PLANNING, DESIGN AND CONSTRUCTION PHASE

The tables describe the Management Statements, Aspects which relates to the receiving Environment, the potential environmental impacts, the recommended Management Actions, and the Management Outcomes identified for the preferred Alternative 1 during the Construction Phase of the development.

Description of Activity Management Statement	Aspects relating to the receiving environment.	Potential Environmental Impacts	Management Actions (Mitigation / Enhancement Measures)	Management Outcome
Geographical, Geological and Physical Aspects				
Physical				
During the Construction, earthmoving and other construction-related activities will be undertaken on site. Accidental spilling of fuel or lubricants (e.g. diesel, oil, etc.) poses a potential risk to the quality of the underlying groundwater. This threat is ubiquitous on almost all construction sites.	Accidental spillages	**Soil and groundwater contamination**	• Ensure that all construction vehicles and equipment are in good working order and drivers and operators are trained with respect to actions to be taken in the case of a spill or leak. • Cement mixing must be confined to a designated area and must be done on an impermeable surface, or pre-mixed cement must be used. • Any fuel stored on-site must be kept in bunded storage tanks. • Drip trays are to be utilised during daily greasing and refuelling of machinery and to catch incidental spills and pollutants. • Place drip trays under engines of vehicles or equipment when parked or stored overnight or longer. • Drip trays are to be inspected every week for leaks and effectiveness and emptied when necessary. This is to be closely monitored during rain events to prevent overflow.	Prevent soil and ground contamination.

Description of Activity Management Statement	Aspects relating to the receiving environment.	Potential Environmental Impacts	Management Actions (Mitigation / Enhancement Measures)	Management Outcome
			• Spill kits to clean up accidental spills from vehicles or equipment must be well marked and available on site. • Workers must undergo an induction to ensure that they are prepared for rapid clean-up procedures. • Immediately clean oil and fuel spills and dispose of contaminated material (soil, etc.) at licensed waste disposal sites. • Compile a procedure for the storage, handling and transport of different hazardous materials and ensure that it is strictly adhered to.	
Ecological Aspects				
Biodiversity				
The Primary Construction Phase botanical impact of the new pipeline installation would be damage and short to long term loss of Medium to High sensitivity vegetationConstruction Phase (gazetted as an Endangered vegetation type) in about 80m of the route (16%). No significant botanical impacts are expected in the Low sensitivity part of the route (84%).	Damage and short to long term loss of Medium to High sensitivity vegetation.	**Damage to and loss of indigenous vegetation**	**Mitigation measures below only relate to the Medium to High Sensitivity Area on site.** • All excavated topsoil and associated surface vegetation in the authorised development area, to a depth of 40cm, must be temporarily removed and set aside for replacement at the surface when trenches are infilled. • Any open trenches should be surveyed every morning and evening by an ECO or Site Agent	Minimise the damage and loss of indigenous vegetation.

Description of Activity Management Statement	Aspects relating to the receiving environment.	Potential Environmental Impacts	Management Actions (Mitigation / Enhancement Measures)	Management Outcome
			and all trapped animals must be safely removed from these trenches. • All woody invasive alien vegetation (notably black wattle (*Acacia mearnsii*) and pine (*Pinus*) must be removed from within 25m of both sides of any authorised servitude (project area), prior to final completion of the project. This should be done by hand, using only approved methodology (see Martens et al 2021). • No herbicide should be sprayed anywhere within the area.	
Aquatic				
During the Construction Phase of the project, the activities would result in the disturbance of the aquatic habitat of the site.	Disturbance of aquatic habitat.	**Aquatic habitat loss, modification, and water quality impacts as a result of the construction of the pipeline.**	• The area of disturbance associated with the construction activities should be limited as far as possible within the river corridor and the disturbed area should be rehabilitated afterwards. The disturbed area should be planted with suitable local indigenous vegetation to stabilize the banks. It is also essential that the clearing of invasive alien plants be undertaken during and after	Minimise the loss of aquatic habitat, modification, and water quality impacts.

