



# GroundTruth

environment & engineering

email: [admin@groundtruth.co.za](mailto:admin@groundtruth.co.za)  
www.groundtruth.co.za  
Tel: +27 33 343 2229

---

Project Ref: GT1377/130924/01

13 September 2024

Attention: Joanne Daneel

Trinity Metals

cc: Sam Ryumugabe

Dear Jo

**Re: Input into the Legacy Tailings Management and River Rehabilitation Programme for Trinity Metals Concessions, Rwanda.**

GroundTruth take pleasure in confirming the Scope of Works (SoW) for input into the development of a Legacy Tailings Management and River Rehabilitation Programme for all three of Trinity Metals mining concessions, namely Rutongo Mine; Trinity Nyakabingo Mine; and Trinity Musha Mine.

The project team's involvement in the programme, will focus on the following core tasks for each of the concession areas:

- Undertaking a comprehensive source, pathway and receptor analysis of potential contamination, including a review of gaps in relevant baseline ESIA assessments. Additional assessments will be undertaken if necessary.
- Determining ecological health and developing an understanding of the drivers of the river and wetland ecosystems.
- Reviewing existing data and updating the water quality monitoring protocols and sites to be monitored. This will include the development and implementation of an online water quality monitoring database and dashboard.
- Determining flood lines for major streams, including deriving flood events under project climate change scenarios.
- Modelling catchment hydrological flows and sediment movements to characterize present and future flows and movements.
- Modelling scenarios and determining management strategies and interventions required to restore rivers and wetlands to predetermined ecological states. This would focus on maximizing climate resilience and ecosystem goods and services delivery to the Rwandan people in a post-mining landscape. This would include an Ecosystem Goods and Services Assessments.
- Developing of a Stakeholder Engagement Plan (SEP) and engagement with key stakeholders during the development of the river rehabilitation management strategies.

- Developing of a citizen-science based monitoring plan and programme, integrating this into the monitoring protocols for the water quality monitoring (and possibly rehabilitation activities).

### **Source, pathway and receptor analysis**

A systematic assessment of sources, pathways, and receptors of potential contaminants will be conducted to help understand the environmental risks associated with the past (e.g. legacy tailing) and current mining operations, including illegal artisanal mining. The outputs from this process will be used to guide and prioritize management actions required to mitigate contamination risks through rehabilitation and ecosystem restoration. The source, pathway and receptor analysis will commence with a review of baseline ESIA assessments to gather and analyze existing hydrological, groundwater, water quality and geochemistry data and how data is spatially and temporally distributed across the three mining concessions and associated catchments. Key information gaps relating to catchment characteristics, water sources, surface water and groundwater flows, soil and water chemistry, heavy metals, nutrients, sedimentation, etc. will be identified from the outset to ensure that these gaps can be addressed through additional desktop assessments, field studies and data collection where necessary. Sources of water and contamination will be identified and mapped in relation to existing receptors within the landscape context of each site. The level of contamination risk will be determined using available limits considered safe and/or acceptable for human and ecosystem wellbeing. The pathways along which contaminants travel from sources to receptors will be determined based on surface runoff and groundwater flow patterns, which will be informed by the surface water and groundwater hydrological modelling. Depending on the various combinations of source-pathway-receptor profiles identified, mapped and assessed, important and/or sensitive receptors (e.g. drinking water sources, aquatic ecosystems, communities, etc.) will be highlighted and used to inform the Legacy Tailings Management and River Rehabilitation Programme. It is important to note that although GroundTruth will principally drive this process, it will be important to involve and integrate findings from other role players, particularly in terms of groundwater and geochemistry. Specific steps and details on how this will be practically achieved will be determined through the integrated workshop in October 2024.

