



TETRA4 CLUSTER 2 GAS PRODUCTION PROJECT

EAP: Environmental Impact Management Services (Pty) Ltd (EIMS)

Applicant: Tetra4 (Pty) Ltd

Project Description

Tetra4 (Pty) Ltd (hereafter Tetra4) holds a Gas Production Right (Ref: 12/4/1/07/2/2) that was granted in 2012 which spans approximately 187 000 hectares for the development of natural gas production operations near the town of Virginia in the Free State Province. Tetra4 wishes to expand the natural gas operations, to be located within the approved production right area and within and around the Cluster 1 project. The Cluster 2 application area covers a total of ~27 500 hectares.

Cluster 2 development aims to produce a total of ~45 Million Standard Cubic Feet per Day (MMSCFD) of gas. The construction of the gas gathering network (including pipelines, booster and compressor stations, etc) is planned to commence in ~May 2023 and be completed by ~October 2025. Construction of the LNG/LHe Plant is planned to 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).

Cluster 2 Environmental Authorisation (EA) is being applied for to increase the gas production within the Production

This planned expansion to the existing approved production activities will involve:

- ❖ ~400 exploration wells (each 50 m X 50 m = 250 m²)
- ~480 km of gas transmission pipelines (10 m servitude)
- **❖** 3 compressor stations (each 60 m x 60 m = 3600 m²)
- **❖** Access roads (2.5 m wide)
- ❖ LNG/LHe Plant (~9.6 ha) with temporary camp/laydown area (~15.8 ha)

Right. This application will include a MPRDA Section 102 revision of the Cluster 1 EMPr to include Cluster 2 specific infrastructure as well as amendments or additions of mitigation measures as and where required. The EA application and study area covers 284 farm portions within the Masilonyana and Matjhabeng Local Municipalities and includes ~27 500 hectares. The site boundary is ~5km southwest of Virginia, ~9km south of Welkom and ~16km north of Theunissen.

A full Scoping and Environmental Impact Assessment (S&EIA) application process is being followed for the EIA Listing Notices listed activities applicable to the project namely:

- NEMA GNR 983: Activity 12, 16, 19, 21D, 24, 27, 28, 34, 48, 51, 56, 59, 60, 67
- NEMA GNR 984: Activity 4, 5, 7, 15
- NEMA GNR 985: Activity 4, 10, 12, 14, 18, 22, 23

Additional licence applications:

- NEMWA Category A1, A6, A7, A12, A13, A14, B1, B10, B11, C1, C2, C6 Integrated EA and WML application
- NEMAQA: Section 21 Subcategory 2.4 Air Emissions Licence Application
- NWA: Section 21 (c), (g) and (i) Water Use Licence Application

