Nahoon Estuary
Management Forum

The City Manager
P O Box 134
East London
5200

BUFFALO CITY METRO MUNICIPALITY
2024 -05- 14
MUNICIPAL MANAGERS OFFICE

Dear Sir

OBJECTION TO THE IDP/BUDGET FOR THE 2025/2026 FINANCIAL YEAR

We kindly refer to my letter to you a year ago to object to the fact that no projects or budgets have been included into the IDP/Budget for the 2023/2024 Financial year to implement the three court orders against you for the following continuous sewer spills, namely:

- Nompumelelo
- Lower Ridge Road
- Maldives

The Council resolved to approve the IDP/Budget for the 2023/2024 Financial Year, despite such objections

We then requested the MEC for Eastern Cape Cooperative Governance and Traditional Affairs to act against BCMM in terms of Section 106, subsection (1) (a) of the Local Government Systems Act, 2000.

The MEC wrote a letter dated 14 March 2024 to BCMM , attached as Annexure A , requiring you " to provide valid reasons for the failure of BCMM to comply with the three court orders as well as to incorporate the Nahoon Estuary Management Plan , promulgated by the MEC of DEDEAT into the municipal IDP/Budget within 7 working days after the receipt of this communique"

To our knowledge BCMM has not complied with the above letter of the MEC

We have perused the Draft BCMM IDP/Budget for the 2024/2025 financial years, and have noticed the following:

Cel: 071 956 8784 | Email: christo@nahoonestuary.co.za

- There is a budget of R 3m for the upgrading of the Nahoon Bulk Outfall Sewer and a budget R 9m for the upgrading of the East Bank Waste Water Treatment Works. These items are linked to the Court Order relating to the Lower Ridge Road Sewer Spill
- There is yet again no provision in the Capital Budget for the implementation of the Court Order relating to the Maldives Sewer Spill
- There is yet again no provision in the Capital Budget for the Court Order relating to the Nompumelelo Sewer Spill

We again demand that BCMM include the implementation of the Court Orders for Maldives and Nompumelelo Sewer Spills into their IDP/Budget for 2024/2025

We are aware of a Memorandum submitted by your HOD for Infrastructure Services/General Manager : Water, Waste Water and Scientific Services, to the City Manager and Head of Legal Services undated and headed " Progress Report for Nompumelelo Township on Compliance with a Court Order issued in April 2022". This report was handed to our attorney by the attorney of BCMM in court . This report is attached as Annexure B

We respond as follows to this report:

- A court order case 1622/2021 of 5 April 2022 against BCMM for spilling sewerage into two streams from Nompumelelo into the Nahoon Estuary stands
- The order is for a contingency plan to prevent sewerage from entering the stormwater system (two streams)
- The response of BCMM was the above report attached as Annexure B
- In this report the BCMM indicates that it is impractical to implement the Court Order as " it means that their should be no spillages " and that a containment facility should be provided for each manhole
- We are of the opinion that that it is possible to implement the Order
- A company, Blue Planet, have submitted a Bioremediation Project Proposal to BCMM and have presented the proposal to a formal meeting of the BCMM of which the author of the above report, Mr B Gqweta, was present
- This is a bona fide company that have and are doing similar projects elsewhere in South Africa with great success

- According to BCMM the problem at Nompumelelo is a housing problem, namely that a solution can only be found for the sewerage problem if all informal houses at Nompumelelo is relocated
- We are of the opinion that the housing problem at Nompumelelo is a long terms problem that will only, if at all be solved in approximately 10 years
- We are of the opinion that the Bioremediation solution is not dependent on the relocation of informal settlements and that it is a viable solution to solve the problem as it is limited to the two streams where sewerage enters into, where a range of ponds or dams will be built and where the water will be treated by bioremediation before it enters the Nahoon Estuary
- The Bioremediation Project for Nompumelelo is attached as Annexure C

There have been no response from BCMM relating to the spillage at the Maldives Housing Development

We therefore again demand that BCMM include the implementation of the Maldives and Nompumelelo Court Orders into the IDP/Budget for 2024/2025

We will again request the MEC of Cogta to act in terms of Section 106 of the Systems Act should you decide to ignore this demand

Kind regards

Christo Theart
Chairperson
0719568784
christo@nahoonestuary.co.za
14 May 2024

Province of the
EASTERN CAPE
COOPERATIVE GOVERNANCE
& TRADITIONAL AFFAIRS

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The Executive Mayor
Buffalo City Metropolitan Municipality
P.O. Box 134
EAST LONDON
5200

Dear Councillor. P. Faku

REQUEST FOR VALID REASONS FOR FAILING TO EXECUTE THREE COURT ORDERS IN RELATION TO THE SEWERAGE SPILLS INTO NAHOON ESTUARY AND FAILING TO INCORPORATE NAHOON ESTUARY DEVELOPMENT PROJECTS IN THE REVISED IDP 2023/2024

The above subject matter bears reference;

1)I have received a petition from the Nahoon Estuary Management Forum (NEMF), a member of BCMM's Coastal Management Committee, concerning the failure of BCMM to comply with three court orders as well as to incorporate the Nahoon Estuary Management Plan, promulgated by the MEC on 19 December 2016 in terms of the National Environment Management: Integrated Coastal Management Act 24 of 2008, into the municipality's IDP as well as all other relevant municipal policies and programmes.

2)The Nahoon Estuary Management Plan was promulgated by the MEC (DEDEAT) on 19 December 2016 in terms of the National Environment Management: Integrated Coastal Management Act 24 of 2008.

3)The Nahoon Estuary Management Plan was adopted by BCMM at a meeting of the Council held on October 30, 2019.

REQUEST FOR VALID REASONS FOR FAILING TO EXECUTE THREE COURT ORDERS IN RELATION TO THE SEWERAGE SPILLS INTO NAHOON ESTUARY AND FAILING TO INCORPORATE NAHOON ESTUARY DEVELOPMENT PROJECTS IN THE REVISED IDP 2023/2024

4) According to the National Estuarine Management Protocol, promulgated by the Minister of Environmental Affairs and Tourism in terms of the National Environmental Management: Integrated Coastal Management Act 24 of 2008, the Council must integrate the plan into their IDP and Budget.

5) In terms of the Nahoon Estuary Management Plan the municipality (BCMM) needs to implement several measures aimed at improving the water quality, namely:

- Conduct a comprehensive audit review of the state of existing sewerage infrastructure and develop a repair and maintenance plan targeting priority areas.
- Develop a contingency plan to deal with accidental releases.
- Provide pump stations with a backup power supply and adequate overflow/containment facilities.
- Assess the feasibility of re-directing stormwater that is likely to contain sewerage to sewer or to a sump/holding facility.
- Develop and implement a planned maintenance program for sewerage infrastructure in the vicinity of the estuary.