### **Freshwater ecosystem assessments**

The project focuses on freshwater ecology, which significantly influences biodiversity patterns, ecosystem functions, and the delivery of ecosystem goods and services. The study will assess freshwater systems, distinguishing between riverine and wetland ecosystems, and recognizing their landscape linkages. IFC PS6 emphasizes the need to identify and assess natural and critical freshwater habitats at risk from project developments. The freshwater ecosystem assessments will characterize and map wetland and riverine habitats (and associated biodiversity) based on their ecological patterns/processes and landscape positions. A desktop review using high-resolution aerial imagery, proposed mining layouts, historical data, topographical maps, and contour data will establish the baseline extent of wetland and riverine habitats. Outputs from the mapping will guide future studies and measurements, and identify key sites for vegetation sampling and determination of present ecological state (PES)/condition.

The approach that will be followed to assess riverine and wetland ecosystems will be as follows:

- Undertaking desktop studies and field-based surveys of associated ecosystems within the area of influence for each site;
- Characterise patterns and processes of freshwater systems in terms of biota (i.e. fauna and flora), vegetation, hydrology, geomorphology, etc.;
- Establish baseline ecological conditions/PES, as well as the provision of ecological benefits and services.

- Highlighting any species of conservation concern (i.e. rare, endemic, Red Data species), in particular species that trigger Criterion 1 to 3 IFC PS6 that will need to be considered in the CHA; and
- Identifying and assessing key indicators suitable for monitoring (e.g. biomonitoring) and determining additional *in-situ* water quality indicators for assessment and longer-term monitoring.

In-field surveys of rivers and wetlands will include the collection of data to determine system drivers, focusing on assessment of freshwater ecosystem condition and functioning. This will include on-site observations regarding ecosystem characteristics, impacts/disturbances, vegetation communities, aquatic biota (e.g. fish, macroinvertebrates, diatoms), water quality, etc. This information will be used as the baseline against which the site activities can be monitored into the future. Importantly, the use of specific wetland and river habitat assessment tools will facilitate the reporting of different scenarios (i.e. current vs. post-development or post-rehabilitation) thereby enhancing EGS reporting requirements. In addition, the usefulness of ecological monitoring techniques is to provide detailed information in terms of various factors that affect the receiving and downstream freshwater environments thus providing an integrated understanding of impacts occurring within the catchment areas.

### **Water Quality (WQ) Monitoring Protocols**

All existing WQ data will be reviewed and analysed to update the WQ Monitoring Protocols and sites for monitoring WQ. In addition, the GroundTruth team, through consultation with Trinity Metal's environmental management team, will develop and implement an online WQ monitoring database and dashboard that will facilitate and optimise the future monitoring and engagement of projects.

### **Catchment Hydrological and Sediment Modelling**

The hydrological yield assessment will utilise GIS spatial data and historical rainfall records to perform hydrological modelling of the catchments. The scope of work covered by the hydrological assessment includes:

- Modelling of hydrological flows generated by the catchment, under both the present landcover scenario, and in comparison, to future potential land use/landcover changes;
- Drawing on the above studies, provide a discussion of the potential impacts of the development on the hydrology of the receiving systems; and
- Provide recommendations to mitigate the impacts of the changes in hydrology on the receiving catchments and users.

To undertake the hydrological yield modelling to the desired level of detail and confidence, a daily timestep process-based model, such as the ACRU model, is envisaged, to be used. Essentially, this model relies on input data and then processes this information to determine hydrological outputs. Hence, it can be utilised, in conjunction with the latest available outputs from multiple Global Circulation Models (GCMs), as inputs to simulate projected future impacts of climate change on the hydrology of these systems. The hydrological modelling component of the study broadly comprises of the following tasks:

- A detailed sequence of GIS-derived workflows;
- Design flood hydrological estimates to inform the flood line modelling. Flood estimates also include climate change scenario projections;
- Design rainfall estimation;
- Catchment yield estimates of present water flows; and
- Catchment yield estimates of future potential land use and landcover changes.

In addition, a detailed geomorphic appraisal is essential to understand and predict flooding and sediment dynamics in river and floodplain wetlands within the concession areas. This appraisal will inform the impact of proposed rehabilitation approaches by examining sediment regimes, which are crucial for creating physical

habitats and supporting ecosystems. Both natural and human-induced disturbances can significantly alter these regimes, affecting morphology, downstream users, and ecosystem services. Given the complexity and variability of sediment regimes, especially in modified landscapes, a spatially explicit sediment modelling framework will be applied at both catchment-wide and local scales, aiding in the planning and prediction of current and future sediment transport scenarios.