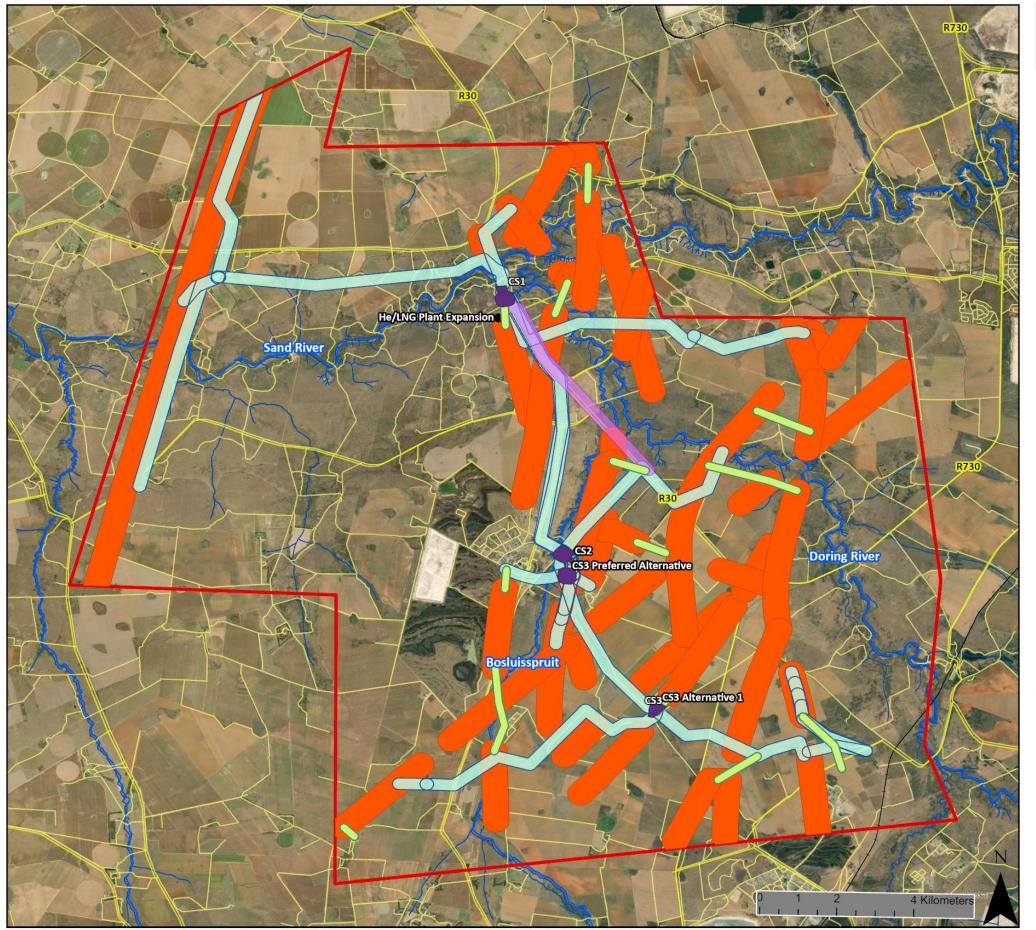
EIMS and Specialist Team

Company	Name	Project Responsibility				
EMS ENVIRONMENTAL IMPACT MANAGEMENT SERVICES	Mr Brian Whitfield	Environmental Assessment Practitioner EAPASA Ref: 2022/4496				
the BI&DIVERS TY COMPLANCE CONTROL	Mr Andrew Husted	Agriculture and HydroSoils / Terrestrial Biodiversity / Wetlands and Aquatics				
AIRSHED PLANNING PROFESSIONALS	Dr Hanlie Liebenberg- Enslin	Noise / Air Quality & Health Risk / GHG & Climate Change				
gradient	Mr Ferdinand Mostert	Geohydrology				
STRATEGY4GOOD	Mr Gerrie Muller	Economic				
PGS	Mr Wouter Fourie	Heritage and Palaeontology				
Member of the Surbana Jurong Group	Mr Rendani Thovhakale	Hydrology				
EQUISPECTIVES RESEARCH & CONSULTING SERVICES	Ms Ilse Aucamp	Social				
ENVIRONMENTAL PLANNING AND DESIGN	Mr Jon Marshall	Visual				

Scoping and EIA Process



Infrastructure Transects Map



Locality Map

1473 Tetra4 Cluster 2 Project



Data Sources:

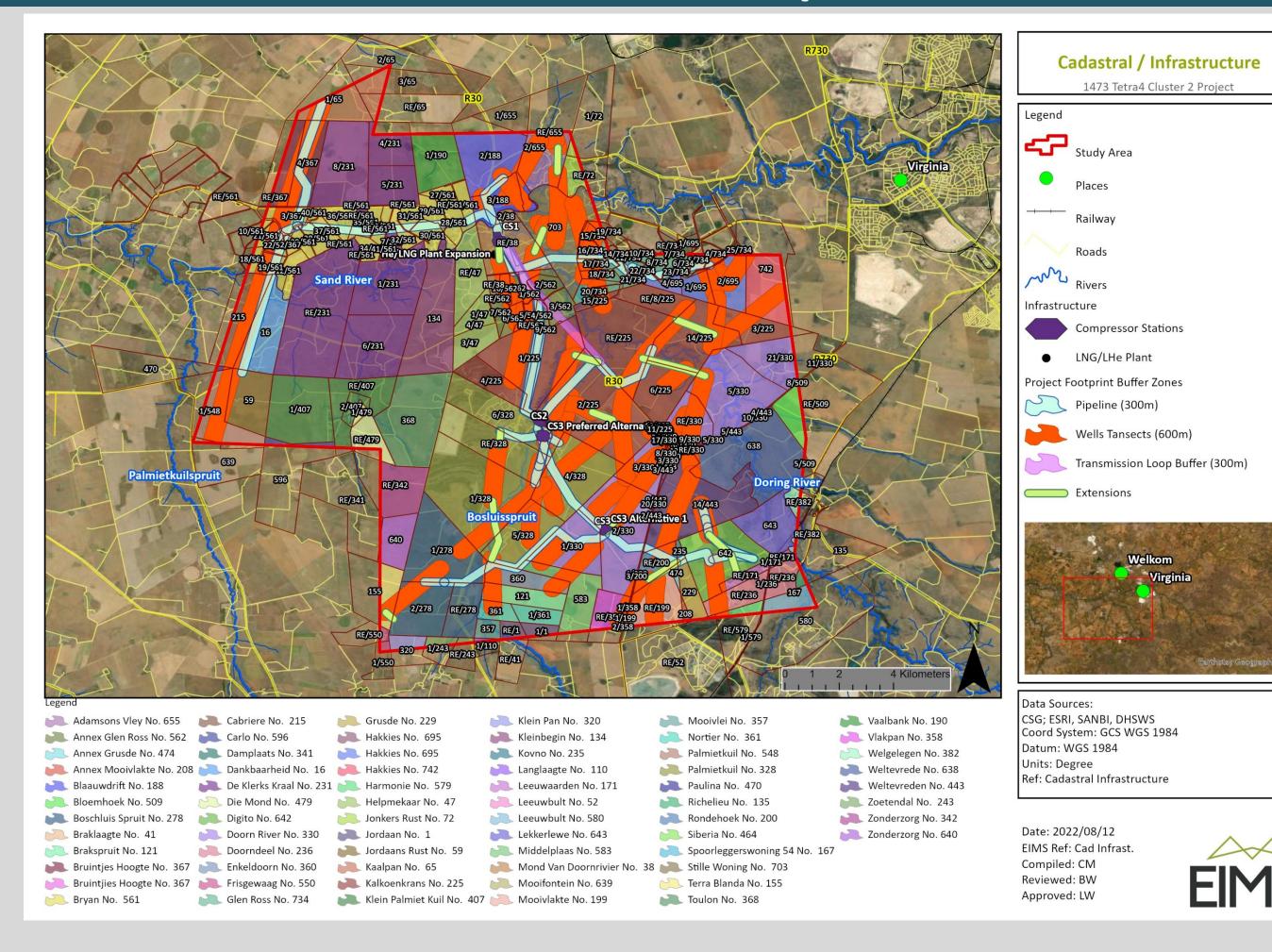
CSG; ESRI, SANBI, DHSWS Coord System: GCS WGS 1984

Datum: WGS 1984 Units: Degree Ref: Locality Map

