

Vlakfontein Cumulative Impacts Table

Soil, Land Capability & Agricultural Agro-ecosystem Assessment				
No.	Aspect	Cumulative Impacts	Significance without Mitigation	Significance with Mitigation
1	Erection of mine structures	<p>Highly productive soils are mined and then poorly rehabilitated, which causes a permanent loss of high potential and highly productive soils. This is a serious, negative, accumulating impact on our national soil resource that degraded an alarming large area of the highly productive soils on the Eastern Highveld. This accumulating impact reduces food production annually.</p> <p>Increased water ingress at poorly rehabilitated open pits, which is the result of poorly shaped, non-free draining surfaces, insufficient soil volumes (soil depth), and poor quality replaced soil material, causes water levels in backfilled pits to rise, which contaminate groundwater and cause decanting of very low-quality water in the surrounding environment, that lead to severe pollution of streams, rivers and dams.</p>	High (-)	Medium (-)
Surface Water Report				
1	Construction Impacts	<p>Reduced availability of water to downstream water users due to changes in MAR;</p> <p>Alteration of the watercourse functionality and increased risk of flooding and scouring (Stream diversion);</p> <p>Reduced availability of water to downstream water users due to changes in water quality.</p>	High (-)	Low (-)
2	Operational Impacts	<p>Reduced availability of water to downstream water users due to changes in MAR;</p> <p>Alteration of the watercourse functionality and increased risk of flooding and scouring (Stream diversion);</p> <p>Reduced availability of water to downstream water users due to changes in water quality.</p>	High (-)	Medium (-)

Aquatic Ecosystem Delineation				
1	Entire Activity	Cumulative risk to resource quality	Medium (-)	Low (-)
Terrestrial Biodiversity Assessment				
1	Flora	Cumulative impacts may include the potential ongoing loss of remnant threatened Endangered (EN) Soweto Highveld Grassland. The spread of alien invasive floral species within this vegetation type is likely, with further alien species introduced through disturbance from the proposed mining operations, which may replace indigenous vegetation and contribute to an overall loss of biodiversity in the region.	Medium (-)	Low (-)
2	Fauna	Cumulative impacts associated with habitat loss may also directly and indirectly affect faunal species and provincial priority floral species. For instance, some faunal SCC have large home ranges and forage widely for food and nesting resources that can be disrupted by the destruction of habitat and other factors associated with construction and mining operations. The transformation of the study area may alter such movements and behaviours and further contribute to the isolation of grassland faunal communities. Effective rehabilitation of the mining operation and opencast areas during the closure and decommissioning phase is essential in order to minimise cumulative impacts resulting from the mining activities.	Medium (-)	Low (-)
Air Quality Impact Assessment				
1	Air Quality	Emissions from sources need to be assessed in terms of the cumulative impacts in an area. The Code of Practice for Air Dispersion Modelling in Air Quality Management in South Africa (DEA, 2014), outlines the following for sources influenced by background concentrations in urban areas and priority areas: For annual averages, the sum of the highest predicted concentration (CP) and background concentration (CB) must be less than the National Ambient Air Quality standards, no exceedances allowed; For short-term averages (24 hours or less), sum of the 99th percentile concentrations and background concentration (CB) must be less than the National Ambient Air Quality Standards. Whenever one year is modelled, the highest concentrations shall be considered.	Medium (-)	Medium (-)

