EnviroAfrica
Environmental Management and Impact Assessment
Omgewingsbestuur en Impakbeoordeling

THE PROPOSED POSTMASBURG WASTE WATER TREATMENT WORKS AND SEWER PIPELINE POSTMASBURG, NORTHERN CAPE

FINAL ENVIRONMENTAL IMPACT REPORT

EXECUTIVE SUMMARY

D:E&NC reference number: NC/EIA/20/ZFM/TSA/POS1/2014

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TSANTSABANE MUNICIPALITY

PROPOSED POSTMASBURG WWTW AND SEWER LINE

Postmasburg, Northern Cape

D:E&NC Ref No.: NC/EIA/20/ZFM/TSA/POS1/2014

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EXECUTIVE SUMMARY

Introduction

Consideration is being given to the construction of a new Waste Water Treatment Works and sewer line in Postmasburg, Northern Cape. The total area of the new Waste Water Treatment Works will be approximately 10 ha.

The applicant is Tsantsabane Municipality who will undertake the activity should it be approved. EnviroAfrica CC has been appointed as the independent environmental assessment practitioner (EAP) responsible for undertaking the relevant EIA and the Public Participation Process required in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA).

The Final Scoping Report and Plan of Study for EIA were submitted to the Department of Environment and Nature Conservation (DENC). The Scoping Report and Plan of Study for EIA were approved by DENC on the 27 July 2015 and EnviroAfrica were advised to proceed with the EIA process (**Appendix 1B**).

Environmental Requirements

The National Environmental Management Act (Act 107 of 1998) (NEMA), as amended, makes provision for the identification and assessment of activities that are potentially detrimental to the environment and which require authorisation from the relevant authorities based on the findings of an environmental assessment. NEMA is a national act, which is enforced by the Department of Environmental Affairs (DEA). These powers are delegated in the Northern Cape to the Department of Environment and Nature Conservation (DE&NC).

On the 18 June 2010 the Minister of Water and Environmental Affairs promulgated regulations in terms of Chapter 5 of the NEMA, namely the EIA Regulations 2010 (GN No. R. 543, R. 544 (Listing Notice 1), R. 545 (Listing Notice 2), R. 546 (Listing Notice 3) and R. 547 in Government Gazette No. 33306 of 18 June 2010). These regulations came into effect on the 2 August 2010. Listing Notice 1 and 3 are for a Basic Assessment and Listing Notice 2 for a full Environmental Impact Assessment.

According to the regulations of Section 24(5) of NEMA, authorisation is required for the following listed activities for the proposed Postmasburg Waste Water Treatment Works and sewer line:

Government Notice R544 (Listing Notice 1) listed activities:

11 The construction of:

(i) canals
(ii) channels
(iii) bridges
(iv) dams
(v) weirs
(vi) bulk storm water outlet structures
(vii) marinas
(viii) jetties exceeding 50 square meters in size
(ix) slipways exceeding 50 square meters in size
(x) buildings exceeding 50 square meters in size or;
(xi) infrastructure or structures covering 50 square meters or more;

where such construction occurs within 32 meters of a watercourse, measured from the edge of a watercourse.

18 The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock from a watercourse.

19 The **construction** of facilities or infrastructure exceeding 1000 meters in length for the bulk transportation of water, sewage or storm water –

(i) With internal diameter of 0.36 meters or more; or
(ii) With a peak throughput of 120 liters per second or more,

Excluding where:

a. Such facilities or infrastructure are for bulk transportation of water, sewage or storm water or storm water drainage inside a road reserve; or
b. Where such construction will occur within urban areas but further than 32 meters from a watercourse, measured from the edge of the watercourse.

23 The transformation of undeveloped, vacant or derelict land to –

(i) Residential, retail, commercial, recreational, industrial or institutional use, inside an urban area, and where the total area to be transformed is 5 hectares or more, but less than 20 hectares, or
(ii) Residential, retail, commercial, recreational, industrial or institutional use, outside an urban area and where the total area to be transformed is bigger than 1 hectare but less than 20 hectares;

Except where such transformation takes place

(i) For linear activities; and
(ii) For purposes of agricultural/afforestation, in which case Activity 16 of Notice No. R. 545 applies.

55a The construction of facilities for the treatment of effluent, wastewater or sewage with a daily throughput capacity of more than 2000 cubic metres but less than 15 000 cubic metres.