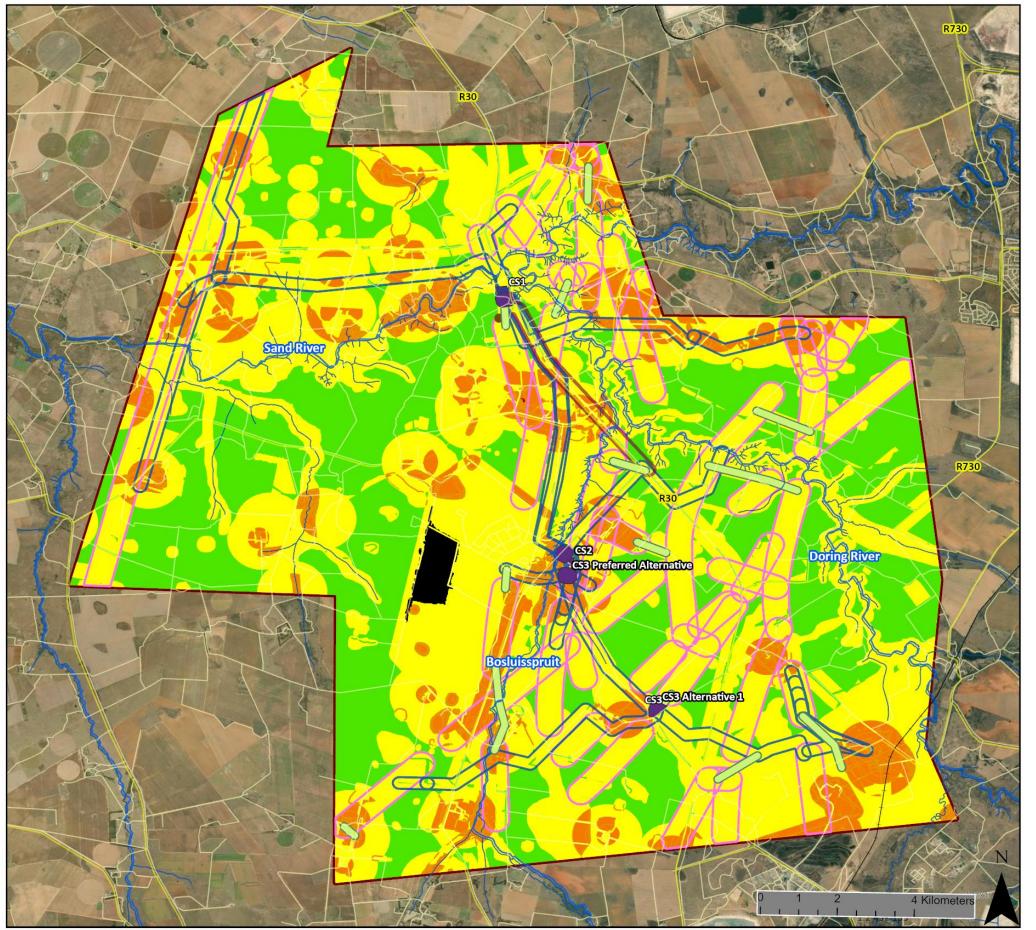
Date: 2022/07/19 EIMS Ref: Locality Compiled: CM Reviewed: BW Approved: LW