6) In light of the above, the petition contains several serious charges which I enumerate below:

- The issue of the implementation of the Nahoon Estuary Management Plan has been raised repeatedly in the Coastal Management Committee meetings by NEMF to no avail.
- NEMF held meetings in 2019 and 2020 with the water and sanitation department of the municipality to discuss sewer spillages into the Nahoon Estuary.

When these measures proved futile NEMF sought legal recourse and obtained the three court orders enumerated below:

- 25 January 2022: A court order against BCMM with regards to spillages from the silt trap and a manhole in Lower Ridge Road, to clear the silt trap and maintain it; to provide an

alternative for the overflow that occurs at the manhole; to provide a backup power supply for the pump station.

- 25 January 2022: A court order against BCMM with regards to spillages from the Maldives Pump Station, to repair the sewer pump station serving the Maldives Housing Development and to maintain it in a working condition.
- 5 April 2022: A court order against the BCMM to develop and implement a contingency plan for the accidental sewerage releases at Nompumelelo and contain sewerage spills and prevent them from entering the stormwater system at Nompumelelo; to develop and implement an inspection and maintenance plan for sewerage infrastructure in Nompumelelo.

7) To date, the municipality has failed to comply with the three court orders.

8) The Infrastructure Services Department of BCMM have not brought the court orders and their proposed responses to the Council's Infrastructure Services Portfolio Committee and thus, to the Council itself since the court orders were granted. Further, Cllr Bentley raised a question on the issue on 13 April 2023 at a meeting of the Infrastructure Services Portfolio Committee, however, the director of the Infrastructure Services Department failed to provide a written response to the Portfolio Committee.

9) BCMM appointed an Engineering Consulting Company, Zutari, to investigate the sewer spills at Lower Ridge Road, and to compile a report to solve the orders of the court, with timeframes and budgets. Zutari submitted their report to BCMM in September of 2022.

10) NEMF submitted an input into the IDP/Budget of the municipality on 8 March 2023 requesting BCMM to include the implementation of the three court orders into the IDP/Budget for the 2023/2024 financial year.

11) The approved IDP/Budget of BCMM for the 2023/2024 financial year did not include a project or budget to implement the three court orders.

REQUEST FOR VALID REASONS FOR FAILING TO EXECUTE THREE COURT ORDERS IN RELATION TO THE SEWERAGE SPILLS INTO NAHOON ESTUARY AND FAILING TO INCORPORATE NAHOON ESTUARY DEVELOPMENT PROJECTS IN THE REVISED IDP 2023/2024

12) In terms of Section 106 , subsection (1(a) of the Local Government: Municipal Systems Act, 2000, kindly provide valid reasons for the failure of BCMM to comply with the three court orders as well as to incorporate the Nahoon Estuary Management Plan, promulgated by the MEC (DEDEAT) on 19 December 2016 in terms of the National Environment Management: Integrated Coastal Management Act 24 of 2008 into the municipal IDP 2024/2025 within seven (7) working days after the receipt of this communique.

Hope you will find this in order.

Kind Regards

MR. Z. A. WILLIAMS
MEMBER OF THE EXECUTIVE COUNCIL
COOPERATIVE GOVERNANCE AND TRADITIONAL AFFAIRS
DATE: 14/03/2024

B

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BUFFALO CITY
METROPOLITAN MUNICIPALITY

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26 Oxford Street, East London, 5201

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MEMORANDUM

Date

From: **HOD: INFRASTRUCTURE SERVICES**
GENERAL MANAGER: WATER, WASTEWATER & SCIENTIFIC SERVICES

To: **CITY MANAGER**
HEAD: LEGAL SERVICES

Our Ref. / Ons Verw. **/ SEW**

Please Ask For / Vra Asseblief Om
MR B. GQWETA (EXT 2084)

Your Ref. / U Verw.

FILE NO:

PROGRESS REPORT FOR NOMPUMELELO TOWNSHIP ON COMPLIANCE WITH A COURT ORDER ISSUED IN APRIL 2022

1. PURPOSE

The purpose of the memorandum is to provide an update on the progress made in Nompumelelo Township with regards to control of sewage spillages, in compliance with a Court Order (Case No.: EL 1622/2021) issues in April 2022.

2. AUTHORITY

The City Manager, as the head of administration and Accounting Officer in terms of Section 55 of Municipal Systems Act (Act No. 32 of 2000), has overall responsibility for municipal administration and to act on behalf of the municipality on legal matters against the municipality.

Similarly, the Head of Directorate of Infrastructure Services has delegated authority for planning, development, operation, maintenance, and management of sewerage reticulation network, pump stations, and wastewater treatment works, to ensure compliance with all legislative requirements and to ensure that appropriate affordable services are provided to communities in a sustainable manner that promotes spatial and economic development of the municipality while ensuring protection of environment.

2/...

3. LEGAL/STATUTORY REQUIREMENT

Section 152 of the Constitution of the Republic of South Africa (1996) compels the municipality to strive, within its financial and administrative capacity, to achieve the objects of local government, which, amongst others, include promotion of safe and healthy environment to local communities.

Section 51 of the Municipal Systems Act (Act No. 32 of 2000) requires the municipality to establish and organize its administration in a manner that would enable the municipality to be responsive to the needs of local communities, and to perform its functions through operationally effective and appropriate administrative units.

The following pieces of legislation and Buffalo City Metropolitan Municipality Water Services By-law have relevant complementary sections and clauses that guide municipal daily operations to achieve the constitutional mandate on local government:

3.1 Constitution of the Republic of South Africa, 1996
3.2 Municipal Systems Act No. 32 of 2000
3.3 Environmental Conservation Act No. 73 of 1989
3.4 National Environmental Management Act No. 107 of 1998
3.5 National Health Act No. 61 of 2003
3.6 National Water Act No. 36 of 1998
3.7 Water Services Act No. 108 of 1997
3.8 Spatial Planning and Land Use Management Act No. 16 of 2013
3.9 Municipal Finance Management Act No. 56 of 2003
3.10 Buffalo City Metropolitan Municipality Water Services By-law (2011)

4. BACKGROUND / REASONING

Buffalo City Metropolitan Municipality (BCMM) operates and maintains 15 Wastewater Treatment Works, 97 sewage pump stations, and approximately 2442 km of sewage reticulation network.