Government Notice **R545** (Listing notice 2) listed activities:

5 The **construction** of facilities or infrastructure for any process or activity which requires a permit or license in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent and which is not identified in Notice No. 544 of 2010 or included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case that Act will apply.

Government Notice **R546** (Listing notice 3) listed activities:

13 The clearance of an area of 1 hectare or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation, except where such removal of vegetation is required for:

(1) the undertaking of a process or activity included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the activity is regarded to be excluded from this list;
(2) the undertaking of a linear activity falling below the thresholds mentioned in Listing 1 in terms of GN R.544 of 2010.

14 The clearance of an area of 5 hectares or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation, except where such removal of vegetation is required for:

(1) purposes of agriculture or afforestation inside areas identified in spatial instruments adopted by the competent authority for agriculture or afforestation purposes;

(2) the undertaking of a process or activity included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the activity is regarded to be excluded from this list;
(3) the undertaking of a linear activity falling below the thresholds in Notice 544 of 2010.

Need and Desirability

Postmasburg falls within the jurisdiction of the Tsantsabane Municipality and within the ZF Mgcawu District Municipality in the Northern Cape Province. The town is located in a valley through which the Groenwater Spruit is the major watercourse. The town of Postmasburg has a population of approximately 42 000 persons and has over the last 3 years maintained a growth rate of 2.5% per annum. This is primarily due to a major increase in mining activities with the two mining houses KUMBA and ASSMANG being the primary economic drivers.

The existing Postmasburg WWTP was constructed in 1986 with a design capacity of 2400 m^3/day (2400 megaliters per day). For political reasons, the treatment plant was constructed on a high point south of the town's CBD. This decision necessitated that all sewage draining from the town must be pumped to the wastewater treatment plant. Subsequently, Postmasburg was initially equipped with 3 sewage pump stations and later on a 4^{th} booster pump station was constructed.

In 2006, the civil works at the treatment plant was doubled in preparation of the coming expansion of mining activities, but the works was never equipped mechanically due to a shortage of funding. In 2009, the Kolomela Mine development commenced and KUMBA started a housing project of 885 housing units in Postmasburg as well as development of required bulk infrastructure. In 2010 the existing Postmasburg Wastewater Treatment Plant was assessed to make proposals to get the plant operational again as it was in a very poor state. A refurbishment project was undertaken and concurrently to this, the mechanical and electrical installation was done on the new portion of the works expanding the plant capacity to 4800m^3/day. The plant was recommissioned on 1st September 2011 and has been operating successfully since.

Since middle 2012, the new houses of Kumba were occupied in phases and ASSMANG commenced development of 450 stands to relocate their employees from Beeshoek to Postmasburg to facilitate expansion of the Beeshoek Mine. The first 250 of these new houses have been occupied since mid-2013. All these houses of both KUMBA and ASSMANG have increased the flow of wastewater to the existing Postmasburg WWTP gradually until a point was reached where the treatment plant was exceeding its design capacity on a daily basis.

In addition to these recently constructed housing units, several private developers have in the past year applied for land to develop further housing projects as KUMBA have indicated that they plan to expand their operations at Kolomela Mine and have an immediate need for another 1 300 housing units. In addition to the above, the municipality are also in a planning process to develop a 3 500 unit mixed housing development. All these planned developments now require that the existing wastewater treatment plant either be upgraded to accommodate these envisaged flows, or as an alternative, that a new wastewater treatment plant be considered.

The proposed location of the Waste Water Treatment Works site is considered ideally suited for the construction of the WWTW.

From an engineering point of view, the proposed site location is preferred since the flow of wastewater to the WWTW can be undertaken under gravity, avoiding the increased costs involved with pumping the wastewater, which is currently the situation with the existing waste water treatment works. It is planned that this new sewer will be extended from the current position of Postmasburg Pump Station No.1 in a southerly direction following

the run of the Groenwaterspruit to a point approximately 1 350m downstream of the town where the pipe will daylight at a gradient of 1 in 200. At this point, the Groenwater Spruit's gradient is steeper than the gradient of the pipe allowing the pipe to daylight above the envisaged 1 in 50 year floodline of the Groenwater Spruit. This represents an ideal position for the proposed new wastewater treatment plant.