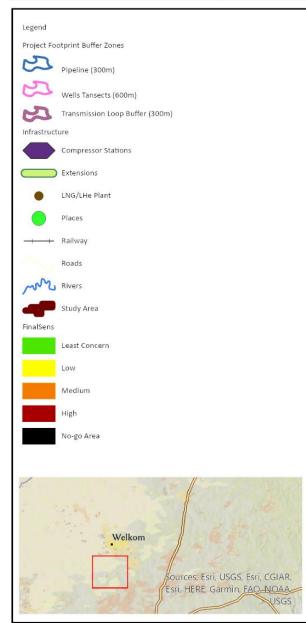
Cadastral Map



Sensitivity Map



Scoping Phase: Combined Sensitivity Map 1473 Tetra4 Cluster 2 Project



Data Sources:

CSG; ESRI, SANBI, DHSWS Coord System: GCS WGS 1984

Datum: WGS 1984 Units: Degree

Ref: Scoping Sensitivity

Date: 2022/06/29

EIMS Ref: Sensitivity Baseline

Compiled: CM Reviewed: BW Approved: LW



Infrastructure Examples







Planning/Construction Impact Assessment

According Increase in all an author impraces due to construction of the consplication of the construction of the construct	Discipline	Impact	Phase	Pre-mitigation ER	Post-mitigation ER	Final score
Control Cont	Air Quality	Increase in air quality impacts due to construction of the road/pipeline	Construction	-9 10	-6.8	-8
Circum Charge Circum Charge risk due to Shore in \$2 construction 4 c						
Second	Climate Change					
Consequence of the content and solution of the Poter and Compressor Stations 2 1.5 2 2						
Gourdonies des caracterior and distance de lo comministration country Control Cont	Noise					
Carbinophone Contraction can be constructed care meet on groundesser suits Carbinophone						
Contemporary Cont	Geobydrology					
Contentional or anotherwise requires door to find a state of the content of the						
Pythodogy Pythodogy Loss of watercourse vegletation Construction Constr	, ,					
Sommaries confarmation						
Surface Vaser Surface Vaser Surface	Hvdrology					
Alexandron of the river banks and river bank Construction -8.8 -3.5 -4 -4 -4 -4 -4 -4 -4 -						
Martiage Particular of unufal granumes Constitution 16						
Personation				-3		
Page	Heritage &					
Impact on patienteningry	Palaeontology					
Visual		Impact on palaeontology		-18	-8	-11
Nulsance factor due to increase in ambient dust and noise levels						
Chargos in Eval patterns Construction 13 9 10		1				
Impacts on Inveltinous de University of Contractors						
Impacts on salety and security of local residents						
Impacts on secolal Senior to Operate Construction 15	Social					
Impacts on the social license to operate Construction 1-12 11 14						
Secondary aconomic apportunities						
Impact on Existing Agricultural Landscape Character						
Impact on Existing Natural Landscape Character						
The visual impact on views from local roads Construction 48 5.3 46						
The vicual impact on views from local homesteads due to Liphing	Visual	The visual impact on views from local roads		_		
Temperary disturbance of wildlife due to increased human presence and use of machinery and/or vehicles						
machinery and/or vehicles						
Introduction of alian species, especially plants		machinery and/or vehicles.	•	-3.5		-2
Encision due to storm water runoff and wind Construction 7.5 6.8 -8 -8	T(2.1					
Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, light, dust, ubration and poaching). Construction C	Terrestriai					
Soils						
Construction of pipelines and transmission loop						
Exploration Wells - Habitat Planning 4 2.3 3 3 2 2 2 2 2 2 2	Soils					
Exploration Wells - Flow Planning -3 -1.5 -2		Exploration Wells - Habitat		-4	-2.3	-3
Pipelines and Transmission loop - Habitat						
Pipelines and Transmission loop - Water Quality Construction 3.5 3.5 3.5 4.4		•				
Compressors Station C81 - Habitat		•				
Compressors Station CS1 - Water Quality Construction -3.5 -3.5 -4						
Compressors Station CS1 - Flow Construction -3 -3 -3 -3 -3 -3 -3 -						
