APPENDIX K: NEED & DESIRABILITY MOTIVATION

NEED AND DESIRABILITY MOTIVATION

In accordance with DEA (2017), Guideline on Need and Desirability, Department of Environmental Affairs

1.How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?

1.1.How were the following ecological integrity considerations taken into account?:
1.1.1.Threatened Ecosystems,
1.1.2.Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure,
1.1.3.Critical Biodiversity Areas ("CBAs") and Ecological Support Areas("ESAs"),
1.1.4.Conservation targets,
1.1.5.Ecological drivers of the ecosystem,
1.1.6.Environmental Management Framework,
1.1.7.Spatial Development Framework, and
1.1.8.Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.).

TERRESTRIAL BIODIVERSITY IMPACT ASSESSMENT. PROPOSED WATER TREATMENT WORKS ON ERF RE/557 AND ERF 672 HEIDELBERG NICOLAAS HANEKOM, FEBRUARY 2026

Conclusion and Recommendations

The sampling and analysis of the site was optimum and provides suitable data and results to present an informed decision on the local ecology and terrestrial biodiversity features. During the site visit, the different biodiversity features, habitat, vegetation and landscape units present were identified and recorded in the field. Walk-through-surveys were conducted of representative habitats and areas of interest. Searches for listed species of conservation concern at the site were conducted, but none were observed which required the recording of their location. The presence of sensitive habitats such as wetlands or pans and unique edaphic environments, such as rocky outcrops or quartz patches, are present and therefore was recorded and mapped. The existing access road that will be used were incorrectly mapped as CBA and the proposed infrastructure is located outside mapped CBA. The Eastern Scale Renosterveld are degraded due to existing Eucalyptus tree plantation and portions of the proposed development footprint were levelled previously. No species of conservation concern were recorded.

The results of the information gathered from the site survey does differ from the Environmental Screen report result of Very High Terrestrial Sensitivity. No SCC were recorded or will be impacted. 338.21m2 was incorrectly mapped as CBA. This mapped area is located on the existing road and pipeline route that will be used. The vegetation impacted by the proposed development area is characterized and dominated by pioneer grasses and does not represent the vegetation structure of Eastern Ruens Shale Renosterveld. The vegetation was impacted by previous levelling of a portion of the site and roads and the rest of the area by Eucalyptus tree plantation and consist mainly of pioneer plants. **Approximately 1200m2 degraded endangered vegetation with a very low ecological sensitivity will be permanently cleared. It is therefore expected that the proposed development will have low negative terrestrial biodiversity and ecological impacts on the terrestrial biodiversity features provided that appropriate mitigation measures are included in the EMPr and adhered to.** No biodiversity offset is required in terms of the National Biodiversity offset Guidelines.

No additional survey or further assessment is in the author's view recommended.

Layout/design Alternative 3 is preferred as it includes a stormwater canal to prevent potential erosion and contamination around the WTW, it also includes an artificial reed bed system as part of the sludge management system from where all overflow will be discharge back into the Bloekombos Dam decreasing the potential to cause pollution. Potential impacts on terrestrial plant and animal species and their potential associated habitat could be sufficiently mitigated/managed by implementing the mitigation measures as proposed within this report

To achieve this objective the following management and mitigation measures are proposed and must be incorporated into the Environmental Management Plan:

- Clearance of indigenous vegetation must be kept to a minimum clearly demarcating the proposed development area before construction commencement, maintaining the demarcation throughout the construction phase. Undertake construction activities only in identified and specifically demarcated areas.
- Construction activities must be completed as quickly as possible to limit disturbance caused to animal and bird life as far as possible.
- All unused construction materials must be removed from site immediately after construction completion.
- No waste pollution may occur due to the construction activities and all waste must be contained and disposed of at the municipal landfill site.
- No trapping, hunting or any injury to animal or birdlife may occur during construction activities. Should any local animal or birdlife be found within the construction area they must carefully be moved to the adjacent natural areas not to be impacted upon.
- Construction activities must be controlled to ensure that the adjacent vegetated areas are not negatively impacted.
- Invasive vegetation to be removed during construction to be disposed of at landfill site in such a manner that seeds must not be able to spread from the disposal site or during transportation.
- The discharge of stormwater and overflow must not lead to waste pollution or erosion at discharge points.
- Waste traps must be installed at the inlet to the stormwater pipes which must be cleared of waste on a monthly basis by the municipality. Any waste at the stormwater discharge areas must also be removed by the municipality and disposed of at the municipal landfill site on a monthly basis.
- Ongoing monitoring of erosion at the outlet structures must be done by the municipality, should any signs of erosion be detected immediate rectification and further prevention measures must be put in place under the guidance of a qualified ecological specialist so as to prevent any additional cumulative impacts on the environment.
- The stormwater outlets must be fitted with a grid to prevent animals and birds from nesting inside of these pipes.
- Discharge of stormwater must be controlled and must be done in such a manner that it does not cause erosion at the discharge point.
- The impacted site must be monitored for alien vegetation encroachment and should alien vegetation encroach on the impacted site it must be removed and monitored in accordance with CapeNature approved alien vegetation management practices.
- Replacement of topsoil and revegetation of the impacted indigenous vegetation areas must be completed within one month of construction completion and under guidance of a qualified ecological specialist. Revegetation must only be done with locally sourced indigenous vegetation.
- Monitoring of rehabilitated areas must be done by an ECO for at least one year after construction completion on a three-monthly basis to determine success of rehabilitation and to monitor other potential impacts such as erosion. Should the ECO find that

rehabilitation is not satisfactory he/she must recommend additional measures to be implemented.
- All services infrastructure must be maintained in a good condition by the municipality not leading to any environmental degradation or pollution.