The current electricity costs to pump all wastewater to the existing plant costs the Tsantsabane Municipality in excess of R5 million per annum and a decision was taken to look at the possibility of constructing a new wastewater treatment works on a site where gravity flow to the plant was possible and also where future expansion was not limited by spatial constraints.

The preferred site alternative meets these requirements.

The proposed WWTW site is located on Farm Olynfontein No.475 Portion 3 just south of the town. The land is mostly undeveloped and is close enough to the town to avoid further costs due to extra pipelines and pump stations, but still far enough to avoid any potential nuisances and/or negative impacts on the residential areas of Postmasburg.

As discussed above, the site is not limited by spatial constraints due to future expansion.

Site Description

The site of the proposed Waste Water Treatment Works is located on Portion 3 of Farm Olynfontein No. 475, Postmasburg in the Northern Cape. The proposed new sewer line will cross the following erven:

- Erf 1,
- Erf 123,
- Erf 125,
- Erf 126,
- Erf 127,
- Erf 764,
- Erf 779 and
- Erf 1504.

The proposed WWTW will be located approximately 350m south-west of the nearest residential area in Postmasburg.

The site coordinates for the WWTW are: S 28^{o} 20' 23.41", E23^{o} 03' 04.92".

The proposed sewer line starts at the existing Postmasburg pump station located at: S 28^{o} 20' 03.78", E23^{o} 03' 29.53".

From the vegetation map (SANBI BGIS), the vegetation that occurs on the properties is Kuruman Thornveld and Postmasburg Thornveld. None of these vegetation types are classified in terms of Section 52 (1)(a) of the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) (NEMBA).

The site of the WWTW is undeveloped and generally near natural. The site of the WWTW is covered relatively densely in Black Thorn/ Swaarthaak (*Acacia mellifera*), which in places has become impregnable.

According to the Biodiversity Assessment (**Appendix 4C**), the thornveld was in relative good condition, but showed signs of having been subjected to stock grazing over time.

The riparian vegetation along the Groenwater Spruit from pump station 1 to the proposed new WWTW location can be described as very degraded and impacted as a result of urban creep and agricultural practices. Apart from a few natural reeds and sedges as well as the occasional *Acacia karroo* and *Searsia lancea* (which were mostly planted as decorative trees), the natural riparian vegetation has been replaced by alien invasive plant species.

According to the Freshwater Impact Assessment (**Appendix 4B**), the aquatic features which occur within the study area include the Groenwaterspruit and its smaller tributaries at Postmasburg, and some largely natural pans and artificial wetland areas.

The Groenwaterspruit is a south-west flowing tributary of the Skeifontein River which discharges into the Orange River as the Soutloop River near Boegoeberg. The stream has been significantly modified within the town, with much of the natural indigenous vegetation have been removed and replaced by grassed and cultivated areas. Patches of natural vegetation remain within the Groenwaterspruit and its tributary within the town that tend to be dominated by *A. Karoo* along the banks and *P. australis* and *J. kraussii* within the stream channel. Small ephemeral tributaries and drainage lines also occur within the study area. These features consist of small channels with terrestrial vegetation and little to no visible aquatic habitat.

According to the Heritage Impact Assessment (HIA) (**Appendix 4D)** thirty four stone implements were encountered during the baseline study, but none of these were found in the proposed sewer pipeline alongside the Groenwater Spruit. No visible graves or typical surface grave markers were found in the pipeline route or associated infrastructure. There are no other old buildings, structures or features older than 60 years that will be impacted by proposed construction activities.

Alternatives

Alternative 1 (Preferred alternative):

This is the option of construction a new Waste Water Treatment Works on Farm Olynfontein No.475 Portion 3, and a new main sewer line from the existing Postmasburg pump station.

Technically and financially (in terms of future Operation and Maintenance costs) this is the preferred option. The reason for this is that the chosen site allows the total sewage load of the town (with the exception of Boichoko) to flow to the wastewater treatment plant under gravity.

This also has the advantage that the municipality will be able to eliminate 4 of their 6 wastewater pump stations. This will firstly generate an annual saving of about R5 million per annum just on the cost of electricity. Secondly it will eliminate 4 operational points which require constant electrical and mechanical maintenance.

Thirdly, it will reduce the risks associated with sewage spills which currently occur on a weekly basis, as these pump stations are operating at their design limits due to the unprecedented growth experienced by Postmasburg. With a number of residential developments being planned in Postmasburg, these developments will put additional strain on the pump stations increasing the risk for spills.

