

**Anticipated cumulative impacts:**

Ref. no.	Environmental component	General description of regional conditions and existing cumulative impacts	Potential contribution of the proposed Springfield Colliery and Redan Siding Project to cumulative impacts	Type of cumulative impact	Timeframe of contribution	Issue of Concern with I&APs Yes / No	Significance of mine's contribution to cumulative impacts, prior to mitigation						Mitigation measures	Significance of mine's contribution to cumulative impacts, after mitigation					
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1	<b>Geology</b>	Springfield Coal Mine and Redan Siding project is underlain by the Malmani Subgroup of the Chuniespoort Group (Transvaal Supergroup) as well as the Vryheid Formation of the Karoo Supergroup. Also present in the area is alluvial sediments. To the north west of the study area, outcrops of the Timeball Hill Formation as well as diabase base of the Vaalian Era. The Malmani Subgroup is composed of dolomite and chert while the Vryheid Formation consists of sandstone, shale and coal seams. The Timeball Hill Formation consists of ferruginous quartzite and ferruginous shale and these form the prominent ridges to the north west of the site. As such, coal is extracted from mines located in the study area (e.g. New Vaal) as well as numerous lime and sand quarries, a dolomite mine (e.g. Glen Douglas) and brick works. Due to the existing surrounding mining operations, the geological strata in the region will be permanently altered.	<ul style="list-style-type: none"> <li>The mining right area at Springfield Colliery cover a total area of 2 547 ha, of which the opencast mining and related activities will cover an area of 1 300 ha. The contribution of the mine to this cumulative impact will increase progressively as mining advances.</li> <li>A large portion of the remaining coal reserves have already been partially removed via underground mining methods. However, the planned opencast mining of the remaining reserves at the proposed Springfield Opencast Colliery will contribute progressively to the existing cumulative impacts, both at Springfield Colliery and within the surrounding region.</li> </ul>	Spatially additive	LOM.	TBC <sup>1</sup>	-	6	3	5	5	70	Implementation of related measures during the Operational and Decommissioning Phases of the mine will ensure that the contribution of the mine to cumulative impacts on geology will be minimised to the extent of the opencast workings. However, due to the nature of coal mining, particularly opencast mining, destruction of the geology is unavoidable. Of greater importance to this part of the EIA is the indirect impacts that the geological impacts will have on other environmental aspects such as surface water and groundwater.	Remains the same.					
2	<b>Geology and Socio-economic conditions</b>	The extraction of coal from in the region has occurred over a period spanning more than a century, and modern day opencast mining techniques enable coal extraction to be maximised. This has led to the systematic depletion of the coal reserves in the region, increasing significantly in the last several decades due to improvements in mining technology. Since coal is a fossil fuel it is a non-renewable resource, and as the remaining coal reserves decrease, the value of the coal will increase because of supply and demand principles. This will lead to an increase in income generation and positive contributions to the regional socio-economic conditions during the Operational Phase of the mine, but will ultimately result in the complete exhaustion of the coal reserves, leaving no coal for future generations. However, a work wide drive for renewable energy sources is anticipated to replace the need for and dependency on fossil fuels and consequent increase of greenhouse gasses.	<ul style="list-style-type: none"> <li>Current mine planning indicates that the target coal reserves at the proposed Springfield Colliery and Redan Siding project will be exhausted by 2055.</li> <li>Coal reserves currently being mined at Springfield Colliery will be exhausted in 31 years.</li> </ul>	Chronologically and spatially additive	Operational Phase.	TBC	-	10	1	5	5	80	The exhaustion of the non-renewable coal reserves at Springfield Colliery is an inevitable and unavoidable consequence of coal mining, particularly since current legislation requires the holder of a Mining Right to mine the target mineral. No mitigation is possible.	Remains the same.					