		The Vlakfontein Coal Mine is a proposed facility thus the modelled emissions do not yet contribute to background concentrations. Predicted dustfall rates, and PM2.5 and PM10 concentrations decrease as you move further away from the emission source. Thus, cumulative impacts for these pollutants will be higher nearer to the proposed activities.		
Environmental Noise Impact Assessment				
1	Noise	<p>Construction activities will cumulatively increase noise levels in the area (influence up to a distance of approximately 2,000 m from the mining related noise-generating activities). The main other source of noise in this area is road traffic noises from the R82.</p> <p>Operational activities will cumulatively increase noise levels in the area (influence up to a distance of approximately 2,000m from the mining related noise-generating activities). The main other source of noise in this area is road traffic noises from the R82.</p>	High (-)	Low (-)
Blasting & Vibration Impact Assessment				
1	Cumulation of multiple blasts impacts	<p>Cumulative effects considered is when ground vibration levels are exceeded, air blast levels are exceeded, fly rock is experienced from a specific blast at a specific POI and multiple blasts occurs directly after each other causing an increased time period of possible influence.</p> <p>On multiple blasts conducted there may be enhancement of ground vibration levels, or for the same reason reduction may also occur. It is a process of constructive or destructive interference of the shock waves. Unfortunately, this can only be determined with actual trial blast process.</p> <p>Multiple blasts will also increase the time period of ground vibration and air blast. This will have an effect on structures for longer and could certainly upset people if the blast period is very long. A period in excess of 15 seconds long is considered unacceptable.</p> <p>Multiple blasts where the limits at structures are constantly exceeded will contribute to higher probability of damage. Therefore, blasts should be conducted such that the limits are not exceeded.</p>	High (-)	Low (-)

Heritage Impact Assessment				
1	Cumulative impacts on historical structures	Impact on Structures older than 60 years Sites.	High (-)	Low (-)
Palaeontological Study				
1	Impact on Palaeontological Resources	Incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities.	High (-)	Low (-)
Visual Impact Assessment				
1	Sense of Place	The development of this site will add cumulatively to the loss of sense of place.	Medium (-)	Medium (-)
Social Impact Assessment				
1	Employment opportunities-Economic Process	<p>Direct Employment: Coal mining typically creates direct employment opportunities for workers involved in various stages of the mining process, including extraction, transportation, and processing of coal. These jobs can range from heavy equipment operators to engineers, geologists, and administrative staff.</p> <p>Indirect Employment: Beyond direct employment in coal mining operations, there are also indirect jobs created in related industries such as equipment manufacturing, transportation, and services that support mining activities. For example, companies providing maintenance services for mining equipment or transportation companies that haul coal from mines to processing facilities or ports.</p> <p>In regions heavily reliant on coal mining, such as South Africa the industry can have a significant impact on the local and regional economies. Coal mining operations contribute to tax revenues for local governments, support businesses catering to the needs of mining communities, and provide income for households. Economic Diversification: However, the reliance on coal can also pose challenges for regional economies, especially when there is a</p>	Medium (+)	High (+)

		<p>downturn in the coal market or regulatory changes affecting the industry.</p> <p>Some regions have been working to diversify their economies away from coal dependency, investing in renewable energy, tourism, or other sectors to create more resilient economies.</p>		
2	Multiplier impacts on the local economy- Economic process	<p>The employment generated by coal mining operations creates a direct impact on the local economy. Wages paid to miners and employees are spent on goods and services within the community, supporting local businesses such as grocery stores, restaurants, and retail shops. These businesses, in turn, hire workers and purchase goods and services from other local suppliers, creating additional employment opportunities.</p> <p>Multiplier impacts refer to the ripple effects of economic activity within a region, where an initial injection of spending leads to additional rounds of spending as money circulates through the local economy. In the context of coal mining, multiplier impacts play a significant role in shaping the overall economic dynamics of mining regions e.g Investment in Infrastructure: Coal mining operations often require significant infrastructure investment, such as roads, railways, ports, and utilities. The construction and maintenance of infrastructure projects contribute to economic activity and employment in the region, both during the initial development phase and through ongoing maintenance and operation.</p>	Medium (+)	High (+)
3	Potential Loss of Agricultural Land	<p>The clearing of land for the construction and operation of coal mines and a siding, infrastructure such as roads and railways, and waste disposal sites can result in the direct loss of agricultural land, reducing the available area for farming activities.</p> <p>Impact on Food Production.</p> <p>The loss of agricultural land due to coal mining can have significant local and regional implications, affecting both the economy and the environment. Agriculture is a significant economic sector in many regions, providing employment and income for many communities.</p>	High (-)	Medium (-)