### **Flood Line Determination**

Using the results from the hydrological modelling component described above, flood lines will be developed for each concession area, including projected flood events under climate change scenarios. The peak discharge relating to the associated flood event will be used to determine the corresponding flood inundation. The flood line determination will be done for only major rivers directly associated with the mining activities, which impact downstream users within each concession area, on the assumption that accurate and detailed survey data will be provided of these watercourses and surrounding areas. Ideally, this survey data should be obtained through recent high resolution LiDAR surveys. A digital terrain model (DTM) will be developed from the LiDAR survey data and used in a HEC-RAS (Hydrologic Engineering Center-River Analysis System) 2D model, along with the hydrological inputs, land cover roughness values, and hydraulic infrastructure details to generate the relevant flood lines.

### **Ecosystem Goods and Services Assessments.**

Ecosystem goods and services (EGS) must be identified and assessed to ensure sustainable and equitable benefits for the environment and community while maintaining economic viability. This project will conduct an ecosystem services assessment (ESA) in accordance with International Finance Corporation (IFC) Performance Standard 6 (PS6). PS6 recognizes biodiversity's importance in delivering valued ecosystem services, and impacts on biodiversity can affect service delivery. The ESA will focus on two groups of ecosystem services: those impacted by the project and communities (e.g. erosion, soil loss, sedimentation, biodiversity, etc.) and those the project depends on (e.g. heavy metal resources, water supply, flood attenuation, etc.).

In the pilot study site of Rutongo, the existing ecosystems currently provide limited goods and services to communities. Key challenges include river system degradation due to extensive tin and aggregates mining, poor soil retention by gum trees, and flood attenuation issues in the wetlands. However, after implementation of potential river and wetland rehabilitation interventions, the landscape could offer improved ecosystem goods and services, such as better runoff management, soil stability, crop yields, water quality, and biodiversity conservation.

The assessment of ecosystem goods and services (EGS) in the study sites will involve using modelling tools and toolkits such as Final Ecosystem Goods and Services (FEGS), Toolkit for Ecosystem Services Site-Based Assessments (TESSA), and Integrated Valuation of Ecosystem Services and Trade-offs (InVEST). These tools can be linked to other modelling tools (e.g. ACURU for hydrological modelling). Additionally, the assessment will consider alternative livelihoods and ecosystem goods that could be introduced into the landscape to build socio-economic resilience. For example, climate and soil suitability will be evaluated to determine the potential for planting spice trees or crops as alternative income sources through profitable and innovative subsistence farming practices. This approach ultimately aims to improve the resilience of the natural environment and nearby communities.

## Management strategies and interventions

Scenario modelling can be a powerful tool, enabling stakeholders to visualize and evaluate the potential outcomes of various restoration strategies. By simulating different scenarios, from 'business-as usual' to freshwater ecosystem restoration and community upliftment, the ecological, social, and economic impacts of the interventions can potentially be predicted. This approach may help identify the most effective and sustainable solutions for each of the study areas. The scenario modelling may highlight the complexities of the rehabilitation activities and allow for informed decision regarding the best way forward. Outcomes of the various studies will be considered and appropriate strategies on the way forward will be developed taking into account various scenarios and/or intervention options. Assumptions regarding the impacts of projected future changes/scenarios will be made to demonstrate the possible effects of the various scenarios and the impacts these may have on flows into and from the freshwater ecosystems but also to maximize climate resilience.

The broad mitigation/adaptation strategies/scenarios will be put forward to address the identified risks and vulnerabilities within the freshwater ecosystems and the associated communities both currently and into the future. Additionally, the costs for these mitigation / adaptation efforts will be estimated with assistance from the team based in the area. In addition, a pilot study will be proposed whereby a selected area within one of the concessions will be identified, with a detailed approach for implementation and allow 'proof of concept' for the adoption of the tested strategy.

## Stakeholder Engagement Plan (SEP)

The project will develop a **Stakeholder Engagement Plan (SEP)** to engage key stakeholders during the development of river rehabilitation management strategies. The plan includes:

- **Stakeholder identification:** Creating a register to identify all stakeholders who can influence or be influenced by the project and its outcomes.
- **Stakeholder analysis:** Assessing each stakeholder's influence and impact on the project and the site's ecosystem goods and services.
- **Stakeholder engagement plan:** Formulating a clear strategy to ensure sufficient stakeholder engagement across all three sites.

Stakeholder engagement is crucial for understanding human impacts on the environment and the benefits communities derive from ecosystems at the three study sites. By involving stakeholders, we capture valuable on-the-ground information for project analyses. Prioritizing ecosystem goods and services will be informed by stakeholder engagement. Customized engagement methods are essential, considering the unique stakeholder landscapes and contexts at each site. Co-developing solutions, alternative livelihoods, and prioritizing ecosystem services empowers local communities—the primary contributors to environmental degradation and beneficiaries of ecosystem services. The stakeholder engagement plan includes identifying key stakeholders, creating a comprehensive database, and using tailored methods such as consultations, focus groups, workshops, and impact mapping. Stakeholder participation and analysis are crucial for identifying key causal relationships between well-being and ecosystem conditions. The stakeholder facilitation process helps uncover potential relationships among relevant stakeholders, aiding in identifying challenges and improving ecosystem service delivery. Inclusivity and informed participation are fundamental principles guiding stakeholder engagement, aligned with their interests and roles. Stakeholders from various categories will be involved throughout the project at all three sites, informing implementation and refining engagement approaches. The goal is to foster effective dialogue, collaboration, and efficient information communication.

## Citizen-science based monitoring plan

The citizen science-based monitoring plan will be developed through a participatory approach, enhancing stakeholder engagement and building on initial ecosystem assessments. Community members, schools, local academic institutions, governmental officials, and NGO representatives will co-create the plan for each mining concession area through a phased approach:

1. **A scenario visioning activity:** Participants create images (“rich pictures”) depicting the current situation, a future without interventions, and a future with interventions, exploring social, economic, environmental, and cultural impacts for these different scenarios.
2. **Selecting tools and developing capacity:** Relevant citizen science tools are introduced based on community concerns highlighted in the “rich picture” images. Training on tools like miniSASS, the Clarity Tube, the Velocity Plank, the miniWET-Health (wetland) tool, the Spring Tool, the River-Health Audit, the Dragonfly Biotic Index, or iNaturalist would be undertaken.
3. **Data collection:** A mobile app would be investigated to feed into a centralized database.

## Specialist Team

Due to the nature of the study, the project team consists of multiple team members to ensure that the project objectives can be met. All GroundTruth team members have comprehensive experience in projects involving the rehabilitation of ecosystems and the implementation of rehabilitation/creation activities and its associated monitoring (**Table 4**). It should be noted that GroundTruth will be working in collaboration with associates, including François-Xavier Tetero (Water Resource Management Specialist) and Michelle Browne (Environmental Economist) to achieve the project objectives.

**Table 4 Team members, roles, experience levels and qualifications**

Key Person Name	Proposed Function	Experience Levels	Qualifications
<b>Mark Graham</b>	Senior Ecologist	30+ years’ experience in the environment and water sector specialising in : <ul style="list-style-type: none"> <li>• Terrestrial and aquatic ecosystem functioning;</li> <li>• Water resource and water quality management;</li> <li>• Understanding of community development projects, particularly those involving citizen science as well as large infrastructural and mining operations/projects</li> </ul>	Ph.D (Botany,) MSc (Biological Sciences) BSc (Agriculture) - Majoring in Rangeland Ecology
<b>François Xavier Tetero</b>	Water Resources Management Specialist	>15 years’ of experience in the fields of <ul style="list-style-type: none"> <li>• Sustainable water management &amp; development;</li> <li>• Watersheds management;</li> <li>• Transboundary water cooperation;</li> <li>• Climate resilience with focus on urban resilience institutional development; and</li> <li>• Projects’ development &amp; management.</li> </ul>	MSc (Water Resources and Environmental Management)
<b>Gary de Winnaar</b>	Biodiversity Specialist	16 years’ experience in terrestrial and aquatic biodiversity studies, including: <ul style="list-style-type: none"> <li>• Terrestrial and aquatic biodiversity surveys including fauna and flora and IFC Critical Habitat Assessments;</li> <li>• River biomonitoring and E-flows;</li> <li>• GIS mapping, modelling and spatial analyses, and risk/ vulnerability assessments;</li> <li>• Invasive alien plants – assessments &amp; management;</li> <li>• Offsets, rehabilitation, etc.</li> </ul>	B.Sc (Zoology & Hydrology), MSc (Hydrology), Pr. Sci. Nat. - Ecology
<b>Juan Tedder</b>	Ecologist	15 years’ experience ranging from:	B.Sc. (Honours) – Majoring in

Key Person Name	Proposed Function	Experience Levels	Qualifications
		<ul style="list-style-type: none"> <li>The application of various indicators of ecological health, namely benthic diatoms, macroinvertebrates, fish and riparian vegetation;</li> <li>Routine and ad-hoc monitoring of water quality and river health for development construction and operational phases, as well as, following toxic material spills;</li> <li>Providing specialist inputs into implementation of water quality monitoring plans associated with numerous large development projects; and</li> <li>Providing specialist input into various studies covering water related issues.</li> </ul>	<p>Environmental Monitoring and Modelling</p> <p>B.Sc. (Ecological Sciences) – Majoring in Wildlife Science.</p> <p>DWS SASS5 Accreditation</p>
<b>Simlindile Mahlaba</b>	Environmental Scientist, Social and Stakeholder Engagement Consultant	<p>5 years of experience in the environment sector, including:</p> <ul style="list-style-type: none"> <li>Integrated environmental management planning and implementation</li> <li>Climate change adaptation and mitigation</li> <li>Water resource management</li> <li>Catchment management and rehabilitation</li> <li>Stakeholder engagement and social facilitation</li> <li>Environmental research and GIS</li> </ul>	<p>MSc (Environmental and Geographical Science),</p> <p>BSc (Hons) Environmental and Geographical Science</p> <p>BSc. Environmental and Geographical Science and Geo-Informatics</p>
<b>Michelle Browne</b>	Environmental Economist	<p>11 years' of experience in environmental economics, including:</p> <ul style="list-style-type: none"> <li>Application of environmental and ecological economic theory and methods; and</li> <li>Socio-ecological interactions taking into consideration key issues including poverty, inequity, land degradation and climate change.</li> </ul>	<p>Ph.D (Economics, Environmental &amp; Natural Resources)</p> <p>MSc (Agricultural Economics)</p> <p>BSc (Agric) - Agribusiness</p>
<b>Craig Cowden</b>	Wetland Specialist	<p>24 years' experience, with input into various wetland studies, including:</p> <ul style="list-style-type: none"> <li>Mapping/inventories, delineation and assessments;</li> <li>Rehabilitation planning;</li> <li>Wetland creation;</li> <li>Mitigation and offset requirements;</li> <li>Wetland rehabilitation implementation support; and</li> <li>Monitoring and evaluation of wetland rehabilitation.</li> </ul>	<p>M.Sc. (Environmental Science)</p> <p>BSc (Agriculture) – Majoring in Wildlife Science</p> <p>Pr.Sci.Nat - Ecology</p>
<b>Fiona Eggers</b>	Wetland Specialist	<p>13 years of experience, with input into various wetland studies:</p> <ul style="list-style-type: none"> <li>Delineation;</li> <li>Assessments;</li> <li>Rehabilitation planning;</li> <li>Monitoring and evaluation of wetland rehabilitation projects;</li> <li>Mitigation &amp; offset studies; and</li> <li>Wetland creation.</li> </ul>	<p>M.Sc. (Botany)</p> <p>Pr.Sci.Nat. – Ecology</p> <p>UNESCO-IHE – Online course on Constructed wetlands for wastewater</p>
<b>Steven Ellery</b>	Wetland Specialist	<p>6 years of experience, with input into various wetland studies including:</p>	<p>M.Sc. (Geography with a focus on</p>

