

**BASIC ASSESSMENT REPORT
IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107
OF 1998) AND ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS, 2014 (AS
AMENDED)**

October 2017

PROJECT TITLE

**Prince Albert Municipality: The proposed upgrade of the Klaarstroom
Oxidation Pond Wastewater Treatment System,
RE Portion 32 & RE Portion 34 of Farm Klaarstroom 178, Prince Albert, Western Cape**

[AUGUST 2019]

REPORT TYPE CATEGORY	REPORT REFERENCE NUMBER	DATE OF REPORT
Pre-Application Basic Assessment Report (if applicable) ¹	16/3/3/6/7/1/C2/3/0013/19	MARCH 2019
Draft Basic Assessment Report ²	16/3/3/1/C2/3/0008/19	JUNE 2019
Revised BAR		AUGUST 2019
Final Basic Assessment Report ³ or, if applicable Revised Basic Assessment Report ⁴ (strikethrough what is not applicable)		

Notes:

1. In terms of Regulation 40(3) potential or registered interested and affected parties, including the Competent Authority, may be provided with an opportunity to comment on the Basic Assessment Report prior to submission of the application but must again be provided an opportunity to comment on such reports once an application has been submitted to the Competent Authority. The Basic Assessment Report released for comment prior to submission of the application is referred to as the "Pre-Application Basic Assessment Report". The Basic Assessment Report made available for comment after submission of the application is referred to as the "Draft Basic Assessment Report". The Basic Assessment Report together with all the comments received on the report which is submitted to the Competent Authority for decision-making is referred to as the "Final Basic Assessment Report".
2. In terms of Regulation 19(1)(b) if significant changes have been made or significant new information has been added to the Draft Basic Assessment Report, which changes or information was not contained in the Draft Basic Assessment Report consulted on during the initial public participation process, then a Final Basic Assessment Report will not be submitted, but rather a "Revised Basic Assessment Report", which must be subjected to another public participation process of at least 30 days, must be submitted to the Competent Authority together with all the comments received.

DEPARTMENTAL REFERENCE NUMBER(S)

Pre-application reference number:	16/3/3/6/7/1/C2/3/0013/19
File reference number (EIA):	
NEAS reference number (EIA):	
File reference number (Waste):	
NEAS reference number (Waste):	
File reference number (Air Quality):	
NEAS reference number (Air Quality):	
File reference number (Other):	
NEAS reference number (Other):	

CONTENT AND GENERAL REQUIREMENTS

Note that:

1. The content of the Department's Circular EADP 0028/2014 (dated 9 December 2014) on the "One Environmental Management System" and the Environmental Impact Assessment ("EIA") Regulations, 2014 (as amended), any subsequent Circulars, and guidelines must be taken into account when completing this Basic Assessment Report Form.
2. This Basic Assessment Report is the standard report format which, in terms of Regulation 16(3) of the EIA Regulations, 2014 (as amended) must be used in all instances when preparing a Basic Assessment Report for Basic Assessment applications for an environmental authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) ("NEMA") and the EIA Regulations, 2014 (as amended) and/or a waste management licence in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) ("NEM:WA"), and/or an atmospheric emission licence in terms of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) ("NEM:AQA") when the Western Cape Government: Environmental Affairs and Development Planning ("DEA&DP") is the Competent Authority/Licensing Authority.
3. This report form is current as of October 2017. It is the responsibility of the Applicant/ Environmental Assessment Practitioner ("EAP") to ascertain whether subsequent versions of the report form have been released by the Department. Visit the Department's website at <http://www.westerncape.gov.za/eadp> to check for the latest version of this checklist.
4. The required information must be typed within the spaces provided in the form. The size of the spaces provided is not necessarily indicative of the amount of information to be provided. The tables may be expanded where necessary.
5. The use of "not applicable" in the report must be done with circumspection. All applicable sections of this report form must be completed. Where "not applicable" is used, this may result in the refusal of the application.
6. While the different sections of the report form only provide space for provision of information related to one alternative, if more than one feasible and reasonable alternative is considered, the relevant section must be copied and completed for each alternative.
7. Unless protected by law, all information contained in, and attached to this report, will become public information on receipt by the competent authority. If information is not submitted with this report due to such information being protected by law, the applicant and/or EAP must declare such non-disclosure and provide the reasons for believing that the information is protected.
8. Unless otherwise indicated by the Department, one hard copy and one electronic copy of this report must be submitted to the Department at the postal address given below or by delivery thereof to the Registry Office of the Department. Reasonable access to copies of this report must be provided to the relevant Organs of State for consultation purposes, which may, if so indicated by the Department, include providing a printed copy to a specific Organ of State.
9. This Report must be submitted to the Department and the contact details for doing so are provided below.
10. Where this Department is also identified as the Licensing Authority to decide applications under NEM:WA or NEM:AQA, the submission of the Report must also be made as follows, for-
 - Waste management licence applications, this report must also (i.e., another hard copy and electronic copy) be submitted for the attention of the Department's Waste Management Directorate (tel: 021-483-2756 and fax: 021-483-4425) at the same postal address as the Cape Town Office.
 - Atmospheric emissions licence applications, this report must also be (i.e., another hard copy and electronic copy) submitted for the attention of the Licensing Authority or this Department's Air Quality Management Directorate (tel: 021 483 2798 and fax: 021 483 3254) at the same postal address as the Cape Town Office.

DEPARTMENTAL DETAILS

CAPE TOWN OFFICE		GEORGE REGIONAL OFFICE
REGION 1 (City of Cape Town & West Coast District)	REGION 2 (Cape Winelands District & Overberg District)	REGION 3 (Central Karoo District & Eden District)
<p>Department of Environmental Affairs and Development Planning Attention: Directorate: Development Management (Region 1) Private Bag X 9086 Cape Town, 8000</p> <p>Registry Office 1st Floor Utilitas Building 1 Dorp Street, Cape Town</p> <p>Queries should be directed to the Directorate: Development Management (Region 1) at: Tel.: (021) 483-5829 Fax: (021) 483-4372</p>	<p>Department of Environmental Affairs and Development Planning Attention: Directorate: Development Management (Region 2) Private Bag X 9086 Cape Town, 8000</p> <p>Registry Office 1st Floor Utilitas Building 1 Dorp Street, Cape Town</p> <p>Queries should be directed to the Directorate: Development Management (Region 2) at: Tel.: (021) 483-5842 Fax: (021) 483-3633</p>	<p>Department of Environmental Affairs and Development Planning Attention: Directorate: Development Management (Region 3) Private Bag X 6509 George, 6530</p> <p>Registry Office 4th Floor, York Park Building 93 York Street George</p> <p>Queries should be directed to the Directorate: Development Management (Region 3) at: Tel.: (044) 805-8600 Fax: (044) 805 8650</p>

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ACRONYMS USED IN THIS BASIC ASSESSMENT REPORT AND APPENDICES:

BAR	Basic Assessment Report
CBA	Critical Biodiversity Area
DEA	National Department of Environmental Affairs
DEA&DP	Western Cape Government: Environmental Affairs and Development Planning
DWS	National Department of Water and Sanitation
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
ESA	Ecological Support Area
HWC	Heritage Western Cape
I&APs	Interested and Affected Parties
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEM:AQA	National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)
NEM:ICMA	National Environmental Management: Integrated Coastal Management Act, 2008 (Act No. 24 of 2008)
NEM:WA	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
PPP	Public Participation Process

DETAILS OF THE APPLICANT

Applicant / Organisation / Organ of State:	Prince Albert Municipality		
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DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER ("EAP")

Name of the EAP organisation:	EnviroAfrica cc		
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EAP Qualifications:	Inge Erasmus: BA Hons - Geography & Environmental Studies Bernard de Witt: B.Sc. Forestry (Stellenbosch); B.A. (Hons) Public Administration (Stellenbosch); National Diploma in Parks and Recreation Management; EIA Short course (UCT); ISO 14001 Auditors course (SABS)		

Please provide details of the lead EAP, including details on the expertise of the lead EAP responsible for the Basic Assessment process. Also attach his/her Curriculum Vitae to this BAR.

Inge completed her BA Honours Degree in Geography and Environmental Studies at Stellenbosch University in 2016. Before completing her honours degree Inge gained practical experience as a junior environmental consultant at Hatch Goba in Johannesburg from 2014 until 2015. Inge acted as an environmental control officer on a variety of projects in the Northern Cape, conducting environmental compliance audits, as well as being part of a project team working on a major resettlement project for Kumba Iron Ore.

Inge joined EnviroAfrica in February 2017, generally performing duties as an environmental assessment practitioner with regards to NEMA EIA applications. Inge is currently busy with a variety of projects of which include Basic Assessments and Waste License Applications for mining and development related projects in the Northern Cape. She is also in the process of conducting a variety of Scoping and Environmental Impact Assessments for projects in the Western Cape, obtaining Environmental Authorisation for new storage dams as well as new agricultural developments.

Bernard: After qualifying with a B. Sc. in Forestry and a B. A. (Hons) in Public Administration at the University of Stellenbosch Bernard joined the Department of Forestry as an Indigenous Forest Planner in 1983, going on to become Manager of the Table Mountain Reserve with the Cape Town Council. He then joined Cape Nature Conservation (CNC) and headed its Conservation Planning Section before taking up the position of District Manager of the Boland area (inc. the Hottentots Holland and Kogelberg). As a Regional Ecologist, he co-ordinated managerial and scientific inputs into Provincial Nature Reserves in the Boland, Overberg and West Coast regions. For the last four years of his employment he assessed and evaluated development applications, from an environmental perspective, on behalf of CNC (now DEA&DP). Since he left DEA&DP 10 years ago he has been involved in environmental consulting in the private sector as a member of **EnviroAfrica**.

CVs of the EAP Appendix K

EXECUTIVE SUMMARY OF THE BASIC ASSESSMENT REPORT:

Project description:

This application is for the proposed upgrade of the exiting Klaarstroom Waste Water Treatment Works on Remainder of Portion 32 of Farm Klaarstroom 178, Prince Albert, Western Cape to produce to increase the capacity and improve the quality of the Final Effluent. It is further proposed that the Final Effluent be used for irrigation of the sports fields in Klaarstroom village. It is proposed to construct a pipeline from the WWTP ponds which will terminate in a new galvanized dam at the sports field on Remainder of Portion 34 of Farm Klaarstroom 178, Prince Albert, Western Cape.

The village of Klaarstroom is located south of the N12 National Road and the existing wastewater treatment plant is located north of the N12. All wastewater from the village is pumped to the wastewater treatment plant.

The village of Klaarstroom is fairly well serviced in terms of water, sewage, electricity and roads. The wastewater is collected at a central pump station in the village and then pumped through a 100mm diameter rising main over a distance of 800m to the wastewater treatment plant.

The current disposal of effluent takes place by means of overhead sprinklers discharging the treated effluent onto the veld north of the existing treatment plant. Any drainage from this area will eventually end up in the Groot River south of Klaarstroom.

Existing Infrastructure:

The existing wastewater treatment plant comprises of only two ponds. The first pond is an anaerobic pond followed by a single facultative pond from where the final effluent is discharged onto the ground. The design capacity of the pond system is given as 50m³/day and it was constructed in 1970. Records indicate a measured peak daily flow of 80 m³/day which is approximately 60% higher than the current design capacity.

According to an analysis of the treated effluent dated August 2015 the current effluent is non-compliant with all important parameters. The total suspended solids on the final effluent is very high at 88mg/l and far exceeds the allowable minimum of 25mg/l. the COD and Ammonia levels are much higher than the allowable limits. The existing Klaarstroom WWTP is both hydraulically (flow) and organically (chemical load) overloaded.

BVi Consulting Engineers' brief was to provide a proposal for the upgrade of the oxidation pond system to increase the capacity and improve the quality of the Final Effluent. The current plant has a footprint of approximately 4446.83m²

The existing system has a design capacity of 50m³ per day. The final effluent is currently chlorinated and then irrigated in the veld north of the plant by means of two overhead sprinklers. It is proposed that the current capacity of the Klaarstroom WWTP be upgraded to a new capacity of 61m³ per day (11m³/ day expansion) for dry weather and The Peak Wet Weather Flow was calculated to be 127m³/day or 1.47 l/s.

Given the existing layout of the plant, it is proposed that the existing plant be converted to a system comprising an inlet works, dual anaerobic ponds, dual aerobic ponds, and a reed bed.

Proposed works:

1. The Inlet works will be rebuilt and comprise of a hand-raked screen in a channel, approximately
2. The depth of the current single anaerobic pond is unknown and probably competently filled with sludge. It is proposed that two new anaerobic ponds are constructed.
3. The existing anaerobic pond is to be modified and reshaped to create a new secondary
4. A second aerobic pond proposed. Each of the secondary ponds to provide a retention period of 5.5day or a total of 11 days.
5. The existing facultative pond (large pond) to be refurbished and reshaped to encourage plug flow.
6. Construction of a single horizontal reed bed for polishing of the final effluent and to facilitate denitrification
7. Construction of a storage pond with a capacity to store at least 7 days of flow.
8. The final effluent is to be utilized for irrigation of sports fields in Klaarstroom village. This will be made possible by using a gravity system as the waste water treatment plant is located at a higher elevation than the village. It is proposed to construct a 160mm ø uPVC pipeline of 500m in length from the effluent storage point which will terminate in a new galvanized dam at the sports field.

Various pipeline alternatives are investigated and are discussed in more detail in Section E of the report. Please refer to the layout maps, Appendix A and Figure 3 & 4 below.

- Alternative C (Most preferred):

Pipeline route Alternative C, represented by the blue line on the locality maps, is now considered the Preferred Alternative. The route changed slightly and is shorter, approximately $\pm 270\text{m}$ than pipeline route Alternative A. It is proposed that the pipeline will follow the same route as Alternative A up until point c on Figure 4 below. It is proposed that this route will cross the N12 via Horizontal Directional Drilling from where it will terminate in the proposed irrigation dam.

- Alternative D (Preferred):

Pipeline route Alternative D, represented by the green lines on the locality maps, is also considered an preferred alternative. This proposed pipeline follows the same route as Alternative C until the point where it is proposed that Alternative C crosses the N12 (point c in Figure 4). It is proposed that pipeline route Alternative D follows the road reserve on the Northern side of the N12 until the existing bridge to the west of the site. From here it is proposed that the pipe be attached to the bridge to cross the road and river to the South of the N12. The pipeline to remain within the road reserve until the point where it crosses into the school property and terminated within the proposed irrigation dam. No listed activities will be triggered as the pipeline is to remain within the road reserve. Approximate length of the pipeline is $\pm 590\text{m}$.

Pipeline Alternative D is also preferred. Pipeline Alternative A is more preferred as it is shorter. The final pipeline route will depend on whether the necessary approvals can be obtained.

9. The proposed galvanized irrigation dam will have a storage volume of $\pm 121\text{m}^3$ and dimensions of 10m diameter x 1.55m high. It is proposed the dam be lined with a polypropylene sheet and covered with a roof.
10. A small pump station (2m^2) will be provided at the dam to provide a flow of 4.5l/s at a head of 3.5bar feeding a crawling irrigator which will be used to irrigate the sports field.
11. A chip doser for the dosing of a calcium hypochlorite solution into the circular dam will be provided to disinfect the final effluent prior to irrigation to avoid any pathogens from remaining in the irrigation water.

Please refer to the project description for dimension of the proposed works, Appendix A for Locality maps and proposed layout plans as well as Appendix B for design drawings.

Handling and disposal of existing sludge within existing ponds on site:

As described above, one of the constraints of the project was to determine the best way to handle the existing sludge within the existing ponds on site to be able to construct the proposed two new Anaerobic Ponds, Aerobic Pond No.1 and reshaping and refurbish the new Facultative Pond.

Various alternatives were investigated and are discussed in more detail in Appendix E of the report. After a meeting held with The Department of Environment and Development Planning Directorate Waste Management and Directorate Pollutions and Chemicals Management, the preferred Alternative was agreed upon. Please refer to the meeting register as well as an email summary of the discussion that took place in the meeting, Appendix F7.4

Alternative A (Preferred Alternative):

It is proposed to construct a temporary drying bed in the area initially dedicated to the proposed disposal of the sludge grit & screenings. It is proposed that the temporary drying beds have a footprint of $\pm 250\text{m}^2$ with a berm $\pm 200\text{mm}$ to $\pm 500\text{mm}$ high and an impermeable liner. It is proposed that the sludge be mixed with onsite soil to a consistency that it can be comfortably handled and be pumped onto the lined drying bed to dry. As soon as the sludge is dry, samples will be taken and the sludge is to be sent for testing and classification. Sludge not to be stored for longer than 90 days to qualify a temporary storage. The classification results will guide the

suitable method of disposal as per Volume 1- 5 of the "Guidelines for the utilization and disposal of wastewater sludge", Water Research Commission, TT 261/07, 2006.

It was agreed that the test result be made available to DEADP Directorate: Waste Management and Directorate: Pollutions and Chemicals Management to confirm best method for disposal. If sludge is of suitable quality, Land farming is considered a viable and affordable option for disposal, alternatively, disposal at a licenced, registered facility

Grit & Screenings Management:

The daily degritting of the inlet works to take place. The Operational Management Plan (Appendix H2) states that the Process Controller will remove the settled grit from the bottom of the channel with a shovel and place the grit on an area adjacent to the channel to allow the grit to dry and the water to drain into the channel.

It is expected that daily grit & screening will be less than one wheelbarrow load day. It can be assumed that a wheelbarrow has a volume of approximately 65 litres or 0.065 m³. It can be calculated that the expected grit and screenings per month will be approximately 1.95m³ (65 litre x 30 days).

Alternative A (Preferred Alternative):

It is proposed that the drying of the grit next to the inlet works channel be on a bunded concrete slab with a channel to allow the water to flow back into the channel. Grit & Screenings not to be placed on bare soil for drying. The process controller to sprinkle lime on the drying beds grit to discourage flies and odours.

Dried grit & screenings to be stored in a skip on site from where it will be disposed of at a licensed, registered facility. It is preferred that the skip have a lid. Skip to be placed close to the inlet works for ease of disposal into the skip. It is proposed that the first batch of grit & screenings be tested to determine a suitable facility for disposal. Screenings and grit to be disposed of at an appropriate registered facility on a monthly basis. Grit & screenings not to be stored for more than 90 days before disposal.

It is proposed that the grit & screenings be tested every 1-3 years to determine if disposal method is still suitable.

Storm Water Management:

It is proposed that a low earth embankment (1.0m high) be placed on the northern side of the proposed works to channel any stormwater around the proposed works. The primary concentrated runoff from the drainage lines will then be mitigated. It is further proposed that the second drainage line from the east be diverted using a trench along the toe-line of the eastern ponds to ensure that stormwater is diverted to the south of the works.

The natural slope of the ground is from East to West. It will therefore be pertinent to have a trench with a flat side slope on the Eastern Side and steeper side slope on the western site. As illustrated in the Stormwater Management Plan images, Appendix A. The trench is proposed to have a length of 254m. The slope along the length of the proposed trench will approximate the natural slope of the ground in a north to south direction as follows:

From Chainage 0.00 where trench commences up to Chainage 100.00, the trench will have a slope of 1 : 100;
From Chainage 100.00 up to Chainage 200.00, the slope will be 1 : 33, and over the last section from Chainage 200.00 to Chainage 254.00 the slope will be 1 : 54.

The trench is proposed to have a depth no more than 300mm deep on the low side of the slope and will be 1500mm wide. The trench will be formally shaped, but will not be lined. As the cross-sectional area is quite large in relation to the expected run-off, low flow velocities are expected which decrease the chance of erosion in the trench. The Inlet Structure and the Outlet Structure will be formally shaped and lined with stone pitching to avoid scour of the natural ground.

Coordinates Storm water trench starts: 33°19'18.13"S 22°31'45.43"E

Coordinates Storm water trench ends: 33°19'22.11"S 22°31'40.69"E

Please refer to the Stormwater Management Plan Layout, **Alternative A**.

Site Location:

Remainder of Portion 32 of Farm Klaarstroom 178, Prince Albert, Western Cape

Remainder of Portion 34 of Farm Klaarstroom 178, Prince Albert, Western Cape

SG Code: C0610000000017800032

SG Code: C0610000000017800034

Current Footprint: ±4446.83m²

Footprint after the upgrade: ±9510m²
Total area of new land required: ±5064
Entire facility fenced off: 17500m²

Services:

Existing roads, electricity connections and freshwater infrastructure is available at the site.

Environmental Legal Requirements

The National Environmental Management Act (NEMA, Act 107 of 1998), as amended, makes provision for the identification and assessment of activities that are potentially detrimental to the environment and which require authorisation from the competent authority based on the findings of an Environmental Assessment. NEMA is a national act, which is enforced by the Department of Environmental Affairs (DEA). In the Western Cape, these powers are delegated to the Department of Environmental Affairs & Development Planning (DEA&DP). Section A(d) of this document, lists all the activities that were identified as “triggered” by the proposed activity. It also discusses activities that “might” be triggered, in terms of the 2014 EIA (Environmental Impact Assessment) Regulations as amended.

A WULA in terms of NWA Section 21 (c); (i) is in process. Dr Dirk van Driel from WATSAN Africa is handling the process.

Significant Environmental Aspects:

Biodiversity:

From the Vegetation Map on Cape Farm Mapper (**Appendix D**) vegetation that would have been present on site is Prince Albert Succulent Karoo vegetation. This type of vegetation does not fall under the *National Environmental Management: Biodiversity Act 2004, National List of Ecosystems that are threatened and in need of protection (NEMBA)*. From google images vegetation on the site is sparse.

The following information was taken from the Botanical Impact report (**Appendix G2**).

The area that will be impacted by the proposed WWTW upgrade and pipeline is very small. If it is taken into account that the existing WWTW is already basically transformed, the additional footprint will be only about 5000 m², while the pipeline will have a temporary impact on between 500- 800 m of veld of which most is located in already disturbed or transformed (within the urban edge) veld portions

Preferred Pipeline Route as revised (Alternative C):

The originally preferred pipeline route will start within at the extended WWTW within the area described above (Refer to the blue line in the figure below). It will then be placed next to the fence of the Road camp within an area that has been cleared of vegetation (potentially a fire break)

From the road camp the pipeline will cross underneath the N14 south for about 250 – 300 m, into the disturbed road reserve to the south of the N14. It will then be located within the road reserve, for a short distance (approximately 30 m) before it enters the Klaarstroom sporting grounds and into a new reservoir (galvanised irrigation dam). The vegetation in road reserve can be described as very degraded with the only species of significance observed being a few small *Vachellia karroo* and hardy or weedy pioneer species like *Augea capensis*, *Galenia africana*, young *Lycium cinereum*, *Kali* species, and *Tetraena simplex*.

Alternative Pipeline Route as revised (Alternative D):

The alternative pipeline route will follow the same path as the preferred route (until it reaches the road reserve of the N12. It will then be located within the road reserve to the north of the N14, until it reaches the bridge over the Sand River. The pipe will then cross the N14 south underneath the bridge (attached to the bridge infrastructure). From the bridge it will again be located within the road reserve of the N12 back to the reservoir (galvanised irrigation dam) within the sporting grounds. Within the road reserve, the vegetation remains as described above.

The riparian vegetation along the Sand River (in the area near to the N14) was basically dominated by *Vachellia karroo*, with *Phragmites australis*, *Melanthus comosus* and *Searsia lancea* occasionally encountered.

Galvanised dam/ reservoir:

A small storage tank or reservoir will be placed within the existing Klaarstroom sport fields from where the sport fields can be irrigated. This reservoir will be located in this site with no natural veld remaining.

Threatened and protected plant species:

No threatened and protected plant species were observed in terms of The Red List of South African; The National Environmental Management: Biodiversity Act, Act 10 of 2004, "Lists of critically endangered, endangered, vulnerable and protected species" (GN. R. 152 of 23 February 2007); or The National Forests Act (NFA) of 1998 (Act 84 of 1998) provides for the protection of forests as well as specific tree species (as updated).

CBA/ ESAs:

The (updated) Biodiversity Overlay Map from Cape Farm Mapper (**Appendix D**) indicate that the existing WWTP does fall within a CBA and that the proposed pipeline routes will impacts on CBAs. Alternative pipeline routes (Alternative B & D, not preferred) will also impact on the ESA associated with the Sand River.

Please note that although the proposed infrastructure will be located within a terrestrial CBA for the purposes of the impact assessment it was taken into account that the pipeline will be located in areas already very much disturbed and that with the current CBA map, there is no alternative location that will fall outside of the CBA. It was also taken into account that the permanent enlargement of the footprint will be relatively small (5000 m²) and that the impact associated with the pipeline route will be temporary. It is also expected that with mitigation and rehabilitation the impact associated with the construction of the pipeline can be minimal.

According to the Botanical Specialist Report (**Appendix G2**) the main impacts associated with the proposed development will be on (1) a disturbed conservation priority area (CBA) and (2) a potential impact on a seasonal watercourse (if the alternative pipeline routes Alternative B is chosen)

Because of the degraded status of the site and the temporary nature of the impact, the cumulative impact from a biodiversity point of view, (even without mitigation), is expected to be relatively low, but this can be further reduced with mitigation.

Freshwater:

The Water Resources map (**Appendix D & Figure 3**) from Cape Farm Mapper indicate that the proposed pipeline routes, Alternative A, C and D, will cross a small section of a non-perennial river/ drainage line.

However, as described above, according to the freshwater report this drainage line was not observed during the site visit on 23 January 2019. The report states that the ground is very level, leaving uncertainty to where the storm water flows. Instead of the drainage line, a culvert (refer to Figure 6 & Figure 7) was observed under the N12 for letting stormwater through that might have accumulated against the northern shoulder of the road. A swale with a hard surface stretches from the culvert to the south into the Klaarstroom township (Figure 8). This is part of the storm water system that releases its water into the Sand river which later becomes the Groot River south of the township.

The preferred pipeline routes, Alternative C and D will have not impact on any drainage lines.

The existing WWTP straddles a drainage line, although the drainage line is very faint (refer Figure 18 below). The upgrade of the works will thus occur within this drainage line. The freshwater report states that during a very high rainfall event, the flow of water can be expected to be fast, with a high erosion potential evident from the deeply incised Groot Rivier and most drainage lines. The drainage line is separated from the next drainage line towards the east with a low ridge. The next drainage line is emphasised and clear.

The freshwater report (Appendix G1) further assess the Present Ecological State (PES) and Ecological Importance (EI) of these drainage lines as well as the Groot river.

The PES of both the instream habitat and riparian zone score a C (Moderately modified). The habitat has been impacted, but the basic ecological functioning remain intact. The PES of the Groot river has been classified as an A (Unmodified, natural), unimpacted and pristine.

The Ecological Importance (EI) is based on the presence of especially fish species that are endangered on a local, regional or national level. There are no indigenous fish in the Groot River at Klaarstroom and its associated drainage lines, as there is no permanent water..

The Ecological Sensitivity (ES) is often is often described as the ability of aquatic habitat to assimilate impacts. The Groot River at Klaarstroom and its associated drainage lines can probably be rated as moderately sensitive.

The freshwater specialist is of the opinion that A WWTP is an ongoing operation. Therefore the possibility of an impact is an ongoing risk as well. The Upgrade of the Klaarstroom WWTP is not considered to detract from the river services, if it is properly managed. The freshwater specialist suggests that it is unlikely that the impacted conditions south of Klaarstroom may creep upstream to the confluence of the Klaarstroom drainage line. It is also unlikely that the small anaerobic pond system is to overflow into the adjacent river, if the upgrade is to be done as planned.

Heritage:

A heritage screener was conducted by CTS Heritage and a NID submitted to Heritage Western Cape. Heritage Western Cape provided comment and no further studies are required (Appendix E1). It is recommended that the HWC Fossil Finds Procedure be implemented throughout the development phase. Please refer to **Appendix G** for the Specialist reports.

Considering all the information, it is not envisaged that the proposed upgrade and expansion of the Klaarstroom WWTP pose any significant negative impact on the environment. The existing Klaarstroom WWTP is hydraulically (flow) and organically (chemical load) overloaded. This is a clear indication that the plant is overloaded and requires urgent extension to cope with the incoming flow and organic load. The implementation of the no go-option would have a negative impact on the receiving environment. It is therefore recommended that the WWTP be upgraded to comply with NEMA and DWS guidelines.

It is therefore recommended that this application be authorised with the necessary conditions of approval as described throughout this BAR.

SECTION A: PROJECT INFORMATION

1. ACTIVITY LOCATION

Location of all proposed sites:	Remainder of Portion 32 of Farm Klaarstroom 178, Prince Albert, Western Cape Remainder of Portion 34 of Farm Klaarstroom 178, Prince Albert, Western Cape
Farm / Erf name(s) and number(s) (including Portions thereof) for each proposed site:	Remainder of Portion 32 of Farm Klaarstroom 178, Prince Albert, Western Cape Remainder of Portion 34 of Farm Klaarstroom 178, Prince Albert, Western Cape
Property size(s) in m ² for each proposed site:	242.09 ha (RE 32 Farm Klaarstroom 178) 3.66 ha (RE 34 Farm Klaarstroom 178)
Development footprint size(s) in m ² :	Current Footprint: ±4446.83m ² Footprint after the upgrade: ±9510m ² Total area of new land required: ±5064 Entire facility fenced off: 17500m ²
Surveyor General (SG) 21 digit code for each proposed site:	C06100000000017800032 C06100000000017800034

2. PROJECT DESCRIPTION

(a) Is the project a new development? If "NO", explain:

YES

NO

The proposed development is the upgrade of the existing Klaarstroom oxidation pond wastewater treatment system.

(b) Provide a detailed description of the scope of the proposed development (project).

Project Description

This application is for the proposed upgrade of the exiting Klaarstroom Waste Water Treatment Works on Remainder of Portion 32 of Farm Klaarstroom 178, Prince Albert, Western Cape to produce to increase the capacity and improve the quality of the Final Effluent. It is further proposed that the Final Effluent be used for irrigation of the sport fields in Klaarstroom village. It is proposed to construct a pipeline from the WWTP ponds which will terminate in a new galvanized dam at the sports field on Remainder of Portion 34 of Farm Klaarstroom 178, Prince Albert, Western Cape.

The following information was taken from the Bvi Technical Report from **Appendix K**.

The village of Klaarstroom is located south of the N12 National Road and the existing wastewater treatment plant is located north of the N12. All wastewater from the village is pumped to the wastewater treatment plant.

The village of Klaarstroom is fairly well serviced in terms of water, sewage, electricity and roads. The wastewater is collected at a central pump station in the village and then pumped through a 100mm diameter rising main over a distance of 800m to the wastewater treatment plant.

The current disposal of effluent takes place by means of overhead sprinklers discharging the effluent onto the veld north of the existing treatment plant. Any drainage from this area will eventually end up in the Groot River south of Klaarstroom.

Existing Infrastructure:

The existing wastewater treatment plant comprises of only two ponds. The first pond is an anaerobic pond followed by a single facultative pond from where the final effluent is discharged onto the ground. The design capacity of the pond system is given as 50m³/day and it was constructed in 1970. Records indicate a measured peak daily flow of 80 m³/day which is approximately 60% higher than the current design capacity.

According to an analysis of the treated effluent dated August 2015 the current effluent is non-compliant with all important parameters. The total suspended solids on the final effluent is very high at 88mg/l and far exceeds the allowable minimum of 25mg/l. the COD and Ammonia levels are much higher than the allowable limits. The existing Klaarstroom WWTP is both hydraulically (flow) and organically (chemical load) overloaded.

BVi Consulting Engineers' brief was to provide a proposal for the upgrade of the oxidation pond system to increase the capacity and improve the quality of the Final Effluent. The current plant has a footprint of approximately 4446.83m²



Figure 1: Layout of Existing Waste Water Treatment Works (BVi Technical Report)

The existing system has a design capacity of 50m³ per day. The final effluent is currently chlorinated and then irrigated in the veld north of the plant by means of two overhead sprinklers. It is proposed that the current capacity of the Klaarstroom WWTP be upgraded to a new capacity of 61m³ per day (11m³/ day expansion) for dry weather and The Peak Wet Weather Flow was calculated to be 127m³/day or 1.47 l/s.

Given the existing layout of the plant, it is proposed that the existing plant be converted to a system comprising an inlet works, dual anaerobic ponds, dual aerobic ponds, a reed bed and final effluent storage pond. Please refer to the proposed new design and layout below. It is proposed that the Final Effluent be used for irrigation of the sport fields in Klaarstroom village. It is proposed to construct a pipeline from the WWTP ponds which will terminate in a new galvanized dam at the sports field on Remainder of Portion 34 of Farm Klaarstroom 178, Prince Albert, Western Cape.



Figure 2: Proposed layout of refurbishment and improvement works of Klaarstroom WWTP (BVI Technical Report)

Constraints:

1. The incoming raw wastewater must be dealt with continuously throughout the construction period.
2. The existing raw sewage rising main will need to be temporarily re-routed to allow space for the construction of the Aerobic No. 1.
3. The treated effluent will need to be disposed of as it has currently been done until the completion of all the ponds. Currently, treated effluent is collected in green Jojo tanks downstream of the existing facultative pond, chlorinated and pumped to the irrigation area in the veld, north of the existing works.
4. The disposal of the wastewater sludge within in existing ponds before ponds can be refurbished.

Proposed works and sequence of construction:

Please note that proposed sequence of construction proposed below is not definitive program or sequence of works, but a to deal be able to deal with the wastewater sludge within the existing ponds on site in a manner to benefit the environment and not delay construction on site. It is a proposed for the logical sequence of events that can practically be executed. The appointed contractor may have a variance or two depending on how he sees the most economical manner in which to deal with the situation.

1. Temporary diversion of the existing rising main to the east of the site using a 110mm diameter above ground HDPE pipeline to continue to discharge into the existing Anaerobic pond and from there through the old facultative to discharge into the existing veld irrigation system (as is current practice)
2. Commence earthworks and construction of Aerobic pond No.2; Horizontal Flow Reedbed and Final Effluent Storage Ponds complete with connector piping, outlet structures, wave protection and manholes.
3. Once Aerobic Pond No.2; Horizontal Flow Reedbed and Final Effluent Storage Ponds have been constructed, the incoming raw sewage can be diverted to pump into the new Aerobic Pond.