Description of Activity Management Statement	Aspects relating to the receiving environment.	Potential Environmental Impacts	Management Actions (Mitigation / Enhancement Measures)	Management Outcome
			construction activities within the disturbed areas. • The minimum area for the construction and laying of the pipeline should be demarcated and works contained within this area. • The use of machinery within the watercourse should be avoided. • Before the construction activities, any suitable indigenous riparian plants within the proposed pipeline route should be identified and set aside for revegetating the disturbed areas immediately after construction is complete. • The soil and cover vegetation removed to excavate the channel in which the pipeline is to be laid should be replaced over the line at the same level as the existing level. • Contaminated runoff from the pipeline installation site should be prevented from directly entering the river and associated wetland areas. Construction of the pipeline should preferably be undertaken in the low rainfall months when the water quality	

Description of Activity Management Statement	Aspects relating to the receiving environment.	Potential Environmental Impacts	Management Actions (Mitigation / Enhancement Measures)	Management Outcome
			impacts from the construction activities can better be contained. • All materials on the construction site(s) should be properly stored and contained. Disposal of waste from the site should also be properly managed. Construction workers should be given ablution facilities at the construction sites that are located away from the river and wetland area (at least 30m) and regularly serviced. These measures should be addressed, implemented, and monitored in terms of the Environmental Management Programme (EMPr, **Appendix H**) for the Construction Phase. • The pipeline should be amply protected and constructed downstream of the dam to ensure that no erosion or breakage of the pipeline occurs should the dam spill. • Regular monitoring and maintenance of the pipeline and its associated infrastructure should be conducted to enable rapid repair of the pipeline. The monitoring should also be for the	

Description of Activity Management Statement	Aspects relating to the receiving environment.	Potential Environmental Impacts	Management Actions (Mitigation / Enhancement Measures)	Management Outcome
			occurrence of erosion of the river channel and adjacent areas as well as the growth of invasive alien plants in the disturbed areas. Any erosion and invasive alien vegetation detected within the area disturbed by the construction of the pipeline should be addressed as soon as possible. • The method statement for the construction of the water pipeline was subsequently sent to the aquatic specialist for the project. The excavator will be utilised for shallow excavations and moving of material and will mostly be making use of existing gravel roads where the soil is already compacted and use of machinery along the roads would be acceptable. Where however it is necessary for the back-acter to work outside of the existing gravel roads and within the watercourse, it is recommended that an aquatic ecologist be present onsite to ensure that work in any sensitive aquatic habitats is carefully undertaken.	

Description of Activity Management Statement	Aspects relating to the receiving environment.	Potential Environmental Impacts	Management Actions (Mitigation / Enhancement Measures)	Management Outcome
Social and Economic Aspects				
Social and Economic				
Temporary employment opportunities could be created for the local community or economy during the Construction Phase.	Employment opportunities	**Temporary employment opportunities**	None required. However, the Application should encourage Contractors to employ local labours, where possible.	Enhance local employment, where possible.
Traffic and Transport				
The movement of large construction vehicles could affect traffic flows near the site; however it is unlikely. Potential safety risks and nuisance for road users could also occur during the Construction Phase of the proposed development; however it is unlikely.	Movement of heavy construction vehicles	**Increased traffic**	The safety requirements of the OHS Act and the traffic control measures provided in the EMPr (**Appendix H**) must be implemented during the Construction Phase.	Minimise and prevent traffic congestions within the local community.
Nuisance				
Increased noise levels during construction could be a nuisance to the surrounding environment, however it is unlikely since the site is located away from residential areas.	• Vegetation clearing • Earthworks	**Noise nuisance**	Refer to the mitigation measures in the EMPr (**Appendix H**).	Minimise noise generation on site.

Description of Activity Management Statement	Aspects relating to the receiving environment.	Potential Environmental Impacts	Management Actions (Mitigation / Enhancement Measures)	Management Outcome
The construction activities will generate dust on site, which could affect the construction personnel and the surrounding environment.	• Clearing of vegetation and earthworks could result in dust generation.	**Dust nuisance**	Refer to the mitigation measures in the EMPr (**Appendix H**).	Minimise dust generation on site.

OPERATIONAL (MAINTENANCE) PHASE

The tables describe the Management Statements, Aspects which relates to the receiving Environment, the potential environmental impacts, the recommended Management Actions, and the Management Outcomes identified for the preferred Alternative 1 during the Operational Phase of the development.

Description of Activity Management Statement	Aspects – relating to the receiving Environment	Potential Environmental Impacts	Management Actions (Mitigation / Enhancement Measures)	Management Outcomes
Geographical, Geological and Physical Aspects				
Physical				
During the Operational Phase of the proposed development, earthmoving and other maintenance-related activities could be undertaken on site. Accidental spilling of fuel or lubricants (e.g. diesel, oil, etc.) poses a potential risk to the quality of the underlying groundwater. This potential impact is ubiquitous on almost all construction sites.	Accidental spillages	**Soil and groundwater contamination**	• Ensure that all maintenance vehicles and equipment are in good working order and drivers and operators are trained with respect to actions to be taken in the case of a spill or leak. • Cement mixing must be confined to a designated area and must be done on an impermeable surface, or pre-mixed cement must be used. • Any fuel stored on-site must be kept in bunded storage tanks. • Drip trays are to be utilised during daily greasing and refuelling of machinery and to catch incidental spills and pollutants.	Minimise and prevent the occurrence of soil and ground contamination.