On the 4th of April 2022 a Court Order was issued against the municipality by the High Court in the East London Circuit, following an application to the High Court by the Non-Profit Organization, namely, Nahoon Estuary Management Forum (NEMF).

The High Court issues to the municipality six (6) Orders that must be complied with. This memorandum gives an update on the progress made in each of the Orders issued against the municipality. The Court Order is attached to this memorandum as **Annexure 1**.

5. EXPOSITION OF FACTS

Table 1 provides a summary of the Court Order issued against the municipality and progress made in compliance with the Order. A total of 6 counts of actions were to be fulfilled in compliance with the Court Order.

A total of two (2) counts of actions issued with the Court Order have already been completed. Two counts of the Court Order have not been fulfilled so far due to the reasons detailed below. The other two counts relate to prayers that the court postponed indefinitely, while the other Order relates to costs of the application to the high court.

3/...

Court Order	Detailed Description	Progress Made	Remarks
1.	Prayers 1,6,7,8,9 and 10 are postponed *sine die*.	Not Applicable	The court decided to postpone compliance with these requests from the applicant indefinitely.
2.	To develop and implement a contingency plan for the accidental sewage releases at Nompumelelo to contain sewage spills and to prevent it from entering the stormwater system of Nompumelelo.	Not Completed	Any sewage spill automatically joins the stormwater system. Therefore, the Court Order is impractical to implement, as it effectively means there should be no spillages.
3.	Develop and implement an inspection and maintenance plan for sewage infrastructure in Nompumelelo.	Completed	The municipality has an Operations and Maintenance Plan for the whole reticulation network, which includes maintenance of Nompumelelo.
4.	To appoint a social facilitator to engage the residents of Nompumelelo regarding proper use of waterborne sanitation as well as the consequences of improper use thereof.	Completed	The municipality conducted two awareness campaigns in Nompumelelo township in the last 6 months.
5.	To take all measures necessary to ensure that the flow of sewage from Nompumelelo Township is contained in a sewage containment facility and is disposed of accordingly.	Not Completed	Similarly, the Court Order is impractical to implement as it implies that sewage spillages should be directed to a containment facility for periodic disposal. With over 300 sewer manholes in Nompumelelo, this means providing a containment facility for every manhole, or directing sewage overflows from each of the manholes to a containment facility.
6.	The respondent shall pay the costs of this application.	Completed	It is presumed that the applicant's legal representative costs have been or will be paid accordingly.

Table 1: Breakdown of Progress Made in Compliance with the Court Order

5.1 Court Order 1 – Prayers 1,6,7,8,9, and 10 Postponed Indefinitely

The court has decided to postpone compliance with this Court Order indefinitely. Therefore, unless there is no progress in other required court actions, the municipality is not required to take any action with regards to the requests made to the court by the applicant.

4/...

5.2 Court Order 2 – Development and Implementation of a Contingency Plan to Contain Sewage Spillages from Entering Stormwater System

The court order requires the municipality to contain sewage spills from entering the stormwater system of Nompumelelo Township, as this result in the contamination of the stream that is a tributary to Nahoon River. Sewage spillages occur on sewer manholes, as these are the only sewer infrastructure exposed to the ground for maintenance purposes. Effectively, the court order requires the municipality to ensure that any sewage spillage from a municipal manhole does not overflow to the environment.

By default, any sewage spillage from a sewer manhole automatically spills to the environment and joins the stormwater system to the stream (see **Photos 1 and 2** in **Annexure 5**).

The sewer system in Nompumelelo has over 300 manholes, with the combined flow of approximately 10 litres per second. It takes the municipal teams approximately 2 hours to get to the reported sewage overflow. There is also the lag time between sewage overflowing and reporting to the municipal call centre. Assuming an overall average time of approximately 3 hours, it would require a containment structure with a size of approximately 108 000 litres to hold the sewage from a manhole until the maintenance team can arrive to site. This volume is approximately 21 average Jojo Tanks of 5 000 litres.

To implement this court order, the municipality would require providing 21 underground Jojo Tanks next to every manhole. This not only is uneconomical, it is also technically impractical as manholes are provided in every bend, or every straight length of 80 m on average.

The other option would be to provide an earth berm or concrete channel along the Nompumelelo stream leading to Nahoon River. Effectively, this would be similar to providing a stormwater stream adjacent to the Nompumelelo Stream, as not only overflow sewage would be contained, but any runoff from any rainfall would end up in the parallel channel next to the stream. Nompumelelo Township has an area of approximately 0.7 km^2. The average precipitation is approximately 70 mm of rainfall every month.

Assuming an average rainfall intensity of 2.3 mm a day and 60 % soil absorption, approximately 0.93 mm of runoff would drain to the concrete channel on an average rainy day. This equates to 651 000 litres of stormwater that would have been draining to the stream, or approximately 130 Jojo tanks of 5000 litre volume. Adding the periodic manhole overflows the containing facility would need to be at least 150 Jojo tanks.

The municipal sewage tanker trucks have a volume of 6000 litres. To empty such a containing facility over a period of 8 hours would require at least 4 sewage tanker trucks running non-stop.

The municipality has a total of 11 sewage suction tankers responsible for periodic emptying of consumers using septic tanks. The current fleet is barely managing to attend to those consumers that have paid for the service. Therefore, the emptying of the containing facility would require the municipality to use private suction tanker trucks with a charge rate of R 6000 per day. During rainy periods the municipality would pay approximately R 24 000 per day to empty the containing facility. This option is also not economical.

Therefore, it is the municipality's considered view that this court order is not implementable.

An awareness campaign was conducted in Nompumelelo Township on the 13th January 2023, where the sanitation department, together with various other municipal department, participated in education of communities about correct use of the municipal sewer system. A copy of a typical pamphlet circulated on the day is also included in **Annexure 4.** Similarly, **Photos 7 and 8** in **Annexure 5** shows two sanitation department staff members explaining correct use of the sewerage system to Nompumelelo community on the 13th January 2023.

Therefore, while a private Social Facilitator was not appointed, it is the municipality's view that the education campaign conducted in Nompumelelo and other communities similarly communities affected by such challenges is meeting the requirements of the court order.

5.5 Court Order 5 – To Take Measures to Ensure Sewage from Nompumelelo Township is Contained in a Sewage Containment Facility

It is the municipality's view that, for all intents and purposes, Court Order 5 has the same practical implications as Court Order 2. It was argued under Court Order 2 that it is not practical or economically feasible to implement such a court order. Accordingly, the same conclusion is drawn for this court order.

5.6 Court Order 6 – The Respondent to Pay the Costs of the Application

Without any information to the contrary, it is presumed that the municipality has paid the applicant the costs of the application. Therefore, this court order is assumed to be implemented.

