

#	Phase	Activities	Impact/ Aspect	Management/ Mitigation Measures	Applicability	Objective	Applicable Standards	Planned Outcomes and/or Targets	Responsibility	Time Periods	Monitoring Mechanism	Monitoring Frequency
1	Planning and Design	All	Water quality baseline	The pre-production condition of the water resources must be utilised as the target for post-production closure objectives. All necessary measures must be taken to ensure that the post-production water quality as the same as pre-production baselines levels. In order to achieve this relevant water pre-construction water sampling must be undertaken to determine the baseline.	General	Reliable baseline data	SABS ISO 5667:2:1991; SABS ISO 5667:11:2009; SABS ISO 5667:3:1994	Reliable baseline for ongoing monitoring.	Tetra 4	Pre-commencement of activity	Water Monitoring Reports	Once per season
2	Planning and Design	All	Management of sensitive areas	Any drill sites or infrastructure routes that are located inside medium, high or very high sensitive sites on the sensitivity/constraint map require a site specific EMP. The EMP must address the sensitive aspects on site. Site specific EMP must be compiled by an EAP and must, where applicable, include input from professional (Pri.Nat.Sci) ecologists, cultural heritage specialists. All recommendations of the site specific EMP will be considered an extension of the requirements of this EMPR.	General	Avoidance and/or management / mitigation of sensitive environmental areas.	N/A	Site specific sensitivities incorporation into EMPr.	Tetra 4/ EAP	Pre-commencement of activity	ECO Reports	Monthly
3	Planning and Design	Pipelines	Impacts on land-use	Infrastructure routes should follow existing servitudes and farm boundaries wherever possible. Where necessary pipelines should be laid underground below plough ripping level. In the event that surface pipelines are to be utilised, written approval must first be obtained from the relevant landowner. Pipelines that will 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.	General	Minimise impacts on existing / future land use	N/A	Continued land-use.	Tetra 4	Pre-commencement of activity	ECO Reports	Monthly
4	Planning and Design	All	Environmental and safety practices	All pipelines and facilities will be designed and constructed in accordance with best practices and international gas standards.	General	Alignment with best practicable industry practice	Relevant SABS Standards, MPRDA Regulations	Designs to be signed off by suitably qualified engineer/s.	Tetra 4	Pre-commencement of activity	Annual Environmental Audit/ Internal Audits	Annual
5	Planning and Design	Exploration/ Production drilling	Impacts on land-use	The identified drill site should, where possible, not infringe on the landowners surface activities. Irrigation Pivot points should remain unaffected by infrastructure, and must be deviated around or buried to allow for continued pivot irrigation operation.	General	Minimise impacts on existing / future land use	N/A	Continued land-use.	Tetra 4	Pre-commencement of activity	ECO Reports	Once-off
6	Planning and Design	Processing facilities, Pipelines	Public safety	A hazardous installation risk assessment must be conducted prior to construction.	General	Avoid and minimise safety risks	Major Hazardous Installations Regulations; Occupational Health and Safety Act.	Legal compliance	Tetra 4	Pre-commencement of activity	ECO Reports	Once-off
7	Planning and Design	All	Impacts of Infrastructure	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.	General	Minimise disruption to existing services and infrastructure.	N/A	No damage to existing services/ infrastructure.	Tetra 4	Pre-commencement of activity	Annual Environmental Audit/ Internal Audits	Once-off
8	Planning and Design	All	Impacts on Traffic Safety	SANRAL will only allow pipelines to be laid outside the road reserve and boundary, and should preferably not be located within 10metres of such boundaries. All pipes within a distance of 60 metres from the National Road reserve will require SANRAL approval as this falls within the building restriction area of the National Road.	General	Avoid and minimise safety risks	National Road Traffic Act (Act 93 Of 1996); South African National Roads Agency Limited and National Roads Act (Act 7 of 1998); applicable road safety regulations.	SANRAL Approval (where applicable)	Tetra 4	Pre-commencement of activity	Annual Environmental Audit/ Internal Audits	Once-off
9	Planning and Design	Exploration/ Production drilling	Management of sensitive areas	Once prospective drilling sites are identified, an Environmental Assessment Practitioner (EAP) or Ecologist (registered Professional Natural Scientist) must undertake a site specific assessment to assess the site for any potential site specific environmental sensitivities prior to commencement.	General	Avoidance and/or management / mitigation of sensitive environmental areas.	N/A	Site specific sensitivities incorporation into EMPr.	Tetra 4/ EAP	Pre-commencement of activity	ECO Reports	Once-off
10	Planning and Design	Access roads	Access roads	Existing roads should be used where possible. Decisions regarding the siting/location of new roads should be done with agreement of the landowner. Fence lines should be followed as far as practical. No trees shall be removed unless authorised by a suitably qualified environmental professional. Protected tree species may not be removed, unless relocation is deemed viable by the specialist ecologist and relevant permits are obtained. Construction of drill sites and associated access roads on steep gradients shall be avoided as far as possible. In case of new access roads, adequate drainage and erosion protection in the form of off-cut berms or trenches should be provided where necessary. Access routes across rivers, streams and wetland areas should be avoided as far as possible. Where such crossings are unavoidable, the relevant authorisations must be obtained, if applicable. Minimise the frequency of vehicle travel on unsurfaced roads where possible.	General	Avoid and minimise impact associated with temporary construction facilities.	N/A	Optimise access route planning to avoid/ minimise impact. ECO Approved access plan.	Tetra 4/ ECO	Pre-commencement of activity	Approved access plan. / Monthly ECO Report	Monthly
11	Planning and Design	All	Management of sensitive areas	After any site specific assessment, the Environmental Management Programme must be amended to include any 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).	General	Avoidance and/or management / mitigation of sensitive environmental areas.	N/A	Site specific sensitivities incorporation into EMPr.	Tetra 4/ EAP	Pre-commencement of activity	ECO Reports	Once-off
12	Planning and Design	Exploration/ Production drilling	Impacts on land-use	The location of the drilling site should be done so as to impact minimally on the daily activities of the landowner. The location of the site should be consulted with the landowner. Drilling site should not be situated near visually sensitive areas or residential areas. Steep areas should be avoided.	General	Minimise disruption and interference with land-use.	N/A	Landowner agreement.	Tetra 4/ EAP	Pre-commencement of activity	Landowner agreements/ ECO Reports	Once-off

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13	Planning and Design	Exploration/ Production drilling	Disturbance/ destruction of sacred natural sites	Once final development footprints (both drilling and development footprints) are determined and confirmed for implementation, a public participation process must be undertaken during which the Interested & Affected Parties (I&APs) are invited to come forward and state whether they are aware of any sacred water sites (secret or not) located within the buffer areas recommended in the hydrology and geohydrology specialist reports. It is important to note that at this stage the I&Ps will not be requested to provide information on the exact location of such sacred sites, only whether such sites are located within these buffer areas. Care must be taken during the public participation to ensure that the cartographic and location information presented to the I&APs contains clear enough information for them to confidently recognise the positions of such proposed drilling site(s) should these be located anywhere in proximity to the properties and landscapes they have knowledge of. The presentation of such cartographic information in English, Afrikaans and Sesotho would be paramount. Should an I&AP state that such a sacred site is indeed located within the recommended buffer area of a proposed development footprint, an experienced team comprising a heritage specialist and geohydrologist must accompany the I&AP to the sacred site for confirmation purposes. The heritage specialist and geohydrologist must compile a letter to indicate the findings of their fieldwork i.e. whether such a sacred site was indeed identified within the recommended buffer area from the proposed development. All aspects relating to the location of the sacred site must be kept strictly confidential. At no stage will any information regarding the position of the sacred site (GPS 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.	Cluster 1	Avoid and/or manage/ mitigate any disturbance or destruction of sacred natural sites.	NHRA	No sacred natural sites disturbed or destroyed (photographic record and monitoring reports) without the relevant permissions and permits.	Tetra 4/ EAP	Pre-commencement of activity	Consultation records / ECO Reports	Monthly
14	Planning and Design	All	Consideration of additional production footprints on heritage sites	The planning of all additional gas production footprints must take cognisance of the heritage sensitivities depicted on the heritage sensitivity maps for Cluster 1. To the extent possible, identified heritage sensitivities must be avoided in the establishment of additional footprints. As soon as any additional gas production footprints are confirmed, a suitably qualified heritage specialist, with expertise in archaeology, must be appointed to undertake a walkthrough. The appointed heritage specialist will be responsible for undertaking heritage walkthroughs of the additional footprint areas to identify any heritage sites located there. The appointed heritage specialist will be responsible for compiling a report containing the findings of the heritage walkthroughs, assessing the heritage significance of such identified heritage sites, assessing the impact of the proposed activities on the identified heritage sites and outlining mitigation measures. The report would be a subsequent heritage impact assessment aimed specifically at the additional footprints, and must be submitted to the heritage authorities for approval.	Cluster 1	Avoid and/or manage/ mitigate any disturbance or destruction of heritage sites on additional gas production development footprints.	NHRA	Heritage survey of additional footprints.	Tetra 4/ Contractor	Pre-commencement of activity	ECO Reports/ Heritage Survey and Impact Assessment	Once-off