<sup>1</sup> TBC: To be confirmed

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3	Topography, Land use and Visual aspects	Springfield Colliery and Redan Siding is located in a region where mining and light and heavy industries (such as smelters) is relatively common place. The number of operational mines in the region, together with the historical nature of the mining in the region will most likely have desensitised local residents to some extent to the visual impacts caused by the changes to the topography and land use. On the contrary, the visibility of the mining areas from the surrounding areas could be of interest to passers-by.	<ul style="list-style-type: none"> <li>Similar impacts occurring at the proposed Springfield Project would give rise to an extended and/or intensified impression of pre-existing mining activities in the landscape, as seen from fixed or transitory locations. This type of cumulative effect is categorised as 'static combined / simultaneous'. Infrastructure of greater height and distinctive outlines that are visible from outside of the mine boundary areas will include the co-disposal facility / discard dump, ROM and product stockpiles, overburden stockpiles, RLT terminal, the conveyor, and the coal processing plant.</li> <li>Visual impacts will also result from the removal of redundant old infrastructure and vegetation and the underlying geological layers to expose carbonaceous material and coal, stockpiling of soil and spoils, changes in topography and the general sense of place associated with the pre-mining landscape and the change in land use from mainly agricultural use to mining.</li> <li>In addition, much of the surface infrastructure at Springfield Colliery has resulted in topographical elevations within the surface land use area, thereby altering the visual 'sense of place' from that associated with the pre-mining agricultural land use.</li> <li>The construction and utilisation of the planned infrastructure at the proposed Springfield Colliery could contribute to cumulative visual impacts through an increase in the perceptions of sensitive receptors where mining components are observed from locations from which more than one facility would now be seen in different parts of the landscape, typically large and tall objects such as stockpiles and the disposal facility. This distinction is most relevant to observers (passers-by or surrounding communities).</li> <li>The visibility of the planned infrastructure and opencast mining areas at the proposed Springfield Colliery and Redan Siding project from the surrounding roads could contribute to an increase in the incidence of sequential perceptions of different mines with associated infrastructure through the recurrence of images and impressions arising from mines at various points in the landscape and which are encountered when moving through it.</li> </ul>	Spatially additive Static combined / Simultaneous	LOM	TBC	-	4	2	4	5	50	<ul style="list-style-type: none"> <li>Management of topography, air quality (dust), land use and visual impacts as committed to in the construction, operation and decommissioning phases Environmental Impact Assessment and Management Action Plan (EIAMAP)s will ensure that the contribution of the mine to cumulative visual impacts will be minimised as far as practicable over the life of mine.</li> <li>The proposed Redan Siding project might be conducted simultaneously with two additional projects being the Vlakfontein Greenfields Coal Mine and Springfield Coal Mining projects. Visual assessments were done for these projects individually. However, a cumulative assessment needs to be done to determine the overall impact if these projects conducted in conjunction with each other.</li> </ul>	-	4	2	4	4	40
4			<ul style="list-style-type: none"> <li>Existing infrastructure associated with the old Springfield Colliery is still present on site but will mostly be demolished for the purpose of this project.</li> <li>The co-disposal facility / discard dump will be visible from nearby residential areas and roads.</li> <li><i>In situ</i> rehabilitation of discard disposal facility, the railway siding and the continued utilisation of some water management infrastructure means that the resultant permanent change in topography will also result in permanent changes to the visual aspects of the study area.</li> </ul>	Spatially additive	Decommissioning and post-Closure phases	TBC	-	4	2	4	5	50	Implementation of the related mitigation measures set out in the operational and decommissioning phases will ensure that the contribution of the co-disposal facility / discard facility, and other infrastructure such as the Rapid Loading Terminal (RTL), conveyor and stockpiles, to the existing cumulative visual impacts, will be minimised / reduced.	-	4	1	4	2	18

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5	Topography, Land use and Visual aspects	Ongoing- (Springfield Colliery and Redan Siding is located in a region where mining and light and heavy industries (such as smelters) is relatively common place. The number of operational mines in the region, together with the historical nature of the mining in the region will most likely have desensitised local residents to some extent to the visual impacts caused by the changes to the topography and land use. On the contrary, the visibility of the mining areas from the surrounding areas could be of interest to passers-by.)	Similar impacts may occur due to the proposed Springfield Colliery and Redan Siding Project. However, the significance of the potential visual impacts of any open pit voids on the sensitive receptors may be higher due to the closer location of the mining areas to the provincial route nearby. The probability that opencast voids will remain in the landscape post-closure is, however, low, since the current long-term mine water management programme requires a PCD and mine water treatment, either active or passive.	Spatially additive	Decommissioning and post-Closure phases	TBC	-	4	2	4	1	10	Continued implementation of the long-term mine water dewatering and treatment programme, will likely eliminate the need for opencast voids at the end of life of mine. This potential impact would therefore not occur.	+	2	1	5	1	8
6			<ul style="list-style-type: none"> <li>The pre-mining 'sense of place' associated with the agricultural areas will change due to the mining and related activities.</li> <li>It is expected that the decommissioning phase would contribute, positively, to the restoration of the agricultural 'sense of place' in the region.</li> <li>The Closure objectives of Springfield Colliery will be revisited upon the development of a detailed mine closure plan at least five years prior to the anticipated end of active mining of coal within the existing mining boundary area. This plan will detail how all remaining disturbed land use areas will be rehabilitated to allow for the proposed end land uses, and may alter the cumulative impacts to some degree..</li> </ul>	Interactive: Countervailing	Decommissioning and post-Closure phases	TBC	+	2	2	5	5	45	The mitigation measures proposed for soil, land use, land capability and visual impacts described for the Operational and decommissioning phases must be implemented.	N/A					
7	Topography	Large sections of the Mining Rights area were affected by old shallow underground mining, which has had a significant impact on the environment, resulting in amongst other sinkhole formation and subsidence amongst others.	<ul style="list-style-type: none"> <li>The mining through of unstable areas at risk of sinkhole formation at the Springfield mining area will contribute positively towards the elimination of the environmental and safety risks associated with sinkhole formation over old underground mining areas, thus contributing to the improvement of such adverse conditions in the local areas. Refer also to the dolomitic study attached.</li> <li>Restoration and improvement of the topography at Springfield Colliery will have consequent positive impacts on surface water, visual aspects, and safety of future land users, amongst others.</li> </ul>	Interactive: Countervailing	Restoration of topography will occur during the operational and decommissioning phases.	TBC	+	6	2	5	5	65	Implementation of related mitigation measures during the operational and decommissioning phases of the mine will ensure that the contribution of the mine to positive cumulative impacts on topography will be maximised, as far as practicable.	N/A					
8	Topography, surface water and groundwater		<ul style="list-style-type: none"> <li>Rehabilitated areas at the proposed Springfield Colliery and Redan Siding project will likely contribute further to the existing cumulative impacts on topography related to the backfilling, bulking and localised subsidence of backfilled opencast areas in the local and regional areas.</li> <li>Overburden used to backfill opencast voids will be highly fractured, in most cases leading to bulking. Furthermore, backfilled areas would be porous and subject to settling, leading to possible localised subsidence and cracking, if not appropriately managed.</li> </ul>	Spatially additive and interactive: Synergistic	LOM	TBC	-	6	2	4	3	36	Implementation of related mitigation measures during the operational and decommissioning phases of the mine will ensure that the contribution of the mine to subsidence in rehabilitated areas within the region will be minimised.	-	4	2	5	2	22