Compressors Station CS1 - Habitat Construction -3 -3 -3 -3 -3 -3 -3 -						
Compressors Station CS1 - Flow Construction -3 -2.5 -3 -3		Compressors Station CS1 - Habitat	Construction	-3	-3	
Compressors CS2 - Habitat						
Compressors CS2 - Water Quality						
Compressors CS3 - Habitat				-3.5	-3.5	-4
Compressors CS3 - Habitat Construction -3.8 -3 -3 -3 -3 -3 -3 -3 -	Wetlands					
Compressors CS3 - Flow						
Compressors CS3 - Water Quality						
Compressors CS3 - Flow						
Powerlines - Habitat						
Powerlines - Water Quality						
Access Roads - Habitat						
Access Roads - Water Quality						
Access Roads - Flow						
LNG/LHe Plant - Water Quality Construction -3.5 -2.5 -3 LNG/LHe Plant - Flow Construction -3 -2.5 -3 EMARK Forex savings Construction 16 16 18 Employment Impacts Construction 13 13 15 Forex savings Construction -9.8 -9.8 -11 Fiscal Income Construction 12 12 14 Economic development per capita Construction 15 15 17 Country and Industry Competitiveness Construction 16 16 18 Black Economic Transformation Construction 14 14 16 Alternative Land-use Construction 8.75 8.75 10 Need and Desirability Construction 15 15 17		Access Roads - Flow	Construction	-3.5	-2	-2
LNG/LHe Plant - Flow Construction -3 -2.5 -3 GGP Impact Construction 16 16 18 Employment Impacts Construction 13 13 15 Forex savings Construction -9.8 -9.8 -11 Fiscal Income Construction 12 12 14 Economic development per capita Construction 15 15 17 Country and Industry Competitiveness Construction 16 16 18 Black Economic Transformation Construction 14 14 16 Alternative Land-use Construction 8.75 8.75 10 Need and Desirability Construction 15 15 17						
Economic GGP Impact Construction 16 18 Employment Impacts Construction 13 13 15 Forex savings Construction -9.8 -9.8 -11 Fiscal Income Construction 12 12 14 Economic development per capita Construction 15 15 17 Country and Industry Competitiveness Construction 16 16 18 Black Economic Transformation Construction 14 14 16 Alternative Land-use Construction 8.75 8.75 10 Need and Desirability Construction 15 15 17	Economic	•				
Forex savings Construction -9.8 -9.8 -11 Fiscal Income Construction 12 12 14 Economic development per capita Construction 15 15 17 Country and Industry Competitiveness Construction 16 16 18 Black Economic Transformation Construction 14 14 16 Alternative Land-use Construction 8.75 8.75 10 Need and Desirability Construction 15 15 17		GGP Impact	Construction	16	16	18
Fiscal Income Construction 12 12 14 Economic development per capita Construction 15 15 17 Country and Industry Competitiveness Construction 16 16 18 Black Economic Transformation Construction 14 14 16 Alternative Land-use Construction 8.75 8.75 10 Need and Desirability Construction 15 15 17						
Economic Economic development per capita Construction 15 15 17 Country and Industry Competitiveness Construction 16 16 18 Black Economic Transformation Construction 14 14 16 Alternative Land-use Construction 8.75 8.75 10 Need and Desirability Construction 15 15 17						
Black Economic Transformation Construction Construction Construction Alternative Land-use Construction Construction Construction Example 16 18 16 18 16 16 18 16 16 18 16 16				15	15	17
Alternative Land-useConstruction8.758.7510Need and DesirabilityConstruction151517						
Need and Desirability Construction 15 15 17						
					15	
		Impact on individual farmland values				