15	Planning and Design	All	Loss of watercourse habitat	Locate pipeline/ trunkline alignments/ compressors outside of buffered watercourses (sensitive watercourse habitat) as far as possible. Buffered watercourses within proximity to the construction footprints should be demarcated on site for the entire construction process to help indicate sensitive areas and prevent unauthorised access. Unavoidable crossings should ideally be located perpendicular to the direction of flow at the shortest possible crossing distances. Long crossings along the length of wetlands, rivers and drainage lines should be avoided as far as practically possible. Aboveground pipeline watercourse crossings that are suspended on plinths are recommended as opposed to the excavation, lowering and infilling of pipelines in watercourses. Tetra 4 should make provision in the design phase for permanent access tracks/ roads that will be required for the maintenance of the pipeline. A construction method statement should be prepared by the contractor with input from a watercourse specialists prior to the start of construction.	Cluster 1	Avoid or minimise damage to watercourse habitats.	National Environmental Biodiversity Act. National Water Act.	Minimise impact on watercourse habitats.	Tetra 4/ EAP	Pre-commencement of activity	ECO Reports	Once-off
16	Planning / Construction	All	Destruction/ damage to archaeological sites	An archaeological watching brief (monitoring of excavation during construction) must be implemented for TET 9 along the banks of the river. 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 Welgegund. 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.	Cluster 1	Avoid and/or manage/ mitigate any disturbance or destruction of archaeological sites.	NHRA	No archaeological sites disturbed or destroyed (photographic record and monitoring reports) without relevant permissions and permits. Archaeological surveys for additional development footprints.	Tetra 4/ Contractor/ ECO	Pre-commencement of activity/ ongoing- during construction	Daily inspections/ ECO Reports	Monthly
17	Planning / Construction	All	Flora and fauna direct and indirect mortality	Search and rescue of species of concern. Obtain permits for disturbance/destruction of any listed/protected species found on site. Where possible, undertake activities in previously disturbed areas and/or habitats with lower sensitivity. Where possible, locate activities on the boundaries of existing disturbance. Use existing access roads as much as possible.	Cluster 1	Avoid or minimise unnecessary damage to flora. Limit activities within Cluster 1 footprint.	National Environmental Biodiversity Act.	Avoid disturbance/destruction of species of concern- obtain relevant permits.	Tetra 4/ ECO	Pre-commencement of activity	ECO Reports/ Permit Records	Monthly
18	Planning / Construction	Exploration/ Production drilling	Reducing groundwater available to existing users.	A hydrocensus must be undertaken within a 500m 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 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 500m radius for future record. Where possible, the sustainable yields of private boreholes that fall within the zones of impact above must be determined prior to Tetra4 commencing with any groundwater abstraction. Complete a pumping test on the boreholes within the zones of impact. The testing requirements for each borehole should be evaluated based on field conditions. A sound groundwater monitoring programme must be implemented in the hydrocensus boreholes that will be affected, as well as in the newly drilled monitoring boreholes and in the gas production wells. Should the results of the monitoring programme indicate a negative impact on private groundwater users as a result of Tetra4's activities, alternative arrangements must be negotiated with the affected parties. Tetra4 must apply for a water use license in the event that groundwater abstraction for the project triggers the requirements of the National Water Act (Act 38 of 1996).	Cluster 1	Ensure groundwater abstraction for Cluster 1 is within legislated parameters and thresholds	NWA GN704 abstraction standards	Legal compliance.	Tetra 4/ ECO	Pre-commencement of activity	Water Monitoring Reports/ ECO Reports	Monthly
19	Planning / Construction	All	Loss of agricultural land	Ensure that as much of the infrastructure as possible is sited away from agricultural lands. Utilize servitudes, farm roads and any other routes to avoid sensitive areas. Ensure that pipelines are buried at sufficient depth (>1 m minimum) to avoid interference with arable agriculture activities.	Cluster 1	No unnecessary loss of agricultural land	Conservation of Agricultural Resources Act.	Minimise impact on current and future agricultural practices.	Tetra 4/ Contractor	Ongoing- during construction	ECO Reports	Monthly

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20	Planning / Construction	All	Disruption of watercourse hydrology	Pipeline crossings through wetlands and other watercourses should ideally be raised aboveground on plinths to prevent preferential flow along their length. In areas where this is not possible, trench breakers with a low hydrological conductivity should be used to reduce water movement in bedding and padding material along the buried pipeline in wetlands and other watercourses. Long and/or steep approaches that border watercourses (specifically wetlands) should receive trench breakers that will help to restrict the desiccation impact on wetlands due to preferential drainage. It is recommended that input be obtained from a geotechnical specialist or geohydrologist regarding the use and positioning of trench breakers along buried sections of the pipeline. Other crossings through depression (pan) and flat wetland require trench-breakers or other forms of underground barriers/plugs to prevent preferential drainage along the pipeline/trunkline alignment.	Cluster 1	Ensure continued watercourse integrity and functionality.	National Environmental Biodiversity Act. National Water Act.	Functioning watercourse systems represented in water monitoring records. No unlicensed or approved infrastructure within a watercourse.	Contractor/ ECO	Ongoing- during construction	ECO Reports/ Watercourse monitoring datasheets	Monthly
21	Planning / Construction	Processing facilities	Decrease in surface water quality	Design and implement a site specific stormwater management plan for the compressor and helium/CNG plant that will enable dispersed release of runoff at outlets, with outlets located outside (upslope) of buffered watercourses (where possible). ensure separation of clean and dirty water and provide for adequate dirty water containment. Ensure that sufficient ablution facilities are available on site and that septic tanks are located outside of buffered watercourses. Stabilise new channels that form as a result of headcut erosion or other forms of erosion once they are recorded.	Cluster 1	Minimise pollution and sedimentation of water resources and minimise and control erosion.	GN704. NWA Waste water discharge parameters. Norms and Standards for the Remediation of Contaminated Land and Soil Quality.	No release of effluent or pollution exceeding legal thresholds to the environment. No uncontrolled erosion.	Tetra 4/ Contractor/ ECO	Ongoing- during construction/ operation	Incident Register/ Water Monitoring Reports/ ECO Reports	Monthly
22	Planning/ Construction/ Operation	Exploration/ Production drilling	Improvement of numerical modelling results	A groundwater monitoring programme must be implemented. On-site rainfall must be measured at the Helium Plant on a daily basis. Tetra4 must undertake geophysical surveys at the remainder of the gas production wells in a similar fashion to what has been completed to date. These surveys must be used to identify additional groundwater monitoring borehole drilling targets as the project progresses. Pumping tests and/or slug tests can also be considered on private boreholes within the zones of influence discussed above that are not already equipped, provided that the geological logs are available for the boreholes (21A, 21B, 21D, 22A, 22B, 4A, 11C, 15E, 17E, 22D, 23D, 24D, 25A, 25B, 25D, OB, OC, ZA). The hydrocensus boreholes can only be tested after permission was obtained from landowners. The information obtained from the activities listed above must be interpreted and incorporated into the existing conceptual model for the project. This data as well as the results of the groundwater monitoring programme must be used to update and re-calibrate the numerical groundwater flow and contaminant transport model for the project on an annual basis.	Cluster 1	Improve groundwater impact predictions.	N/A	Refined conceptual hydrogeological model	Tetra 4	Ongoing- during planning/ construction	Water Monitoring Reports/ Pump test results/ annual revision of hydrogeological model	Annual
23	Planning/ Construction/ Operation	All	Influx of people looking for economic opportunities	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. The local area of influence should be agreed with stakeholders early on in the process.	Cluster 1	No unrealistic expectations from community regarding employment.	N/A	Stakeholder awareness of recruitment policy. Records of discussion on employment opportunities including numbers and types of jobs as well as the local area of influence discussed at CLF meetings.	Tetra 4/ Contractor	Pre-commencement of activity	Internal Audits/ employment records/ CLF Meeting Minutes/ Annual Environmental Audit	Annual
24	Planning/ Construction/ Operation	Exploration/ Production drilling	Stray gas migration affecting groundwater quality	Well design to be undertaken according to designs developed by a qualified well engineer. The existing production boreholes should be assessed and where relevant retrospectively amended to ensure suitable integrity to align with the design objectives of the MPRDA Regulations. The recommended gas well construction configuration is such that the upper 300 – 450m of the geological succession is cased off using a combination of telescopic drilling, steel casing and cementation between the well annulus and the casing towards isolating the shallow Karoo potable aquifer from the deep-seated gas production zone and the saline formation water associated with the production zone. In the unlikely event that produced water has to be extracted from gas production wells, this water should be stored in sealed containers, removed from site and disposed of to a suitable environment/waste management facility. A groundwater monitoring programme (to monitor gas pressure and potential leaks) must be implemented in the gas well, as well as in the monitoring and hydrocensus boreholes to detect dissolved methane and ethane gas. Well construction according to the relevant standards and regulations.	Cluster 1	Ensure zonal isolation through the vertical length of the well.	MPRDA regulations on well casings.	Reduce contamination of useable groundwater by saline water and/or gas intrusion.	Tetra 4	Pre-commencement of activity	Records of regulatory well tests (CBL, pressure tests, etc)/ Water Monitoring Reports/ ECO Reports	Once-off/ Annual water monitoring report.