4. At the same time, the existing contents of the old Anaerobic Pond can be pumped into the new Aerobic Pond No.2. In this way, all the wastewater is continuously contained and exposed to a degree of treatment.
5. The existing Jojo Tank and Irrigation pump can then be temporarily connected to the outlet of the Final Effluent Storage Pond and continue to discharge the effluent of the Final Effluent Storage Pond and continue to discharge the effluent to the veld irrigation area as before.
6. Once the old Anaerobic ponds and Facultative ponds have been emptied of liquid, the remaining sludge can be dealt with.
7. It is proposed to construct temporary drying beds on site for the sludge to dry. It is proposed that the sludge be mixed with on-site soil to a consistency where it can be comfortably handled. Sludge to be pumped onto the temporary drying beds to dry. Samples of sludge to be taken once sludge is sufficiently dried and sent for testing and classification. Classification of sludge will guide the best/suitable method of disposal. Sludge handling and disposal discussed in more detail below. Alternatives investigated for disposal of handling of the existing sludge is discussed in Section E of the report.
8. Construction and earthworks of the two new Anaerobic ponds; Aerobic Pond 1 and the reshaping of the new Facultative Pond can now commence.
9. The new Inlet works concrete structure can now be constructed.
10. During the duration of activities of 8 and 9 above, the incoming wastewater will be passed through Aerobic Pond 2, the Horizontal Flow Reedbed and Final Storage Pond and then irrigated into the veld, as is current practice.
11. On completion of the earthworks, construction of the new Anaerobic Ponds, the reshaped Facultative Pond and Aerobic Pond 1, complete with Outlet Structures, wave protection, connector piping and manholes, the incoming flow can be diverted temporarily to the inlet of the new Anaerobic Ponds until completion of the new Inlet Works is done.
12. At this stage, all process units will be operational and flow will be as designed.
13. On completion of the concrete works at the new Inlet Structure, a new permanent rising main will be constructed and connected to the new inlet works permanently.
14. Finishing of the site and permanent fencing of the WWTW can be commended with.
15. Construction of the galvanised storage dam on the sports field.
16. Construction of the gravity pipeline to feed treated effluent into the storage dam for irrigation of the sports field. Pipeline routes discussed in more detail below. Alternative pipeline routes investigated discussed in Section E of the report.

Details of proposed works:

1. Inlet works:

The Inlet works will be rebuilt and comprise of a hand-raked screen in a channel, approximately 0.5m x 2m x 1m deep, followed by dual grit removal channels with approximate dimensions of 0.3m x 5m x 1m deep, followed by a Parshall measuring flume with dimensions of 0.3m x 0.7m x 1m deep. The flume outlet will drop off into a concrete chamber approximately 0.1 m x 0.1m. From this box, a 160mm diameter 25m gravity sewer will feed the Anaerobic ponds.

Approx. footprint for Inlet works are: 25m²

2. Two new Anaerobic Ponds:

The depth of the current single anaerobic pond is unknown and probably competently filled with sludge. It is proposed that two new Anaerobic ponds are constructed. The anaerobic ponds are suggested to have a combined retention period of 24hours which should be sufficient to break down the organic fraction of the waste water by at least 50%.

Dimensions for each new anaerobic pond is proposed to be 5.5m x 5.5m x 3.5m depth.

Approx. footprint for both Anaerobic ponds are: 60.5m² or 211.75m³.

3. Two new Aerobic Ponds:

The existing anaerobic pond is to be modified and reshaped to create a new secondary Aerobic pond with dimensions of 38m x 15m x 100m deep

A second Aerobic pond of 38m x 15m x 100m deep is proposed. Each of the secondary ponds to provide a retention period of 5.5day or a total of 11 days.

Approx. footprint for both Aerobic ponds are: 1140 m² or 1140 000 m³

4. Refurbishment of the Facultative pond:

The existing Facultative pond (large pond) to be refurbished and reshaped to encourage plug flow. Proposed final dimensions: 58m x 30m x 1.2 m deep. A total retention of 25 days is provided for.

Approx. footprint for the Facultative pond is: 1740 m² or 2088 m³.

5. Horizontal Reed Bed:

Construction of a single Horizontal Reed Bed for polishing of the final effluent and to facilitate denitrification Proposed dimensions: 60m x 20m x 0.6m deep

Approx. footprint of the reed bed is: 1200 m² or 720 m³

6. Final Effluent Storage Pond:

Construction of a Final Effluent Storage Pond with a capacity to store at least 7 days of flow. Proposed dimensions include: 40m x 20m x 1.5m deep.

Approx. footprint of the final effluent storage pond is: 800 m² or 1200 m³

7. Irrigation Pipelines:

The final effluent is to be utilized for irrigation of sports fields in Klaarstroom village. This will be made possible by using a gravity system as the waste water treatment plant is located at a higher elevation than the village. It is proposed to construct a 160mm ø uPVC pipeline of ±500m in length from the effluent storage point which will terminate in a new galvanized dam at the sports field.

Various pipeline alternatives are investigated and are discussed in more detail in Section E of the report. Please refer to the layout maps, Appendix A and Figure 3 & 4 below.

Alternative A (Not preferred):

Pipeline route Alternative A, represented by the purple line was originally the preferred route., after consultation with SANRAL and PGWC: Department of Transport and Public Works this route is not considered viable. Please refer to the Comment and Response Report (Appendix F1) and Original Comments (Appendix F1.3).

Alternative B (Not preferred):

Pipeline route Alternative B, represented by the red line was also investigated. This route will impact on the banks of the Sand River and require land owner consent from the neighbour and is therefore not preferred.

Alternative C (Most preferred):

Pipeline route Alternative C, represented by the blue line on the locality maps, is now considered the Preferred Alternative. The route changed slightly and is shorter, approximately ±270m than pipeline route Alternative A. It is proposed that the pipeline will follow the same route as Alternative A up until point c on Figure 4 below. It is proposed that this route will cross the N12 via Horizontal Directional Drilling from where it will terminate in the proposed irrigation dam.

Alternative D (Preferred):

Pipeline route Alternative D, represented by the green lines on the locality maps, is also considered an preferred alternative. This proposed pipeline follows the same route as Alternative C until the point where it is proposed that Alternative C crosses the N12 (point c in Figure 4). It is proposed that pipeline route Alternative D follows the road reserve on the Northern side of the N12 until the existing bridge to the west of the site. From here it is proposed that the pipe be attached to the bridge to cross the road and river to the South of the N12. The pipeline to remain within the road reserve until the point where it crosses into the school property and terminated within the proposed irrigation dam. No listed activities will be triggered as the pipeline is to remain within the road reserve. Approximate length of the pipeline is $\pm 590\text{m}$.

Pipeline Alternative D is also preferred. Pipeline Alternative A is more preferred as it is shorter. The final pipeline route will depend on whether the necessary approvals can be obtained.

8. Galvanised Irrigation Dam:

The proposed galvanised irrigation dam will have a storage capacity of $\pm 121\text{m}^3$ and dimensions of $\pm 10\text{m}$ diameter $\pm 1.55\text{m}$ high. It is proposed the be covered with a galvanised sheeting roof structure. The dam will be fire retardant and manufactured from Aluzinc corrugated sheets of 0.8mm thickness. The dam to be provided with an 800g/m^2 supported PVC Liner which carries a 12 year warrantee. The liners are UV stabilised and contain biocides to minimise fungus growth thus making it suitable for water storage.

A small pump station (2m^2) will be provided at the irrigation dam to provide a flow of 4.5l/s at a head of 3.5bar feeding a crawling irrigator which will be used to irrigate the sports field.

A chip doser for the dosing of a calcium hypochlorite solution into the irrigation dam will be provided to disinfect the final effluent prior to irrigation to avoid any pathogens from remaining in the irrigation water.

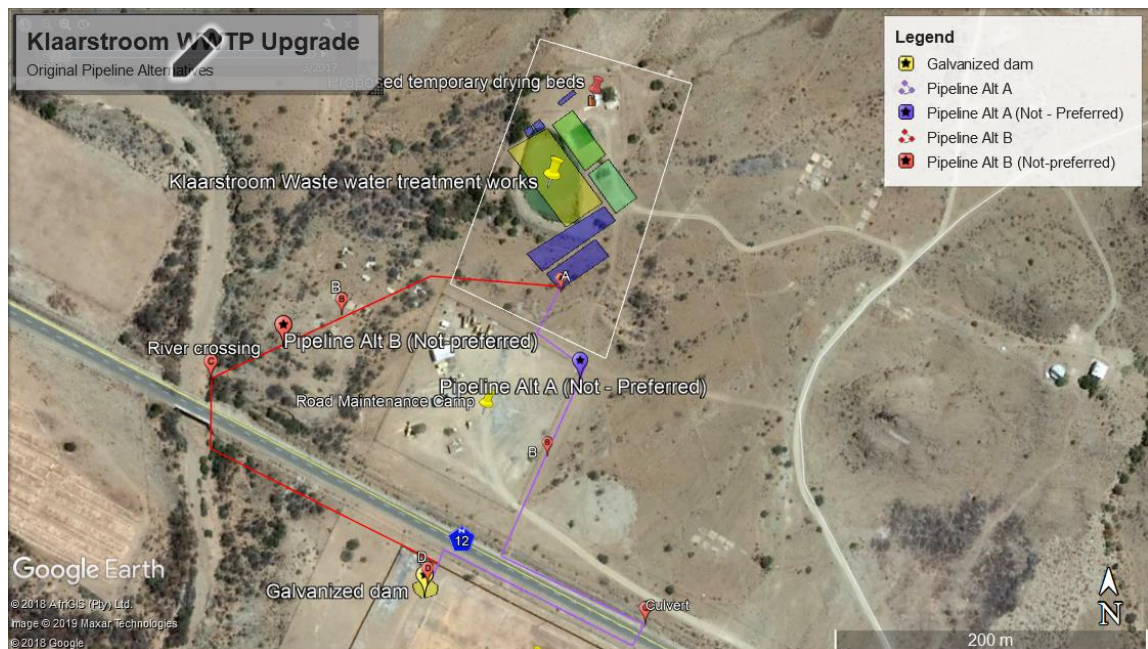


Figure 3: Layout Plan for Original Pipeline Alternatives investigated (Alternative A & B both not preferred,

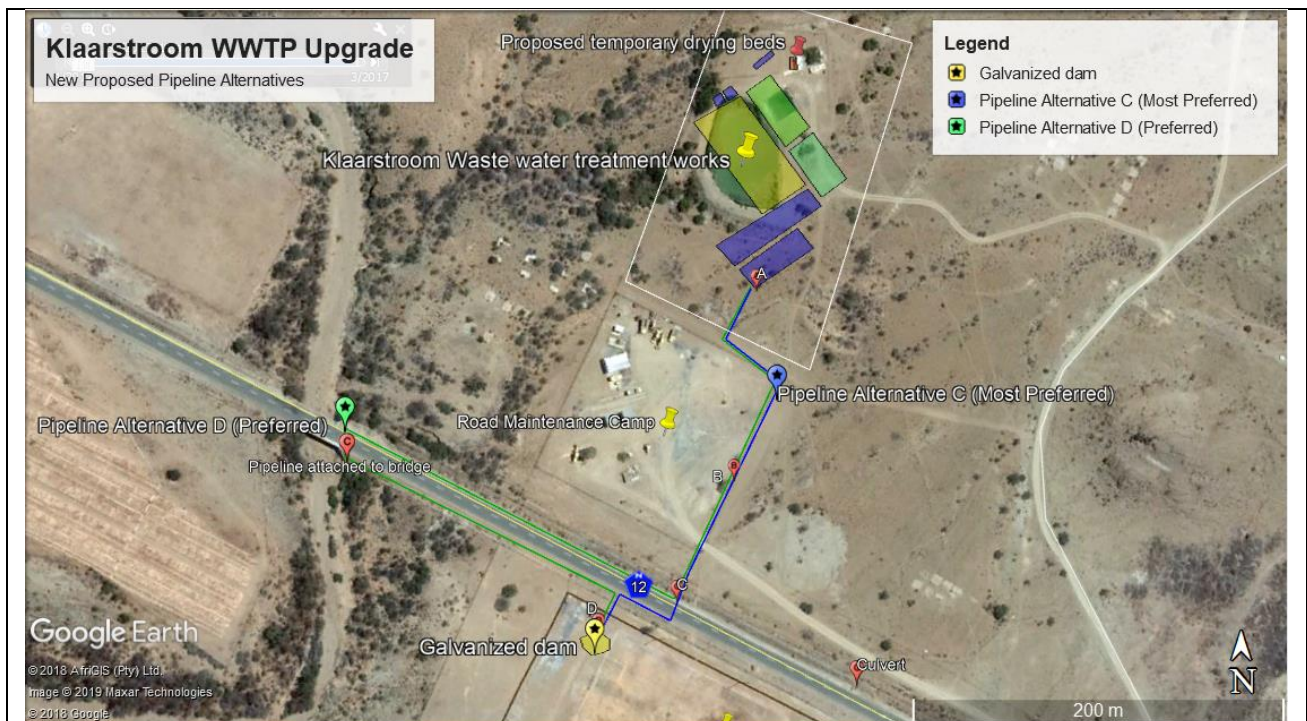


Figure 4: New Pipeline Alternatives Investigated. Pipeline route Alternative C, blue line, is considered the most preferred alternative. It is proposed this route cross the N12 by means of horizontal directional drilling. Pipeline Route Alternative D, green line, is also considered a preferred alternative. It is proposed the pipeline to follow the route of Alternative C up until point c as indicated on the map from where it will turn SW towards the bridge. The pipeline to remain within the N12 road reserve and to cross the N12 attached to the existing bridge.

Handling and disposal of existing sludge within existing ponds on site:

As described above, one of the constraints of the project was to determine the best way to handle the existing sludge within the existing ponds on site to be able to construct the proposed two new Anaerobic Ponds, Aerobic Pond No.1 and reshaping and refurbish the new Facultative Pond.

Various alternatives were investigated and are discussed in more detail in Appendix E of the report. After a meeting held with The Department of Environment and Development Planning Directorate Waste Management and Directorate Pollutions and Chemicals Management, the preferred Alternative was agreed upon. Please refer to the meeting register as well as an email summary of the discussion that took place in the meeting, Appendix F7.4.

Alternative A (Preferred Alternative):

It is proposed to construct a temporary drying bed in the area initially dedicated to the proposed disposal of the sludge grit & screenings. It is proposed that the temporary drying beds have a footprint of $\pm 250\text{m}^2$ with a berm $\pm 200\text{mm}$ to $\pm 500\text{mm}$ high and an impermeable liner. It is proposed that the sludge be mixed with onsite soil to a consistency that it can be comfortably handled and be pumped onto the lined drying bed to dry. As soon as the sludge is dry, samples will be taken and the sludge is to be sent for testing and classification. Sludge not to be stored for longer than 90 days to qualify a temporary storage. The classification results will guide the suitable method of disposal as per Volume 1- 5 of the "Guidelines for the utilization and disposal of wastewater sludge", Water Research Commission, TT 261/07, 2006.

It was agreed that the test result be made available to DEADP Directorate: Waste Management and Directorate: Pollutions and Chemicals Management to confirm best method for disposal. If sludge is of suitable quality, Land farming is considered a viable and affordable option for disposal, alternatively, disposal at a licenced, registered facility

Alternative B (Not preferred):

Take sludge to a larger Waste Water Treatment Works for disposal with the facilities current sludge management practices. This must only be allowed should sludge management at this facility confine to acceptable methods as stated in Volume 1- 5 of the "Guidelines for the utilization and disposal of wastewater

sludge”, Water Research Commission, TT 261/07, 2006. It is also unlikely that a WWTW facility will accept untested sludge. This alternative is therefore not preferred and it is proposed that the sludge be tested to determine the best acceptable method of disposal as proposed in Alternative A.

Alternative C (Not preferred)

The original and only alternative investigated initially was to bury untested sludge on site. As a precautionary principle, the untested sludge is considered hazardous. According to the NEM:WA the burying of any quantity of hazardous waste to land will require a waste licence. This alternative is therefore not preferred and it is proposed that the sludge be tested to determine the best acceptable method of disposal as proposed in Alternative A.

Approximate development footprint:

The proposed pipeline from the effluent storage pond to the proposed galvanized dam at the sports field will be approximately 500m- 600m long with a diameter of 160mm. The pipeline route will have a construction footprint of minimum 6000m².

The current plant has a footprint of approximately 4446.83m²

The total area of the plant on completion of the proposed upgrade will be approximately 9510 m²

Thus, a new area of approximately 5064m² will need to be cleared for the upgrade.

Total area for temporary drying beds is approximately 250m² and will be on disturbed land where the septic tank was situated.

It is proposed that the works be fenced off for security and safety reasons. The footprint of the fenced off area is proposed as 18 0086m² or 1,8ha.

Please refer to Appendix A for Locality maps and proposed layout plans as well as Appendix B for design drawings

Operational aspects

Grit & Screenings Management:

The daily degritting of the inlet works to take place. The Operational Management Plan (Appendix H2) states that the Process Controller will remove the settled grit from the bottom of the channel with a shovel and place the grit on an area adjacent to the channel to allow the grit to dry and the water to drain into the channel.

It is expected that daily grit & screening will be less than one wheelbarrow load day. It can be assumed that a wheelbarrow has a volume of approximately 65 litres or 0.065 m³. It can be calculated that the expected grit and screenings per month will be approximately 1.95m³ (65 litre x 30 days).

Alternative A (Preferred Alternative):

It is proposed that the drying of the grit next to the inlet works channel be on a bunded concrete slab with a channel to allow the water to flow back into the channel. Grit & Screenings not to be placed on bare soil for drying. The process controller to sprinkle lime on the drying beds of grit to discourage flies and odours.

Dried grit & screenings to be stored in a skip on site from where it will be disposed of at a licensed, registered facility. It is preferred that the skip have a lid. Skip to be placed close to the inlet works for ease of disposal into the skip. It is proposed that the first batch of grit & screenings be tested to determine a suitable facility for disposal. Screenings and grit to be disposed of at an appropriate registered facility on a monthly basis. Grit & screenings not to be stored for more than 90 days before disposal.

It is proposed that the grit & screenings be tested every 1-3 years to determine if disposal method is still suitable.

Should the quantity of grit & screenings at the facility reach the threshold volumes for the Norms and Standards for waste, the facility will need to be registered and adhere to the norms and standards.

The Applicant must also adhere to Section 28 of the NEMA, the duty of care

Alternative B (Not Preferred):

Grit & Screenings to added to grit & screening of the lager Prince Albert Waste Water Treatment Works. It is unsure if the current management and disposal of grit & screenings the larger facility is occurring in a lawful manner and therefore this Alternative is not preferred. Alternative A is considered most preferred.

Alternative C (Not Preferred):

The original and only alternative investigated initially proposed that daily grit & screenings be disposed of in trenches on the site, within the fenced off area. It was proposed to dig two trenches of about 1.8m deep and 10m long. Each day's solids are then placed in the length of the trench, sprinkled with lime and then covered with a layer of soil. When the trench is full up to 300mm, it is completely closed and a new trench is dug. This alternative was not preferred by DEADP Directorate: Waste Management and Directorate: Pollutions and Chemicals Management. It is proposed that the grit & screenings be tested to determine the best method od disposal at a licensed facility, as suggested in Alternative A.

Future Sludge Management

The new Anaerobic Ponds will also accumulate sludge. At normal rates, it would be required that these ponds be de-sludged once in 5 to 7 years. Based on comments Bvi (Appendix F1 for C&RR) the volume of sludge expected after 7 years equates to approximately 43m³ after 7 years. When ponds are to be de-sludged in future (approx. 5-7 years) sludge needs to be dried as per the method described above (Alternative A for sludge handling and disposal). Sludge to be tested and classified to determine best method of disposal.



Figure 5: Google image indicating area proposed for the establishment of temporary drying beds for sludge to dry

Stormwater Management:

It is proposed that a low earth embankment (1.0m high) be placed on the northern side of the proposed works to channel any stormwater around the proposed works. The primary concentrated runoff from the drainage lines will them be mitigated. It is further proposed that the second drainage line from the east be diverted using a trench along the toe-line of the eastern ponds to ensure that stormwater is diverted to the south of the works.

The natural slop of the ground is from East to West. It will therefore be pertinent to have a trench with a flat side slope on the Eastern Side and steeper side slope on the western site. As illustrated in the Stormwater Management Plan images, Appendix A. The trench is proposed to have a length of 254m. The slope along the length of the proposed trench will approximate the natural slope of the ground in a north to south direction as follows:

From Chainage 0.00 where trench commences up to Chainage 100.00, the trench will have a slope of 1 : 100; From Chainage 100.00 up to Chainage 200.00, the slope will be 1 : 33, and over the last section from Chainage 200.00 to Chainage 254.00 the slope will be 1 : 54.

The trench is proposed to have a depth no more than 300mm deep on the low side of the slope and will be 1500mm wide. The trench will be formally shaped, but will not be lined. As the cross-sectional area is quite large in relation to the expected run-off, low flow velocities are expected which decrease the chance of erosion in the trench. The Inlet Structure and the Outlet Structure will be formally shaped and lined with stone pitching to avoid scour of the natural ground.

Coordinates Storm water trench starts: 33°19'18.13"S 22°31'45.43"E
Coordinates Storm water trench ends: 33°19'22.11"S 22°31'40.69"E

Please refer to the Stormwater Management Plan Layout, **Alternative A**.

Environmental considerations:

From the Vegetation Map on Cape Farm Mapper (**Appendix D**) vegetation that would have been present on site is Prince Albert Succulent Karoo vegetation. This type of vegetation does not fall under the *National Environmental Management: Biodiversity Act 2004, National List of Ecosystems that are threatened and in need of protection (NEMBA)*. From google images vegetation on the site is sparse.

The Biodiversity Overlay Map from Cape Farm Mapper (**Appendix D**) indicate that the existing WWTP does fall within a CBA and ESA2.

From the Water Resources Map on Cape Farm Mapper (**Appendix D**) a non-perennial river/ drainage line runs through the site. No wetlands present on site. The maps indicate that Pipeline Routes Alternative A (not preferred) and Alternative C (most preferred) will cross a non-perennial river. However, from the Freshwater report, this drainage line was not observed on site.

Please note: This description must relate to the listed and specified activities in paragraph (d) below.

(c) Please indicate the following periods that are recommended for inclusion in the environmental authorisation:

(i)	the period within which commencement must occur,	Construction is expected to take a period of 4 months – 6 months. Commencement must begin within a month from the granting of the EA and the WUL.
(ii)	the period for which the environmental authorisation should be granted and the date by which the activity must have been concluded, where the environmental authorisation does not include operational aspects;	Construction is expected to take a period of 4 months – 6 months. The EA should be valid for 1 to 2 years , not including operational aspects.
(iii)	the period that should be granted for the non-operational aspects of the environmental authorisation; and	The EA should be valid for 1 to 2 years , not including operational aspects.
(iv)	the period that should be granted for the operational aspects of the environmental authorisation.	The EA should be valid for the life cycle of the WWTW, approximately 20 years in terms of operational aspects.

Please note: The Department must specify the abovementioned periods, where applicable, in an environmental authorisation. In terms of the period within which commencement must occur, the period must not exceed 10 years and must not be extended beyond such 10 year period, unless the process to amend the environmental authorisation contemplated in regulation 32 is followed.

(d) List all the listed activities triggered and being applied for.

Please note: The onus is on the applicant to ensure that all the applicable listed activities are applied for and assessed as part of the EIA process. Please refer to paragraph (b) above.

EIA Regulations Listing Notices 1 and 3 of 2014 (as amended):

Listed Activity No(s):	Describe the relevant Basic Assessment Activity(ies) in writing as per Listing Notice 1 (GN No. R. 983)	Describe the portion of the development that relates to the applicable listed activity as per the project description.	Identify if the activity is development / development and operational / decommissioning / expansion / expansion and operational.
19	The infilling of any material of more than 10 cubic metres into or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse.	The existing WWTP intersects non-perennial streams/ drainage lines. The upgrade of the works will allow the removal of more than 10m ³ of sand and soil in a watercourse	Expansion
48	The expansion of- (i) infrastructure where the physical footprint is expanded by 100m ² or more; where such expansion occurs – (a) within a watercourse	The existing WWTP intersect non-perennial streams/ drainage lines. With the upgrade of the works the footprint will be expanded by more than 100m ² within a watercourse.	Expansion
Listed Activity No(s):	Describe the relevant Basic Assessment Activity(ies) in writing as per Listing Notice 3 (GN No. R. 985)	Describe the portion of the development that relates to the applicable listed activity as per the project description.	Identify if the activity is development / development and operational / decommissioning / expansion / expansion and operational.

Waste management activities in terms of the NEM: WA (GN No. 921):

Category A Listed Activity No(s):	Describe the relevant Category A waste management activity in writing as per GN No. 921	Describe the portion of the development that relates to the applicable listed activity as per the project description
	N/A	

Note: If any waste management activities are applicable, the **Listed Waste Management Activities Additional Information Annexure** must be completed and attached to this Basic Assessment Report as **Appendix I**.

Atmospheric emission activities in terms of the NEM: AQA (GN No. 893):

Listed Activity No(s):	Describe the relevant atmospheric emission activity in writing as per GN No. 893	Describe the portion of the development that relates to the applicable listed activity as per the project description.
	N/A	

- e) Provide details of all components (including associated structures and infrastructure) of the proposed development and attach diagrams (e.g., architectural drawings or perspectives, engineering drawings, process flowcharts, etc.).

Buildings Provide brief description below:	YES	NO
N/A No buildings required		
Infrastructure (e.g., roads, power and water supply/ storage) Provide brief description below:	YES	NO
Existing access roads to be used. Power will be from existing connections from the municipality		

The existing water supply pipeline will be utilised for clean water. Site to be fenced off for safety and security reasons.		
Processing activities (e.g., manufacturing, storage, distribution) Provide brief description below:	YES	NO
N/A No processing activities required.		
Storage facilities for raw materials and products (e.g., volume and substances to be stored) Provide brief description below:	YES	NO
N/A No storage of raw materials.		
Storage and treatment facilities for effluent, wastewater or sewage: Provide brief description below:	YES	NO
Yes. Please refer to the project description in Section 2 (b) above for a detailed description as well as Appendix A & B for Locality maps & Layout Plans . Please also refer to the BVi Technical Report (Appendix K)		
Storage and treatment of solid waste Provide brief description below:	YES	NO
<p>No treatment of waste on site</p> <p>Establishment of temporary drying beds (250m²) for the drying of the existing sludge on site. Samples to be taken once sludge is dry and sent for testing and classification to determine a suitable method of disposal. Sludge not to be stored on site for longer than 90 days (to qualify as temporary storage)</p> <p>Storage of daily grit & screenings within a skip on site. Grit & screenings to be disposed of at a licensed facility on a monthly basis. No grit & screenings to be stored on site for longer than 90 days (to qualify as temporary storage). An amount of no more than 1.95m³ expected monthly.</p>		
Facilities associated with the release of emissions or pollution. Provide brief description below:	YES	NO
N/A No emissions or pollution to be released.		
Other activities (e.g., water abstraction activities, crop planting activities) – Provide brief description below:	YES	NO
N/A No water abstraction / crop planting.		

3. PHYSICAL SIZE OF THE PROPOSED DEVELOPMENT

(a) Property size(s): Indicate the size of all the properties (cadastral units) on which the development proposal is to be undertaken	2420900m ² / 242.09 ha (RE 32 Farm Klaarstroom 178) 3.66 ha (RE 34 Farm Klaarstroom 178) 36600m ² / 3.66 ha (RE 34 Farm Klaarstroom 178)	m ²
(b) Size of the facility: Indicate the size of the facility where the development proposal is to be undertaken	±9510 m ² (WWT Ponds upgrade) ±250m ² (temporary drying beds) ±18 0086 m ² (1,8ha) entire facility fenced off	m ²
(c) Development footprint: Indicate the area that will be physically altered as a result of undertaking any development proposal (i.e., the physical size of the development together with all its associated structures and infrastructure)	±9510 m ² (WWT Ponds upgrade) ±250m ² (temporary drying beds) ±18 0086 m ² (1,8ha) entire facility fenced off	m ²
(d) Size of the activity: Indicate the physical size (footprint) of the development proposal	±9510 m ² (WWT Ponds upgrade) ±250m ² (temporary drying beds) ±18 0086 m ² (1,8ha) entire facility fenced off	m ²
(e) For linear development proposals: Indicate the length (L) and width (W) of the development proposal	(L) ±500	M
	(W) 0.16	M
(f) For storage facilities: Indicate the volume of the storage facility		m ³
(g) For sewage/effluent treatment facilities: Indicate the volume of the facility (Note: the maximum design capacity must be indicated)	Average Dry Weather flow of 61m³/day or 0.71 l/s. The Peak Wet Weather Flow was calculated to be 127m³/day or 1.47 l/s.	m ³

4. SITE ACCESS

(a) Is there an existing access road?	YES	NO
(b) If no, what is the distance in (m) over which a new access road will be built?	m	

(c) Describe the type of access road planned:

N/A

Please note: The position of the proposed access road must be indicated on the site plan.

5. DESCRIPTION OF THE PROPERTY(IES) ON WHICH THE LISTED ACTIVITY(IES) ARE TO BE UNDERTAKEN AND THE LOCATION OF THE LISTED ACTIVITY(IES) ON THE PROPERTY

- 5.1 Provide a description of the property on which the listed activity(ies) is/are to be undertaken and the location of the listed activity(ies) on the property, as well as of all alternative properties and locations (duplicate section below as required).

The WWTP is located on RE32 of Farm Klaarstroom 178, Prince Albert. The land on which the proposed work is to be conducted is part of municipal commonage and is currently undeveloped veld with the exception of the current WWTP and a fairly new road maintenance camp located south of the plant, between the N12 and the WWTP.

The proposed Galvanized Storage Dam for irrigation of the sports field at Klaarstroom Primary School on RE 34 of Farm Klaarstroom 178, Prince Albert

No alternative properties were considered as the proposed project aims to upgrade the existing Klaarstroom WWTP.

The proposed pipeline from the effluent storage pond to the proposed galvanized dam at the sports field will be approximately 500m – 600m long with a diameter of 160mm. The pipeline route will have a construction footprint of $\pm 600\text{m}^2$.

Various pipeline alternatives are investigated. Please refer to the layout maps, Appendix A and Figure 3 & 4 above.

Alternative A (Not preferred):

- Pipeline route Alternative A, represented by the purple line was originally the preferred route. It was proposed that this route will cross the N12 road through an existing culvert. However, after consultation with SANRAL and PGWC: Department of Transport and Public Works it was decided that this route is not viable as the PGWC will not consider an application proposing to cross the road via a culvert or by means of trenching, only trenchless technology will be considered. Please refer to the Comment and Response Report (Appendix F1) and Original Comments (Appendix F1.3).

Alternative B (Not preferred):

Pipeline route Alternative B, represented by the red line was also investigated. It was proposed that the pipeline will cross the N12 on private farmland under the bridge and run parallel to the Sand river. This route will impact on the banks of the Sand River and require landowner consent from the neighbour and is therefore not preferred.

Alternative C (Most preferred):

Pipeline route Alternative C, represented by the blue line on the locality maps, is now considered the Preferred Alternative. The route changed slightly and is shorter, approximately $\pm 270\text{m}$ than pipeline route Alternative A. It is proposed that the pipeline will follow the same route as Alternative A up until point c on Figure 4 above. Pipeline to run past the road maintenance camp. It is proposed that this route will cross the N12 via Horizontal Directional Drilling from where it will terminate in the proposed irrigation dam.

Alternative D (Preferred):

Pipeline route Alternative D, represented by the green lines on the locality maps, is also considered an preferred alternative. This proposed pipeline follows the same route as Alternative C until the point where it is proposed that Alternative C crosses the N12 (point c in Figure 4 above). Pipeline to run past the road maintenance camp It is proposed that pipeline route Alternative D follows the road reserve on the Northern side of the N12 until the existing bridge to the west of the site. From here it is proposed that the pipe be attached to the bridge to cross the road and river to the South of the N12. The pipeline to remain within the road reserve until the point where it crosses into the school property and terminated within the proposed irrigation dam. No listed activities will be triggered as the pipeline is to remain within the road reserve. Approximate length of the pipeline is $\pm 590\text{m}$.

Pipeline Alternative D is also preferred. Pipeline Alternative A is more preferred as it is shorter. The final pipeline route will depend on whether the necessary approvals can be obtained.

Please refer to **Appendix A** for site coordinates.

Coordinates of all the proposed activities on the property or properties (sites):	Latitude (S): (deg.; min.; sec)			Longitude (E): (deg.; min.; sec.)		
	33 °	19 '	20.09"	22 °	31 '	43.44"
	33 °	19 '	28.40"	22 °	31 '	40.64"
	33 °	19 '	18.38"	22°	31 '	44.94"
	°	'	"	°	'	"

Note: For land where the property has not been defined, the coordinates of the area within which the development is proposed must be provided in an addendum to this report.

- 5.2 Provide a description of the area where the aquatic or ocean-based activity(ies) is/are to be undertaken and the location of the activity(ies) and alternative sites (if applicable).

The Water resources map from Cape Farm Mapper (**Appendix D & Figure 4**) indicates that the existing WWTP is located within a non-perennial rivers/ drainage lines and adjacent to the Sand river No wetlands present on site.

The following information was taken from the Freshwater report (**Appendix G1**).

The existing WWTP straddles a drainage line, although the drainage line is very faint. Refer Figure 6 below. The upgrade of the works will thus occur within this drainage line. The freshwater report states that during a very high rainfall event, the flow of water can be expected to be fast, with a high erosion potential evident from the deeply incised Sand River and most drainage lines. The drainage line is separated from the next drainage line towards the east with a low ridge. The next drainage line is emphasised and clear.

The Water resources map from Cape farm mapper indicates that proposed pipeline route Alternative A, C and D (of which C is considered most preferred alternative) will intersect a non-perennial river/ drainage line.

However, according to the freshwater report this drainage line was not observed during the site visit on 23 January 2019. The report states that the ground is very level, leaving uncertainty to where the storm water flows. Instead of the drainage line, a culvert (refer to Figure 8 & Figure 9) was observed under the N12 for letting stormwater through that might have accumulated against the northern shoulder of the road. A swale with a hard surface stretches from the culvert to the south into the Klaarstroom township (Figure 9). This is part of the storm water system that releases its water into the Groot River south of the township.

Therefore the most preferred pipeline route, Alternative C will not impact any drainage lines.