<b>Key Person Name</b>	<b>Proposed Function</b>	<b>Experience Levels</b>	<b>Qualifications</b>
		<ul style="list-style-type: none"> <li>• Delineation;</li> <li>• Assessments;</li> <li>• Rehabilitation planning;</li> <li>• Monitoring and evaluation of wetland rehabilitation projects;</li> <li>• Wetland geomorphology studies;</li> <li>• Soil conservation and soil transportation studies; and</li> <li>• Wetland monitoring using UAV technology</li> </ul>	wetland geochemistry and geomorphology) Pr.Sci.Nat. – Ecology Registered UAV Pilot
<b>Trevor Pike</b>	Environmental Engineer	25+ years' experience, with input into various environmental engineering studies, focusing on: <ul style="list-style-type: none"> <li>• Wetland rehabilitation and constructed wetland design;</li> <li>• Stormwater management;</li> <li>• Project management</li> </ul>	B.Sc. (Agricultural Engineering)
<b>Tyler Harvey</b>	Environmental Engineer	6 years' of experience, with input into various environmental engineering studies, focusing on: <ul style="list-style-type: none"> <li>• Hydrological and hydraulic modelling;</li> <li>• Wetland rehabilitation / constructed wetland design;</li> <li>• Wetland rehabilitation setting out and implementation support;</li> <li>• Earthworks design and quantification using Model Maker Systems;</li> <li>• Soil conservation plans;</li> <li>• Surveying and analysis of survey data;</li> <li>• Stormwater management plans and flood mitigation plans; and</li> <li>• Flood line and flood risk assessments using HEC-RAS and mapping using GIS.</li> </ul>	B.Sc. (Agricultural Engineering)
<b>Keanu Singh</b>	Hydrologist	4 years' of experience, with input into various environmental engineering studies, focusing on: <ul style="list-style-type: none"> <li>• Hydrological and hydraulic modelling;</li> <li>• Flood line and flood risk assessments.</li> </ul>	M.Sc. (Hydrology)

## Previous Experience

The project team has been involved in several rehabilitation and creation projects over the last few years. Recent projects have been included to illustrate the teams experience in this field (**Table 5**)

**Table 5 Recent project experience of the project team**

Client	Nature of Work	Completion Date/Status
<b>Letšeng Diamond Mine</b>	Creation of wetland habitat and implementation support along the Qaqa River in the Lesotho Highlands.	The creation plan was submitted in June 2012. The implementation support was completed by June 2013
<b>Exxaro Belfast<sup>1</sup></b>	The initial wetland rehabilitation planning involved a week-long site visit with wetland ecologists and engineers to determine the best means to improve the functioning and integrity of the wetland systems remaining within the post-mine development landscape. Once this was approved by authorities, intensive onsite implementation support was provided	Onsite rehabilitation plan submitted in November 2016. Construction completed in 2020
<b>Exxaro Grootegeluk<sup>2</sup></b>	Principle agent and wetland supervision for pan creation within the Grootegeluk mine.	2021
<b>Letšeng Diamond Mine</b>	Wetland creation plan for the RTZ valley.	The creation plan was submitted in 2023.
<b>Aurecon / Zutari</b>	Working for Wetlands: Oversight of rehabilitation planning for the Free State, KwaZulu-Natal and Eastern Cape Provinces	2016-2021
<b>C40 City Finance Facility (CFF)</b>	River Vulnerability Assessment and Proto-Masterplan for the Ohlanga Catchment to inform the Business Case for Durban's Transformative Riverine Management Programme (TRMP)	2020
<b>C40 City Finance Facility (CFF)</b>	Transformative adaptation of rivers in an urban context: An ecological infrastructure and socio-ecological toolkit	2020
<b>Development Bank of South Africa</b>	Mapping and prioritisation for maintaining and/or rehabilitating ecological infrastructure for the uMngeni Catchment, and development of management and investment plans for the Green Fund Project "Investing in ecological infrastructure to enhance water security in the uMngeni River catchment".	2014-2015
<b>eThekweni Municipality (funded by AFD – Agence Française de Développement)</b>	AFD CICLIA Durban Transformative Riverine Management Programme Support Project, assisting eThekweni Municipality by developing four Catchment Partnership Development Frameworks and eight Precinct Business Management Plans within the Ohlanga, uMhlangane, Palmiet and uMhlatuzana Catchments in the Durban area by identifying and assessing current water quality and flood risks, and to propose recommendations on how risks	2022