Description of Activity Management Statement	Aspects – relating to the receiving Environment	Potential Environmental Impacts	Management Actions (Mitigation / Enhancement Measures)	Management Outcomes
			• Place drip trays under engines of vehicles or equipment when parked or stored overnight or longer. • Drip trays are to be inspected every week for leaks and effectiveness and emptied when necessary. This is to be closely monitored during rain events to prevent overflow. • Spill kits to clean up accidental spills from vehicles or equipment must be well marked and available on site. • Workers must undergo an induction to ensure that they are prepared for rapid clean-up procedures. • Immediately clean oil and fuel spills and dispose of contaminated material (soil, etc.) at licensed waste disposal sites. • Compile a procedure for the storage, handling and transport of different hazardous materials and ensure that it is strictly adhered to.	
Ecological Aspects				
Biodiversity				
Habitat fragmentation and associated loss of ecological connectivity through the study area will be very minor, and will be temporary to short term in nature, as some degree of natural rehabilitate will take place over a period of 2-5 years.	The new pipeline construction and disturbance will disrupt the moderate diversity plant community present in about 80m of the pipeline route (16% of	**Temporary loss of current fairly high levels of ecological connectivity; associated Habitat Fragmentation.**	<u>Management Actions ONLY for Medium – High Sensitivity Area:</u> • All excavated topsoil and associated surface vegetation in the authorised development area, to a depth of 40cm, must be temporarily removed and set aside for replacement at the surface when trenches are infilled.	Minimise the loss of fairly high levels of ecological connectivity; associated Habitat Fragmentation in the Medium – High Sensitivity Area of the proposed development site.

Description of Activity Management Statement	Aspects – relating to the receiving Environment	Potential Environmental Impacts	Management Actions (Mitigation / Enhancement Measures)	Management Outcomes
	the new pipeline route).		• Any open trenches should be surveyed every morning and evening by an ECO or Site Agent and all trapped animals must be safely removed from these trenches. • All woody invasive alien vegetation (notably black wattle (Acacia mearnsii) and pine (Pinus) must be removed from within 25m of both sides of any authorised servitude (project area), prior to final completion of the project. This should be done by hand, using only approved methodology (see Martens et al 2021). • No herbicide should be sprayed anywhere within the area.	
During the Construction Phase the soil within the Medium – High Sensitivity Area will be disturbed which could facilitate alien plant invasions.	Soil disturbance will facilitate alien plant invasion in the area.	**Alien Invasive Plants**	Ongoing invasive alien vegetation management in servitude and adjacent areas up to 25m each side.	Minimise the alien invasive plants from establishing in the Medium – High Sensitivity Area of the proposed development site.
Aquatic				
During maintenance activities, the water quality of the minor channel with the associated valley bottom wetland could be affected.	Water quality	**Possible water quality impacts**	• The area of disturbance associated with the construction activities should be limited as far as possible within the river corridor and the disturbed area should be rehabilitated afterwards. The disturbed area should be planted with suitable local indigenous vegetation to stabilize the banks. It is also essential that the clearing of invasive alien plants be undertaken	Minimise possible water quality impacts during maintenance activities on site.

Description of Activity Management Statement	Aspects – relating to the receiving Environment	Potential Environmental Impacts	Management Actions (Mitigation / Enhancement Measures)	Management Outcomes
			during and after construction activities within the disturbed areas. • The minimum area for the construction and laying of the pipeline should be demarcated and works contained within this area. • The use of machinery within the watercourse should be avoided. • Before the construction activities, any suitable indigenous riparian plants within the proposed pipeline route should be identified and set aside for revegetating the disturbed areas immediately after construction is complete. • The soil and cover vegetation removed to excavate the channel in which the pipeline is to be laid should be replaced over the line at the same level as the existing level. • Contaminated runoff from the pipeline installation site should be prevented from directly entering the river and associated wetland areas. Construction of the pipeline should preferably be undertaken in the low rainfall months when the water quality impacts from the construction activities can better be contained. • All materials on the construction site(s) should be properly stored and contained. Disposal of waste from the site should also be properly managed. Construction workers should be given ablution facilities	