Operational Impact Assessment

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Discipline	Impact	Phase	Pre-mitigation ER	Post-mitigation ER	Final score
Air Quality	Increase in air quality impacts due to the operation of vehicles on unpaved roads	Operation	-12	-7.5	-8
	Increase in air quality impacts due to operation of the booster stations	Operation	-12	-8.3	-8
	Increase in air quality impacts due to operation of the plant	Operation	-7.5	-7.5	-8
Climate Change	Climate Change risk due to Scope 1 & 2 construction Increase in noise levels due to Blower Station operation	Operation Operation	-12 -9	- <u>11</u> -6	-15 -6
Noise	Increase in noise levels due to Plant and Compressor Station operation	Operation	-9	<u>-6</u>	-6
	Migration of saline groundwater from the deep, fractured aquifer to the overlying,				
	potable aquifer(s) during the gas production phase.	Operation	-18	-12	-15
	Migration of stray gas from the deep, fractured aquifer to the overlying, potable	Operation	-18	-12	-15
	aquifer(s) during the gas production phase.	Operation	10	12	10
	Groundwater pollution as a result of wastewater spills and seepage from the	Operation	-12	-7.5	-9
Geohydrology	evaporation dams. Poor quality leachate may emanate from the plant footprint area which may have a	<u>'</u>			
(Groundwater)	negative impact on groundwater quality.	Operation	-12	-7.5	-9
(Grodinariator)	Mobilisation and maintenance of heavy vehicle and machinery on-site may cause	0	0.0	4.5	0
	hydrocarbon contamination of groundwater resources.	Operation	-8.3	-4.5	-6
	Poor storage and management of hazardous chemical substances on-site may cause	Operation	-12	-7.5	-9
	groundwater pollution.	Орогалогі	12	7.0	Ŭ .
	Leakage of harmful substances from tanks, pipelines or other equipment may cause	Operation	-12	-7.5	-9
	groundwater pollution. Erosion	Operation	-5.5	-2.8	-3
Hydrology (Surface Water)	Stormwater contamination	Operation	-9	-3.5	-4
	Alien and/or Invasive Vegetation	Operation	-9.8	-4	-5
	Impact on livelihoods	Operation	-20	-15	-21
	Impact of servitudes on land values	Operation	-21	-15	-21
	Damage to farm roads, existing services, and infrastructure	Operation	-14	-13	-16
	Impacts on safety and security of local residents	Operation	-19	-14	-18
Social	impacts on sense and spirit of place	Operation	-20	-20	-28
	Impacts on the social licence to operate	Operation	-15	13	16
	Public perceptions about safety associated with gas production Contribution to economy of South Africa	Operation Operation	-12 22.5	-6.8 23.8	-7 27
	Secondary economic opportunities	Operation	13	18.8	21
	Potential opportunity for education, skills development, and training	Operation	13	18.8	21
	Impact on Existing Agricultural Landscape Character	Operation	-10	-9	-10
	Impact on Existing Natural Landscape Character	Operation	-7.5	-3.5	-4
Visual	The visual impact on views from local roads	Operation	-11	-7.5	-8
	Change of Natural of Views from Homesteads	Operation	-11	-6.8	-8
	The visual impact on views from local homesteads due to Lighting	Operation	-11	-1.8	-2
	Environmental pollution due to potential leaks, discharges, pollutant leaching into the	Operation	-9	-5.5	-6
	surrounding environment Continued fragmentation, further loss and fragmentation of the vegetation community	Operation	-11	-8.3	-10
	Vegetation loss due to erosion and encroachment by alien invasive plant species	Operation	-8.3	-4.5	-5
T	Potential leaks, discharges, pollutant from activities leaching into the surrounding				
Terrestrial	environment	Operation	-9	-7.5	-8
	Continued displacement and fragmentation of the faunal community (including threatened or protected species) due to ongoing anthropogenic disturbances (noise, dust and vibrations) and habitat degradation/loss (litter, road mortalities and/or poaching).	Operation	-12	-5.5	-6
0.11	Operation of Compressor and Wells	Operation	-8.3	-5.5	-6
Soils	Operation of pipelines and transmission loop	Operation	-7.5	-5	-6
	Pipelines and Transmission loop - Habitat	Operation	-4	-2.5	-3
	Pipelines and Transmission loop - Water Quality	Operation	-3.5	-2	-2
	Pipelines and Transmission loop - Flow	Operation	-3	-1	-1
	Compressors Station CS1 - Habitat	Operation	-9.8	-6	-7
	Compressors Station CS1 - Water Quality Compressors Station CS1 - Flow	Operation Operation	-3.5 -4	-3.5 -4	-4 -4
	Compressors Station CS1 - Flow Compressors Station CS1 - Habitat	Operation	-6.8	-3.5	-4
	Compressors Station CS1 - Water Quality	Operation	-3.5	-3.5	-4
	Compressors Station CS1 - Flow	Operation	-3	-1	-1
	Compressors CS2 - Habitat	Operation	-8.3	-3	-3
	Compressors CS2 - Water Quality	Operation	-3	-2	-2
	Compressors CS2 - Flow	Operation	-4.5	-2	-2
Motlanda	Compressors CS3 - Habitat	Operation	-7.5 2.5	-4 2.5	-5 4
Wetlands	Compressors CS3 - Water Quality Compressors CS3 - Flow	Operation Operation	-3.5 -4	-3.5 -4	-4 -4
	Compressors CS3 - Flow Compressors CS3 - Habitat	Operation	- -4 -7.5	-4	- 4 -5
	Compressors CS3 - Mater Quality	Operation	-3.5	-3.5	-4
	Compressors CS3 - Flow	Operation	-4	-4	-4
	Powerlines - Habitat	Operation	-5	-3.5	-4
	Powerlines - Water Quality	Operation	-1	-1	-1
	Powerlines - Flow	Operation	-1	-1.3	-1
	Access Roads - Habitat	Operation	-9	-4.5	-5
	Access Roads - Water Quality	Operation	-5	-4 2.5	-4
	Access Roads - Flow LNG/LHe Plant - Habitat	Operation Operation	-5 -4.5	-3.5 -4	-4 -4
	LNG/LHe Plant - Habitat LNG/LHe Plant - Water Quality	Operation	-4.5 -3.5	-3.5	-4 -4
	LNG/LHe Plant - Flow	Operation	-3.3	-3.5	-4
Economic	GGP Impact	Operation	23.8	23.8	33
	Employment Impacts	Operation	17	17	23
	Forex savings	Operation	18	18	25
	Fiscal Income	Operation	17	17	23
	Economic development per capita	Operation	17	17	23
	Country and Industry Competitiveness Black Economic Transformation	Operation	20	20 16	28 22
	Alternative Land-use	Operation Operation	16 11.3	11.3	15
	Need and Desirability	Operation	20	20	28
		Operation	-9	-9	-12
	Impact on individual farmland values	Operation			-12