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9	<b>Soil, land capability and Socio-economic conditions</b>	Agriculture is one of the largest economic sectors in Gauteng. The number of opencast mines and quarries, sand works and brickworks in the region, particularly large operations, have led to a significant loss of high agricultural potential soils that would otherwise continue to be capable of supporting crop cultivation. Industrial use, both light and heavy as well as extensive residential development in the study area has led to further loss of agricultural land. Further loss of high potential agricultural land due to opencast mining activities in the area will reduce the food production capability of the region, and may pose food security issues for future generations, if not mitigated or prevented.	If appropriately managed, the post-mining land capabilities can be re-established to support the same land capabilities as pre-mining conditions over the majority of the Springfield mining area. It is therefore not anticipated that the proposed Springfield Colliery and Redan Siding project will contribute significantly to the permanent reduction of available high potential agricultural potential land. However, it will contribute for the LOM. Furthermore, depending on the final land use options selected during Closure planning, the land within the study area could produce more crops than current, pre-mining conditions, depending on the soil amelioration measures implemented and the replacement of the source of water for irrigation, as the underground mine will no longer be a viable source. The post-mining land capabilities and land use could, together, improve the current contribution of the study area to economic growth relating to agricultural production. This should also be demonstrated in a Cost Benefit Analysis which should be undertaken for the proposed Springfield Colliery and Redan Siding project and which should form part of the final environmental authorisation application.	Interactive: Synergistic and Spatially additive  Interactive: countervailing	LOM, post-Closure phase.	Yes	-	8	2	5	5	75	Implementation of mitigation measures during the LOM, including the separation and replacement of soil types according to the agricultural specialist report attached, will ensure that the contribution of the mine to the reduction of food production due to soil impacts will be minimised.	-	6	1	5	4	48

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10	Soil, land capability, biodiversity and sensitive landscapes	<ul style="list-style-type: none"> <li>Cumulative impacts are those impacts from the proposed project combined with the impacts from past, existing and reasonably foreseeable future projects that would affect the same biodiversity or natural resources (e.g. a number of mines in the same catchment or ecosystem type collectively affected water quality or flow, or impacting the same local endemic species).</li> <li>In addition, large areas of the surface have been affected by agriculture and opencast mining, which has led to loss of soil structure and function, and ultimately to loss of biodiversity due to the transformation and fragmentation of natural habitats and ecosystems.</li> </ul>	<ul style="list-style-type: none"> <li>The proposed Springfield Colliery and Redan Siding project will be located within an area which is in close proximity to residential areas, and which has already been partially transformed by anthropogenic presence and activities. However, the loss of untransformed grassland and of wetlands within the study area was identified as being of high significance. The loss of the untransformed grassland and the wetlands within the study area will contribute to the existing regional impacts resulting from the cumulative loss of wetlands and untransformed vegetation, and thus potential habitat for species of conservation concern.</li> <li>The proposed mining operations is likely to contribute towards regional cumulative impacts as a result of loss of natural vegetation and floral species (including Gauteng provincial priority species) due to the proposed opencast mining area extending into wetland and moist grassland habitat. Such cumulative impacts may therefore include the potential ongoing loss of Endangered (EN) Soweto Highveld Grassland vegetation type and further impacts on the Vulnerable (VU) Soweto Highveld Grassland Ecosystem, as well as loss or impacts on designated CBA and ESA areas, as well as any remaining, remnant vegetation as indicated by the NBA (2018). 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.</li> <li>Cumulative impacts associated with habitat loss may also directly and indirectly affect faunal species and provincial priority floral species. For instance, African grass owl habitat will be affected if mining occurs in the areas of high ecological sensitivity identified in this assessment. Moreover, 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.</li> </ul>	Interactive: Synergistic and Spatially additive	LOM	Yes	-	8	2	5	5	75	Implementation of measures to manage the impacts on topography, soil, vegetation, animal life, wetlands, surface water and groundwater during the LOM, will ensure that the contribution of the mine to biodiversity loss, habitat transformation and fragmentation will be minimised as far as practicable and rectified through means of e.g. wetland offset.	-	8	2	5	4	60