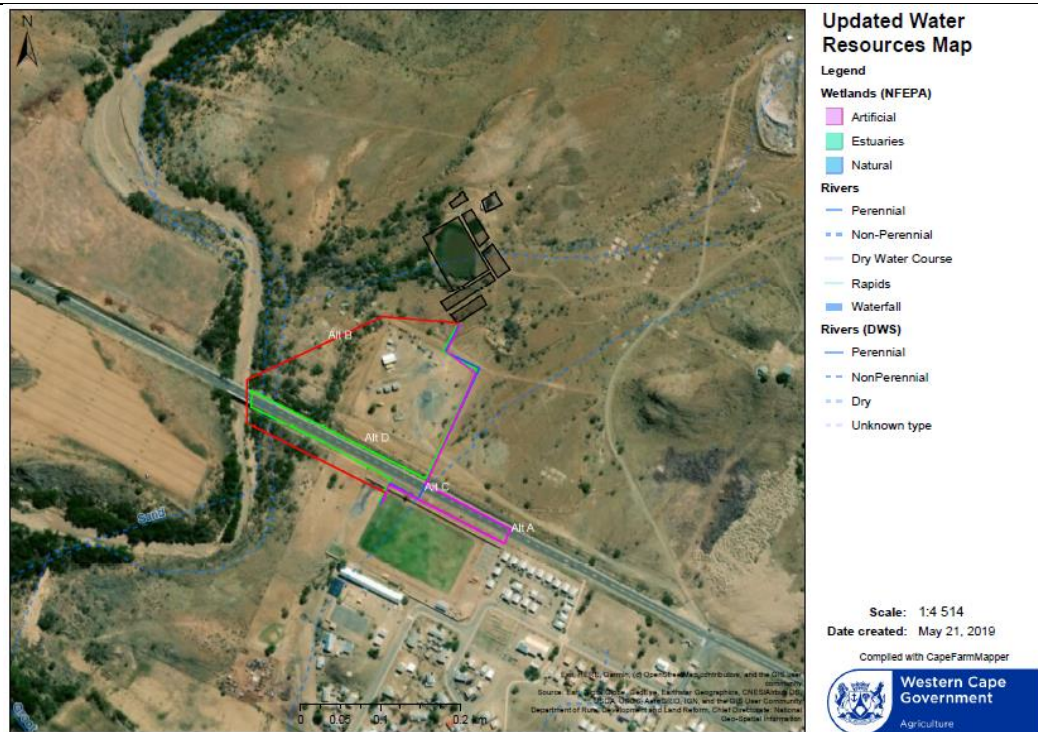


Figure 6: Water Resources Map indicating the proposed layout if the WWTP upgrade as well as pipeline alternatives (Cape Farm Mapper, 2019)

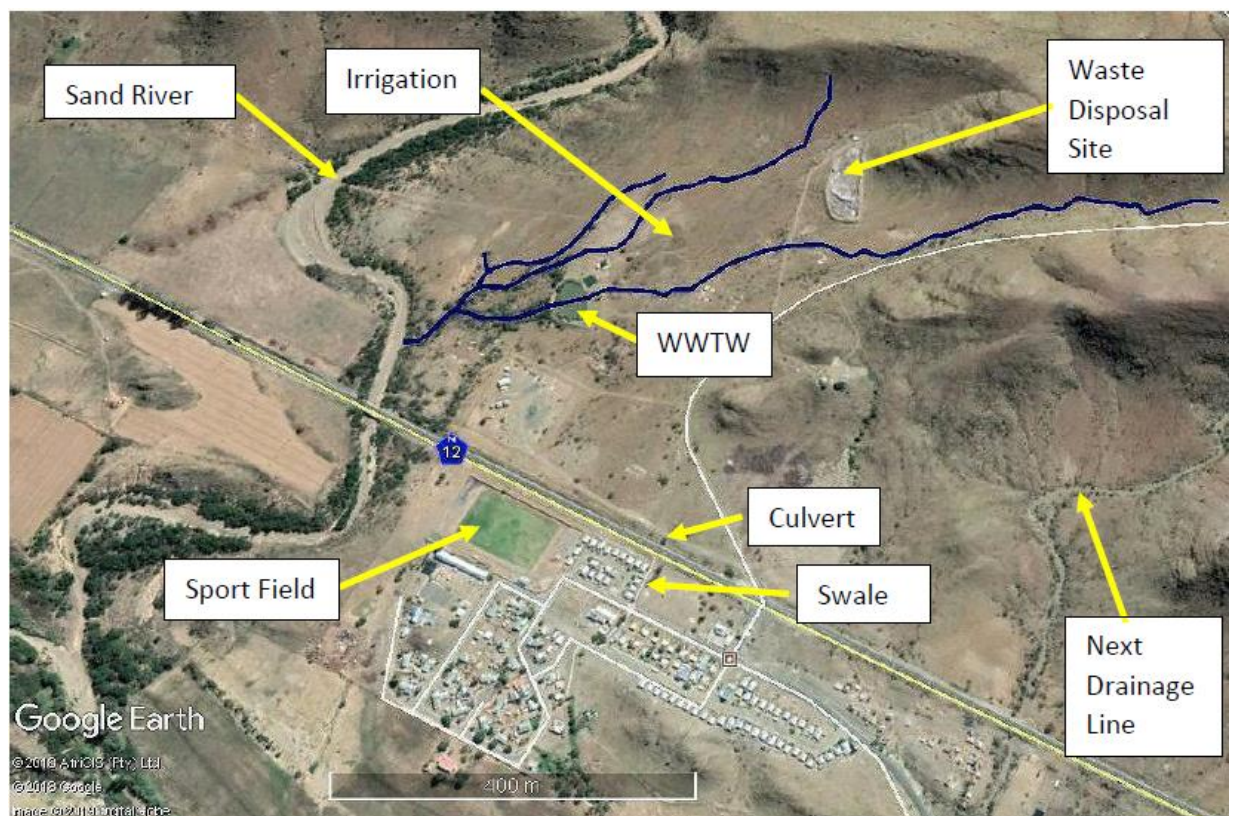


Figure 7: Drainage line (Freshwater Report, WATSAN 2019)



Figure 8: Culvert (Freshwater Report, WATSAN 2019)

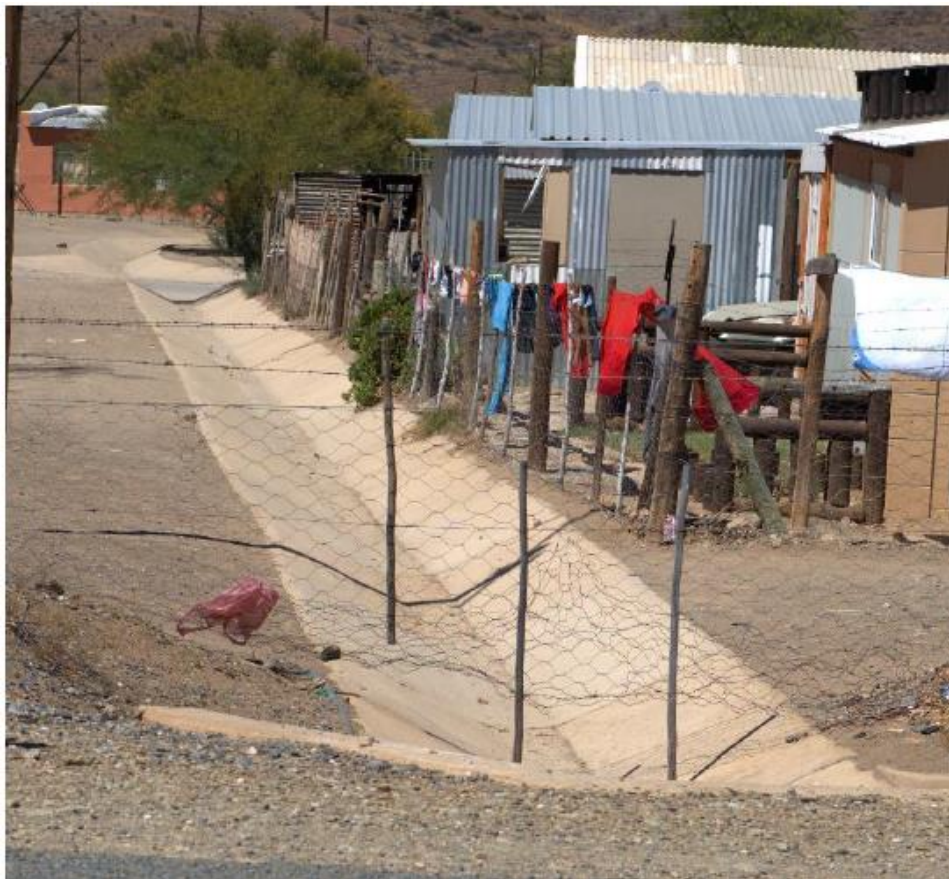


Figure 9: Swale (Freshwater Report, WTASAN 2019)

Coordinates of the boundary /perimeter of all proposed aquatic or ocean-based activities (sites) (if applicable):	Latitude (S): (deg.; min.; sec)			Longitude (E): (deg.; min.; sec)		
	33 °	19 '	20.09"	22 °	31'	43.44"
	°	'	"	°	'	"
	°	'	"	°	'	"

	°	'	"	°	'	"
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- 5.3 For a linear development proposal, please provide a description and coordinates of the corridor in which the proposed development will be undertaken (if applicable).

Irrigation Pipelines:

The final effluent is to be utilized for irrigation of sports fields in Klaarstroom village. This will be made possible by using a gravity system as the waste water treatment plant is located at a higher elevation than the village. It is proposed to construct a 160mm ø uPVC pipeline of ±500m in length from the effluent storage point which will terminate in a new galvanized dam at the sports field.

Various pipeline alternatives are investigated and are discussed in more detail in Section E of the report. Please refer Figure 5, 6 & 7 in Layout maps, Appendix A and Figure 3 & 4 above.

Alternative A (Not preferred):

Pipeline route Alternative A, represented by the purple line was originally the preferred route, after consultation with SANRAL and PGWC: Department of Transport and Public Works this route is not considered viable. Please refer to the Comment and Response Report (Appendix F1) and Original Comments (Appendix F1.3).

Alternative B (Not preferred):

Pipeline route Alternative B, represented by the red line was also investigated. It was proposed that the pipeline will cross the N12 on private farmland under the bridge and run parallel to the Sand river. This route will impact on the banks of the Sand River and require land owner consent from the neighbour and possibly trigger as WULA 21 i and is therefore not preferred.

Alternative C (Most preferred):

Pipeline route Alternative C, represented by the blue line on the locality maps, is now considered the Preferred Alternative. The route changed slightly and is shorter, approximately ±270m than pipeline route Alternative A. It is proposed that the pipeline will follow the same route as Alternative A up until point c in Figure 4 above/Figure 7, Locality Maps, Appendix A. It is proposed that this route will cross the N12 via Horizontal Directional Drilling from where it will terminate in the proposed irrigation dam.

Alternative D (Preferred):

Pipeline route Alternative D, represented by the green lines on the locality maps, is also considered a preferred alternative. This proposed pipeline follows the same route as Alternative C until the point where it is proposed that Alternative C crosses the N12 (point c in Figure 4 above/Figure 7, Locality map, Appendix A 4). It is proposed that pipeline route Alternative D follows the road reserve on the Northern side of the N12 until the existing bridge to the west of the site. From here it is proposed that the pipe be attached to the bridge to cross the road and river to the South of the N12. The pipeline to remain within the road reserve until the point where it crosses into the school property and terminated within the proposed irrigation dam. No listed activities will be triggered as the pipeline is to remain within the road reserve. Approximate length of the pipeline is ±590m.

Pipeline Alternative D is also preferred. Pipeline Alternative A is more preferred as it is shorter. The final pipeline route will depend on whether the necessary approvals can be obtained.

The Water Resources map (Appendix D & Figure 6) from Cape Farm Mapper indicate that the proposed pipeline routes, Alternative A, C and D, will cross a small section of a non-perennial river/ drainage line.

However, as described above, according to the freshwater report this drainage line was not observed during the site visit on 23 January 2019. The report states that the ground is very level, leaving uncertainty to where the storm water flows. Instead of the drainage line, a culvert (refer to Figure 7 & Figure 8) was observed under the N12 for letting stormwater through that might have accumulated against the northern shoulder of the road. A swale with a hard surface stretches from the culvert to the south into the Klaarstroom township (Figure 9). This is part of the storm water system that releases its water into the Groot River south of the township.

Therefore, Pipeline routes, Alternative C (most preferred) and Alternative D (preferred) will not impact on any drainage lines.

Please refer to **Appendix A** for site coordinates.

For linear activities:	Latitude (S): (deg.; min.; sec)			Longitude (E): (deg.; min.; sec)		
• Starting point of the activity	°	'	"	°	'	"
• Middle point of the activity	°	'	"	°	'	"
• End point of the activity	°	'	"	°	'	"

Note: For linear development proposals longer than 1000m, please provide an addendum with co-ordinates taken every 250m along the route. All important waypoints must be indicated and the GIS shape file provided digitally.

- 5.4 Provide a location map (see below) as **Appendix A** to this report that shows the location of the proposed development and associated structures and infrastructure on the property; as well as a detailed site development plan / site map (see below) as **Appendix B** to this report; and if applicable, all alternative properties and locations. The GIS shape files (.shp) for maps / site development plans must be included in the electronic copy of the report submitted to the competent authority.

<p>Locality Map: Appendix A</p>	<p>The scale of the locality map must be at least 1:50 000. For linear development proposals of more than 25 kilometres, a smaller scale e.g., 1:250 000 can be used. The scale must be indicated on the map. The map must indicate the following:</p> <ul style="list-style-type: none"> • an accurate indication of the project site position as well as the positions of the alternative sites, if any; • road names or numbers of all the major roads as well as the roads that provide access to the site(s) • a north arrow; • a legend; • a linear scale; • the prevailing wind direction (during November to April and during May to October); and • GPS co-ordinates (to indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site. The co-ordinates should be in degrees and decimal minutes. The minutes should have at least three decimals to ensure adequate accuracy. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection). <p>For an ocean-based or aquatic activity, the coordinates must be provided within which the activity is to be undertaken and a map at an appropriate scale clearly indicating the area within which the activity is to be undertaken.</p> <p>Coordinates must be provided in degrees, minutes and seconds using the Hartebeesthoek94; WGS84 co-ordinate system.</p>
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<p>Site Plan: Appendix B</p>	<p>Detailed site development plan(s) must be prepared for each alternative site or alternative activity. The site plans must contain or conform to the following:</p> <ul style="list-style-type: none"> • The detailed site plan must preferably be at a scale of 1:500 or at an appropriate scale. The scale must be indicated on the plan, preferably together with a linear scale. • The property boundaries and numbers of all the properties within 50m of the site must be indicated on the site plan. • The current land use (not zoning) as well as the land use zoning of each of the adjoining properties must be indicated on the site plan. • The position of each element of the application as well as any other structures on the site must be indicated on the site plan. • Services, including electricity supply cables (indicate aboveground or underground), water supply pipelines, boreholes, sewage pipelines, storm water infrastructure and access roads that will form part of the development must be indicated on the site plan. • Servitudes and an indication of the purpose of each servitude must be indicated on the site plan. • Sensitive environmental elements within 100m of the site must be included on the site plan, including (but not limited to): <ul style="list-style-type: none"> ◦ Watercourses / Rivers / Wetlands - including the 32 meter set back line from the edge of the bank of a river/stream/wetland; ◦ Flood lines (i.e., 1:100 year, 1:50 year and 1:10 year where applicable); ◦ Ridges; ◦ Cultural and historical features; ◦ Areas with indigenous vegetation (even if degraded or infested with alien species). • Whenever the slope of the site exceeds 1:10, a contour map of the site must be submitted. • North arrow <p>A map/site plan must also be provided at an appropriate scale, which superimposes the proposed development and its associated structures and infrastructure on the environmental sensitivities of the preferred and alternative sites indicating any areas that should be avoided, including buffer areas.</p> <p>The GIS shape file for the site development plan(s) must be submitted digitally.</p>
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6. SITE PHOTOGRAPHS

Colour photographs of the site and its surroundings (taken on the site and taken from outside the site) with a description of each photograph. The vantage points from which the photographs were taken must be indicated on the site plan, or locality plan as applicable. If available, please also provide a recent aerial photograph. Photographs must be attached as **Appendix C** to this report. The aerial photograph(s) should be supplemented with additional photographs of relevant features on the site. Date of photographs must be included. Please note that the above requirements must be duplicated for all alternative sites.

Appendix C

SECTION B: DESCRIPTION OF THE RECEIVING ENVIRONMENT

Site/Area Description

For linear development proposals (pipelines, etc.) as well as development proposals that cover very large sites, it may be necessary to complete copies of this section for each part of the site that has a significantly different environment. In such cases please complete copies of Section B and indicate the area that is covered by each copy on the Site Plan.

1. GRADIENT OF THE SITE

Indicate the general gradient of the sites (highlight the appropriate box).

Flat	Flatter than 1:10	1:10 – 1:4	Steeper than 1:4
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2. LOCATION IN LANDSCAPE

(a) Indicate the landform(s) that best describes the site (highlight the appropriate box(es)).

Ridgeline	Plateau	Side slope of hill / mountain	Closed valley	Open valley	Plain	Undulating plain/low hills	Dune	Sea-front
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(b) Provide a description of the location in the landscape.

Bottom of an open valley leading into Meiringspoort to the south (a closed “poort” connecting Beaufordt West with Oudtshoorn and George), while opening up to the north towards Beaufordt West.

3. GROUNDWATER, SOIL AND GEOLOGICAL STABILITY OF THE SITE

(a) Is the site(s) located on or near any of the following (highlight the appropriate boxes)?

Shallow water table (less than 1.5m deep)	YES	NO	UNSURE
Seasonally wet soils (often close to water bodies)	YES	NO	UNSURE
Unstable rocky slopes or steep slopes with loose soil	YES	NO	UNSURE
Dispersive soils (soils that dissolve in water)	YES	NO	UNSURE
Soils with high clay content	YES	NO	UNSURE
Any other unstable soil or geological feature	YES	NO	UNSURE
An area sensitive to erosion	YES	NO	UNSURE
An area adjacent to or above an aquifer.	YES	NO	UNSURE
An area within 100m of a source of surface water	YES	NO	UNSURE
An area within 500m of a wetland	YES	NO	UNSURE
An area within the 1:50 year flood zone	YES	NO	UNSURE
A water source subject to tidal influence	YES	NO	UNSURE

(b) If any of the answers to the above is “YES” or “UNSURE”, specialist input may be requested by the Department. (Information in respect of the above will often be available at the planning sections of local authorities. The 1:50 000 scale Regional Geotechnical Maps prepared by Geological Survey may also be used).

(c) Indicate the type of geological formation underlying the site.

Granite	Shale	Sandstone	Quartzite	Dolomite	Dolorite	Other (describe)
Provide a description.						

According to the Heritage Screener conducted by CTS Heritage (**Appendix G1**) the area proposed for the development is underlain by siltstone shale and arenaceous shale sediments of the Traka Subgroup of the Bokkeveld Group of the Cape Supergroup of a very high palaeontological sensitivity according to SAHRIS Palaeosensitivity Map. According to SAHRIS, the Traka Subgroup is known for its fossils of fish (sharks, acanthodians, placoderms, bony fish, recorded especially from Da), bivalves and vascular plants (psilophytes, lycopods), common but low diversity trace fossils, including Spirophyton, and rare brachiopods. Tectonic deformation often limits fossil collection, especially within mudrock-rich horizons, and distorts fossils. Biostratigraphically and palaeoecologically important fossil assemblages are known from high palaeoaltitudes (such as the Klipbokkop and Adolphspoort Fms). These sensitive formations may be impacted by the proposed development, and as such it is recommended that the HWC Fossil Finds Procedure be implemented throughout the development phase.

Heritage Western Cape provided comments and no further studies are required (**Appendix E1**).

4. SURFACE WATER

(a) Indicate the surface water present on and or adjacent to the site and alternative sites (highlight the appropriate boxes)?

Perennial River	YES	NO	UNSURE
Non-Perennial River	YES	NO	UNSURE
Permanent Wetland	YES	NO	UNSURE
Seasonal Wetland	YES	NO	UNSURE
Artificial Wetland	YES	NO	UNSURE
Estuarine / Lagoon	YES	NO	UNSURE

(b) Provide a description.

Please refer to the description in Section A 5.2 above.

The existing WWTP straddles a drainage line, although the drainage line is very faint. Refer Figure 5 below. The upgrade of the works will thus occur within this drainage line. The freshwater report states that during a very high rainfall event, the flow of water can be expected to be fast, with a high erosion potential evident from the deeply incised Groot Rivier and most drainage lines. the drainage line is separated from the next drainage line towards the east with a low ridge. The next drainage line is emphasised and clear.

The Water resources map from Cape farm mapper indicates that proposed pipeline routes Alternative A, C & D (of which Alternative C is the most preferred alternative) will intersect a non-perennial river/ drainage line. However, according to the freshwater report this drainage line was not observed during the site visit on 23 January 2019. The report states that the ground is very level, leaving uncertainty to where the storm water flows. Instead of the drainage line, a culvert (refer to Figure 6 & Figure 7) was observed under the N12 for letting stormwater through that might have accumulated against the northern shoulder of the road.

A swale with a hard surface stretches from the culvert to the south into the Klaarstroom township (Figure 8). This is part of the storm water system that releases its water into the Sand River south of the township.

Preferred pipeline route Alternative C and D will therefore not impact on any drainage lines.

5. THE SEAFRONT / SEA

(a) Is the site(s) located within any of the following areas? (highlight the appropriate boxes).

If the site or alternative site is closer than 100m to such an area, please provide the approximate distance in (m).

AREA	YES	NO	UNSURE	If "YES": Distance to nearest area (m)
An area within 100m of the high water mark of the sea	YES	NO	UNSURE	
An area within 100m of the high water mark of an estuary/lagoon	YES	NO	UNSURE	
An area within the littoral active zone	YES	NO	UNSURE	
An area in the coastal public property	YES	NO	UNSURE	
Major anthropogenic structures	YES	NO	UNSURE	
An area within a Coastal Protection Zone	YES	NO	UNSURE	
An area seaward of the coastal management line	YES	NO	UNSURE	
An area within the high risk zone (20 years)	YES	NO	UNSURE	
An area within the medium risk zone (50 years)	YES	NO	UNSURE	
An area within the low risk zone (100 years)	YES	NO	UNSURE	
An area below the 5m contour	YES	NO	UNSURE	
An area within 1km from the high water mark of the sea	YES	NO	UNSURE	
A rocky beach	YES	NO	UNSURE	
A sandy beach	YES	NO	UNSURE	

- (b) If any of the answers to the above is "YES" or "UNSURE", specialist input may be requested by the Department. (The 1:50 000 scale Regional Geotechnical Maps prepared by Geological Survey may also be used).

6. BIODIVERSITY

Note: The Department may request specialist input/studies depending on the nature of the biodiversity occurring on the site and potential impact(s) of the proposed development. To assist with the identification of the biodiversity occurring on site and the ecosystem status, consult <http://bgis.sanbi.org> or BGIShelp@sanbi.org. Information is also available on compact disc ("cd") from the Biodiversity-GIS Unit, Tel.: (021) 799 8698. This information may be updated from time to time and it is the applicant/ EAP's responsibility to ensure that the latest version is used. A map of the relevant biodiversity information (including an indication of the habitat conditions as per (b) below) must be provided as an overlay map on the property/site plan as **Appendix D** to this report.

- (a) Highlight the applicable biodiversity planning categories of all areas on preferred and alternative sites and indicate the reason(s) provided in the biodiversity plan for the selection of the specific area as part of the specific category. Also describe the prevailing level of protection of the Critical Biodiversity Area ("CBA") and Ecological Support Area ("ESA") (how many hectares / what percentages are formally protected).

Systematic Biodiversity Planning Category	CBA	ESA	Other Natural Area ("ONA")	No Natural Area Remaining ("NNR")
If CBA or ESA, indicate the reason(s) for its selection in biodiversity plan and the conservation management objectives	<p>From the Biodiversity Overlay Maps from Cape Farm Mapper (Appendix D) and the Botanical Assessment Report (Appendix G2) the proposed upgrade falls within a Terrestrial Critical Biodiversity Area (CBA) with the alternative pipeline route (Alternative B, not preferred) impacting on Ecological Support Area 2 (ESA2).</p> <p>The Botanical Specialist explains:</p> <p>CBA's are areas of the landscape that need to be maintained in a natural or near-natural state in order to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. In other words, if these areas are not maintained in a natural or near-natural state then biodiversity conservation targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity-compatible land uses and resource uses. For CBA's the impact on biodiversity of a change in land-use that results in a change from the desired ecological state is most significant locally at the point of impact through the direct loss of a biodiversity feature (e.g. loss of a populations or habitat).</p> <p>ESA's are areas that are not essential for meeting biodiversity representation targets/thresholds but which nevertheless play an important role in supporting the ecological functioning of critical biodiversity areas and/or in delivering ecosystem services that support socio-economic development, such as water provision, flood mitigation or carbon sequestration. The degree of restriction on land use and resource use in these areas may be lower than that recommended for critical biodiversity areas. For ESA's a change from the desired ecological state is most significant elsewhere in the landscape through the indirect loss of biodiversity due to a breakdown, interruption or loss of an ecological process pathway (e.g. removing a corridor results in a population going extinct elsewhere or a new plantation locally results in a reduction in stream flow at the exit to the catchment which affects downstream biodiversity).</p>			
	<p>Describe the site's CBA/ESA quantitative values (hectares/percentage) in relation to the prevailing level of protection of CBA and ESA (how many hectares / what</p> <p>The Botanical specialist concluded that although the proposed infrastructure will be located within a terrestrial CBA for the purposes</p>			

percentages are formally protected locally and in the province)	of the impact assessment it was taken into account that the pipeline will be located in areas already very much disturbed and that with the current CBA map, there is no alternative location that will fall outside of the CBA. It was also taken into account that the permanent enlargement of the footprint will be relative small and that the impact associated with the pipeline route will be temporary. It is also expected that with mitigation and rehabilitation the impact associated with the construction of the pipeline can be minimal.
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(b) Highlight and describe the habitat condition on site.

Habitat Condition	Percentage of habitat condition class (adding up to 100%) and area of each in square metre (m ²)		Description and additional comments and observations (including additional insight into condition, e.g. poor land management practises, presence of quarries, grazing/harvesting regimes, etc.)
Natural	%	m ²	
Near Natural (includes areas with low to moderate level of alien invasive plants)	10%	630m ²	Natural veld near the river
Degraded (includes areas heavily invaded by alien plants)	30%	1 890m ²	Veld subject to urban influences in and around existing WWTP.
Transformed (includes cultivation, dams, urban, plantation, roads, etc.)	60%	4447 m ²	Existing WWTP and its larger footprint.

(c) Complete the table to indicate:

- (i) the type of vegetation present on the site, including its ecosystem status; and
- (ii) whether an aquatic ecosystem is present on/or adjacent to the site.

Terrestrial Ecosystems		Description of Ecosystem, Vegetation Type, Original Extent, Threshold (ha, %), Ecosystem Status
Ecosystem threat status as per the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)	Critically	
	Endangered	
	Vulnerable	
	Least Threatened	Prince Albert Succulent Karoo classified as Least Threatened in term of the <i>Environmental Management: Biodiversity Act 10 of 2004 (NEMBA)</i> , <i>National List of Ecosystems that are threatened and in need of protection</i> .

Aquatic Ecosystems						
Wetland (including rivers, depressions, channelled and unchannelled wetlands, flats, seeps pans, and artificial wetlands)			Estuary		Coastline	
YES	NO	UNSURE	YES	NO	YES	NO

- (d) Provide a description of the vegetation type and/or aquatic ecosystem present on the site, including any important biodiversity features/information identified on the site (e.g. threatened species and special habitats). Clearly describe the biodiversity targets and management objectives in this regard.

From the Vegetation Map on Cape Farm Mapper (**Appendix D**) vegetation that would have been present on site is Prince Albert Succulent Karoo vegetation. This type of vegetation does not fall under the *National Environmental Management: Biodiversity Act 2004, National List of Ecosystems that are threatened and in need of protection (NEMBA)*. From google images vegetation on the site is sparse.

The Biodiversity Overlay Map from Cape Farm Mapper (**Appendix D**) indicate that the existing WWTP does fall within a CBA with the pipeline route Alternative B, (not preferred) impacting an ESA2.

Findings from the Botanical Specialist Report (Appendix G2):

The area that will be impacted by the proposed WWTW upgrade and pipeline is very small. If it is taken into account that the existing WWTW is already basically transformed, the additional footprint will be only about 5000 m², while the pipeline will have a temporary impact on between 500- 800 m of veld of which most is located in already disturbed or transformed (within the urban edge) veld portions.



Figure 10: Google overview of the study area, showing the additional area that will be impacted by the proposed WWTW (green polygon), the preferred pipeline route in blue (as revised), the alternative pipeline route in red (as revised), in relation to areas that were basically transformed as a result of urban activities (in orange). The yellow area indicating private property (Botanical Impact Assessment, PB Consult 2019).

With the figure above, the botanical specialist tries to illustrate the status of the veld, as encountered during the site visit. The areas in light orange are either transformed or much degraded as result of urban and associated impacts. No natural veld remains in these areas and only a few hardy or weedy indigenous plants were encountered. This includes the existing fenced off WWTW, where the only remaining natural species (apart from weeds growing in the slightly damper areas) is a number of *Vachellia karroo* (= *Acacia karroo*) trees around the property and the reed *Phragmites australis* within the existing ponds. It must be noted that all around the existing WWTW, the small tree *Vachellia karroo* were frequently encountered, clearly benefiting from the water bodies of the treatment works.



Figure 11: The existing WWTW looking from an easterly direction back towards the existing inlet structure of the WWTW. Again the absence of any natural vegetation within the fenced off treatment works footprint should be noted. A beautiful *Vachellia karroo* in the background next to the inlet works – clearly benefitting from the water on site (Botanical Impact Assessment, 2019).

The area just south of the existing WWTW, between the WWTW and the Department of Transport's road camp, are covered by slightly more natural vegetation (seemingly slightly less impacted, although it had been degraded by the dumping of building rubble and road waste like tar chips). Since this area represented some of the best preserved natural veld in the whole of the proposed footprint (in terms of species encountered) it was used as basis to describe the vegetation expected in the area (including the pipeline route).

The veld still showed signs of being disturbed and cannot be described as typical Prince Albert Succulent Karoo vegetation. However, it is considered a disturbed form of this vegetation type, which was still dominated by leaf succulent vygies and small-leaved shrubs with *Vachellia karroo* and occasional other larger shrubs (e.g. *Lycium cinereum* & occasionally *Cadaba aphylla*) scattered within.



Figure 12: Showing the vegetation to the south of the WWTW (with the Road camp in the background of the picture). Note the sparse low shrub bottom stratum and the top stratum of *Vachellia karroo* and *Lycium*. The green area, showing the approximate area that will be impacted (Botanical Impact Report, 2019).

The vegetation can be described as a low (<0.5 m) sparse shrubland with a *Vachellia karroo* top stratum scattered throughout. The density of the *Vachellia karroo* over layer is probably slightly higher than expected (which is likely the result of the nearby WWTW and its water bodies). In between these trees the following species were observed: the alien *Atriplex nummularia*, the low growing *Augea capensis* (common), the spiny *Blepharis mitrata*, *Cadaba aphylla*, *Carpobrotus edulis*, *Chrysocoma ciliata*, *Drosanthemum* species, *Eriocephalus* species, the disturbance indicator *Galenia africana*, the hardy *Lycium cinereum*, *Mesembryanthemum noctiflorum*, *Mesembryanthemum* cf. *junceum* (= *Psilocalon*) species, *Mesembryanthemum guerichianum* ("soutslaii"), *Polygala leptophylla*, *Pteronia glabrata*, *Pteronia* cf. *pallens*, the thorny *Ruschia spinosa*, *Salsola kali* (disturbance indicator), *Salsola* cf. *aphylla*, *Tetraena lichtensteinianum*, *Tetraena simplex*, the semi-parasitic *Thesium lineatum* and *Tripteris* cf. *sinuata*. The absence of many of the more palatable species suggests that the veld is grazed, although no domestic stock was observed on site. Grasses were notably absent, which is probably a combination of drought and grazing.

Preferred Pipeline Route as revised (Alternative C):

The originally preferred pipeline route will start within at the extended WWTW within the area described above (Refer to the blue line in the figure below). It will then be placed next to the fence of the Road camp within an area that has been cleared of vegetation (potentially a fire break)

From the road camp the pipeline will cross underneath the N14 south for about 250 – 300 m, into the disturbed road reserve to the south of the N14. It will then be located within the road reserve, for a short distance (approximately 30 m) before it enters the Klaarstroom sporting grounds and into a new reservoir (galvanised irrigation dam). The vegetation in road reserve can be described as very degraded with the only species of significance observed being a few small *Vachellia karroo* and hardy or weedy pioneer species like *Augea capensis*, *Galenia africana*, young *Lycium cinereum*, *Kali* species, and *Tetraena simplex*.



Figure 13: Pipeline route, Alternative C location next to the Roads camp. It will be placed within an existing disturbed area (e.g. potential fire-break) with almost no vegetation remaining (Botanical Report, 2019)



Figure 14: Pipeline route, Alternative C, along the N12 from where it will cross underneath the N12. Again the vegetation in this area had been subject to past disturbance (clearing actions).

Alternative Pipeline Route as revised (Alternative D):

The alternative pipeline route will follow the same path as the preferred route (until it reaches the road reserve of the N12). It will then be located within the road reserve to the north of the N14, until it reaches the bridge over the Sand River. The pipe will then cross the N14 south underneath the bridge (attached to the bridge infrastructure). From the bridge it will again be located within the road reserve of the N12 back to the reservoir (galvanised irrigation dam) within the sporting grounds. Within the road reserve, the vegetation remains as described above.

The riparian vegetation along the Sand River (in the area near to the N14) was basically dominated by *Vachellia karroo*, with *Phragmites australis*, *Melianthus comosus* and *Searsia lancea* occasionally encountered.



Figure 15: Showing the proposed pipeline route within the road reserve along the N14. Note the disturbed status of the road reserve in general with only hardy pioneer species remaining.



Figure 16: The bridge underneath the N12. The pipeline is proposed to be attached to this bridge.

Galvanised dam/ reservoir:

A small storage tank or reservoir will be placed within the existing Klaarstroom sport fields from where the sport fields can be irrigated. This reservoir will be located in this site with no natural veld remaining.



Figure 17: The Klaarstroom sport fields, indicating the proposed location for the small balancing reservoir.

