28.246143, 26.766922



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7. Verification findings and motivation:

Assessment for specialist studies and motivation:					
Screening Tool Specialist Study Required:	Level of Sensitivity:	Suggested Sensitivity:	Required Assessment	level of	Motivation
Agriculture Theme	High	High	None.	<input type="checkbox"/>	A full DFFE protocol compliant specialist Agricultural Impact Assessment will be undertaken. In addition, a Social Impact Assessment and Economic Impact Assessment will be undertaken.
			Compliance Statement	<input type="checkbox"/>	
			Full Assessment	<input checked="" type="checkbox"/>	
			Other	<input type="checkbox"/>	
Animal Species Theme	Medium	Medium	None.	<input type="checkbox"/>	A full DFFE protocol compliant specialist Terrestrial Biodiversity Impact Assessment will be undertaken which will include impact on sensitive or protected faunal species in the area.
			Compliance Statement	<input type="checkbox"/>	
			Full Assessment	<input checked="" type="checkbox"/>	
			Other	<input type="checkbox"/>	
Aquatic Biodiversity Theme	Very High	Very High	None.	<input type="checkbox"/>	A full DFFE protocol compliant specialist Aquatic and Wetland Impact Assessment will be undertaken.
			Compliance Statement	<input type="checkbox"/>	
			Full Assessment	<input checked="" type="checkbox"/>	
			Other	<input type="checkbox"/>	
Archaeological and Cultural Heritage Theme	High	High	None.	<input type="checkbox"/>	A full DFFE protocol compliant specialist Heritage Impact Assessment will be undertaken.
			Compliance Statement	<input type="checkbox"/>	
			Full Assessment	<input checked="" type="checkbox"/>	
			Other	<input type="checkbox"/>	
Civil Aviation Theme	High	Low	None.	<input checked="" type="checkbox"/>	The nature of the development (gas production) as well as the maximum height of the development components during both construction and operational phases will not pose a material risk to commercial air traffic. As such, no specialist aviation studies will be undertaken.
			Compliance Statement	<input type="checkbox"/>	
			Full Assessment	<input type="checkbox"/>	
			Other	<input type="checkbox"/>	
Defence Theme	Low	Low	None.	<input checked="" type="checkbox"/>	The defence theme was rated as low and therefore no defence related studies will be undertaken.
			Compliance Statement	<input type="checkbox"/>	
			Full Assessment	<input type="checkbox"/>	
			Other	<input type="checkbox"/>	
Palaeontology Theme	Very High	Very High	None.	<input type="checkbox"/>	A full DFFE protocol compliant specialist Palaeontological Impact Assessment will be undertaken.
			Compliance Statement	<input type="checkbox"/>	
			Full Assessment	<input checked="" type="checkbox"/>	
			Other	<input type="checkbox"/>	
Plant Species Theme	Low	Medium	None.	<input type="checkbox"/>	A full DFFE protocol compliant specialist



			Compliance Statement	<input type="checkbox"/>	Terrestrial Biodiversity Impact Assessment will be undertaken which will include impact on sensitive or protected floral species in the area.
			Full Assessment	<input checked="" type="checkbox"/>	
			Other	<input type="checkbox"/>	
Terrestrial Biodiversity Theme	Very High	Very High	None.	<input type="checkbox"/>	A full DFFE protocol compliant specialist Terrestrial Biodiversity Impact Assessment will be undertaken.
			Compliance Statement	<input type="checkbox"/>	
			Full Assessment	<input checked="" type="checkbox"/>	
			Other	<input type="checkbox"/>	