25	Pre-construction	All	Enviro-legal compliance	Holder to obtain all necessary permits to comply with all legislative requirements.	General	Legal Compliance	N/A	Legal compliance	Tetra 4	Pre-commencement of activity	ECO Reports	Monthly
26	Pre-construction	All	Enviro-legal compliance	A heritage specialist should be appointed prior to commencing with the site establishment to identify any potential impacts on heritage features. Necessary legal processes need to be complied with.	General	Legal Compliance	SAHRA Requirements	Avoid uncontrolled destruction of heritage features.	Tetra 4	Pre-commencement of activity	ECO Reports	Monthly
27	Pre-construction	All	Impacts of cultural and heritage features	A phase 1 HIA must be completed for all new drill sites and pipeline routes.	General	Avoidance and/or management / mitigation of sensitive environmental areas.	N/A	Site specific sensitivities incorporation into EMPr.	Tetra 4/ EAP	Pre-commencement of activity	ECO Reports	Monthly
28	Pre-construction	All	Landowner Consultations	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.	General	Clear landowner consultation and understanding.	N/A	Written landowner agreements	Tetra 4	Pre-commencement of activity	Annual Environmental Audit/ Internal Audits	Annual
29	Pre-construction/ construction	All	Temporary construction camps, laydowns, offices.	The camp and office site shall be sited and fenced (where necessary) in consultation with the landowner and tenants. No camp and office site shall be situated closer than 100 meters from any stream, spring, dam or pan, and 100 meters from any residential area or farm homestead. In the event that any infrastructure is located closer than 100m from any residential area or homestead then written consent must be obtained from the relevant landowner/ occupier. The area required for the camp and site office shall be kept to a minimum, as to reduce the impact on surrounding ecology. Activities should be restricted to the agreed or fenced area. In the case where water will be required, the water supply pipelines laid down should be done in accordance to the agreement with the landowner and tenants, in such a manner that the surface and natural vegetation are not unduly disturbed (where necessary). Only legal water supplies may be utilised. An approved chemical toilet service supplier should be used to supply and maintain chemical toilets for the duration of the proposed activity on the site. Portable toilets (preferred) should be used and sited on the campsite in such a way that they do not cause water pollution, odour or other forms of pollution. Any impact such as noise, dust, bright lights etc. that may cause disturbance to landowners or tenants, will be kept to a minimum. No structures older than 60 years are to be impacted on without the necessary permits.	General	Avoid and minimise impact associated with access roads.	N/A	Optimise temporary construction facilities planning to avoid/ minimise impact. ECO Approved layout plans.	Contractor	Pre-commencement of activity	ECO Reports	Monthly

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30	Pre-construction	All	Management of sensitive species	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).	General	Avoidance and/or management / mitigation of sensitive species.	National Environmental Biodiversity Act.	No loss of sensitive species.	EAP	Pre-commencement of activity	ECO Reports	Once-off
31	Pre-construction	Construction areas	Loss of heritage features	A heritage specialist should be appointed to assess the selected site for any potential occurrence of heritage artefacts or potential archaeological sites.	General	Avoidance and/or management / mitigation of cultural and historic features.	South African Heritage Resources Act.	No unpermitted loss of disturbance of cultural and historic features.	Tetra 4/ EAP	Pre-commencement of activity	ECO Reports	Once-off
32	Construction	Pipelines	Impacts on land-use	Where applicable, the pipes will be buried between the harvesting season and the next seasons planting to minimise disturbance of the farming operations.	General	Minimise impacts on existing / future land use	N/A	Continued land-use.	Tetra 4/ Contractor	Construction	ECO Reports	Monthly
33	Construction	All	Impacts on Traffic Safety	A consulting engineer with a transportation background should be consulted in order to ensure that access features along roads are acceptable to SANRAL, and allow for the consideration and approval of safety to motorists and the general public.	General	Avoid and minimise safety risks	National Road Traffic Act (Act 93 Of 1996); South African National Roads Agency Limited and National Roads Act (Act 7 of 1998); applicable road safety regulations.	No road traffic incidents.	Tetra 4/ Contractor	Construction	Annual Environmental Audit/ Internal Audits	Once-off
34	Construction	All	Landowner Consultations	Landowners should be notified of the intention to carry out production activities at the identified drilling sites. Assess routes should be planned in consultation with relevant landowners. Areas to be disturbed or cleared (for access, pipelines and drill sites) should be communicated to the landowner prior to clearing. The relevant construction and operation scheduling must be communicated to applicable landowners. Landowners should be consulted regarding the position of the production site footprint. Agreement should be obtained from landowners, for the use of the land, water, power and final rehabilitation outcome.	General	Clear landowner consultation and understanding.	N/A	Written landowner agreements. No landowner complaints.	Tetra 4	Pre-commencement of activity	Grievance Register/ Landowner Agreements/ Monthly ECO Reports	Monthly
35	Construction	All	Management of topsoils	Topsoil should be removed from areas that are to be cleared and stockpiled separately for later use during rehabilitation. Topsoil should be stockpiled for the minimal amount of time and should not exceed 1.5m in height, or have a slope steeper than 1:2. Stockpiles should ideally not stand for longer than a period of 12 months.	General	Avoidance and/or management / mitigation of topsoils. Adequate passive rehabilitation.	Conservation of Agricultural Resources Act.	Viable topsoils for rehabilitation.	Contractor	Ongoing- during construction	ECO Reports	Monthly
36	Construction	Exploration/ Production drilling	Water pollution and waste management	<u>To mitigate the effluent from long term drilling sites (>3 years):</u> Separation pits (sumps) for wastewater and grease and oil polluted fluids should be excavated and constructed to treat wastewater; Where excavating these pits, topsoil and subsoil should be stored separately; Sump areas should be lined with PVC to prevent seepage; In order to contain non-biodegradable oil and fuel spills, drip pans or PVC lining should be provided for mobile pans and drip pans; For stationary drill rigs, thin concrete slabs and/or with PVC lining should be installed before the stationary drill rigs are erected; Sump areas should be surrounded by a berm or earth wall of at least 50 cm which can withstand heavy rainfall; and Sump areas should be constructed in such a way that clean water (stormwater) is diverted away from these areas. <u>To mitigate effluent from short term drillings sites (<3 years):</u> The topsoil layer of the surface area required for the drill should be excavated and stored according to accepted topsoil management practices; A contiguous impervious PVC layer (e.g. large silage sheets) is placed under the drill (within the excavated area) to collect any spills; Spills of hazardous substances should be collected and disposed of according to the approved EMPR requirements at a suitably licensed facility; Collected spills from the drill must not be allowed to contaminate the soils and/or the closed water system utilised for the drilling fluids; and it is recommended that where possible, closed, above ground tanks are utilised for future drilling as opposed to sumps/pits.	General	Control effluent and waste to minimise impact on environment.	DWS Waste water discharge parameters. Norms and Standards for the Remediation of Contaminated Land and Soil Quality.	No release of effluent or pollution exceeding legal thresholds to the environment.	Tetra 4/ Contractor	Ongoing- during construction	Incident register/ ECO Reports	Daily
37	Construction	Construction areas	Stormwater control and management	All clean water should be diverted away from the site. Minimize the area that is disturbed during production activities in order to minimize the potential stormwater disturbance and to reduce the sediment loads to receiving water courses. Adequate drainage and erosion protection in the form of cut-off berms or trenches should be provided where necessary.	General	Minimise pollution and sedimentation of water resources and minimise and control erosion.	GN704; Conservation of Agricultural Resources Act.	No release of effluent or pollution exceeding legal thresholds to the environment. No uncontrolled erosion.	Contractor	Ongoing- during construction	ECO Reports	Monthly
38	Construction	All	Noise, vibration, visual and dust impacts	The contractor must prevent labourers from loitering in the area and causing noise disturbance. Ensure that all equipment is in a good working condition to ensure that no additional noise is admitted from them. Light impact should be kept to a minimum (e.g. use of full cut-off lighting fixtures if necessary). Retain vegetation where possible to maintain its natural noise and visual screening function. Reduce speed limit on gravel roads to reduce noise generation.	General	Avoid or minimise dust and noise from vehicles and production machinery. Minimise visual disturbance from lights and production infrastructure. Avoid or minimise traffic accidents.	National Noise Control Regulations (GN R154 of 1992) and SANS 10103:2008.	No nuisance complaints. Existing roads, vehicles and machinery well maintained.	Tetra 4/ Contractor	Ongoing- during construction/ operation	ECO Reports/ Incident Register/Grievance Register	Monthly
39	Construction	All	Fugitive emissions (dust) from exploration/production drilling	In controlling vehicle entrained particulate matter, it is recommended that water (at an application rate of 2 litre/m2-hour), be applied on all unpaved road sections to ensure a minimum of 50% control efficiency (CE). In addition, binding agents or chemical suppressants should be considered for application on all unpaved road sections. The need for dust control to be informed by the ECO.	Cluster 1	Avoid or minimise dust from exploration/production activities.	SANS 1929; National Dust Control Regulations (GN827/2013),	No unmitigated dust complaints.	Contractor/ ECO	Ongoing- during construction	Daily inspections/ ECO Reports	Daily
40	Construction	All	Loss of farm labour to the Cluster 1 project	If any farm labourers apply for positions at Tetra 4 or one of its contractors, Tetra 4 or the contractor must ensure that the labourer is aware that the position may only be temporary and what the long term consequences of taking the position are.	Cluster 1	Farm labourers aware of employment timeframes and long term implications.	N/A	Employee awareness of the employment timeframes, represented in employment records.	Tetra 4/ Contractor	Ongoing- during construction	Internal Audits/ Employment contracts/ Annual Environmental Audit.	Monthly
41	Construction		Potential for conflict between local residents and newcomers about economic opportunities.	Preference for employment should be given to the local community. The recruitment policy must be communicated openly and made available to the public if requested.	Cluster 1	Avoid any conflict stemming from the Cluster 1 project in the community as far as possible.	N/A	Employment policy and local area of influence available upon request. Records of discussions on employment opportunities including numbers and types of jobs as well as the local area of influence discussed at CLF meetings.	Tetra 4/ Contractor	Ongoing- during construction	Internal Audits/ ECO Reports/ CLF meeting minutes	Annual