Alternative 2:

The only other viable option is to extend the capacity of the existing wastewater treatment plant (4.8Ml/day) by doubling its capacity to9.8Ml/day. This will cost approximately the same as the construction of the new proposed WWTW (Alternative 1). The reason for this being that the current plant's inlet works has reached its design capacity which means that the entire plant must be duplicated to achieve the required treatment capacity.

There is sufficient space at the current site to do this, however, it would entail substantial blasting as the site is basically a calcrete koppie.

This alternative is also not preferred as it will continue to require that all sewage generated in the town of Postmasburg be pumped. This will require that at least 4 of the six pump stations be upgraded to increase their capacity by at least 50%. Given that Postmasburg Pump station No.1 has a sump of 11m in depth, this will entail major construction works on a very constricted site at great cost.
If the lifecycle cost of a pump is considered over 20 years, 85% of the cost is for energy (electricity), 10% for the initial capital investment and 5% for maintenance. The continued use of the pump stations will also require continued electrical and mechanical maintenance.

This alternative is also not preferred as the existing site has no more space for the safe disposal of the treated effluent. The current naturally occurring pans which are used to evaporate the treated effluent have been overflowing since May 2014. This overflowing treated effluent is now flowing onto the roads and stormwater system of the Airfield residential suburb. Although the water is of good quality, the continuous flooding of the roads and streets of Airfield will eventually lead to their premature failure. This issue can only be addressed by constructing a pipeline from the existing works to the Groenwaterspruit at an additional cost of R12 million, as this water needs to be disposed of and the future flows cannot be accommodated at the pans any more.

No-Go Alternative:

This is the option of not developing the proposed Waste Water Treatment Works. Although this might result in no potential negative environmental impacts, the direct and indirect socio-economic benefits of not constructing the WWTW will not be realised. As described in *Section 2.1*, future expansion and development of the town of Postmasburg, and as a result, mining operations in the area, will be limited in future.

According to the Freshwater Impact Assessment (**Appendix 4B**), the 'No-Go' alternative would imply not developing the proposed WWTW. This alternative would result in no additional potential negative environmental impacts as a result of the new WWTW and sewer line, however one could expect that there would be impacts associated with the limited capacity of the existing WWTW to treat the wastewater arising from the expanding town as well as increased loading (greater quantities of poor quality water) of the wetland areas and tributary of the Groenwaterspruit Tributary near the WWTW that would result in a gradual degradation of these aquatic ecosystems.

According to the Biodiversity Assessment (**Appendix 4C**), the "No-Go alternative" does not signify significant biodiversity gain or loss especially on a regional basis. However, it will ensure that none of the potential impacts in Section 9 below occur.

The No-Go option will result in continual pollution and health risks, coupled with huge maintenance costs. In addition the current WWTW will still have to be upgraded in order to handle the current and projected sewerage volumes expected. The location of the current works will remain problematic (uncontrolled discharge of raw effluent) and very expensive to operate (pumping costs).

<u>Tasks to be undertaken during the EIA Phase</u>

The following tasks must still be undertaken during the EIA phase of the process:

- Compile Draft Environmental Impact Report (EIR) for public comment based on specialist information (
- Advertise Draft EIR for public comment
- Distribute and/or make the Draft EIR available for viewing and comment
- Receive comments on Draft EIR. All comments received and responses to the comments will be incorporated into the Final Environmental Impact Report (EIR).
- Preparation of a FINAL EIR for submission to DEA&DP for consideration and decision-making.

Specialist Studies

The following specialist studies were undertaken as part of this Environmental Impact Assessment:

- Heritage Impact Assessment
- Geo-hydrological Impact Assessment
- Biodiversity Impact Assessment
- Freshwater Impact Assessment

Conclusion

The specialist studies and the information provided within the EIA Report, indicates that the proposed Postmasburg WWTW development does not pose any significant impacts and can be implemented with appropriate mitigation.

The need and desirability of the proposed Postmasburg Waste Water Treatment Works is indicated in the Preliminary Design Report. This is mostly due to the growth of Postmasburg, and the average daily flows exceeding the design capacity of the existing WWTW.