Threatened and protected plant species:

The Red List of South African Plants online provides up to date information on the national conservation status of South Africa's indigenous plants (SANBI, 2015).

- **No red-listed species** was observed.

The National Environmental Management: Biodiversity Act, Act 10 of 2004, provides for the protection of species through the "Lists of critically endangered, endangered, vulnerable and protected species" (GN. R. 152 of 23 February 2007).

- **No NEM: BA protected species** was observed.

The National Forests Act (NFA) of 1998 (Act 84 of 1998) provides for the protection of forests as well as specific tree species (as updated).

- **No species protected in terms of the NFA** was observed.

Freshwater features:

From the Water Resources Map on Cape Farm Mapper (**Appendix D**) a non-perennial river/ drainage line runs through the site. No wetlands present on site. The map indicates that the proposed pipeline route (Alternative A,C,D) will cross a non-perennial river/ drainage line.

However, according to the Freshwater Report (**Appendix G1**) this drainage line was not observed during the site visit on 23 January 2019. The report states that the ground is very level, leaving uncertainty to where the storm water flows. Instead of the drainage line, a culvert (refer to Figure 7 & Figure 8) was observed under the N12 for letting stormwater through that might have accumulated against the northern shoulder of the road. A swale with a hard surface stretches from the culvert to the south into the Klaarstroom township (Figure 9). This is part of the storm water system that releases its water into the Groot River south of the township.

The existing WWTP straddles a drainage line, although the drainage line is very faint (refer Figure 7). The upgrade of the works will thus occur within this drainage line. The freshwater report states that during a very high rainfall event, the flow of water can be expected to be fast, with a high erosion potential evident from the deeply incised Groot Rivier and most drainage lines. the drainage line is separated from the next drainage line towards the east with a low ridge. The next drainage line is emphasised and clear.

The freshwater report (**Appendix G1**) further assess the Present Ecological State (PES) and Ecological Importance (EI) of these drainage lines as well as the Sand river.

According to the assessment, the upper part of the drainage line (Figure 6 &7) is natural, with no impacts. Lower down, the drainage line is impacted by the municipal waste disposal site and irrigated area and the existing WWTP straddles the drainage line. Evidence of seepage exist downstream from the WWTP as there is a dense stand of shrub trees, more so than in the direct surroundings. The PES of both the instream habitat and riparian zone score a C (Moderately modified). The habitat has been impacted, but the basic ecological functioning remain intact.

The river reach of interest in the Sand river is upstream from the N12 road bridge. The Sand River reach upstream from the N12 road bridge is near-pristine, even though it is dry. Impacts include farm roads and four small farm dams. The river is incised and well demarcated at the N12 road bridge. The banks are steep and overgrown with *Vachelia karoo* (soetdoring) trees. A patch of *Phragmitis australis* reeds, then very dry, indicated that there is water from time to time. Downstream of the road bridge, where the western tributary joins the Groot River, the river is impacted by agricultural and probably the return flow from Klaarstroom, as there was a small pond of water overgrown with bulrush *Typha capensis*.

The PES of the Sand river has been classified as an A (Unmodified, natural), unimpacted and pristine.

In conclusion, the Klaarstroom drainage line is one of the smaller drainage lines entering the Sand river and although it has been classified as a C (moderately modified), it does not, according to the freshwater specialist, have any negative effect on the class A (Unmodified, natural) classification of the Sand river reach, if the WWTP is properly managed. It is not expected that the construction and operation the WWTP should negatively affect the PES classification in any way, given that the works will be properly managed and maintained

The Ecological Importance (EI) is based on the presence of especially fish species that are endangered on a local, regional or national level. There are no indigenous fish in the Sand River at Klaarstroom and its

associated drainage lines, as there is no permanent water. According to freshwater assessment, which is prescribed for WULA's, the site and surrounds are not ecologically important. No other endangered species, either plant or animal, were detected in or near the drainage line.

The Ecological Sensitivity (ES) is often is often described as the ability of aquatic habitat to assimilate impacts. It is not sensitive if it remains the same despite of the onslaught of impacts. Put differently, sensitive habitat changes substantially, even under the pressure of slight impacts. The Ecological Sensitivity also refers to the potential of aquatic habitat to bounce back to an ecological condition closer to the situation prior to human impact. If it recovers, it is not regarded as sensitive. The question arises if the river south of Klaarstroom will recover if the ongoing impacts are removed.

The DWS, through a number of their official notifications pertaining to WULA's have indicated that dry drainage lines are considered to be sensitive. The dominant vegetation on the banks of the Sand River at Klaarstroom is *Vechelia karoo*, a tree that in many parts become invasive if land is disturbed or overgrazed. It can be expected that the riparian zone of the river south of Klaarstroom will be re-colonised by these trees, if the area is left to its own devices and if the perpetual impacts are terminated. From this point of view the riparian zone here is not sensitive.

The in-stream habitat would probably return to its original state, even though this may only take place after several large floods with a recurrence of once in 50 or 100 years, large enough to re-set the geomorphological status of the river.

However, these impacts are most unlikely to ever cease. It can be estimated that the Sand River at Klaarstroom and its associated dry tributaries, such as the one that at the WWTW, are less sensitive than the ones in the Northern Cape, but still sensitive. If rated in classes of sensitivity from highly sensitive, moderately sensitive and unsensitive, the Groot River at Klaarstroom can probably be rated as moderately sensitive.

7. LAND USE OF THE SITE

Note: The Department may request specialist input/studies depending on the nature of the land use character of the area and potential impact(s) of the proposed development.

Untransformed area	Low density residential	Medium density residential	High density residential	Informal residential
Retail	Commercial & warehousing	Light industrial	Medium industrial	Heavy industrial
Power station	Office/consulting room	Military or police base/station/compound	Casino/entertainment complex	Tourism and Hospitality facility
Open cast mine	Underground mine	Spoil heap or slimes dam	Quarry, sand or borrow pit	Dam or reservoir
Hospital/medical centre	School	Tertiary education facility	Church	Old age home
Sewage treatment plant	Train station or shunting yard	Railway line	Major road (4 lanes and more)	Airport
Harbour	Sport facilities	Golf course	Polo fields	Filling station
Landfill or waste treatment site	Plantation	Agriculture	River, stream or wetland	Nature conservation area
Mountain, koppie or ridge	Museum	Historical building	Graveyard	Archaeological site

Other land uses (describe):	
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(a) Provide a description.

The existing Klaarstroom Waste Water Treatment Plant (WWTP) is located on RE32 of Farm Klaarstroom 178, Prince Albert, on municipal land north of the N12 national road, a fairly new road maintenance camp is located south of the plant, between the N12 and the WWTP. A waste disposal site is also located north of the WWTP in the same municipal property.

The Galvanized Storage dam is proposed on the Klaarstroom Primary School Sports field, RE 34 of Farm Klaarstroom 178, Prince Albert.

Please refer to the Figure below.

8. LAND USE CHARACTER OF THE SURROUNDING AREA

(a) Highlight the current land uses and/or prominent features that occur within +/- 500m radius of the site and neighbouring properties if these are located beyond 500m of the site.

Note: The Department may request specialist input/studies depending on the nature of the land use character of the area and potential impact(s) of the proposed development.

Untransformed area	Low density residential	Medium density residential	High density residential	Informal residential
Retail	Commercial & warehousing	Light industrial	Medium industrial	Heavy industrial
Power station	Office/consulting room	Military or police base/station/compound	Casino/entertainment complex	Tourism and Hospitality facility
Open cast mine	Underground mine	Spoil heap or slimes dam	Quarry, sand or borrow pit	Dam or reservoir
Hospital/medical centre	School	Tertiary education facility	Church	Old age home
Sewage treatment plant	Train station or shunting yard	Railway line	Major road (4 lanes and more)	Airport
Harbour	Sport facilities	Golf course	Polo fields	Filling station
Landfill or waste treatment site	Plantation	Agriculture	River, stream or wetland	Nature conservation area
Mountain, koppie or ridge	Museum	Historical building	Graveyard	Archaeological site
Other land uses (describe):				

(b) Provide a description, including the distance and direction to the nearest residential area, industrial area, agri-industrial area.

The village of Klaarstroom lies adjacent south the N12. Mountain ridges or Koppies are located east along the N12. The proposed Galvanised storage dam is to be located at Klaarstroom Primary School Sports field, RE 34 of Farm Klaarstroom 178, Prince Albert. The village of Klaarstroom is located further south.

The Crop Census map from Cape Farm Mapper (**Appendix B**) indicates planted pastures to the West (RE/178 Klaarstroom) and South of the WWTP. RE/178 Klaartstroom is private land.

Please see the Figure below.

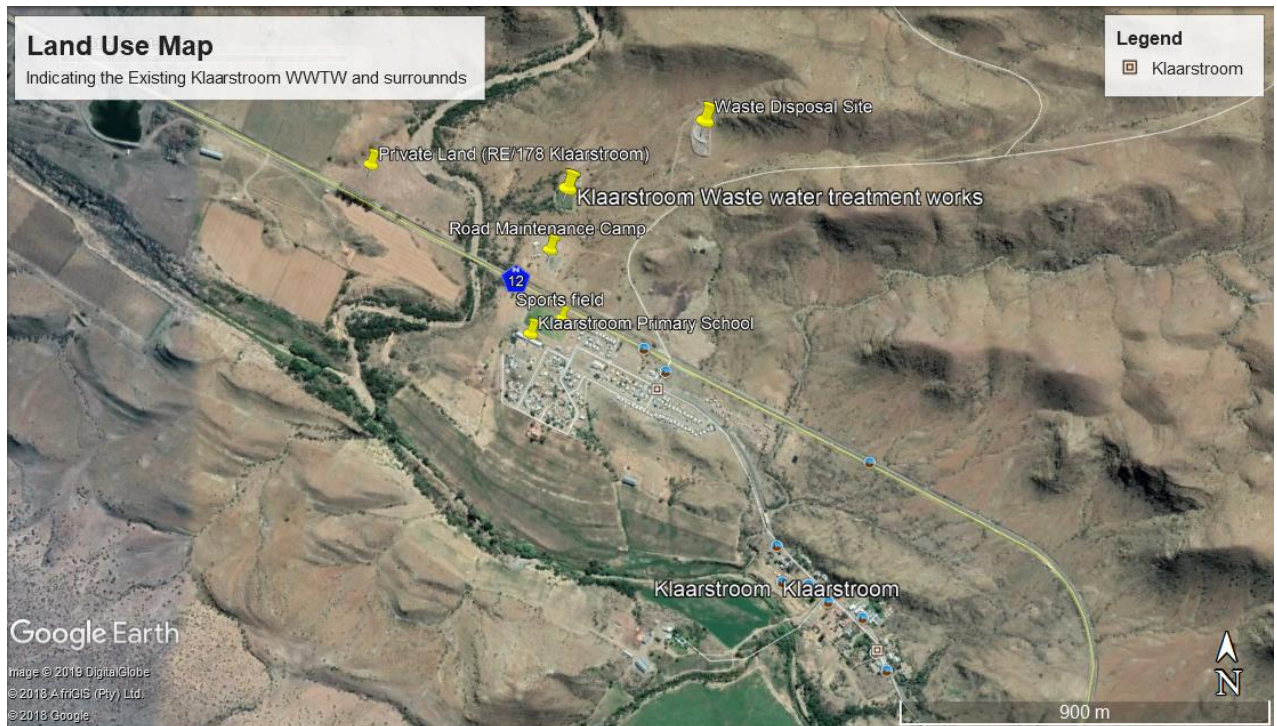


Figure 18: Land use map, showing the existing WWTP and surrounds

9. SOCIO-ECONOMIC ASPECTS

- a) Describe the existing social and economic characteristics of the community in the vicinity of the proposed site, in order to provide baseline information (for example, population characteristics/demographics, level of education, the level of employment and unemployment in the area, available work force, seasonal migration patterns, major economic activities in the local municipality, gender aspects that might be of relevance to this project, etc.).

Klaarstroom is a village in Prince Albert Local Municipality in the Western Cape province of South Africa. The following information was taken from the Social-Economic Profile (SEP) Prince Albert Municipality (2007).

It was estimated that in 2018, Prince Albert will have a population of 14 091, after five years this population is estimated to be 14 753. This equates an estimated growing rate in this time span of 4.69 per cent. The estimated population growth rate of Prince Albert is therefore 0.3 percentage points more than the estimated population growth of its District Central Karoo which is 4.39 per cent.

Learner enrolment in Prince Albert increased at an annual average growth rate of 2.19 per cent between 2014 and 2016, which is an indication that access to education has improved within the Prince Albert municipal area.

Prince Albert matric pass rate increased from 76.6 per cent in 2014 to 98.3 per cent in 2015. However, in 2016 the matric pass rate decreased dramatically to 69.2 per cent. The decrease in the pass rate can potentially be associated with various social ills.

In order to ensure basic service delivery to all, municipal budget allocations should be informed by credible and accurate assumptions regarding the number of households within a municipal area. Access to formal housing and services in Prince Albert is measured against a total number of households of 3 578 in 2011 and 4 183 in 2016. Prince Albert experienced a higher growth rate in the number of households from 2011 to 2016 relative to the Central Karoo District.

The number of formal dwellings in Prince Albert increased by 3 003 between 2011 and 2016, at an average annual rate of 2.7 per cent, which translates into approximately 601 additional formal dwellings per year over this period. This increase in formal dwellings was however unable to keep pace with the growth in the total number of households, resulting in the proportion of formal households declining slightly from 93.9 per cent in 2011 to 91.8 per cent in 2016.

Although Prince Albert experienced an annual increase of household access to piped water (to within 200 metres of the yard) of approximately 541 households per annum between 2011 and 2016, the proportion of households with access declined over this period from 99.3 per cent in 2011 to 97.9 per cent in 2016. This again indicating that access to piped water was unable to keep pace with the growth in the total number of households.

Access to sanitation promotes health and dignity through the provision of safe disposal and treatment of human waste. Where sanitation systems are inadequate, negative health effects can be extremely serious. The current drought highlights challenges in the use of potable water within the sanitation services process. Prince Albert experienced significant progress in household access to sanitation services, as the proportion of households with access to acceptable standards of sanitation services increased from 81.6 per cent in 2011 to 95.6 per cent in 2016. The Municipality was able to provide an additional 1 079 households with access annually; access growing at an average annual rate of 6.5 per cent.

The Prince Albert municipal area had a total of 3 650 jobs in 2015. This reflects the limited size of the Municipality and its economy, as this is much less than the 12 132 jobs in the Beaufort West municipal area. However, unlike the Beaufort West area, Prince Albert had a positive net change in employment in 2016 (33 jobs). Over the past five years, 595 new jobs were created, which surpasses job losses prior to 2011. The Prince Albert municipal area had a total of 3 650 jobs in 2015. This reflects the limited size of the Municipality and its economy, as this is much less than the 12 132 jobs in the Beaufort West municipal area. However, unlike the Beaufort West area, Prince Albert had a positive net change in employment in 2016 (33 jobs). Over the past five years, 595 new jobs were created, which surpasses job losses prior to 2011.

The agriculture, forestry and fishing sector employed the most people in the area in 2015 (33.0 per cent of local jobs). However, in terms of job creation over the past decade, most of the job creation can be attributed to the tertiary sector (the general government and community, social and personal services sectors) indicating the Prince Albert municipal area's job market is diversifying. Unemployment has been steadily rising in the Prince Albert area since 2010, with an unemployment rate of 19.9 per cent recorded in 2015. In 2016, the unemployment rate of the Prince Albert area is estimated to have increased to 20.2 per cent, which is lower than that of the Central Karoo District (23.2 per cent) but higher than that of the Province (18.7 per cent in 2016).

10. HISTORICAL AND CULTURAL ASPECTS

- (a) Please be advised that if section 38 of the NHRA is applicable to your proposed development, you are requested to furnish this Department with written comment from Heritage Western Cape as part of your public participation process. Heritage Western Cape must be given an opportunity, together with the rest of the I&APs, to comment on any Pre-application BAR, a Draft BAR, and Revised BAR.

Section 38 of the NHRA states the following:

"38. (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as-

- (a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding **300m in length**;
- (b) the construction of a bridge or similar structure exceeding 50m in length;
- (c) any development or other activity which will change the character of a site-
 - (i) exceeding **5 000m² in** extent; or
 - (ii) involving three or more existing erven or subdivisions thereof; or
 - (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or
 - (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
- (d) the re-zoning of a site exceeding 10 000m² in extent; or
- (e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority,

must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development".

- (b) The impact on any national estate referred to in section 3(2), excluding the national estate contemplated in section 3(2)(i)(vi) and (vii), of the NHRA, must also be investigated, assessed and evaluated. Section 3(2) states the following: "3(2) Without limiting the generality of subsection (1), the national estate may include—
- (a) places, buildings, structures and equipment of cultural significance;
 - (b) places to which oral traditions are attached or which are associated with living heritage;
 - (c) historical settlements and townscapes;
 - (d) landscapes and natural features of cultural significance;
 - (e) geological sites of scientific or cultural importance;
 - (f) archaeological and palaeontological sites;
 - (g) graves and burial grounds, including—
 - (i) ancestral graves;
 - (ii) royal graves and graves of traditional leaders;
 - (iii) graves of victims of conflict;
 - (iv) graves of individuals designated by the Minister by notice in the Gazette;
 - (v) historical graves and cemeteries; and
 - (vi) other human remains which are not covered in terms of the Human Tissue Act, 1983 (Act No. 65 of 1983);
 - (h) sites of significance relating to the history of slavery in South Africa;
 - (i) movable objects, including—
 - (i) objects recovered from the soil or waters of South Africa, including archaeological and paleontological objects and material, meteorites and rare geological specimens;
 - (ii) objects to which oral traditions are attached or which are associated with living heritage;
 - (iii) ethnographic art and objects;
 - (iv) military objects;
 - (v) objects of decorative or fine art;
 - (vi) objects of scientific or technological interest; and
 - (vii) books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings, excluding those that are public records as defined in section 1(xiv) of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996)".

Is Section 38 of the NHRA applicable to the proposed development?		YES	NO	UNCERTAIN
If YES or UNCERTAIN, explain:	The proposed pipeline route will be approximately 500m in length, exceeding the 300m threshold.			
Will the development impact on any national estate referred to in Section 3(2) of the NHRA?		YES	NO	UNCERTAIN

If YES or UNCERTAIN, explain:	<p>The Heritage Screener (Appendix G) stated that it is known that the village of Klaarstroom is a unique, Victorian town located just off the main thoroughfare of the N12. The historic core of Klaarstroom remains largely intact and has a distinctive sense of place.</p> <p>The proposed development is unlikely to impact this sense of place as the proposed development is simply an upgrade to the existing WWTP located outside of the Victorian historic core, and on the other side of the N12.</p>			
Will any building or structure older than 60 years be affected in any way?		YES	NO	UNCERTAIN
If YES or UNCERTAIN, explain:	No buildings to be affected.			
Are there any signs of culturally or historically significant elements, as defined in section 2 of the NHRA, including Archaeological or paleontological sites, on or close (within 20m) to the site?		YES	NO	UNCERTAIN
If YES or UNCERTAIN, explain:	<p>According to the CTS Heritage Screener (Appendix G3) Klaarstroom situated on the outskirts of a small Karoo town, and alongside a river, it is likely that Early, Middle and Later Stone Age artefacts are present within the WWTP site. In addition, some of the area has been surveyed for rock art by Nardell and a number of rock art sites have been identified within 20km of the proposed development area. However, as this site is already developed, and as this site is located far from any rocky outcrops, it is unlikely that any significant archaeological resources or rock art sites will be impacted by the proposed development.</p> <p>The area proposed for development is underlain by siltstone, shale and arenaceous shale sediments of the Traka Subgroup of the Bokkeveld Group of the Cape Supergroup, of very high palaeontological sensitivity according to the SAHRIS Palaeosensitivity Map. According to SAHRIS, the Traka Subgroup is known for its fossils of fish (sharks, acanthodians, placoderms, bony fish, recorded especially from Da), bivalves and vascular plants (psilophytes, lycopods), common but low diversity trace fossils, including <i>Spirophyton</i> , and rare brachiopods. Tectonic deformation often limits fossil collection, especially within mudrock-rich horizons, and distorts fossils. Biostratigraphically and palaeoecologically important fossil assemblages are known from high palaeoaltitudes (such as the Klipbökkop and Adolphspoort Fms). These sensitive formations may be impacted by the proposed development, and as such it is recommended that the HWC Fossil Finds Procedure be implemented throughout the development phase.</p> <p>Heritage Western Cape provided comment and no further studies are required (Appendix E1).</p>			

Note: If uncertain, the Department may request that specialist input be provided **and** Heritage Western Cape must provide comment on this aspect of the proposal. (Please note that a copy of the comments obtained from the Heritage Resources Authority must be appended to this report as Appendix E1).

11. APPLICABLE LEGISLATION, POLICIES, CIRCULARS AND/OR GUIDELINES

- (a) Identify all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to the development proposal and associated listed activity(ies) being applied for and that have been considered in the preparation of the BAR.

LEGISLATION, POLICIES, PLANS, GUIDELINES, SPATIAL TOOLS, MUNICIPAL DEVELOPMENT PLANNING FRAMEWORKS, AND INSTRUMENTS	ADMINISTERING AUTHORITY and how it is relevant to this application	TYPE Permit/license/authorisation/comment / relevant consideration (e.g. rezoning or consent use, building plan approval, Water Use License and/or General Authorisation, License in terms of the SAHRA and CARA, coastal discharge permit, etc.)	DATE (if already obtained):
National Environmental Management Act, 1998 (Act No. 107 of 1998) – NEMA EIA Regulations 2014, as amended	Department of Environmental Affairs and Development Planning (“DEA&DP”)	Environmental Authorisation	The Basic Assessment process (this report) is currently underway.
National Water Act (Act 36 of 1998)	Breede-Gouritz Catchment Management Area (BGCMA)	General Authorisation / Water Use License	Liaison with BGMA underway.

- (b) Describe how the proposed development **complies with and responds** to the legislation and policy context, plans, guidelines, spatial tools, municipal development planning frameworks and instruments.

LEGISLATION, POLICIES, PLANS, GUIDELINES, SPATIAL TOOLS, MUNICIPAL DEVELOPMENT PLANNING FRAMEWORKS, AND INSTRUMENTS	Describe how the proposed development complies with and responds:
Department’s Circular EADP 0028/2014 (dated 9 December 2014) on the “One Environmental Management System”	Circular and guidelines consulted and adhered to when undertaking this Basic Assessment Report.
Guidelines on EIA Regulations 2014	Guideline was consulted while compiling the BAR.
Guidelines on Public Participation, 2014	Guideline was consulted while compiling the BAR.
Guidelines on Need and Desirability, 2013	Guideline was consulted while compiling the BAR.
Guidelines on Alternatives, 2014	Guideline was consulted while compiling the BAR.
Western Cape Biodiversity Spatial Plan Handbook 2017	Guideline was consulted regarding land use advise and the developments within CBAs and ESAs
Volume 1 – 5 Guidelines for the Utilization and Disposal of Wastewater Sludge, Water Research Commission, TT 261/06,2006.	Guideline was consulted in determining the disposal methods for the sludge in the existing ponds
National Environmental Management: Waste Act (Act No. 59 of 2008) List of Waste Management activities that have or are likely to have a detrimental effect on the environment. GN No. 921 of 29 Nov 2013:	The Act was consulted while investigating appropriate disposal methods for wastewater sludge as well as grit & screenings

NEM:WA: National Norms and Standards for the storage of waste. GN N. 926	Norms and Standards was consulted while investigating the handling of the existing sludge on site as well as grit & screenings
NEM:WA: National Norms and Standards for Disposal of Waste to Landfill	The Act was consulted while investigating appropriate disposal methods for wastewater sludge as well as grit & screenings

Note: Copies of any comments, permit(s) or licences received from any other Organ of State must be attached to this report as **Appendix E**.

Section C: PUBLIC PARTICIPATION

The PPP must fulfil the requirements outlined in the NEMA, the EIA Regulations, 2014 (as amended) and if applicable, the NEM: WA and/or the NEM: AQA. This Department's Circular EADP 0028/2014 (dated 9 December 2014) on the "One Environmental Management System" and the EIA Regulations, any subsequent Circulars, and guidelines must also be taken into account.

1. Please highlight the appropriate box to indicate whether the specific requirement was undertaken or whether there was an exemption applied for.

In terms of Regulation 41 of the EIA Regulations, 2014 (as amended) -			
(a) fixing a notice board at a place conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of -			
(i) the site where the activity to which the application relates, is or is to be undertaken; and	YES	EXEMPTION	
(ii) any alternative site	YES	EXEMPTION	N/A
(b) giving written notice, in any manner provided for in Section 47D of the NEMA, to -			
(i) the occupiers of the site and, if the applicant is not the owner or person in control of the site on which the activity is to be undertaken, the owner or person in control of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;	YES	EXEMPTION	N/A
(ii) owners, persons in control of, and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;	YES	EXEMPTION	
(iii) the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;	YES	EXEMPTION	
(iv) the municipality (Local and District Municipality) which has jurisdiction in the area;	YES	EXEMPTION	
(v) any organ of state having jurisdiction in respect of any aspect of the activity; and	YES	EXEMPTION	
(vi) any other party as required by the Department;	YES	EXEMPTION	N/A
(c) placing an advertisement in -			
(i) one local newspaper; or	YES	EXEMPTION	
(ii) any official Gazette that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations;	YES	EXEMPTION	N/A
(d) placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or district municipality in which it is or will be undertaken	YES	EXEMPTION	N/A
(e) using reasonable alternative methods, as agreed to by the Department, in those instances where a person is desirous of but unable to participate in the process due to— (i) illiteracy; (ii) disability; or (iii) any other disadvantage.	YES	EXEMPTION	N/A
If you have indicated that "EXEMPTION" is applicable to any of the above, proof of the exemption decision must be appended to this report.			
Please note that for the NEM: WA and NEM: AQA, a notice must be placed in at least two newspapers circulating in the area where the activity applied for is proposed.			
If applicable, has/will an advertisement be placed in at least two newspapers?	YES	NO	
If "NO", then proof of the exemption decision must be appended to this report.			

2. Provide a list of all the State Departments and Organs of State that were consulted:

State Department / Organ of State	Date request was sent:	Date comment received:	Support / not in support
DEA&DP: Land use	Feb 2019 March 2019 June 2019	No comments received	
DEA&DP: Waste Management	Feb 2019 March 2019 June 2019 Meeting July 2019	15-04-2019 08-07-2019 & 11-07-2019	
DEA&DP: Pollutions & Chemicals Management	June 2019 Meeting July 2019	05-07-2019 & 11-07-2019	
Cape Nature	Feb 2019		

	March 2019 June 2019	15-04-2019 No comment	
Department of Agriculture	Feb 2019 March 2019 June 2019	No comment received	
BGCMA	Feb 2019 March 2019 June 2019	27-02-2019 15-07-2019	
Department of Water and Sanitation	Feb 2019 March 2019 June 2019	No comments received	
Department of Health	Feb 2019 March 2019 June 2019	No comments received	
HWC	Submission of NID Feb 2019 March 2019 June 2019	04-03-2019	Support (Appendix E1)

3. Provide a summary of the issues raised by I&APs and an indication of the manner in which the issues were incorporated, or the reasons for not including them.
(The detailed outcomes of this process, including copies of the supporting documents and inputs must be included in a Comments and Response Report to be attached to the BAR (see note below) as **Appendix F**).

Please note that the Poster and Notification Letters made available to potential I&APs, invited the public and Organs of state to register to receive information regarding the proposed development. Due to the Water Use License Application component a 60 day registering period was provided from 8 February 2019 until 15 April 2019.

The posters and Notification letters stipulated that a Pre-App BAR will be made available for comment. However, due to outstanding information and specialist inputs, the full Pre-App BAR could not be completed and therefor a Pre-App BAR summary was uploaded in the mean time for information sharing regarding the proposed development.

The Pre-App BAR summary was replaced by this Pre-App BAR March'19 for comment, on 12 March 2019, to provide more than 30 days for registered I&APs to comment before the published end date 15 April 2019.

The Post-App BAR June was made available for comment from 4 June 2019 – 8 July 2019.

Comments are captured in the Comments and Response Report, **Appendix F1**. Original comments are included as **Appendix F1.1** –

4. Provide a summary of **any conditional aspects identified** / highlighted by any Organs of State, which have jurisdiction in respect of any aspect of the relevant activity.

Comments from Heritage Western Cape (Appendix E):

- Should any heritage resources, including evidence of graves and human burials, archaeological material and paleontological material be discovered during the execution of the activities, all works must be stopped immediately and HWC must be notified without delay.

Comments from DEA&DP: Waste Management (Appendix F1.6):

- Should there be any major spills of hazardous substances at the facility which could lead to environmental degradation, the management of such spills should adhere to section 30 of the NEMA as amended, which includes reporting responsibilities.

Comments from Cape Nature (Appendix F1.7):

- Any indigenous vegetation that require removal should be rescued and used for rehabilitation purposes. CapeNature would like to reiterate that all endangered species or protected species listed in Schedules 3 and 4 respectively, in terms of the Western Cape Nature Conservation Laws Amendment Act, 2000 (Act No. 3 of 2000) may not be picked or removed without the relevant permit, which must be obtained from CapeNature. This is also to ensure plants that rescued plant material is accounted for and used in the rehabilitation or relocation process. To obtain such permits please contact the relevant Conservation Services Officials at the George CapeNature Regional Office or use the following website address <http://www.capenature.co.za/permits-information/>.
- CapeNature would also like to remind the landowner that, in terms of the Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) ("CARA"), landowners must prevent the spread of alien invasive plants on the property
- In addition to CARA, in terms of the Alien and Invasive Species Regulations, NEM:BA, 2014, specific alien plant species (e.g. *Opuntia ficus-indica*) are either prohibited or listed as requiring a permit; aside from restricted activities concerning, inter alia, their spread, and should be removed.
- It should be noted that Cape Nature will not support the use of any alien invasive plant species within the proposed reed beds. Only the use of cosmopolitan or indigenous plant species can be supported.
- To conclude, the upgrading of WWTW is essential for improving the water quality of our freshwater resources. CapeNature encourages all such systems to be rigorously monitored and compliance strictly enforced throughout the project lifecycle to ensure that such systems do not fall into a state of disrepair. Training of municipal staff regarding the operation of such facilities should already being in the construction phase of the project to ensure that all such personnel are fully skilled in terms of ensuring the facilities optimal use. CapeNature reserves the right to revise initial comments and request further information based on any additional information that may be received

Comment from DEA&DP Directorate: Waste Management & Directorate Pollutions and Chemicals Management (Appendix F7):

- As the grit storage is continual, should the mount of grit stored at the Facility reach the threshold volumes for the Norms and Standards for waste, the Facility will need to be duly registered and adhere to the Norms and Standards.
- The applicant will still need to adhere to section 28 of the National Environmental Management Act, 1998 (Act No. 107 of 1998), Duty of Care.

Note:

Even if pre-application public participation is undertaken as allowed for by Regulation 40(3), it must be undertaken in accordance with the requirements set out in Regulations 3(3), 3(4), 3(8), 7(2), 7(5), 19, 40, 41, 42, 43 and 44.

If the "exemption" option is selected above and no proof of the exemption decision is attached to this BAR, the application will be refused.

A list of all the potential I&APs, including the Organs of State, notified and a list of all the registered I&APs must be submitted with the BAR. The list of registered I&APs must be opened, maintained and made available to any person requesting access to the register in writing.

The BAR must be submitted to the Department when being made available to I&APs, including the relevant Organs of State and State Departments which have jurisdiction with regard to any aspect of the activity, for a commenting period of at least 30 days. Unless agreement to the contrary has been reached between the Competent Authority and the EAP, the EAP will be responsible for the consultation with the relevant State Departments in terms of Section 24O and Regulation 7(2) – which consultation must happen simultaneously with the consultation with the I&APs and other Organs of State.

All the comments received from I&APs on the BAR must be recorded, responded to and included in the Comments and Responses Report included as **Appendix F** of the BAR. If necessary, any amendments made in response to comments received must be effected in the BAR itself. The Comments and Responses Report must also include a description of the PPP followed.

The minutes of any meetings held by the EAP with I&APs and other role players wherein the views of the participants are recorded, must also be submitted as part of the public participation information to be attached to the final BAR as **Appendix F**.

Proof of all the notices given as indicated, as well as notice to I&APs of the availability of the Pre-Application BAR (if applicable), Draft BAR, and Revised BAR (if applicable) must be submitted as part of the public participation information to be attached to the BAR as **Appendix F**. In terms of the required "proof" the following must be submitted to the Department:

- a site map showing where the site notice was displayed, a dated photographs showing the notice displayed on site and a copy of the text displayed on the notice;
- in terms of the written notices given, a copy of the written notice sent, as well as:
 - if registered mail was sent, a list of the registered mail sent (showing the registered mail number, the name of the person the mail was sent to, the address of the person and the date the registered mail was sent);
 - if normal mail was sent, a list of the mail sent (showing the name of the person the mail was sent to, the address of the person, the date the mail was sent, and the signature of the post office worker or the post office stamp indicating that the letter was sent);
 - if a facsimile was sent, a copy of the facsimile report;
 - if an electronic mail was sent, a copy of the electronic mail sent; and
 - if a "mail drop" was done, a signed register of "mail drops" received (showing the name of the person the notice was handed to, the address of the person, the date, and the signature of the person); and
- a copy of the newspaper advertisement ("newspaper clipping") that was placed, indicating the name of the newspaper and date of publication (of such quality that the wording in the advertisement is legible).

Interested and Affected Parties (I&APs) were identified throughout the process. Landowners adjacent to the proposed site, relevant organs of state, organizations, ward councillors and the Local and District Municipality were added to this database. A complete list of organisations and individual groups identified to date is shown in **Appendix F5**.

Public Participation was conducted for this proposed dam in accordance with the requirements outlined in Regulation 41, 42, 43 and 44 of the NEMA EIA Regulations 2014 as amended, as well as the Department of Environmental Affairs and Development Planning's guideline on Public Participation 2011. The issues and concerns raised during the scoping phase will be dealt with in the EIA phase of this application.

As such each subsection of Regulation 54 contained in Chapter 6 of the NEMA EIA Regulations will be addressed separately to thereby demonstrate that all potential Interested and Affected Parties (I&AP's) were notified of the proposed development.