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42	Construction	All	Loss / destruction of natural habitat	Where possible, locate infrastructure in previously disturbed places and/or habitats with a lower sensitivity score. Rehabilitate disturbed areas as soon as possible. Control alien plants.	Cluster 1	Avoid, limit habitat loss. Disturbance limited to Cluster 1 footprint.	National Environmental Management Biodiversity Act. Conservation of Agricultural Resources Act.	Activities within production footprint. Tetra 4/ Contractor Photographic record of existing natural habitat extent.	Tetra 4/ Contractor	Pre-commencement of activity/ Ongoing	ECO Reports	Monthly
43	Construction	All	Disturbance/ destruction of graves (including possible stillborn and unmarked graves)	Where construction activities are closer than 50m 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. For destruction of possible stillborn and unmarked graves the following mitigations apply: written notification to SAHRA that reconnaissance excavation will be undertaken; reconnaissance excavation (archaeological test excavation by hand) of the structure(s) to assess whether any graves are indeed located here; and should evidence for graves be found, a comprehensive grave relocation procedure must be implemented.	Cluster 1	Avoid and/or manage/ mitigate any disturbance or destruction of graves including possible unmarked and stillborn graves.	NHRA	No graves disturbed or destroyed (photographic record and monitoring reports) without relevant permitting.	Tetra 4/ Contractor/ ECO	Ongoing- during construction	Daily inspections/ ECO Reports	Monthly
44	Construction	All	Disturbance/ destruction of cemeteries	The final development footprint, whether it entails the in-field south (Alternative P4) pipeline, the in-field north (Alternative P2) pipeline or the trunkline (ST23 to Sibanye), must be re-aligned where possible to allow for a buffer area between each cemetery and the development footprint area. A buffer area of at least 50m between each cemetery and the development footprint area is preferred. In cases where such a 50m buffer area would not be possible, the buffer area can be reduced. However, with the exception of the cemetery at TET 16, this reduced buffer area may never be less than 25m. Furthermore, all construction work undertaken at distances of between less than 50m and 25m from such identified cemeteries, must be monitored by a heritage specialist/ rchaeologist. Since no development alternatives were possible to the proposed pipeline in proximity to TET 16 other than to place the pipeline footprint on the northern side of the farm road which runs along the fence located north of the cemetery. This means that the pipeline development here will be located roughly 12m from the nearest grave at TET 16. On the condition that the development activities here remain at least 10m from the nearest grave at the cemetery, without any machinery or activities undertaken across or south of the farm fence located here, the development of the pipeline here may be allowed. Please note that any construction work undertaken here at distances closer than 50m from the cemetery, must again be monitored by a heritage specialist/archaeologist. Moreover, the placement of the development footprints for the six proposed well positions at F1, F2, F3, F4, F5 and F6 as well as the proposed compressor site at ST23 must be done in such a way that a buffer area of at least 50m is allowed between these development footprints and the heritage sites identified, where possible. Should any construction be required closer than 50m of a cemetery, a heritage specialist should be consulted to monitor the excavation during construction and necessary permission from SAHRA obtained, where applicable.	Cluster 1	Avoid and/or manage/ mitigate any disturbance or destruction of cemeteries.	NHRA	No cemeteries disturbed or destroyed (photographic record and monitoring reports) without relevant permitting.	Tetra 4/ Contractor/ ECO	Ongoing- during construction	Daily inspections/ ECO Reports	Monthly
45	Construction	All	Disturbance/ destruction of Stone Age sites	Ensure that the placement of the development footprints of the six proposed well positions as well as the one compressor site at ST23 are done in such a way that a buffer of undeveloped space of at least 50m is maintained between the development footprints and these sites, where possible. Where construction activities are closer than 50m 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.	Cluster 1	Avoid and/or manage/ mitigate any disturbance or destruction of Stone age sites.	NHRA	No Stone Age sites disturbed or destroyed (photographic record and monitoring reports). Where any disturbance is anticipated, records of the relevant permits available on site. Records of	Tetra 4/ Contractor/ ECO	Ongoing- during construction	Daily inspections/ ECO Reports	Monthly
46	Construction	All	Disturbance/ destruction of historic sites and structures	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. An archaeological watching brief (monitoring of excavation during construction) must be implemented for the identified heritage feature TET 9 (a concrete drift and adjacent bridge) along the banks of the Sand River at Blaauwdrift.	Cluster 1	Avoid and/or manage/ mitigate any disturbance or destruction of historic sites and structures.	NHRA	No historic sites or structures disturbed or destroyed (photographic record and monitoring reports) without relevant permissions and permits.	Tetra 4/ Contractor/ ECO	Ongoing- during construction	Daily inspections/ ECO Reports/ Archaeological monitoring report.	Monthly
47	Construction	All	Disturbance/ destruction of palaeontological sites	Two areas have been identified where a pipeline route will traverse potentially sensitive alluvial deposits ranging in thicknesses between 4 m and 15 m at the Bosluisspruit (GPS coordinates 28°11'4.46"S 26°43'54.24"E) and the Sand River (GPS coordinates S 28° 7' 4.33" E 26° 43' 9.88"E). Any excavation exceeding a depth of 1m into these overbank deposits will require monitoring by a palaeontologist during the construction phase of the pipelines. It is advised that a palaeontologist is brought in <u>once</u> to monitor trench excavations into the overbank sediments at the Bosluisspruit and Sand River crossings before the pipeline is installed. The palaeontologist must apply for a valid permit from SAHRA for the collection/removal of fossils encountered during the excavations. For the proposed surface infrastructure, it is advised that a palaeontologist is brought in <u>on one occasion</u> to train the ECO of the project to identify potential fossil remains in the unlikely event of fossil exposure. If fossils are encountered and reported, a palaeontologist must be appointed to remove the fossils after applying for a valid collection permit from SAHRA.	Cluster 1	Avoid and/or manage/ mitigate any disturbance or destruction of palaeontological sites.	NHRA	No palaeontological sites disturbed or destroyed (photographic record and monitoring reports). Where any disturbance is anticipated, records of the relevant permits available on site.	Tetra 4/ Contractor/ ECO	Ongoing- during construction	Daily inspections/ ECO Reports	Daily
48	Construction	All	Disruption of aquatic communities	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. Use existing access roads/tracks as far as possible. 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. . 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. No perched flumes should be present in temporary construction running tracks and/or permanent access tracks. In the case of aboveground pipelines, the pipeline should not be located 'flush' along the surface profile of the watercourse with no gap between the natural ground level and the pipeline. Aboveground pipelines should rather be suspended on plinths of a sufficient height that will allow the free movement of indigenous fauna present within the study area, such as tortoises, as recorded in the Bosluisspruit channel near existing well SPG3.	Cluster 1	Ensure continued aquatic habitat and community integrity.	National Environmental Biodiversity Act. National Water Act.	Avoid and manage disruption of aquatic communities.	Contractor/ ECO	Ongoing- during construction	ECO Reports/ Watercourse monitoring datasheets	Monthly

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49	Construction	All	Watercourse erosion	Prevent the use of only one or two flume pipes in access/running tracks located in watercourses, specifically unchannelled valley bottom wetland and seep wetlands where concentrated flows can result in headcut development and the formation of a channel. Surface flows should also be spread out in channelled watercourse crossings though the use of several flume pipes to prevent channel incision and scour erosion. Access tracks should be maintained during the entire construction process and removed once construction is completed. Flume pipes should be monitored and kept free of blockages. Construction in watercourses should ideally occur during the dry season. Any new erosion features identified should be stabilised during the construction process (soft interventions such as hay bales, rock packs, runoff control berms and 'bio-socks' are recommended). Erosion control features should be maintained. Keep vegetation clearing to a minimum on the adjacent slopes to prevent erosion on approaches bordering watercourses. Small temporary contour berms may be used to help control runoff on approaches should it be required. Drainage furrows that may be required to create dry working conditions should ideally be avoided as they can easily erode during high flow events. Development of a watercourse monitoring plan before the onset of the construction phase, and the development and implementation of a watercourse rehabilitation plan during the latter half of the construction phase to ensure the eroded wetlands and other watercourses are stabilised and rehabilitated. Dewatering discharges at construction sites should be done in a silt bay to prevent erosion and sedimentation in adjacent watercourses. Runoff from the construction footprint should be controlled on site to prevent concentrated point releases of water into downslope watercourses. Care needs to be taken not to initiate or aggravate erosion in watercourses.	Cluster 1	Ensure continued watercourse services and functionality.	National Environmental Biodiversity Act. National Water Act.	Avoid and control erosion within watercourses.	Contractor/ ECO	Ongoing- during construction	ECO Reports/ Watercourse monitoring datasheets/ Water monitoring reports	Monthly/ Annual Water Monitoring Report
50	Construction	All	Noise impacts from construction activities	The use of smaller/quieter equipment when operating near receptors. Ensuring that equipment is well maintained and fitted with the correct and appropriate noise abatement measures. Engine bay covers over heavy equipment could be pre-fitted with sound absorbing material. Heavy equipment that fully encloses the engine bay should be considered, ensuring that the seam gap between the hood and vehicle body is minimised. Where possible only undertake construction activities during the day. If night-time activities are required, do not operate closer than 500m from any sensitive receptors. Ensure a good working relationship between the developer and all potentially noise-sensitive receptors. Communication channels should be established to ensure prior notice to the sensitive receptor if work is to take place close to them (especially if work is to take place within 500m from them at night). 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. 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.	Cluster 1	Avoid, minimise and remediate noise nuisance.	National Noise Control Regulations (GN R154 of 1992) and SANS 10103:2008.	No nuisance complaints.	Tetra 4/ Contractor/ CLO	Ongoing- during construction	ECO Reports/ Incident Register/Grievance Register	Monthly
51	Construction	All	Potential opportunity for education, skills development, and training	Tetra 4 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. Tetra 4 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 Social and Labour Plan (SLP) must be implemented.	Cluster 1	Implement measures to support and promote local education, skills development and training.	MPRDA	Compliance with SLP requirements.	Tetra 4/ CLO/ ECO	Ongoing- during all phases	Annual Environmental Audit/ Performance Assessment.	Annual