		The loss of agricultural land due to coal mining can lead to job displacement and economic hardship for farmers and agricultural workers. It can also have ripple effects on related industries such as food processing and distribution.		
4	Potential Loss of Heritage Resources	<p>The study identified a total of five heritage features and resources. These consist of one structural remains of ruins (SRV001), two historic houses (SVR004 and KF008) and two recent structures (SVR002 and SVR003) which are not conservation worthy. Heritage resources are integral to the identity and sense of belonging of communities living in mining areas. The destruction of culturally significant sites can lead to a loss of cultural identity and a disconnect from ancestral traditions and history.</p> <p>The loss of heritage resources due to coal mining can have significant impacts at both the local and regional levels, affecting cultural identity, historical preservation, and tourism potential, e.g. The Projects can result in the destruction or degradation of archaeological sites, historic buildings, monuments, and other cultural artifacts that are part of the region's heritage.</p>	Medium (-)	Low (-)
5	Community Development and Social Upliftment through LED Projects Economic process	<p>Community development and social upliftment projects play a vital role in mitigating the cumulative impacts of coal mining on local communities and promoting sustainable economic processes.</p> <p>Coal mining companies can invest in infrastructure projects such as road construction, water supply systems, schools, and healthcare facilities. Improved infrastructure enhances the quality of life for local residents, facilitates economic development, and creates job opportunities.</p> <p>Skill Development and Training: Community development programs can provide training and skill development opportunities to local residents, equipping them with the skills needed to access employment in the mining industry or other sectors. This helps diversify the local economy and reduces dependence on coal mining for livelihoods.</p>	Medium (+)	High (+)

6	Effects from Population Influx	<p>The areas surrounding the Project area could possibly experience an influx of job seekers from neighbouring settlements like Aeroval, Arcon Park, Falcon Ridge, Harmoniesrus, Redan, Rothdene, Rust Ter Vaal, Sonlandpark, Sprincol, Van der Merwes Kroon and Waldrift. It is not possible to accurately predict the amount of job seekers and opportunists that would flood to the area. Population influx can disrupt social cohesion and community dynamics. It may lead to tensions between existing residents and newcomers, as well as cultural clashes in diverse communities. Social services may also become overwhelmed, impacting the quality of life for residents.</p> <p>An influx of people into the potentially affected communities (surrounding the Project area(s)) can strain existing infrastructure such as roads, housing, healthcare facilities, and schools. Local governments and communities may struggle to accommodate the increased demand for services, leading to overcrowding and inadequate infrastructure.</p>	High (-)	Medium (-)
7	Increased social pathologies linked to influx of workers and job seekers- Demographic change/Socio-cultural wellbeing process	<p>The stressful and transient nature of mining-related employment can contribute to substance abuse and addiction issues among workers and residents. Factors such as easy access to alcohol and drugs, social isolation, and economic insecurity may increase the risk of substance abuse disorders. Population influx can also exacerbate social inequalities and marginalization in mining communities. Temporary workers and migrant populations may face discrimination, stigma, and exclusion from social and economic opportunities, leading to social exclusion and marginalization.</p> <p>The influx of population due to the proposed Projects can indeed bring about various social pathologies and challenges, both at the local and regional levels, e.g increased Regional crime rates: Rapid population growth in mining communities can lead to an increase in crime rates, including theft, vandalism, substance abuse, and violence. The influx of temporary workers and outsiders may strain law enforcement resources and contribute to social disorder.</p>	Medium (-)	Low (-)