Description of Activity Management Statement	Aspects – relating to the receiving Environment	Potential Environmental Impacts	Management Actions (Mitigation / Enhancement Measures)	Management Outcomes
			at the construction sites that are located away from the river and wetland area (at least 30m) and regularly serviced. These measures should be addressed, implemented, and monitored in terms of the Environmental Management Programme (EMPr, Appendix H) for the Construction Phase. • The pipeline should be amply protected and constructed downstream of the dam to ensure that no erosion or breakage of the pipeline occurs should the dam spill. • Regular monitoring and maintenance of the pipeline and its associated infrastructure should be conducted to enable rapid repair of the pipeline. The monitoring should also be for the occurrence of erosion of the river channel and adjacent areas as well as the growth of invasive alien plants in the disturbed areas. Any erosion and invasive alien vegetation detected within the area disturbed by the construction of the pipeline should be addressed as soon as possible. • The method statement for the construction of the water pipeline was subsequently sent to the aquatic specialist for the project. The excavator will be utilised for shallow excavations and moving of material and will mostly be making use of existing gravel roads where the soil is	

Description of Activity Management Statement	Aspects – relating to the receiving Environment	Potential Environmental Impacts	Management Actions (Mitigation / Enhancement Measures)	Management Outcomes
			already compacted and use of machinery along the roads would be acceptable. Where however it is necessary for the back-acter to work outside of the existing gravel roads and within the watercourse, it is recommended that an aquatic ecologist be present onsite to ensure that work in any sensitive aquatic habitats is carefully undertaken.	
Socio-Economic Aspects				
Social and Economic				
Increased dust levels associated with movement of construction vehicles and general construction activities might be a nuisance to the local community.	Dust nuisance	**Dust nuisance**	Refer to the mitigation measures in the MMP (**Appendix K2**).	Minimise dust generation during the Operational Phase.
The use of construction vehicles and other construction machinery will increase the noise levels during working hours. Increased noise levels may be a nuisance factor to neighbouring land occupiers.	Noise nuisance	**Noise nuisance**	Refer to the mitigation measures in the MMP (**Appendix K2**).	Minimise noise generation during the Operational Phase.

DECOMMISSIONING AND CLOSURE PHASE

The tables describe the Management Statements, Aspects which relates to the receiving Environment, the potential environmental impacts, the recommended Management Actions, and the Management Outcomes identified for the preferred Alternative 1 during the Decommissioning and Closure Phase (if necessary).

Ecological Aspects				
Aquatic				
Should the pipeline be required to be decommissioned, the activities could result in affecting the water quality and aquatic habitat on site.	Aquatic habitat disturbance and water quality	**Aquatic habitat disturbance and water quality impacts as a result of the decommissioning of the pipeline.**	• The area of disturbance associated with the construction activities should be limited as far as possible within the river corridor and the disturbed area should be rehabilitated afterwards. The disturbed area should be planted with suitable local indigenous vegetation to stabilize the banks. It is also essential that the clearing of invasive alien plants be undertaken during and after construction activities within the disturbed areas. • The minimum area for the construction and laying of the pipeline should be demarcated and works contained within this area. • The use of machinery within the watercourse should be avoided. • Before the construction activities, any suitable indigenous riparian plants within the proposed pipeline route should be identified and set aside for revegetating the disturbed areas immediately after construction is complete. • The soil and cover vegetation removed to excavate the channel in which the pipeline is to be laid should be replaced	Minimise the disturbance of the aquatic habitat including water quality impacts.

			over the line at the same level as the existing level. • Contaminated runoff from the pipeline installation site should be prevented from directly entering the river and associated wetland areas. Construction of the pipeline should preferably be undertaken in the low rainfall months when the water quality impacts from the construction activities can better be contained. • All materials on the construction site(s) should be properly stored and contained. Disposal of waste from the site should also be properly managed. Construction workers should be given ablution facilities at the construction sites that are located away from the river and wetland area (at least 30m) and regularly serviced. These measures should be addressed, implemented, and monitored in terms of the Environmental Management Programme (EMPr, **Appendix H**) for the Construction Phase. • The pipeline should be amply protected and constructed downstream of the dam to ensure that no erosion or breakage of the pipeline occurs should the dam spill. • Regular monitoring and maintenance of the pipeline and its associated infrastructure should be conducted to enable rapid repair of the pipeline. The monitoring should also be for the occurrence of erosion of the river channel and adjacent areas as well as the growth of invasive alien plants in the disturbed	

			areas. Any erosion and invasive alien vegetation detected within the area disturbed by the construction of the pipeline should be addressed as soon as possible. • The method statement for the construction of the water pipeline was subsequently sent to the aquatic specialist for the project. The excavator will be utilised for shallow excavations and moving of material and will mostly be making use of existing gravel roads where the soil is already compacted and use of machinery along the roads would be acceptable. Where however it is necessary for the back-acter to work outside of the existing gravel roads and within the watercourse, it is recommended that an aquatic ecologist be present onsite to ensure that work in any sensitive aquatic habitats is carefully undertaken.	