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11	Land use and Socio-economic conditions	Mining is an important sector in South Africa, adding a significant portion to the national GDP as well as the number of jobs provided. Mining plays a significant role in the South Africa's economy with the mining industry being the fifth largest contributor to South Africa's GDP, accounting for 7.3% of the total GDP and contributing R356 billion in 2021 (Stats SA). The South African Revenue Service (SARS) indicated that the mining sector contributed R89 billion in corporate tax and R28.45 billion through royalties in the 2021/22 financial year. Mining thus remains a strong pillar of South Africa's economy, supporting growth, employment, and revenue generation.	The temporary change in land use to mining will result in a much higher income per hectare of land over the short-term in comparison with agriculture. This should be confirmed by the Cost Benefit Analysis that should be undertaken.	Additive	LOM	TBC	+	6	3	4	5	65	The positive impact should be enhanced if possible.	N/A						
12	Biodiversity - Alien species	Invading alien plants are a serious threat to plant and animal biodiversity through the effects of predation, alteration of habitat or disruption of ecosystem process and services. Invading alien plants waste water resources, reduce farming productivity, intensity flooding and fires, cause erosion, degrade river systems, increase rate of siltation of dams, reduce water quality and can cause extinction of indigenous plants and animals. Invasive alien plants are widely considered as a major threat to biodiversity, human livelihoods and economic development.	<ul style="list-style-type: none"> <li>Alien and invasive species tend to establish in disturbed surface areas such as at the Springfield Colliery and Redan siding project area. Unless appropriately managed, it is likely that alien and invasive species will encroach into natural vegetation areas, and especially into areas that are newly disturbed or rehabilitated.</li> <li>The potential establishment of alien invasive species within the proposed Springfield project area was identified and it was indicated that, if not appropriately managed, alien invasive species would likely become established in disturbed areas, particularly vulnerable areas such as rehabilitated surfaces).</li> </ul>	Interactive: Synergistic and Spatially additive	LOM, post-Closure phase.	TBC	-	8	2	4	4	56	Implementation of the mitigation measures set out in the EIAMAPs regarding the control of alien invasive species will reduce the significance of the associated impacts and therefore the potential contribution of Springfield Colliery (including the Redan siding) to the existing problems with alien invasive species in the region.	-	4	1	4	3	27	

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13	<b>Biodiversity - Threatened species</b>	Numerous species in Gauteng face the risk of extinction due to factors such as habitat loss, environmental degradation and fragmentation of landscapes. The identified loss of natural habitat, and the fragmentation of the remaining habitat that goes with it, is the single biggest cause of biodiversity loss in South Africa. In almost all cases it is irreversible.	<ul style="list-style-type: none"> <li>Two species of conservation concern were previously recorded in the study area. These were the African grass owl (<i>Tyto capensis</i>) and Lanner falcon (<i>Falco biarmicus</i>). Both these species are classified as Vulnerable in South Africa. African grass owls are a priority Red List species in Gauteng. The lanner falcon likely utilises large areas of the study site and surrounding landscapes, including agricultural areas, to forage.</li> <li>The impacts of mining, in terms of noise, ground vibrations, wetlands, surface water and groundwater impacts will severely affect the habitat of the Grass owls, and may destroy the habitat and or lead to the loss of life of the owls. Furthermore, the increase in human presence on site will contribute to the migration of this species but the lack of suitable habitat in the surrounding areas may further contribute to loss of animal life.</li> <li>Potentially suitable habitat for the following species will be lost or fragmented due to the proposed Project: Habitat areas for vulnerable species (the African grass owl (<i>Tyto capensis</i>), Lanner falcon (<i>Falco biarmicus</i>) and the giant girdled lizard (<i>Smaug giganteus</i>). While it is noted in the terrestrial ecology study that the habitat is already degraded and very limited at the site, any remaining habitat should be conserved as these vulnerable species require suitable habitat areas. The loss and fragmentation of habitat within the study area would contribute to the existing cumulative impacts in the region regarding loss of habitat for threatened plant and animal species.</li> </ul>	Interactive: Synergistic	LOM, and post-Closure phase.	TBC	-	10	2	5	5	85	Implementation of measures to manage the impacts on topography, soil, vegetation, animal life, surface water, groundwater and sensitive landscapes during the LOM will ensure that the negative contribution of the mine to existing impacts on habitats will be reduced. However, due to the nature of the proposed opencast mining, the loss and possible fragmentation of habitat within the proposed Springfield Colliery and Redan siding area is unavoidable.	-	8	2	5	3	45
14	<b>Surface water-Availability</b>	The bulk of water resources available in Gauteng comes from surface water resources, water transfers into the province as well as relatively small percentage of groundwater. Other sources of available water include return flows from mining, industrial, irrigation and urban sectors. Water use in South Africa is dominated by agricultural use (61% according to the NWRS II, 2023).	<ul style="list-style-type: none"> <li>The containment of contaminated water in pollution control facilities at Springfield Colliery and Redan siding will lead to a decrease in the MAR available to the affected catchments. This applies to the LOM for containment and decant management respectively.</li> <li>The isolation of the dirty water management areas at the proposed Springfield Colliery and Redan Siding project will result in the removal of a portion of the catchment yield draining into the receiving water resource, the Klip spruit. The withholding of the poor quality water is necessary to prevent significant impacts on water quality in the receiving catchment area, and is not considered to be significant in terms of volume.</li> <li>The alteration of the watercourse functionality and increased risk of flooding and scouring will increase the footprint area responsible for the alteration of the catchment hydrology.</li> <li>It is therefore not expected that the Springfield Colliery and Redan Siding project will contribute significantly to existing cumulative impacts in the catchment, providing all the recommended mitigation measures are appropriately implemented.</li> </ul>	Interactive: Synergistic and Spatially additive	LOM, and post Closure	TBC	-	8	2	5	5	75	Implementation of surface water management measures during the LOM will ensure that the overall volume that need to be withheld from the catchment for water quality management purposes will be minimised. In addition, the treatment of mine water, including AMD extracted from old underground workings and, in future, backfilled opencast workings, at the Springfield Mine Water Treatment Plant will enable the return of treated water back to the affected catchments, as far as practicable. Passive treatment is being investigated for post Closure decant management, which would make treated mine affected water available to the receiving resource, rather than utilisation of evaporation and withholding of the mine affected water from the downstream resources.	-	6	1	5	3	36