52	Construction	All	Increase in social pathologies such as prostitution, sexually transmitted diseases, teenage pregnancies and alcohol and substance abuse	Toolbox talks should include talks about the impact of promiscuous behaviour. Tetra 4 should develop an in-house infectious diseases strategy to address health issues within the workforce, and align the strategy with a community HIV strategy implemented by a non-profit organisation. Local schools and farm worker communities must be included in the strategy. The strategy should include voluntary counselling and testing and training of peer educators. A workforce code of conduct should be developed to maximise positive employee behaviour in the local community, and optimise integration.	Cluster 1	Avoid teenage pregnancies, onset of pathologies and sexually transmitted diseases related to commencement of Cluster 1 activities.	N/A	Records of toolbox talks on health issues and responsible sexual behaviour. HIV strategy. Workplace code of conduct for contactors and employees.	Contractor/ CLO	Ongoing- during construction	Training Register/ Monthly ECO Reports/ Annual Environmental Audits	Monthly
53	Construction	All	Establishment of informal settlements close to the project area	No informal settlers should be allowed on private property within the development area. If any person erects an illegal structure the landowner and police should be informed immediately and asked to remove the structure.	Cluster 1	Avoid informal settlements on site.	N/A	No new informal settlements established within the project area as a result of Tetra 4 activities.	Contractor/ ECO	Ongoing- during construction	Daily diary/ Incident register/ ECO Reports/ Grievance Register	Daily
54	Construction	Pipelines	Safety aspects associated with open trenches (people and animals)	Open trenches to be fenced or barricaded where necessary, and should be clearly demarcated. The time that any trench remains open should be limited. Access to areas with open fences should be controlled. There must be a protocol on how to rescue a stranded animal from a trench.	Cluster 1	Avoid and minimise safety risks	Occupational Health and Safety Act.	No public accidents reported in incident register.	Contractor	Ongoing- during construction	Incident Register/ ECO Reports	Monthly
55	Construction	All	Increase sediment loads	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. 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. 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.	Cluster 1	Avoid sediment build-up from exposed soil. Ensure timely rehabilitation of disturbed areas.	Conservation of Agricultural Resources Act. NWA. NWA Waste water discharge parameters.	Minimise sedimentation.	Contractor/ ECO	Ongoing- during construction	ECO Reports/ Watercourse monitoring datasheets/ Water monitoring reports	Monthly
56	Construction	Exploration/ Production drilling	Spillage of oils, fuel and chemicals	The placement of drip trays under the drilling rigs should be implemented and recorded to minimize the contamination of waste oil from the drilling rig. Drilling fluids should be biodegradable and should be kept in a lined mud pit or surface container. Proper rehabilitation and off site removal of excess fluids should take place. Oil recovered from the drilling rigs and any vehicle on site should be collected, stored and disposed of at licenced facilities or provided to accredited vendors for recycling.	Cluster 1	Avoid, minimise and remediate pollution.	NEMWA/GN704 Waste water discharge parameters. Norms and Standards for the Remediation of Contaminated Land and Soil Quality.	No release of hazardous waste or effluent exceeding legal thresholds directly to the environment. Waste disposal certificates. Spill response procedure implemented and spill kits available on site.	Tetra 4/ Contractor	Ongoing- during construction	Incident register/ Waste disposal records/ ECO Reports	Monthly
57	Construction	All	Increased soil erosion	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. Ensure that pipeline route is re-vegetated as soon as possible after construction and that soil surface is in good condition.	Cluster 1	Avoid, minimise, and remediate erosion.	N/A	Minimise loss of topsoil through erosion.	Contractor/ ECO	Ongoing- during construction	ECO Reports	Monthly
58	Construction/ Operation	All	Loss/ management of heritage features	Should any artefacts, fossils or graves be uncovered during the production activity, the Applicant, the relevant SAHRA authority and SAPS (in the case of a grave) should be notified immediately and necessary permitting procedures followed. All activities within this area should be stopped immediately until permitted to proceed by the EAP/ECO.	General	Avoidance and/or management / mitigation of cultural and historic features.	South African Heritage Resources Act.	No uncontrolled destruction/ disturbance to cultural and/or historic features.	Contractor	Immediate	Incident register/ ECO Reports	Daily

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59	Construction/ Operation	All	Spill response and pollution clean-up	All necessary measures should be taken to prevent spills from occurring on site. However, should a spill occur, the following procedure must be followed: A spill response kit should be available on site at all times. Where potential contaminants are transported along access roads, emergency containment and mitigation measures must be developed to minimize impacts should accidental spills occur. Any spillage will be investigated and immediate action must be taken. In the event of a significant spill (>35 litres) of any hazardous substance, these must also be recorded and reported to the PASA, DWA 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 site manager should determine the exact method of treatment in consultation with a suitably qualified specialist. treatment could include the use of absorbent material or hydrocarbon-digesting substances. It is therefore, recommended that a spill kit and hydrocarbon digesting substance should be kept on site at all times. Clean up should be immediate and to the satisfaction of the ECO. Excavation of contaminated soil must involve careful removal of soil using appropriate tools/machinery to storage containers until treated or disposed of at a licensed hazardous landfill site. Materials used for the remediation of spills must be used according to product specification and guidance for use. A record of all spills and actions taken to remediate the spills should be kept at all times. Proper and frequent maintenance should be done to minimise spillage risk.	General	Avoid, minimise and remediate pollution.	NEMWA/GN704 Waste water discharge parameters. Norms and Standards for the Remediation of Contaminated Land and Soil Quality.	No release of effluent or pollution exceeding legal thresholds to the environment. Implement spill response procedure immediately.	Tetra 4/ Contractor	Ongoing- during construction/operation s.	Incident register/ ECO Reports	Monthly
60	Construction/ Operation	All	Fire safety	The contractor must take all reasonable measures to ensure that fires are not started as a result of operational activities on site, and shall also ensure that their operations comply with the Occupational Health and Safety Act (Act No. 85 of 1993). The following measures will be taken to reduce the risk of fires: No open fires are permitted on site; Every possible precaution shall therefore be taken when working with potential flammable equipment or liquids near potential sources of combustion. Such precautions include having an approved fire extinguisher immediately available at the site of any such activities; The contractor shall ensure that there is basic fire fighting equipment available on site at all times. The contractor shall appoint a member of his staff to be responsible for the installation and inspection of this equipment; and the contractor is to ensure that he/she has the contact details of the nearest fire station in case of an emergency. A fire and safety officer must be appointed as legally required. Firebreaks must also be implemented.	General	No fire incidents.	National Veld Fire Act/ Occupational Health and Safety Act	No fire damage or incidences reported	Tetra 4/ ECO	Ongoing- during construction/ Operation	ECO Reports	Daily
61	Construction/ Operation	All	Movement on site	Reduce speed limits (especially on gravel roads) to reduce dust emissions and accident risk. Keep the amount of vehicle movement on site as minimal as possible. Gates should be kept closed (unless otherwise agreed to in writing with the relevant landowner). Newly constructed access roads should be well maintained.	General	Avoid or minimise dust from vehicles, traffic accidents, and damage to existing infrastructure.	National Road Traffic Act (Act 93 Of 1996); South African National Roads Agency Limited and National Roads Act (Act 7 of 1998); applicable road safety regulations.	No traffic safety incidents or dust complaints. Existing roads well maintained.	Tetra 4/ ECO	Ongoing- during operation	Incident register/ Grievance register/ ECO Reports	Daily
62	Construction/ Operation	All	Blockage of floral and faunal seasonal and dispersal movements	Where possible, undertake activities in previously disturbed areas and/or habitats with lower sensitivity. Where possible, locate activities on the boundaries of existing disturbance. Use existing access roads as much as possible. Rehabilitate disturbed areas as soon as possible.	Cluster 1	Avoid, minimize and manage disturbance outside production activities. Allow for movement of fauna around production footprint.	National Environmental Biodiversity Act.	Continued regional floral and faunal movements.	Contractor/ ECO	Ongoing- during construction/ operation	ECO Reports	Monthly
63	Construction/ Operation	All	Pollution of wetland habitats	Control all waste sources emanating from proposed activities. Maintain minimum distances from aquatic and wetland habitats, where possible. Undertake activities in previously disturbed areas and/or habitats with lower sensitivity.	Cluster 1	Avoid, minimise and remediate pollution.	NEMWA/GN704 Waste water discharge parameters. Norms and Standards for the Remediation of Contaminated Land and Soil Quality.	No release of hazardous waste or effluent exceeding legal thresholds directly to the environment. Waste disposal certificates. Limited disturbance to sensitive habitats.	Tetra 4/ Contractor	Ongoing- during construction/ operation	ECO Reports/ Incident Register	Monthly
64	Construction/ Operation	All	Decrease in surface water quality in watercourses	Store all hazardous materials (Incl hydrocarbons) in a banded area, outside of buffered watercourses. Stripped and excavated subsoil and topsoil stockpiles should be stored outside of buffered wetland areas and be protected from erosion. This may not be possible for long wetland crossings in seep and other wetlands, in which case topsoil can be stored on low berms within the wetland on geotextile material. Topsoil and subsoil should however be protected from erosion. Approaches that border watercourses, particularly those along steep and long slopes, should receive runoff control measures to prevent siltation and concentrated flow into watercourses. Inspect vehicles for leaks and repair all leaks immediately. Any generators used in watercourses should be used with a functional drip tray. Ensure that sufficient ablution facilities are available on site and that they are located outside of buffered watercourses. Stabilise new channels that form as a result of headcut erosion or other forms of erosion once they are recorded. 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. Sediment deposition events into watercourses should be evaluated by an experienced ECO/ wetland specialist and based on the magnitude of the impact recommendations can be made regarding the removal of deposited material.	Cluster 1	Ensure continued watercourse services and functionality.	NWA. NWA Waste water discharge parameters. Norms and Standards for the Remediation of Contaminated Land and Soil Quality.	Avoid and control pollution and water quality within watercourses.	Contractor/ ECO	Ongoing- during construction	ECO Reports/ Watercourse monitoring datasheets/ Water monitoring reports	Monthly/ Annual Water Monitoring Report