5.7 Long-term Plan to Address Sewage Spillages in Nompumelelo

Nompumelelo Township was established in 2005 as one of the low-cost housing areas of East London. The township has a population of approximately 8000 people, with 46% in formal houses in terms of the 2011 Census. Therefore, over 50% of communities are either in informal settlements or backyard dwellers. Most informal settlements of Nompumelelo are constructed over sewers in low-lying areas, resulting in several sewage overflows due to vandalism of infrastructure, illegal sewer connections, and solid waste and foreign objects thrown into the network.

As part of the Informal Settlement Development Plan, the municipality is developing a plan to relocate informal settlements in the area to a more suitable area. The municipality is engaged in a process of land acquisition and development of General Plans for a new township between Beacon Bay and Gonubie, to relocate informal settlements from Nompumelelo and Ducats areas.

Relocation of informal settlements from Nompumelelo Township and Ducats has been prioritized in the latest draft of Informal Settlements Development Plan to be submitted for approval by the National Department of Human Settlements. However, sufficient funding to purchase the targeted privately owned land is still a challenge that needs to be addressed.

6. CHALLENGES

The municipality will continue conducting regular awareness campaigns to Nompumelelo Township communities, to try and reduce the impact of sewage spillage from the area. As indicated earlier, this challenge is exacerbated by socio-economic factors and other social ills, that include illegal water connections, illegal sewer connections, illegal electricity connections, and vandalism of infrastructure.

The municipality is faced with raising funding for purchase of privately owned land for relocation of informal settlements in Nompumelelo and Ducats. While a certain percentage can be sourced from grant funding for purchase of land and subsequent development there is counter funding expected from the municipality.

Nompumelelo informal settlements are inaccessible by municipal maintenance vehicles. This poses a challenge as maintenance teams must walk in between the shacks to get to the reported blockages. Occasionally, some blockages are so resistant and require use of a pressure Jetting Machine mounted from the back of a bakkie. Without vehicular access, clearing sewage blockages takes longer in such areas than normal, as the teams are left with no option other than the use of manual steel plumbing rods. Illegal electricity connections pose a serios risk to maintenance personnel in Nompumelelo as they navigate the narrow pathways carrying plumbing rods that may touch illegal electricity wires, resulting in electrocution.

Therefore, the sewage overflows are still likely to occur until the long-term plan of relocation of informal settlements in Nompumelelo Township has been implemented.

7. STAFF IMPLICATIONS

There are no staff implications at this stage.

8. FINANCIAL IMPLICATIONS

As indicated earlier, maintenance of a private Jetting Machine for Nompumelelo Township and surrounding areas cost the municipality approximately R 140 000 monthly.

9. OTHER PARTIES CONSULTED

Municipal Land Administration and Human Settlements Directorates were contacted in preparation of the memorandum.

10. RECOMMENDATION

It is **recommended** that:

10.1 The City Manager takes note of the progress made in complying with the Court Order (Case No.: EL 1622/2021) for dealing with sewage spillages in Nompumelelo Township.

blue SOUTH AFRICA

C

NAHOON ESTUARY AND NOMPUMELELO BIOREMEDIATION TREATMENT PROPOSAL

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Directors: H. Dominick, FA Van Niekerk, HA Barnard - Non Executive Director: R Dominick
Company Reg No: 2016/006497/07 Vat Number: 4030273249

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SOUTH AFRICA

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Directors: H. Dominick, FA Van Niekerk, HA Barnard - Non Executive Director: R Dominick
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2. BLUEPLANET MICROBIAL TECHNOLOGY

Our BluePlanet Microbial cultures contain four (4) different geneses with six (6) different strains of bacteria included. The BluePlanet Microbial blends are made up of aerobic, facultative, facultative anaerobes, photosynthetic and chemosynthetic bacteria groups. The specific bacteria groups, geneses and species are included in the technical support data. The BluePlanet Microbial Product Plate count is certified as follows and exceed that of most competitors in the market place.

TEST ITEM	STANDARD SPECS	TEST RESULTS
Heterotrophic Plate Count	1×10^7 CFU/mL	2.4×10^7 CFU/mL
Anaerobic Plate Count	1×10^7 CFU/mL	2.5×10^7 CFU/mL
Photosynthetic Bacteria MPN	1×10^6 MPN/mL	4.8×10^6 MPN/mL

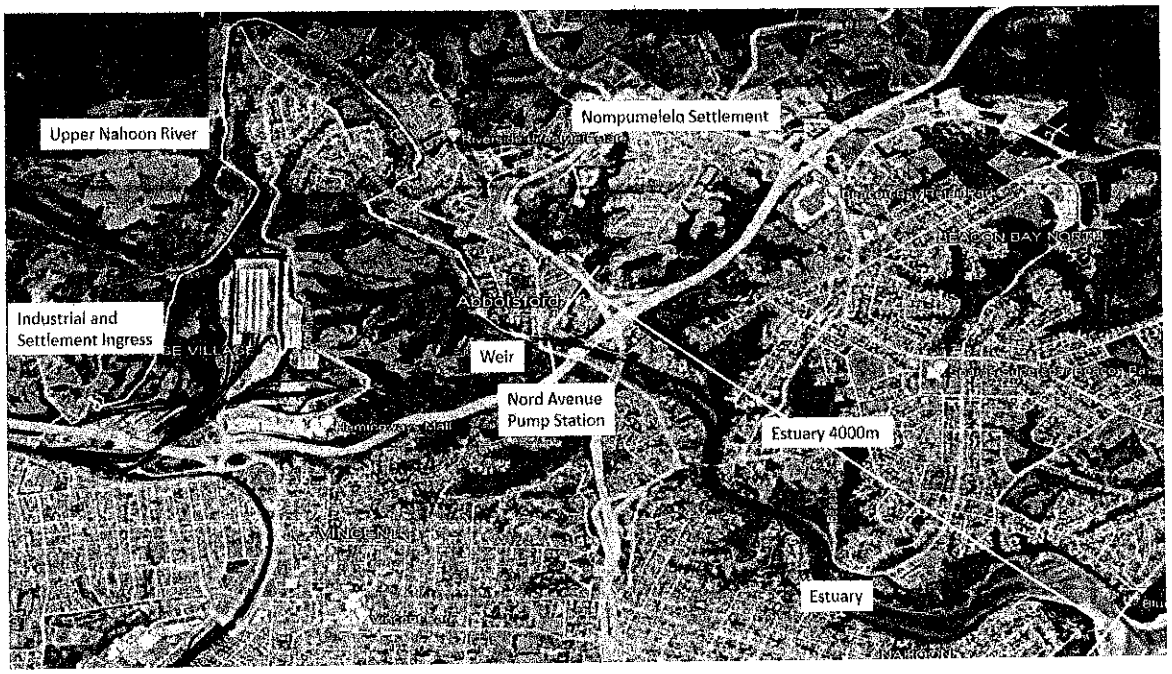
The micro-organisms in Aqua-Clean are non-toxic and non-pathogenic. They are live bacteria in a liquid medium that is non-offensive to humans, animals, s and all types of aqua culture. The six (6) strains of bacteria in BluePlanet Microbial Products are self-selecting and those with ample nutrient supply will flourish.

This makes application of the product particularly simple as it does not require specialist knowledge to select the correct strains of bacteria for a particular situation.

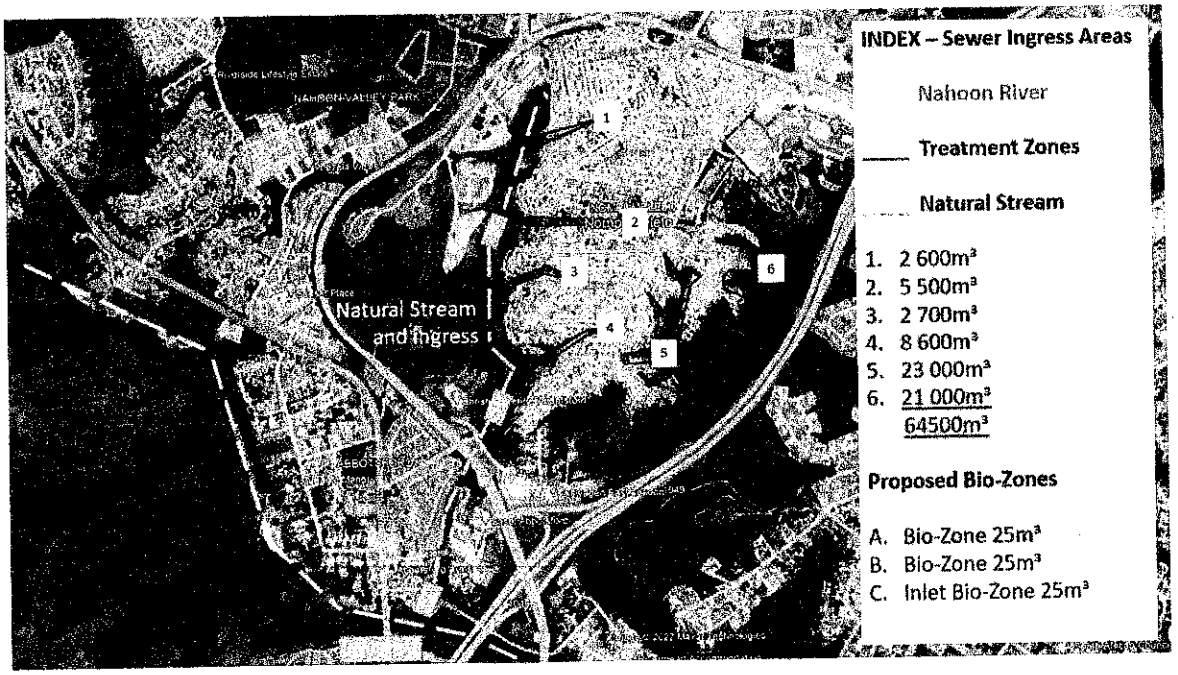
PRODUCT	DESCRIPTION	APPLICATION
ACF-32	Microbial formula used to degrade organic waste in natural bodies of water, waste water systems and contaminated soil.	Open Water, Waste Water, Hydro/Soil
ACF-AD Activator	Anaerobic Digester Activator used to boost production of enhanced bacteria to speed up bio-gas process at significant cost savings.	Open Water, Waste Water
ACF-SC	Sludge Cellulose Formula used to degrade hard to remove fibrous organic materials by breaking down cellulose and sludge in waste water and composting.	Waste Water Composting
ACF-NITRO Activator	Nutrients used to create large quantities of nitrifying bacteria to significantly enhance waste water treatment and environmental remediation activities.	Open Water, Waste Water, Hydro/Soil
ACF-Nutrient	Macro and micro nutrients used in both waste water and soil amendment to remove any bio-chemical limiting factors.	Waste Water

3. SITE OVERVIEW

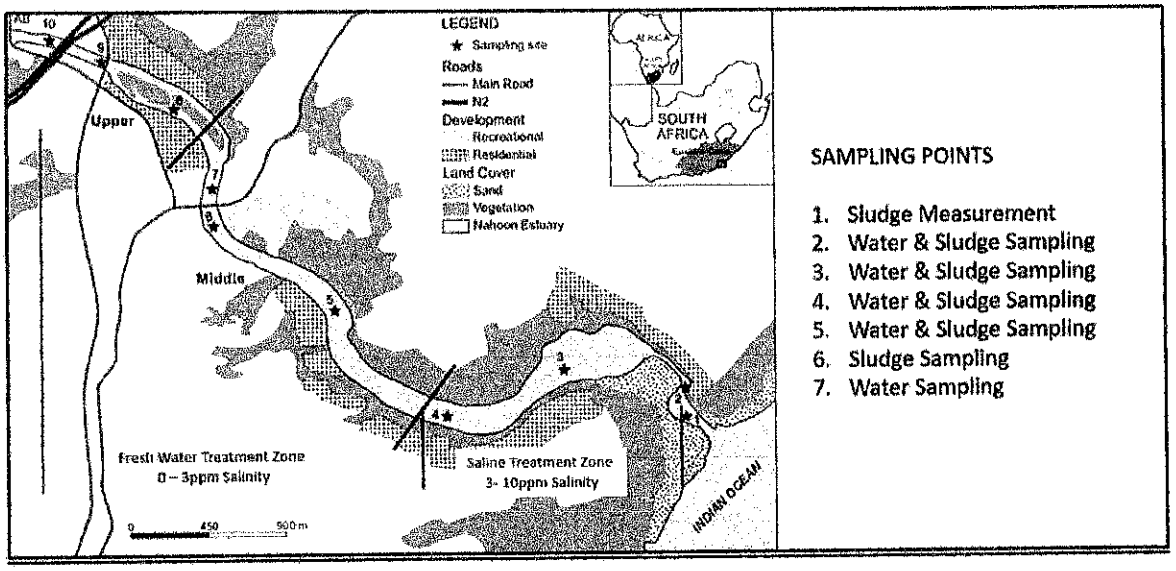
Nahoon River flowing into the Nahoon Estuary



Nompumelelo Tributary flowing into the Nahoon Estuary



Nahoon Estuary Treatment Zones



4. SITE PROPERTIES

ITEM	MEASURE	QTY
Estuary River Length	M	4000
Average River Width	M	90
Average River Depth	M	1,5
Volume of Nahoon Estuary	M^3	540 000
Flow Rate of Nahoon Estuary	M^3 / Day	
Nompumelelo Discharge	M^3 / Day	400

A large section of the affected terrain is inaccessible. For this purpose biozones would need to be created. This consists of temporary gabions filled with bio-media strategically installed in the Nahoon Estuary catchment area.

Manual application of microbes will be required at Nompumelelo settlement ingress zones.

5. ONSITE VISIT OBSERVATIONS AND CONCLUSIONS

5.1. Nahoon Estuary

The Nahoon River and Estuary, from the weir to the mouth, have a length of approximately 4000m, an average width of 90m and an average depth of 1,5m. The approximate volume of the estuary during low flow periods is estimated to be between 400 000m^3 to 650 000m^3.

Our most critical observation is that Nahoon Estuary has over the years been contaminated by a number of sources. These sources are attributable to a number of factors, but not limited to, the lack of adequate sewer infrastructure at the growing Nompumelelo Informal settlement, damaged & blocked sewer infrastructure and pump station overflows during load shedding, which are the major contributing factors to the contamination problems downstream of the weir.

During our site visit to the Nahoon Estuary and Nompumelelo Settlement, we noticed that some of these contamination sources include, but not limited to:

- Some nutrient and pollutant ingress from the Nahoon river above weir
- Ever increasing informal housing erected around Nompumelelo Settlement and the lack of increase in adequate sewer infrastructure to meet this increase in informal housing
- Blocked and vandalized/broken-down sewer infrastructure, resulting in overflowing and discharge into ravines that flow to the estuary catchment area
- Constant flow of run-off water carrying contaminants from areas without services to the estuary catchment area
- Natural spring running from Nompumelelo Settlement to the river, carrying plastic, contaminants and untreated sewage to catchment area
- Pump stations overflowing in Abbotsford, more especially during load shedding and depositing raw sewage directly into the estuary
- Storm water and road run off containing hydrocarbons

All these abovementioned factors have contributed considerably to the deterioration conditions of the Nahoon River and Estuary over the years. Algae blooms, an indication of excess nitrogen and phosphorus, have become common during low flow periods. Water hyacinth, which is quite an aggressive invader, has flourished quite significantly over the last years due to the constant high levels nutrients attributable to the continuous ingress carried by run offs, pump station overflows and sewer ingress, particularly from the Nompumelelo Settlement.

We have also observed that these excessively high levels of nitrate and phosphate, as a result of the nutrient ingress, increase considerably during the dry season due to the lack of flushing. Although the heavy rainfalls in January would have resulted in the Nahoon river and Estuary being flushed, consequently washing away the water hyacinth onto the Nahoon beach, there is, however, already quite a considerable regrowth visible above the weir as the nutrient loading in the river increases due to low flow.

Also quite noticeable on site was a very strong odour coming from both the Nahoon River and Estuary. This is a common problem associated with sulphurous compounds in sewage breaking down in anaerobic conditions, thus releasing hydrogen sulphide (H_2S) and ammonia (NH_3).

5.2. Nompumelelo Settlement

The lack of adequate sewer infrastructure at the Nompumelelo Settlements, damaged sewer infrastructure and blocked sewer lines are the major factor that are contributing to the contamination of the Nahoon Estuary downstream from the weir.

The Nompumelelo Settlement also has quite a few ravines areas that are not connected to the sewer system and that flow directly into the Nahoon Estuary. Currently, the flow of the untreated sewage and spring water run-off from Nompumelelo Settlement is approximately 5L/s – 10L/s, although this varies from time to time depending on the flow rate of the spring and the rainfalls.

We have also established that the Nompumelelo Settlement community is continuously dumping solid waste into the ravines. This, in some parts of the ravines, has caused some major blockages thus further exacerbating condition of contamination. This is attributed to fact that the community have never been workshopped about the dangers of dumping waste into the ravines and the consequences of water pollution.

5.3. Observation Indicators

5.3.1. Algae Blooms:

An algae bloom is the rapid increase of the algae population in the aquatic ecosystems, both in fresh and marine waters. They tend to thrive where there is an abundance of two nutrients; phosphorus and nitrogen, usually caused by runoff of nutrients (animal waste, fertilizers, sewage) from nearby communities, in this case the Nompumelelo Settlement. This is the case with the Nahoon Estuary, algae blooms have become so common due the excessive nitrogen and phosphorus.

The danger here is that too much nitrogen and phosphorus in the water, unfortunately, causes algae to grow faster than ecosystems can handle. These significant rapid increases in algae growth decrease the oxygen aquatic life needs to survive. Perhaps an even more significant fact is that algae blooms can be harmful to humans because they produce elevated toxins and bacterial growth that can make people sick if they come into contact with polluted water, consume tainted fish or shellfish, or drink contaminated water.

5.3.2. Odour:

The odour currently being experienced at the Nahoon Estuary is an indication that anaerobic conditions have set in. The odour is as a result of the gases {Hydrogen sulphide (H_2S), Ammonia (NH_3)}, released by the sludge and sewage as it breaks down in slow anaerobic digestions. These bubble to the surface, noxious, sulphurous compounds bubble to the surface and are released all at once, thus giving rise to the toxic odour. If this condition is not dealt with, the excessive sludge will continue to break down and float to the top of the Nahoon Estuary, creating even more odours as it has no water cap over it to keep odours at bay.

5.4. In Summary

- Nahoon Estuary is heavily contaminated;
- The Nompumelelo Settlement is one of the major contributors of contamination to the Nahoon Estuary;
- The settled faeces and organic matter have collected and accumulated in the Estuary;
- There is a high Chemical Oxygen Demand (COD), created by the Nompumelelo Settlement untreated raw discharge;
- The Nompumelelo Settlement discharge requires careful treatment before discharging into the Nahoon Estuary;
- There is solid waste dumped into the ravines is causing more contamination challenges;
- Of most concern are the gases that are being released {Hydrogen Sulphide (H_2S), Ammonia (NH_3), Phosphates (PO_4^{3-})} that are causing the bad odour that is disturbing the local community;

6. PROPOSED BIOREMEDIATON TREATMENT PLAN

Our proposal comprises of a six (6) months bioremediation plan. This plan will be broken up into the Nahoon Estuary and Nompumelelo Settlements, both combined in the six (6) months. Our proposal recommends a bioremediation of the Nahoon Estuary and Nompumelelo Settlement ravine areas not connected to the sewer system. Our bioremediation plan will also target the overflowing sewage pumps station, pathogens, odour and run off water that flows into the Nahoon Estuary.

The upper Nahoon River shows signs of high nutrient loading, as mentioned earlier in the proposal, that continuously results in the algae and hyacinth rapid growth, but does not show signs of raw sewage as in the case of the Nahoon Estuary. Therefore, for the purposes of this proposal our focus will be on the bioremediation of the Nahoon Estuary and the overflow from Nompumelelo Settlement into the Nahoon Estuary.

Based on previous experience, our recent site visit, satellite imagery and research data received, we believe that the proposed bioremediation methodology will deliver a sequential improvement

in the Nahoon Estuary water quality and odour, whilst also eliminating sludge and faeces accumulation in the estuary. Furthermore, this approach also focuses on improving the living conditions of all those most severely impacted by the lack of and damage to sewer infrastructure, not only at Nompumelelo Settlement, but also in the surrounding communities around the Nahoon Estuary.

In order to ensure the successful implementation of our bioremediation approach, which will ensure that the impact of the sewer ingress in the Nahoon Estuary, it is important that key focus is placed on the following activities:

- Bioremediating the accumulated sludge and sewage in the Nahoon Estuary;
- Identifying all sewer and run off ingress into the estuary;
- Creating bioremediation zones for the Nahoon Estuary;
- Putting up of debris collection gabions to treat the flow before entering into the estuary and to act as a bio-zone with sufficient surface area to act as such;
- Identifying the Nompumelelo Settlement overflows;
- Creating bioremediation treatment zones;
- Putting up of debris collection gabions to treat the flow towards the estuary;
- Targeted Nano Aeration along the Nahoon Estuary.

Our approach also involves a community stakeholder engagement session, which will be aimed at workshopping the surrounding community on the importance of the Nahoon Estuary. The community will be workshopped on the dangers of littering, polluting and contaminating the Nompumelelo Settlement ravines. After the community engagement sessions with the various community leaders and stakeholders, BluePlanet will adopt a deliberate labour intensive approach, aimed at removing and bioremediating the wastewater flow in the ravines currently being dumped into the Nompumelelo Settlement ravines.

BluePlanet has developed this bespoke pilot bioremediation plan based on experience gained at North End Lake, Gqeberha, that required bio-zones and catchment gabions to be set up. We also draw from similar work experiences conducted at the Eerste River and Kuils River, in Cape Town.

Even more important, this bioremediation plan is similar to that which we applied at the Rio Turia, Spain, which also a combination of saline and freshwater bioremediation.

7. THE BIOREMEDIATION APPROACH

7.1. Nahoon Estuary

Our bioremediation approach here will require that the Nahoon Estuary section be split into two (2) parts, the one part being the fresh water section and the other part being the saline water section.

Our approach here will involve the application of 10ppm saline acclimatized microbes and exo-enzymes at 50ppm per month of the estimated volume of the saline estuary component. The fresh water component of the estuary will be treated at 30ppm as there will be incoming flow of microbial flush from the proposed bio-zones feeding from Nompumelelo Settlement and the Nord Avenue Pump Station.

The river and estuary from the weir to the mouth have a length of approximately 4000m, an average width of 90m and an average depth of 1,5m. The approximate volume of the estuary during low flow periods is estimated to be around 400 000m^3 to 650 000m^3. An average of 300 000m^3 has been selected as the fresh water component of the Nahoon Estuary volume to be bioremediated, whilst approximately another 200 000m^3 has been determined to be the saline water component requiring bioremediation.

This means that our monthly doses will be:

Monthly 10ppm Saline Requirement	**Monthly Fresh Water Requirement**
200 000m^3 x 50ppm = 10m^3/month 10m^3 / 4 = 2,5m^3/week (2500L) Applied 1,5km upriver to the mouth	300 000m^3 x 30ppm = 9m^3/month 9m^3 / 4 = 2,25m^3/week (2250L) Applied at weir and up to 2km down the estuary

Acclimatized fresh water and saline microbes and exo-enzymes will be brewed off site, transported to the Nahoon Estuary and administered by firefighting unit, spraying and injection into and onto settled and accumulated sludge and sewage layers on a weekly basis. Fresh water cultured microbes will be able to function at a salinity of 10ppm, however, their efficacy will be impacted. This stresses the importance of splitting the bioremediation into a saline and fresh water solution

Along with the bioremediation plan, a nano aeration approach will also be added to the plan to help administer the dissolved oxygen back into Nahoon Estuary, especially in the deeper parts of the estuary. This nano aeration approach will ensure that aerobic conditions are invigorated back into the Nahoon Estuary. We included this process in our approach to stop the production of hydrogen sulphide (H_2S) in the anaerobic areas of the Nahoon Estuary. Our MK1 Nano Aerators will be deployed daily, until we are satisfied, through regular water testing, that the aerobic conditions are completely restored back into the Nahoon Estuary.

Weekly water and sludge sampling will be undertaken to monitor the progress of the bioremediation program and to determine if any adjustments need to be made to the brewing and application process.

7.2. Nompumelelo Settlement and Sewage Pump Station Overflows

Our bioremediation approach here will require that the Nompumelelo Settlement section be split into three (3) bio-zones, as shown in the map below. These bio-zones will be installed between the Nompumelelo Settlement and the inflow to the estuary. Each of the bio-zones will consist of a 25m^3 gabion bed filled with plastic bio-media rings for surface area. These zones will be temporarily fitted into the bed of the stream leading past the Nord Avenue pump station into the Nahoon Estuary. Each bio-zone has a bio-film surface area of 11250m^2, enough to achieve the results we want to achieve.

The flow from the Nompumelelo Settlement has been approximated to be between 5 – 10L/s. This equates to approximately 400 000L of ingress inflow into the Nahoon Estuary, this is excluding the flow from the Nord Avenue sewer overflows.

A dosing rate of 20ppm/m^3 flow will be applied at the dosing zones. This compliments the 30ppm already being dosed into the fresh water section of the Nahoon Estuary.

Furthermore, nitrifying and photosynthetic bacteria will be added to the brewed exo-enzymes before applying to the zones.