R41	Posters, Advertisement & Notification letters
(2) (a) (i)	<p><u>Posters were</u> displayed on the site property and in the town of Klaarstroom.</p> <p><u>Posters were</u> A1 and A3</p> <p>Please see Appendix F3 for proof of posters</p>
(ii)	<u>N/A No viable alternative site</u>
(2) (b) (iii)	<p><u>Notification letters were sent to the municipal ward councilor at the Local Municipality</u></p> <p>District Municipality.</p> <p>Please see Appendix F4</p>

<u>(iv)</u>	<p><u>Notification letters were sent to</u> Prince Albert Local Municipality</p> <p>Please see Appendix F4</p>
<u>(v)</u>	<p><u>Notification letters were sent to the following organs of state:</u></p> <ul style="list-style-type: none"> • <u>Department of Environment and Development Planning</u> (DEADP_ • <u>DEADP (Waste Management)</u> • <u>Breede-Gourtiz Catchment Management Area</u> • <u>Cape Nature</u> • <u>Heritage Western Cape \</u> • <u>Department of Agriculture and Land Use Management</u> • <u>SANRAL</u> <p>Please see Appendix F4</p>
<u>(vi)</u>	<p><u>Notification letters were sent to neighbours</u></p> <p>Please see Appendix F4</p>
<u>(2) (c) (i)</u>	<p><u>An advert was placed in</u> the newspaper: Friends of Prince Albert 08/02/2019.</p> <p>Please see Appendix F6</p>
R42 & 34	<u>Register of I&AP</u>
<u>(a), (b), (c), (d)</u>	<p><u>A register of interested and affected parties was opened and maintained and is available to any person requesting access to the register in writing</u></p> <p>Please see Appendix F5</p>
R43	<u>Registered I&AP entitled to comments</u>
<u>3</u>	<p><u>I&AP were given</u> total of 60s <u>days for comments during the initial public participation</u> to include the public participation process in term of water use 08/02/2019 – 15/02/2019. A back-ground information document was upload in the EnviroAfrica website to inform I&APs of the proposed development.</p> <p>I&APS was given 30 day to comment on the Pre-Application BAR 12/03/2019 – 15/02/2019</p> <p>I&Aps will be given 30days to comment on the Post-Application BAR</p>
R44	<u>I&AP to be recorded</u>
	<p><u>A summary of issues raised by I&AP are addressed in the comments and response report</u> (C&RR).</p> <p>Please see Appendix F1 for the C&RR as well as original comments received this far.</p>

SECTION D: NEED AND DESIRABILITY

Note: Before completing this section, first consult this Department's Circular EADP 0028/2014 (dated 9 December 2014) on the "One Environmental Management System" and the EIA Regulations, 2014 (as amended), any subsequent Circulars, and guidelines available on the Department's website: <http://www.westerncape.gov.za/eadp>. In this regard, it must be noted that the *Guideline on Need and Desirability in terms of the Environmental Impact Assessment (EIA) Regulations, 2010* published by the national Department of Environmental Affairs on 20 October 2014 (GN No. 891 on Government Gazette No. 38108 refers) (available at: http://www.gov.za/sites/www.gov.za/files/38108_891.pdf) also applied to EIAs in terms of the EIA Regulations, 2014 (as amended).

1. Is the development permitted in terms of the property's existing land use rights?	YES	NO	Please explain
The proposed project entails the upgrade of the existing Klaarstroom WWTP, the land use will not change.			
2. Will the development be in line with the following?			
(a) Provincial Spatial Development Framework ("PSDF").	YES	NO	Please explain
The PSDF for the Western Cape March 2014 widely addresses the adoption of the reuse of wastewater effluent as standard practices. The proposed upgrade of the Klaarstroom WWTP will allow for the use of the treated effluent to be used for irrigation purposed at the Klaarstroom Primary School Sports field.			
(b) Urban edge / edge of built environment for the area.	YES	NO	Please explain
The upgrade of the exiting Klaarstroom WWTP will not compromise the integrity of the urban edge/ built environment. The proposed projects is situated outside the urban edge of Klaarstroom village.			
(c) Integrated Development Plan and Spatial Development Framework of the Local Municipality (e.g., would the approval of this application compromise the integrity of the existing approved and credible municipal IDP and SDF ?).	YES	NO	Please explain
The Prince Albert SDF was not available. However, the proposed upgrade of the Klaarstroom WWTP will not compromise the integrity of the existing IDP, but only contribute to reaching goals as set out in the plan. The Prince Albert IDP 2012-2017 emphasis that all WWTW need to be operating at functional and acceptable levels. The IDP states that the Klaarstroom WWTW will be upgraded as funding application has been approved.			
(d) An Environmental Management Framework ("EMF") adopted by this Department. (e.g., Would the approval of this application compromise the integrity of the existing environmental management priorities for the area and if so, can it be justified in terms of sustainability considerations?)	YES	NO	Please explain
It is unknown if the municipality adopted an EMF, however the upgrade of the Klaarstroom WWTP will contribute to reaching goals as set out in the Prince Albert IDP 2012-2017. The IDP emphasis that all WWTW need to be operating at functional and acceptable levels. The IDP states that the Klaarstroom WWTW will be upgraded as funding application has been approved.			
(e) Any other Plans (e.g., Integrated Waste Management Plan (for waste management activities), etc.)).	YES	NO	Please explain
The Western Cape Intergrated Waste Management Plan 2017 – 2020 speaks about wastewater treatment works and sewage sludge disposal. With the correct mitigation and management practices in place, the upgraded Klaarstroom WWTP can contribute to the successful disposal of sewage sludge.			
3. Is the land use (associated with the project being applied for) considered within the timeframe intended by the existing approved SDF agreed to by the relevant environmental authority (in other words, is the proposed development in line with the projects and programmes identified as priorities within the credible IDP)?	YES	NO	Please explain
The Prince Albert SDF was not available. However, the proposed upgrade of the Klaarstroom WWTP will not compromise the integrity of the existing IDP, but only contribute to reaching goals as set out in the plan. The Prince Albert IDP 2012-2017 emphasis that all WWTW need to be operating at functional and acceptable levels. The IDP states that the Klaarstroom WWTW will be upgraded as funding application has been approved.			
4. Should development, or if applicable, expansion of the town/area concerned in terms of this land use (associated with the activity being applied for) occur on the proposed site at this point in time?	YES	NO	Please explain

N/A			
5. Does the community/area need the project and the associated land use concerned (is it a societal priority)? (This refers to the strategic as well as local level (e.g., development is a National Priority, but within a specific local context it could be inappropriate.)	YES	NO	Please explain
<p>Yes, the upgrade of the Klaarstroom WWTP will benefit the community of Klaarstroom.</p> <p>The BVi Technical Report (Appendix K) states that an analysis of treated effluent dated August 2015 indicates that the current effluent is non-compliant with current crucial parameters. The Total Suspended Solids and COD and levels of Ammonia are much higher than the allowable limits. The existing Klaarstroom WWTP is hydraulically (flow) as well as organically (chemical load) overloaded. It is therefore motivated that the existing WWTP be upgraded to increase the capacity and improve the quality of the Final Effluent. The upgrade of the WWTP will directly benefit the community and contribute to reaching goals as set out in numerous development plans.</p> <p>The current disposal of effluent takes place by sprinkling the treated effluent in the veld, from where it could eventually end up in the Sand River. With the proposed upgrade it is planned that treated effluent be used for irrigation of the sports field at the Klaarstroom Primary School, directly benefitting the community.</p>			
6. Are the necessary services available together with adequate unallocated municipal capacity (at the time of application), or must additional capacity be created to cater for the project? (Confirmation by the relevant municipality in this regard must be attached to the BAR as Appendix E .)	YES	NO	Please explain
Existing roads, electricity connections and freshwater infrastructure is available at the site. The project is for the proposed upgrade of the existing Klaarstroom WWTP as well the better utilisation of final effluent.			
7. Is this project provided for in the infrastructure planning of the municipality and if not, what will the implication be on the infrastructure planning of the municipality (priority and placement of services and opportunity costs)? (Comment by the relevant municipality in this regard must be attached to the BAR as Appendix E .)	YES	NO	Please explain
Yes, according to the IDP the proposed upgrade of the Klaarstroom WWTP is inline with infrastructure planning of the Prince Albert Municipality.			
8. Is this project part of a national programme to address an issue of national concern or importance?	YES	NO	Please explain
The upgrade of the Klaarstroom WWTP aligns with the National Water and Sanitation Master Plan Nov 2017.			
9. Do location factors favour this land use (associated with the development proposal and associated listed activity(ies) applied for) at this place? (This relates to the contextualisation of the proposed land use on the proposed site within its broader context.)	YES	NO	Please explain
<p>Yes, the location favours this land use as the proposed project entails the upgrade of the existing Klaarstroom WWTP.</p> <p>The Bvi Technical report (Appendix K) further states that the current site has a medium to sharp slope in a southerly direction towards the N12 National Road. This is considered a good site for the works as well as its proposed upgrade/ extensions, as the natural slope assists in allowing gravity flow through the system and also decreases the volumes of earthworks required for construction.</p>			
10. Will the development proposal or the land use associated with the development proposal applied for, impact on sensitive natural and cultural areas (built and rural/natural environment)?	YES	NO	Please explain

No, the proposed upgrade of the Klaarstroom WWTP will not impact on sensitive natural or cultural areas. The area is disturbed with little natural vegetation remaining, due to past development activities. The Heritage Screener (**Appendix G3**) stated that no heritage resources will be impacted by the proposed upgrade. Comments from Heritage Western Cape still to be included.

11. Will the development impact on people's health and well-being (e.g., in terms of noise, odours, visual character and 'sense of place', etc.)?	YES	NO	Please explain
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The proposed upgrade will positively impact people's health. The proposed upgrade will increase the capacity and improve the quality of the Final Effluent to current important parameters.

12. Will the proposed development or the land use associated with the proposed development applied for, result in unacceptable opportunity costs?	YES	NO	Please explain
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No unacceptable opportunity costs expected.

13. What will the cumulative impacts (positive and negative) of the proposed land use associated with the development proposal and associated listed activity(ies) applied for, be?
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Positive

- Upgrade of the design capacity of the WWTP from 50m³/ day to 61m³ per day;
- The upgrade plant to produce a final effluent of an acceptable quality;
- More efficient use of treated effluent for irrigation of sports facilities;
- More controlled disposal/handling of wastewater sludge and daily screenings and grit
- The current site has a medium to sharp slope in a southerly direction towards the N12 National Road. This is considered a good site for the wastewater works as well as its proposed extensions, as the natural slope assists in allowing gravity flow through the system and also decreases the volumes of earthworks required for construction of the pond embankments as the natural slope assists in allowing gravity flow through the system and also decreases the volumes of earthworks required for construction.
- The Sand river (the Sand river joins the Groot river down stream) and drainage lines are considered to be in a good condition, the upgrade of the WWTP will ensure these conditions are maintained or even improve.
- Advantages of a natural treatment system as taken from the BVI Technical Report (Appendix K) can be listed as:
 - Oxidation Ponds and Reedbeds are well suited for the treatment of low to medium strength domestic wastewater
 - Very effective at removing nitrogen, phosphates and heavy metals
 - Civil works limited to earthworks and HDPE linings, no major structures required
 - Totally natural system, no external energy input required
 - Reed beds and oxidation ponds can be scaled infinitely to fit the desired treatment capacity requirement
 - No electricity required for operation
 - Limited chemicals required for operation – only disinfectant required
 - Very low maintenance costs, no mechanical or electrical equipment required
 - Very low operational costs, limited supervision and operator input required
 - Will continue working even if severely neglected
 - Provides a good quality effluent that complies with General Limit values if not overloaded.
 - Reed beds have no odours as water is always subsurface
 - Reeds exude tannins from their root zone, which are toxic to most bacteria such as E.coli and therefore assist in disinfecting the final effluent without the addition of chemicals.
 - Scenically attractive and provides a good habitat for birds
 - Long life expectancy, in excess of 30 years

Negative

- The proposed upgrade and expansion would contribute to the further transformation of the area. However majority of the area and proposed prefer pipeline route are considered transformed. The Klaarstroom WWTP is both hydraulically (flow) overloaded, as well as organically (chemical load)

<p>overloaded and with increased population growth expected, the upgrade of the Klaarstroom WWTP would benefit the receiving environment as well as the community.</p> <ul style="list-style-type: none"> The disadvantages of natural treatment systems as taken from the BVI Technical Report (Appendix K) are listed below: <ul style="list-style-type: none"> Large footprint, significantly more land required than for conventional type plants (However, in this case the footprint is available as this project is an upgrade of an existing WWTP where the footprint exists). Sensitive to effective pre-treatment, requires good screening and primary settlement to avoid solids blocking the reed bed growth media or primary ponds filling up with solids (inlets & grid to be cleaned daily to avoid blocking of reed bed and primary ponds). Earthworks at Klaarstroom may be problematic due to hard rock excavations. Reeds need to be cut and harvested on an annual basis (do be done regularly). Requires expert design and construction (BVI Engineers undertaking the design) Sensitive to toxins entering the plant with wastewater, plants and active bacteria may die Odours can be problematic due to anaerobic nature of some ponds, exude hydrogen sulphide (all components of the plant to be kept in good working condition to minimise the generation of odours). Requires secure fencing as deep ponds pose a risk for drowning if open to the public (secure fencing of the entire plant proposed). 				
14. Is the development the best practicable environmental option for this land/site?		YES	NO	Please explain
<p>The BVI Technical Report (Appendix K) states that an analysis of treated effluent dated August 2015 indicates that the current effluent is non-compliant with current crucial parameters. The existing Klaarstroom WWTP is hydraulically (flow) as well as organically (chemical load) overloaded. If the Klaarstroom WWTP is not upgraded, it is more likely that the existing small anaerobic pond system overflow and spill into the adjacent river.</p>				
15. What will the benefits be to society in general and to the local communities?				Please explain
<p>The BVI Technical Report (Appendix K) states that an analysis of treated effluent dated August 2015 indicates that the current effluent is non-compliant with current crucial parameters. The Total Suspended Solids and COD and levels of Ammonia are much higher than the allowable limits. The existing Klaarstroom WWTP is hydraulically (flow) as well as organically (chemical load) overloaded. It is therefore motivated that the existing WWTP be upgraded to increase the capacity and improve the quality of the Final Effluent. The upgrade of the WWTP will directly benefit the community and contribute to reaching goals as set out in numerous development plans.</p> <p>The current disposal of effluent takes place by sprinkling the treated effluent in the veld, from where it could eventually end up in the Groot River. With the proposed upgrade it is planned that treated effluent be used for irrigation of the sports field at the Klaarstroom Primary School, directly benefitting the community.</p>				
16. Any other need and desirability considerations related to the proposed development?				Please explain
<p>The need existed to increase the capacity and improve the quality of the Final Effluent of the Klaarstroom WWTP to comply with current important parameters.</p> <p>Desirability can be attained to land use – the current site has a medium to sharp slope in a southerly direction toward the N12 National Road, this is considered good site for the WWTP as well as its proposed extensions, as the natural slope assists in allowing gravity flow through the system and also decreases the volumes of earthworks required for construction of the pond embankments.</p>				
17. Describe how the general objectives of Integrated Environmental Management as set out in Section 23 of the NEMA have been taken into account:				
<p>The general objectives of Integrated Environmental Management have been taken into account through the following:</p> <ul style="list-style-type: none"> The actual and potential impacts of the activity on the environment, socio-economic conditions and cultural heritage have been identified, predicted and evaluated, as well as the risks and consequences and alternatives and options for mitigation of activities, with a view to minimizing negative impact, maximizing benefits and promoting compliance with the principles of environmental management – please refer to Section F below. 				

- The effects of the activity on the environment have been considered before actions taken in connection with them alternatives have been considered and investigated (please refer to Section E below).
- Adequate and appropriate opportunity for public participation is ensured through the public participation process.
- The environmental attributes have been considered in the management and decision-making of the activity – an EMPr has been included (Appendix H) with the proposed activity and must adhere to the requirements of all applicable state Authorities.

18 Describe how the **principles of environmental management** as set out in Section 2 of the NEMA have been taken into account:

The principles of environmental management as set out in section 2 of NEMA have been taken into account. The principles pertinent to this activity include:

- People and their needs have been placed at the forefront while serving their physical, psychological, developmental, cultural and social interests – the proposed activity will have a beneficial impact on people, especially developmental, cultural and social benefits due to increased coverage and reliability of communications.
- Development must be socially, environmentally and economically sustainable. Where disturbance of ecosystems, loss of biodiversity, pollution and degradation, and landscapes and sites that constitute the nation's cultural heritage cannot be avoided, are minimised and remedied.
- Although the activity is expected to have little to no environmental impact, these impacts have been considered, and mitigation measures have been put in place.
- Where waste cannot be avoided, it is minimised and remedied through the implementation and adherence of EMPr.
- The use of non-renewable natural resources is responsible and equitable – no exploitation of non-renewable natural resources occurs with the proposed activity.
- The negative impacts on the environment and on people's environmental rights have been anticipated and prevented, and where they cannot be prevented, are minimised and remedied - refer to Section F below.
- The interests, needs and values of all interested and affected parties will be taken into account in any decisions through the Public Participation Process - refer to Section F below.
- The social, economic and environmental impacts of the activity have been considered, assessed and evaluated, including the disadvantages and benefits – refer to Section F below.

The effects of decisions on all aspects of the environment and all people in the environment have been taken into account, by pursuing what is considered the best practicable environmental option – the proposed activity is expected to have minimal/negligible environmental impacts, especially after mitigation measures as described under Section F and in the EMPr are implemented. The social benefits are considered to outweigh any potential negative environmental impacts from the activity

SECTION E: DETAILS OF ALL THE ALTERNATIVES CONSIDERED

Note: Before completing this section, first consult this Department's Circular EADP 0028/2014 (dated 9 December 2014) on the "One Environmental Management System" and the EIA Regulations, 2014 (as amended), any subsequent Circulars, and guidelines available on the Department's website <http://www.westerncape.gov.za/eadp>.

The EIA Regulations, 2014 (as amended) defines "alternatives" as "*in relation to a proposed activity, means different means of fulfilling the general purpose and requirements of the activity, which may include alternatives to the—*

(a) property on which or location where the activity is proposed to be undertaken;

(b) type of activity to be undertaken;

(c) design or layout of the activity;

(d) technology to be used in the activity; or

(e) operational aspects of the activity;

(f) and includes the option of not implementing the activity;"

The NEMA (section 24(4)(a) and (b) of the NEMA, refers) prescribes that the procedures for the investigation, assessment and communication of the potential consequences or impacts of activities on the environment must, *inter alia*, with respect to every application for environmental authorisation –

- ensure that the general objectives of integrated environmental management laid down in the NEMA and the National Environmental Management Principles set out in the NEMA are taken into account; and
- include an investigation of the potential consequences or impacts of the alternatives to the activity on the environment and assessment of the significance of those potential consequences or impacts, including the option of not implementing the activity.

The general objective of integrated environmental management (section 23 of NEMA, refers) is, *inter alia*, to "*identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage, the risks and consequences and alternatives and options for mitigation of activities, with a view to minimising negative impacts, maximising benefits, and promoting compliance with the principles of environmental management*" set out in the NEMA.

The identification, evaluation, consideration and comparative assessment of alternatives directly relate to the management of impacts. Related to every identified impact, alternatives, modifications or changes to the activity must be identified, evaluated, considered and comparatively considered to:

- in terms of negative impacts, firstly avoid a negative impact altogether, or if avoidance is not possible alternatives to better mitigate, manage and remediate a negative impact and to compensate for/offset any impacts that remain after mitigation and remediation; and
- in terms of positive impacts, maximise impacts.

1. DETAILS OF THE IDENTIFIED AND CONSIDERED ALTERNATIVES AND INDICATE THOSE ALTERNATIVES THAT WERE FOUND TO BE FEASIBLE AND REASONABLE

Note: A full description of the investigation of alternatives must be provided and motivation if no reasonable or feasible alternatives exists.

(a) Property and **location/site** alternatives to avoid negative impacts, mitigate unavoidable negative impacts and maximise positive impacts, or detailed motivation if no reasonable or feasible alternatives exist:

In the April 2017 amendment to the 2014 EIA regulation under NEMA, Appendix 1(3)(1)(h)(x) it states: 3(1) "A basic assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include- (h) a full description of the process followed to reach the proposed preferred alternative within the site, including: (x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such;

Site/ Location Alternatives for Proposed Ponds Upgrade & Expansion:

This is an upgrade and expansion of an existing facility. Therefore, no site alternatives were investigated as the project aims to upgrade and expand the existing Klaarstroom WWTP. The location of the WWTP and its proposed extensions are favoured as the natural slope assists in allowing gravity flow through the system and also decreased the volumes of earth works required for construction (Bvi Technical Report, 2018).

Site/ Location Alternative for Proposed Establishment of Temporary Drying beds for drying of sludge:

The area selected for the establishment of the temporary drying beds on site is the area initially dedicated to the proposed disposal of the sludge and grit and screenings to land as agreed upon in the meeting held on 25 July 2019. It is proposed that the temporary 'drying bed' have a footprint of $\pm 250\text{m}^2$ with a $\pm 200\text{mm}$ to $\pm 500\text{mm}$ (max) high berm and an impermeable lining. Refer Appendix L for the email summary and meeting register. The area selected for the establishment is considered completely transformed. The existing inlet works and septic tanks is currently situated here and will be demolished. Please refer to locality maps Appendix A.

- (b) **Activity** alternatives to avoid negative impacts, mitigate unavoidable negative impacts and maximise positive impacts, or detailed motivation if no reasonable or feasible alternatives exist:

Activity Alternatives for Proposed Ponds Upgrade & Expansion:

This is an upgrade and expansion of an existing facility. Therefore, no Site/ Location or Activity Alternatives were investigated for the upgrade of the ponds.

The other option in terms of activity is the No-Go option. The No-Go option will mean that the ponds will remain as is, risking the health of surrounding communities as well as the environment

Activity Alternative for Handling & Disposing of the existing sludge:

As described in the Project Description Section above, one of the constraints of the project was to determine the best way to handle the existing wastewater sludge within the existing ponds on site to be able to construct the proposed two new Anaerobic Ponds, Aerobic Pond No.1 and reshaping and refurbish the new Facultative Pond. Another challenge was to determine an acceptable solution for the disposal of the existing wastewater sludge within the existing ponds on site in such a way to benefit the environment and to not delay the project.

A meeting was held between EnviroAfrica The Department of Environment and Development Planning Directorate Waste Management and Directorate Pollutions and Chemicals Management, where alternatives were discussed and the preferred Alternative was agreed upon. Please refer to the meeting register as well as an email summary of the discussion that took place in the meeting, Appendix F7.4

Alternative A (Preferred):

Establish temporary drying beds for sludge to dry. Send sludge for testing & classification to determine appropriate method of disposal.

It is proposed to construct a temporary drying bed in the area initially dedicated to the proposed disposal of the sludge grit & screenings. It is proposed that the temporary drying beds have a footprint of $\pm 250\text{m}^2$ with a berm $\pm 200\text{mm}$ to $\pm 500\text{mm}$ high and an impermeable liner. It is proposed that the sludge be mixed with onsite soil to a consistency that it can be comfortably handled and be pumped onto the lined drying bed to dry. As soon as the sludge is dry, samples will be taken and the sludge is to be sent for testing and classification at a SANAS accredited laboratory. Sludge not to be stored for longer than 90 days to qualify a temporary storage. The classification results will guide the suitable method of disposal as per Volume 1- 5 of the "Guidelines for the utilization and disposal of wastewater sludge", Water Research Commission, TT 261/07, 2006.

It was agreed that the test result be made available to DEADP Directorate: Waste Management and Directorate: Pollutions and Chemicals Management to confirm best method for disposal. If sludge is of suitable quality, land farming is considered a viable and affordable option for disposal, alternatively, disposal at a licenced, registered facility.

Alternative A is therefore the preferred (and only) alternative for the handling and disposal of wastewater sludge on site.

Drying beds must conform to NEM:WA (Act No. 59 of 2008): Norms and Standards for the storage of waste GN No. 926.

The Applicant must also adhere to Section 28 of the NEMA, the duty of care The section 28 duty of care under NEMA requires every person who causes, has caused or may cause significant pollution or degradation of the environment to take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environmental is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution and degradation of the environment. "Reasonable measures" include measures to: investigate, assess and evaluate the impact on the environment; cease, modify or control any act causing pollution or degradation and remedying the effect of pollution or degradation

Alternative B (Not preferred):

Tanker sludge to a larger Waste Water Treatment Works for disposal

Another alternative that was considered was to tanker the untested sludge to a larger Waste Water Treatment Works (WWTW) such as Prince Albert WWTW. However, this will only be allowed should the facility confine to acceptable method of sludge disposal as per Volume 1-5 of the "Guidelines for the

utilization and disposal of wastewater sludge”, Water Research Commission, TT 261/07, 2006. It is unlikely that a WWTP facility will accept untested sludge. To determine if Prince Albert WWTP sludge disposal is currently according to legislated standards is beyond the scope of work for this project. For this reason this alternative is not considered a viable alternative and not investigated any further.

It is proposed that the sludge be tested to determine the best method of disposal as proposed in Alternative A above.

Alternative C Not preferred):

Bury sludge on site

The original and only alternative investigated initially was to bury untested sludge on site in a dedicated area. This alternative is however not favoured by DEA&DP: Directorate Waste Management and Directorate Pollution and Chemicals Management without the obtainment of a waste license. As a precautionary principle, the untested sludge is considered hazardous. According the NEM:WA the burying of any quantity of hazardous waste to land will require a waste licence which will be a timeous and expensive process. Alternative C is therefore not considered a viable alternative and is therefore not preferred.

It proposed that the sludge be tested to determine the best acceptable method of disposal as proposed in Alternative A above.

Activity Alternative for Irrigation of treated effluent of sports field:

It would be beneficial to use the treated, final effluent for irrigation of the sports field in Klaarstroom village, hereby not using drinking water and reducing water demand in a drought stricken town. Therefore no other activity alternatives for the use of the treated effluent was not considered.

Irrigation of the sports field with the final treated effluent. will be made possible by using a gravity system as the wastewater treatment plant is located at a higher elevation that the village. It is proposed to construct a 160mm ø uPVC pipeline of ±500m in length from the effluent storage point which will terminate in a new galvanized dam at the sports field. A small pump station (2m²) will be provided at the dam to provide a flow of 4.5l/s at a head of 3.5bar feeding a crawling irrigator which will be used to irrigate the sports field. A chip doser for the dosing of a calcium hypochlorite solution into the circular dam will be provided to disinfect the final effluent prior to irrigation to avoid any pathogens from remaining in the irrigation water.

The other option would be No-Go. This means that the current situation will remain where the final effluent from the current oxidation pond is used to irrigate the veld north of the ponds. The current effluent is not considered up to standard for irrigation. This effluent eventually finding its way into the Sand river. The No-go option with regards to the irrigation of treated effluent is therefore not preferred.

- (c) **Design or layout** alternatives to avoid negative impacts, mitigate unavoidable negative impacts and maximise positive impacts, or detailed motivation if no reasonable or feasible alternatives exist:

Layout/ Design Alternative for Proposed Ponds Upgrade & Expansion:

Due to the fact that the refurbishment and proposed new ponds are servicing an existing plant and expanding the existing WWTP capacity. The layout and design alternatives are limited to accommodate existing infrastructure and pipes.

The design and layout for the upgrade was chosen so that the natural slope assists gravity flow through the system and also decreases the volumes of earthworks required for construction.

The flow through the oxidation ponds is by means of gravity. Subsequently, the direction of the natural slope of the land must be followed to utilize gravity. Therefore, the natural occurring terrain dictates the direction in which the upgrade and new extensions must take place. Any other options or layouts would require pumping to transfer wastewater from one pond to the next. Hence the layout as proposed.

Layout/ Design Alternatives for Proposed Pipeline Alternatives:

The final effluent is to be utilized for irrigation of sports fields in Klaarstroom village. This will be made possible by using a gravity system as the wastewater treatment plant is located at a higher elevation than the village. It is proposed to construct a 160mm Ø uPVC pipeline of ±500m in length from the effluent storage point which will terminate in a new galvanized dam at the sports field.

Various pipeline alternatives are investigated, Figure 5, 6 & 7 in the Locality Maps Appendix A and the figure below.

Alternative A (Not preferred/ not viable):

Pipeline route Alternative A, represented by the purple line was originally the preferred route. It was proposed that this route will cross the N12 road through an existing culvert. However, after consultation with SANRAL and PGWC: Department of Transport and Public Works it was decided that this route is not viable as the PGWC will not consider an application proposing to cross the road via a culvert or by means of trenching, only trenchless technology will be considered. Please refer to the Comment and Response Report (Appendix F1) and Original Comments (Appendix F1.3).

Alternative B (Not preferred):

Pipeline route Alternative B, represented by the red line was also investigated. It was proposed that the pipeline will cross the N12 on private land under the bridge and run parallel to the Sand river. This route will impact on the banks of the Sand River and require landowner consent from the neighbour and possibly trigger a WULA 21 i and is therefore not preferred.

Alternative C (Most preferred):

Pipeline route Alternative C, represented by the blue line on the locality maps, is now considered the Preferred Alternative. The route changed slightly and is shorter than pipeline route Alternative A approximately, ±270m. It is proposed that the pipeline will follow the same route as Alternative A, past the road maintenance camp, up until point c (Figure 7, Locality Maps, Appendix A). It is proposed that this route will cross the N12 via Horizontal Directional Drilling from where it will terminate in the proposed irrigation dam.

Alternative D (Preferred):

Pipeline route Alternative D, represented by the green line on the locality maps, is also considered an preferred alternative. This proposed pipeline follows the same route as Alternative C until the point where it is proposed that Alternative C crosses the N12 (point c Figure 7, Locality Maps, Appendix A). It is proposed that pipeline route Alternative D follows the road reserve on the Northern side of the N12 until the existing bridge to the west of the site. From here it is proposed that the pipe be attached to the bridge to cross the road and river to the South of the N12. The pipeline to remain within the road reserve until the point where it crosses into the school property and terminated within the proposed irrigation dam. No listed activities will be triggered as the pipeline is to remain within the road reserve. Approximate length of the pipeline is ±590m.

Pipeline Alternative D is also preferred. Pipeline Alternative A is more preferred as it is shorter. The final pipeline route will depend on whether the necessary approvals can be obtained.

Please also refer to site photographs, Appendix C.

The Water Resources map (**Appendix D**) from Cape Farm Mapper indicate that the proposed pipeline routes, Alternative A, C and D, will cross a small section of a non-perennial river/ drainage line.

However, as described above, according to the freshwater report this drainage line was not observed during the site visit on 23 January 2019. The report states that the ground is very level, leaving uncertainty to where the storm water flows. Instead of the drainage line, a culvert (refer to Figure 6 & Figure 7) was observed under the N12 for letting stormwater through that might have accumulated against the northern shoulder of the road. A swale with a hard surface stretches from the culvert to the south into the Klaarstroom township (Figure 8). This is part of the storm water system that releases its water into the Sand River south of the township.

Therefore, the preferred pipeline routes, Alternative C and D will not impact on any drainage lines.

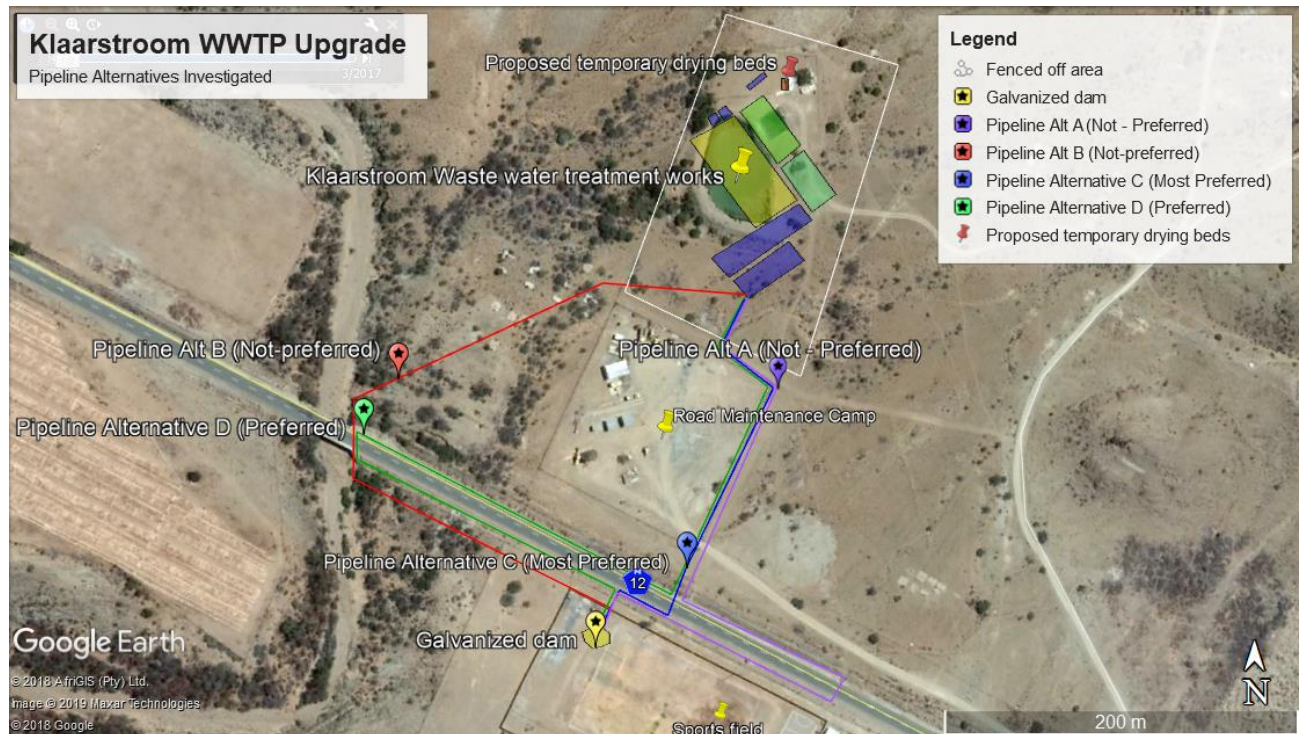


Figure 19: Pipeline route alternatives considered. Pipeline Route Alt A, red line, was originally the preferred but is not considered viable. Pipeline Route Alt B, purple line, not preferred as it will require a WUL and Land owner consent, Pipeline Route Alt C, blue line, most preferred alternative, to cross the N12 via horizontal directional drilling, Pipeline route Alt D, green line also considered preferred, to cross the N12 via an existing bridge and remain within road reserves.