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15	Surface water-Quality	<p>The water quality indicators within the quaternary catchments C22E and C22F (part of the Vaal River Management area), have shown a general well documented slow decrease in water quality over time. Median levels of surface water nutrients have increased and indicate a potential for enrichment within the Vaal River catchment. The consequences of such elevated levels are:</p> <ul style="list-style-type: none"> <li>• The greater potential for algal blooms;</li> <li>• An impact on riverine ecosystems; and</li> <li>• Impairment of human health.</li> </ul> <p>High (and increasing) total dissolved solids (TDS) levels in the Vaal River Water Management Area have the potential for decreasing the aesthetic value of the water. Exceedance of the guideline levels for certain metals in the Vaal River WMA may be attributed to the numerous industrial and mining activities taking place in the study area.</p> <p>The main water quality challenge in the Vaal River system near the study area is that of sewage pollution. Rand Water, ERWAT, DWS and municipalities such as Emfuleni are involved in the management, rectification and monitoring thereof. The Vaal River Intervention commenced in 2003 and is still ongoing. According to the Vaal River Intervention's published water quality data, the Klip river, prior to the confluence with the Vaal River reflected an excessively high E.coli count of 3890/100ml on the 07<sup>th</sup> of February 2024.</p>	<ul style="list-style-type: none"> <li>• Similar impacts occurring as a result of the proposed Springfield Colliery and Redan Siding project could contribute to the current poor water quality conditions in the unnamed tributary of the Klipspruit and the Fourie spruit and further downstream in the Klip spruit, if not prevented. Unless sufficiently treated and or managed prior to discharge in the receiving streams, the proposed Springfield Colliery and Redan Siding project could contribute further to the existing water quality problems of the Vaal River</li> <li>• If contaminated surface water (including decanting acid mine water) is discharged, or allowed to flow, to the receiving environment without treatment, the water quality in the receiving environment would further deteriorate. Downstream users and aquatic habitats would be negatively affected by such discharge, and the wetlands in downstream receiving areas would also be negatively impacted.</li> <li>• The increased risk of soil erosion from exposed earth my contribute to pollution. Other sources of water quality deterioration will be spillages and accidental discharges.</li> </ul>	Interactive: Synergistic and Spatially additive	LOM, post-Closure.	Yes	-	10	3	5	5	90	Implementation of the mitigation measures set out in the operational and decommissioning phases will minimise and reduce impacts on water quality, including decant management and treatment, and will significantly reduce the overall contribution of Springfield Colliery to the negative water quality issues within the applicable catchments. Furthermore, the retention of mine water within the isolated dirty water management system at the Springfield mine and Redan siding project, and the proper management thereof, as well as the use of the package plant for treatment of domestic waste water, will minimise, and possibly eliminate, the potential for the proposed project to contribute to the existing water quality problems of the Klip spruit and Vaal River.	-	6	1	5	3	36