<sup>1</sup> Please refer to the video link of the work undertaken at Belfast <https://youtu.be/8NVKgDZN33E>

<sup>2</sup> Please refer to the video link of the work undertaken at Grootegeluk <https://youtu.be/hxadmmh-gWQ>

Client	Nature of Work	Completion Date/Status
	and issues can be prioritized and addressed by developing, while building on strengths of collaborative involvement of various stakeholders.	
<b>Swedish Agency for Marine and Water Management (SwAM)</b>	Socio-Economic Analysis of the Costs of Inaction of Plastic Debris Leakage into the uMngeni River Catchment in KwaZulu-Natal, Durban, South Africa	2022
<b>Water Research Commission and the Department of Water and Sanitation</b>	Updating the 2014 Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS) Database for Rivers from within the Inkomati/Usuthu catchment and Pongola to Mtamvuna Water Management Area, with inclusion of wetlands and estuaries.	Current (2023-2025)
<b>Willowton Group Facility (Pietermaritzburg)</b>	Monitoring river health and functioning following the Willowton oil and grease spill into the Baynespruit and Duzi Rivers of the uMngeni Catchment, including a reintroduction of fish, notable <i>Labeobarbus natalensis</i>	2019-current (ongoing)
<b>ERM and Globeleq</b>	Environmental flows (E-flows) assessment for a hydroelectric project on the Kalungwishi River in the Northern Province of Zambia	2017-2018
<b>Naidu Consulting</b>	Hammarsdale Dam: Wetland creation and implementation plan Conceptual design for the creation of wetland habitat within the basin of the Hammarsdale Dam, to 'polish' the effluent originating from the Waste Water Treatment Works (WWTW) and base flows of the Sterkspruit River	November 2013
<b>PE Continental</b>	Legionella and water quality monitoring and stormwater contamination treatment plant development	2016-2019
<b>Glencore</b>	Groundwater remediation piloting and in situ site treatment solutions	2017-2019
<b>Mauritius Government</b>	Port Louis Ring Road and materials borrow pit geotechnical investigation	2000

## Budget

The following budget has been derived based on GroundTruth's understanding of the project objectives and the key tasks:

KEY TASKS	TOTAL (US \$)
Source, pathway and receptor analysis, including a review of gaps in ESIA assessments.	\$ 20 800
Ecological health and drivers of the river and wetland ecosystems.	\$ 48 300
Reviewing water quality monitoring protocols including the development of an online water quality monitoring database and dashboard.	\$ 16 450
Desktop mapping and Geographic Information System data derivation.	\$ 22 500
Determining flood lines for major streams, including climate change scenarios.	\$ 34 100
Modelling catchment hydrological flows and sediment movements.	\$ 59 850
Developing of a citizen-science based monitoring plan and programme.	\$ 18 450
Modelling scenarios and determining management strategies and interventions for river and wetland restoration.	\$ 88 850
Ecosystem Goods and Services Assessments.	\$ 34 350
Stakeholder Engagement Plan (SEP) and engagement with key stakeholders.	\$ 40 450
Project management, Workshops etc.	\$ 84 000
<b>TOTAL</b>	<b>\$ 468 100</b>

## SoW Validity

This SoW should be seen as a draft and would be subject to refinement and finalisation during a workshop to be held in Kigali in October 2024.

Please do not hesitate to contact us should you require any further information.

Yours faithfully

**Craig Cowden**

**Pr. Sci. Nat.**

**GroundTruth**