8	Impacts Related to Community Health and Safety	The cumulative impacts of coal mining on community health and safety can have the potential to not only individuals directly involved in mining activities but also broader populations living in proximity to mining operations. Air Quality Degradation; Water Contamination; Noise and Vibrations; Social and Mental Health Impacts. Cumulative impacts of coal mining on community health and safety can have significant regional implications, affecting not only individuals directly involved in mining activities but also broader populations living in proximity to mining operations	High (-)	Medium (-)
9	Dependency on the proposed Project for sustaining local economy (during closure)	<p>The heavy reliance on coal mining can create a dependency syndrome, wherein local economies become overly dependent on a single industry for sustenance. This dependency can make communities vulnerable to economic downturns, market fluctuations, and structural changes in the coal industry, leading to job losses, business closures, and social upheaval.</p> <p>Coal mining activities contribute to local and regional income generation through wages, taxes, royalties, and business revenues. The economic benefits derived from coal mining may support various community services and infrastructure projects, including schools, healthcare facilities, roads, and public utilities. When the mine closes, the ripple effects, if not well managed, can be experienced at a regional scale.</p>	High (-)	Medium (-)
Community Health Impact Assessment				
1	Vector-related diseases	During active operational periods, the proposed Projects may create new breeding sites for key mosquito vectors which would significantly increase the vector-borne disease risk. In addition, existing water bodies, such as surface-water environmental-control dams or new reservoirs, may become magnets for local community members and increase the risks of injury, including accidental drowning. In addition, water storage facilities require careful environmental engineering (for example, vegetation control) to prevent development of vector breeding sites. During construction and operations phases, tires, drums, and other containers may become significant breeding sites for mosquitoes.	Medium (-)	Low (-)

2	Acute respiratory infections and respiratory effects from housing	Mining activities at the various operations, proposed and existing, can contribute to acute respiratory infections and various respiratory effects due to exposure to dust and airborne pollutants generated during mining operations. Studies have connected asthma, nasal skin damage, and septal perforation to workers exposed to mine dust. Lung function loss and generalised obstructive pulmonary disease have both been connected to dust exposure.	Medium (-)	Low (-)
3	Veterinary medicine and zoonotic issues	Coal mining can indirectly influence zoonotic veterinary diseases, which are diseases that can be transmitted between animals and humans. While the direct impact may not be significant, several factors associated with mining activities can contribute to the potential spread or emergence of zoonotic diseases.	Low (-)	Low (-)
4	Sexually-transmitted infections, including Human Immunodeficiency Virus/ Acquired Immune Deficiency Syndrome (HIV/AIDS)	The cumulative impacts of coal mining on STIs, including HIV and Acquired Immune Deficiency Syndrome (AIDS), can result from a combination of socio-economic, environmental, and behavioural factors. Coal mining projects often attract a transient workforce, including migrant workers, who may engage in high-risk sexual behaviours due to factors such as separation from family, loneliness, and limited social support networks. Population influx and mobility associated with mining activities can lead to increased sexual encounters and transmission of STIs, including HIV/AIDS, both within mining communities and between mining areas and surrounding regions. In addition to this, coal mining environments may be associated with substance abuse, including alcohol and drug use, which can impair judgment, increase sexual disinhibition, and contribute to risky sexual behaviours. Substance abuse can fuel the spread of STIs, including HIV/AIDS, through unprotected sex, needle sharing, and other high-risk practices among individuals engaged in mining-related activities.	High (-)	Medium (-)
5	Soil-, water- and waste-related diseases	The cumulative impacts of coal mining on soil, water, and waste can lead to a range of health issues, including diseases related to contamination, pollution, and exposure to hazardous substances. Several coal mining operations within close proximity of one another can result in the release of pollutants such as heavy metals, chemicals, and sediments into surface water and groundwater sources. Contaminated water sources pose risks to human health through ingestion, inhalation, and dermal exposure. Diseases	High (-)	Medium (-)