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16	Groundwater	According to the DWS, more than 50% of available groundwater is being utilized in five Water Management Areas (WMAs) across the country, with the highest utilisation happening in Limpopo. Groundwater contributes approximately 6% of available water in Gauteng in 2023 (excluding mine water).	<ul style="list-style-type: none"> <li>A groundwater study is being conducted for the proposed Springfield Colliery and Redan Siding project. It is amongst other the intention to determine if any of the surrounding groundwater users would be affected by the change in groundwater level during the LOM of the project. It will specifically also be assessed what the impact will be on groundwater use from the old mine, once dewatering commences.</li> <li>The Springfield underground mine underlying the study area serves as a high yield man-made aquifer, as these boreholes were drilled into the underground workings. The average yields of these boreholes are in the order of 100 000 l/h (28l/s) and a total of around 20 800 m<sup>3</sup>/day is abstracted from this resource.</li> <li>In fact, the removal of contaminated groundwater from the underground workings ahead of opencast mining, and the treatment thereof at the Springfield Mine Water Treatment Plant for onward use as potable water for domestic consumption by the Municipality or for replacement back into the catchment areas, or for use for irrigation purposes for farming, (or most likely a combination thereof) will contribute to the use of groundwater in the interest of the public, while simultaneously eliminating the potential water quality problems associated with mine water decant.</li> <li>The extent and quality of pollution plumes emanating from mining areas will affect the overall groundwater quality in the area. This could impact on the water users in the area and immediately adjacent to the study area.</li> </ul>	Interactive: Countervailing	LOM, and post-Closure phase.	Yes	-	10	3	5	5	90	Implementation of operational and decommissioning phase mitigation measures to minimise and reduce impacts on groundwater quantity will significantly reduce the overall contribution of Springfield Colliery to regional groundwater reduction.	-	8	2	5	3	45
17		<ul style="list-style-type: none"> <li>Groundwater is used for irrigation and domestic consumption in the surrounding agricultural region.</li> <li>Groundwater levels are drawn down at all operational mines in the region, leading to an overall impact on groundwater levels.</li> <li>Flow of groundwater between the mine and adjacent quarries may be possible.</li> <li>The groundwater use for Irrigation at Springfield area was determined to be approximately 84% of the total water use in the regional area.</li> <li>The majority of the boreholes visited during the hydro census are being used for large scale abstraction for irrigation purposes.</li> <li>The study area consists mostly of farms where intensive agriculture is being practised. The Springfield underground mine underlying the study area serves as a high yield man-made aquifer, as these boreholes were drilled into the underground workings. The average yields of these boreholes are in the order of 100 000 l/h (28l/s) and a total of around 20 800 m<sup>3</sup>/day is abstracted from this resource.</li> </ul>	<ul style="list-style-type: none"> <li>Development of draw down cones during the operational phase will occur due to the dewatering of mining operations to enable mining to proceed. This will affect the groundwater levels within the study area during the operational phase, but once dewatering ceased, groundwater levels are expected to recover.</li> <li>While similar impacts will occur on regional groundwater levels due to the removal of groundwater ahead of opencast mining, the drawdown cones are not expected to exceed 1km from the opencast pits. It is therefore not expected that the drawdown effect at the proposed Springfield Colliery and Redan Siding project will contribute significantly to existing cumulative impacts on groundwater levels in the region.</li> <li>Some deterioration in the quality of the groundwater accumulating in the back filled opencast areas, post mining is anticipated, see the attached groundwater report.</li> </ul>	Additive	Operational phase.	Yes	-	10	2	5	4	68	No mitigation is possible, since dewatering is necessary for mining to proceed. Monitoring of the groundwater levels by the mine and the reporting of the results of the DWS will allow for the development of a central database of groundwater information.	-	10	2	5	4	68

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		<ul style="list-style-type: none"> <li>The aquifer system in the study area can be classified as a "Major Aquifer System", based on the fact that the local population is dependent on groundwater.</li> <li>The major aquifer system referred to is the underlying dolomite aquifer which feeds the upper layer and the underground workings.</li> </ul>																	
18	Air quality	<p>Air quality is an issue of concern in the study area (Vaal triangle, particularly), as it is in many other parts of South Africa. The Vaal Triangle is known for persistently higher concentration of air pollutants compared to many other areas in the country. The main identified sources likely to contribute to existing cumulative particulate impacts are the coal mines, industries, power stations and vehicles. Other sources are the surrounding agricultural activities, domestic fuel burning, and domestic use of fossil fuels. The larger area surrounding the project site is classified as rural in nature and is located in the Vaal Triangle Airshed Priority Area (VTAPA). The VTAPA was declared a Priority Area by the Minister of Environmental Affairs and Tourism on 28 May 2009 under the National Environmental Management Air Quality Act (Act No. 39 of 2004) (NEM:AQA) (Government Gazette, No. 32263 of 28 May 2009). The area was declared a priority area due to high pollutant concentrations within the area, especially particulates.</p>	<ul style="list-style-type: none"> <li>The proposed Springfield Colliery and Redan siding are located within the Nationally declared VTAPA, where the air quality is already poor due to persistent elevated ambient concentrations of criteria pollutants such as PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub> and NO<sub>x</sub>. This is evidenced by the baseline air quality concentrations recorded at the Three Rivers AQMS, where several exceedances are recorded in terms of PM<sub>10</sub> and PM<sub>2.5</sub> concentrations, including a few exceedances in terms of SO<sub>2</sub> concentrations. While the proposed operations are located 5km away from the Three Rivers AQMS, criteria air pollutant concentrations recorded at the Three Rivers AQMS are considered representative of the baseline pollutant concentrations at the proposed mine.</li> <li>Dust fall, PM<sub>10</sub> and PM<sub>2.5</sub> are key pollutants of concern associated with operations at the proposed mine and will be emitted from the following key sources.</li> <li>For the operational phase (post-mitigation), predicted incremental dust fall rates and PM<sub>2.5</sub> concentrations are relatively high but fall below the applicable limits over most of the project area modelled, with higher concentrations, including exceedances, mainly observed near to the proposed surface mining activities (open pit, drilling, blasting, loading and offloading operations, haul routes, material stockpile areas, conveyor transfer points, and proposed material stockpile/exposed areas). However, exceedances in daily PM<sub>2.5</sub> concentrations also extend beyond the south-western mine boundary within a maximum radius of 3km. As seen under the construction scenario, predicted incremental PM<sub>10</sub> concentrations are also high, with exceedances of the daily limit extending over a wide area within the proposed mine boundary. While exceedances in predicted incremental daily and annual PM<sub>10</sub> concentrations extend beyond the north-western, south-western and south-eastern mine boundaries, they are within maximum radii of 15 km and 2.8km, respectively.</li> </ul>	Spatially additive and Interactive: Synergistic	Operational and Decommissioning Phases.	Yes	-	6	3	4	5	65	Implementation of the mitigation measures proposed for the construction, operation and decommissioning phase of the proposed project will minimise and reduce impacts on air quality, and will significantly reduce the overall contribution of Springfield Colliery and Redan Siding to regional air quality problems, and also to climate change.	-	4	2	4	4	40

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19	Noise	Noise generated by mining activities is related to blasting and use of equipment and vehicles. However, noise is directional, and dissipates with distance. The spatial distribution of mines and related operations in the region reduces noise impacts inherently. However, when the noise is generated near residential areas, the location of the I&APs within the noise transmission paths together with the actual generation of noise cumulatively increases the significance of the impact.	<ul style="list-style-type: none"> <li>Construction 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 R59 and R82.</li> <li>Noise levels during the operational phase are not expected to affect the residents of nearby residential areas during the day, but at night, noise levels are more likely to affect sensitive receptors if not mitigated or avoided.</li> <li>It is possible that the noise levels from the Springfield Colliery and Redan Siding project may overlap at night during the operational phase and have a nuisance impact of sensitive receptors.</li> <li>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 R59 and R82.</li> </ul>	Interactive: Synergistic	Operational and decommissioning phases.	Yes	-	6	2	4	4	48	Implementation of the noise management measures stipulated in the construction, operational and decommissioning phases as well as the attached specialist study, will reduce the contribution of Springfield Colliery and Redan Siding to the regional ambient noise levels and consequent impacts on I&APs.	-	4	2	4	2	20
20	Socio-Economic	There are various industrial and agricultural projects which are currently being undertaken in the study area, including South 32, Lethabo Power Station, New Vaal Colliery, Cape Gate, Arcelor Mittal and Heineken, amongst others. The presence of these developments will contribute to the environmental and social impacts.	<ul style="list-style-type: none"> <li>The cumulative impacts associated with the creation of employment and business opportunities and training during the construction phase, are that there is an opportunity for employment seekers to improve their skills;</li> <li>The cumulative impacts associated with the influx of job seekers include the long-term impacts on family structures and social networks of communities. In the case of HIV/AIDS or unwanted pregnancies the impacts might be permanent and have permanent cumulative impacts on the affected individuals, families and the community;</li> <li>An influx of workers (direct) and jobseekers (indirect) may lead to increased pressure on infrastructure and services and an increase in social pathologies. Glubay Coal should make every effort to discourage influx by communicating early and widely that local residents will be given preference for employment. Glubay Coal must ensure that it collaborates with the relevant local authorities and mining operations to identify and actively participate in initiatives/ projects to improve capacity where required. While the potential impacts linked to influx can have negative consequences, this is a common and anticipated phenomenon that cannot be a reason for preventing further development;</li> <li>An increase in direct project nuisance factors; namely, noise, air pollution, traffic and visual disturbances could further impact negatively on the sense of place for some receptors. Implementation of suitable mitigation measures will be proposed to reduce and manage these nuisance factors.</li> </ul>	Chronologically additive	LOM	Yes	-	8	4	5	5	85	Measures will continue to be implemented to focus employment and community projects in the local area.	-	6	2	4	4	48