This means that our monthly doses will be:

Monthly Nompumelelo Requirement
400 000m x 20ppm = 8m^3/month 8000L/4 = 2000L/week

Product will be applied as follows:

- 1000L per week applied will be sprayed directly into the run off ravines within the Nompumelelo Settlement (64500m^2);
- 250L per week will be applied via spray cart to bio-zone 1;
- 250L per week will be applied via spray cart to bio-zone 2;
- 500L per week will be applied at Nord Avenue bridge and to the inlet bio-zone and trash collection gabion.

Weekly water samples will be taken at the outflow of the three bio-zones. No bioremediation will take place at the quarry dam or at the natural spring, this outflow water will be dealt with in the bio-zones.

Access and safety concerns omit the spring and the quarry from the treatment plan. The interventions outlined above will deliver a sequential improvement of the water quality, reduce settled sludge, hydrolyse faeces and organic matter, and eliminate odour.

7.3. In Summary

- Targeting sludge and faeces reduction through weekly applications of acclimatized and site specifically grown microorganisms;
- Enhanced nitrification through nitrifying microorganisms and enhanced oxygen levels required;
- Installation of two Nano Bubblers with the purpose of achieving:
  - ✓ Increased dissolved oxygen levels required for advanced oxygenation;
  - ✓ Oxygenation and settling of metals if present;
  - ✓ Accelerated sludge and raw sewage reduction;
  - ✓ Odour control.

8. MORE ON OUR BIOREMEDIATION APPROACH

There are five primary modes of action with our products:

- Enhanced organic particulate and sludge solubilisation;
- Enhanced digestion of solubilised organic and inorganic matter;
- Enhanced nitrification or denitrification;
- Odour control;
- Enhanced oxygenation through Nano Bubble Technology.

8.1. Enhanced Organic Particulate and Sludge Solubilization

- Bacteria cannot consume particulate organic matter;
- Enzymes solubilize organic matter so that it can pass through the bacterial cell wall;
- Enzyme producing bacteria replicate slowly (60 minutes) while non-enzyme producing bacteria replicate quickly (20 minutes);
- In the presence of solubilized food, non-enzyme producing bacteria outcompete the enzyme producing bacteria (competitive exclusion);
- A key consideration in bioremediation of water bodies is the presence of sufficient enzymes to solubilize organic matter;
- BluePlanet bacteria produce extracellular exo-enzymes (protease, amylase, lipase, cellulase).

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10. LONG TERM RECOMMENDATIONS

10.1. Nahoon Estuary and Nompumelelo Settlement

We cannot emphasise enough that the major sources of contamination of the Nahoon Estuary are the Nompumelelo Settlements ravines that carry raw sewage and the pump stations overflows. Treating the Nahoon Estuary is not a permanent solution, but it is indeed the first step in the correct direction. This exercise would then be followed by, should BCM choose this option, ongoing maintenance that will assist with the treatment of the discharge ingress from the Nompumelelo Settlement. It will also assist with the re-accumulation of sludge and faeces in the Nahoon Estuary.

Along with these recommendations, BCMM should also consider a physical expansion of the sewerage infrastructure in the Nompumelelo Settlement to meet the constantly ever increasing population demands at the settlement. We also recommend that BCMM looks into alternative power/energy options and solutions for the pump stations, so that load shedding outages will not affect operations resulting in raw sewage spills to the estuary.

10.2. Ongoing Maintenance After Month Six (6)

It is important that the BCMM considers the model of ongoing maintenance. This will ensure that the sludge and faeces accumulation in the Nahoon Estuary is hydrolysed and reduced over a period of time. This will also ensure that the ingress flow and sewage discharge form Nompumelelo Settlement and the pump station overflows is controlled before discharging into the Nahoon Estuary. This, in turn, will guarantee that the bad odour is also controlled.

A separate schedule will be submitted for the ongoing maintenance and continuous treatment of both the Nahoon Estuary and Nompumelelo Settlement ravines & run offs.

Successfully meeting the project specs will mean implementing a three (3) phase program:

PHASE 1: Bioremediation of the Nahoon Estuary;

PHASE 2: Bioremediation of the Nompumelelo Settlement ravines and overflowing pump stations;

PHASE 3: Maintenance (on going to prevent re-occurrence of problems) – this Phase will depend on the satisfaction of BCMM and its commitment to maintaining environmentally acceptable standards.

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11. COST ANALYSIS FOR THE BIOREMEDIATION APPROACH

Please refer to our BOQ for a clearer breakdown of the costs of this proposal

12. SITE DISCLAIMER

BluePlanet cannot take responsibility in the event of a shock kill due to large chemical or oxidant loading into the system. In the event of a suspected chemical shock loading, additional water samples will be taken at the at all the critical ingress points.

13. PRICING TERMS

Delivery of components and products	Included
Validity	45 Days from proposal date
Payment Terms	TO BE DISCUSSED
Reporting	Monthly report with weekly sampling analysis

14. PROJECT COMMENCEMENT

The project will commence once project order and agreed deposit have been received.

15. CONCLUSION

We believe that the options put forward will achieve the desired results, which are:

- ✓ Comprehensive treatment of the Nahoon Estuary;
- ✓ Digestion of the sludge and raw sewage in the Nahoon Estuary;
- ✓ Stabilisation of the ingress flow into the Nahoon Estuary;
- ✓ Elimination of the bad odour causing sulphides in the Nahoon Estuary;
- ✓ Improve aquatic life and aqua tourism in the Nahoon Estuary;

Our team is available to discuss the contents of this proposal in detail and we welcome the opportunity to engage with BCMM, to find the best possible treatment plan for the Nahoon Estuary. We understand that the project will have moving goal posts as this is normal in the field of bioremediation.

16. LOCAL SITES REFERENCES

Selected Sites (RSA)	Comments	Year
KKL (Klein Karoo Looiereie)	Treatment of tannery	2010 - 2012
Knysna Municipality	Treatment of sludge spill	2010
Parmalat South Africa	Various sites / Sludge / Odour	2012 – Present
North End Lake (PE)	Sludge reduction / PCB	Current project
Prince Albert Municipality	WWTP – Treatment of sludge	2010 – 2011
Tulbach Wines	Winery Wastewater / Odour	2014 – present
Montagu Cellars	Winery Wastewater / Odour	2014 – present
Ashton Cellars	Winery Wastewater / Odour	2014 – Present
Simba Isando	Hydrocarbon clean up	2010
No2 Piggeries	Sludge Digestion / Odour	2015 various sites
Blouwbank Piggery	Sludge Digestion / Odour	2015
Chalala Piggery	Sludge Digestion / Odour	2015
Morning Milk	Sludge / Odour / FOGs	2014 – present
Shell Oil – SA	Various WWTP Countrywide	2014 – present