		associated with water contamination include gastrointestinal illnesses, skin disorders, and reproductive health issues. Also, coal mining activities, including land clearing, excavation, and waste disposal, can lead to soil erosion, compaction, and contamination with heavy metals, hydrocarbons, and other toxic substances. Contaminated soils can pose health risks to humans through direct contact, inhalation of dust particles, and uptake by food crops. Diseases related to soil contamination include skin disorders, respiratory ailments, and neurological disorders.		
6	Food- and nutrition-related issues	Coal mining-related pollution and environmental degradation can have adverse health effects on communities, including respiratory diseases, water-borne illnesses, and malnutrition. Poor health outcomes can further exacerbate food insecurity by reducing household productivity (loss of agricultural land), increasing healthcare expenses, and limiting access to nutritious foods.	Medium (-)	Low (-)
7	Accidents/injuries	The cumulative health impacts of injuries and accidents in coal mining can be severe and multifaceted, affecting workers, communities, and the environment. Mining accidents and environmental disasters, such as mine collapses, spills, and releases of toxic substances, pose risks to the health and safety of communities living in proximity to coal mining operations. The cumulative impact of these incidents can lead to injuries, acute health effects, and long-term health risks for residents, including respiratory problems, water contamination, and psychological trauma. In addition to this, the healthcare burden associated with coal mining-related injuries and accidents can strain local healthcare systems and resources. Emergency response and medical care for injured workers and affected communities may be inadequate, particularly in remote or rural areas where coal mining operations are located, leading to delays in treatment and compromised health outcomes.	Medium (-)	Low (-)
8	Exposure to potentially hazardous materials, noise and malodours	Exposure to potentially hazardous materials, noise, and malodours in coal mining environments can have cumulative impacts on the health of workers and nearby communities. With regards to noise and vibration, some of the surrounding settlements and farm dwellings will be exposed to noise from the operations of various machines on the mine and trucks on the road. Extraction and transport operations of other mines will affect some the receptors. Though blasting will be	High (-)	Medium (-)

		carried out at other mines, the effects are not synergistic. With modern blasting technologies, the effects are likely to be small, localised, easy to mitigate, and non-cumulative.		
9	Social determinants of health	Coal mining can have significant cumulative impacts on the social determinants of health, which are the conditions in which people are born, grow, live, work, and age, and which shape health outcomes. Rapid population growth and migration to mining areas can strain housing infrastructure, leading to overcrowding, inadequate housing, and homelessness. Poor housing conditions, including lack of access to safe drinking water, sanitation, and heating, can contribute to health disparities, infectious diseases, and respiratory illnesses among mining communities. Furthermore, healthcare access and infrastructure in mining areas may be limited or insufficient. Barriers to healthcare access, including geographic isolation, transportation challenges, and financial constraints, can impede timely diagnosis, treatment, and prevention of diseases among mining populations.	High (-)	Medium (-)
10	Cultural health practices	The cumulative impacts of coal mining on cultural health practices can be significant, affecting the traditions, customs, and ways of life of communities living in mining areas e.g. coal mining projects may encroach upon areas used for traditional healing practices, such as medicinal plant gathering, spiritual ceremonies, and rituals for health and well-being. Disruption of these practices can limit access to traditional medicine and healing knowledge, affecting the health outcomes and resilience of communities.	Medium (-)	Low (-)
11	Health systems issues	There are several Healthcare facilities within the affected Local Municipalities. However, the capacity of these facilities remains a challenge. In terms of proposed Project impacts, influx may create increased demand for what is already a scarce resource. The proposed Projects, in conjunction with other like Projects in the vicinity of the Project area have the potential to impact on the national/local health service infrastructure and delivery mechanisms in the following ways: <ul style="list-style-type: none"> - In-migration - Health service delivery capacity and expectations on the proposed Projects - Healthcare funding 	Medium (-)	Medium (-)

		- Health service inequalities		
12	Non-communicable diseases	The cumulative impacts of coal mining on non-communicable diseases are multifaceted and can arise from various environmental, social, and economic factors associated with coal mining activities. An example of this is air pollution. Coal mining operations, including excavation, transportation, and combustion of coal, can release significant amounts of air pollutants such as particulate matter (PM), sulfur dioxide (SO ₂), nitrogen oxides (NO _x), and volatile organic compounds (VOCs). Prolonged exposure to these pollutants has been linked to respiratory diseases such as chronic obstructive pulmonary disease (COPD), asthma, and lung cancer, as well as cardiovascular diseases.	High (-)	Medium (-)