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21		Multiplier impacts on the local economy due to the various industrial and agricultural projects which are currently being undertaken in the study area, including South 32, Lethabo Power Station, New Vaal Colliery, Cape Gate, Arcelor Mittal and Heineken, amongst others.	The proposed mining operations may result in several economic benefits for local communities through direct and multiplier effects stimulated by capital expenditure and construction activities. The mine is likely to generate contracts for the purchase of equipment and other goods and services. Most of these contracts will be for specialist goods and services, which will be provided by businesses within the project area. Procuring of specialist goods and services will likely generate more opportunities for Small, Medium and Micro sized Enterprises, provided they are formalised and able to meet the mine's procurement requirements. The local economy may be stimulated as follows: <ul style="list-style-type: none"> <li>Increased financial spending.</li> <li>Expenditure on resources that is required for the construction of the development to take place. These include the purchasing of building material, payment of services provided and infrastructure etc.</li> <li>Increased expenditure by construction workers.</li> <li>Income that would be earned by employees would be mostly spent within the region.</li> </ul>	Chronologically additive	LOM	Yes	+	2	2	4	4	32	Measures will continue to be implemented to focus employment and obtain goods and services from within the local area and the region.	+	4	3	4	5	55
22	Socio-Economic	Mine closure will raise unemployment levels in the region, and would increase significantly as more mines and industries such as the power station, close down in future..	<ul style="list-style-type: none"> <li>The proposed Springfield Colliery and Redan Siding project will have a temporary positive effect on continued employment opportunity in the regional area and the associated spin-off benefits for local goods and services, as well as the communities. Once the proposed Springfield Colliery and Redan Siding project closes, however, it is expected that the severity, duration and probability of occurrence of the negative impacts associated with closure will increase to a higher significance.</li> <li>All positive impacts of the mine on the socio-economy that will have taken place during the operational phase will wane during the decommissioning phase until they cease, mainly due to the reduction or cessation of jobs and the cessation of demand for goods and services, as well as the cessation of contributions to community projects and initiatives.</li> <li>The proposed Cost-benefit analyses to be undertaken for the Springfield Colliery will be able to further quantify these identified impacts.</li> </ul>	Interactive: Countervailing	LOM, and post-Closure	Yes	-	8	3	4	5	75	Glubay Coal will, through the Social and Labour Plan processes pertaining to management of downscaling and retrenchments and the relevant legislation, re-skill all employees to be retrenched. This will ensure that the employees affected by the closure of this mining operation can re-enter the workplace. Note, however, that the mine and the mining contractor may still use the employees in other mining projects, hence retrenchments may not occur. However, not all employees will be willing to relocate to other projects.	+	4	4	5	3	39
23			<ul style="list-style-type: none"> <li>Rehabilitation of the Springfield Colliery and Redan Siding mining and surface infrastructure areas to support long-term sustainable land uses will improve the contribution, or potential contribution, of the land within the Springfield Colliery and Redan Siding project boundary area to provide jobs and contribute to the regional socio-economy, compared to pre-mining conditions. This should be confirmed through the results of a Cost Benefit Analysis.</li> <li>Rehabilitation of the surface to support the pre-mining land capability means that future land use of the site could be sustainable over the long-term. Use of the land for agricultural purposes such as crop cultivation or grazing will enable the contribution of future land users to the local and regional socio-economy through food production and agricultural job creation.</li> </ul>	Interactive: Countervailing	LOM, and post-Closure.	Yes	+	4	1	5	4	40	Implementing measures during the LOM to ensure that the land capability and end land use objectives can be achieved, such as the measures included in the agriculture specialist report attached, will ensure that the anticipated positive future long-term socio-economic impacts will be possible.	+	6	2	5	4	52

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24	I&APs	The use of provincial roads by heavy duty vehicles for the haulage in the region leads to the deterioration of the public roads and increased safety hazards for all road users, particularly in poor visibility conditions/	Since the coal (mainly product) will be transported from the coal beneficiation plant at Springfield Colliery to the Redan Siding via conveyor and from the Redan Siding to the export market via rail, it is anticipated that the Springfield Colliery and Redan Siding project will not contribute significantly to any existing impacts in the region arising from the use of provincial roads by heavy duty coal trucks for coal haulage. Some heavy goods vehicles will still be used to transport coal to the domestic markets from Springfield Colliery, although the majority of the coal product will be transports via conveyor and rail.	Additive	LOM	Yes	-	4	3	4	3	33	Springfield Colliery's procurement policies ensure that drivers employed by contractors responsible for the transport of the coal will be well trained to manage the safety hazards presented on the roads in the region. Coal transport trucks will be covered with tarpans to prevent road spillages.	-	4	3	4	2	22
25		I&APs are generally affected indirectly by the direct impacts of mining and related activities, heavy industries and power stations on environmental aspects, such air quality , noise, visual aspects and water related impacts. The location of the I&APs in relation to the mining and related activities strongly influences the severity of the impacts. Nearby and adjacent residential areas were indicated on a map in the beginning of this report and include amongst other: Waldrift, Arcon Park, Fleurdal, Klip River Country Estate, Glen Donald AH, Rothdene, Kookrus, Aeroval, Meyrdustris, Rust Ter Vaal, Harmoniesrus, Van der Merwes Kroon and Spirincol.	As mentioned previously, the village of Waldrif may be affected by impacts on air quality, noise and visual aesthetics, as well as potential impacts resulting from blasting and vibrations, if not mitigated or prevented. Impacts of the adjacent Vlakfontein project and the Redan Siding will combine to result in an increased impact.	Additive	LOM	-	6	2	4	4	48	<ul style="list-style-type: none"> <li>The infrastructure of the proposed Springfield Colliery and Redan Siding project was designed to minimise the potential air quality, noise and visual impacts of the proposed mining areas and surface infrastructure on the residents of the surrounding communities.</li> <li>In addition to implementing measures to mitigate impacts on the mentioned environmental aspects, communication between the mine and I&amp;APs is essential to managing the significance of such impacts.</li> </ul>	-	4	2	4	3	30	