Provided that activities are restricted to the property and the mitigation measures to reduce the impacts of the activities are implanted, then the activities are not likely to result in long-term degradation of the receiving environment or significant net loss of terrestrial biodiversity.

1.2.How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?

As per the Terrestrial Biodiversity Impact Assessment, Plant and Animal Compliance Statement conducted, provided that activities are restricted to the proposed 0.5ha development area and the mitigation measures to reduce the impacts of the activities are implemented, then the activities are not likely to result in long-term degradation of the receiving environment or significant net loss of terrestrial, plant or animal biodiversity.

All mitigation measures as per the specialist impact assessments conducted were included in the EMP requirements.

1.3.How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?

All potential impacts relating to the potential pollution and/or degradation of the biophysical environment were assessed, and mitigation measures proposed that were included in the requirements of the EMPr. No offsetting is required as no significant indigenous vegetation ecosystems are expected to be impacted by the proposed development.

Refer to Appendix J for detailed impact assessment conducted and associated mitigation measures proposed.

1.4.What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided altogether, what measures were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?

An integrated waste management approach will be followed as per the requirements of the EMPr during the construction phase. Refer to EMPr.

During the operational phase of the WTWs the only expected waste to be produced is sludge and waste water from the sludge dams.

<u>Sludge Handling</u>
The option to dispose of the backwash water into the municipal sewer system and this finally disposed into the waste water treatment works was considered. The proposed WTW is located on the far end of Heidelberg and the volumes discharged during backwashing is much higher than what the sewer design capacities on the outskirts can transfer. This option is also not contributing to water saving and economic water usage.

In order to minimise water losses during water treatment, three concrete lined lagoons, with ground level dimensions 27m x 12m x 1.8m deep, will be incorporated for the recovery of backwash and filter rinsing water, The top two lagoons will be operated as settling dams and the third lagoon will operate as an artificial reed bed, with all the backwash settled water passing through the reed bed and be fully returned into the Bloekombos Dam. Only the site rainwater runoff will be piped into the non-perennial stream.

Filters will be backwashed at 4 hours intervals to enable the recycle pump to draw the settled sludge supernatant water down at a constant rate. The recycle pump (+standby) will pump the controlled flow of supernatant from the artificial reed bed at 3.0L/s along a 100mm diameter uPVC underground pipe to the inlet point of the irrigation canal into the Bloekombos Dam.

Surface water discharged from the sludge settling dam will be collected form the surface by a floated outlet pipe, floating just below the surface. In this manner the minimum sludge will be carried over into the artificial reed bed, where the final discharge will then be carried over into the return flow sump. This will also ensure that in the event of sump pump failure, a controlled overflow from the plant with minimal risk for contamination, is in place. The overflow water (after settling) will contain low concentration dissolved iron (a natural environmental metal) and some colour (organic origins) and turbidity (natural surface soil origins).

Settled sludge collected in the lagoons, will require to be emptied twice per annum. Access to a suction tanker to each lagoon, will enable sludge to be abstracted and transferred to the Heidelberg landfill site. The two settling lagoons will be cleaned (desludged) one at a time while the other lagoon is operational.

Return flow from the artificial reed bed into the Bloekombos Dam, will be at an estimated ration of Inflow canal/return flow = 20/1. Artificial reed beds are highly efficient in Fe removal from streams and waste water. Fe levels as high as 40mg/l can be treated with some 80-90% removal, based on the design parameters selected.

All of the backwash settled water passing through the reed bed will be fully returned to the Bloekombos Dam. Only the site stormwater runoff will be piped into the natural stream. This is the preferred option since the natural regrowth on natural wetland species will be supported.

1.5.How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?

No landscapes or sites that constitute the nation's cultural heritage will be impacted upon. HWC NID was completed and submitted to the Heritage Western Cape whom confirmed no expected heritage impacts and no heritage impact assessments required.

1.6.How will this development use and/or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?

During construction phase water saving measures as per the EMPr requirements are to be implemented at all times.

A per the Technical Report provide (attached as Appendix L2 of the BAR) the proposed WTW operations will be based on the following:

1. Maximum capacity of 3 000m³/day
2. Surface abstraction by floating pumps from Bloekombos Dam on a variable demand basis;
3. Treatment processes as discussed below;
4. Sludge dams and artificial reed bed for backwash water collections and sludge settlement;
5. A collector sump and pumps for return flow of supernatant from artificial reed bed into Bloekombos dam to optimise water use. Return flow water to be pumped along an underground 110mm x 87m long uPVC pipe to the canal inlet point at the Dam;
6. A pump station and 200mm x 650m uPVC pipeline for final water distribution from the WWTW into the existing bulk distribution system in Heidelberg.

The following treatment process is proposed to optimise water use, reuse and recycle water in the WTWs:

Step 1. pH Adjustment (Caustic Soda)

Caustic Soda will be dosed upstream of the works to ensure that the incoming water is at pH8, which is optimum for iron removal. An inline orifice plate will create the point of dosing and turbulence required. The Caustic Soda dosing rate will vary between 10 – 15 mg/l depending on the incoming pH. Two dosing pumps shall be provided, on duty and one standby. A continuous sampler and pH controller will be installed in the raw water sump. Each dosing pump shall be variable speed controlled and the dosage rate directed from the controller. Dosing pumps shall each be rated at a 5 l/hr capacity.

Step 2. Coagulation (Poly Electrolyte dosing)

Flocculation beaker tests performed by Metsi Chem iKapa (2021) or raw water from the Duivenhoks Dam, confirmed that an optimum dosage of 80 mg/L of ZetaFlos measured as un-filtered water, will result in sufficient iron, turbidity and colour removal. The flocculant dosing pumps shall be sized accordingly.