Decommissioning and Rehabilitaiton Impact Assessment

Disciplina	lunnast	Dhana	Dro mitimation FD	Doct mitiration FD	Final seems
Discipline Air Quality	Impact Increase in air quality impacts due to decommissioning and closure	Phase Decommissioning	Pre-mitigation ER	Post-mitigation ER -7.5	Final score
Noise	Increase in noise levels	Decommissioning	-11	-7.5	-8
Geohydrology (Groundwater)	Migration of saline groundwater from the deep, fractured aquifer to the overlying, potable aquifer(s) during the borehole closure and decommissioning phase.	Decommissioning	-16	-9	-11
	Migration of stray gas from the deep, fractured aquifer to the overlying, potable aquifer(s) borehole closure and decommissioning phase.	Decommissioning	-16	-9	-11
	Groundwater pollution as a result of wastewater spills and seepage from the evaporation dams.	Decommissioning	-6.5	-2.3	-3
	Poor quality leachate may emanate from the plant footprint area which may have a negative impact on groundwater quality.	Decommissioning	-6.5	-2.3	-3
	De-mobilisation of heavy vehicle and machinery as part of the decommissioning phase on-site may cause hydrocarbon contamination of groundwater resources.	Decommissioning	-6.5	-2.3	-3
Hydrology	Erosion	Decommissioning	-5	-2.5	-3
(Surface Water)	Stromwater contamination	Decommissioning	-9	-3.5	-4
,	Alien and/or Invasive Vegetation	Decommissioning	-6.5 -10	-1.8 -1	-2 -1
	Impact on Existing Agricultural Landscape Character Impact on Existing Natural Landscape Character	Decommissioning Decommissioning	-5.3	-2	-2
Visual	The visual impact on views from local roads	Decommissioning	-10	-1	-1
	Change of Natural of Views from Homesteads	Decommissioning	-10	-1	-1
	The visual impact on views from local homesteads due to Lighting	Decommissioning	-8	-1	-1
	Continued encroachment of vegetation community by alien invasive plant species as well as erosion due to disturbed soils	Decommissioning	-7.5	-4.5	-5
Terrestrial	Continued displacement and fragmentation of the faunal community (including potential threatened or protected species) due to ongoing habitat degradation/loss (infringement, litter, road mortalities and/or poaching).	Decommissioning	-7.5	-4.5	-5
Soils	Decommissioning of Compressors and Wells	Decommissioning	-6	-6	-7
	Decommissioning of pipelines and transmission loop	Decommissioning	-4 -7.5	-4 -4	-5 -5
	Pipelines and Transmission loop - Habitat Pipelines and Transmission loop - Water Quality	Decommissioning Decommissioning	-7.5 -3.5	-3.5	-5 -4
	Pipelines and Transmission loop - Water Quality Pipelines and Transmission loop - Flow	Decommissioning	-3.3	-3	-3
	Compressors Station CS1 - Habitat	Decommissioning	-8.3	-5	-6
	Compressors Station CS1 - Water Quality	Decommissioning	-3.5	-3.5	-4
	Compressors Station CS1 - Flow	Decommissioning	-3	-3	-3
	Compressors Station CS1 - Habitat	Decommissioning	-3	-3	-3
	Compressors Station CS1 - Water Quality Compressors Station CS1 - Flow	Decommissioning Decommissioning	-3 -3	-3 -2.5	-3 -3
	Compressors CS2 - Habitat	Decommissioning	-4	-2.5 -4	-5 -5
	Compressors CS2 - Water Quality	Decommissioning	-3.5	-3.5	-4
	Compressors CS2 - Flow	Decommissioning	-3	-3	-3
NAZ- (I I -	Compressors CS3 - Habitat	Decommissioning	-3.8	-3	-3
Wetlands	Compressors CS3 - Water Quality Compressors CS3 - Flow	Decommissioning Decommissioning	-3.5 -3	-3.5 -3	-4 -3
	Compressors CS3 - How Compressors CS3 - Habitat	Decommissioning	-4	-4	-5 -5
	Compressors CS3 - Water Quality	Decommissioning	-3.5	-3.5	-4
	Compressors CS3 - Flow	Decommissioning	-3	-3	-3
	Powerlines - Habitat	Decommissioning	-5	-3	-3
	Powerlines - Water Quality	Decommissioning	-2	-1.3	-1
	Powerlines - Flow Access Roads - Habitat	Decommissioning Decommissioning	-2.5 -4.5	-1.3 -3	-1 -3
	Access Roads - Mater Quality	Decommissioning	-4.5	-4	-4
	Access Roads - Flow	Decommissioning	-3.5	-2	-2
	LNG/LHe Plant - Habitat	Decommissioning	-4	-3	-3
	LNG/LHe Plant - Water Quality	Decommissioning	-3.5	-2.5	-3
	LNG/LHe Plant - Flow	Decommissioning	-3 -13	-2.5	-3
	GGP Impact Employment Impacts	Decommissioning Decommissioning	-13 -13	-13 -13	-13 -13
	Forex savings	Decommissioning	-23	-23	-23
	Fiscal Income	Decommissioning	-23	-23	-23
	Economic development per capita	Decommissioning	-13	-13	-13
Economic	Country and Industry Competitiveness	Decommissioning	-18	-18	-18
	Black Economic Transformation	Decommissioning	-16	-16	-16
	Alternative Land-use Need and Desirability	Decommissioning Decommissioning	-15 -15	-15 -15	-15 -15
	Impact on individual farmland values	Decommissioning	8.25	8.25	-15 8
	GGP Impact	Rehab and closure	-23	-23	-23
	Employment Impacts	Rehab and closure	-23	-23	-23
	Forex savings	Rehab and closure	-23	-23	-23
	Fiscal Income	Rehab and closure	-23	-23	-23
	Economic development per capita Country and Industry Competitiveness	Rehab and closure Rehab and closure	-23 -15	-23 -15	-23 -15
	Black Economic Transformation	Rehab and closure	-15 -16	-15 -16	-15 -16
	Alternative Land-use	Rehab and closure	-19	-19	-19
	Need and Desirability	Rehab and closure	-18	-18	-18
	Impact on individual farmland values	Rehab and closure	8.25	8.25	8