65	Construction/ Operation	All	Potential health risks to people and animals if waste (including sewage) is not managed properly (pests e.g. rodents)	Tetra 4 must develop a waste management strategy and employ an EO/ECO that oversees all the environmental aspects of the project, especially during the construction phase. There must be a formal procedure in place on how to report incidents to ensure grievances are recorded. Education about waste management must be shared during Toolbox talks. In areas where there are lots of animals, plastic safety ribbons (hazard tape) should not be used. There should be enough portable toilets during the construction phase to ensure that the contractors do not use the bush as a toilet facility.	Cluster 1	Avoid and minimise health risks.	N/A	Waste management strategy. Training and awareness on waste management.	Tetra 4/ Contractor	Ongoing- during construction/ operation	Incident Register/ Grievance Register/ Training Register/ ECO Reports	Monthly
66	Construction/ Operation/ Decommissioning	All	Health and Safety	All personnel should be aware of the procedures to follow in the case of a health or environmental emergency such as in the case of an accidental injuries or spills. Workers should be advised on sexual transmitted diseases and preventative measures against sexual transmitted diseases should be put in place-for example provision of condoms in camp site. Personnel should be provided with safety clothing and no person should be allowed to enter construction site without prior authorization by site manager. The construction site should be surrounded with danger tape and/or other suitable safety signage in order to alert pedestrians and vehicles about the construction activity. The drill rig should be provided with necessary hazard protection systems (e.g. a gas blowout prevention system; or Washington well head).	General	Ensure worker and landowner/occupier health and safety.	Occupational Health and Safety Act.	No health and safety incidents. Efficient and timeous response to incidents.	Tetra 4/ Contractor	Ongoing- during construction/ operation/ decommissioning.	Incident register/ Daily inspections	Daily

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74	Construction/ Decommissioning	All	Loss/change of sense of place due to visual impacts and project activities	Re-vegetation of exposed areas as soon as possible. Dust suppression methods applied where necessary to reduce visual impact of dust. Lighting on site should be pointed downwards and away from oncoming traffic and nearby residents. Create a community liaison forum (CLF) that communicates the mitigation and monitoring measures to the affected parties. This forum can also act as a platform to discuss environmental issues. The CLF can meet twice a year to discuss all the concerns about the project and to share new project information. It can be an important aspect assisting Tetra 4 with obtaining a social license to operate. Successful rehabilitation will go a long way in recreating a rural sense of place.	Cluster 1	Avoid, minimise and remediate any visual, noise, dust and other nuisance impacts on affected land surrounding properties	National Noise Control Regulations (GN R154 of 1992) and SANS 10103:2008.	No nuisance to landowners. No damage to property/infrastructure. Safety of community. Good relations with community and landowners.	Tetra 4/ CLO/ ECO	Ongoing- during construction/ operation	Incident register/ Grievance Register/ ECO Reports	Monthly
75	Construction/ Operation/ Decommissioning	All	Watercourse erosion	Use existing access roads as far as possible. Unavoidable new permanent access roads/tracks in watercourses should be designed to prevent erosion downstream of the crossings by using several flume pipes, preferably culverts, or other structures, such as concrete fords. All temporary and permanent vehicle access tracks/roads in watercourses will require approval from DWS in the form of a Water Use License. New permanent access roads/tracks should be located along existing infrastructure footprints as far as possible and at areas that will enable the shortest crossing distance through watercourses. Long crossings along the length of watercourses (parallel to its flow direction) should be avoided. Remnant erosion features that remain after the rehabilitation phase should be stabilised with the assistance of a civil engineer with wetland rehabilitation experience. Rehabilitation interventions for remnant erosion features should be based on a site survey and a formal design with quality control measures during its implementation. Input from a wetland specialist with rehabilitation experience is also advised. Identified permanent access tracks should be maintained during the entire operational phase of the project and blockages should be removed, while erosion features should be repaired once observed. Concrete fords (low water bridges) are preferred as crossing structures in larger watercourse channels, compared to culverts and flume pipes, which are more likely to result in erosion and require more regular maintenance. The Helium plant should receive stormwater mitigation measures at its outlets that will prevent concentrated flow. Stormwater mitigation measures and flow outlets should be located outside of buffered watercourses.	Cluster 1	Ensure continued watercourse services and functionality.	National Environmental Biodiversity Act. National Water Act.	Erosion control infrastructure in place and well maintained. Photographic record of the banks of Cluster 1 watercourse. Stormwater Management plan for processing facilities.	Tetra 4/ Contractor/ ECO	Ongoing- during construction/ operation	ECO Reports/ Watercourse monitoring datasheets/ Water monitoring reports	Monthly/ Annual Water Monitoring Report
76	Construction/ Decommissioning/ Rehab and Closure	All	Increase in social licence to operate due to management of nuisance impact	Tetra 4 should appoint a dedicated person, community liaison officer (CLO) to communicate with the landowners. The person must have enough authority and access to management to ensure that he can assist with dealing with everyday issues. Tetra 4 should establish a CLF that meets at least twice a year. The forum can be used to share information and give feedback on general and environmental issues. Before the project commences the construction programme must be shared with the affected parties.	Cluster 1	Clear landowner consultation and understanding.	N/A	CLO appointment. CLF meeting records. Ongoing communication between Tetra 4 and affected landowners.	Tetra 4/ CLO	Ongoing- during construction/ operation	ECO Reports/ Grievance Register/ CLF meeting minutes	Monthly
77	Operation	Exploration/ Production drilling and Processing facilities	Pollution prevention and usage of water sources	All contaminated water and spillage will be drained from the containment area into primary and secondary fully lined sumps. Drilling water should be kept in closed circuit and re-circulated to the drilling machine. Water condensate from the gas polishing process (Dehydration) should be treated to remove volatile compounds, before evaporation. Make up water will be introduced when required. All domestic effluent water from the site should be collected and disposed of in an appropriate and legal manner such as a French drain system which is situated not closer than 100 metres from any streams, rivers, pans, dams or boreholes. Do not exceed the estimated amount of water required for the drilling activities.	General	Minimise pollution of water resources. No wasting of water, usage to be within licensed thresholds.	National Water Act (Incl GA Provisions)	No release of effluent or pollution exceeding legal thresholds to the environment.	Tetra 4/ ECO	Ongoing- during operation	Incident register/ ECO Reports	Daily
78	Operation	All	Social issues	All areas posing risk to interface communities during the site establishment phase of the proposed development need to be properly marked and visible to reduce accidents. The health and safety of the interface communities and workers should not be compromised in any way. All gates on the landowners' property (and where relevant adjacent properties traversed) are to be closed if found closed and left open if found open. Contact with the affected parties shall be courteous at all times. The rights of the affected parties shall be represented at all times. Any impact such as noise, dust, bright lights etc. that may cause disturbance to landowners or tenants, will be kept to a minimum. Damage to infrastructure shall not be tolerated and any damage shall be rectified immediately by the contractor. A record of all damage and remedial actions shall be kept on site. Access to the production area should be strictly controlled. Labour should be transported to and from site to discourage loitering in adjacent areas and to prevent possible increase in crime or disturbance. Workers should be easily identifiable by clothing and ID badges (with clear ID photographs). Workers should carry with them at all times a letter from the applicant/employer, stating their identity, role/task description, and landline number which the landowner may phone to confirm ID and other information given by the worker. The drill site shall be fenced, where necessary to prevent any loss or injury to persons or livestock during the production phase. Fires will only be allowed in facilities or equipment specially constructed for this purpose. If required by applicable legislation, a firebreak shall be cleared around the perimeter of the camp and office sites. Sufficient ablution facilities should be made available. The applicant must take reasonable measures to prevent any disruption to the landowners use of the properties (e.g. farming). Landowners/tenants should be compensated for loss of arable land.	General	Health and safety of communities and landowners. Adherence to landowner agreements and conditions.	Occupational Health and Safety Act.	No nuisance to landowners. No damage to property/infrastructure. Safety of community. Good relations with community and landowners.	Tetra 4/ Contractor/ CLO	Ongoing- during construction/ operation	ECO Reports/ Incident Register	Monthly
79	Operation	Pipelines	Safety and nuisance impacts where trench has to be opened to repair faults	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. Open trenches to be fenced or barricaded where necessary, and should be clearly demarcated. Access to areas with open fences should be controlled. If any damage is done to the property or harvest of the landowner, they must be compensated for their losses.	Cluster 1	Avoid and minimise safety risks	Occupational Health and Safety Act.	No trenches opened for repair without timely landowner notification.	Tetra 4/ Contractor	Ongoing- during operation	Incident Register/ ECO Reports	Annual
80	Operation	All	Public perceptions about safety associated with gas production	Tetra 4 should compile a background information document (BID) explaining the process and potential risks in laymen terms. This should be distributed to local stakeholders. Special 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.	Cluster 1	Public awareness regarding gas production and potential health and safety impacts and associated mitigations in place.	Major Hazardous Installations Regulations. Occupational Health and Safety Act.	Major Hazard Installation report results available to public particularly affected landowners and occupiers. CLF meetings where concerns are addressed and any misconceptions cleared.	Tetra 4/ CLO/ ECO	Ongoing- during construction/ operation	ECO Reports/ CLF meeting minutes	Monthly/ 6 monthly
81	Operation	All	Pollution of soil profile due to leakage/spillage	Ensure that any possible source of leakage/spillage is contained and that bulk storage facilities are isolated from surrounding soils, especially wetland. Ensure that pipeline construction is done properly, taking soil characteristics (clay content and water content) into account.	Cluster 1	Avoid and minimise disturbance a pollution of soil and water resources.	NEMWA/GN704 Waste water discharge parameters. Norms and Standards for the Remediation of Contaminated Land and Soil Quality.	No release of hazardous waste or effluent directly to the environment. Waste disposal certificates. Spill response procedure implemented and spill kits available on site.	Tetra 4/ Contractor/ ECO	Ongoing- during construction/ operation	ECO Reports/ Incident Register	Monthly

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82	Operation	Exploration/ Production drilling	Contamination from leakage and spillage	The pipeline needs to be inspected regularly to find and fix any leakages. A water quality monitoring plan needs to be produced and implemented to determine any changes in the water quality. Any water (Incl condensate) generated at the conventional and unconventional well heads need to be captured in some form of dirty water storage facility. This water can be tested and treated (if needed) and used for irrigation or discharge into the environment if found to be suitable. Should the water be found to be unsuitable for irrigation or discharge into the environment, the contaminated water will be disposed of at a suitable licenced facility.	Cluster 1	Avoid, minimise and remediate pollution of soil and water resources.	NEMWA/GN704 Waste water discharge parameters. Norms and Standards for the Remediation of Contaminated Land and Soil Quality.	No release of waste or effluent exceeding legal thresholds directly to the environment. Waste disposal certificates. Spill response procedure implemented and spill kits available on site.	Contractor/ ECO	Ongoing- during construction	ECO Reports/ Incident Register/ Water Monitoring Reports	Monthly
83	Operation	All	Pollution of habitats	Control all waste sources emanating from operations activities. A defined waste management system must be implemented according to the hierarchy of waste management (avoid, reduce, reuse, recycle, dispose). All wastes generated must be stored and disposed of according to relevant legal requirements.	Cluster 1	Responsible waste management practices	NEMA/NEMWA norms and standards.	No release of effluent or pollution exceeding legal thresholds to the environment. No pollution incidents. No complaints of nuisance from waste. Waste disposal certificates.	Tetra 4	Ongoing- during construction/ operation	Annual Environmental Audit	Annual
84	All Phases	All	Interruption in services	Notice of any planned service interruptions must be given at least a day before the interruption takes place – a SMS or e-mail system can be used for this purpose.	Cluster 1	Avoid interruption in services, where necessary, provide timely notification.	N/A	Interruption notices. No service interruption complaints.	Tetra 4/ Contractor/ CLO	Ongoing- during construction/ operation/ decommissioning.	Grievance Register/ Incident reports/ ECO reports	Monthly
85	Decommissioning	Exploration/ Production drilling	Contamination from leakage and spillage	All wells should be capped to prevent the spilling of contaminated groundwater. The water quality monitoring plan should be implemented in this phase to monitor any deterioration of the water quality.	Cluster 1	Prevent contamination of groundwater.	NWA GN704/MPRDA Regulations.	All decommissioned wells capped.	Tetra 4/ ECO	Ongoing- during decommissioning	Annual Environmental Audit/ Internal Audits/ Water monitoring reports/ ECO reports	Monthly
86	Decommissioning and Closure	All	Post construction decommissioning activities	Rehabilitate area to its original landform or as agreed to by the landowner, tenants and authorities. Rip compacted surfaces where necessary as part of the rehabilitation. Re-vegetation should be done where required. The use of indigenous species to the specific area should be promoted. Weed species should be eradicated at all disturbed areas. This must be monitored for a period following rehabilitation to ensure that alien invasive plants do not establish themselves. Re-vegetation of cleared areas should occur directly after production activities are completed. Disturbed areas should be correctly compacted, ripped and graded/sloped. Regular inspections should be carried out during the entire rehabilitation process and ongoing maintenance must be implemented until the area is fully rehabilitated.	General	Successful rehabilitation.	N/A	Successful rehabilitation.	Tetra 4	Ongoing- during decommissioning and closure	ECO Reports	Monthly
87	Decommissioning and Closure	All	Final closure decommissioning	Rehabilitate area to its original landform or as agreed to by the landowner, tenants and authorities. Rehabilitation should be carried out in accordance with the approved rehabilitation plan prepared prior to commencement (where possible). Rip compacted surfaces where necessary as part of the rehabilitation. Re-vegetation should be done where required. The use of indigenous species to the specific area should be promoted. Weed species should be eradicated at all disturbed areas. This must be monitored for a period of time following rehabilitation to ensure that alien invasive plants do not establish themselves. Re-vegetation of cleared areas should occur directly after production activities are completed. Boreholes should be properly sealed after production activities have ceased in order to prevent potential dewatering of shallow aquifers as well as to avoid creating potential pathways for the transport of contaminants into aquifers. Inactive gas holes should be sealed off at least 1.5 meter below surface and covered with soil. Active gas discharge stacks should be fenced off in as small as practical areas. 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. Disturbed areas should be correctly compacted, ripped and graded/sloped. Regular inspections should be carried out during the entire rehabilitation process. Landowners/tenants should be compensated for loss of arable land, where applicable. All pipelines and other infrastructure must be removed (unless permitted under the specific approved closure plan) and the sites rehabilitated as per the closure requirements. In the event that 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.	General	Successful rehabilitation and closure of all production activities.	MPRDA Regulations	Closure certificate.	Tetra 4	Ongoing- during decommissioning and closure	ECO Reports	Monthly
88	Rehab and Closure	Exploration/ Production drilling	Well casing and/or cementation failure affecting groundwater quality	Well abandonment and plugging to comply with the requirements of the Petroleum Regulations, and accepted best practice. Tetra4 to implement well-specific plugging requirements protect the shallow potable Karoo aquifers at closure. Well design to be done by a qualified reservoir engineer who will take corrosion, pressures, temperatures, exposure times, production life and well rehabilitation into consideration. The cement seals to be pumped as a water-cement slurry down the casing to the bottom of the well, leaving a sheath of cement to set and harden. The integrity of the seals should, where applicable, be pressure tested before the next phase of drilling commences. If the well fails the pressure test, the casing will be re-cemented before drilling continues. Testing to be implemented to ensure that the plug is placed at the proper level and provides adequate protection of permeable zones, for example the fracture zones from which gas was produced and the overlying Karoo aquifers. These tests should include tagging the top of the plug. Pressure testing should be undertaken on the seal but care should be taken not to damage the seal during pressure testing. Swabbing can be undertaken to remove fluids from the well. Upon completion of the rehabilitation of the well, a surface casing vent flow test should be considered to determine whether gas or liquid or a combination thereof is escaping from the casing. If gas is detected during this test, additional seals should be designed and implemented. A groundwater and gas monitoring programme to be implemented at each well to serve as an early detection mechanism.	Cluster 1	Prevent contamination of groundwater from failed well casing/ plugging.	MPRDA Regulations. Relevant international standards.	Well casing and cementation certificates. Closure certificates.	Tetra 4	Ongoing- during rehab and closure	Annual Environmental Audit/ Internal Audits/ Water and gas monitoring reports/ ECO reports	Monthly
89	All Phases	All	Environmental Awareness	All personnel should undergo environmental awareness and induction training. A register should be kept of all attendees. Toolbox talks should be scheduled to ensure continuous environmental awareness training. Emergency procedures should be communicated and displayed prominently on the site. 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.	General	Awareness of environmental sensitivities and responsibilities.	N/A		Tetra 4/ Contractor	Weekly	Training Register/ Monthly ECO Reports/ Annual Environmental Audits	Monthly

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90	All Phases	All	Emergency Response	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.	General	Efficient and effective response to emergencies.	N/A	All staff to be informed and aware of emergency response protocols. Preparation and maintenance of an Emergency Preparedness and Response Plan.	Tetra 4	Pre-commencement of activity, and regular (at least annual) review and amendment.	ECO Reports	Monthly
91	All Phases	All	Management of flora and fauna	Vegetation should be retained as far as possible. Establish an alien invasive plant eradication programme for the control of weed species. This must be monitored for a period of time following rehabilitation to ensure that alien invasive plants do not establish themselves. Unnecessary damage or disturbance to vegetation should be prevented. No trees or shrubs should be felled or damaged for the purpose of obtaining firewood, unless otherwise agreed to with the landowner. Areas outside the footprint (including all infrastructure) should be considered as no-go areas. No faunal species are allowed to be purposefully killed. Any potential protected or sensitive areas should be clearly demarcated and noted as no-go areas.	General	Avoidance and/or management / mitigation of flora and fauna.	National Environmental Biodiversity Act/ Conservation of Agricultural Resources Act.	Develop and implement alien invasive plant eradication programme. Avoid unnecessary damage to flora and fauna.	Tetra 4/ Contractor	Pre-commencement of activity/ Ongoing	ECO Reports	Monthly
92	All Phases	All	Damage to private property	All piped, lines 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, pipes, lines and other utilities or infrastructure and movable properties, should be repaired, replaced or otherwise compensated for as agreed with the affected person.	General	Minimise and rectify damage to private property.	N/A	Avoid unnecessary damage to private property. Repair, replace, compensate for damage to private property.	Tetra 4/ Contractor	Immediate	Grievance Register	Monthly
93	All Phases	All	Water abstraction	The necessary DWA (DWS) permits should be obtained before water abstraction is undertaken. Obtain agreement from landowner to abstract water from existing boreholes. If required, abstraction of water should be kept within the permit limits as issued to the landowner by DWA. Water may only be obtained from approved sources.	General	Legal Compliance	National Water Act (Incl GA Provisions)	Legal abstraction of water.	Tetra 4/ Contractor	Pre-commencement of activity	ECO Reports	Monthly
94	All Phases	All	Interference with existing land uses/livelihoods	Tetra 4 must appoint a CLO that deals with the affected landowners throughout the life of the project. If existing activities will be affected negatively Tetra 4 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, Tetra 4 must consult with the landowner and take reasonable steps to obtain his consent to execute the activity on his/her land. A system to arrange access to properties must be devised and formalised. All reasonable efforts must be taken to obtain agreement on the system 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. Tetra 4 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. 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 must be put in place for any transgressions affecting the landowners.	Cluster 1	Community and landowner representation. Clear landowner consultation and understanding.	N/A	CLO appointment letter. Landowner agreements. Community and landowner consultation records and incident/grievance register.	Tetra 4	Pre-commencement of activity. Ongoing- for all phases.	CLO Appointment/ Landowner agreements/ Induction and Toolbox talk registers. Monthly ECO reports	Monthly
95	All Phases	All	Interference with existing land uses/livelihoods	If a farmer reports any invasion of alien species as a result of Tetra 4, immediate action must be taken to ensure the invasion does not spread further. If any damage was done as a result of their activities, Tetra 4 should carry the cost of rehabilitation and compensate the farmer for his losses. If needed an external mediation process should be followed. There must be a formal procedure in place on how to report incidents and a claims procedure to ensure records of all grievances are kept. Environmental incidents must be reported to the CLO, who must inform the EO. In order to receive compensation, the claim forms must be submitted to the Tetra 4 CLO. Compensation should follow the IFC principles, which states that market related prices should be paid, and if anything is restored, it must be to the same or better standards than before. A water census should be conducted before the project commences and each affected party should be given the records affecting their property. Tetra 4 should keep records of all the properties. If any decline in the volume or quality of water occurs that can be linked to Tetra 4 activities, Tetra 4 should provide the affected parties with water of equivalent or better quality (depending on use) until such a time that the quality and availability is restored to pre-project levels. Create a CLF to communicate the mitigation and monitoring measures to affected parties as well as to discuss environmental issues and assist Tetra 4 with obtaining a social license to operate.	Cluster 1	Community and landowner representation. Clear landowner consultation and understanding.	N/A	CLO appointment letter. Landowner agreements. Community and landowner consultation records and incident/grievance register.	Tetra 4	Pre-commencement of activity. Ongoing- for all phases.	CLO Appointment/ Landowner agreements/ Induction and Toolbox talk registers. Monthly ECO reports	Monthly
96	All Phases	All	Nuisance factor due to increase in ambient dust and noise levels	Waste management measures to be adhered to in order to minimise waste and associated nuisances from affecting neighbouring receptors. Complaints or grievance register kept on site indicating nature of complaint and how complaint was addressed. Create a CLF that communicate the mitigation and monitoring measures to the affected parties. Putting shade nets against fences close to dwellings during the construction phase should be investigated. Low-frequency alarms, or buzzers can be used instead of the current system. The need for the alarms must be explained to the affected stakeholders, and acceptable solutions must be developed with the input of the stakeholders.	Cluster 1	Avoid, minimise and remediate nuisance. Clear landowner consultation and understanding.	NEMWA norms and standards.	No grievances regarding waste, noise and dust. Good relations with landowners and occupiers. Establish and maintain a CLF (Bi-annually).	CLO/ ECO	Ongoing- for all phases	ECO Reports/ Grievance Register/ Bi-annual CLF meeting minutes	Monthly
97	All Phases	All	Local travel patterns (longer travelling times and need to change routes due to increase in traffic)	Before construction commences Tetra 4 must meet individually with each applicable landowner to discuss their movement patterns and needs. Tetra 4 must provide all the affected landowners with a construction schedule to ensure that they know when construction will take place on their properties. It is important to inform the affected stakeholders about the possibility of changed travel patterns (as previously agreed) as soon as possible. It is recommended that construction be done outside the peak planting and harvesting seasons. Any changes to the construction schedule must be communicated to the farmers at least a week in advance. As far as possible obstruction of access routes and sensitive areas must be avoided. If it cannot be avoided both parties must agree on alternative routes, and Tetra 4 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.	Cluster 1	Minimise changes/impacts on local traffic, and landowner and community travel patterns.	National Road Traffic Act (Act 93 Of 1996); South African National Roads Agency Limited and National Roads Act (Act 7 of 1998); applicable road safety regulations.	Landowner agreement including access arrangements.	Tetra 4/ Contractor/ CLO	Ongoing- all phases	Landowner agreements/ Grievance Register/ ECO Reports	Monthly

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98	All Phases	All	Greenhouse gas emissions including odour nuisance and health impacts	To lower exhaust emissions from vehicles and machinery, equipment suppliers or contractors should be required to ensure compliance with appropriate emission standards for production fleets. Maintenance and repair of diesel engines should be carried out as prescribed by manufacturer in order to maximize combustion and reduce gaseous emissions. Apply fuel efficient driving and operating practices on all vehicles. The use of low-NOx burners in combustion systems should be considered for operation of the Helium and CNG plant. Products, liquid fuels and chemicals should be stored in areas where there are provisions for containment of spills. Implementing vapour recovery systems to control losses of VOCs for storage tanks and other applicable units should be considered. A suitable and effective gas leak detection system must be designed and implemented to monitor gas leaks from the pipelines and other production infrastructure.	Cluster 1	Minimise gas emissions.	NEMAQA emissions standards	Greenhouse gas emissions not exceeding minimum standards.	Tetra 4/ Contractor	Ongoing- during all phases	ECO Reports/ Vehicle service records	Monthly
99	All Phases	All	Fugitive emissions (dust) including health impacts	Vehicle speeds on unpaved roads should be kept as low as reasonably possible. Unnecessary travelling of vehicles on untreated roads should be avoided. In controlling vehicle entrained particulate matter, it is recommended that water (at an application rate of 2 litre/m ² -hour), be applied on all unpaved road sections to ensure a minimum of 50% control efficiency (CE). In addition, binding agents or chemical suppressants should be considered for application on all unpaved road sections. During construction and rehabilitation phases, stockpiles of fine or erodible material should be treated regularly with water sprayers to reduce their potential for erosion.	Cluster 1	Avoid and minimise dust nuisance.	SANS 1929; National Dust Control Regulations (GN827/2013),	No unmitigated dust complaints.	Contractor/ ECO	Ongoing- during construction	Daily inspections/ ECO Reports	Daily
100	All Phases	All	Employment opportunities	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.	Cluster 1	Employ local labour where possible.	N/A	Records of advertised employment opportunities in accessible avenues. Development and implementation of recruitment policy. Employment records indicating representation of local community.	Tetra 4/ Contractor	Ongoing- during all phases	Internal Audits/ Recruitment records.	Annual
101	All Phases	All	Habitat fragmentation and edge effects	Undertake activities in previously disturbed areas and/or habitats with lower sensitivity where possible. Locate activities on the boundaries of existing disturbance where possible. Use existing access roads as much as possible. Rehabilitate disturbed areas as soon as possible.	Cluster 1	Maintain habitat integrity and ecosystem functionality.	National Environmental Management Biodiversity Act.	Activities within production footprint. Photographic record of diverse and continuous habitats.	Contractor/ ECO	Ongoing- during construction	Annual vegetation survey/ Annual Environmental Audit	Annual
102	All Phases	All	Loss of watercourse habitat/ Alterations of the river banks and river bed	Locate pipeline/trunkline alignments outside of buffered watercourses (sensitive watercourse habitat) as far as possible. Buffered watercourses should be demarcated on site for the entire construction process to help indicate sensitive areas and prevent unauthorised access. Mitigation for pipeline construction primarily includes the avoidance of watercourse crossings. Where crossings are unavoidable, crossings should be located along existing infrastructure features, such as roads, dam walls and existing pipelines. Unavoidable crossings should ideally be located perpendicular to the direction of flow at the shortest possible crossing distances. Long crossings along the length of wetlands, rivers and drainage lines should be avoided as far as practically possible. 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 considered to be an acceptable approach in other types of watercourse crossings. The construction servitude should however not remain bare (stripped for longer than a month at a time), while trenches should not remain open for more than five days. 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. The servitude width should be restricted in watercourse crossings to reduce the footprint of the impact. Topsoil material should only be stripped in the area where trench excavation is required, while the surrounding area in the servitude is only cleared of vegetation. Limited topsoil stripping is conditional on the prevention of soil compaction by heavy motorised vehicles (HMs) 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. Removed topsoil and subsoil should be sorted separately in stockpiles on geotextile fabric, and protected with silt fences to prevent loss of material during rainfall events.	Cluster 1	Avoid or minimise damage to watercourse habitats.	National Environmental Biodiversity Act. National Water Act.	Minimise impact on watercourse habitats. No unlicensed or approved infrastructure within a watercourse. Photographic records of river banks and river beds in the vicinity of Cluster 1 activities over time.	Contractor/ ECO	Ongoing- during construction/ operation	ECO Reports/ Watercourse monitoring datasheets	Monthly
103	All Phases	All	Loss of watercourse habitat/ Alterations of the river banks and river bed	A construction method statement should be prepared by the contractor with input from a watercourse specialists prior to the start of construction. Mitigation measures recommended should be considered along with other recommendations based on more recent information in order to accommodate any unforeseen changes in the design and infrastructure. Conditions stated in the water use license should also be implemented. The use of old and new quarry sites for bedding and padding material, as well as other needs (e.g. the discard of spoil material) should not be located within wetlands and other watercourse types. A watercourse specialists should be appointed to evaluate proposed sites located outside of the study area. The use of sites outside the study area will also be subject to environmental authorisation. Provision should be made in the design phase for permanent access tracks/roads that will be required for the maintenance of the pipeline. 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. During the start of the growing season the annual grass <i>Eragrostis tef</i> can be introduced through manual broadcasting on reinstated watercourse surfaces. Areas that are exposed to grazing should be fenced off for the first year to help enable the establishment of this pioneer species, which will be replaced by indigenous wetland species through natural selection.	Cluster 1	Avoid or minimise damage to watercourse habitats.	National Environmental Biodiversity Act. National Water Act.	Minimise impact on watercourse habitats. No unlicensed or approved infrastructure within a watercourse. Photographic records of river banks and river beds in the vicinity of Cluster 1 activities over time.	Contractor/ ECO	Ongoing- during construction/ operation	ECO Reports/ Watercourse monitoring datasheets	Monthly
104	All Phases	All	Impacts on local economy	Comply with the prescripts of the mining charter, B-BBEE codes and the Social and Labour Plan.	Cluster 1	Optimise the impact on local economy.	MPRDA. Mining Charter. BBBEE Act.	Legal compliance.	Tetra 4	Ongoing- during construction/ operation	Internal Audits/ MPRDA Performance Assessments	Annual