Step 3. Post Chlorination

Coliform bacteria and other contaminants will be removed by oxidations through chlorine dosing. The post chlorine dosing rate will vary between 0.6 -1.5 mg/l. Two injectors shall be provided, one duty and one standby. Each injector shall have a dosing capacity of 1.5 mg/l. The clear water sump will have a division wall to prevent short circuiting and enough contact time for disinfections. A sampling point for water samples will be provided on the outlet pipes to the final water pumps.

Step 4. Filtration

The raw water quality is of such a nature that no standard settling tanks will be required. Direct filtration onto 3 x 2.3m diameter pressure filters will be required.

WTW Desing flow	3Ml/d i.e. 125.0 Kl/hr
Number pressure filters	3
Flow/filter	41.7 m3/hr
Filtration rate	10 m/hr
Required area/filter	4.17 m2
Filter diameter	2.30m

Filter media shall be a 900mm bed of glass media, effective grain size (de) 0.6-1.4mm with uniformity coefficient (P60/P10) of 1.0, The glass filter medium will be supported on a gravel bed 150mm thick. The gravel layer shall be silica and have an effective size (de) 3-5mm and a uniformity coefficient <2.5.

Step 5. Sludge Handling

The option to dispose of the backwash water into the municipal sewer system and this finally disposed into the waste water treatment works was considered. The proposed WTW is located on the far end of Heidelberg and the volumes discharged during backwashing is much higher than what the sewer design capacities on the outskirts can transfer. This option is also not contributing to water saving and economic water usage.

In order to minimise water losses during water treatment, three concrete lined lagoons, with ground level dimensions 27m x 12m x 1.8m deep, will be incorporated for the recovery of backwash and filter rinsing water, The top two lagoons will be operated as settling dams and the third lagoon will operate as an artificial reed bed, with all the backwash settled water passing through the reed bed and be fully returned into the Bloekombos Dam. Only the site rainwater runoff will be piped into the non-perennial stream.

Filters will be backwashed at 4 hours intervals to enable the recycle pump to draw the settled sludge supernatant water down at a constant rate. The recycle pump (+standby) will pump the controlled flow of supernatant from the artificial reed bed at 3.0L/s along a 100mm diameter uPVC underground pipe to the inlet point of the irrigation canal into the Bloekombos Dam.

Surface water discharged from the sludge settling dam will be collected form the surface by a floated outlet pipe, floating just below the surface. In this manner the minimum sludge will be carried over into the artificial reed bed, where the final discharge will then be carried over into the return flow sump. This will also ensure that in the event of sump pump failure, a controlled overflow from the plant with minimal risk for contamination, is in place. The overflow water (after settling) will contain low concentration dissolved iron (a natural environmental metal) and some colour (organic origins) and turbidity (natural surface soil origins).

Settled sludge collected in the lagoons, will require to be emptied twice per annum. Access to a suction tanker to each lagoon, will enable sludge to be abstracted and transferred to the Heidelberg landfill site. The two settling lagoons will be cleaned (desludged) one at a time while the other lagoon is operational.

Return flow from the artificial reed bed into the Bloekombos Dam, will be at an estimated ration of Inflow canal/return flow = 20/1. Artificial reed beds are highly efficient in Fe removal from streams and waste water. Fe levels as high as 40mg/l can be treated with some 80-90% removal, based on the design parameters selected.

All of the backwash settled water passing through the reed bed will be fully returned to the Bloekombos Dam. Only the site stormwater runoff will be piped into the natural stream. This is the preferred option since the natural regrowth on natural wetland species will be supported.

1.7.How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts?

1.7.1.Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)?(note: sustainability requires that settlements reduce their ecological

footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life)

1.7.2.Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra-and intergenerational equity, and are there more important priorities for which the resources should be used(i.e. what are the opportunity costs of using these resources this the proposed development alternative?)

1.7.3.Do the proposed location, type and scale of development promote a reduced dependency on resources?

RESPONSE 1.7.1-1.7.3

The proposed treatment plant will require a 3 phase 400/230V nominal supply at 50 Hz and will be made available from the nearest pole mounted transformer. The supply from the transformer to the plant control room, will be an underground cable some 55m long. To ensure the WTWs is operated optimally an Operating & Maintenance Manual will be compiled within 6 months after construction completion for implementation.

1.8.How were a risk-averse and cautious approach applied in terms of ecological impacts?:

1.8.1.What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?

1.8.2.What is the level of risk associated with the limits of current knowledge?

1.8.3.Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?

RESPONSE 1.8.1-1.8.3

Potential ecological impacts associated with the proposed development were assessed by the qualified EAP and specialists. The significance of these impacts was determined, ranked and mitigation measures to reduce the negative impact have been provided and included in the EMPr requirements.

The key mitigation measures recommended are for impact avoidance. Where adverse impacts cannot reasonably be avoided, the significance of the impacts will be managed through the effective implementation of the EMP

Refer to Appendix H: EMP for all mitigation measures as proposed to minimise potential impacts on the environment.

1.9.How will the ecological impacts resulting from this development impact on people's environmental right in terms following:

1.9.1.Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?

1.9.2.Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?

RESPONSE 1.9.1-1.9.2

The impact assessment findings for the preferred site, activity and layout alternative before and after recommended mitigation is summarised below.

Layout/design Alternative 3:

- WTW package plant with maximum capacity of 3 000m³/day (3Ml/day) 120m² footprint.
- Surface abstraction by floating pumps from Bloekombos Dam on a variable demand basis along an 60m long x 200mm uPVC pipeline above ground where it goes over and along the dam wall and below ground from the foot of the dam wall to the WTW.