Design/layout for the galvanized irrigation dam Alternatives:

The galvanized irrigation dam will have a storage capacity of $\pm 121\text{m}^3$ and dimensions of $\pm 10\text{m}$ diameter $\pm 1.55\text{m}$ high. It is proposed the be covered with a galvanized sheeting roof structure. The dam will be fire retardant and manufactured from Aluzinc corrugated sheets of 0.8mm thickness. The dam to be provided with an 800g/m² supported PVC Liner which carries a 12 year warrantee. The liners are UV stabilised and contain biocides to minimise fungus growth thus making it suitable for water storage.

No other alternatives for the proposed irrigation dam was investigated as design as described above is considered the best design option for the proposed project based on budgetary constraints.

- (d) **Technology** alternatives (e.g., to reduce resource demand and increase resource use efficiency) to avoid negative impacts, mitigate unavoidable negative impacts and maximise positive impacts, or detailed motivation if no reasonable or feasible alternatives exist:

Technology Alternatives for Proposed Ponds Upgrade & Expansion:

Although higher level technologies for WWTP exist they are both expensive and energy intensive. Given the Municipalities financial difficulties and lack of high level technical capacity to operate and maintain technologically advanced treatment options, only lower level technologies were considered.

The following section for the motivation of an Oxidation Pond System was taken from the BVI Technical Report. Appendix K.

Klaarstroom has a hot dry climate and the area is considered semi-arid. This and the fact that there is the land space available, makes the area suitable for utilization of natural treatment systems such as oxidation ponds and constructed wetlands/ reedbeds.

The Oxidation Pond systems was considered the favourable option as these pond systems are every popular in small communities such as Klaarstroom, due to low construction and operating costs. Oxidation ponds are a natural treatment system which means that the wastewater is treated under naturally occurring conditions and that the process cannot be manipulated by external means. Due to the nature of these two systems, they serve to complement each other, with the reedbeds correcting the inadequacies of the oxidation pond systems. Oxidation ponds and Reed Beds are not technically complex to operate. No special human intervention is required to operate the process except for the occasional removal of floating debris off the surface of the ponds and normal maintenance in terms of the inlet works where rags and grit are removed. The advantage of “natural systems” are that they continue to function even if they are severely neglected in terms of normal maintenance, as they are only dependant on naturally occurring processes.

Other technologies considered in terms of the irrigation of the final effluent include:

A small pump station (2m²) will be provided at the dam to provide a flow of 4.5l/s at a head of 3.5bar feeding a crawling irrigator which will be used to irrigate the sports field.

A chip doser for the dosing of a calcium hypochlorite solution into the circular dam will be provided to disinfect the final effluent prior to irrigation to avoid any pathogens from remaining in the irrigation water

- (e) **Operational** alternatives to avoid negative impacts, mitigate unavoidable negative impacts and maximise positive impacts, or detailed motivation if no reasonable or feasible alternatives exist:

Operational Alternatives of the Proposed Ponds Upgrade & Expansion:

No other operational alternatives have been considered as viable alternatives (as described above). Oxidation Ponds generally require very little human intervention due to it being a naturally occurring process. Subsequently, no alternative operations were considered. Once the current plant has been upgraded and the process established, it will provide a nuisance free treatment option at a low economic operational cost.

Operational Alternatives of the Handling & Disposal of Daily Grit & Screenings:

The daily degritting of the inlet works to take place. It is expected that daily grit & screening will be less than one wheelbarrow load day. It can be assumed that a wheelbarrow has a volume of approximately 65 litres or 0.065 m³. It can be calculated that the expected grit and screenings per month will be approximately 1.95m³ (65 litre x 30 days).

A meeting was held between EnviroAfrica The Department of Environment and Development Planning Directorate Waste Management and Directorate Pollutions and Chemicals Management, where alternatives were discussed in terms of the handling and disposal of the daily grit & screenings. The preferred Alternative was agreed upon. Please refer to the meeting register as well as an email summary of the discussion that took place in the meeting, Appendix F4.7

Alternative A (Preferred):

Temporary Storage of daily grit & screenings in a skip on site for disposal at a licensed facility.

The Operational Management Plan (Appendix H2) states that the Process Controller will remove the settled grit from the bottom of the channel with a shovel and place the grit on an area adjacent to the channel to allow the grit to dry and the water to drain into the channel.

It is proposed that the drying of the grit next to the inlet works channel be on a bunded concrete slab with a channel to allow the water to flow back into the channel. Grit & Screenings not to be placed on bare soil for drying. The process controller to sprinkle lime on the drying beds grit to discourage flies and odours.

Dried grit & screenings to be stored in a skip on site from where it will be disposed of at a licensed, registered facility. It is preferred that the skip have a lid. Skip to be placed close to the inlet works for ease of disposal into the skip. The final location of the skip to be approved by the ECO on site.

It is proposed that the first batch of grit & screenings be tested to determine a suitable facility for disposal at a licensed facility. Screenings and grit to be disposed of at an appropriate registered facility on a monthly basis. Grit & screenings not to be stored for more than 90 days before disposal.

It is proposed that the grit & screenings be tested every 1-3 years to determine if disposal method is still suitable. Should the quantity of grit & screenings at the facility reach the threshold volumes for the Norms and Standards for waste, the facility will need to be registered and adhere to the norms and standards.

The Applicant must also adhere to Section 28 of the NEMA, the duty of care. The section 28 duty of care under NEMA requires every person who causes, has caused or may cause significant pollution or degradation of the environment to take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution and degradation of the environment. "Reasonable measures" include measures to: investigate, assess and evaluate the impact on the environment; cease, modify or control any act causing pollution or degradation and remedying the effect of pollution or degradation.

Alternative B (Not preferred):

Add Grit & Screening to a larger Waste Water Treatment Works for disposal

Grit & Screenings to be added to grit & screening of the larger Waste Water Treatment Works such as Prince Albert WWTW. It is unsure if the current management and disposal of grit & screenings at this facility is occurring in a lawful manner and beyond the scope of work for this project. For this reason this alternative is not considered viable and not investigated further. Alternative A is considered most preferred.

Alternative C (Not preferred):

Bury grit & screenings in trenches on site

The original and only alternative investigated initially proposed that daily grit & screenings be disposed of in trenches on the site, within the fenced off area. It was proposed to dig two trenches of about 1.8m deep and 10m long. Each day's solids are then placed in the length of the trench, sprinkled with lime and then covered with a layer of soil. When the trench is full up to 300mm, it is completely closed and a new trench is dug. This alternative was not preferred by DEADP Directorate: Waste Management and Directorate: Pollutions and Chemicals Management without the obtainment of a waste license. Untested grit & screenings is considered hazardous waste. It is proposed that the grit & screenings be tested to determine the best method of disposal at a licensed facility, as suggested in Alternative A.

Operational Alternatives Future Sludge Management

The new Anaerobic Ponds will accumulate sludge. At normal rates, it would be required that these ponds be de-sludged once in 5 to 7 years. Based on comments Bvi (Appendix F1 for C&RR) the volume of sludge expected after 7 years equates to approximately 43m³ after 7 years.

It was agreed in the with DEADP: Directorate Waste Management and Pollutions and Chemicals Management that when ponds are to be de-sludged in future (approx. 5-7 years) sludge needs to be dried as per the method described above (Alternative A for sludge handling and disposal). Sludge to be tested and classified to determine best method of disposal.

- (f) The option of **not implementing** the activity (the 'No-Go' Option):

The no-go option will result in the status quo of the current Klaarstroom WWTP being maintained or even worsen.

The existing Klaarstroom WWTP has become both hydraulically and organically overloaded with the current effluent being non-compliant with all the important parameters. This is a clear indication that the plant is overloaded and requires urgent extension to cope with the incoming flow and organic load. The current disposal of effluent takes place by sprinkling effluent in the veld. The option of not utilizing final effluent for irrigation of the sports field might lead to the effluent ending up in the Sand river south of Klaarstroom.

The no-go option will mean that the existing ponds will remain and desludging of the ponds will probably never occur, only contributing to the organically and hydraulically overloaded plant and irrigation will continue to take place as is current practice being non compliant with non-compliant parameters. Alternatively the ponds will be desludged in an uncontrolled manner that can potentially harm the environment and place surrounding communities at risk.

The "no-go" alternative is therefore not considered the 'best practical environmental option'.

The proposed upgrade and increase the capacity of the Klaarstroom WWTP will improve the final effluent and is in line with the Prince Albert IDP 2017. Should the project be approved, the disposal and efficient use of wastewater sludge can occur in a more controlled and environmentally sound manner.

- (g) **Other** alternatives to avoid negative impacts, mitigate unavoidable negative impacts and maximise positive impacts, or detailed motivation if no reasonable or feasible alternatives exist:

All alternatives considered are discussed above.

(h) Provide a **summary** of all alternatives investigated and the outcome of each investigation:

- **Location/ Site Alternatives:**

- **Proposed Ponds Upgrade & Expansion:**

This is an upgrade and expansion of an existing facility. Therefore, no site alternatives were investigated as the project aims to upgrade and expand the existing Klaarstroom WWTP. The location of the WWTP and its proposed extensions are favoured as the natural slope assists in allowing gravity flow through the system and also decreased the volumes of earth works required for construction (Bvi Technical Report, 2018).

- **Site/ Location Alternative for Proposed Establishment of Temporary Drying beds:**

The area selected for the establishment of the temporary drying beds on site is the area initially dedicated to the proposed disposal of the sludge and grit and screenings to land as agreed upon in the meeting held on 25 July 2019. It is proposed that the temporary 'drying bed' have a footprint of $\pm 250\text{m}^2$ with a $\pm 200\text{mm}$ to $\pm 500\text{mm}$ (max) high berm and an impermeable lining. Refer Appendix L for the email summary and meeting register. The area selected for the establishment is considered completely transformed. The existing inlet works and septic tanks is currently situated here and will be demolished. Please refer to locality maps Appendix A.

- **Activity Alternatives:**

- **Proposed Ponds Upgrade & Expansion:**

This is an upgrade and expansion of an existing facility. Therefore, no Site/ Location or Activity Alternatives were investigated for the upgrade of the ponds. The other alternative in terms of this activity is the No-Go option. The No-Go option will mean that the ponds will remain as is, hydraulically and organically overloaded, risking the health of surrounding communities as well as the environment in the future.

- **Handling & Disposing of the existing sludge:**

Alternative A: Establish temporary drying beds for sludge to dry. Send sludge samples for testing & classification to determine appropriate method of disposal – **Preferred**

Alternative B: Tanker sludge to a larger Waste Water Treatment Works for disposal – Not Preferred

Alternative C: Bury untested sludge on site – Not preferred

- **Irrigation of treated effluent of sports field **

It would be beneficial to use the treated, final effluent for irrigation of the sports field in Klaarstroom village, hereby not using drinking water and reducing water demand in a drought stricken town. Therefore no other activity alternatives for the use of the treated effluent was not considered.

Irrigation of the sports field with the final treated effluent. will be made possible by using a gravity system as the wastewater treatment plant is located at a higher elevation than the village. It is proposed to construct a 160mm \varnothing uPVC pipeline of $\pm 500\text{m}$ in length from the effluent storage point which will terminate in a new galvanized dam at the sports field. A small pump station (2m^2) will be provided at the dam to provide a flow of 4.5l/s at a head of 3.5bar feeding a crawling irrigator which will be used to irrigate the sports field. A chip doser for the dosing of a calcium hypochlorite solution into the circular dam will be provided to disinfect the final effluent prior to irrigation to avoid any pathogens from remaining in the irrigation water.

The other alternative for this activity will be the No-go option. The No-Go option will mean that the quality of the effluent will remain (non-compliant with current crucial parameters) and the current practice of disposing the effluent in the veld will continue, risking the low quality effluent ending up in the Sand River.

- **Layout/ Design Alternatives:**

- **Proposed Ponds Upgrade & Expansion:**

Due to the fact that the refurbishment and proposed new ponds are servicing an existing plant and expanding the existing WWTP capacity. The layout and design alternatives are limited to accommodate existing infrastructure and pipes. The design and layout for the upgrade was chosen so that the natural slope assists gravity flow through the system and also decreases the volumes of earthworks required for construction.

The flow through the oxidation ponds is by means of gravity. Subsequently, the direction of the natural slope of the land must be followed to utilize gravity. Therefore, the natural occurring terrain dictates the direction in which the upgrade and new extensions must take place. Any other options or layouts would require pumping to transfer wastewater from one pond to the next. Hence the layout as proposed.

- Proposed Pipeline Alternatives:

Alternative A: Pipeline route Alternative A, represented by the purple line was originally the preferred route. It was proposed that this route will cross the N12 road through an existing culvert – **Not preferred/ not viable**

Alternative B: Pipeline route Alternative B, represented by the red line was also investigated. It was proposed that the pipeline will cross the N12 on private land under the bridge and run parallel to the Sand river – **Not preferred**

Alternative C: Pipeline route Alternative C, represented by the blue line. It is proposed that this route will cross the N12 by means of Horizontal Directional Drilling – **Most Preferred**

Alternative D: Pipeline route Alternative D, represented by the green line. It is proposed the pipeline follow the same route as Alternative C. It is proposed that pipeline route Alternative D follows the road reserve on the Northern side of the N12 until the existing bridge to the west of the site. From here it is proposed that the pipe be attached to the bridge to cross the road and river to the South of the N12. The pipeline to remain within the road reserve until the point where it crosses into the school property and terminated within the proposed irrigation dam – **Preferred**

Pipeline Alternative D is also preferred. Pipeline Alternative A is more preferred as it is shorter. The final pipeline route will depend on whether the necessary approvals can be obtained.

- Proposed galvanized irrigation dam Alternatives:

The galvanized irrigation dam will have a storage capacity of $\pm 121\text{m}^3$ and dimensions of $\pm 10\text{m}$ diameter $\pm 1.55\text{m}$ high. It is proposed to be covered with a galvanized sheeting roof structure. The dam will be fire retardant and manufactured from Aluzinc corrugated sheets of 0.8mm thickness. The dam to be provided with an 800g/m² supported PVC Liner which carries a 12 year warrantee. The liners are UV stabilised and contain biocides to minimise fungus growth thus making it suitable for water storage.

No other alternatives for the proposed irrigation dam was investigated as design as described above is considered the best design option for the proposed project based on budgetary constraints.

- Technology Alternatives:

- Technology Alternatives for Proposed Ponds Upgrade & Expansion:

Although higher level technologies for WWTP exist they are both expensive and energy intensive. Given the Municipality's financial difficulties and lack of high level technical capacity to operate and maintain technologically advanced treatment options, only lower level technologies were considered. The Oxidation Pond systems was considered the favourable option as these pond systems are very popular in small communities such as Klaarstroom, due to low construction and operating costs.

Other technologies considered in terms of the irrigation of the final effluent include:

A small pump station (2m²) will be provided at the dam to provide a flow of 4.5l/s at a head of 3.5bar feeding a crawling irrigator which will be used to irrigate the sports field.

A chip doser for the dosing of a calcium hypochlorite solution into the circular dam will be provided to disinfect the final effluent prior to irrigation to avoid any pathogens from remaining in the irrigation water

- **Operational Alternatives:**

- **Proposed Ponds Upgrade & Expansion:**

No other operational alternatives have been considered as viable alternatives (as described above). Oxidation Ponds generally require very little human intervention due to it being a naturally occurring process. Subsequently, no alternative operations were considered. Once the current plant has been upgraded and the process established, it will provide a nuisance free treatment option at a low economic operational cost

- **Handling & Disposal of Daily Grit & Screenings:**

Alternative A: Temporary Storage of daily grit & screenings in a skip on site. First batch of grit & screenings to be sent for testing and classification to determine disposal at a licensed facility – **Preferred**

Alternative B: Add Grit & Screening to a larger Waste Water Treatment Works for disposal – Not preferred

Alternative C: Bury untested grit & screenings in trenches on site – Not preferred

- **Operational Alternatives of Future Sludge Management:**

No other alternatives considered. It was agreed in the meeting held with DEADP: Directorate Waste Management and Pollutions and Chemicals Management that when ponds are to be de-sludged in future (approx. 5-7 years) sludge needs to be dried as per the method described above (Alternative A for sludge handling and disposal). Sludge to be tested and classified to determine best method of disposal.

- (i) Provide a detailed **motivation for not further considering** the alternatives that were found not feasible and reasonable, including a description and proof of the investigation of those alternatives:

- Handling & Disposing of the existing sludge:

Alternative B (Not preferred/not viable): Tanker the untested sludge to a larger Waste Water Treatment Works (WWTW) such as Prince Albert WWTW. However, this will only be allowed should the facility confine to acceptable method of sludge disposal as per Volume 1-5 of the "Guidelines for the utilization and disposal of wastewater sludge", Water Research Commission, TT 261/07, 2006. It is unlikely that a WWTW facility will accept untested sludge. To determine if Prince Albert WWTP sludge disposal is currently according to legislated standards is beyond the scope of work for this project. For this reason this alternative is not considered a viable alternative and not investigated any further. It is proposed that the sludge be tested to determine the best acceptable method of disposal as proposed in Alternative A and agreed upon in the meeting held on 25 July 2019. Refer Appendix F4.7 for the email summary and meeting register.

Alternative C (Not preferred/not viable): The original and only alternative investigated initially was to bury untested sludge on site in a dedicated area. This alternative is however not favoured by DEA&DP: Directorate Waste Management and Directorate Pollution and Chemicals Management without the obtainment of a waste license. As a precautionary principle, the untested sludge is considered hazardous. According to the NEM:WA the burying of any quantity of hazardous waste to land will require a waste licence which will be a timeous and expensive process. Alternative C is therefore not considered a viable alternative and is therefore not preferred.

It is proposed that the sludge be tested to determine the best acceptable method of disposal as proposed in Alternative A above and agreed upon by in the meeting held on 25 July 2019. Refer Appendix F4.7 for the email summary and meeting register.

- Proposed Pipeline Alternatives:

Alternative A (Not preferred/not viable): Pipeline route Alternative A, represented by the purple line was originally the preferred route. It was proposed that this route will cross the N12 road through an existing culvert. However, after consultation with SANRAL and PGWC: Department of Transport and Public Works it was decided that this route is not viable as the PGWC will not consider an application proposing to cross the road via a culvert or by means of trenching, only trenchless technology will be considered. Please refer to the Comment and Response Report (Appendix F1) and Original Comments (Appendix F1.3).

Alternative B (Not preferred/ not viable) : Pipeline route Alternative B, represented by the red line was also investigated. It was proposed that the pipeline will cross the N12 on private land under the bridge and run parallel to the Sand river. This route will impact on the banks of the Sand River and might trigger a WULA 21 (i) and is therefore not preferred. Land owner consent from will also need to be obtained as pipeline Alternative B will cross private land - Not preferred

Pipeline routes Alternative D and C is now considered preferred.

- Handling & Disposal of Daily Grit & Screenings:

Alternative B (Not preferred/not viable): Grit & Screenings to be added to grit & screening of the larger Waste Water Treatment Works such as Prince Albert WWTW. It is unsure if the current management and disposal of grit & screenings at this facility is occurring in a lawful manner and beyond the scope of work for this project. For this reason this alternative is not considered viable and not investigated further. Alternative A is considered most preferred and agreed upon in the meeting held on 25 July 2019. Refer Appendix F4.7 for the email summary and meeting register.

Alternative C (Not preferred/ not viable): The original and only alternative investigated initially proposed that daily grit & screenings be disposed of in trenches on the site, within the fenced off area. It was proposed to dig two trenches of about 1.8m deep and 10m long. Each day's solids are then placed in the length of the trench, sprinkled with lime and then covered with a layer of soil. When the trench is full up to 300mm, it is completely closed and a new trench is dug. This alternative was not preferred by DEADP Directorate: Waste Management and Directorate: Pollutions and Chemicals Management without the obtainment of a waste license. Untested grit & screenings is considered hazardous waste. It is proposed that the grit & screenings be tested to determine the best method of disposal at a licensed

facility, as suggested in Alternative A and agreed in the meeting held on 25 July 2019. Refer Appendix F4.7 for the email summary and meeting register.

2. PREFERRED ALTERNATIVE

- (a) Provide a **concluding statement** indicating the preferred alternative(s), including preferred location, site, activity and technology for the development.

Site/ Location Alternatives for Proposed Ponds Upgrade & Expansion:

This is an upgrade and expansion of an existing facility. Therefore, no site alternatives were investigated as the project aims to upgrade and expand the existing Klaarstroom WWTP on Remainder of Portion 32 of Farm Klaarstroom 178, Prince Albert, Western Cape. The location of the WWTP and its proposed extensions are favoured as the natural slope assists in allowing gravity flow through the system and also decreased the volumes of earth works required for construction (Bvi Technical Report, 2018).

Activity Alternatives for Proposed Ponds Upgrade & Expansion:

This is an upgrade and expansion of an existing facility. Therefore, no Site/ Location or Activity Alternatives were investigated for the upgrade of the ponds.

The other option in terms of activity is the No-Go option. The No-Go option will mean that the ponds will remain as is hydraulically and chemically overload, risking the health of surrounding communities as well as the environment in the future.

Layout/ Design Alternative for Proposed Ponds Upgrade & Expansion:

Due to the fact that the refurbishment and proposed new ponds are servicing an existing plant and expanding the existing WWTP capacity. The layout and design alternatives are limited to accommodate existing infrastructure and pipes. The design and layout for the upgrade was chosen so that the natural slope assists gravity flow through the system and also decreases the volumes of earthworks required for construction.

The flow through the oxidation ponds is by means of gravity. Subsequently, the direction of the natural slope of the land must be followed to utilize gravity. Therefore, the natural occurring terrain dictates the direction in which the upgrade and new extensions must take place. Any other options or layouts would require pumping to transfer wastewater from one pond to the next. Hence the layout as proposed.

Technology Alternatives for Proposed Ponds Upgrade & Expansion:

Although higher level technologies for WWTP exist they are both expensive and energy intensive. Given the Municipalities financial difficulties and lack of high level technical capacity to operate and maintain technologically advanced treatment options, only lower level technologies were considered.

Klaarstroom has a hot dry climate and the area is considered semi-arid. This and the fact that there is the land space available, makes the area suitable for utilization of natural treatment systems such as oxidation ponds and constructed wetlands/ reedbeds. The Oxidation Pond systems was considered the favourable option as these pond systems are every popular in small communities such as Klaarstroom, due to low construction and operating costs.

Operational Alternatives of the Proposed Ponds Upgrade & Expansion:

No other operational alternatives have been considered as viable alternatives (as described above). Oxidation Ponds generally require very little human intervention due to it being a naturally occurring process. Subsequently, no alternative operations were considered. Once the current plant has been upgraded and the process established, it will provide a nuisance free treatment option at a low economic operational cost.

Site/ Location Alternative for Proposed Establishment of Temporary Drying beds:

The area selected for the establishment of the temporary drying beds on site is the area initially dedicated to the proposed disposal of the sludge and grit and screenings to land as agreed upon in the meeting held on 25 July 2019. It is proposed that the temporary 'drying bed' have a footprint of $\pm 250\text{m}^2$ with a $\pm 200\text{mm}$ to $\pm 500\text{mm}$ (max) high berm and an impermeable lining. Refer Appendix F4.7 for the email summary and meeting register. The area selected for the establishment is considered completely transformed. The existing inlet works and septic tanks is currently situated here and will be demolished. Please refer to locality maps Appendix A.

Activity Alternative for Handling & Disposing of the existing sludge:

As described in the Project Description Section above, one of the constraints of the project was to determine the best way to handle the existing wastewater sludge within the existing ponds on site to be able to construct the proposed two new Anaerobic Ponds, Aerobic Pond No.1 and reshaping and refurbish the new Facultative Pond. Another challenge was to determine an acceptable solution for the disposal of the existing wastewater sludge within the existing ponds on site in such a way to benefit the environment and to not delay the project.

A meeting was held between EnviroAfrica The Department of Environment and Development Planning Directorate Waste Management and Directorate Pollutions and Chemicals Management, where alternatives were discussed and the preferred Alternative was agreed upon. Please refer to the meeting register as well as an email summary of the discussion that took place in the meeting, Appendix F4.7.

Alternative A (Preferred):

Establish temporary drying beds for sludge to dry. Send sludge for testing & classification to determine appropriate method of disposal.

It is proposed to construct a temporary drying bed in the area initially dedicated to the proposed disposal of the sludge grit & screenings. It is proposed that the temporary drying beds have a footprint of $\pm 250\text{m}^2$ with a berm $\pm 200\text{mm}$ to $\pm 500\text{mm}$ high and an impermeable liner. It is proposed that the sludge be mixed with onsite soil to a consistency that it can be comfortably handled and be pumped onto the lined drying bed to dry. As soon as the sludge is dry, samples will be taken and the sludge is to be sent for testing and classification at a SANAS accredited laboratory. Sludge not to be stored for longer than 90 days to qualify a temporary storage. The classification results will guide the suitable method of disposal as per Volume 1- 5 of the "Guidelines for the utilization and disposal of wastewater sludge", Water Research Commission, TT 261/07, 2006.

It was agreed that the test result be made available to DEADP Directorate: Waste Management and Directorate: Pollutions and Chemicals Management to confirm best method for disposal. If sludge is of suitable quality, land farming is considered a viable and affordable option for disposal, alternatively, disposal at a licenced, registered facility.

Alternative A is therefore the preferred (and only) alternative for the handling and disposal of wastewater sludge on site.

Drying beds must conform to NEM:WA (Act No. 59 of 2008): Norms and Standards for the storage of waste GN No. 926. The Applicant must also adhere to Section 28 of the NEMA, the duty of care.

Layout/ Design Alternatives for Proposed Pipeline Alternatives:

The final effluent is to be utilized for irrigation of sports fields in Klaarstroom village. This will be made possible by using a gravity system as the wastewater treatment plant is located at a higher elevation than the village. It is proposed to construct a 160mm \varnothing uPVC pipeline of $\pm 500\text{m}$ in length from the effluent storage point which will terminate in a new galvanized dam at the sports field.

Various pipeline alternatives are investigated, Figure 5, 6 & 7 in the Locality Maps Appendix A and the figure above.

Alternative C (Most preferred):

Pipeline route Alternative C, represented by the blue line on the locality maps, is now considered the Preferred Alternative. The route changed slightly and is shorter than pipeline route Alternative A approximately, $\pm 270\text{m}$. It is proposed that the pipeline will follow the same route as Alternative A, past the road maintenance camp, up until point c (Figure 7, Locality Maps, Appendix A). It is proposed that this route will cross the N12 via Horizontal Directional Drilling from where it will terminate in the proposed irrigation dam.

Alternative D (Preferred):

Pipeline route Alternative D, represented by the green line on the locality maps, is also considered an preferred alternative. This proposed pipeline follows the same route as Alternative C until the point where it is proposed that Alternative C crosses the N12 (point c Figure 7, Locality Maps, Appendix A). It is proposed that pipeline route Alternative D follows the road reserve on the Northern side of the N12 until the existing bridge to the west of the site. From here it is proposed that the pipe be attached to the bridge to cross the

road and river to the South of the N12. The pipeline to remain within the road reserve until the point where it crosses into the school property and terminated within the proposed irrigation dam. No listed activities will be triggered as the pipeline is to remain within the road reserve. Approximate length of the pipeline is $\pm 590\text{m}$.

Pipeline Alternative D is also preferred. Pipeline Alternative A is more preferred as it is shorter. The final pipeline route will depend on whether the necessary approvals can be obtained.

Please also refer to site photographs, Appendix C.

Activity Alternative for Irrigation of treated effluent of sports field:

It would be beneficial to use the treated, final effluent for irrigation of the sports field in Klaarstroom village, hereby not using drinking water and reducing water demand in a drought stricken town. Therefore no other activity alternatives for the use of the treated effluent was not considered.

Irrigation of the sports field with the final treated effluent. will be made possible by using a gravity system as the wastewater treatment plant is located at a higher elevation than the village. It is proposed to construct a 160mm \varnothing uPVC pipeline of $\pm 500\text{m}$ in length from the effluent storage point which will terminate in a new galvanized dam at the sports field. A small pump station (2m^2) will be provided at the dam to provide a flow of 4.5l/s at a head of 3.5bar feeding a crawling irrigator which will be used to irrigate the sports field. A chip doser for the dosing of a calcium hypochlorite solution into the circular dam will be provided to disinfect the final effluent prior to irrigation to avoid any pathogens from remaining in the irrigation water.

The other option would be No-Go. This means that the current situation will remain where the final effluent from the current oxidation pond is used to irrigate the veld north of the ponds. The current effluent is not considered up to standard for irrigation. This effluent eventually finding its way into the Sand river. The No-go option with regards to the irrigation of treated effluent is therefore not preferred.

Design/Layout Alternative for Proposed Galvanized Irrigation dam:

The galvanized irrigation dam will have a storage capacity of $\pm 121\text{m}^3$ and dimensions of $\pm 10\text{m}$ diameter $\pm 1.55\text{m}$ high. It is proposed to be covered with a galvanized sheeting roof structure. The dam will be fire retardant and manufactured from Aluzinc corrugated sheets of 0.8mm thickness. The dam to be provided with an 800g/m² supported PVC Liner which carries a 12 year warrantee. The liners are UV stabilised and contain biocides to minimise fungus growth thus making it suitable for water storage.

No other alternatives for the proposed irrigation dam was investigated as design as described above is considered the best design option for the proposed project based on budgetary constraints.

Technologies considered in terms of the irrigation of the final effluent include:

A small pump station (2m^2) will be provided at the dam to provide a flow of 4.5l/s at a head of 3.5bar feeding a crawling irrigator which will be used to irrigate the sports field.

A chip doser for the dosing of a calcium hypochlorite solution into the circular dam will be provided to disinfect the final effluent prior to irrigation to avoid any pathogens from remaining in the irrigation water

Operational Alternatives of the Handling & Disposal of Daily Grit & Screenings:

The daily degritting of the inlet works to take place. It is expected that daily grit & screening will be less than one wheelbarrow load day. It can be assumed that a wheelbarrow has a volume of approximately 65 litres or 0.065 m³. It can be calculated that the expected grit and screenings per month will be approximately 1.95m³ (65 litre x 30 days).

A meeting was held between EnviroAfrica The Department of Environment and Development Planning Directorate Waste Management and Directorate Pollutions and Chemicals Management, where alternatives were discussed in terms of the handling and disposal of the daily grit & screenings. The preferred Alternative was agreed upon. Please refer to the meeting register as well as an email summary of the discussion that took place in the meeting, Appendix F4.7.

Alternative A (Preferred):

Temporary Storage of daily grit & screenings in a skip on site for disposal at a licensed facility.

The Operational Management Plan (Appendix H2) states that the Process Controller will remove the settled grit from the bottom of the channel with a shovel and place the grit on an area adjacent to the channel to allow the grit to dry and the water to drain into the channel.

It is proposed that the drying of the grit next to the inlet works channel be on a bunded concrete slab with a channel to allow the water to flow back into the channel. Grit & Screenings not to be placed on bare soil for drying. The process controller to sprinkle lime on the drying beds grit to discourage flies and odours.

Dried grit & screenings to be stored in a skip on site from where it will be disposed of at a licensed, registered facility. It is preferred that the skip have a lid. Skip to be placed close to the inlet works for ease of disposal into the skip. The final location of the skip to be approved by the ECO on site.

It is proposed that the first batch of grit & screenings be tested to determine a suitable facility for disposal at a licenced facility. Screenings and grit to be disposed of at an appropriate registered facility on a monthly basis. Grit & screenings not to be stored for more than 90 days before disposal.

It is proposed that the grit & screenings be tested every 1-3 years to determine if disposal method is still suitable. Should the quantity of grit & screenings at the facility reach the threshold volumes for the Norms and Standards for waste, the facility will need to be registered and adhere to the norms and standards.

Drying beds must conform to NEM:WA (Act No. 59 of 2008): Norms and Standards for the storage of waste GN No. 926. The Applicant must also adhere to Section 28 of the NEMA, the duty of care.

Operational Alternatives Future Sludge Management

The new Anaerobic Ponds will accumulate sludge. At normal rates, it would be required that these ponds be de-sludged once in 5 to 7 years. Based on comments Bvi (Appendix F1 for C&RR) the volume of sludge expected after 7 years equates to approximately 43m³ after 7 years.

It was agreed in the meeting held with DEADP: Directorate Waste Management and Pollutions and Chemicals Management that when ponds are to be de-sludged in future (approx. 5-7 years) sludge needs to be dried as per the method described above (Alternative A for sludge handling and disposal). Sludge to be tested and classified to determine best method of disposal.

SECTION F: ENVIRONMENTAL ASPECTS ASSOCIATED WITH THE ALTERNATIVES

Note: The information in this section must be DUPLICATED for all the feasible and reasonable ALTERNATIVES.

1. DESCRIBE THE ENVIRONMENTAL ASPECTS ASSOCIATED WITH THE PROPOSED DEVELOPMENT AND ITS ALTERNATIVES, FOCUSING ON THE FOLLOWING:

- (a) Geographical, geological and physical aspects:

Topography:

The Botanical Impact report (**Appendix G2**) stated that Klaarstroom is located in the valley bottom at the foot of the Swartberg Mountains where the Meiringspoort gorge opens up into the Great Karoo. The WWTP upgrade and pipeline will be located on an almost level area within this open valley. The slight slopes very slightly from northeast to southwest, from the WWTP, which is located at approximately 735 m above mean sea level, towards the town of Klaarstroom, which is located at approximately 730 m above mean sea level. The seasonal Sand River, passes to the northwest of the WWTP and drains into the Groot River, which passes behind (to the west) of Klaarstroom. It was clear that aspect did not have any significant influence on the vegetation encountered.

Geology & Soils:

The soils, according to the BVi technical report (**Appendix K**), have a high clay content. Underneath is Karoo shale, which is for the most part impermeable. This is advantageous to the operation of the WWTP, as penetration of moist from the ponds down into the ground water is prevented. Ground water is deep down, small in volume and mostly salty and with limited use.

According to Mucina and Rutherford (2006), the geology and soils can be described as sedimentary rocks of the Ecca Group (particularly the Fort Brown and Prince Albert Formations) together with diamictite of the Dwyka Group (most important in the area), and to a lesser extent shales and quartzites of the Devonian Witteberg Group. In places, Tertiary alluvial and slope deposits overlie these Karoo and Cape Supergroup rocks. This geology supports development of various cambisols and leptosols. Fc is the dominant land type, while Ag land type plays only a minor role.