In terms of alternatives, **Alternative 1** is the preferred alternative due to technical and financial reasons in terms of future Operation and Maintenance costs. The proposed site allows the total sewage load of the town (with the exception of Boichoko) to flow to the wastewater treatment plant under gravity. This also has the advantage that the municipality will be able to eliminate 4 of their 6 wastewater pump stations. This will firstly generate an annual saving of about R5 million per annum just on the cost of electricity. Secondly it will eliminate 4 operational points which require constant electrical and mechanical maintenance.

It will also reduce the risks associated with sewage spills which currently occur on a weekly basis, as these pump stations are operating at their design limits due to the unprecedented growth experienced by Postmasburg. With a number of residential developments being planned in Postmasburg, these developments will put additional strain on the pump stations increasing the risk for spills.

The “no-go” option, which is the option of not developing the proposed Waste Water Treatment Works, might result in no additional potential negative environmental impacts, the direct and indirect socio-economic benefits of not constructing the WWTW will not be realised. As described in *Section 2.1*, future expansion and development of the town of Postmasburg, and as a result, mining operations in the area, will be limited in future.

According to the Freshwater Impact Assessment (**Appendix 4B**), the ‘No-Go’ alternative would imply not developing the proposed WWTW. This alternative would result in no additional potential negative environmental impacts as a result of the new WWTW and sewer line, however one could expect that there would be impacts associated with the limited capacity of the existing WWTW to treat the wastewater arising from the expanding town as well as increased loading (greater quantities of poor quality water) of the wetland areas and tributary of the Groenwaterspruit Tributary near the WWTW that would result in a gradual degradation of these aquatic ecosystems.

The No-Go option will result in continual pollution and health risks, coupled with huge maintenance costs. In addition the current WWTW will still have to be upgraded in order to handle the current and projected sewerage volumes expected. The location of the current works will remain problematic (uncontrolled discharge of raw effluent) and very expensive to operate (pumping costs).

According to the Biodiversity Assessment, the biodiversity aspects and associated impacts pertaining to the proposed development, the proposed project will have a significant impact on cutting operational costs, pollution prevention and health risks.

From a biodiversity perspective it will have very little impact on local or regional conservation targets, but will have a slight impact on protected species and a temporary impact on the Groenwater Spruit riparian vegetation. But the impact will be localised and with good environmental control and mitigation should not have any significant impact on conservation targets.

According to the Freshwater Impact Assessment, without mitigation the cumulative impact of the new WWTW and sewer line could be expected to result in some degradation of the condition of the stream. However, considering the current degraded state of the stream and the impacts of the existing activities, the relative impact would be low. With effective implementation of the recommended mitigation measures, the condition of the stream could be maintained at an acceptable level or even improved. In addition, the proposed new WWTW would result in the decommissioning of the existing WWTW which has altered to characteristic of the pans within the area from being largely ephemeral features to being primarily permanently inundated wetland areas. With the alteration of the proposed discharge of treated wastewater this existing impact on the freshwater features in the area would be eliminated.

According to the Geo-hydrological Impact Assessment, the groundwater in the area is a valuable resource and is vulnerable to surface based contamination. While the water quality of the final effluent is good with regard to certain indicator parameters it has a relatively elevated orthophosphate concentration. As this is considered a plant nutrient it is recommended that the water be used for crop irrigation as opposed to letting the water flow out in a single stream. The water quality suitability for irrigation should be considered with special reference to the relevant crops. From existing data this is the most favourable method of disposal.

It is essential that monitoring of the groundwater levels and quality takes place at and down-gradient of the point of effluent disposal, be it via irrigation or discharge as proposed. The monitoring will serve as an early warning system for groundwater users down-gradient of the site. Existing boreholes could be incorporated into the monitoring network.

According to the Heritage Impact Assessment, construction of the proposed sewer pipeline alongside the Groenwater Spruit will not impact on any important archaeological heritage. Construction of the proposed WWTP on the kopje overlooking the Spruit will also have a very limited impact on archaeological remains. Indications are that in terms of archaeological heritage, the receiving environment is not a sensitive archaeological landscape.

Considering all the information, it is not envisaged that this proposed Postmasburg Waste Water Treatment Works will have a significant negative impact on the environment, and the socio-economic benefits are expected to greatly outweigh any negative impacts.

It is therefore recommended that the proposed new waste water treatment works (**Alternative 1**) be supported and be authorised with the necessary conditions of approval, subject to the implementation of the recommended enhancement and mitigation measures contained in Section 11.