- 2 x Sludge settling ponds (27m x 12m x 1.8m deep with 518m³ capacity each) for backwash water collections and sludge settlement.
- 1 x Artificial reed bed pond (27x 12m x 1.8m deep with 518m³ capacity) with aal the backwash water from the two settling ponds passing through the reed bed and returned to the Bloekombos Dam via the canal.
- The proposed cut and fil construction of the three ponds will have 3m high support embankments with a total 1200m² footprint.
- A collector sump and pumps for return flow of supernatant from sludge dams back into Bloekombos dam via the canal to optimise water use. Return flow water to be pumped along an underground 170mm x 110m long uPVC pipe to the canal inlet point at the Dam.
- A pump station and 200mm x 620m uPVC pipeline for final water distribution from the WTW into the bulk distribution system in Heidelberg via Muir Street.
- Vehicle parking and materials storage area 280m²
- Stormwater Pipeline to western non-perennial drainage line of 85m x 450mm concrete class 100D outlet headwall within non-perennial drainage line. Only the site rainwater runoff will be piped into the non-perennial drainage line.
- Widening and re-alignment of existing 3m wide access road from Muir Street by 1m (84m long x 4m wide), and three 4m access roads total distance 72m to sludge dams.
- A 3 phase 400/230V nominal supply at 50hz from nearest transformer with 55m long underground cable.

Total expected development footprint of 0.5ha.

Reasons why Layout/design alternative 3 is preferred:

- It includes a stormwater canal to prevent potential erosion and contamination around the WTW, Alternative 1 does not.
- It accommodates a larger storage and sludge handling capacity design for backwash water collections and sludge settlement at the proposed sludge settling ponds, than Alternative 1 which has no sludge dams.
- It includes an artificial reed bed to treat sludge handling water suitable for discharge back into the Bloekombos Dam instead of into the non-perennial drainage line as proposed for Alternative 2.

CONSTRUCTION PHASE- LAYOUT/DESIGN/PROCESS ALTERNATIVE 3

- Disturbance to subsurface geological layers (medium negative impact before mitigation and low negative impact with mitigation measures);
- Soil erosion (medium negative impact before mitigation and low negative impact with mitigation measures);
- Compaction of soil (medium negative impact before mitigation and low negative impact with mitigation measures);
- Increase in and accumulation of stormwater runoff (high negative impact before mitigation and low negative impact with mitigation measures);
- Impacts of construction activities on the terrestrial animal and bird life populations and their associated habitats. (Medium negative impact before mitigation and low negative impact with mitigation measures)
- Impacts of construction activities on terrestrial indigenous vegetation as part of Endangered Eastern Ruens Shale Renosterveld. (Medium negative impact before mitigation and low negative impact with mitigation measures)
- Impacts of construction activities on terrestrial biodiversity and ecological functioning also partially mapped as terrestrial CBA1 (Medium negative impact before mitigation and low negative impact with mitigation measures)
- Impacts of construction activities on the aquatic functioning of freshwater features of the site and surrounds such as the western non-perennial drainage line (Medium negative impact before mitigation and low negative impact with mitigation measures)

- Introduction of alien and weed plant species (medium negative impact before mitigation and low negative impact with mitigation measures)
- Increased temporary construction jobs (low positive impact)
- Agricultural impacts in terms of change to the future agricultural production potential of the development area (Low negative impact before mitigation and low negative impact with mitigation measures)
- Increased traffic due to the construction activities requiring various vehicles to come onto and leave the site. (medium negative impact before mitigation and low negative impact with mitigation measures)
- Impact of construction workers on local community safety and security (medium negative impact before mitigation and low negative impact with mitigation measures)
- Impact of litter or waste from the construction site on the surrounding communities (medium negative impact before mitigation and low negative impact with mitigation measures)
- Dust and emissions pollution arising from ground clearing and other construction activities (medium negative impact before mitigation and low negative impact with mitigation measures)
- The potential impact of the proposed development on archaeological, paleontological and heritage remains (high negative impact before mitigation and low negative impact with mitigation measures)
- Noise due to construction machinery (low negative impact before mitigation and low negative impact with mitigation measures)
- Visual impact of construction of proposed serviced erven (medium negative impact before mitigation and low negative impact with mitigation measures)

OPERATIONAL PHASE- LAYOUT/DESIGN/PROCESS ALTERNATIVE 3

- Increase in storm water runoff which may lead to erosion of surrounding areas (medium negative impact before mitigation and low negative impact with mitigation measures);
- Impacts of Water Treatment Works operational activities on the terrestrial animal and bird life populations and their associated habitats (medium negative impact before mitigation and low negative impact with mitigation measures)
- Impacts of Water Treatment Works operational activities on terrestrial indigenous vegetation as part of Endangered Eastern Ruens Shale Renosterveld (medium negative impact before mitigation and low negative impact with mitigation measures)
- Impacts of operational activities on terrestrial biodiversity and ecological functioning also partially mapped as terrestrial CBA1 (Medium negative impact before mitigation and low negative impact with mitigation measures)
- Potential impact of operational activities on sensitive aquatic features such as the western non-perennial drainage line (medium negative impact before mitigation and low negative impact with mitigation measures)
- Introduction of alien and weed plant species (medium negative impact before mitigation and low negative impact with mitigation measures)
- Additional water supply infrastructure to the towns of Heidelberg and Slangrivier (high positive impact)
- Agricultural impacts in terms of change to the future agricultural production potential of the development area (Low negative impact before mitigation and low negative impact with mitigation measures)
- Production of noise or odours due to proposed Water Treatment Works causing noise disturbance or odours affected adjacent residential areas (medium negative impact before mitigation and low negative impact with mitigation measures)
- Visual impact of proposed Heidelberg Water Treatment works below the Bloekombos Dam (medium negative impact before mitigation and low negative impact with mitigation measures)

DECOMMISSIONING AND CLOSURE PHASE- LAYOUT/DESIGN/PROCESS ALTERNATIVE 3

It is not anticipated that decommissioning will occur in the near future. Should decommissioning occur, the expected impacts are similar to those listed in the construction phase above with the additional positive impact of rehabilitating the decommissioned area to a near natural/indigenous state and high negative impact of destroying water services infrastructure intended to provide water supply to the areas of Heidelberg and Slangrivier. Impacts must be mitigated and managed according to the best practise techniques/management measures available for that time.

Refer to Appendix J and Appendix H for Impact Assessment and EMPr with associated mitigation measures proposed.

1.10.Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?

The only water supply source for Heidelberg and Slangrivier, is from the Overberg Water Supply System (WSS). The required assurance of supply has been compromised for several years. The projected increase in summer seasonal water demand in these towns, is predicted to exceed supply from the current source within the next 2 years.

The Overberg WSS is fully developed and there are no further infrastructure options available to improve the system yield unless expanded. The proposed Heidelberg water scheme comprises the utilisation of the existing Bloekombos dam, a new Water Treatment Works and a potable water pipeline from the WTW to Muir Street where it connects the Ultkyk Reservoir via a 200mm diameter uPVC pipeline. The proposed plant aims to provide an efficient solution for treating water from the Duivenhoks Dam in addition to the present supply from the Overberg WSS, ensuring a consistent supply of high-quality water for residential and industrial use.

The need for water services infrastructure upgrades required within the Heidelberg area to ensure and increase water supply and capacity especially during the peak dry summer months was identified and approved as part of the Amended 2022-2027 IDP for Hessequa Municipality.

1.11.Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives/targets/considerations of the area?

Refer to 1.9 above for a list of all the potential negative and positive impacts assessed and to Appendix J for the detailed impacts assessment.

1.12.Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?

In order to determine the best practicable environmental option for the development proposal feasible and reasonable alternatives (if available) must be considered and investigated to avoid negative impacts. The Environmental Assessment Practitioner and developer considered all of relevant inputs from specialists, engineers, town planners, key departments, the public and relevant stakeholders if available during the impact assessment process. Impacts identified that could not be avoided have been mitigated and managed as per the EMPr requirements.

As such the mitigation hierarchy has been effectively applied to this development proposal resulting in the best practicable environmental option (preferred alternative) presented for consideration by the competent authority.

Summary of Alternatives Assessed:

PROPERTY AND SITE/LOCATION ALTERNATIVES ASSESSED:

Property/site Alternative 1:

- Proposed new water treatment works on erven 672 and RE/557 just below the southern wall of the Bloekombos Dam at Heidelberg – Western Cape

Property/site Alternative 1 is the only reasonable and feasible property/site alternative to be considered for development of the water treatment works as water to be treated in the water treatment works is to be abstracted from the Bloekombos Dam which is located on the same property.

ACTIVITY ALTERNATIVES ASSESSED:

Activity Alternative 5:

- Heidelberg Water Scheme Project, which comprises the utilisation of the existing Bloekombos Dam as is, a new Water Treatment Works and a potable water pipeline from the WTW to Muir Street where it connects the Uitkyk Reservoir via a 200mm uPVC pipeline.

Reason/s why Activity alternative 5 is preferred:

- The proposed plant aims to provide an efficient solution for treating water from the Duivenhoks Dam in addition to the present supply from the Overberg WSS, ensuring a consistent supply of high-quality water for residential and industrial use.
- The new WTW as proposed was included under Item 12.18 of the Amended 2022-2027 IDP for Hessequa Municipality, Council approved the Amended 2022-2027 IDP at its meeting held on 31 May 2023.
- An analysis of the optimal water use form the canal only and utilisation of the present Bloekombos dam, indicated that with a minimum 60% balancing capacity at the beginning of summer season, more than 3 months storage will be possible

LAYOUT/DESIGN ALTERNATIVES ASSESSED:

Layout/design Alternative 3:

- WTW package plant with maximum capacity of 3 000m³/day (3Ml/day) 120m² footprint.
- Surface abstraction by floating pumps from Bloekombos Dam on a variable demand basis along an 60m long x 200mm uPVC pipeline above ground where it goes over and along the dam wall and below ground from the foot of the dam wall to the WTW.
- 2 x Sludge settling ponds (27m x 12m x 1.8m deep with 518m³ capacity each) for backwash water collections and sludge settlement.
- 1 x Artificial reed bed pond (27x 12m x 1.8m deep with 518m³ capacity) with aal the backwash water from the two settling ponds passing through the reed bed and returned to the Bloekombos Dam via the canal.
- The proposed cut and fil construction of the three ponds will have 3m high support embankments with a total 1200m² footprint.
- A collector sump and pumps for return flow of supernatant from sludge dams back into Bloekombos dam via the canal to optimise water use. Return flow water to be pumped along an underground 170mm x 110m long uPVC pipe to the canal inlet point at the Dam.
- A pump station and 200mm x 620m uPVC pipeline for final water distribution from the WTW into the bulk distribution system in Heidelberg via Muir Street.
- Vehicle parking and materials storage area 280m²
- Stormwater Pipeline to western non-perennial drainage line of 85m x 450mm concrete class 100D outlet headwall within non-perennial drainage line. Only the site rainwater runoff will be piped into the non-perennial drainage line.
- Widening and re-alignment of existing 3m wide access road from Muir Street by 1m (84m long x 4m wide), and three 4m access roads total distance 72m to sludge dams.
- A 3 phase 400/230V nominal supply at 50hz from nearest transformer with 55m long underground cable.
  Total expected development footprint of 0.5ha.

Reasons why Layout/design alternative 3 is preferred:

- It includes a stormwater canal to prevent potential erosion and contamination around the WTW, Alternative 1 does not.
- It accommodates a larger storage and sludge handling capacity design for backwash water collections and sludge settlement at the proposed sludge settling ponds, than Alternative 1 which has no sludge dams.
- It includes an artificial reed bed to treat sludge handling water suitable for discharge back into the Bloekombos Dam instead of into the non-perennial drainage line as proposed for Alternative 2.

TECHNOLOGY ALTERNATIVES ASSESSED:

Water Treatment Works technology/process alternative 3:

i. Raw water abstract (floating pumps and pipeline)
ii. pH Adjustment (Caustic Soda dosing)
iii. Coagulation dosing (ZetaFloc 2348)
iv. Flash mixing and flocculation (Floc conditioning)
v. Filtration & backwash water collection/recycling
vi. Final disinfection (Chlorine)
vii. Final water distribution pumps.

The analysis of raw water sampled from Blokombos Dam confirmed that the only quality criteria which do not comply with the SANS 241-1:2015 standard for potable water, are pH – 6.64l Turbidity – 12.4 NTU; Colour – 276 mg/L; Iron -742 ug/L; Total Coliform Bacteria and Heterotrophic Plate Count.

The following treatment process will be incorporated to ensure that he final water complies in all respects.

Step 1. pH Adjustment (Caustic Soda)
Caustic Soda will be dosed upstream of the works to ensure that the incoming water is at pH8, which is optimum for iron removal. An inline orifice plate will create the point of dosing and turbulence required. The Caustic Soda dosing rate will vary between 10 – 15 mg/l depending on the incoming pH. Two dosing pumps shall be provided, on duty and one standby. A continuous sampler and pH controller will be installed in the raw water sump. Each dosing pump shall be variable speed controlled and the dosage rate directed from the controller. Dosing pumps shall each be rated at a 5 l/hr capacity.

Step 2. Coagulation (Poly Electrolyte dosing)
Flocculation beaker tests performed by Metsi Chem iKapa (2021) or raw water from the Duivenhoks Dam, confirmed that an optimum dosage of 80 mg/L of ZetaFloc measured as un-filtered water, will result in sufficient iron, turbidity and colour removal. The flocculant dosing pumps shall be sized accordingly.

Step 3. Post Chlorination
Coliform bacteria and other contaminants will be removed by oxidations through chlorine dosing. The post chlorine dosing rate will vary between 0.6 -1.5 mg/l. Two injectors shall be provided, one duty and one standby. Each injector shall have a dosing capacity of 1.5 mg/l. The clear water sump will have a division wall to prevent short circuiting and enough contact time for disinfections. A sampling point for water samples will be provided on the outlet pipes to the final water pumps.

Step 4. Filtration
The raw water quality is of such a nature that no standard settling tanks will be required. Direct filtration onto 3 x 2.3m diameter pressure filters will be required.

WTW Desing flow	3Ml/d i.e. 125.0 Kl/hr
Number pressure filters	3
Flow/filter	41.7 m3/hr
Filtration rate	10 m/hr
Required area/filter	4.17 m2
Filter diameter	2.30m

Filter media shall be a 900mm bed of glass media, effective grain size (de) 0.6-1.4mm with uniformity coefficient (P60/P10) of 1.0, The glass filter medium will be supported on a gravel bed 150mm thick. The gravel layer shall be silica and have an effective size (de) 3-5mm and a uniformity coefficient <2.5.

Step 5. Sludge Handling
The option to dispose of the backwash water into the municipal sewer system and this finally disposed into the waste water treatment works was considered. The proposed WTW is located on the far end of Heidelberg and the volumes discharged during backwashing is much higher than what the sewer design capacities on the outskirts can transfer. This option is also not contributing to water saving and economic water usage.

In order to minimise water losses during water treatment, three concrete lined lagoons, with ground level dimensions 27m x 12m x 1.8m deep, will be incorporated for the recovery of backwash and filter rinsing water, The top two lagoons will be operated as settling dams and the third lagoon will operate as an artificial reed bed, with all the backwash settled water passing through the reed bed and be fully returned into the Bloekombos Dam. Only the site rainwater runoff will be piped into the non-perennial stream.

Filters will be backwashed at 4 hours intervals to enable the recycle pump to draw the settled sludge supernatant water down at a constant rate. The recycle pump (+standby) will pump the controlled flow of supernatant from the artificial reed bed at 3.0L/s along a 100mm diameter uPVC underground pipe to the inlet point of the irrigation canal into the Bloekombos Dam.

Surface water discharged from the sludge settling dam will be collected form the surface by a floated outlet pipe, floating just below the surface. In this manner the minimum sludge will be carried over into the artificial reed bed, where the final discharge will then be carried over into the return flow sump. This will also ensure that in the event of sump pump failure, a controlled overflow from the plant with minimal risk for contamination, is in place. The overflow water (after settling) will contain low

concentration dissolved iron (a natural environmental metal) and some colour (organic origins) and turbidity (natural surface soil origins).

Settled sludge collected in the lagoons, will require to be emptied twice per annum. Access to a suction tanker to each lagoon, will enable sludge to be abstracted and transferred to the Heidelberg landfill site. The two settling lagoons will be cleaned (desludged) one at a time while the other lagoon is operational.

Return flow from the artificial reed bed into the Bloekombos Dam, will be at an estimated ration of Inflow canal/return flow = 20/1. Artificial reed beds are highly efficient in Fe removal from streams and waste water. Fe levels as high as 40mg/l can be treated with some 80-90% removal, based on the design parameters selected.

All of the backwash settled water passing through the reed bed will be fully returned to the Bloekombos Dam. Only the site stormwater runoff will be piped into the natural stream. This is the preferred option since the natural regrowth on natural wetland species will be supported.

Reasons why Technology/process alternative 3 is preferred:

- The treatment system and steps as proposed is based on analysis done of the Bloekombos Dam water and what will be the optimal process to use to produce potable water in line with SANS requirements.
- The option to dispose of the backwash water back into the Bloekombos Dam after desludging and treatment through artificial reed bed system is preferred as this will not put additional strain on the municipal effluent system nor would it lead to potential negative impacts associated with the discharge of overflow backwash into a non-perennial drainage line.

OPERATIONAL ALTERNATIVES ASSESSED:

Refer to technology alternatives as discussed above which also includes the description of the operational alternatives assessed.

THE NO-DEVELOPMENT OPTIONS ASSESSED:

The No-Development option will result in the current water storage capacity and supply for Heidelberg and Slangrivier remaining as it is. The only water supply source for Heidelberg and Slangrivier, is from the Overberg Water Supply System (WSS). The required assurance of supply has been compromised for several years. The projected increase in summer seasonal water demand in these towns, is predicted to exceed supply from the current source within the next 2 years.

The Overberg WSS is fully developed and there are no further infrastructure options available to improve the system yield unless expanded. The proposed Heidelberg water scheme comprises the utilisation of the existing Bloekombos dam, a new Water Treatment Works and a potable water pipeline from the WTW to Muir Street where it connects the Uitkyk Reservoir via a 200mm diameter uPVC pipeline. The proposed plant aims to provide an efficient solution for treating water from the Duivenhoks Dam in addition to the present supply from the Overberg WSS, ensuring a consistent supply of high-quality water for residential and industrial use.

The need for water services infrastructure upgrades required within the Heidelberg area to ensure and increase water supply and capacity especially during the peak dry summer months was identified and approved as part of the Amended 2022-2027 IDP for Hessequa Municipality.

Hence should the municipality not be able to implement the development as proposed there is a high risk that the town of Heidelberg and Slangrivier will exceed available potable water sources supplies within the next 2 years potentially leading to high negative socio-economic and human health impacts and is therefore not preferred.

1.13.Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?

Refer to 1.9 above for a list of all the potential negative and positive impacts assessed and to Appendix J for the detailed impacts assessment.

2.1.What is the socio-economic context of the area, based on, amongst other considerations, the following considerations?:
2.1.1.The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks of policies applicable to the area,
2.1.2.Spatial priorities and desired spatial patterns (e.g. need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.),
2.1.3.Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.), and

2.1.4.Municipal Economic Development Strategy ("LED Strategy").

RESPONSE 2.1.1-2.1.4

The need for water services infrastructure upgrades required within the Heidelberg area to ensure and increase water supply and capacity especially during the peak dry summer months was identified and approved as part of the Amended 2022-2027 IDP for Hessequa Municipality.

2.2.Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area?

2.2.1.Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?

During construction local community members will be temporarily employed and trained in construction skills development as far as possible which will have a positive socio-economic benefit.

2.3.How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?

The need for water services infrastructure upgrades required within the Heidelberg area to ensure and increase water supply and capacity especially during the peak dry summer months was identified and approved as part of the Amended 2022-2027 IDP for Hessequa Municipality.

2.4.Will the development result in equitable (intra-and inter-generational) impact distribution, in the short-and long-term? Will the impact be socially and economically sustainable in the short-and long-term?

Yes, as per the impact assessment all potential environmental and socio-economic impacts can be mitigated to an acceptable level with the implementation of the EMPr.

2.5.In terms of location, describe how the placement of the proposed development will:

2.5.1.result in the creation of residential and employment opportunities in close proximity to or integrated with each other,

The proposed development is water services infrastructure therefore it will not result in creation of residential opportunities.

2.5.2.reduce the need for transport of people and goods,

Not applicable.

2.5.3.result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport),

Not applicable

2.5.4.compliment other uses in the area,

The reason for the proposed development is to provide the necessary water services infrastructure to support current water supply services and increase the water supply capacity to the towns of Heidelberg, Slangrivier and surrounds.

2.5.5.be in line with the planning for the area,

The need for water services infrastructure upgrades required within the Heidelberg area to ensure and increase water supply and capacity especially during the peak dry summer months was identified and approved as part of the Amended 2022-2027 IDP for Hessequa Municipality.

2.5.6.for urban related development, make use of underutilised land available with the urban edge,

Not applicable

2.5.7.optimise the use of existing resources and infrastructure,

The reason for the proposed development is to provide the necessary water services infrastructure to support current water supply services and increase the water supply capacity to the towns of Heidelberg, Slangrivier and surrounds.

2.5.8.opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement),

The reason for the proposed development is to provide the necessary water services infrastructure to support current water supply services and increase the water supply capacity to the towns of Heidelberg, Slangrivier and surrounds.

2.5.9.discourage "urban sprawl" and contribute to compaction/densification,

Not applicable.

2.5.10.contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs,

The reason for the proposed development is to provide the necessary water services infrastructure to support current water supply services and increase the water supply capacity to the towns of Heidelberg, Slangrivier and surrounds.

2.5.11.encourage environmentally sustainable land development practices and processes,

Mitigation measures have been proposed by specialists and incorporated into the requirements of the EMP to ensure that the development is constructed and operated in a environmentally sustainable manner without causing any significant negative environmental impacts.

2.5.12.take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.),

Proposed water services infrastructure has been proposed within close proximity to the water source which will be the Bloekombos Dam and on already disturbed undeveloped areas as far as possible and where infrastructure is proposed within natural areas the most environmentally suitable and viable location was identified and proposed.

2.5.13.the investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential),

Not applicable.

2.5.14.impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area, and

There are no significant cultural or historical features that will be impacted by the proposed development.

2.5.15.in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?

Not appliable

2.6.How were a risk-averse and cautious approach applied in terms of socio-economic impacts?:

2.6.1.What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?

2.6.2.What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?

2.6.3.Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?

Potential socio-economic impacts associated with the proposed development was assessed. The significance of these impacts was determined, ranked and mitigation measures to reduce the negative impact have been provided and included in the EMPr requirements.

The key mitigation measures recommended are for impact avoidance. Where adverse impacts cannot reasonably be avoided, the significance of the impacts will be managed through the effective implementation of the EMP

2.7.How will the socio-economic impacts resulting from this development impact on people's environmental right in terms following:

2.7.1.Negative impacts: e.g. health (e.g. HIV-Aids), safety, social skills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?

2.7.2.Positive impacts. What measures were taken to enhance positive impacts?

Refer to 2.7 above for a list of all the potential negative and positive impacts assessed and to Appendix J for the detailed impacts assessment.

2.8.Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socio-economic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?

It is not expected that the proposed development will result in over utilisation of natural resources.

2.9.What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?

An EMPr has been compiled taking into account all potential environmental and socio-economic impacts as assessed during the construction and operational phases and providing appropriated mitigation measures to minimise the severity of these impacts throughout the life cycle of the proposed development. Refer to Appendix H: EMPr

2.10.What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons(who are the beneficiaries and is the development located appropriately)?

Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?

It is the opinion of the EAP that the proposed development as per the described activity and development layout alternative 3 should be authorised. The proposed preferred activity and layout Alternatives 3 will allow the municipality to expand and upgrade water services provisions for the town of Heidelberg and surrounds without causing significant detrimental impacts on the natural environmental functioning. However strict adherence to all specialist recommendations and requirements of the EMPr must be adhered to.

2.11.What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?

The only water supply source for Heidelberg and Slangrivier, is from the Overberg Water Supply System (WSS). The required assurance of supply has been compromised for several years. The projected increase in summer seasonal water demand in these towns, is predicted to exceed supply from the current source within the next 2 years.

The Overberg WSS is fully developed and there are no further infrastructure options available to improve the system yield unless expanded. The proposed Heidelberg water scheme comprises the utilisation of the existing Bloekombos dam, a new Water Treatment Works and a potable water pipeline from the WTW to Muir Street where it connects the Ultkyk Reservoir via a 200mm diameter uPVC pipeline. The proposed plant aims to provide an efficient solution for treating water from the Duivenhoks Dam in addition to the present supply from the Overberg WSS, ensuring a consistent supply of high-quality water for residential and industrial use.

The need for water services infrastructure upgrades required within the Heidelberg area to ensure and increase water supply and capacity especially during the peak dry summer months was identified and approved as part of the Amended 2022-2027 IDP for Hessequa Municipality.

2.12.What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?

An EMPr has been compiled taking into account all potential impacts during all the phases of the proposed development and providing appropriated mitigation measures to minimise the severity of these impacts throughout the life cycle of the proposed development. Refer to Appendix H: EMPr

2.13.What measures were taken to:
2.13.1.ensure the participation of all interested and affected parties,
2.13.2.provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation,
2.13.3.ensure participation by vulnerable and disadvantaged persons,382.13.4.promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means,
2.13.5.ensure openness and transparency, and access to information in terms of the process,
2.13.6.ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge, and
2.13.7.ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein were be promoted?

Refer to Appendix F of the BAR indicating all public participation steps taken thus far and still to be undertaken as part of the basic assessment process.

2.14.Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g.. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?

During the public participation process conducted (and still to be conducted) all comments/concerns received from the public are taken into consideration and addressed, and where practicable and possible recommendations are incorporated into the design of the development. The proposed development is also in line with the objectives manifested in the IDP of the local municipality.

2.15.What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?

As per the EMPr requirements all regulations in terms of the Health and Safety Act must be adhered to during all phases of the proposed development.

2.16.Describe how the development will impact on job creation in terms of, amongst other aspects:
2.16.1.the number of temporary versus permanent jobs that will be created,
2.16.2.whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area),
2.16.3.the distance from where labourers will have to travel,
2.16.4.the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits), and
2.16.5.the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).

Temporary construction jobs will be created during the construction phase however it is unclear at this stage exactly how many as this will depend on the amount of government funding available at the time. As far as possible local community members will be employed from the adjacent previously disadvantaged community and surrounds.

2.17.What measures were taken to ensure:
2.17.1.that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment, and
2.17.2.that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?
2.18.What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?

The BAR sets out the applicable legislation and policies taken into account for the development proposal as well as all the various stakeholders / organs of state consulted in terms of this application.

The public participation process also facilitates coordination of all relevant legislation and resolving conflicts and interested of all the various parties.

A comments and responses report will be compiled in which all issues raised are recorded and responded to in Appendix F and submitted as part of the Final BAR to the competent authority for consideration.

2.19.Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?

Yes. the proposed mitigation measures within the EMPr are realistic and long-term management will relate to the maintenance and monitoring of especially services infrastructure which is to be maintained by the municipality.

2.20.What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?

As per standard EMP and EA requirements the applicant, as per the EA issued, will remain financially responsible for remedying any negative environmental and health effects caused by or due to the proposed activities.

2.21.Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?

In order to determine the best practicable environmental option for the development proposal feasible and reasonable alternatives (if available) must be considered and investigated to avoid negative impacts. The Environmental Assessment Practitioner and developer considered all of relevant inputs from specialists, engineers, town planners, key departments, the public and relevant stakeholders if available during the impact assessment process. Impacts identified that could not be avoided have been mitigated and managed as per the EMPr requirements.

As such the mitigation hierarchy has been effectively applied to this development proposal resulting in the best practicable environmental option (preferred alternative) presented for consideration by the competent authority.

Refer to 1.12 above for a summary of the outcome of the alternatives assessed.

2.22.Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?

Refer to 2.7 above for a list of all the potential negative and positive impacts assessed and to Appendix J for the detailed impacts assessment.