Borehole testing results were obtained from Prince Albert Municipality and analysed by die Freshwater Specialist. The Freshwater report (Appendix G1) states that 6 boreholes in the vicinity of the WWTW has been tested, according to SRK testing sheets. One of them delivered 3ls-1, another 1.5ls-1 and the rest less than 0.5ls-1. Two of these deliver slightly salty water, but still fit for human use. One was fit for livestock watering. There are another 3 boreholes some 1.2 km downstream from the WWTW. These were drilled through the Sand River's alluvium, probably into a secondary aquifer below. These boreholes serve as water resource for Klaarstroom. Analytical laboratory analyses show no sign of any impact from the WWTW, with the potassium, ammonia and phosphorus levels not elevated in any way.

Vegetation:

From the Vegetation Map on Cape Farm Mapper (**Appendix D**) vegetation that would have been present on site is Prince Albert Succulent Karoo vegetation. This type of vegetation does not fall under the *National Environmental Management: Biodiversity Act 2004, National List of Ecosystems that are threatened and in need of protection (NEMBA)*. From google images vegetation on the site is sparse.

The following information was taken from the Botanical Impact report (**Appendix G2**).

The area that will be impacted by the proposed WWTW upgrade and pipeline is very small. If it is taken into account that the existing WWTW is already basically transformed, the additional footprint will be only about 5000 m², while the pipeline will have a temporary impact on between 500- 800 m of veld of which most is located in already disturbed or transformed (within the urban edge) veld portions

In Figure 8, the botanical specialist tries to illustrate the status of the veld, as encountered during the site visit. The areas in light orange are either transformed or much degraded as result of urban and associated impacts. No natural veld remains in these areas and only a few hardy or weedy indigenous plants were encountered. This includes the existing fenced off WWTW, where the only remaining natural species (apart from weeds growing in the slightly damper areas) is a number of *Vachellia karroo* (= *Acacia karroo*) trees around the property and the reed *Phragmites australis* within the existing ponds. It must be noted that all around the existing WWTW, the small tree *Vachellia karroo* were frequently encountered, clearly benefiting from the water bodies of the treatment works.

The vegetation can be described as a low (<0.5 m) sparse shrubland with a *Vachellia karroo* top stratum scattered throughout. The density of the *Vachellia karroo* over layer is probably slightly higher than expected (which is likely the result of the nearby WWTW and its water bodies). In between these trees the following

species were observed: the alien *Atriplex nummularia*, the low growing *Augea capensis* (common), the spiny *Blepharis mitrata*, *Cadaba aphylla*, *Carpobrotus edulis*, *Chrysocoma ciliata*, *Drosanthemum* species, *Eriocephalus* species, the disturbance indicator *Galenia africana*, the hardy *Lycium cinereum*, *Mesembryanthemum noctiflorum*, *Mesembryanthemum* cf. *juncum* (= *Psilocaulon*) species, *Mesembryanthemum guerichianum* ("soutslaii"), *Polygala leptophylla*, *Pteronia glabrata*, *Pteronia* cf. *pallens*, the thorny *Ruschia spinosa*, *Salsola kali* (disturbance indicator), *Salsola* cf. *aphylla*, *Tetraena lichtensteinianum*, *Tetraena simplex*, the semi-parasitic *Thesium lineatum* and *Tripteris* cf. *sinuata*.

The absence of many of the more palatable species suggests that the veld is grazed, although no domestic stock was observed on site. Grasses was notably absent, which is probably a combination of drought and grazing.

Preferred Pipeline Route as revised (Alternative C):

The originally preferred pipeline route will start within at the extended WWTW within the area described above (Refer to the blue line in the figure below). It will then be placed next to the fence of the Road camp within an area that has been cleared of vegetation (potentially a fire break)

From the road camp the pipeline will cross underneath the N14 south for about 250 – 300 m, into the disturbed road reserve to the south of the N14. It will then be located within the road reserve, for a short distance (approximately 30 m) before it enters the Klaarstroom sporting grounds and into a new reservoir (galvanised irrigation dam). The vegetation in road reserve can be described as very degraded with the only species of significance observed being a few small *Vachellia karroo* and hardy or weedy pioneer species like *Augea capensis*, *Galenia africana*, young *Lycium cinereum*, *Kali* species, and *Tetraena simplex*.

Alternative Pipeline Route as revised (Alternative D):

The alternative pipeline route will follow the same path as the preferred route (until it reaches the road reserve of the N12. It will then be located within the road reserve to the north of the N14, until it reaches the bridge over the Sand River. The pipe will then cross the N14 south underneath the bridge (attached to the bridge infrastructure). From the bridge it will again be located within the road reserve of the N12 back to the reservoir (galvanised irrigation dam) within the sporting grounds. Within the road reserve, the vegetation remains as described above.

The riparian vegetation along the Sand River (in the area near to the N14) was basically dominated by *Vachellia karroo*, with *Phragmites australis*, *Melanthus comosus* and *Searsia lancea* occasionally encountered.

Galvanised dam/ reservoir:

A small storage tank or reservoir will be placed within the existing Klaarstroom sport fields from where the sport fields can be irrigated. This reservoir will be located in this site with no natural veld remaining.

Threatened and protected plant species:

The Red List of South African Plants online provides up to date information on the national conservation status of South Africa's indigenous plants (SANBI, 2015).

- **No red-listed species** was observed.

The National Environmental Management: Biodiversity Act, Act 10 of 2004, provides for the protection of species through the "Lists of critically endangered, endangered, vulnerable and protected species" (GN. R. 152 of 23 February 2007).

- **No NEM: BA protected species** was observed.

The National Forests Act (NFA) of 1998 (Act 84 of 1998) provides for the protection of forests as well as specific tree species (as updated).

- **No species protected in terms of the NFA** was observed.

Critical Biodiversity Area/ Ecological Support Areas:

The Biodiversity Overlay Map from Cape Farm Mapper (**Appendix D**) indicate that the existing WWTP does fall within a CBA and that the alternative pipeline route (Alternative B, not preferred) will also impact on the ESA associated with the Sand River.

According to the Botanical Specialist Report (Appendix G2) the proposed infrastructure will be located within a terrestrial CBA, however, the purposes of the impact assessment it was taken into account that the pipeline will be located in areas already very much disturbed and that with the current CBA map, there is no alternative location that will fall outside of the CBA. It was also taken into account that the permanent enlargement of the footprint will be relatively small (5000 m²) and that the impact associated with the pipeline route will be temporary. It is also expected that with mitigation and rehabilitation the impact associated with the construction of the pipeline can be minimal.

According to the Botanical Specialist Report (**Appendix G2**) the main impacts associated with the proposed development will be on (1) a disturbed conservation priority area (CBA) and (2) a potential impact on a seasonal watercourse (if the alternative pipeline route is chosen)

Because of the degraded status of the site and the temporary nature of the impact, the cumulative impact from a biodiversity point of view, (even without mitigation), is expected to be relatively low, but this can be further reduced with mitigation.

Freshwater resources:

From the Water Resources Map on Cape Farm Mapper (**Appendix D**) a non-perennial river/ drainage line runs through the site. No wetlands present on site. Proposed pipeline route (Alternative A, C & D) will cross a non-perennial river/ drainage line.

However, according to the Freshwater Report (**Appendix G1**) this drainage line was not observed during the site visit on 23 January 2019. The report states that the ground is very level, leaving uncertainty to where the storm water flows. Instead of the drainage line, a culvert (refer to Figure 7 & Figure 8 above) was observed under the N12 for letting stormwater through that might have accumulated against the northern shoulder of the road. A swale with a hard surface stretches from the culvert to the south into the Klaarstroom township (Figure 9). This is part of the storm water system that releases its water into the Groot River south of the township.

Therefore, the preferred pipeline route Alternative C will not impact on any drainage lines.

Pipeline route Alternative B (red line in Figure 19 above) is not considered the preferred alternative as it is proposed to cross the N12 under the bridge and run parallel on the banks of Grootrivier. This proposed route will cross the Groot River and a S21 (i) WUL will be required. Land owner consent will also need to be obtained as pipeline Alternative B will cross private land. (Refer to the Freshwater specialist report **Appendix G1** as well as Sensitivity Maps **Appendix D**).

The existing WWTP straddles a drainage line, although the drainage line is very faint (refer Figure 7). The upgrade of the works will thus occur within this drainage line. The freshwater report states that during a very high rainfall event, the flow of water can be expected to be fast, with a high erosion potential evident from the deeply incised Groot Rivier and most drainage lines. The drainage line is separated from the next drainage line towards the east with a low ridge. The next drainage line is emphasised and clear.

The freshwater report (**Appendix G1**) further assess the Present Ecological State (PES) and Ecological Importance (EI) of these drainage lines as well as the Groot river.

According to the assessment, the upper part of the drainage line (Figure 7) is natural, with no impacts. Lower down, the drainage line is impacted by the municipal waste disposal site and irrigated area and the existing WWTP straddles the drainage line. Evidence of seepage exist downstream from the WWTP as there is a dense stand of shrub trees, more so than in the direct surroundings. The PES of both the instream habitat and riparian zone score a C (Moderately modified). The habitat has been impacted, but the basic ecological functioning remain intact.

The river reach of interest in the Groot river is upstream from the N12 road bridge. The Groot River reach upstream from the N12 road bridge is near-pristine, even though it is dry. Impacts include farm roads and four small farm dams. The river is incised and well demarcated at the N12 road bridge. The banks are steep and overgrown with *Vachelia karoo* (soetdoring) trees. A patch of *Phragmitis australis* reeds, then very dry, indicated that there is water from time to time. Downstream of the road bridge, where the western tributary joins the Groot River, the river is impacted by agricultural and probably the return flow from Klaarstroom, as there was a small pond of water overgrown with bulrush *Typha capensis*.

The PES of the Groot river has been classified as an A (Unmodified, natural), unimpacted and pristine.

In conclusion, the Klaarstroom drainage line is one of the smaller drainage lines entering the Groot river and although it has been classified as a C (moderately modified), it does not, according to the freshwater specialist, have any negative effect on the class A (Unmodified, natural) classification of the Groot river reach, if the WWTP is properly managed. It is not expected that the construction and operation the WWTP should negatively affect the PES classification in any way, given that the works will be properly managed and maintained

The Ecological Importance (EI) is based on the presence of especially fish species that are endangered on a local, regional or national level. There are no indigenous fish in the Groot River at Klaarstroom and its associated drainage lines, as there is no permanent water. According to freshwater assessment, which is prescribed for WULA's, the site and surrounds are not ecologically important. No other endangered species, either plant or animal, were detected in or near the drainage line.

The Ecological Sensitivity (ES) is often is often described as the ability of aquatic habitat to assimilate impacts. It is not sensitive if it remains the same despite of the onslaught of impacts. Put differently, sensitive habitat changes substantially, even under the pressure of slight impacts. The Ecological Sensitivity also refers to the potential of aquatic habitat to bounce back to an ecological condition closer to the situation prior to human impact. If it recovers, it is not regarded as sensitive. The question arises if the river south of Klaarstroom will recover if the ongoing impacts are removed.

The DWS, through a number of their official notifications pertaining to WULA's have indicated that dry drainage lines are considered to be sensitive. The dominant vegetation on the banks of the Groot River at Klaarstroom is *Vachelia karoo*, a tree that in many parts become invasive if land is disturbed or overgrazed. It can be expected that the riparian zone of the river south of Klaarstroom will be re-colonised by these trees, if the area is left to its own devices and if the perpetual impacts are terminated. From this point of view the riparian zone here is not sensitive.

The in-stream habitat would probably return to its original state, even though this may only take place after several large floods with a recurrence of once in 50 or 100 years, large enough to re-set the geomorphological status of the river.

However, these impacts are most unlikely to ever cease. It can be estimated that the Groot River at Klaarstroom and its associated dry tributaries, such as the one that at the WWTP, are less sensitive than the ones in the Northern Cape, but still sensitive. If rated in classes of sensitivity from highly sensitive, moderately sensitive and unsensitive, the Groot River at Klaarstroom can probably be rated as moderately sensitive.

The freshwater specialist is of the opinion that A WWTP is an ongoing operation. Therefore the possibility of an impact is an ongoing risk as well. The Upgrade of the Klaarstroom WWTP is not considered to detract from the river services, if it is properly managed. The freshwater specialist suggests that it is unlikely that the impacted conditions south of Klaarstroom may creep upstream to the confluence of the KLaarstroom drainage line. It is also unlikely that the small anaerobic pond system is to overflow into the adjacent river.

(b) Ecological aspects:

Will the proposed development and its alternatives have an impact on CBAs or ESAs? If yes, please explain: Also include a description of how the proposed development will influence the quantitative values (hectares/percentage) of the categories on the CBA/ESA map.	YES	NO
<p>According to the Botanical Specialist Report (Appendix G2) the main impacts associated with the proposed development will be on (1) a disturbed conservation priority area (CBA) and (2) a potential impact on a seasonal watercourse (if the alternative pipeline route, Alternative B, not preferred, is chosen)</p> <p>Because of the degraded status of the site and the temporary nature of the impact, the cumulative impact from a biodiversity point of view, (even without mitigation), is expected to be relatively low, but this can be further reduced with mitigation.</p> <p>Please refer to the explanation in Section 1 (a) above</p>		
Will the proposed development and its alternatives have an impact on terrestrial vegetation, or aquatic ecosystems (wetlands, estuaries or the coastline)? If yes, please explain:	YES	NO
<p>Please refer to the explanation in Section 1 (a) above</p>		
Will the proposed development and its alternatives have an impact on any populations of threatened plant or animal species, and/or on any habitat that may contain a unique signature of plant or animal species? If yes, please explain:	YES	NO
<p>According to the Botanical Impact Reports (Appendix G2) <u>Impact on threatened and protected plant species:</u></p> <p>The Red List of South African Plants online provides up to date information on the national conservation status of South Africa's indigenous plants (SANBI, 2015).</p> <ul style="list-style-type: none"> • No red-listed species was observed. <p>The National Environmental Management: Biodiversity Act, Act 10 of 2004, provides for the protection of species through the "Lists of critically endangered, endangered, vulnerable and protected species" (GN. R. 152 of 23 February 2007).</p> <ul style="list-style-type: none"> • No NEM: BA protected species was observed. <p>The National Forests Act (NFA) of 1998 (Act 84 of 1998) provides for the protection of forests as well as specific tree species (as updated).</p> <ul style="list-style-type: none"> • No species protected in terms of the NFA was observed. <p>According to the Freshwater Impact Report (Appendix G1):</p> <p>The Ecological Importance (EI) is based on the presence of especially fish species that are endangered on a local, regional or national level. There are no indigenous fish in the Groot River at Klaarstroom and its associated drainage lines, as there is no permanent water. According to freshwater assessment, which is prescribed for WULA's, the site and surrounds are not ecologically important. No other endangered species, either plant or animal, were detected in or near the drainage line.</p>		
Describe the manner in which any other biological aspects will be impacted:		
The proposed upgrade of the Klaarstroom WWTP is not expected to impact on other biological aspects.		
Will the proposed development also trigger section 63 of the NEM: ICMA?	YES	NO

If yes, describe the following:

(i) the extent to which the applicant has in the past complied with similar authorisations;

(ii) whether coastal public property, the coastal protection zone or coastal access land will be affected, and if so, the extent to which the proposed development proposal or listed activity is consistent with the purpose for establishing and protecting those areas;

(iii) the estuarine management plans, coastal management programmes, coastal management lines and coastal management objectives applicable in the area;

(iv) the likely socio-economic impact if the listed activity is authorised or is not authorised;

(v) the likely impact of coastal environmental processes on the proposed development;

(vi) whether the development proposal or listed activity—

(a) is situated within coastal public property and is inconsistent with the objective of conserving and enhancing coastal public property for the benefit of current and future generations;

(b) is situated within the coastal protection zone and is inconsistent with the purpose for which a coastal protection zone is established as set out in section 17 of NEM: ICMA;

(c) is situated within coastal access land and is inconsistent with the purpose for which coastal access land is designated as set out in section 18 of NEM: ICMA;

(d) is likely to cause irreversible or long-lasting adverse effects to any aspect of the coastal environment that cannot satisfactorily be mitigated;

(e) is likely to be significantly damaged or prejudiced by dynamic coastal processes;

(f) would substantially prejudice the achievement of any coastal management objective; or

(g) would be contrary to the interests of the whole community;

(vii) whether the very nature of the proposed activity or development requires it to be located within coastal public property, the coastal protection zone or coastal access land;

(viii) whether the proposed development will provide important services to the public when using coastal public property, the coastal protection zone, coastal access land or a coastal protected area; and

(ix) the objects of NEM: ICMA, where applicable.

(c) Social and Economic aspects:

What is the expected capital value of the project on completion?	R 4 023 758.82
What is the expected yearly income or contribution to the economy that will be generated by or as a result of the project?	R NIL
Will the project contribute to service infrastructure?	YES NO
Is the project a public amenity?	YES NO
How many new employment opportunities will be created during the development phase?	Approx. 15 persons
What is the expected value of the employment opportunities during the development phase?	R 587 530.00
What percentage of this will accrue to previously disadvantaged individuals?	100%
How will this be ensured and monitored (please explain):	
It is estimated that approximately 16 persons will be employed for the construction period. The construction period is expected to be 180 days, this then calculates to 2880 person days. At a minimum wage of R204-00 per day, this equates to a total value for local labour of R587 520-00 expenditure.	
How many permanent new employment opportunities will be created during the operational phase of the project?	One
What is the expected current value of the employment opportunities during the first 10 years?	R 1040 000.00
What percentage of this will accrue to previously disadvantaged individuals?	100%
How will this be ensured and monitored (please explain):	
There will be a Monthly Labour Report as part of the project reporting. This report must indicate the number of labourers employed and prove this with their Identity documents and payslips.	
Any other information related to the manner in which the socio-economic aspects will be impacted:	
N/A	

(d) Heritage and Cultural aspects:

According to the CTS Heritage Screener (**Appendix G3**) the WWTP is situated on the outskirts of a small Karoo town, and alongside a river, it is likely that Early, Middle and Later Stone Age artefacts are present within the WWTP site. In addition, some of the area has been surveyed for rock art by Nardell and a number of rock art sites have been identified within 20km of the proposed development area. However, as this site is already developed, and as this site is located far from any rocky outcrops, it is unlikely that any significant archaeological resources or rock art sites will be impacted by the proposed development.

The area proposed for development is underlain by siltstone, shale and arenaceous shale sediments of the Traka Subgroup of the Bokkeveld Group of the Cape Supergroup, of very high palaeontological sensitivity according to the SAHRIS Palaeosensitivity Map. According to SAHRIS, the Traka Subgroup is known for its fossils of fish (sharks, acanthodians, placoderms, bony fish, recorded especially from Da), bivalves and vascular plants (psilophytes, lycopods), common but low diversity trace fossils, including *Spirophyton*, and rare brachiopods. Tectonic deformation often limits fossil collection, especially within mudrock-rich horizons, and distorts fossils. Biostratigraphically and palaeoecologically important fossil assemblages are known from high palaeoaltitudes (such as the Klipbakkop and Adolphspoort Fms). These sensitive formations may be impacted by the proposed development, and as such it is recommended that the HWC Fossil Finds Procedure be implemented throughout the development phase.

Heritage Western Cape provided comment and no further studies are required (**Appendix E1**).

2. WASTE AND EMISSIONS

(a) Waste (including effluent) management

Will the development proposal produce waste (including rubble) during the development phase?	YES	NO
If yes, indicate the types of waste (actual type of waste, e.g. oil, and whether hazardous or not) and estimated quantity per type?	m ³	
Rubble/ General construction waste as well as sludge from the existing oxidation ponds.	Amount of rubble is unknown; Approx. 100m ³ of sludge from the existing oxidation ponds	
Will the development proposal produce waste during its operational phase?	YES	NO
If yes, indicate the types of waste (actual type of waste, e.g. oil, and whether hazardous or not) and estimated quantity per type?	m ³	
Yes, sludge and non-biodegradable waste collected daily in die grid channels. De-sludging of the new ponds to occur every 5-7 years. It is proposed that this sludge be analysed to determine method of disposal.	Grit & screenings: ±0.063m ³ daily/ 1.95m ³ monthly Sludge: ±43m ³ after 7 years	
Will the development proposal require waste to be treated / disposed of on site?	YES	NO
If yes, indicate the types of waste (actual type of waste, e.g. oil, and whether hazardous or not) and estimated quantity per type per phase of the proposed development to be treated/disposed of?	Unknown at this stage m ³	
<ul style="list-style-type: none"> Any building rubble produced during the construction to be disposed of at a licensed facility or used as backfill on site. Disposal of existing wastewater sludge within existing ponds on site during the construction phase (±100m³ or less): - It is proposed to establish temporary drying beds on site. Sludge to be mixed with soil and pumped into temporary drying beds to dry. Samples of the sludge to be 		

<p>taken and send away for classification. Classification results will guide the suitable method of disposal.</p> <ul style="list-style-type: none"> When ponds are to be de-sludged in future as part of the operational phase (approx. 5-7 years) sludge needs to be dried as per the method described above. Sludge to be tested and classified to determine best method of disposal Daily grit & screenings produced during operations to be stored in a skip on site from where it will be disposed of at a licensed facility. First batch of grit & screenings to be tested to determine suitable licensed facility for disposal. Grit and screenings to be tested annually for the first 3 years to determine if disposal method is still suitable. 		
<p>If no, where and how will the waste be treated / disposed of? Please explain. Indicate the types of waste (actual type of waste, e.g. oil, and whether hazardous or not) and estimated quantity per type per phase of the proposed development to be treated/disposed of?</p>	m ³	
<p>Has the municipality or relevant authority confirmed that sufficient capacity exists for treating / disposing of the waste to be generated by the development proposal? If yes, provide written confirmation from the municipality or relevant authority.</p>	YES	NO
<p>Will the development proposal produce waste that will be treated and/or disposed of at another facility other than into a municipal waste stream?</p>	YES	NO
<p>If yes, has this facility confirmed that sufficient capacity exists for treating / disposing of the waste to be generated by the development proposal? Provide written confirmation from the facility.</p>	YES	NO
<p>Does the facility have an operating license? (If yes, please attach a copy of the licence.)</p>	YES	NO
Facility name:		
Contact person:		
Cell:	Postal address:	
Telephone:	Postal code:	
Fax:	E-mail:	
Describe the measures that will be taken to reduce, reuse or recycle waste:		
<p>Recyclable waste should be disposed of at a dedicated recycle point.</p> <p>The new Anaerobic Ponds will also accumulate sludge. At normal rates, it would be required that these ponds be de-sludged once in 5 to 7 years. Based on comments Bvi (Appendix F1 for C&RR) the volume of sludge expected after 7 years equates to approximately 43m³ after 7 years. It is suggested that this sludge be analysed to determine the method of disposal, i.e. land farming/ composting.</p>		

(b) Emissions into the atmosphere

Will the development proposal produce emissions that will be released into the atmosphere?	YES	NO
If yes, does this require approval in terms of relevant legislation?	YES	NO
If yes, what is the approximate volume(s) of emissions released into the atmosphere?		m ³
Describe the emissions in terms of type and concentration and how these will be avoided/managed/treated/mitigated:		
N/A		

3. WATER USE

(a) Indicate the source(s) of water for the development proposal by highlighting the appropriate box(es).

Municipal	Water board	Groundwater	River, Stream, Dam or Lake	Other	The project will not use water
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Note: Provide proof of assurance of water supply (e.g. Letter of confirmation from the municipality / water user associations, yield of borehole)

(b) If water is to be extracted from a groundwater source, river, stream, dam, lake or any other natural feature, please indicate the volume that will be extracted per month:		m ³
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(c) Does the development proposal require a water use permit / license from DWS?	YES	NO
If yes, please submit the necessary application to the DWS and attach proof thereof to this application as an Appendix.		

A WULA in terms of NWA Section 21 (c); (i) is in process. Dr Dirk van Driel from WATSAN Africa is handling the process.

(d) Describe the measures that will be taken to reduce water demand, and measures to reuse or recycle water:
The proposed upgrade of the Klaarstroom WWTP entails a proposed pipeline and galvanised storage dam for the storage final treated effluent for irrigation of the Klaarstroom sportified. Hereby, not using drinking water and reducing water demand.

4. POWER SUPPLY

(a) Describe the source of power e.g. municipality / Eskom / renewable energy source.

Power supply will be from existing municipal connections.

(b) If power supply is not available, where will power be sourced?

N/A

5. ENERGY EFFICIENCY

(a) Describe the design measures, if any, that have been taken to ensure that the development proposal will be energy efficient:

<p>The design and layout for the upgrade was chosen so that the natural slope assists gravity flow through the system and also decreases the volumes of earthworks required for construction.</p> <p>The flow through the oxidation ponds is by means of gravity. Subsequently, the direction of the natural slope of the land must be followed to utilize gravity. Therefore, the natural occurring terrain dictates the direction in which the upgrade and new extensions must take place. Any other options or layouts would require pumping to transfer wastewater from one pond to the next. Hence the layout as proposed.</p>

(b) Describe how alternative energy sources have been taken into account or been built into the design of the project, if any:

Refer to the explanation above.

6. TRANSPORT, TRAFFIC AND ACCESS

Describe the impacts in terms of transport, traffic and access.

Existing access roads will be used. Vehicles will only be allowed to stay in the roads and within the demarcated footprint set out for development.

7. NUISANCE FACTOR (NOISE, ODOUR, etc.)

Describe the potential nuisance factor or impacts in terms of noise and odours.

Reed beds are not expected to produce any odours as water is always subsurface.
Lime is proposed within the trench where non-biodegradable waste will be disposed of. It should be ensured that all components of the treatment plant are in good working condition at all times. If the plant is functioning, generation of odours should be minimised.

The proposed upgrade will produce minimal noise during construction. No noise expected during operations. Construction activities should be limited to daylight hours.

Note: Include impacts that the surrounding environment will have on the proposed development.

8. OTHER

Should other factors impacting the environment be identified they will be addressed.

SECTION G: IMPACT ASSESSMENT, IMPACT AVOIDANCE, MANAGEMENT, MITIGATION AND MONITORING MEASURES

1. METHODOLOGY USED IN DETERMINING AND RANKING ENVIRONMENTAL IMPACTS AND RISKS ASSOCIATED WITH THE ALTERNATIVES

- (a) Describe the **methodology** used in determining and ranking the nature, significance consequences, extent, duration and probability of potential environmental impacts and risks associated with the proposed development and alternatives.

Please refer to **Appendix J1** for the Methodology applied for the environmental impacts and risk assessment for the proposed upgrade of the Klaartstroom WWTP.

- (b) Please describe any gaps in knowledge.

Gaps in the knowledge did pertain to the correct disposal of the exiting sludge in the ponds on site as well as well as the disposal of the sludge.

A meeting was held with DEA&DP Directorate Waste Management & Directorate Chemicals and Pollutions to discuss these uncertainties and come to a solution. An email summary of the outcome of the meeting is available as Appendix F7.4.

- (c) Please describe the underlying assumptions.

The following assumptions are made:

- The information on which the report is based (i.e. project information) is correct.
- The construction and management of this proposed development will be in line with the recommendations in this report, which will be enforced by the implementation of detailed Environmental Management Plan. Much of the long-term success lies in the effective implementation of the measures prescribed in the Environmental Management Plan.

- (d) Please describe the uncertainties.

There are no uncertainties that we are aware of at present.

- (e) Describe adequacy of the assessment methods used.

The assessment criteria are based on the EIA Guidelines, published by the Department of Environmental Affairs and Tourism (June 2006) in support of the EIA Regulations, 2014 (as amended).

2. IDENTIFICATION, ASSESSMENT AND RANKING OF IMPACTS TO REACH THE PROPOSED ALTERNATIVES INCLUDING THE PREFERRED ALTERNATIVE WITHIN THE SITE

Note: In this section the focus is on the identified issues, impacts and risks that influenced the identification of the alternatives. This includes how aspects of the receiving environment have influenced the selection.

(a) List the identified impacts and risks for each alternative.

Alternative 1: Construction of new WWTP ponds	Soils, Water (surface and ground water), Fauna & Flora, Heritage Resources, Air Quality, Waste Management; Visual Impacts; Noise Impacts
Pipeline Route A (Not preferred Alternative)	Soils, Water (surface and ground water), Fauna & Flora, Heritage Resources, Air Quality, Waste Management; Visual Impacts; Noise Impacts
Pipeline Route B (Not preferred alternative)	Soils, Water (surface and ground water), Fauna & Flora, Heritage Resources, Air Quality, Waste Management; Visual Impacts; Noise Impacts
Pipeline Route C (Preferred Alternative)	Soils, Water (surface and ground water), Fauna & Flora, Heritage Resources, Air Quality, Waste Management; Visual Impacts; Noise Impacts
Pipeline Route D (Not Preferred Alternative)	Soils, Water (surface and ground water), Fauna & Flora, Heritage Resources, Air Quality, Waste Management; Visual Impacts; Noise Impacts
Disposal of existing sludge to earth from decommissioning of the existing facultative pond	Soils, Water (surface and ground water), Fauna & Flora, Heritage Resources, Air Quality, Waste Management; Visual Impacts; Noise Impacts
Disposal of Screening & Grid	Soils, Water (surface and ground water), Fauna & Flora, Heritage Resources, Air Quality, Waste Management; Visual Impacts; Noise Impacts
No-go Alternative:	Soils, Water (surface and ground water), Fauna & Flora, Heritage Resources, Air Quality, Waste Management; Visual Impacts; Noise Impacts

(b) Describe the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts can be reversed; may cause irreplaceable loss of resources; and can be avoided, managed or mitigated.

The following table serves as a guide for summarising each alternative. The table should be repeated for each alternative to ensure a comparative assessment. (The EAP has to select the relevant impacts identified in blue in the table below for each alternative and repeat the table for each impact and risk).

Please refer to **Appendix J2** for the comprehensive Impact Risk Matrix for all activities & alternatives considered.

Alternative 1 :	Geology / geohydrological / ecological / socio-economic / heritage and cultural-historical / noise / visual / etc.
PLANNING, DESIGN AND DEVELOPMENT PHASE	
Potential impact and risk:	
Nature of impact:	
Extent and duration of impact:	
Consequence of impact or risk:	
Probability of occurrence:	
Degree to which the impact may cause irreplaceable loss of resources:	
Degree to which the impact can be reversed:	
Indirect impacts:	
Cumulative impact prior to mitigation:	
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	
Degree to which the impact can be avoided:	
Degree to which the impact can be managed:	
Degree to which the impact can be mitigated:	

Proposed mitigation:	
Residual impacts:	
Cumulative impact post mitigation:	
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	
OPERATIONAL PHASE	
Potential impact and risk:	
Nature of impact:	
Extent and duration of impact:	
Consequence of impact or risk:	
Probability of occurrence:	
Degree to which the impact may cause irreplaceable loss of resources:	
Degree to which the impact can be reversed:	
Indirect impacts:	
Cumulative impact prior to mitigation:	
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	
Degree to which the impact can be avoided:	
Degree to which the impact can be managed:	
Degree to which the impact can be mitigated:	
Proposed mitigation:	
Residual impacts:	
Cumulative impact post mitigation:	
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	
DECOMMISSIONING AND CLOSURE PHASE	
Potential impact and risk:	
Nature of impact:	
Extent and duration of impact:	
Consequence of impact or risk:	
Probability of occurrence:	
Degree to which the impact may cause irreplaceable loss of resources:	
Degree to which the impact can be reversed:	
Indirect impacts:	
Cumulative impact prior to mitigation:	
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	
Degree to which the impact can be avoided:	
Degree to which the impact can be managed:	
Degree to which the impact can be mitigated:	
Proposed mitigation:	
Residual impacts:	
Cumulative impact post mitigation:	
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	

Note: The EAP may decide to include this section as Appendix J to the BAR.

Please refer to **Appendix J2** for the comprehensive Impact Risk Matrix for all activities & alternatives considered.

(c) Provide a summary of the site selection matrix.

Please refer to **Appendix J2** for the comprehensive Impact Risk Matrix for the project and project life cycle. The following section provides a brief summary

No-go alternative:

The existing Klaarstroom WWTP is hydraulically (flow) and organically (chemical load) overloaded. The implementation of the no go-option with increasing population growth would have a negative impact on the receiving environment. It is therefore recommended that the WWTP be upgraded to comply with NEMA and DWS guidelines.

(d) Outcome of the site selection matrix.

It is expected that the construction, operations and decommissioning of the WWTP Ponds will have **moderately medium significance** impact on the receiving environment if the correct mitigation measures as described in the risk matrix, specialist recommendations, EMPr, Operational Management Plan and Stormwater Management Plan is implemented. Site specific method statements also to be conducted before any constructed is permitted. Special care must be taken to prevent the spillage of incoming raw sewage when diverting the incoming sewage during construction. It is important to accommodate a free board to avoid overflow of wastewater from the works into freshwater resources/ soil Irrigation of treated effluent is also considered to have a **moderately medium significance**. Final effluent must comply with the standards as set out by DWS to avoid contamination of freshwater resources & soil/ biodiversity.

Pipeline Route Alternative C and D are all rated to have a **moderately medium significance** rating on the receiving environment of correct mitigation measures are implemented. Pipeline route Alternative C is considered the preferred alternative as it will mostly fall on land considered transformed and will cross the N12 via Horizontal Directional Drilling. No vegetation or aquatic habitat will be lost.

Alternative D is also considered a viable alternative as the route will fall on transformed land, within road reserves and attach to an existing bridge to cross the N12.

The area selected for the establishment of temporary drying beds for the sludge to dry is considered completely transformed. This is the area initially selected for the disposal of the existing sludge as well as grit and screenings on site. The existing inlet works and septic tank is currently located within the selected area, but will be demolished. The establishment of temporary drying beds for the drying of the sludge is rated to have a **moderately medium significance after mitigation**. The temporary storage of grit and screenings in a dedicated skip on site is also rated to have a **moderately medium significance after mitigation**. The disposal of the **tested** sludge as well as the grit and screenings in an acceptable manner is rated to have a **very low significance**. Mitigation measures as per the EMPr must be adhered to as well as adherence to the approved Operational & Maintenance Manual. Site specific method statements also to be conducted before any constructed is permitted.

The existing Klaarstroom WWTP is hydraulically (flow) and organically (chemical load) overloaded. The implementation of the no go-option and increasing population growth would have a negative impact on the receiving environment. It is therefore recommended that the WWTP be upgraded to comply with NEMA and DWS guidelines.

1. SPECIALIST INPUTS/STUDIES, FINDINGS AND RECOMMENDATIONS

Note: Specialist inputs/studies must be attached to this report as **Appendix G** and must comply with the content requirements set out in Appendix 6 of the EIA Regulations, 2014 (as amended). Also take into account the Department's Circular EADP 0028/2014 (dated 9 December 2014) on the "One Environmental Management System" and the EIA Regulations, 2014, any subsequent Circulars, and guidelines available on the Department's website (<http://www.westerncape.gov.za/eadp>).

Provide a summary of the findings and impact management measures identified in any specialist report and an indication of how these findings and recommendations have been included in the BAR.

The following mitigation measures/ recommendations from the specialists were included in the Environmental Management Plan (**Appendix H**) which should be complied with by the Applicant and relevant contractors. These mitigation measures were also considered while conducting the Impact significant ratings (Impact Rating Matrix) (**Appendix J**). Key findings from specialist discussed in the section directly below.

Recommendations from the Freshwater Specialist:

The main aim of the mitigation measures suggested by the Freshwater specialist is to keep sewage. Treated sewage effluent. Treated sludge or any runoff from the site away and out of the Groot river.

Mitigation measures must be considered against the background that Klaarstroom is located in a semi-arid area with low rainfall, that the Sand/ Groot river and drainage lines are dry most of the time and the Klaarstroom WWTP is small.

However, it must be kept in mind that sudden floods of formidable size and with a strong scouring potential occur from time to time.

Mitigation in terms of planning:

- The WWTP should be re-designed and re-constructed in future before it runs out of capacity because of population growth and subsequent a larger volume of sewage production. This demands ongoing planning.
- The berms of the ponds should be high enough, wide enough and structurally sound to withstand the onslaught of a sudden flood. These berms should answer to all the official provisions of dam safety.

Mitigation in terms of construction:

- An ECO should be appointed to oversee the construction of the new WWTP. This person should be independent and knowledgeable.
- Construction of the new WWTP should commence in winter when the chances for flash floods are at its least. Construction should be completed prior to the onset of summer thunder storms.
- The digested sewage sludge that has accumulated over the life of the WWTP in the current anaerobic pond must be removed and disposed off according to accepted practice. This has been decided during a meeting in the Cape Town offices of DEADP on 25 July 2019. A temporary pond should be constructed on level ground at the site of 250m², with berms of 400mm high to retain the

excavated sludge on a HDPE lining. The sludge should then be allowed to completely dry out in the pond. It is expected that of the estimated 100m³ of sludge, less than 30m³ will remain when dried for disposal.

- A representative sample should then be taken for analysis in a SANAS accredited laboratory. The analytical results should then determine if the dried sludge should be land farmed, disposed off on a general and licensed municipal waste disposal site or on a hazardous waste disposal site, as is stipulated in South African guidelines for the disposal of sludge (Herselman & Snyman, 2007).
- Construction should be allowed to carry on during the drying period and analytical results should not be a prerequisite for the onset of construction.
- Building rubble and scrapped equipment should be removed from the site and properly disposed of. None of this should be allowed to be washed down the drainage line and into the Groot River during thunder storms.

Mitigation in terms of operations:

- Anaerobic pond systems produce sludge only once in five years or more. According to the national Green Drop WWTW performance scoring system, there should be a pond desludging schedule
- http://www.dwa.gov.za/Dir_WS/DWQR/subscr/ViewComDoc.asp?Docid=4.
- Ponds are usually allowed to dry and are then excavated. The sludge should then be analysed according to the ruling of the DEADP meeting on 25 July 2019 and disposed of in accordance with the South African guidelines (Herselman & Snyman, 2007).
- However, Klaarstroom WWTW is very small, with only a limited volume of sludge. It is estimated that the new primary pond will produce less than 30m³ of dry sludge when desludged. There are no industries in and around Klaarstroom that produces heavy metals or toxicants that could find their way into the sewage sludge. Therefore, it is expected that the sludge would be land farmed, as prescribed in the guidelines.
- Likewise, the material that is scraped off the grid at the intake of the new WWTW should be dealt with in similar fashion. The volume could amount to a wheel burrow full of even less a day. According to the ruling of the DEADP meeting of 26 July 2019, scrapings should daily be collected in a skip, a standard mobile container as is regularly used in the waste management industry. The scrapings should be allowed to dry out and a representative sample should be taken to an accredited laboratory for analyses, after which it could be decided as to how dispose of the scrapings, similar to that of sewage sludge.
- Ponds should not be allowed to fill up and overflow. A free board of 500mm should be maintained.
- Land should not be over-irrigated. Ponding of treated sewage effluent should be prevented. Sprinklers should be moved around according to a schedule.
- Treated sewage effluent should be chemically and microbiologically analysed according to a schedule. Effluent that does not meet national quality guidelines should not be irrigated in urban areas. Should guidelines not be met, the operation of the WWTP should be adjusted in order to improve the quality.
- Pumps, pipelines and other equipment should be regularly inspected and maintained. Spare parts should be readily available. Downtime should be kept to a minimum in order to prevent spillages and adverse environmental impacts. Flow meters should be kept in working order and calibrated if necessary.
- When reeds are harvested on the horizontal flow reed bed, harvested material should be removed for use or composting elsewhere and not be allowed to accumulate on the site or move down the drainage line.
- The staff should be appropriately qualified. At the moment the WWTW is operated by a specialised and contracted company, Alveo. It is assumed that the company will have the experience to do justice to the new WWTW.
- Audits should be undertaken as officially prescribed for WWTW's in South Africa. The results should be made publicly available, should it be necessary.

Mitigation in terms of decommissioning of the existing ponds:

- Keep fluids and sludge out of the drainage lines and the river.
- Dry sludge on site
- Dry grit scrapings out on site

Recommendations in terms of the Botanical specialist:

- All construction must be done in accordance with an approved construction and operational phase Environmental Management Plan (EMP), which must include the recommendations made in this report.
- A suitably qualified Environmental Control Officer must be appointed to monitor the construction phase in terms of the EMP and any other conditions pertaining to specialist studies.
- If required, water course should be crossed in such a manner as to minimise the disturbance footprint and potential erosion as a result of construction
- **Before any work is done** the development footprint and access routes must be clearly demarcated and approved by the ECO. The demarcation must include the total footprint necessary to execute the work, but must aim at minimum disturbance.
- Lay-down areas or construction sites must be located within already disturbed areas or areas of low ecological value and must be pre-approved by the ECO.
- Indiscriminate clearing of any area outside of the construction footprint must be avoided.
- All areas impacted as a result of construction must be rehabilitated on completion of the project.
 - This includes the removal of all excavated material, spoil and rocks, all construction related material and all waste material.
 - It also included replacing the topsoil back on top of the excavation as well as shaping the area to represent the original shape of the environment.
- An integrated waste management approach must be implemented during construction.
 - Construction related general and hazardous waste may only be disposed of at Municipal approved waste disposal sites.
 - All rubble and rubbish should be collected and removed from the site to a suitable registered waste disposal site.

2. ENVIRONMENTAL IMPACT STATEMENT

Provide an environmental impact statement of the following:

(i) A summary of the key findings of the EIA.

Key findings regarding Freshwater resources:

From the Water Resources Map on Cape Farm Mapper (**Appendix D**) a non-perennial river/ drainage line runs through the site. No wetlands present on site. Proposed pipeline route (Alternative A, C & D) will cross a non-perennial river/ drainage line.

However, according to the Freshwater Report (**Appendix G1**) this drainage line was not observed during the site visit on 23 January 2019. The report states that the ground is very level, leaving uncertainty to where the storm water flows. Instead of the drainage line, a culvert (refer to Figure 7 & Figure 8 above) was observed under the N12 for letting stormwater through that might have accumulated against the northern shoulder of the road. A swale with a hard surface stretches from the culvert to the south into the Klaarstroom township (Figure 9). This is part of the storm water system that releases its water into the Groot River south of the township.

Therefore, pipeline routes Alternative C and D will not impact on any drainage lines.

The existing WWTP straddles a drainage line, although the drainage line is very faint (refer Figure 7). The upgrade of the works will thus occur within this drainage line. The freshwater report states that during a very high rainfall event, the flow of water can be expected to be fast, with a high erosion potential evident from the

deeply incised Groot Rivier and most drainage lines. The drainage line is separated from the next drainage line towards the east with a low ridge. The next drainage line is emphasised and clear.

The freshwater report (**Appendix G1**) further assess the Present Ecological State (PES) and Ecological Importance (EI) of these drainage lines as well as the Groot river.

According to the assessment, the upper part of the drainage line (Figure 20) is natural, with no impacts. Lower down, the drainage line is impacted by the municipal waste disposal site and irrigated area and the existing WWTP straddles the drainage line. Evidence of seepage exist downstream from the WWTP as there is a dense stand of shrub trees, more so than in the direct surroundings. The PES of both the instream habitat and riparian zone score a C (Moderately modified). The habitat has been impacted, but the basic ecological functioning remain intact. The PES of the Groot river has been classified as an A (Unmodified, natural), unimpacted and pristine.

The Ecological Importance (EI) is based on the presence of especially fish species that are endangered on a local, regional or national level. There are no indigenous fish in the Groot River at Klaarstroom and its associated drainage lines, as there is no permanent water. According to freshwater assessment, which is prescribed for WULA's, the site and surrounds are not ecologically important. No other endangered species, either plant or animal, were detected in or near the drainage line.

The Ecological Sensitivity (ES) is often is often described as the ability of aquatic habitat to assimilate impacts. The Ecological Sensitivity refers to the potential of aquatic habitat to bounce back to an ecological condition closer to the situation prior to human impact. If it recovers, it is not regarded as sensitive. The Groot River at Klaarstroom and its associated drainage lines can probably be rated as moderately sensitive.

The freshwater specialist is of the opinion that A WWTP is an ongoing operation. Therefore the possibility of an impact is an ongoing risk as well. The Upgrade of the Klaarstroom WWTP is not considered to detract from the river services, if it is properly managed. The freshwater specialist suggests that it is unlikely that the impacted conditions south of Klaarstroom may creep upstream to the confluence of the KLaarstroom drainage line. It is also unlikely that the small anaerobic pond system is to overflow into the adjacent river, if the upgrade is to be done as planned.

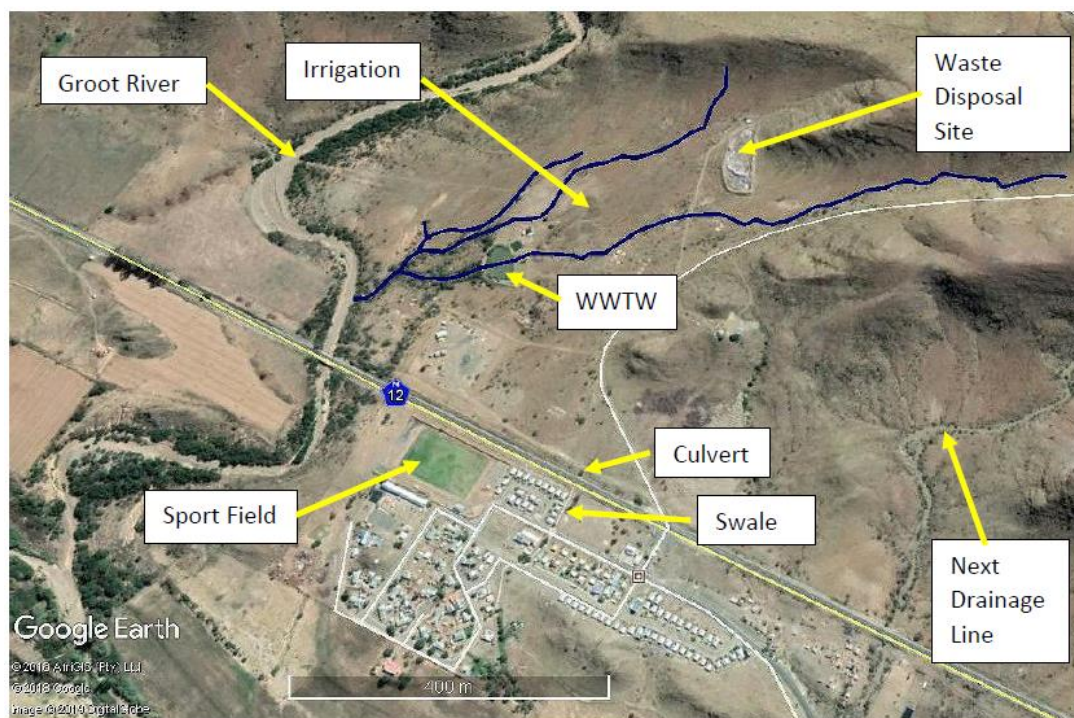


Figure 20: Image indicating the existing WWTP, affected drainage line, culvert & swale (Freshwater report, WATSAN 2019)

Key findings regarding Biodiversity:

The area that will be impacted by the proposed WWTP upgrade and pipeline is very small. If it is taken into account that the existing WWTP is already basically transformed, the additional footprint will be only about

5000 m², while the pipeline will have a temporary impact on between 500- 800 m of veld of which most is located in already disturbed or transformed (within the urban edge) veld portions.

The riparian vegetation along the Sand River (in the area near to the N12) was basically dominated by *Vachellia karroo*, with *Phragmites australis* patches also common, with *Melianthus comosus* and *Searsia lancea* occasionally. Once the pipeline has crossed the N12 it will turn south following the N14 (still on private land) back towards the Klaarstroom sport fields. The vegetation remains the same as discussed above, with dense stands of *Vachellia karroo* next to the Sand River, which becomes less dense as you move away from the river corridor.

A small storage tank or reservoir will be placed within the existing Klaarstroom sport fields from where the sport fields can be irrigated. This reservoir will be located in this site with no natural veld remaining.

Threatened and protected plant species:

No threatened and protected plant species were observed in terms of The Red List of South African; The National Environmental Management: Biodiversity Act, Act 10 of 2004, "Lists of critically endangered, endangered, vulnerable and protected species" (GN. R. 152 of 23 February 2007); or The National Forests Act (NFA) of 1998 (Act 84 of 1998) provides for the protection of forests as well as specific tree species (as updated).

CBA/ ESAs:

The Biodiversity Overlay Map from Cape Farm Mapper (**Appendix D**) indicate that the existing WWTP does fall within a CBA and that the alternative pipeline route (Alternative B, not preferred) will also impact on the ESA associated with the Sand River/ Groot river.

According to the Botanical Impact assessment it should be noted that although the proposed infrastructure will be located within a terrestrial CBA for the purposes of the impact assessment it was taken into account that the pipeline will be located in areas already very much disturbed and that with the current CBA map, there is no alternative location that will fall outside of the CBA. It was also taken into account that the permanent enlargement of the footprint will be relatively small (5000 m²) and that the impact associated with the pipeline route will be temporary. It is also expected that with mitigation and rehabilitation the impact associated with the construction of the pipeline can be minimal.

According to the Botanical Specialist Report (**Appendix G2**) the main impacts associated with the proposed development will be on (1) a disturbed conservation priority area (CBA) and (2) a potential impact on a seasonal watercourse (if the alternative pipeline route B, not preferred, is chosen)

Because of the degraded status of the site and the temporary nature of the impact, the cumulative impact from a biodiversity point of view, (even without mitigation), is expected to be relatively low, but this can be further reduced with mitigation.

Heritage Resources:

According to the CTS Heritage Screener (**Appendix G3**) the WWTP is situated on the outskirts of a small Karoo town, and alongside a river, it is likely that Early, Middle and Later Stone Age artefacts are present within the WWTP site. In addition, some of the area has been surveyed for rock art by Nardell and a number of rock art sites have been identified within 20km of the proposed development area. However, as this site is already developed, and as this site is located far from any rocky outcrops, it is unlikely that any significant archaeological resources or rock art sites will be impacted by the proposed development.

The area proposed for development is underlain by siltstone, shale and arenaceous shale sediments of the Traka Subgroup of the Bokkeveld Group of the Cape Supergroup, of very high palaeontological sensitivity according to the SAHRIS Palaeosensitivity Map. According to SAHRIS, the Traka Subgroup is known for its fossils of fish (sharks, acanthodians, placoderms, bony fish, recorded especially from Da), bivalves and vascular plants (psilophytes, lycopods), common but low diversity trace fossils, including *Spirophyton*, and rare brachiopods. Tectonic deformation often limits fossil collection, especially within mudrock-rich horizons, and distorts fossils. Biostratigraphically and palaeoecologically important fossil assemblages are known from high palaeoaltitudes (such as the Klipbakkop and Adolphspoort Fms). These sensitive formations may be impacted by the proposed development, and as such it is recommended that the HWC Fossil Finds Procedure be implemented throughout the development phase.

Heritage Western Cape provided comment and no further studies are required (**Appendix E1**).

(ii) Has a map of appropriate scale been provided, which superimposes the proposed development and its associated structures and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers?	YES	NO
(iii) A summary of the positive and negative impacts that the proposed development and alternatives will cause in the environment and community.		
<p>Positive</p> <ul style="list-style-type: none"> The area that will be impacted by the proposed WWTW upgrade and pipeline is very small. If it is taken into account that the existing WWTW is already basically transformed, the additional footprint will be only about 5000 m², while the pipeline will have a temporary impact on between 500- 800 m of veld of which most is located in already disturbed or transformed (within the urban edge) veld portions The Sand river and drainage lines are considered to be in a good condition, the upgrade of the WWTP will ensure these conditions are maintained or even improve. Upgrade of the design capacity of the WWTP from 50m³/ day to 61m³ per day; The upgraded plant to produce a final effluent of an acceptable quality; More efficient use of treated effluent for irrigation of sports facilities (not using drinking water for irrigation); More controlled method of sludge and grit & screenings handling and disposal The current site has a medium to sharp slope in a southerly direction towards the N12 National Road. This is considered a good site for the wastewater works as well as its proposed extensions, as the natural slope assists in allowing gravity flow through the system and also decreases the volumes of earthworks required for construction of the pond embankments as the natural slope assists in allowing gravity flow through the system and also decreases the volumes of earthworks required for construction. Advantages of a natural treatment system as taken from the BVI Technical Report (Appendix K) can be listed as: <ul style="list-style-type: none"> Oxidation Ponds and Reedbeds are well suited for the treatment of low to medium strength domestic wastewater Very effective at removing nitrogen, phosphates and heavy metals Civil works limited to earthworks and HDPE linings, no major structures required Totally natural system, no external energy input required Reed beds and oxidation ponds can be scaled infinitely to fit the desired treatment capacity requirement No electricity required for operation Limited chemicals required for operation – only disinfectant required Very low maintenance costs, no mechanical or electrical equipment required Very low operational costs, limited supervision and operator input required Will continue working even if severely neglected Provides a good quality effluent that complies with General Limit values if not overloaded. Reed beds have no odours as water is always subsurface Reeds exude tannins from their root zone, which are toxic to most bacteria such as E.coli and therefore assist in disinfecting the final effluent without the addition of chemicals. Scenically attractive and provides a good habitat for birds Long life expectancy, in excess of 30 years <p>Negative</p> <ul style="list-style-type: none"> The proposed upgrade and expansion would contribute to the further transformation of the area. However majority of the area and proposed prefer pipeline route are considered transformed. The Klaarstroom WWTP is both hydraulically (flow) overloaded, as well as organically (chemical load) overloaded and with increased population growth expected, the upgrade of the Klaarstroom WWTP would benefit the receiving environment as well as the community. The disadvantages of natural treatment systems as taken from the BVI Technical Report (Appendix K) are listed below: <ul style="list-style-type: none"> Large footprint, significantly more land required than for conventional type plants (However, in this case the footprint is available as this project is an upgrade of an existing WWTP where the footprint exists). Sensitive to effective pre-treatment, requires good screening and primary settlement to avoid solids blocking the reed bed growth media or primary ponds filling up with solids (inlets & grid to be cleaned daily to avoid blocking of reed bed and primary ponds). Earthworks at Klaarstroom may be problematic due to hard rock excavations. 		

- Reeds need to be cut and harvested on an annual basis (do be done regularly).
- Requires expert design and construction (BVi Engineers undertaking the design)
- Sensitive to toxins entering the plant with wastewater, plants and active bacteria may die
- Odours can be problematic due to anaerobic nature of some ponds, exude hydrogen sulphide (all components of the plant to be kept in good working condition to minimise the generation of odours).
- Requires secure fencing as deep ponds pose a risk for drowning if open to the public (secure fencing of the entire plant proposed).

3. IMPACT MANAGEMENT, MITIGATION AND MONITORING MEASURES

- (a) Based on the assessment, describe the impact management, mitigation and monitoring measures as well as the impact management objectives and impact management outcomes included in the EMP. The EMP must be attached to this report as Appendix H.

Appendix J and EMP (Appendix H) Appendix 17 of the

- (b) Describe any provisions for the adherence to requirements that are prescribed in a Specific Environmental Management Act relevant to the listed activity or specified activity in question.

- Compliance with the Environmental Management Program (**Appendix H**) must be mandatory; and
- Appointment of an Environmental Control Officer during the construction phase;
- Rehabilitation must be agreed upon and provisions must be made for rehabilitation.

- (c) Describe the ability of the applicant to implement the management, mitigation and monitoring measures.

Under South African environmental legislation, the Applicant is accountable for the potential impacts of the activities that are undertaken and is responsible for managing these impacts.

The Applicant therefore has overall and total environmental responsibility to ensure that the implementation of the construction phase of this EMP complies with the relevant legislation and the conditions of the environmental authorisation.

The Applicant will be responsible for the development and implementation of the conditions of the Environmental Authorisation in terms of the design of the development and construction thereof. The developer will thus be responsible for the implementation of this EMP.

The applicant has shown commitment to implement management, mitigation and monitoring measures as specified in the recommendations in and the EMP.

- (d) Provide the details of any financial provisions for the management of negative environmental impacts, rehabilitation and closure of the proposed development.

According to the engineers, provisions of approximately R100 000.00 has been made available for rehabilitation & sludge disposal.

Rehabilitation as discussed in the EMPr must be adhered to.

- (e) Provide the details of any financial provisions for the management of negative environmental impacts, rehabilitation and closure of the proposed development.

According to the engineers, provisions of approximately R100 000.00 has been made available for rehabilitation & sludge disposal

Rehabilitation as discussed in the EMPr must be adhered to.

- (f) Describe any assumptions, uncertainties, and gaps in knowledge which relate to the impact management, mitigation and monitoring measures proposed.

Gaps in the knowledge did pertain to the correct disposal of the exiting sludge in the ponds on site as well as well as the disposal of the sludge.

A meeting was held with DEA&DP Directorate Waste Management & Directorate Chemicals and Pollutions to discuss these uncertainties and come to a solution. An email summary of the outcome of the meeting is available as Appendix F7.4.

The following assumptions are made:

- The information on which the report is based (i.e. project information) is correct.
- The construction and management of this proposed development will be in line with the recommendations in this report, which will be enforced by the implementation of detailed Environmental Management Plan. Much of the long-term success lies in the effective implementation of the measures prescribed in the Environmental Management Plan.

There are no uncertainties that we are aware of at present.

SECTION H: RECOMMENDATIONS OF THE EAP AND SPECIALISTS

(a) In my view as the appointed EAP, the information contained in this BAR and the documentation attached hereto is sufficient to make a decision in respect of the listed activity(ies) applied for.	YES	NO
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(b) If the documentation attached hereto is sufficient to make a decision, please indicate below whether, in your opinion, the listed activity(ies) should or should not be authorised:		
Listed activity(ies) should be authorised:	YES	NO
Provide reasons for your opinion		
<p>The proposed upgrade and expansion of the Klaarstroom WWTP should be authorised for the following reasons:</p> <ul style="list-style-type: none"> The Klaarstroom WWTP is both hydraulically (flow) overloaded, as well as organically (chemical load) overloaded and with increased population growth expected, the upgrade of the Klaarstroom WWTP would benefit the receiving environment as well as the community. Upgrade of the design capacity of the WWTP from 50m³/ day to 61m³ per day; The upgraded plant to produce a final effluent of an acceptable quality; More efficient use of treated effluent for irrigation of sports facilities (not using drinking water for irrigation); More controlled handling and disposing of wastewater sludge as well as grit & screenings; The botanical specialist agrees that the area that will be impacted by the proposed WWTP upgrade and pipeline is very small. If it is taken into account that the existing WWTP is already basically transformed, the additional footprint will be only about 5000 m², while the pipeline will have a temporary impact on between 500- 800 m of veld of which most is located in already disturbed or transformed (within the urban edge) veld portions The Freshwater specialist stated that the Sand river and drainage lines are considered to be in a good condition, the upgrade of the WWTP will ensure these conditions are maintained or even improve. The current site has a medium to sharp slope in a southerly direction towards the N12 National Road. This is considered a good site for the wastewater works as well as its proposed extensions, as the natural slope assists in allowing gravity flow through the system and also decreases the volumes of earthworks required for construction of the pond embankments as the natural slope assists in allowing gravity flow through the system and also decreases the volumes of earthworks required for construction. It is also not expected to produce any unacceptable noise or odours during the construction or operational phases. It should be ensured that all components of the plant to be kept in good working condition to minimise the generation of odours The proposed expansion of the dam, is not expected to have any significant negative impact on the visual character of the area. The proposed development will result in positive socio-economic spin-offs for the community. With the storing of winter listed water, more fruit orchards can be planted, resulting in more seasonal and permanent jobs. The proposed upgrade of the Klaarstroom WWTP will be in line with the Prince Albert IDP 2017. <p>Considering all the information, it is not envisaged that the proposed upgrade and expansion of the Klaarstroom WWTP pose any significant negative impact on the environment. The existing Klaarstroom WWTP is hydraulically (flow) and organically (chemical load) overloaded. This is a clear indication that the plant is overloaded and requires urgent extension to cope with the incoming flow and organic load. The implementation of the no go-option would have a negative impact on the receiving environment. It is therefore recommended that the WWTP be upgraded to comply with NEMA and DWS guidelines.</p> <p><u>It is therefore recommended that this application be authorised with the necessary conditions of approval as described throughout this BAR.</u></p>		

C) Provide a description of any aspects that were conditional to the findings of the assessment by the EAP and Specialists which are to be included as conditions of authorisation.

Implementation of the EMPr as well as the Operation & Maintenance Manual with regards to disposal and handling of sludge, grit & screening.

Comments from Heritage Western Cape (Appendix E):

- Should any heritage resources, including evidence of graves and human burials, archaeological material and paleontological material and paleontological material be discovered during the execution of the activities, all works must be stopped immediately and HWC must be notified without delay.

Comments from DEA&DP: Waste Management (Appendix F1.6):

- Should there be any major spills of hazardous substances at the facility which could lead to environmental degradation, the management of such spills should adhere to section 30 of the NEMA as amended, which includes reporting responsibilities.

Comment from DEA&DP Directorate: Waste Management & Directorate Pollutions and Chemicals Management (Appendix F7.4):

- As the grit storage is continual, should the mount of grit stored at the Facility reach the threshold volumes for the Norms and Standards for waste, the Facility will need to be duly registered and adhere to the Norms and Standards.
- The applicant will still need to adhere to section 28 of the National Environmental Management Act, 1998 (Act No. 107 of 1998), Duty of Care.

In terms of proposed pipeline route Alternative C crossing the N12 by means of Horizontal Directional Drilling:

- The necessary approvals and authorisations from PGWC must be in place before construction starts

(c) If you are of the opinion that the activity should be authorised, please provide any conditions, including mitigation measures that should in your view be considered for inclusion in an environmental authorisation.

A suitably qualified ECO should be appointed to oversee the project.
Recommendations as set out by the specialists and captured in the EMPr should be adhered to at all times.
Rehabilitation should be agreed upon and implemented after construction.
The Operational Manual must be adhered to at all times.

(d) Please indicate the recommended periods in terms of the following periods that should be specified in the environmental authorisation:

i.	the period within which commencement must occur;	Construction is expected to take a period of 4 months – 6 months Commencement must begin within a month from the granting of the EA and WUL.
ii.	the period for which the environmental authorisation is granted and the date on which the development proposal will have been concluded, where the environmental	Construction is expected to take a period of 4 months – 6 months. Therefore the EA should be valid for 1 to 2 years, not including operational aspects.

	authorisation does not include operational aspects;	
iii.	the period for which the portion of the environmental authorisation that deals with non-operational aspects is granted; and	The EA should be valid for 1 to 2 years for non-operational aspects
iv.	the period for which the portion of the environmental authorisation that deals with operational aspects is granted.	The EA should be valid for the life cycle of the WWTW, approximately 20 years in terms of operational aspects.

SECTION I: APPENDICES

The following appendices must be attached to this report:

APPENDIX		Confirm that Appendix is attached
Appendix A:	Locality map	Yes
Appendix B:	Site development plan(s)	No
	A map of appropriate scale, which superimposes the proposed development and its associated structures and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffer areas;	Yes
Appendix C:	Photographs	Yes
Appendix D:	Biodiversity overlay map	Yes
Appendix E:	Permit(s) / license(s) from any other Organ of State, including service letters from the municipality.	N/A
	Appendix E1: Copy of comment from HWC.	Yes
Appendix F:	Public participation information: including a copy of the register of I&APs, the comments and responses report, proof of notices, advertisements and any other public participation information as is required in Section C above.	Yes
Appendix G:	Specialist Report(s)	Yes
Appendix H :	EMPr	Yes
Appendix I:	Additional information related to listed waste management activities (if applicable)	N/A
Appendix J:	If applicable, description of the impact assessment process followed to reach the proposed preferred alternative within the site.	Yes
Appendix K:	Any Other (if applicable). Bvi Technical Report	Yes

SECTION J: DECLARATIONS

THE APPLICANT

Note: Duplicate this section where there is more than one applicant.

I, in my personal capacity or duly authorised thereto, hereby declare/affirm all the information submitted as part of this Report is true and correct, and that I –

- am aware of and understand the content of this report;
- am fully aware of my responsibilities in terms of the NEMA, the EIA Regulations in terms of the NEMA (Government Notice No. R. 982, refers) (as amended) and any relevant specific environmental management Act and that failure to fulfil these requirements may constitute an offence in terms of relevant environmental legislation;
- have provided the EAP and Specialist, Review EAP (if applicable), and Review Specialist (if applicable), and the Competent Authority with access to all information at my disposal that is relevant to the application;
- will be responsible for complying with conditions that may be attached to any decision(s) issued by the Competent Authority;
- will be responsible for the costs incurred in complying with the conditions that may be attached to any decision(s) issued by the Competent Authority;

Note: If acting in a representative capacity, a certified copy of the resolution or power of attorney must be attached.

Signature of the Applicant:

Name of Organisation:

Date:

THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

I, as the appointed EAP hereby declare/affirm:

- the correctness of the information provided as part of this Report;
- that all the comments and inputs from stakeholders and I&APs have been included in this Report;
- that all the inputs and recommendations from the specialist reports, if specialist reports were produced, have been included in this Report;
- any information provided by me to I&APs and any responses by me to the comments or inputs made by I&APs;
- that I have maintained my independence throughout this EIA process, or if not independent, that the review EAP has reviewed my work (Note: a declaration by the review EAP must be submitted);
- that I have throughout this EIA process met all of the general requirements of EAPs as set out in Regulation 13;
- I have throughout this EIA process disclosed to the applicant, the specialist (if any), the Department and I&APs, all material information that has or may have the potential to influence the decision of the Department or the objectivity of any report, plan or document prepared as part of the application;
- have ensured that information containing all relevant facts in respect of the application was distributed or was made available to I&APs and that participation by I&APs was facilitated in such a manner that all I&APs were provided with a reasonable opportunity to participate and to provide comments;
- have ensured that the comments of all I&APs were considered, recorded and submitted to the Department in respect of the application;
- have ensured the inclusion of inputs and recommendations from the specialist reports in respect of the application, if specialist inputs and recommendations were produced;
- have kept a register of all I&APs that participated during the PPP; and
- am aware that a false declaration is an offence in terms of Regulation 48 of the EIA Regulations, 2014 (as amended).

Signature of the EAP: _____

Name of Company: _____

Date: _____

THE REVIEW ENVIRONMENTAL ASSESSMENT PRACTITIONER

I, as the appointed Review EAP hereby declare/affirm:

- that I have reviewed all the work produced by the EAP;
- the correctness of the information provided as part of this Report;
- that I have, throughout this EIA process met all of the general requirements of EAPs as set out in Regulation 13;
- I have, throughout this EIA process disclosed to the applicant, the EAP, the specialist (if any), the review specialist (if any), the Department and I&APs, all material information that has or may have the potential to influence the decision of the Department or the objectivity of any report, plan or document prepared as part of the application; and
- am aware that a false declaration is an offence in terms of Regulation 48 of the EIA Regulations, 2014 (as amended).

Signature of the
Review EAP:

Name of Company:

Date:

THE SPECIALIST

Note: Duplicate this section where there is more than one specialist.

I, as the appointed Specialist hereby declare/affirm the correctness of the information provided or to be provided as part of the application, and that I :

- in terms of the general requirement to be independent:
 - other than fair remuneration for work performed in terms of this application, have no business, financial, personal or other interest in the development proposal or application and that there are no circumstances that may compromise my objectivity; or
 - am not independent, but another specialist (the "Review Specialist") that meets the general requirements set out in Regulation 13 has been appointed to review my work (Note: a declaration by the review specialist must be submitted);
- in terms of the remainder of the general requirements for a specialist, have throughout this EIA process met all of the requirements;
- have disclosed to the applicant, the EAP, the Review EAP (if applicable), the Department and I&APs all material information that has or may have the potential to influence the decision of the Department or the objectivity of any report, plan or document prepared or to be prepared as part of the application; and
- am aware that a false declaration is an offence in terms of Regulation 48 of the EIA Regulations, 2014 (as amended).

Signature of the Specialist:

Name of Company:

Date:

THE REVIEW SPECIALIST

I, as the appointed Review Specialist hereby declare/affirm:

- that I have reviewed all the work produced by the Specialist(s);
- the correctness of the specialist information provided as part of this Report;
- that I have, throughout this EIA process met all of the general requirements of specialists as set out in Regulation 13;
- I have, throughout this EIA process disclosed to the applicant, the EAP, the review EAP (if applicable), the Specialist(s), the Department and I&APs, all material information that has or may have the potential to influence the decision of the Department or the objectivity of any report, plan or document prepared as part of the application; and
- I am aware that a false declaration is an offence in terms of Regulation 48 of the EIA Regulations, 2014 (as amended).

Signature of Review Specialist:

Name of Company:

Date:
