



DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

The Proposed Establishment of a 1.6 million m³ Dam, and Cultivation of 106.62 ha of Land, Located on Portion 1 of Meersig No. 15550; Rem, Portion 1, Portion 3 and Portion 4 of Smaldeel No. 1390; and Portion 2, Portion 3 and Portion 10 of Lindeques Laager No. 1039, Lush Valley Farm and Prairie Farm, within the Okhahlamba Local and uThukela District Municipality, Winterton, KwaZulu-Natal

REF: DC23/0001/2021

**PREPARED FOR: SABLE HILL DAM EDUCATIONAL FUND NPC
DATE: 23 JUNE 2021**



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INTERNAL REVIEW

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REPORT REVIEWED BY	Rebecca Bowd	15 June 2021	

EXECUTIVE SUMMARY

The Applicant, Sable Hill Dam Educational Fund NPC, proposes to establish a 1.6 million m³ dam, and cultivate 106.62 ha of land, located on Portion 1 of Meersig No. 15550; Rem, Portion 1, Portion 3 and Portion 4 of Smaldeel No. 1390; and Portion 2, Portion 3 and Portion 10 of Lindeques Laager No. 1039, Lush Valley Farm and Prairie Farm, within the Okhahlamba Local and uThukela District Municipality, Winterton, KwaZulu-Natal.

Please note that the proposed cultivation of land only came about during the Scoping Phase. As such, during the initial Public Participation Process, only mention was made of the proposed dam. Prior to the Engineer undertaking a detailed dam investigation, a 2.3 million m³ dam was proposed. Due to the significant inundation associated with a dam of this extent, a 1.6 million m³ dam is now being proposed. During the Scoping Phase, 102 ha of land was proposed to be cultivated. Based on feedback from the Specialist Studies, the cultivation sites have since been realigned outside of the identified freshwater ecosystems and heritage sites, and a total of 106.62 ha is now proposed to be cultivated.

The proposed project comprises the following components:

- Establishment of a 1.6 million m³ dam;
- Cultivation of 106.62 ha of land; and
- Installation of associated pipelines for irrigation purposes.

The proposed dam site is located on Portion 1 of Meersig No. 15550, and Rem, Portion 1 and Portion 4 of Smaldeel No. 1390, at GPS coordinates 28°48'31.80" S and 29°28'42.60" E, and along the Lindequespruit River. The dam will fall on Lush Valley Farm which is located on the northern banks of the Lindequespruit River, and on Prairie Farm which is located on the southern banks of the Lindequespruit River. The existing Glen Gray Dam is located upstream of the proposed dam site, and is approximately 4.5 million m³ in extent. The Lindequespruit Irrigation Board was established for the six members who have shares in the Glen Gray Dam. Please note that in the Specialist Studies, both the Lindequespruit River and the Situlwane River have been referred to, as they are the same river. The currently preferred dam design comprises the following specifications:

- Storage capacity – 1.6 million m³;
- Area – 34 ha;
- Wall height – 13.95 m;
- Wall length – 311.83 m; and
- Water depth – 13.33 m.

Based on water uses within the quaternary catchment, the total registered surface water abstractions total 19 294 041 m³ / year, and the total registered downstream water use totals 1 299 500 m³ / year. As such, the proposed dam was calculated to have a yield of approximately 1 265 211 m³ / year with a 75 % assurance of supply, and the total releases or Ecological Water Requirement (EWR) for the proposed dam

was calculated to be 3 314 687 m³ / year, which is more than enough to meet the ecological requirements from the sub-catchment. In the event of a 1:50 year or a 1:100 year flood, no permanent structures will be impacted along the Lindequespruit River.

The proposed dam site falls within the V13D quaternary catchment and the Pongola to Mtamvuna Water Management Area (WMA). Multiple Hydrogeomorphic (HGM) units were identified within the proposed dam site; namely, four hillslope seepage wetland systems and one depression wetland system. Six riparian channels were also identified within the proposed dam site. Although the proposed dam will result in the inundation of portions of the wetland systems, this loss is considered limited based on the extent of the wetland systems. Due to the impacts being limited to a loss of 0.3 ha equivalents of wetland habitat, wetland rehabilitation measures are not required to be implemented. Under natural conditions, the proposed dam site would have been characterised by Northern KwaZulu-Natal Moist Grassland (Gs 4), which falls under the Sub-Escarpment Grassland (Gs) Group 4 bioregion. In terms of floral species, the proposed dam site is currently dominated by alien invasive vegetation; namely, *Populus candescens* and *Poplar candescens*. The impacts associated with the loss of habitat for faunal species will be minimal, and the proposed dam will in fact benefit and promote the presence of faunal species. Due to several fish species likely to occur within the Lindequespruit River, and which have a conservation status of 'vulnerable', a fishway is required to be established on the wall of the proposed dam to allow for the migration of fish species. It is important to note that the existing Glen Gray Dam has resulted in the proposed dam site being subject to transformation which is associated with alterations to flood events, restrictions during low flow periods and changes in water flow and volumes etc., as well as alteration to the riverine and terrestrial habitats. As such and although the proposed dam is viewed as an expansion of the impacts on biodiversity arising from the existing Glen Gray Dam, the recommendations included in this Report will address such impacts.

The cultivation of 106.62 ha of land is proposed to take place on Lush Valley Farm which is located on the northern banks of the Lindequespruit River. This will involve the installation of centre pivot irrigation systems and associated pipelines. The Applicant is proposing to plant these lands to crops and pastures, comprising kikuyu and other grass mixtures. Water from the dam is proposed to be pumped via pipelines that will run from the dam to the cultivation sites. The proposed pipelines will have a total length of approximately 7 km and a diameter of 20 mm to 25 mm.

The cultivation is proposed to take place on the following properties:

- 22.87 ha pivot located on Portion 4 of Smaldeel No. 1390 at GPS coordinates 28°48'41.79" S and 29°28'11.36" E;
- 23.49 ha pivot located on Portion 3 of Smaldeel No. 1390, and Portion 10 of Lindeques Laager No. 1039, at GPS coordinates 28°49'10.34" S and 29°27'37.32" E;
- 8.06 ha pivot located on Portion 2, Portion 3 and Portion 10 of Lindeques Laager No. 1039, at GPS coordinates 28°49'8.15" S and 29°27'12.05" E;
- 10.17 ha pivot located on Portion 2, Portion 3 and Portion 10 of Lindeques Laager No. 1039, at GPS

coordinates 28°49'18.36" S and 29°27'7.44" E;

- 12.22 ha pivot located on Portion 2 and Portion 10 of Lindeques Laager No. 1039, at GPS coordinates 28°49'26.88" S and 29°27'16.82" E;
- 9.80 ha pivot located on Portion 3 of Lindeques Laager No. 1039, at GPS coordinates 28°49'15.44" S and 29°26'46.80" E; and
- 20.01 ha pivot located on Portion 2, Portion 3 and Portion 10 of Lindeques Laager No. 1039, at GPS coordinates 28°49'31.91" S and 29°26'57.60" E.

Based on historical imagery, portions of the proposed cultivation sites have been used for agricultural activities prior to 1937. Portions of the proposed cultivation sites comprise erosion gullies due to these historical agricultural activities. Although five HGM units were identified within the proposed cultivation sites and are classified as hillslope seepage wetland systems, the proposed cultivation sites have since been realigned to fall outside of the identified wetland systems and the recommended 20 m buffer. As such, should the recommendations and mitigation measures included in this Report be adhered to, the impacts of the proposed cultivation on the wetland systems are considered to be low. Portions of the low lying areas were identified to be characterised by Bonheim soils which tend to comprise a high moisture content, thus careful management of the agricultural activities and irrigation will be required. In terms of the floral species, the proposed cultivation sites comprise a graminoid environment, and thus the impacts on this habitat are likely to be minimal. It is important to note that although portions of the proposed cultivation sites fall within an 'optimal' Critical Biodiversity Area (CBA), this CBA is not 'irreplaceable' or 'environmentally sensitive'. Although *Otomys auratus* (vlei rat) and *Aonyx capensis* (Cape clawless otter), as well as *Opisththalmus praedo* (Tugela burrowing scorpion) are identified as 'near threatened' and 'protected' respectively, and have the potential to occur within the proposed study sites; it is unlikely that these faunal species will be impacted should the recommendations and mitigation measures included in this Report be adhered to.

Although the Heritage Specialist identified portions of the proposed cultivation sites to comprise stone walled Later Iron Age sites which are considered to have a high local significance and must therefore be retained as heritage sites; the proposed cultivation sites have since been realigned to fall outside of the identified heritage sites and the recommended 20 m buffer.

Lush Valley Farm and Prairie Farm are commercial agricultural operations comprising maize, potatoes, wheat, soya beans, peas and butternut which is planted on a rotational basis, as well as beef cattle. Water from the dam is proposed to be pumped via the associated pipelines to surrounding lands on both farms for irrigation purposes. On Lush Valley Farm, the 106.62 ha of land proposed to be cultivated, is to be irrigated from the proposed dam. There is an additional 106 ha of existing cultivated land that is also to be irrigated from the proposed dam. Water is to be released from the proposed dam and into the Lindequespruit River where it will be abstracted further downstream for irrigation purposes. On Prairie Farm, there is approximately 188 ha of existing cultivated land which is to be irrigated via existing pipelines from the proposed dam. These lands comprise maize, wheat, soya beans and peas which are planted on a

rotational basis. A portion of the existing lands also comprise pecan nuts which will be required to be irrigated from the proposed dam. The proposed dam will thus allow for increased water storage and availability for supplementary irrigation during the summer months, and a back-up during the dry, winter months. There are currently approximately 1500 head of cattle on Lush Valley Farm, and with the additional cultivated land which is proposed to be irrigated, the cattle herd will be able to be expanded by approximately 500 cattle. The proposed project will thus ensure the long-term sustainability of both farms, through increased yields, and crop and livestock production, as well as increased employment opportunities. This in turn will result in skills development, income generation and improved quality of life. Should the Water Use License Application (WULA) for the proposed project not be approved, the proposed cultivation sites will be for dry land agricultural activities.

The main issues which have been raised during the Scoping Phase Public Participation Process are:

- All conditions stipulated by Eskom must be adhered to;
- The location of the Eskom powerlines must be taken into consideration;
- The need for a Biodiversity Assessment to be compiled to address the potential impacts on natural forests, protected tree species and other biodiversity;
- The management of water resources, waste, noise and dust nuisances must be taken into consideration;
- The need for ablution facilities and potable water must be provided during the construction phase;
- The potential impacts on downstream water users must be investigated, as well as the volume of water required to be released from the proposed dam;
- The need for the relevant bye-laws and regulations to be taken into consideration since the proposed dam falls within the Lindequespruit Irrigation Board;
- The type of dam proposed to be established must be addressed;
- The need for clarification on the location of the Situlwane River;
- The members of the Sable Hill Dam Educational Fund NPC and Lindequespruit Irrigation Board must be illustrated on a map;
- The need to include all farm labour in the Public Participation Process of the proposed project;
- Certain Listed Notice 3 activities are applicable to the proposed project;
- A column showing the I&APs must be included in the Public Information Session minutes;
- The need to address why the proposed cultivation was not included in the Public Participation Process documentation;
- Dam safety and potential dam failure must be addressed;
- The potential need for a detailed Geotechnical Assessment to be compiled must be investigated;
- The need for an Agricultural Potential and Impact Assessment to be compiled to assess the proposed cultivation sites; and
- The need for a sensitivity map showing all sensitivities, and captions and directions of the photographs must be provided.

The Scoping Phase has not identified any 'fatal flaws' with the proposed project, however; as part of the EIA Phase, a number of Specialist Studies have been compiled, and include:

- Freshwater Ecosystem Assessment;
- Ecological Reserve Determination;
- Hydrological Assessment;
- Biodiversity Assessment;
- Baseline Aquatic Assessment;
- Wetland Assessment;
- Heritage Impact Assessment;
- Desktop Geotechnical Assessment;
- Agricultural Potential and Impact Assessments; and
- Paleontological Impact Assessment.

The Environmental Assessment Practitioner (EAP) concludes that no fatal-flaws have been identified during the proposed project, and provided that the Environmental Management Programme (EMPr) and recommendations made in this Report are strictly adhered to, there should be no significant, detrimental impacts on the environment.

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1 INTRODUCTION

The Applicant, Sable Hill Dam Educational Fund NPC, proposes to establish a 1.6 million m³ dam, and cultivate 106.62 ha of land, located on Portion 1 of Meersig No. 15550; Rem, Portion 1, Portion 3 and Portion 4 of Smaldeel No. 1390; and Portion 2, Portion 3 and Portion 10 of Lindeques Laager No. 1039, Lush Valley Farm and Prairie Farm, within the Okhahlamba Local and uThukela District Municipality, Winterton, KwaZulu-Natal.

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The proposed project requires Environmental Authorisation from the Department of Economic Development, Tourism and Environmental Affairs (DEDTEA) in terms of the Environmental Impact Assessment (EIA) Regulations of 2014 (as amended – 2017) promulgated under Section 24 of the National Environmental Management Act (NEMA, Act No. 107 of 1998). A Water Use License (WUL) is also required in terms of Section 21 of the National Water Act (NWA, Act No. 36 of 1998). In terms of the EIA Regulations, the Applicant is required to appoint an independent Environmental Assessment Practitioner (EAP) to conduct the process. As such, Green Door Environmental has been appointed to conduct the Scoping and EIA Process.

The proposed project comprises the following components:

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Although the Heritage Specialist identified portions of the proposed cultivation sites to comprise stone walled Later Iron Age sites which are considered to have a high local significance and must therefore be retained as heritage sites; the proposed cultivation sites have since been realigned to fall outside of the identified heritage sites and the recommended 20 m buffer.

Lush Valley Farm and Prairie Farm are commercial agricultural operations comprising maize, potatoes,

wheat, soya beans, peas and butternut which is planted on a rotational basis, as well as beef cattle. Water from the dam is proposed to be pumped via the associated pipelines to surrounding lands on both farms for irrigation purposes. On Lush Valley Farm, the 106.62 ha of land proposed to be cultivated, is to be irrigated from the proposed dam. There is an additional 106 ha of existing cultivated land that is also to be irrigated from the proposed dam. Water is to be released from the proposed dam and into the Lindequespruit River where it will be abstracted further downstream for irrigation purposes. On Prairie Farm, there is approximately 188 ha of existing cultivated land which is to be irrigated via existing pipelines from the proposed dam. These lands comprise maize, wheat, soya beans and peas which are planted on a rotational basis. A portion of the existing lands also comprise pecan nuts which will be required to be irrigated from the proposed dam. The proposed dam will thus allow for increased water storage and availability for supplementary irrigation during the summer months, and a back-up during the dry, winter months. There are currently approximately 1500 head of cattle on Lush Valley Farm, and with the additional cultivated land which is proposed to be irrigated, the cattle herd will be able to be expanded by approximately 500 cattle. The proposed project will thus ensure the long-term sustainability of both farms, through increased yields, and crop and livestock production, as well as increased employment opportunities. This in turn will result in skills development, income generation and improved quality of life. Should the Water Use License Application (WULA) for the proposed project not be approved, the proposed cultivation sites will be for dry land agricultural activities.

2 LEGISLATIVE FRAMEWORK

2.1 THE CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA (ACT NO. 108 OF 1996)

The Constitution of the Republic of South Africa (Act No. 108 of 1996) is the legal source for all law, including environmental law, in South Africa. The Bill of Rights is fundamental to the Constitution of South Africa and the underlying principle behind Section 24 of the Act is that 'everyone has the right to an environment that is not harmful to their health or well-being'. Furthermore, the environment should be protected for present and future generations by preventing pollution, promoting conservation and practising ecologically sustainable development.

2.2 NATIONAL ENVIRONMENTAL MANAGEMENT ACT (ACT NO. 107 OF 1998)

2.2.1 EIA Regulations

The NEMA came into effect in January 1999. The NEMA is South Africa's overarching environmental legislation and its primary objective is to provide for cooperative governance by establishing principles for decision making on matters affecting the environment, institutions that will promote cooperative governance and procedures for coordinating environmental functions exercised by organs of state, and to provide for matters connected therewith.

The NEMA provides the equitable distribution of natural resources, sustainable development, environmental protection, and the duty of care / polluter pays principles of environmental management frameworks.

In terms of the EIA Regulations promulgated under the NEMA, certain Listed Activities are specified for which either a Basic Assessment Process (GNR 324 and GNR 327) or a Scoping and EIA Process (GNR 325) is required.

The Listed Activities under **GNR 324** (Basic Assessment Process) which are applicable to the proposed project include:

- **GNR 324 – Part 12:** *“The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.*
 - d. KwaZulu-Natal...*
 - v. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;...*
 - xi. Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose;*
 - xii. Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; or ...”*

Applicable as the proposed cultivation will fall within portions of an ‘optimal’ CBA. However, it is important to note that the CBA is not ‘irreplaceable’ or ‘environmentally sensitive’, and thus the potential impacts of the proposed project are likely to be minimal.

- **GNR 324 – Part 14:** *“The development of –*
 - (i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or*
 - (ii) infrastructure or structures with a physical footprint of 10 square metres or more;*

where such development occurs –

 - (a) within a watercourse;...*
 - (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;...*

d. KwaZulu-Natal

x. Outside urban areas:

 - (aa) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any terrestrial protected area identified in terms of NEMPAA or from the core area of a biosphere reserve;...*

Applicable as the establishment of the proposed dam and fishway which will both exceed 10 m², will be established within 32 m of a watercourse, and occur within 10 km from the Spioenkop Dam Nature Reserve. A ‘fishway’ refers to structures consisting of a series of interconnected pools, a channel fitted with flow-directing baffles, or similar devices that dissipate the energy of artificially-induced high-flowing water (such as that due to falling water over an artificial instream structure) to the point that allows migrating fish to move upstream and downstream across the artificial in stream barrier. Fishways have traditionally consisted of a series of step-like pools that get progressively higher.

The Listed Activities under **GNR 327** (Basic Assessment Process) which are potentially applicable to the proposed project include:

- **GNR 327 – Part 12:** *“The development of –*
 - (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or*
 - (ii) infrastructure or structures with a physical footprint of 100 square metres or more;*

where such development occurs –

 - (a) within a watercourse;...*
 - (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;...”*

Applicable as the establishment of the proposed dam and fishway which will both exceed 100 m², will be established within 32 m of a watercourse.

- **GNR 327 – Part 19:** *“The infilling or depositing 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...”*

Applicable as the establishment of the proposed dam and fishway, and installation of the associated pipelines will require the excavation of more than 10 m³ of material from a watercourse.

The Listed Activities under **GNR 325** (Scoping and EIA Process) which are applicable to the proposed project include:

- **GNR 325 – Part 15:** *“The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for...”*

Applicable as the establishment of the proposed dam, installation of the associated pipelines, and cultivation of land will require the clearance of more than 20 ha of indigenous vegetation.

- **GNR 325 – Part 16:** *“The development of a dam where the highest part of the dam wall, measured from the outside toe of the wall to the highest part of the wall, is 5 metres or higher, or where the high water mark of the dam covers an area of 10 hectares or more.”*

Applicable as the proposed dam will have a wall height of more than 5 m, and will cover an area of more than 10 ha.

The proposed project is therefore subject to a **Scoping and EIA Process** in terms of the EIA Regulations, for which the Applicant is required to appoint an independent EAP.

The aim of the EIA Regulations is to assess the possible environmental impacts that may arise from a proposed project, in order to make an informed decision on the future of the proposed project. The Scoping Phase is carried out at phase 1 of the Scoping and EIA Process and aims to identify all potential issues, impacts and project alternatives. The proposed project then proceeds into phase 2, the EIA Phase, during which the potential impacts and alternatives identified during the Scoping Phase are investigated in further detail. This phase also includes Specialist Studies to investigate certain potential impacts in more detail.

2.2.2 Sustainable Development

The principle of sustainable development has been established in the Constitution of the Republic of South Africa, and is given effect by the NEMA. Section 1(29) of the NEMA states that sustainable development refers to the integration of social, economic and environmental factors into the planning, implementation and decision-making process so as to ensure that development serves present and future generations.

Thus, sustainable development requires that:

- The disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
- That pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
- The disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and remedied;
- Waste is avoided, or where it cannot be altogether avoided, minimised and reused or recycled where possible and otherwise disposed of in a responsible manner;
- A risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions; and
- Negative impacts on the environment and on people's environmental rights be anticipated; and, prevented and where they cannot altogether be prevented, are minimised and remedied.

2.2.3 'Polluter Pays' Principle

The 'Polluter Pays' Principle provides that 'the cost of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment'.

Section 28 of the NEMA makes provision that anyone who causes pollution or degradation of the environment is responsible for preventing impacts occurring, continuing or recurring, and for the costs of repair of the environment. In terms of the provisions under Section 28:

'(1) Every person who causes, has caused or may cause significant pollution or degradation of the environment must 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 or degradation of the environment'.

2.3 NATIONAL WATER ACT (ACT NO. 36 OF 1998)

The proposed project falls within the ambit of the NWA because of its potential to cause pollution of water resources defined under the NWA. The NWA recognises that water is a natural resource that belongs to all people. It regulates the manner in which persons obtain the right to use water and provides for just and equitable utilisation of water resources.

Sustainability and equity are identified as central guiding principles in the protection, use and management of water resources. These guiding principles recognise:

- The basic human needs of present and future generations;
- The need to protect water resources;

- The need to share some water resources with other countries; and
- The need to promote social and economic development through the use of water.

Section 19 of the NWA states that the person responsible for land upon which any activity is or was performed and which causes, has caused or is likely to cause, pollution of a water resource, must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring.

Part 5 of the NWA deals with the pollution of water resources, following an emergency incident. This could include an accident involving the spill of a harmful substance that finds, or may find, its way into a water resource. In terms of Section 30 of the NEMA and Section 20 of the NWA, the responsibility for remedying the situation rests with the person responsible for the incident or the substance involved. If there is a failure to act, the relevant Catchment Management Agency may take the necessary steps and recover the costs from the responsible person(s).

Water Use Licensing

Certain activities are listed, as 'Water Uses' and these activities are required to be licensed or authorised, under the NWA. Under the NWA, 'Water Use' includes, among other things, the following:

- Taking water from a water resource;
- Storing water;
- Stream flow reduction activities;
- Diverting the flow of water in a watercourse;
- Disposing of waste in a manner that may detrimentally impact on a water resource;
- Altering the bed, bank, course or characteristics of a watercourse; and
- Controlled activities, such as irrigating with waste, power generation with water, atmospheric modification or recharging an aquifer.

The Applicant is aware that the proposed project requires a WULA to be undertaken. The Scoping and EIA Process forms part of the WULA documentation, which will be submitted to the Department of Water and Sanitation (DWS) for consideration (WU: 20617). Green Door Environmental has been appointed to conduct the WULA.

2.4 NATIONAL VELD AND FOREST FIRE ACT (ACT NO. 101 OF 1998)

The purpose of the National Veld and Forest Fire Act (Act No. 101 of 1998) is to prevent and combat veld, forest and mountain fires throughout South Africa. The Act provides regulations for the establishment, registration, duties and functioning of fire protection associations. In addition, it provides for the prevention of veld fires through a fire emergency rating system. Chapter 4 of the National Veld and Forest Fire Act places a duty on owners to prepare and maintain firebreak, and provides regulations on the role of adjoining landowner. Chapter 5 places a duty on all owners to acquire equipment and have fire personnel available to combat fire. Chapter 6 provides regulations on offences and penalties.

2.5 NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT (ACT NO. 10 OF 2004)

The National Environmental Management: Biodiversity Act (NEM:BA, Act No. 10 of 2004) makes provision for the management and conservation of South Africa's biodiversity within the framework of the NEMA through:

- The protection of species and ecosystems;
- Sustainable use of indigenous living organisms; and
- The equitable distribution of benefits that result from biological resources.

Sections 75 and 76 of the NEM:BA deals with alien invasive species monitoring, control and eradication plans and how they should be implemented:

- Section 75 (1) states that *'control and eradication of a listed invasive species must be carried out by means of methods that are appropriate for the species concerned and the environment in which it occurs'*;
- Section 75 (2) states that *'any action taken to control and eradicate a listed invasive species must be executed with caution and in a manner that may cause the least possible harm to biodiversity and damage to the environment'*; and
- Section 75 (3) states that *'The methods employed to control and eradicate a listed invasive species must also be directed at the offspring, propagating material and re-growth of such invasive species in order to prevent such species from producing offspring, forming seed, regeneration or re-establishing itself in any manner'*.

Category 1a Listed alien invasive vegetation species (such as Bluebell Creeper, Water Primrose, Skeleton Weed) are those species that must be removed and eradicated, and require compulsory control. No person is allowed to sell, advertise, exhibit, transmit, send, deliver for sale, exchange or dispose of any specimen. It is also illegal to accept a Category 1a plant as a gift or disperse of the weed from one place to another. All Category 1a species are required to be removed by law and no permits are issued.

Category 1b Listed alien invasive vegetation species (such as Bugweed, Lantana, Madagascar Periwinkle and Triffid Weed) are those species that must be controlled. These plants need to be eradicated and removed as they are declared weeds and are not tolerated. No person is allowed to grow, sell, breed or move any specimen. These plants are known to have a high invasive potential, and an invasion of these species can require an Alien Invasive Vegetation Management Programme, and need to be eradicated. No permits are issued for Category 1b species.

Category 2 Listed alien invasive vegetation species (such as Black Wattle, Australian Blackwood, St John's Wort, Jacaranda Tree) are those species that require a permit to carry out a restricted activity within an area specified in the Notice or an area specified in the permit. In order to carry out a restricted activity, a permit is required. A person on whose land a Category 2 Listed alien invasive vegetation species occurs must ensure that the species does not spread outside of the land where the permit is specified. These

plants may only be grown in areas demarcated on sites where such plants may be established, retained and strictly controlled. In the case for the exemption of an existing plantation whereby a plantation existed before the NEM:BA notice came into effect; it is exempted from requiring a permit for any restricted activity. A permit is needed to authorise multiple restricted activities. Category 2 vegetation may only be acquired or sold by any person who has an area of land which has been demarcated for the growing of that species.

Category 3 Listed alien invasive vegetation species (such as the Chameleon Plant, Stinging Nettle, Lesser Balloon Vine) are those species that are prohibited from growing, breeding, selling, buying and donating. Further plantings are prohibited. An individual plant permit is required to undertake any of the following restricted activities (import, possess, grow, breed, move, sell, buy or accept as a gift) involving a Category 3 species. Without a permit, trade in category 3 plants is not allowed, however, the trade in the wood of Category 3 plants is allowed. If these plants exist already, they may be retained but no new planting or trade may occur. A permit is required to take on any of the restricted activities. Any action taken to control weeds or invader plants must be executed with caution and in a manner that will have minimal environmental impact.

If any alien invasive vegetation species do occur, despite using the necessary means to control them, the Applicant must control them by means of any of the control methods that are appropriate for the species concerned. Methods that are used need to be appropriate and suitable for the species concerned, as well as it being determined by the ecosystem which they occur in. Any action taken to control weeds or invader plants must be performed with caution and in a manner that will have minimal environmental impact. It is important that the control plan that is put in place is an annual plan of operation and should be for a minimum of five years.

3 ASSISTING GUIDELINE DOCUMENTS

3.1 THE DEPARTMENT OF ECONOMIC DEVELOPMENT, TOURISM AND ENVIRONMENTAL AFFAIRS ASSISTING GUIDELINE DOCUMENT SERIES

3.1.1 Western Cape Department of Economic Development, Tourism and Environmental Affairs EIA Guideline and Information Document Series (March 2013)

In order to assist potential Applicants, EAPs and Interested & Affected Parties (I&APs) to understand what is required of them in terms of the EIA Regulations, what their rights are and / or what their role may be, the Department of Environmental Affairs (DEA) has made provision for the Western Cape Department of Environmental Affairs and Development Planning (DEA&DP) to issue an EIA Guideline & Information Document Series. Following permission from the National Minister, the Department formally published the following EIA guidelines in terms of Section 24J:

- **Guidelines on Transitional arrangements (March 2013);**
- **Guideline on Appeals (March 2013);**
- **Guideline on Alternatives (March 2013);**
- **Guideline on Public Participation (March 2013);**
- **Guideline on Exemption Applications (March 2013);**
- **Guideline on Need and Desirability (March 2013); and**
- **Guideline on Generic Terms of Reference for EAPs and Project Schedules (March 2013).**

Unpublished guidelines in terms of Section 24J of the NEMA are as follows:

- **Information Document on the Interpretation of the Listed Activities (August 2010); and**
- **Information Document on Biodiversity Offsets (October 2011).**

The following three guideline documents were consulted in the compilation of this Report:

Guideline on Alternatives (March 2013)

The NEMA defines the 'best practicable environmental option' as *'the option that provides the most benefit or causes the least damage to the environment as a whole, at a cost acceptable to society, in the long term as well as in the short term'*. Alternatives are defined in the NEMA, EIA Regulations as *'different means of meeting the general purpose and requirements of the activity'*. The *'feasibility'* and *'reasonability'* of and the need for alternatives must be determined by considering, inter alia, (a) the general purpose and requirements of the activity, (b) need and desirability, (c) opportunity costs, (d) the need to avoid negative impact altogether, (e) the need to minimise unavoidable negative impacts, (f) the need to maximise benefits, and (g) the need for equitable distributional consequences.

Guideline on Public Participation (March 2013)

The general objectives of integrated environmental management laid down in the NEMA include to:

'Ensure adequate and appropriate opportunity for public participation in decisions that may affect the environment'. The National Environmental Management Principles include the principle that 'the participation of all interested and affected parties in environmental governance must be promoted, and all people must have the opportunity to develop the understanding, skills and capacity necessary to achieving equitable and effective participation, and participation by vulnerable and disadvantaged persons must be ensured'.

The guideline provides details on when to facilitate public participation, the methods to apply for notifications to I&APs, the formats required to be used for notifications, details on requirements for commenting and consultation periods, the process of identifying and responding to stakeholders, and guidelines for compilation of public participation reports for inclusion to the Basic Assessment Process or Scoping and EIA Process.

Guideline on Need and Desirability (March 2013)

The guidelines specify that the needs and desirability of a project must be measured within a local strategic context against the municipalities Integrated Development Plan (IDP), Spatial Development Framework (SDF) and Environmental Management Framework (EMF). These local strategies and policies will contain the local community's needs, interests and objectives in respect of desired land uses and location and nature of project within the municipality. Of equal importance is the question of whether the project meets the societal needs and interests of the broader public. Fourteen questions provided in the guidelines are intended to provoke adequate consideration of 'need and desirability' in order to ensure that the best practicable environmental option is pursued and that the project more equitably serves broader societal needs.

3.1.2 Department of Economic Development, Environmental Affairs and Tourism Guideline Documents

The DEDTEAs vision is based around economic growth and sound environmental management, which is underpinned by sustainable development. The DEDTEAs mission is to lead economic growth, development and environmental management in KwaZulu-Natal.

3.2 uTHUKELA DISTRICT MUNICIPALITY: INTEGRATED DEVELOPMENT PLAN REVIEW (2019 / 2020)

The uThukela District Municipality is approximately 11 500 km². It is one of ten district municipalities in KwaZulu-Natal. The Amajuba, uMzinyathi and uMgungundlovu District Municipalities border onto the uThukela District Municipality. It comprises three local municipalities, namely the Alfred Duma, Inkosi Langalibalele and Okhahlamba Local Municipalities. The uThukela District Municipality is predominantly rural in nature, with a population of approximately 706 589 people. It is characterised by high levels of poverty based on both income inequality and low levels of development.

Commercial agriculture is the dominant land use within the uThukela District Municipality, which covers approximately 6852 km² and comprises predominantly commercial crops and timber. Commercial crops include maize, wheat, soya beans, potatoes, cabbages, sugar cane and oranges. The agricultural sector contributed R 946 million to the uThukela District Municipality's economy during 2011, and approximately 7959 people were employed. Although the agricultural sector plays an important role in the district municipality, this sector is not fully exploited, and it faces numerous challenges. Challenges faced by the agricultural sector include stock theft, poor herd quality, failure of land reform, lack of farming experience and threats of land claims etc.

3.3 OKHAHLAMBA LOCAL MUNICIPALITY: DRAFT INTEGRATED DEVELOPMENT PLAN REVIEW (2019 / 2020)

The Okhahlamba Local Municipality falls within the uThukela District Municipality. It is located along the eastern boundary of KwaZulu-Natal, and borders the Free State and Lesotho. It covers an area of approximately 3543 km² and has a population of 135 132 people. The local municipality is characterised by a major spatial feature which is the Drakensberg Mountains. The main economic sectors within the local municipality include agriculture, manufacturing, trade, commerce and tourism.

The agricultural sector contributed R 357 million to the Okhahlamba Local Municipality's economy during 2011, and it employed approximately 2718 people. Subsistence agriculture is practiced in the traditional areas and comprises a mixture of agricultural activities which include smallholder and food security production to livestock and small-scale timber production. Land which is occupied by commercial agriculture covers approximately 14.2 % of the geographic area of the Okhahlamba Local Municipality. Commercial agriculture continues to perform as an important economic sector although its relative importance is declining. Semi-intensive beef and irrigated dairy farming are still important enterprises but the main agricultural activities include maize, wheat and soya beans, the bulk of which is grown under irrigation. The Okhahlamba Local Municipality is identified as one area with huge potential for growth in agriculture and agro-processing.

3.4 NATIONAL FRESHWATER ECOSYSTEM PRIORITY AREAS

The National Freshwater Ecosystem Priority Areas (NFEPA) project responds to the high levels of threat prevalent in the water resources of South Africa. It provides strategic spatial priorities for conserving the country's freshwater ecosystems and supporting sustainable use of water resources. These strategic priorities are known as Freshwater Ecosystem Priority Areas (FEPAs). Intended key users of NFEPA products include: National Departments of Water and Sanitation, National Department of Environmental Affairs, catchment management agencies and their associated stakeholders, the National and Provincial Departments of Agriculture, the Department of Mineral Resources, South African National Biodiversity Institute, South African National Parks, bioregional programmes, provincial conservation agencies, provincial environmental affairs departments, municipalities, non-governmental organisations, conservancies and environmental consultants.

According to the available NFEPA wetland system coverage, there are no high priority FEPA wetland systems located within the proposed study sites (Refer to **Figure 1** and **Appendix B**). However, there are several low priority artificial FEPA areas which coincide with dams within the surrounding area. The Lindequespruit River is identified as a high priority FEPA river.

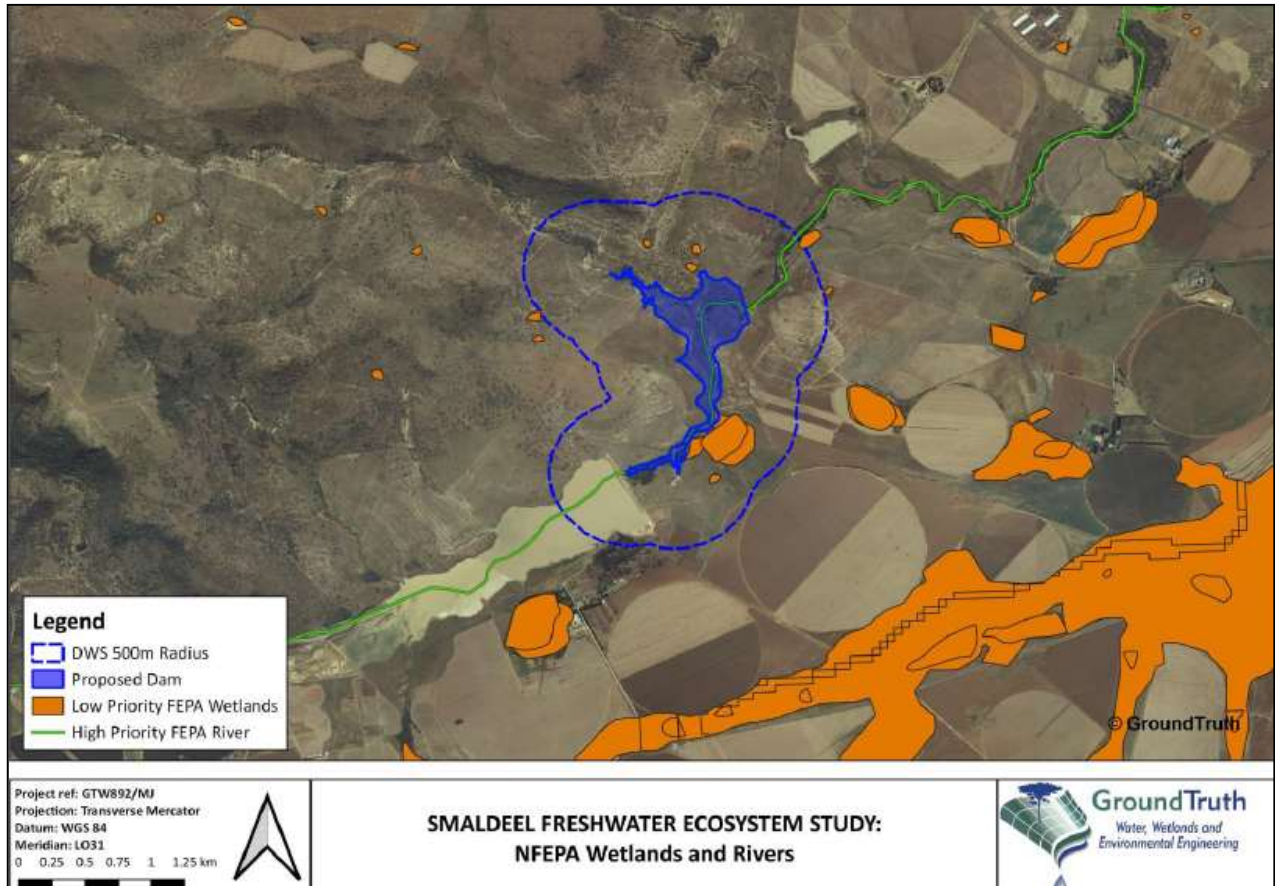


Figure 1: Map showing the NFEPA wetland system coverage within a 500 m radius of the proposed study sites (Source: GroundTruth).

4 METHODOLOGY FOR THE EIA PHASE

The methodology for the Scoping and EIA Process is based on the procedures detailed in Regulations 39 to 44 of the EIA Regulations, promulgated in terms of Section 24 (5) of the NEMA in GNR 326.

The entire Scoping and EIA Process was completed in two phases, with the Scoping Phase as phase 1 and the EIA Phase as phase 2. The Scoping Phase is described in Section 4.3. The EIA Phase is described in Section 4.4.

4.1 SITE VISIT AND BASELINE INFORMATION GATHERING

The proposed project was initiated by meeting with the Applicant to discuss what is being proposed. Further to this, site visits were undertaken to gather more detailed baseline environmental information and identify the sensitivity of the proposed dam site. This was supplemented by information gathered through related desktop and field studies, including:

- Topography (visual aspects, steepness of slope, stability);
- Surface / groundwater (presence of sensitive hydrological features e.g. wetland systems and aquatic ecology);
- Biodiversity (presence of sensitive floral and faunal communities, specifically Red Data species);
- Air quality; and
- Socio-economic impacts (effect on surrounding neighbours, landowners and land use e.g. employment, visual impacts etc.).

4.2 APPLICATION FOR SCOPING AND ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

The official Application Form, provided by the DEDTEA, was completed with all the necessary details, including contact details of and signed declarations by the Applicant and EAP. It also includes a description of the proposed project, property location and applicable Listed Activities. This was submitted to the DEDTEA on 07 January 2020 prior to the Draft Scoping Report being submitted, and acknowledgement was received on 11 January 2021. A copy of the Application Form has been included in **Appendix C**.

A Pre-application meeting was held at the proposed dam site on 30 November 2020 with the DEDTEA (Refer to **Appendix D** for the Pre-application meeting agenda, attendance register and minutes).

4.3 SCOPING PHASE

4.3.1 Scoping Report

The purpose of the Scoping Report was to identify the potential impacts and alternatives of the proposed project. It included a Plan of Study which identified the relevant Specialist Studies, which were undertaken during the EIA Phase, as well as further public participation to be conducted. The Plan of Study was made available for comment in the Scoping Report.

All relevant legislation pertaining to the proposed project was identified. The need and desirability of the proposed project was also briefly explored and any feasible alternatives were identified. The Scoping Report was supplemented with other relevant and necessary documentation, including maps, photographs, layouts etc.

The Draft Scoping Report was circulated to all I&APs from 13 January 2021 for a 30 day comment period. All comments received following circulation of the Draft Scoping Report were included in the Final Scoping Report. The Final Scoping Report was submitted to the DEDTEA on 18 February 2021 for decision. On 25 March 2021, the DEDTEA approved the Final Scoping Report (Refer to **Appendix E1**). Since acceptance of the Scoping Phase, the process has advanced to the EIA Phase.

4.3.2 Public Participation Process

A Public Participation Process, as described in Regulation 39 – 44 of the EIA Regulations was undertaken. This included:

- Newspaper adverts were published in the English and Zulu in the Ladysmith Gazette on 06 March 2020 to notify I&APs of the proposed project (Refer to **Appendix E2**);
- Site posters in English and Zulu were placed on the access routes to the farms on 10 March 2020 (Refer to **Appendix E3**);
- A Background Information Document (BID) was circulated by fax, email post, or hand delivered from 02 March 2020 (Refer to **Appendix E4**);
- A list of I&APs was compiled, and is continually updated (Refer to **Appendix E5**);
- Hard copies of all comments received following circulation of the newspaper adverts, site posters and BID are included in **Appendix E6**;
- A Scoping Phase Public Information Session was held at the Lush Valley Farm offices on 11 August 2020 (Refer to **Appendix E7** for the Public Information Session notification, attendance register, handout, minutes and photographs);
- Hard copies of all comments received following circulation of the Draft Scoping Report are included in **Appendix E8**; and
- Hard copies of all comments received following circulation of the Final Scoping Report are included in **Appendix E9**.

4.4 EIA PHASE

4.4.1 EIA Report

As part of the EIA Phase for the proposed project a number of Specialist Studies have been compiled:

- Freshwater Ecosystem Assessment;
- Ecological Reserve Determination;
- Hydrological Assessment;
- Biodiversity Assessment;
- Baseline Aquatic Assessment;

- Wetland Assessment;
- Heritage Impact Assessment;
- Desktop Geotechnical Assessment;
- Agricultural Potential and Impact Assessments; and
- Paleontological Impact Assessment.

A detailed description of the proposed project is provided in Section 5 of this Report. Identified potential alternatives to the proposed project have been provided in Section 6. A detailed description of the environment (physical, biological, social, economic and cultural) that may be affected by the proposed project, as well as potential environmental implications and associated mitigation measures and recommendations are provided in Section 8 and 9. In order to assess the potential environmental issues associated with the proposed project, each aspect addressed in Section 8 and 9 has been given a qualitative rating in relation to its environmental impact. Each aspect has been divided into a number of different classes, each of which has been assigned various criteria (Refer to Section 10).

This Draft EIA Report and the Environmental Management Programme (EMPr) (Refer to Section 4.4.2) has been circulated to all I&APs for a 30 day comment period. All comments received following circulation of the Draft EIA Report will be summarised and responded to in the Final EIA Report which will be submitted to the DEDTEA for decision. All I&APs will be notified of this decision.

4.4.2 Public Participation Process

Please note that due to the poor attendance during the Scoping Phase Public Information Session, an EIA Phase Public Information Session will not be held. Should an I&AP wish for a Public Information Session to be held, then this must be communicated with the EAP.

4.4.3 Environmental Management Programme

As part of the EIA Phase, an EMPr has been compiled which contains guidelines to ensure that the proposed project will be carried out in an environmentally responsible and acceptable manner (Refer to Section 11). The EMPr includes the following:

- Spill Contingency Plan;
- Alien Invasive Vegetation Management Programme;
- Erosion control measures; and
- Water management measures.

The EMPr will be used as a framework for environmental compliance monitoring and reporting for the operational lifetime of the proposed project (Refer to **Appendix P**).

5 THE PROPOSED PROJECT

5.1 PROPERTY LOCATION AND LAND DESCRIPTION

The proposed dam site is located on Portion 1 of Meersig No. 15550, and Rem, Portion 1 and Portion 4 of Smaldeel No. 1390, at GPS coordinates 28°48'31.80" S and 29°28'42.60" E, and along the Lindequespruit River. The dam will fall on Lush Valley Farm which is located on the northern banks of the Lindequespruit River, and on Prairie Farm which is located on the southern banks of the Lindequespruit River. The existing Glen Gray Dam is located upstream of the proposed dam site, and is approximately 4.5 million m³ in extent. The Lindequespruit Irrigation Board was established for the six members who have shares in the Glen Gray Dam. Please note that in the Specialist Studies, both the Lindequespruit River and the Situlwane River have been referred to, as they are the same river. The currently preferred dam design comprises the following specifications (Refer to **Appendix F**):

- Storage capacity – 1.6 million m³;
- Area – 34 ha;
- Wall height – 13.95 m;
- Wall length – 311.83 m; and
- Water depth – 13.33 m.

Based on water uses within the quaternary catchment, the total registered surface water abstractions total 19 294 041 m³ / year, and the total registered downstream water use totals 1 299 500 m³ / year (Refer to **Appendix G**) As such, the proposed dam was calculated to have a yield of approximately 1 265 211 m³ / year with a 75 % assurance of supply, and the total releases or EWR for the proposed dam was calculated to be 3 314 687 m³ / year, which is more than enough to meet the ecological requirements from the sub-catchment. In the event of a 1:50 year or a 1:100 year flood, no permanent structures will be impacted along the Lindequespruit River (Refer to **Appendix H**).

The proposed dam site falls within the V13D quaternary catchment and the Pongola to Mtamvuna WMA (Refer to **Appendix B**). Multiple HGM units were identified within the proposed dam site; namely, four hillslope seepage wetland systems and one depression wetland system. Six riparian channels were also identified within the proposed dam site. Although the proposed dam will result in the inundation of portions of the wetland systems, this loss is considered limited based on the extent of the wetland systems. Due to the impacts being limited to a loss of 0.3 ha equivalents of wetland habitat, wetland rehabilitation measures are not required to be implemented. Under natural conditions, the proposed dam site would have been characterised by Northern KwaZulu-Natal Moist Grassland (Gs 4), which falls under the Sub-Escarpment Grassland (Gs) Group 4 bioregion. In terms of floral species, the proposed dam site is currently dominated by alien invasive vegetation; namely, *Populus candescens* and *Poplar candescens* (Refer to **Appendix I**). The impacts associated with the loss of habitat for faunal species will be minimal, and the proposed dam will in fact benefit and promote the presence of faunal species. Due to several fish species likely to occur within the Lindequespruit River, and which have a conservation status of 'vulnerable', a fishway is required to be established on the wall of the proposed dam to allow for the migration of fish species (Refer

to **Appendix J**). It is important to note that the existing Glen Gray Dam has resulted in the proposed dam site being subject to transformation which is associated with alterations to flood events, restrictions during low flow periods and changes in water flow and volumes etc., as well as alteration to the riverine and terrestrial habitats. As such and although the proposed dam is viewed as an expansion of the impacts on biodiversity arising from the existing Glen Gray Dam, the recommendations included in this Report will address such impacts.

The cultivation of 106.62 ha of land is proposed to take place on Lush Valley Farm which is located on the northern banks of the Lindequespruit River. This will involve the installation of centre pivot irrigation systems and associated pipelines. The Applicant is proposing to plant these lands to crops and pastures, comprising kikuyu and other grass mixtures. Water from the dam is proposed to be pumped via pipelines that will run from the dam to the cultivation sites. The proposed pipelines will have a total length of approximately 7 km and a diameter of 20 mm to 25 mm.

The cultivation is proposed to take place on the following properties:

- 22.87 ha pivot located on Portion 4 of Smaldeel No. 1390 at GPS coordinates 28°48'41.79" S and 29°28'11.36" E;
- 23.49 ha pivot located on Portion 3 of Smaldeel No. 1390, and Portion 10 of Lindeques Laager No. 1039, at GPS coordinates 28°49'10.34" S and 29°27'37.32" E;
- 8.06 ha pivot located on Portion 2, Portion 3 and Portion 10 of Lindeques Laager No. 1039, at GPS coordinates 28°49'8.15" S and 29°27'12.05" E;
- 10.17 ha pivot located on Portion 2, Portion 3 and Portion 10 of Lindeques Laager No. 1039, at GPS coordinates 28°49'18.36" S and 29°27'7.44" E;
- 12.22 ha pivot located on Portion 2 and Portion 10 of Lindeques Laager No. 1039, at GPS coordinates 28°49'26.88" S and 29°27'16.82" E;
- 9.80 ha pivot located on Portion 3 of Lindeques Laager No. 1039, at GPS coordinates 28°49'15.44" S and 29°26'46.80" E; and
- 20.01 ha pivot located on Portion 2, Portion 3 and Portion 10 of Lindeques Laager No. 1039, at GPS coordinates 28°49'31.91" S and 29°26'57.60" E.

Based on historical imagery, portions of the proposed cultivation sites have been used for agricultural activities prior to 1937 (Refer to **Appendix K**). Portions of the proposed cultivation sites comprise erosion gullies due to these historical agricultural activities. Although five HGM units were identified within the proposed cultivation sites and are classified as hillslope seepage wetland systems, the proposed cultivation sites have since been realigned to fall outside of the identified wetland systems and the recommended 20 m buffer. As such, should the recommendations and mitigation measures included in this Report be adhered to, the impacts of the proposed cultivation on the wetland systems are considered to be low. Portions of the low lying areas were identified to be characterised by Bonheim soils which tend to comprise a high moisture content, thus careful management of the agricultural activities and irrigation will be required. In terms of the floral species, the proposed cultivation sites comprise a graminoid environment,

and thus the impacts on this habitat are likely to be minimal (Refer to **Appendix I**). It is important to note that although portions of the proposed cultivation sites fall within an 'optimal' CBA, this CBA is not 'irreplaceable' or 'environmentally sensitive'. Although *Otomys auratus* (vlei rat) and *Aonyx capensis* (Cape clawless otter), as well as *Opisthophthalmus praedo* (Tugela burrowing scorpion) are identified as 'near threatened' and 'protected' respectively, and have the potential to occur within the proposed study sites; it is unlikely that these faunal species will be impacted should the recommendations and mitigation measures included in this Report be adhered to.

Although the Heritage Specialist identified portions of the proposed cultivation sites to comprise stone walled Later Iron Age sites which are considered to have a high local significance and must therefore be retained as heritage sites; the proposed cultivation sites have since been realigned to fall outside of the identified heritage sites and the recommended 20 m buffer (Refer to **Appendix L**).

To access the proposed dam and cultivation sites, from Pietermaritzburg travel on the N3 towards Johannesburg. Turn left at the Bergville / Colenso off ramp and continue straight on the R74 Road through Winterton. Approximately 4 km outside Winterton on the R74 Road, turn left into Doveton Farm. Continue straight to the Doveton Farm office, and the farmer will provide directions to the proposed dam and cultivation sites, since they can only be accessed along farm roads.

Refer to **Figure 1 to 6** for maps showing the proposed study sites, and **Figure 7** for photographs showing the proposed study sites.



Figure 1: Locality Map showing the proposed study sites and surrounding area, Winterton, KwaZulu-Natal (Source: Google Earth).

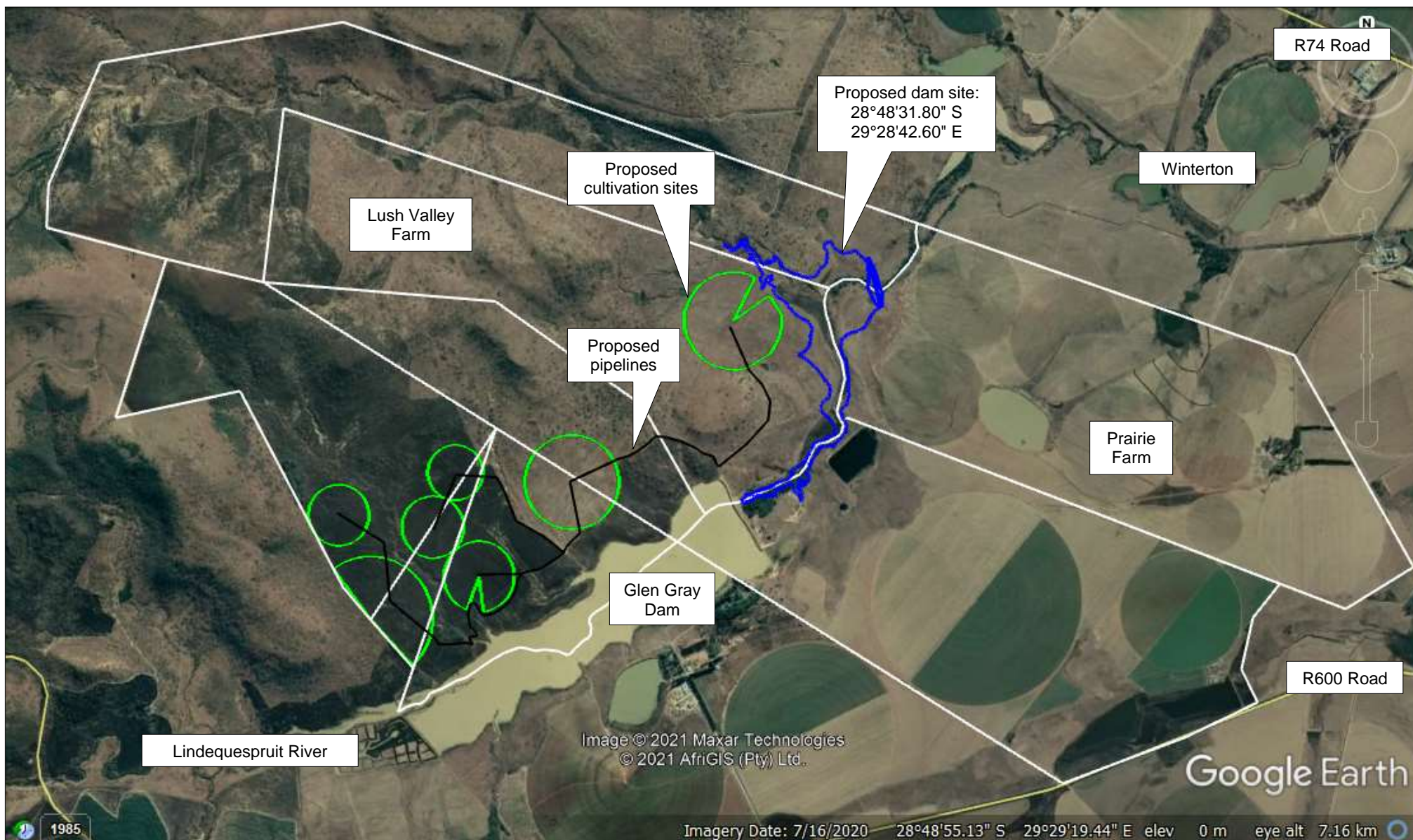


Figure 2a: Map showing the proposed study sites and surrounding area, Winterton, KwaZulu-Natal (Source: Google Earth).

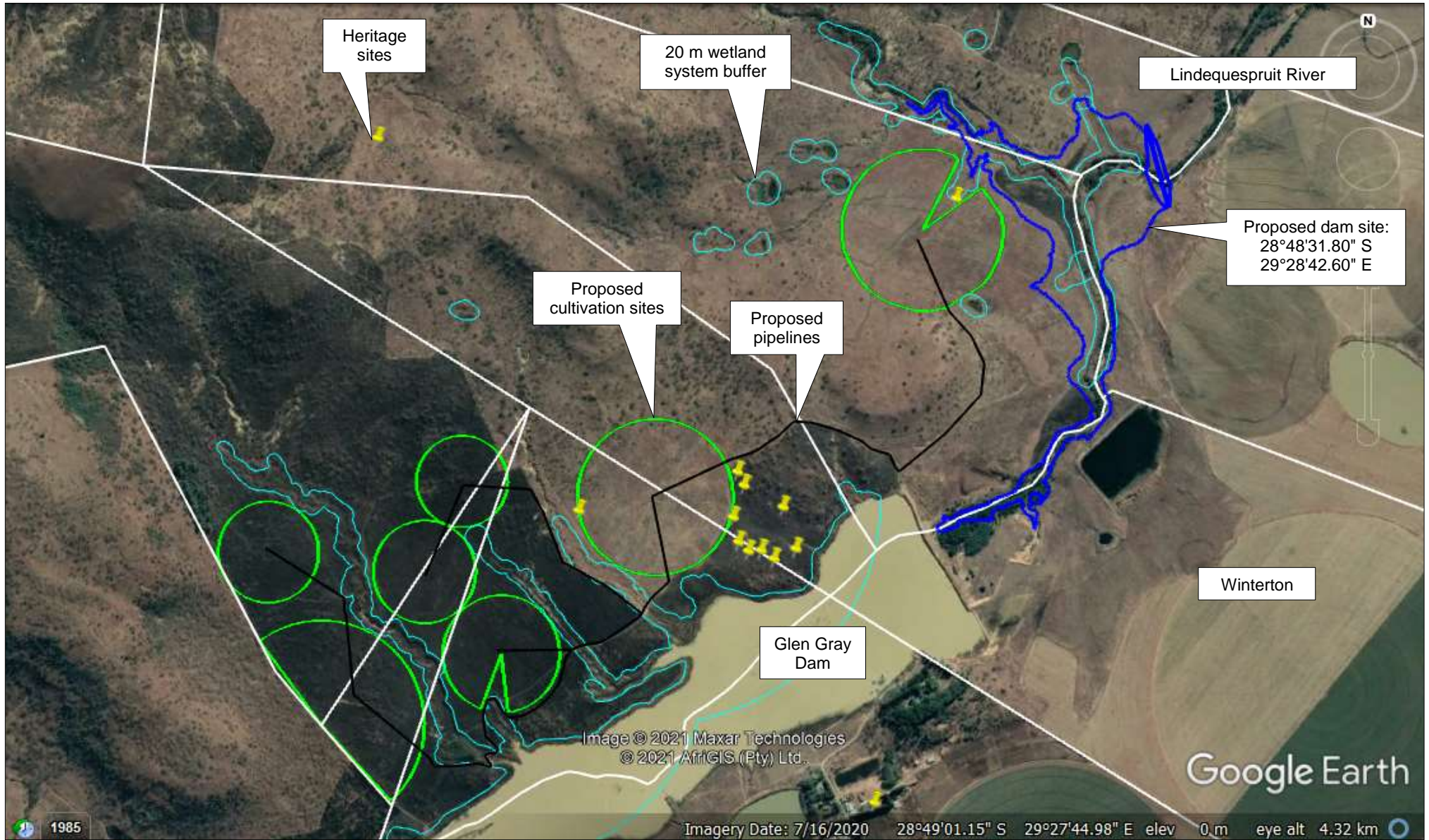


Figure 2b: Map showing the proposed study sites and identified sensitivities, Winterton, KwaZulu-Natal (Source: Google Earth).

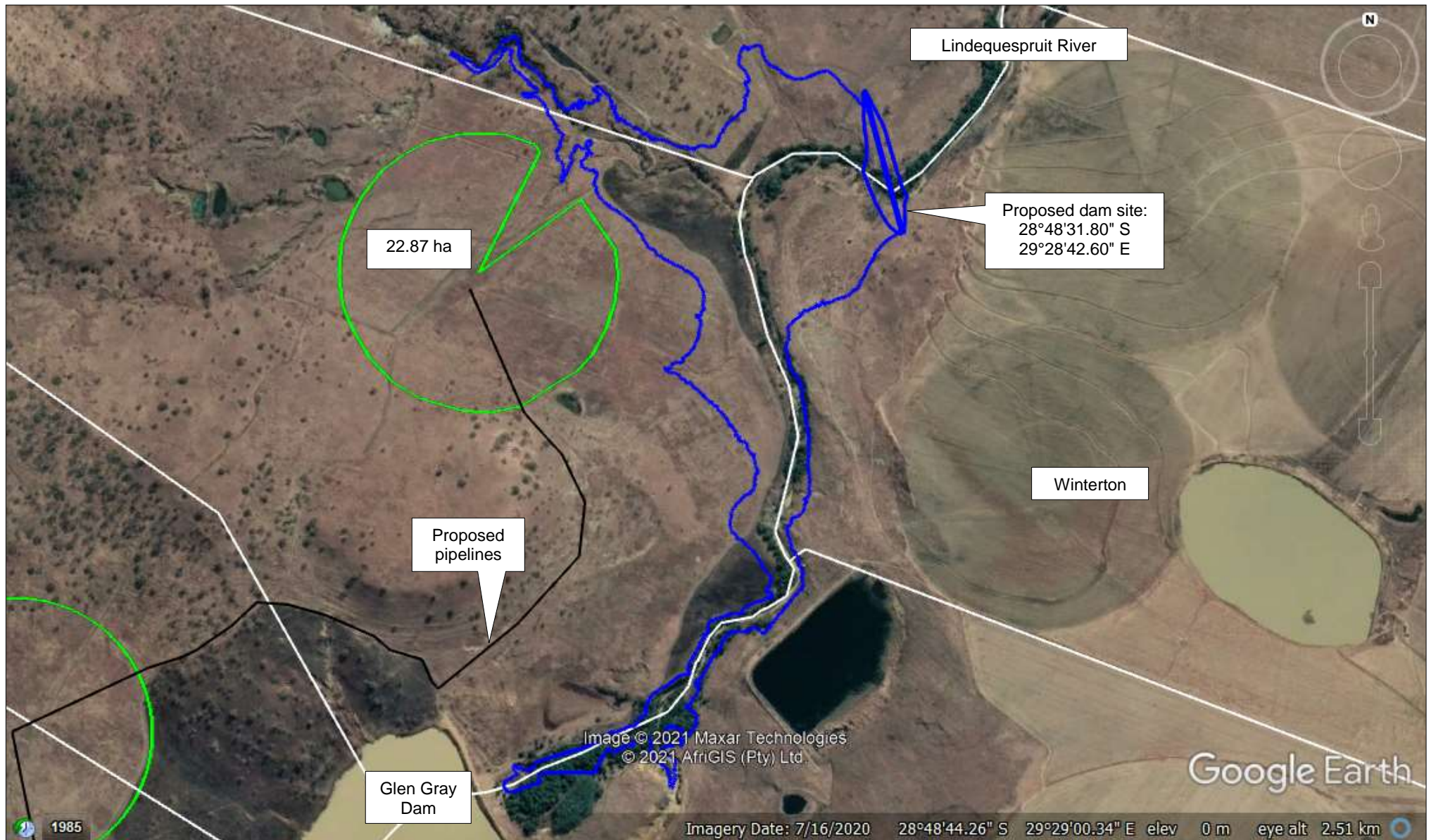


Figure 3: Map showing the proposed dam site, Winterton, KwaZulu-Natal (Source: Google Earth).

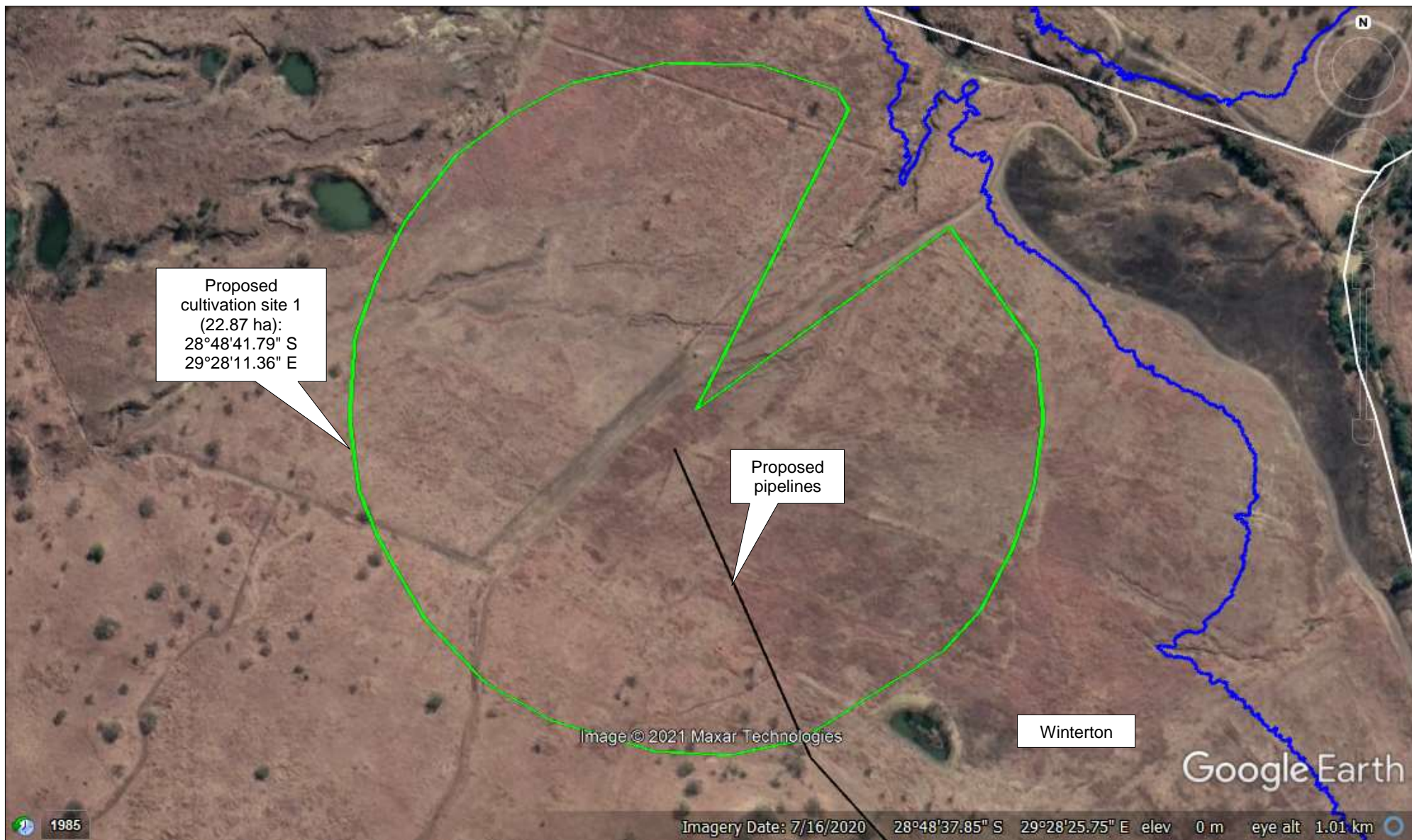


Figure 4a: Map showing the proposed cultivation site 1, Winterton, KwaZulu-Natal (Source: Google Earth).



Figure 4b: Map showing the proposed cultivation site 2, Winterton, KwaZulu-Natal (Source: Google Earth).

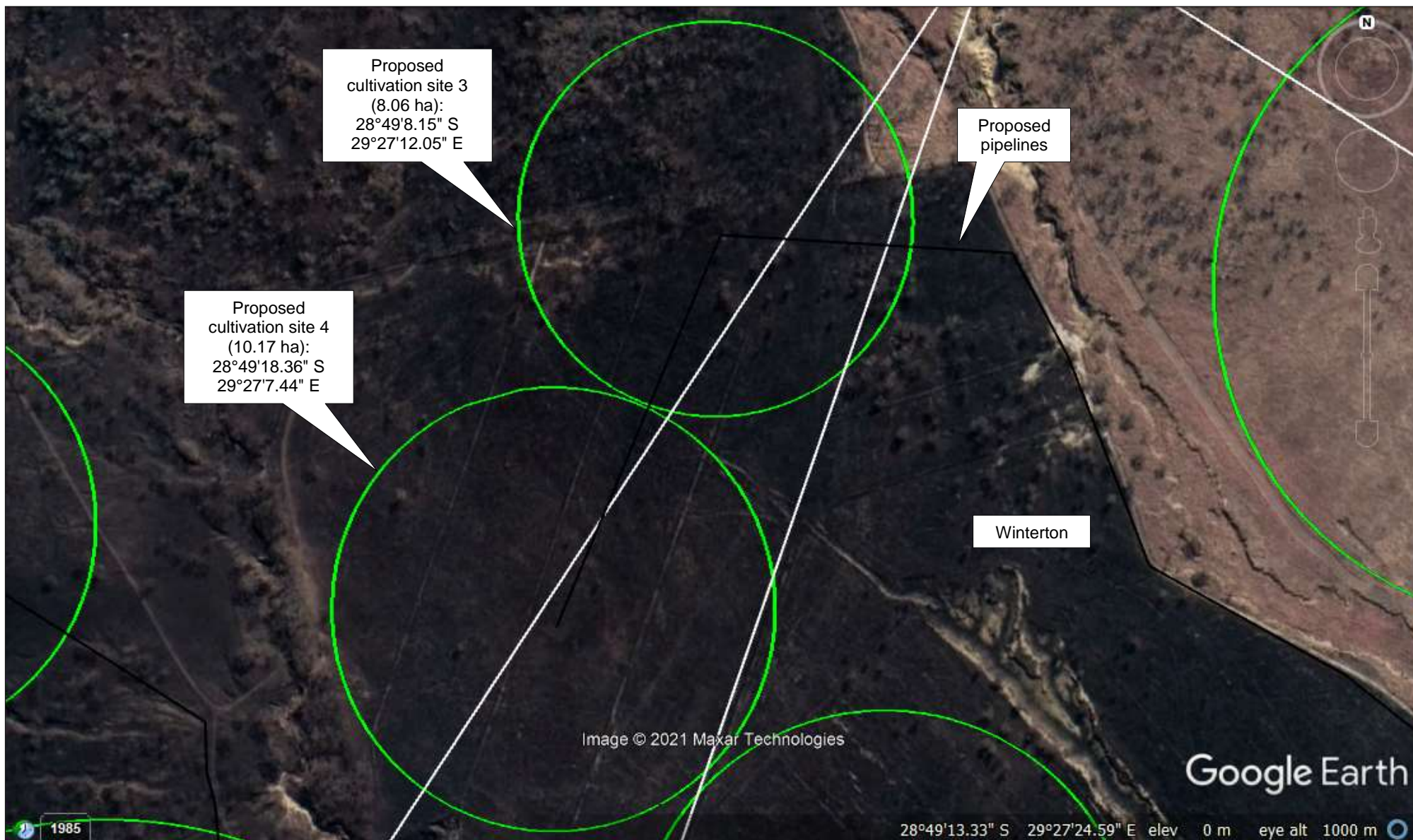


Figure 4c: Map showing the proposed cultivation site 3 and 4, Winterton, KwaZulu-Natal (Source: Google Earth).

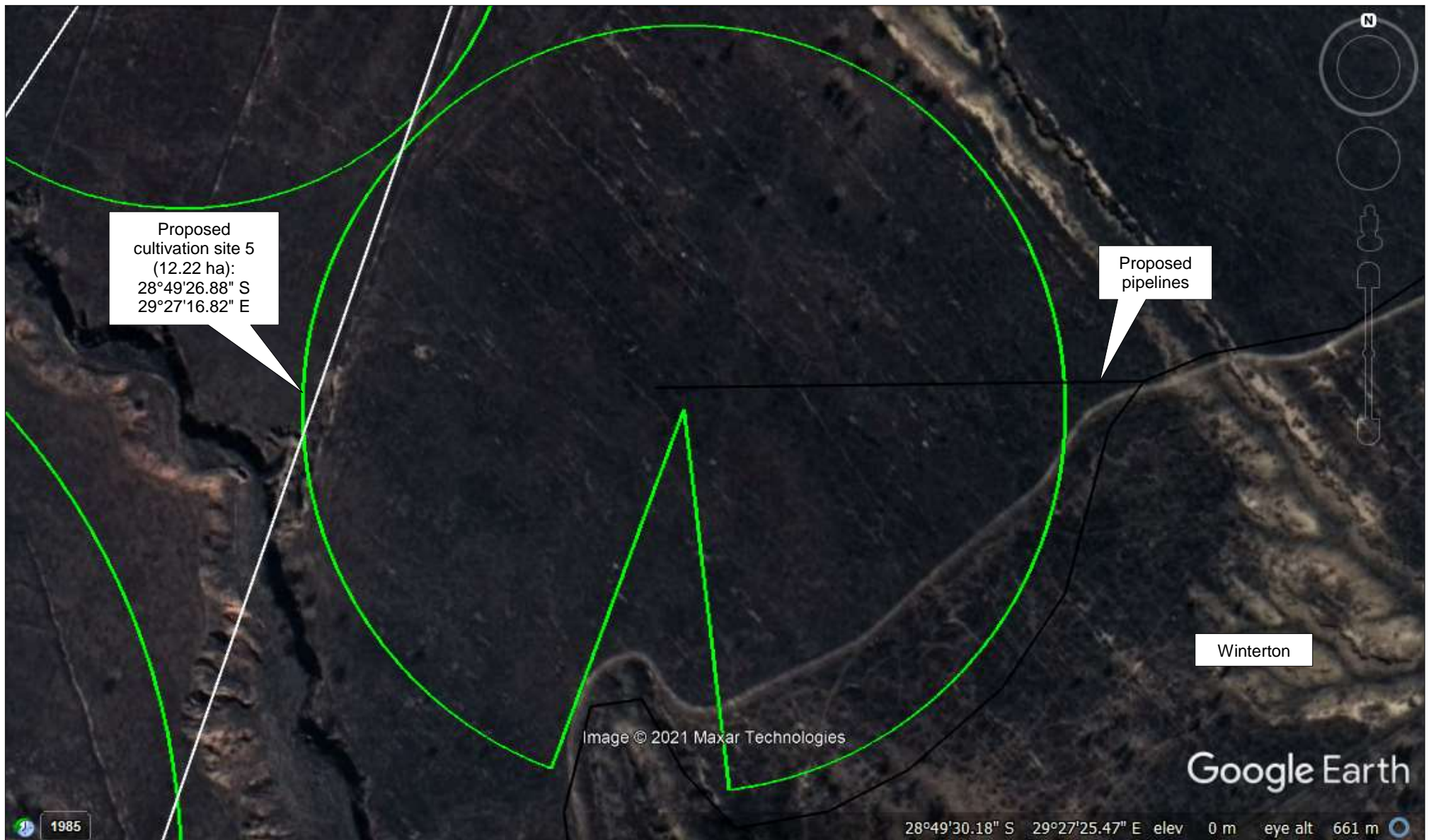


Figure 4d: Map showing the proposed cultivation site 5, Winterton, KwaZulu-Natal (Source: Google Earth).



Figure 4e: Map showing the proposed cultivation site 6, Winterton, KwaZulu-Natal (Source: Google Earth).

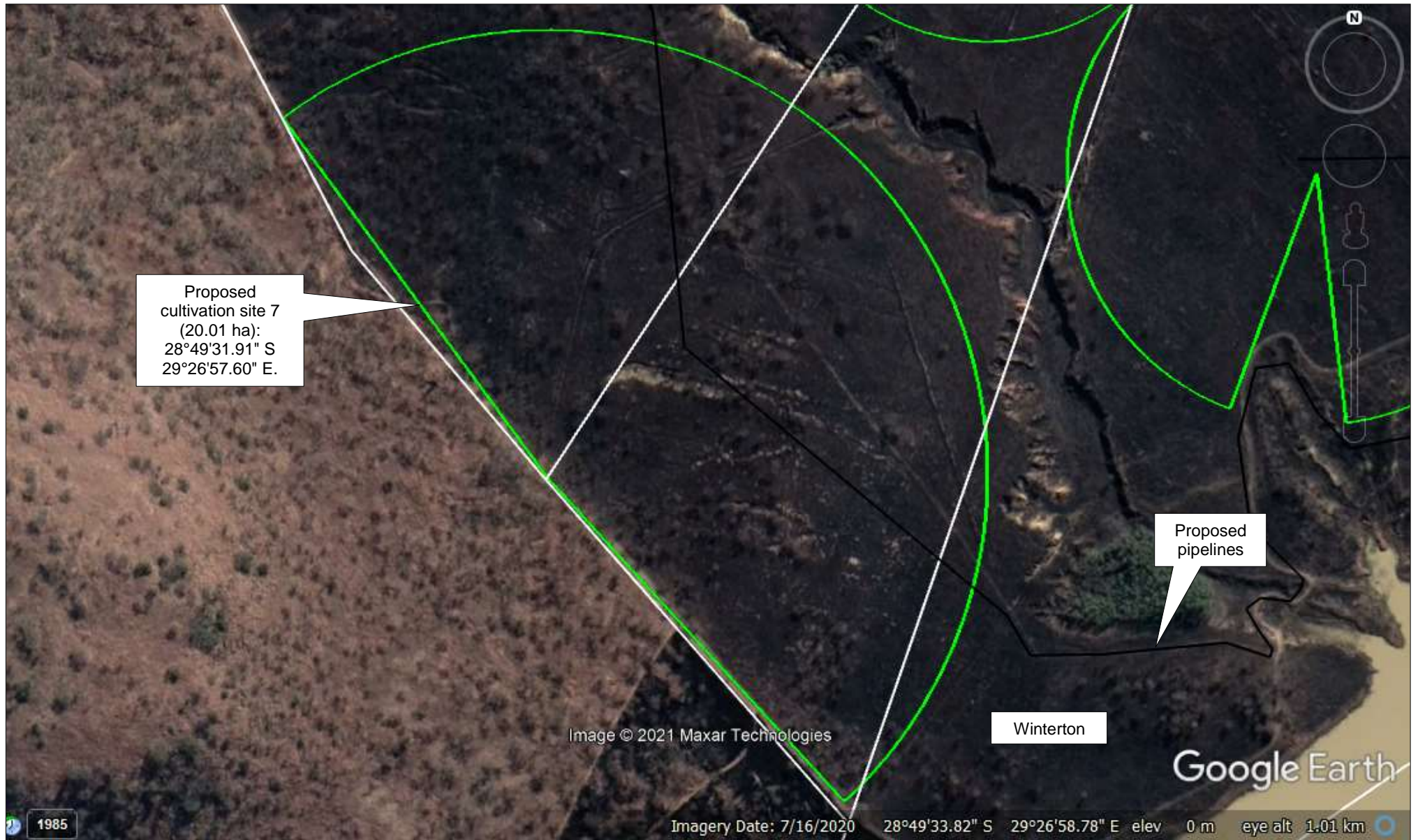


Figure 4f: Map showing the proposed cultivation site 7, Winterton, KwaZulu-Natal (Source: Google Earth).

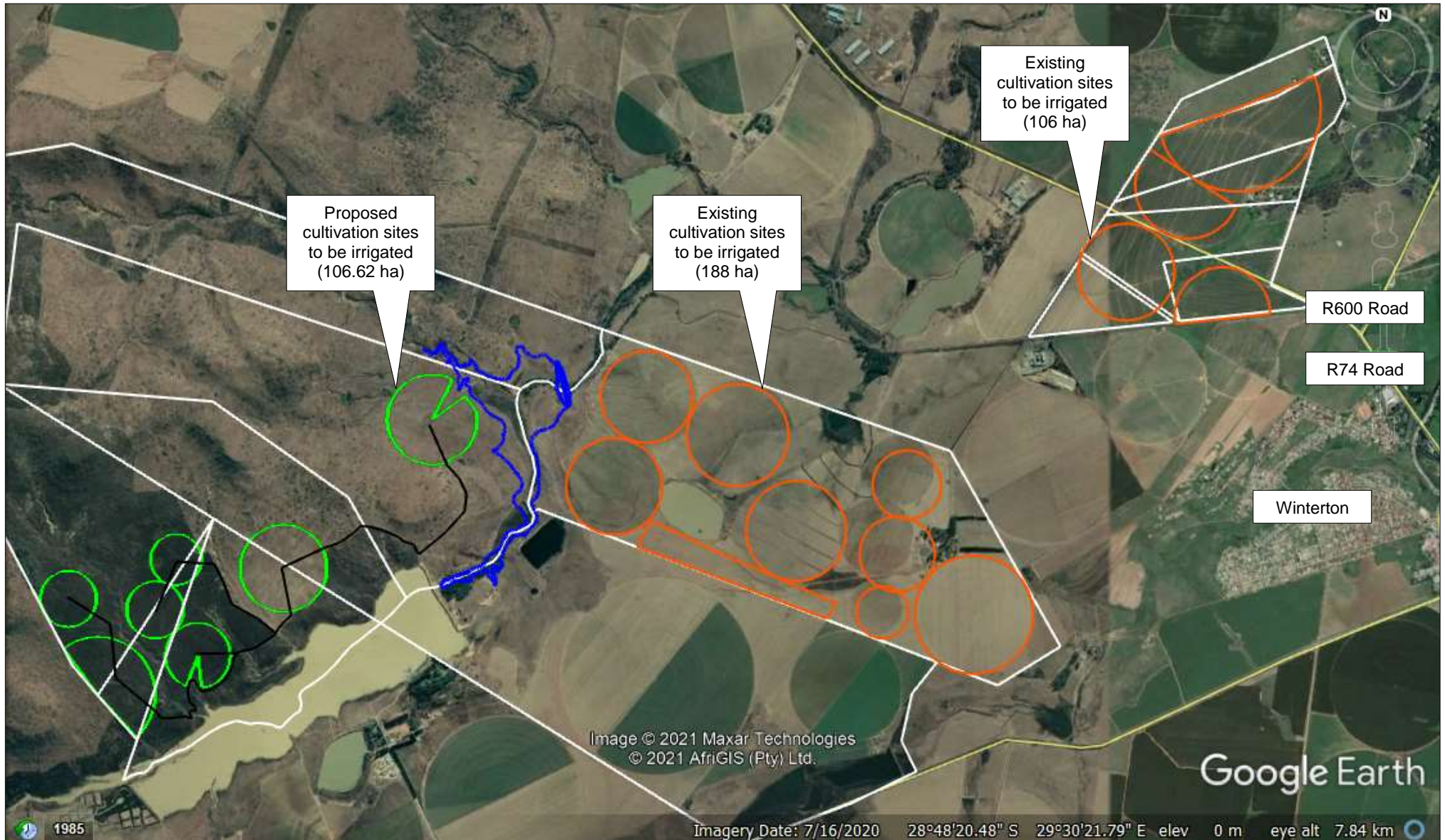


Figure 5: Map showing the proposed and existing cultivated lands to be irrigated from the dam, Winterton, KwaZulu-Natal (Source: Google Earth).

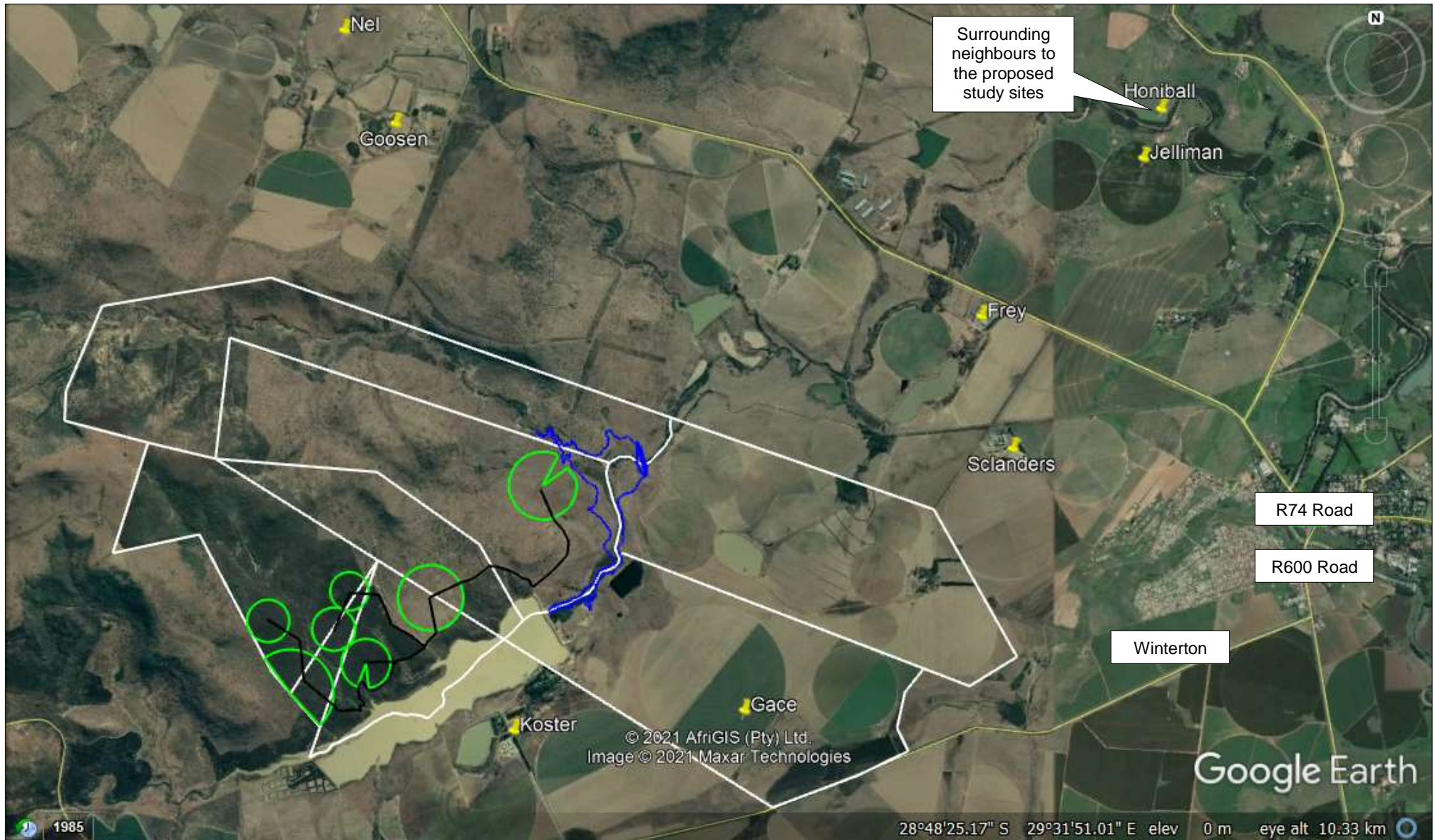


Figure 6: Map showing the surrounding landowners to the proposed study sites, Winterton, KwaZulu-Natal (Source: Google Earth).



Downstream view of the proposed dam site from Prairie Farm which is located on the southern banks of the Lindequespruit River.



Upstream view of the proposed dam site from Prairie Farm which is located on the southern banks of the Lindequespruit River.



Westerly view of the proposed cultivation sites 2 to 7 from Lush Valley Farm.



Northerly view of the proposed cultivation site 1 from Lush Valley Farm.



Westerly view of the proposed cultivation sites from Lush Valley Farm.



Westerly view of the existing Glen Gray Dam from Lush Valley Farm.
Figure 7: Photographs showing the proposed study sites.

5.2 THE PROPOSAL

The Applicant, Sable Hill Dam Educational Fund NPC, proposes to establish a 1.6 million m³ dam, and cultivate 106.62 ha of land, located on Portion 1 of Meersig No. 15550; Rem, Portion 1, Portion 3 and Portion 4 of Smaldeel No. 1390; and Portion 2, Portion 3 and Portion 10 of Lindeques Laager No. 1039, Lush Valley Farm and Prairie Farm, within the Okhahlamba Local and uThukela District Municipality, Winterton, KwaZulu-Natal.

Please note that the proposed cultivation of land only came about during the Scoping Phase. As such, during the initial Public Participation Process, only mention was made of the proposed dam. Prior to the Engineer undertaking a detailed dam investigation, a 2.3 million m³ dam was proposed. Due to the significant inundation associated with a dam of this extent, a 1.6 million m³ dam is now being proposed. During the Scoping Phase, 102 ha of land was proposed to be cultivated. Based on feedback from the Specialist Studies, the cultivation sites have since been realigned outside of the identified freshwater ecosystems and heritage sites, and a total of 106.62 ha is now proposed to be cultivated.

The proposed project comprises the following components:

- Establishment of a 1.6 million m³ dam;
- Cultivation of 106.62 ha of land; and
- Installation of associated pipelines for irrigation purposes.

The proposed dam site is located on Portion 1 of Meersig No. 15550, and Rem, Portion 1 and Portion 4 of Smaldeel No. 1390, at GPS coordinates 28°48'31.80" S and 29°28'42.60" E, and along the Lindequespruit River (Refer to **Appendix F**). The dam will fall on Lush Valley Farm which is located on the northern banks of the Lindequespruit River, and on Prairie Farm which is located on the southern banks of the Lindequespruit River. The existing Glen Gray Dam is located upstream of the proposed dam site, and is approximately 4.5 million m³ in extent. The Lindequespruit Irrigation Board was established for the six members who have shares in the Glen Gray Dam. Please note that in the Specialist Studies, both the Lindequespruit River and the Situlwane River have been referred to, as they are the same river. The currently preferred dam design comprises the following specifications.

Based on water uses within the quaternary catchment, the total registered surface water abstractions total 19 294 041 m³ / year, and the total registered downstream water use totals 1 299 500 m³ / year (Refer to **Appendix G**) As such, the proposed dam was calculated to have a yield of approximately 1 265 211 m³ / year with a 75 % assurance of supply, and the total releases or EWR for the proposed dam was calculated to be 3 314 687 m³ / year, which is more than enough to meet the ecological requirements from the sub-catchment. In the event of a 1:50 year or a 1:100 year flood, no permanent structures will be impacted along the Lindequespruit River (Refer to **Appendix H**).

The proposed dam site falls within the V13D quaternary catchment and the Pongola to Mtamvuna WMA (Refer to **Appendix B**). Multiple HGM units were identified within the proposed dam site; namely, four

hillslope seepage wetland systems and one depression wetland system. Six riparian channels were also identified within the proposed dam site. Although the proposed dam will result in the inundation of portions of the wetland systems, this loss is considered limited based on the extent of the wetland systems. Due to the impacts being limited to a loss of 0.3 ha equivalents of wetland habitat, wetland rehabilitation measures are not required to be implemented. Under natural conditions, the proposed dam site would have been characterised by Northern KwaZulu-Natal Moist Grassland (Gs 4), which falls under the Sub-Escarpment Grassland (Gs) Group 4 bioregion. In terms of floral species, the proposed dam site is currently dominated by alien invasive vegetation; namely, *Populus candescens* and *Poplar candescens* (Refer to **Appendix I**). The impacts associated with the loss of habitat for faunal species will be minimal, and the proposed dam will in fact benefit and promote the presence of faunal species. Due to several fish species likely to occur within the Lindespruit River, and which have a conservation status of 'vulnerable', a fishway is required to be established on the wall of the proposed dam to allow for the migration of fish species (Refer to **Appendix J**). It is important to note that the existing Glen Gray Dam has resulted in the proposed dam site being subject to transformation which is associated with alterations to flood events, restrictions during low flow periods and changes in water flow and volumes etc., as well as alteration to the riverine and terrestrial habitats. As such and although the proposed dam is viewed as an expansion of the impacts on biodiversity arising from the existing Glen Gray Dam, the recommendations included in this Report will address such impacts.

The cultivation of 106.62 ha of land is proposed to take place on Lush Valley Farm which is located on the northern banks of the Lindequespruit River. This will involve the installation of centre pivot irrigation systems and associated pipelines. The Applicant is proposing to plant these lands to crops and pastures, comprising kikuyu and other grass mixtures. Water from the dam is proposed to be pumped via pipelines that will run from the dam to the cultivation sites. The proposed pipelines will have a total length of approximately 7 km and a diameter of 20 mm to 25 mm.

The cultivation is proposed to take place on the following properties:

- 22.87 ha pivot located on Portion 4 of Smaldeel No. 1390 at GPS coordinates 28°48'41.79" S and 29°28'11.36" E;
- 23.49 ha pivot located on Portion 3 of Smaldeel No. 1390, and Portion 10 of Lindeques Laager No. 1039, at GPS coordinates 28°49'10.34" S and 29°27'37.32" E;
- 8.06 ha pivot located on Portion 2, Portion 3 and Portion 10 of Lindeques Laager No. 1039, at GPS coordinates 28°49'8.15" S and 29°27'12.05" E;
- 10.17 ha pivot located on Portion 2, Portion 3 and Portion 10 of Lindeques Laager No. 1039, at GPS coordinates 28°49'18.36" S and 29°27'7.44" E;
- 12.22 ha pivot located on Portion 2 and Portion 10 of Lindeques Laager No. 1039, at GPS coordinates 28°49'26.88" S and 29°27'16.82" E;
- 9.80 ha pivot located on Portion 3 of Lindeques Laager No. 1039, at GPS coordinates 28°49'15.44" S and 29°26'46.80" E; and
- 20.01 ha pivot located on Portion 2, Portion 3 and Portion 10 of Lindeques Laager No. 1039, at GPS

coordinates 28°49'31.91" S and 29°26'57.60" E.

Based on historical imagery, portions of the proposed cultivation sites have been used for agricultural activities prior to 1937 (Refer to **Appendix K**). Portions of the proposed cultivation sites comprise erosion gullies due to these historical agricultural activities. Although five HGM units were identified within the proposed cultivation sites and are classified as hillslope seepage wetland systems, the proposed cultivation sites have since been realigned to fall outside of the identified wetland systems and the recommended 20 m buffer. As such, should the recommendations and mitigation measures included in this Report be adhered to, the impacts of the proposed cultivation on the wetland systems are considered to be low. Portions of the low lying areas were identified to be characterised by Bonheim soils which tend to comprise a high moisture content, thus careful management of the agricultural activities and irrigation will be required. In terms of the floral species, the proposed cultivation sites comprise a graminoid environment, and thus the impacts on this habitat are likely to be minimal (Refer to **Appendix I**). It is important to note that although portions of the proposed cultivation sites fall within an 'optimal' CBA, this CBA is not 'irreplaceable' or 'environmentally sensitive'. Although *Otomys auratus* (vlei rat) and *Aonyx capensis* (Cape clawless otter), as well as *Opisthophthalmus praedo* (Tugela burrowing scorpion) are identified as 'near threatened' and 'protected' respectively, and have the potential to occur within the proposed study sites; it is unlikely that these faunal species will be impacted should the recommendations and mitigation measures included in this Report be adhered to.

Although the Heritage Specialist identified portions of the proposed cultivation sites to comprise stone walled Later Iron Age sites which are considered to have a high local significance and must therefore be retained as heritage sites; the proposed cultivation sites have since been realigned to fall outside of the identified heritage sites and the recommended 20 m buffer (Refer to **Appendix L**).

Lush Valley Farm and Prairie Farm are commercial agricultural operations comprising maize, potatoes, wheat, soya beans, peas and butternut which is planted on a rotational basis, as well as beef cattle. Water from the dam is proposed to be pumped via the associated pipelines to surrounding lands on both farms for irrigation purposes. On Lush Valley Farm, the 106.62 ha of land proposed to be cultivated, is to be irrigated from the proposed dam. There is an additional 106 ha of existing cultivated land that is also to be irrigated from the proposed dam. Water is to be released from the proposed dam and into the Lindequespruit River where it will be abstracted further downstream for irrigation purposes. On Prairie Farm, there is approximately 188 ha of existing cultivated land which is to be irrigated via existing pipelines from the proposed dam. These lands comprise maize, wheat, soya beans and peas which are planted on a rotational basis. A portion of the existing lands also comprise pecan nuts which will be required to be irrigated from the proposed dam. The proposed dam will thus allow for increased water storage and availability for supplementary irrigation during the summer months, and a back-up during the dry, winter months. There are currently approximately 1500 head of cattle on Lush Valley Farm, and with the additional cultivated land which is proposed to be irrigated, the cattle herd will be able to be expanded by approximately 500 cattle. The proposed project will thus ensure the long-term sustainability of both farms,

through increased yields, and crop and livestock production, as well as increased employment opportunities. This in turn will result in skills development, income generation and improved quality of life. Should the WULA for the proposed project not be approved, the proposed cultivation sites will be for dry land agricultural activities.

Table 1: Preferred dam design specifications.

ASPECT	MEASUREMENT
Storage capacity	1 600 174.43 million m ³
Dam area	34 ha
Wall height	13.95 m
Wall length	311.83 m
Water depth	13.33 m
Pipeline length	7 km
Pipeline diameter	20 mm to 25 mm

The anticipated construction period is approximately three months. Refer to **Figure 1 to 6** for maps showing the proposed study sites, **Figure 7** for photographs showing the proposed study sites and **Figure 8** for the dam designs.

The area that will be inundated by the dam will be cleared of boulders, trees, stumps, grass and topsoil. The topsoil will be stockpiled and used on the face of the dam to allow for the establishment of suitable grass cover. Layers of sand and organic, or porous material will be excavated and removed from the construction area.

The cut-off trench and base of the dam will be kept free of water during the construction phase. Any porous, organic, or loose material will be removed before the topsoil is placed in the foundation and compacted. All rock surfaces in the foundation will be excavated to sound rock and washed clean using air and water jets. Joints and cracks that are exposed will then be cleaned and filled with grout to ensure that the contact with the fill material is tight.

Material with high clay content will be placed in the central zone of the embankment and material with a higher sand fraction will be placed in the outer zones of the embankment. All excavations for the earth fill will be below the full supply level of the basin. The entire embankment will be constructed in layers and compacted systematically over each layer. Any holes or depressions that occur in the abutments, core trench or outlet pipe will be hand rammed to maximum compaction.

The spillway will be excavated to the recommended minimum width. The total freeboard of the embankment will be no less than the minimum recommended height above the spillway level. The spillway and the slope downstream of the spillway will be cleared of obstruction such as trees and boulders, and all depressions will be filled appropriately. It will then be top soiled and grassed to minimise the risk of erosion.

The embankment and spillway will then be fenced off.

In order to facilitate a speedy and uninterrupted construction phase, all materials will be preconditioned and made easily available, prior to any material being placed on the embankment. The stockpiling of the rock fill from the spillway will assist in increasing the rate at which materials can be placed on the embankment and reduce the potential for delays.

A summary of the main work items involved in the construction phase of the proposed dam includes:

- Clear area to be inundated and stockpile material;
- Excavate to rock and compact topsoil in the foundation;
- Clean and grout rock where necessary;
- Place and compact material to embankment;
- Excavate spillway and remove obstructions;
- Topsoil all exposed portions of work; and
- Grass exposed areas with indigenous, endemic grasses species.

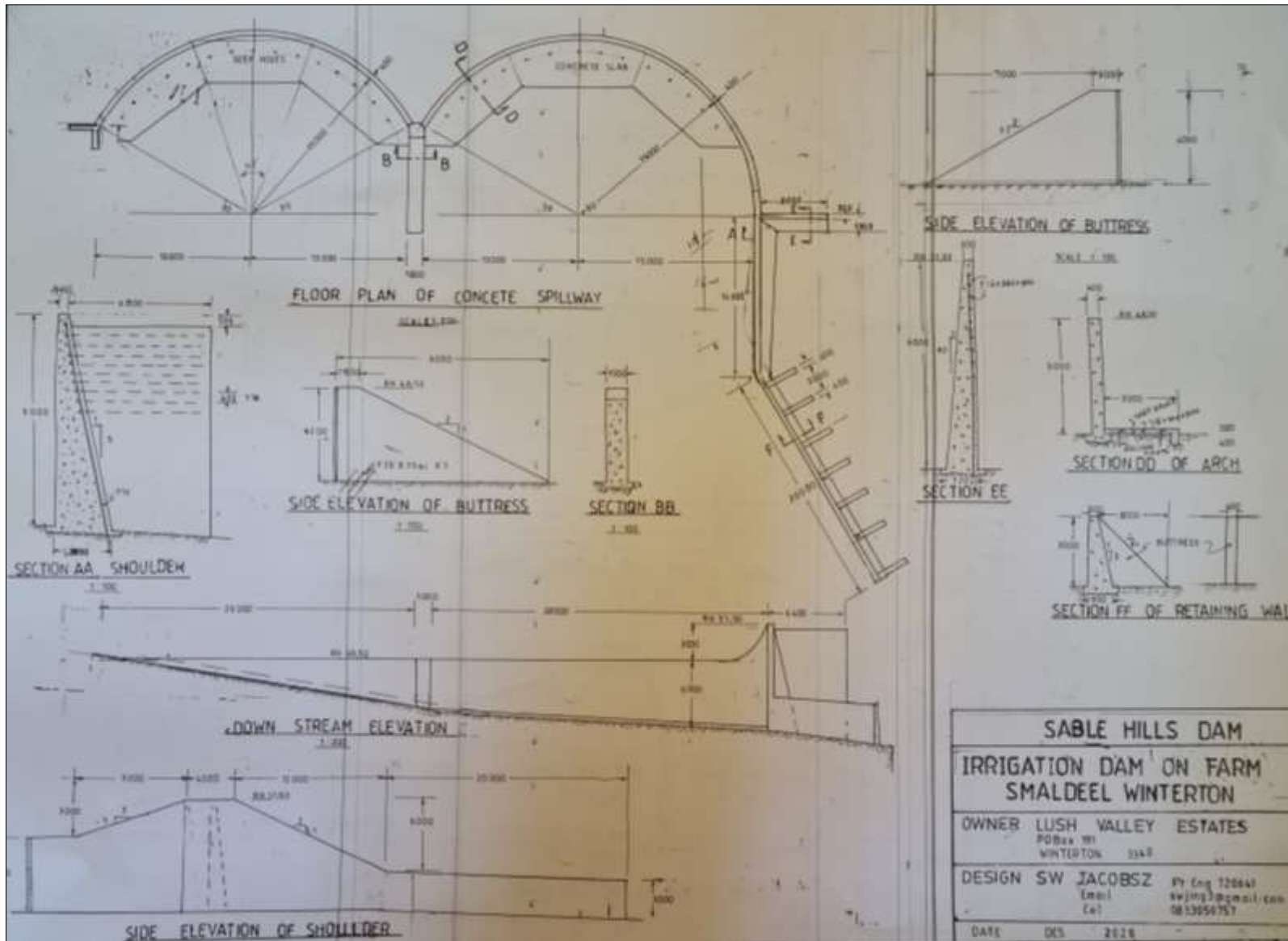


Figure 8a: Design of the proposed dam, Winterton, KwaZulu-Natal (Source: SW Jacobsz).

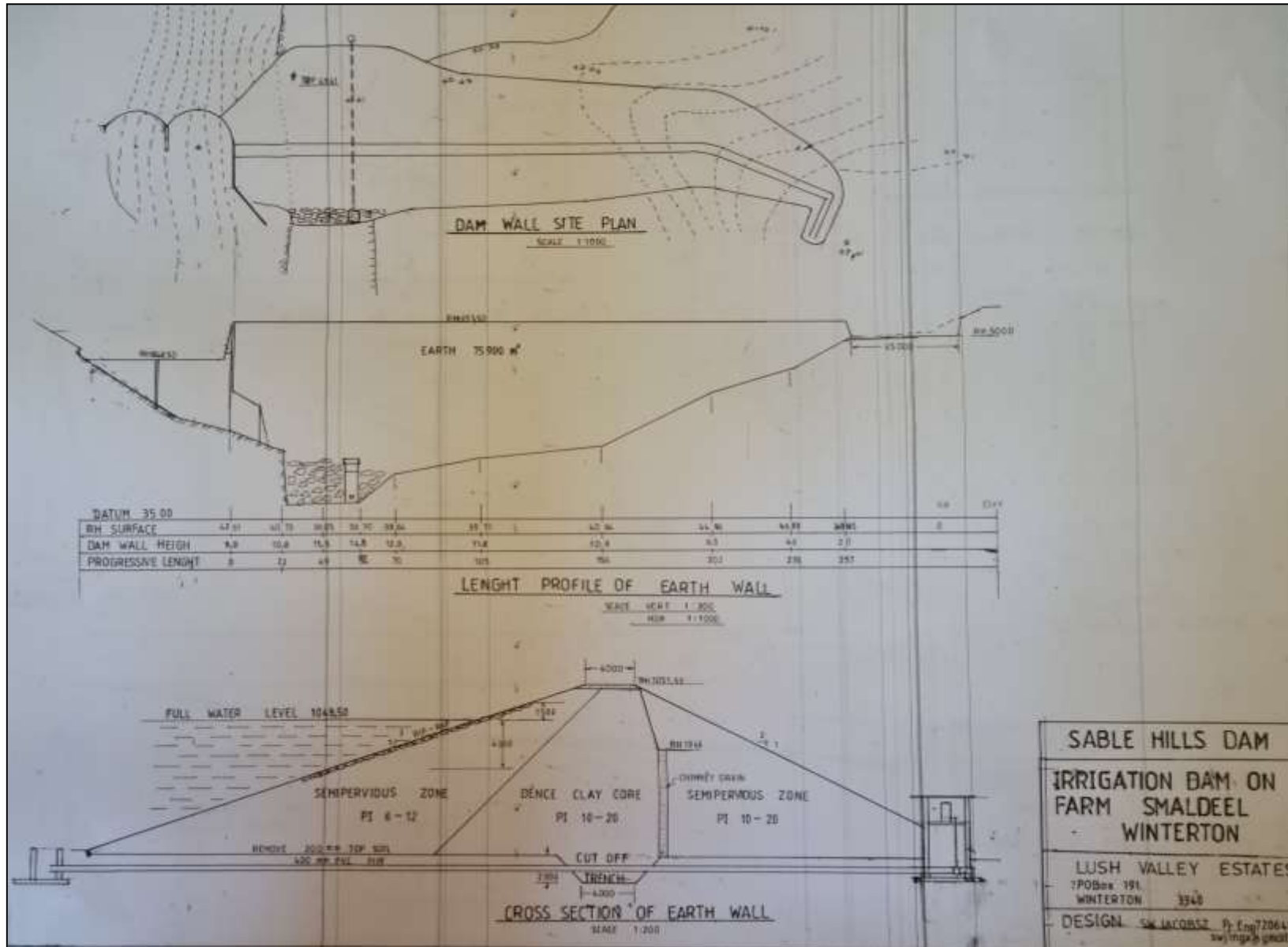


Figure 8b: Design of the proposed dam, Winterton, KwaZulu-Natal (Source: SW Jacobsz).

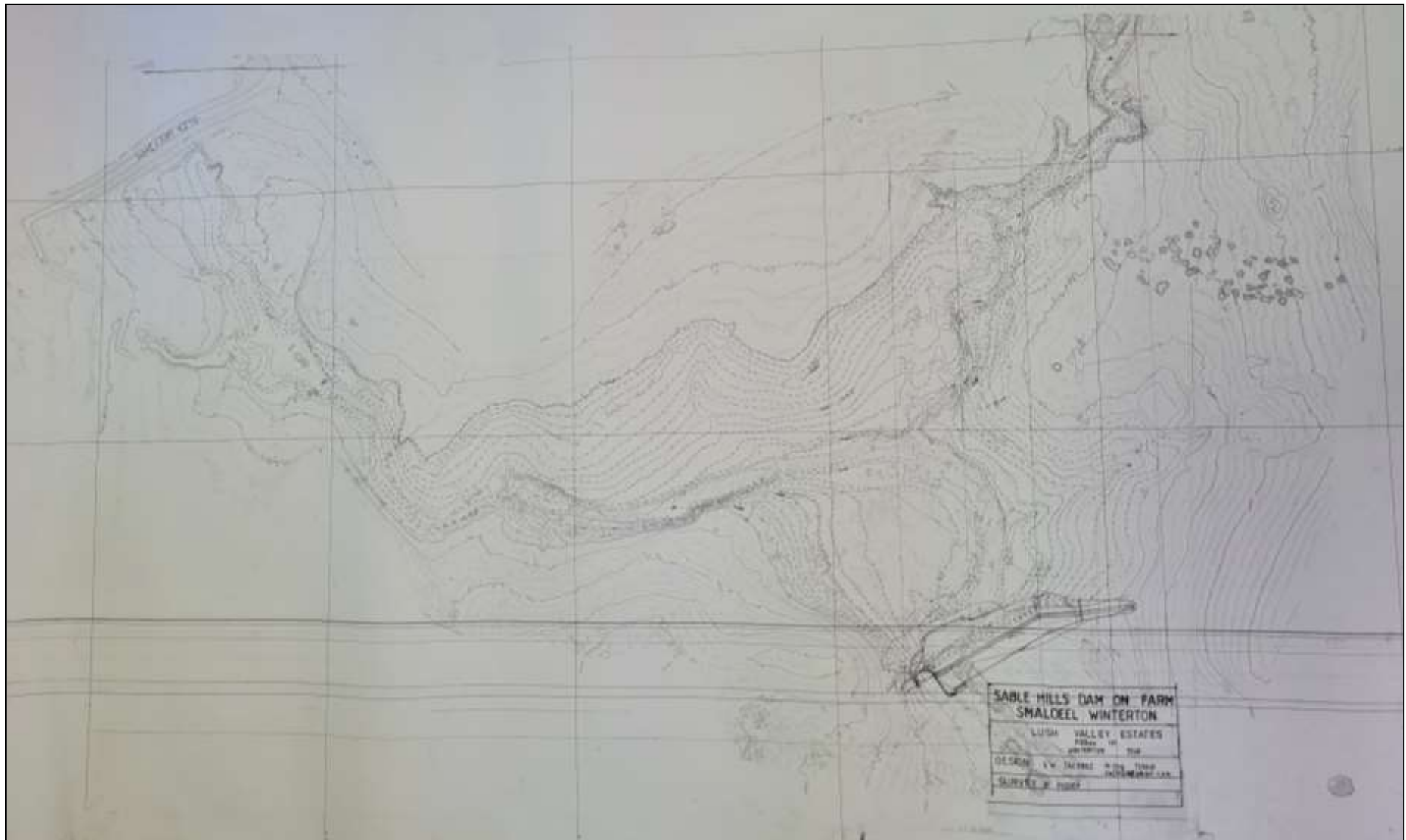


Figure 8c: Design of the proposed dam, Winterton, KwaZulu-Natal (Source: SW Jacobsz).

5.3 MOTIVATION

Lush Valley Farm and Prairie Farm are commercial agricultural operations comprising maize, potatoes, wheat, soya beans, peas and butternut which is planted on a rotational basis, as well as beef cattle. Water from the dam is proposed to be pumped via the associated pipelines to surrounding lands on both farms for irrigation purposes. On Lush Valley Farm, the 106.62 ha of land proposed to be cultivated, is to be irrigated from the proposed dam. There is an additional 106 ha of existing cultivated land that is also to be irrigated from the proposed dam. Water is to be released from the proposed dam and into the Lindequespruit River where it will be abstracted further downstream for irrigation purposes. On Prairie Farm, there is approximately 188 ha of existing cultivated land which is to be irrigated via existing pipelines from the proposed dam. These lands comprise maize, wheat, soya beans and peas which are planted on a rotational basis. A portion of the existing lands also comprise pecan nuts which will be required to be irrigated from the proposed dam. The proposed dam will thus allow for increased water storage and availability for supplementary irrigation during the summer months, and a back-up during the dry, winter months. There are currently approximately 1500 head of cattle, and with the additional cultivated land which is proposed to be irrigated, the cattle herd will be able to be expanded by approximately 500 cattle. Although there is a significant once off cost associated with the establishment of a dam, there are minimal maintenance costs. In the agricultural industry, it is becoming increasingly important for farmers to utilise economies of scale in order to remain sustainable. The job security of the labour employed on both Lush Valley Farm and Prairie Farm relies on its sustainability. To allow for livestock herds to expand and to obtain maximum crop yields, there needs to be both lands and water available. With the increased water storage, and thus availability, and additional lands, there will be sufficient capacity to irrigate lands during the dry months, and sufficient grazing and fodder for livestock. The proposed project will thus ensure the long-term sustainability of both farms, through increased yields, and crop and livestock production, as well as increased employment opportunities. This in turn will result in skills development, income generation and improved quality of life. Should the WULA for the proposed project not be approved, the lands proposed to be irrigated will be for dry land agricultural activities.

Multiple HGM units were identified within the proposed dam site; namely, four hillslope seepage wetland systems and one depression wetland system (Refer to **Appendix B**). Six riparian channels were also identified within the proposed dam site. Although the proposed dam will result in the inundation of portions of the wetland systems, this loss is considered limited based on the extent of the wetland systems. Due to the impacts being limited to a loss of 0.3 ha equivalents of wetland habitat, wetland rehabilitation measures are not required to be implemented. Under natural conditions, the proposed dam site would have been characterised by Northern KwaZulu-Natal Moist Grassland (Gs 4), which falls under the Sub-Escarpment Grassland (Gs) Group 4 bioregion. In terms of floral species, the proposed dam site is currently dominated by alien invasive vegetation; namely, *Populus candescens* and *Poplar candescens* (Refer to **Appendix I**). The impacts associated with the loss of habitat for faunal species will be minimal, and the proposed dam will in fact benefit and promote the presence of faunal species. Due to several fish species likely to occur within the Lindequespruit River, and which have a conservation status of 'vulnerable', a fishway is required to be established on the wall of the proposed dam to allow for the migration of fish species (Refer

to **Appendix J**). It is important to note that the existing Glen Gray Dam has resulted in the proposed dam site being subject to transformation which is associated with alterations to flood events, restrictions during low flow periods and changes in water flow and volumes etc., as well as alteration to the riverine and terrestrial habitats. As such and although the proposed dam is viewed as an expansion of the impacts on biodiversity arising from the existing Glen Gray Dam, the recommendations included in this Report will address such impacts.

Feedback from the Ecological Reserve Determination and Water Analysis confirmed that there is sufficient water available in the catchment for the proposed dam, as well as to sustain the EWR (Refer to **Appendix G**). Based on water uses within the quaternary catchment, the total registered surface water abstractions total 19 294 041 m³ / year, and the total registered downstream water use totals 1 299 500 m³ / year. As such, the proposed dam was calculated to have a yield of approximately 1 265 211 m³ / year with a 75 % assurance of supply, and the total releases or EWR for the proposed dam was calculated to be 3 314 687 m³ / year, which is more than enough to meet the ecological requirements from the sub-catchment. The proposed dam will result in a minimal reduction in water flows, and would be feasible to meet the normal flow and legal flow requirements, and the proposed abstractions for irrigation purposes. The water balance shows that the dam yield is sufficient to meet the demand of the areas proposed to be irrigated. As such, the impacts associated with the proposed dam on the ecological reserve and downstream water users are considered low.

Based on historical imagery, portions of the proposed cultivation sites have been used for agricultural activities prior to 1937 (Refer to **Appendix K**). Portions of the proposed cultivation sites comprise erosion gullies due to these historical agricultural activities. Although five HGM units were identified within the proposed cultivation sites and are classified as hillslope seepage wetland systems, the proposed cultivation sites have since been realigned to fall outside of the identified wetland systems and the recommended 20 m buffer. As such, should the recommendations and mitigation measures included in this Report be adhered to, the impacts of the proposed cultivation on the wetland systems are considered to be low. Portions of the low lying areas were identified to be characterised by Bonheim soils which tend to comprise a high moisture content, thus careful management of the agricultural activities and irrigation will be required. In terms of the floral species, the proposed cultivation sites comprise a graminoid environment, and thus the impacts on this habitat are likely to be minimal (Refer to **Appendix I**). It is important to note that although portions of the proposed cultivation sites fall within an 'optimal' CBA, this CBA is not 'irreplaceable' or 'environmentally sensitive'. Although *Otomys auratus* (vlei rat) and *Aonyx capensis* (Cape clawless otter), as well as *Opisthophthalmus praedo* (Tugela burrowing scorpion) are identified as 'near threatened' and 'protected' respectively, and have the potential to occur within the proposed study sites; it is unlikely that these faunal species will be impacted should the recommendations and mitigation measures included in this Report be adhered to.

Although the Heritage Specialist identified portions of the proposed cultivation sites to comprise stone walled Later Iron Age sites which are considered to have a high local significance and must therefore be

retained as heritage sites; the proposed cultivation sites have since been realigned to fall outside of the identified heritage sites and the recommended 20 m buffer (Refer to **Appendix L**).

Although the WUL will specify monthly release volumes, the proposed dam will be beneficial for downstream water users during times of drought, as additional water will be able to be released. The loss of wetland habitat associated with the proposed dam is considered to be low, and thus wetland rehabilitation measures are not required to be implemented. Faunal, floral and aquatic communities will thus benefit as a result of the presence of additional open water and wetland habitat. The implementation of the recommendations and mitigation measures will allow for the surrounding wetland systems and floral species to be maintained and monitored, which will have significant benefits, as well as providing habitat and foraging for faunal species.

5.3.1 Description of Services

On Lush Valley Farm, the 106.62 ha of land proposed to be cultivated to crops and pastures, comprising kikuyu and other grass mixtures, and to be irrigated from the proposed dam. There is an additional 106 ha of existing cultivated land that is also to be irrigated from the proposed dam. Water is to be released from the proposed dam and into the Lindequespruit River where it will be abstracted further downstream for irrigation purposes. On Prairie Farm, there is approximately 188 ha of existing cultivated land which is to be irrigated from the proposed dam. Should the WULA for the proposed project not be approved, the proposed cultivation sites will be for dry land agricultural activities.

Electricity

The proposed project may require electrical supply during the construction phase, however; this can be supplied via portable generators for the duration of the construction phase or as and when required. During the operational phase, the water from the proposed dam is proposed to be pumped via pipelines to surrounding lands, and into the Lindequespruit River, for abstraction further downstream for irrigation purposes. Water may also be pumped to replenish existing dams on the farms when required. The pump house on Lush Valley Farm is proposed to be established at GPS coordinates 28°49'6.63" S and 29°28'8.97" E.

Water

Potable water, for use during the construction phase of the proposed project, will be sourced from the Lindequespruit River.

Sewage

It is proposed that portable toilets will be provided by the contractor responsible for the proposed project. These portable toilets will be utilised for the disposal of domestic sewage generated by the construction labour, which will comprise approximately 60 labour.

Waste and Domestic Refuse

It is proposed that any waste or domestic refuse generated by the construction labour during the construction phase will be collected and stored onsite in an appropriate manner, prior to disposal at a registered landfill site. The proposed project will not generate any domestic refuse during the operational phase, other than fertiliser bags and pesticide containers. Solid and hazardous waste, such as concrete waste generated during the construction phase will be handled in a similar manner, collected and stored appropriately onsite and then disposed of at an appropriate hazardous waste landfill site.

Traffic and Access

The proposed dam site is located on Portion 1 of Meersig No. 15550, and Portion 1, Portion 4 and Rem of Smaldeel No. 1390, at GPS coordinates 28°48'31.80" S and 29°28'42.60" E. The dam will fall on Lush Valley Farm which is located on the northern banks of the Lindequespruit River, and on Prairie Farm which is located on the southern banks of the Lindequespruit River. The cultivation of 106.62 ha of land is proposed to take place on Lush Valley Farm which is located on the northern banks of the Lindequespruit River.

To access the proposed dam and cultivation sites, from Pietermaritzburg travel on the N3 towards Johannesburg. Turn left at the Bergville / Colenso off ramp and continue straight on the R74 Road through Winterton. Approximately 4 km outside Winterton on the R74 Road, turn left into Doveton Farm. Continue straight to the Doveton Farm office, and the farmer will provide directions to the proposed dam and cultivation sites, since they can only be accessed along farm roads.

Traffic volumes are not expected to increase directly as a result of the proposed project, nor are the type of vehicles utilising the roads anticipated to change. During the construction phase, there will be construction vehicles and equipment onsite, but this machinery will continue to remain onsite until project completion and will therefore not impact on traffic or access routes. Crops being sold to customers has the potential to result in the minimal increase in traffic volumes during the operational phase. Thus, no significant traffic related impacts are anticipated during the construction phase and operational phase of the proposed project.

6 ALTERNATIVES

The EIA Regulations require an identification and investigation of alternatives. These could include alternative layouts, activities, locations, infrastructure, land uses as well as the 'do-nothing' alternative. For the purposes of the Scoping Phase, several alternatives were identified. These alternatives and their feasibilities have been evaluated in the EIA Phase and reported on in this Report.

The following different types of alternatives have been identified for the proposed project:

- Do-nothing – the assessment of environmental and socio-economic impacts if the proposed project or any of its alternatives do not proceed.

- Dam size – the assessment of alternative dam wall heights and storage capacities:
 - A dam wall height of 13.95 m and a storage capacity of 1.6 million m³;
 - A dam wall height less than 13.95 m and storage capacity less than 1.6 million m³; and
 - A dam wall height of 16 m and a storage capacity of 2.3 million m³

- Dam wall location – the assessment of alternative dam wall locations on the property:
 - The preferred dam wall site located at GPS coordinates 28°48'31.80" S and 29°28'42.60" E; and
 - A dam wall site located at an alternative location on the property.

- Dam configuration – the assessment of alternative dam configurations:
 - A single dam (preferred); and
 - Two or three small dams which collectively hold the equivalent amount of water as the single dam.

- Cultivation site location and size – the assessment of alternative cultivation site locations and sizes on the property:
 - The preferred cultivation site locations and sizes; and
 - Alternative cultivation site locations and sizes.

The abovementioned types of alternatives have been assessed in detail during the EIA Phase (Refer to **Section 10**).

6.1 DO-NOTHING

The do-nothing alternative would be to continue operating Lush Valley Farm and Prairie Farm as is, and without the proposed establishment of a 1.6 million m³ dam and cultivation of 106.62 ha of land.

POSITIVE

- If the do-nothing alternative is chosen, the farms will continue to operate with the existing water supply and cultivated lands;

- As there would be no construction phase, there would be no potential for negative impacts, such as noise and dust nuisances, soil erosion and sedimentation, pollution potential and encroachment of alien invasive vegetation;
- The identified freshwater ecosystems and floral, faunal and aquatic communities will not be impacted, and instead will be conserved;
- Time, money and effort will no longer need to be put into the implementation of the recommendations and mitigation measures;
- The hydrological flow and stream flow characteristics will not be altered, thus water flow to downstream water users and the surrounding catchment, and to maintain the ecological reserve will continue at its current rate.

NEGATIVE

- If the do-nothing alternative is chosen, the farms will continue to operate with the existing water supply and cultivated lands;
- As such, it is highly unlikely that the farms will remain sustainable given the importance of farmers to utilise economies of scale;
- The job security of the labour employed on the farms relies on its sustainability;
- When water is scarce, and during times of desperation, water would need to be brought in with tankers, or obtained from alternative water sources for the irrigation of existing cultivated lands;
- Thus, this will have an impact on the crop yield and livestock production, and in turn will have an impact on the sustainability of the farms and thus the job security of the labour;
- The areas which would have benefited from the implementation of the recommendations and the mitigation measures will not benefit;
- There will minimal water storage for use in times of drought, which would reduce the resilience of the farming operations, and which would have both social and economic impacts during and post times of drought; and
- This will negatively impact on the skills development, income generation and quality of life of the labour. It also has the potential to have long-term impacts on the area, the local municipality as well as the local economy.

6.2 DAM SIZE

The currently preferred dam design has a storage capacity of 1.6 million m³ and occupies an area of approximately 34 ha. The proposed dam has a wall height of 13.95 m, a wall length of 311.83 m and a water depth of 13.33 m.

The dam design specifications were based on the following:

- The volume of water required for the irrigation of the proposed cultivation sites;
- The volume of water required to meet the EWR;
- The volume of water required to increase the sustainability of the farms; and
- The need to avoid high impacts on freshwater ecosystems and biodiversity.

Thus, given the abovementioned information, the proposed 1.6 million m³ dam is adequate to ensure the irrigation of the proposed cultivation sites and existing cultivated land, as well as to ensure the sustainability of the farm. The proposed dam will result in the loss of 0.3 ha of wetland habitat equivalents, and as such, wetland rehabilitation measures are not required to be implemented. The impacts of the proposed dam on floral species and faunal species is considered negligible. Although the proposed dam is viewed as an expansion of the impacts on biodiversity arising from the existing Glen Gray Dam, the recommendations included in this Report will address such impacts.

By establishing a dam with a wall height less than 13.95 m and a storage capacity less than 1.6 million m³, will result in a smaller volume of water being stored. Although a smaller dam would have the potential to conserve surrounding freshwater ecosystems and biodiversity, a dam of this storage capacity would not be sufficient to meet the irrigation demand of both farms. In the long-term, a dam of this storage capacity has the potential to result in more negative impacts than benefits. It has the potential to impact on the long-term sustainability of the farms, and thus the job security of the labour.

During the Scoping Phase, a dam with a wall height of 16 m and a storage capacity of 2.3 million m³ was proposed (Refer to **Figure 9** – light blue outline). Although a dam of this size will result in a larger volume of water being stored and would thus be able to meet the irrigation demand along with other water demands on both farms, it resulted in the inundation of large portions of freshwater ecosystems as well as biodiversity. A dam of this size would have also had negative impacts on the wall of the existing Glen Gray Dam. In the long-term, a dam of this size would have had the potential to result in additional costs in terms of dam maintenance. There would have also been the need for the implementation of wetland and biodiversity rehabilitation measures, which would have resulted in significant costs, time and effort required to put in conserving this habitat. A dam of this size would have also had a profound impact on hydrological flow and stream flow characteristics, thus water flow to downstream water users and to sustain the EWR would have been severely compromised.

POSITIVE

- The currently preferred dam specifications optimise the ratio of the dam wall height and length to volume, and thus allows for maximum storage capacity with relatively lower construction costs;
- The proposed dam will have minimal impacts on the surrounding freshwater ecosystems and biodiversity;
- The dam size is adequate for the operation and sustainability of the farms, and irrigation of the proposed cultivation sites and the existing cultivated land;
- It will result in the long-term sustainability through increased yields, and crop and livestock production, as well as increased employment opportunities for both farms. This in turn will result in the generation of skills development, income generation, improved quality of life and benefits to the local economy;
- It will result in the generation of wetland systems, thus faunal, floral and aquatic communities will benefit as a result of an additional body of water as well as wetland habitat;

- The implementation of the recommendations and mitigation measures will allow for the surrounding freshwater ecosystems and biodiversity to be maintained and monitored;
- Feedback from the Ecological Reserve Determination and Water Analysis confirmed that there is sufficient water available in the catchment for the proposed dam, as well as to sustain the EWR (Refer to **Appendix G**);
- The proposed dam will result in a minimal reduction in water flows, and would be feasible to meet the normal flow and legal flow requirements, and the irrigation demand of the farms; and
- As such, the impacts associated with the proposed dam on the ecological reserve and downstream water users are considered low.

NEGATIVE

- The size of the proposed dam will result in the loss of 0.3 ha of wetland habitat equivalents; and
- Although the proposed dam is viewed as an expansion of the impacts on biodiversity arising from the existing Glen Gray Dam, the recommendations included in this Report will address such impacts.



Figure 9: Map showing alternative dam sizes and dam wall sites, Winterton, KwaZulu-Natal (Source: Google Earth).

6.3 DAM WALL LOCATION

The proposed dam site is located on Portion 1 of Meersig No. 15550, and Rem, Portion 1 and Portion 4 of Smaldeel No. 1390, at GPS coordinates 28°48'31.80" S and 29°28'42.60" E, and along the Lindequespruit River. Dam wall location – the assessment of alternative dam wall locations on the property:

The dam wall site was based on the following:

- The natural topography of the area;
- The extent of the catchment and availability of water within the Lindequespruit River;
- The limited impacts on downstream water users and hydrological flow; and
- The minimal impacts on freshwater ecosystems and biodiversity.

Thus, given the abovementioned information, the proposed dam wall site is adequate. The natural topography of the area allows the dam to be established in a relatively easy manner, with minimal construction costs, and impacts on the surrounding freshwater ecosystems and biodiversity. The proposed dam site minimises the loss of freshwater ecosystems and biodiversity. Although the proposed dam is viewed as an expansion of the impacts on biodiversity arising from the existing Glen Gray Dam, the recommendations included in this Report will address such impacts.

Feedback from the Ecological Reserve Determination and Water Analysis has confirmed that there is sufficient water available in the catchment for the proposed dam, as well as to sustain the EWR (Refer to **Appendix G**). The proposed dam will result in a minimal reduction in water flows, and would be feasible to meet the normal flow and legal flow requirements, as well as the irrigation demand of the farms. As such, the impacts associated with the proposed dam on the EWR and downstream water users are considered low.

As such, the dam wall sites were assessed (Refer to **Figure 9**). The alternative dam size and associated dam wall site would have either resulted in significant impacts to freshwater ecosystems and biodiversity, or would have provided inadequate water storage for the irrigation demand of Lush Valley Farm and Prairie Farm.

POSITIVE

- The natural topography maximises the dam size. As such, it will result in relatively lower construction costs;
- The proposed dam minimises the impacts on surrounding freshwater ecosystems and biodiversity;
- There is sufficient water available within the Lindequespruit River and at the proposed dam wall site; and
- There are limited impacts on downstream water users and hydrological flow.

NEGATIVE

- The location of the wall of the proposed dam will result in the loss of 0.3 ha of wetland habitat equivalents; and
- Although the proposed dam is viewed as an expansion of the impacts on biodiversity arising from the existing Glen Gray Dam, the recommendations included in this Report will address such impacts.

6.4 DAM CONFIGURATION

The currently preferred dam configuration comprises a single dam with a storage capacity of 1.6 million m³ and occupies an area of approximately 34 ha. The proposed dam has a wall height of 13.95 m, a wall length of 311.83 m and a water depth of 13.33 m.

The dam configuration was based on the following:

- The natural topography of the area;
- The extent of the catchment and availability of water within the Lindequespruit River;
- The limited impacts on downstream water users and hydrological flow; and
- The minimal impacts on freshwater ecosystems and biodiversity.

Thus, given the abovementioned information, the proposed dam configuration is adequate. The natural topography of the area allows for a single dam to be established in a relatively easy manner, with minimal construction costs, and impacts on the surrounding freshwater ecosystems and biodiversity. Although the proposed dam is viewed as an expansion of the impacts on biodiversity arising from the existing Glen Gray Dam, the recommendations included in this Report will address such impacts.

The establishment of multiple (two or three) smaller dams which collectively hold the equivalent amount of water as the single dam, has the potential to result in increased sedimentation, and thus the potential to impact on a dam's storage capacity and ability to store water. The volume of silt discharged into a dam is the same whether it be a single or multiple dams. As a result, the percentage of storage capacity reduced in two or three smaller dams would be much greater in comparison to a single dam. Multiple smaller dams are thus ineffective as long-term storage solutions as they often act as sumps capturing sediment and losing storage capacity.

POSITIVE

- The establishment of a single dam in comparison to multiple smaller dams of the equivalent storage capacity allows for a shorter construction phase and relatively lower construction costs. As such, it allows the disturbed areas to be rehabilitated and revegetated as soon as possible;
- A single dam has the potential to result in less impacts to surrounding freshwater ecosystems and biodiversity;
- The need for the implementation of recommendations and mitigation measures for a single dam are far less and easier to implement in comparison to multiple dams;
- The earth fill storage ratio is a measurement of cost feasibility. Earth fill required for the embankment and spillway of a single dam will thus be less costly; and
- Water loss in dams is related to evaporation from wind and the sun, and from heavy rainfall which results in overflow of water via the spillway. The more efficient a dam, the lower the water loss is per square metre of storage capacity. The yield of a dam is thus greater from a single dam in comparison to multiple smaller dams. A single dam is thus more beneficial from a water conservation point of view.

NEGATIVE

Potential for less 'edge' and thus less suitable habitat for faunal, floral and aquatic communities.

6.5 CULTIVATION SITE LOCATION AND SIZE

The cultivation of 106.62 ha of land is proposed to take place on Lush Valley Farm which is located on the northern banks of the Lindequespruit River (Refer to **Figure 10**). This will involve the installation of centre pivot irrigation systems and associated pipelines. The Applicant is proposing to plant these lands for foliage and grazing, which will consist of pastures comprising kikuyu and other grass mixtures. Water from the dam is proposed to be pumped via pipelines that will run from the dam to the pivot lands. The proposed pipelines will have a total length of approximately 7 km and a diameter of 20 mm to 25 mm.

The cultivation is proposed to take place on the following properties:

- 22.87 ha pivot located on Portion 4 of Smaldeel No. 1390 at GPS coordinates 28°48'41.79" S and 29°28'11.36" E;
- 23.49 ha pivot located on Portion 3 of Smaldeel No. 1390, and Portion 10 of Lindeques Laager No. 1039, at GPS coordinates 28°49'10.34" S and 29°27'37.32" E;
- 8.06 ha pivot located on Portion 2, Portion 3 and Portion 10 of Lindeques Laager No. 1039, at GPS coordinates 28°49'8.15" S and 29°27'12.05" E;
- 10.17 ha pivot located on Portion 2, Portion 3 and Portion 10 of Lindeques Laager No. 1039, at GPS coordinates 28°49'18.36" S and 29°27'7.44" E;
- 12.22 ha pivot located on Portion 2 and Portion 10 of Lindeques Laager No. 1039, at GPS coordinates 28°49'26.88" S and 29°27'16.82" E;
- 9.80 ha pivot located on Portion 3 of Lindeques Laager No. 1039, at GPS coordinates 28°49'15.44" S and 29°26'46.80" E; and
- 20.01 ha pivot located on Portion 2, Portion 3 and Portion 10 of Lindeques Laager No. 1039, at GPS coordinates 28°49'31.91" S and 29°26'57.60" E.

During the Scoping Phase, 102 ha of land was proposed to be cultivated and this consisted of five centre pivot irrigation systems (Refer to **Figure 10** – red outline). Based on feedback from the Specialist Studies, the cultivation sites have since been realigned outside of the identified freshwater ecosystems and heritage sites, and a total of 106.62 ha is now proposed to be cultivated, which consists of seven centre pivot irrigation systems.

The proposed cultivation sites location and size was based on the following:

- Proximity to the proposed dam to minimise the length of the pipelines;
- The need to maximise the size of the proposed cultivation sites based on the surrounding non-sensitive area and topography;
- The need to maximise the size of the proposed cultivation sites based on the yield of the proposed dam;
- The need to minimise potential impacts on freshwater ecosystems and biodiversity;

- The need to be located outside of the identified erosion gullies;
- The need to be located outside of the wetland systems and associated 20 m buffers; and
- The need to be located outside of the heritage sites and associated 20 m buffers.

Thus, given the abovementioned information, the proposed cultivation sites location and size is adequate.

POSITIVE

- The proposed cultivation sites are located on Lush Valley Farm which is owned by the Applicant;
- They respect the wetland systems and associated 20 m buffer;
- They are located outside of the identified erosion gullies;
- They respect the heritage sites and associated 20 m buffer;
- The proposed cultivation site locations have resulted in their size being maximised;
- They are located in close proximity to the proposed dam which reduces costs associated with installation of pipelines;
- Potential impacts on surrounding freshwater ecosystems and biodiversity has been minimised; and
- Majority of these which will thus result in the preservation of any faunal, floral and aquatic communities; and
- Majority of the proposed cultivation sites have been historically cultivated.

NEGATIVE

Careful management of agricultural activities and irrigation will be required in the areas characterised by Bonheim soils.

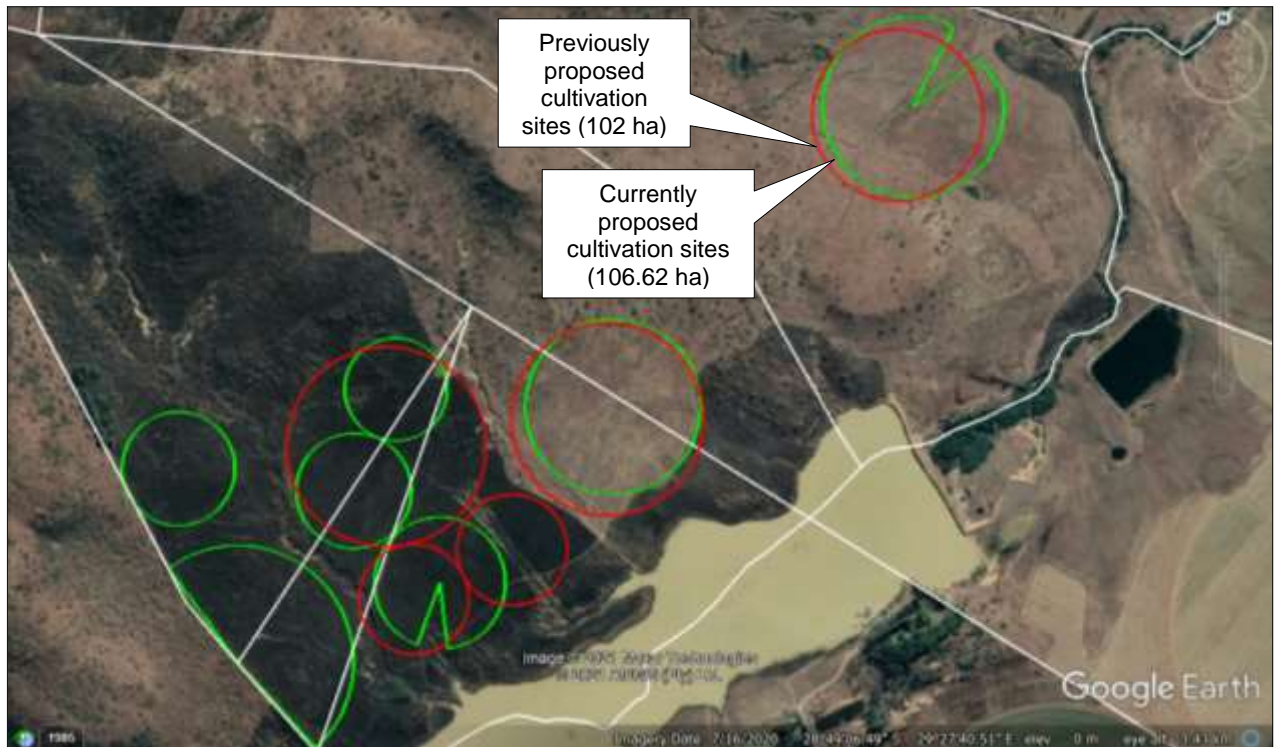


Figure 10: Map showing the proposed cultivation sites location and size, Winterton, KwaZulu-Natal (Source: Google Earth).

7 PUBLIC PARTICIPATION PROCESS

A Public Participation Process was undertaken according to Regulation 39 to 44 of the EIA Regulations as promulgated under Section 24 of the NEMA.

7.1 APPLICATION FOR SCOPING AND EIA PROCESS

The official Application Form, provided by the DEDTEA, was completed with all the necessary details, including contact details of and signed declarations by the Applicant and EAP. It also includes a description of the proposed project, property location and applicable Listed Activities. This was submitted to the DEDTEA on 07 January 2020, and acknowledgement was received on 11 January 2021. A copy of the Application Form has been included in **Appendix C**.

A Pre-application meeting was held at the proposed dam site on 30 November 2020 with the DEDTEA (Refer to **Appendix D** for the Pre-application meeting agenda, attendance register and minutes).

7.2 NOTIFICATION OF THE PROPOSED PROJECT DURING THE SCOPING PHASE

A Public Participation Process, as described in Regulation 39 to 44 of the EIA Regulations was undertaken. This included:

- Newspaper adverts were published in the English and Zulu in the Ladysmith Gazette on 06 March 2020 to notify I&APs of the proposed project (Refer to **Appendix E2**);
- Site posters in English and Zulu were placed on the access routes to the farms on 10 March 2020 (Refer to **Appendix E3**);
- A Background Information Document (BID) was circulated by fax, email post, or hand delivered from 02 March 2020 (Refer to **Appendix E4**);
- A list of I&APs was compiled, and is continually updated (Refer to **Appendix E5**);
- Hard copies of all comments received following circulation of the newspaper adverts, site posters and BID are included in **Appendix E6**;
- A Scoping Phase Public Information Session was held at the Lush Valley offices on 11 August 2020 (Refer to **Appendix E7** for the Public Information Session notification, attendance register, handout, minutes and photographs);
- Hard copies of all comments received following circulation of the Draft Scoping Report are included in **Appendix E8**;
- Hard copies of all comments received following circulation of the Final Scoping Report are included in **Appendix E9**; and
- The Scoping Phase acceptance is included in **Appendix E1**.

7.3 INTERESTED AND AFFECTED PARTIES

A register of I&APs was compiled at the outset of the proposed project. This includes names and contact details of authorities, Government / Municipal Departments, NGOs, local interest groups, and surrounding

neighbours and landowners (Refer to **Appendix E5**). The list of I&APs is continually updated.

7.4 BACKGROUND INFORMATION DOCUMENT

Written notification in the form of a BID was circulated from 14 August 2020 by email, post, fax or hand delivered to relevant authorities, and surrounding neighbours and landowners (Refer to **Appendix E4**).

Comments received following circulation of the newspaper adverts, site posters and BID are included in **Table 2** (Refer to **Appendix E6**). Additional information has also been provided where it has become available.

Please note that the proposed cultivation of land only came about during the Scoping Phase. As such, during the initial Public Participation Process, only mention was made of the proposed dam.

Table 2: Comments received following circulation of the newspaper adverts, site posters and BID.

I&AP	COMMENT	RESPONSE
Michelle Nicol Eskom 02 March 2020	<ul style="list-style-type: none"> • Portion 1 of Meersig has a 11 kV line running across it. • Portion 1 and 4 of Smaldeel No. 1390 seems clear of lines where I assume they want to place the dam. 	<ul style="list-style-type: none"> • Noted. This has been taken into consideration. • The EAP and Engineer are familiar with the Eskom power lines in the vicinity of the proposed study sites.
Nandipha Sontangane Department of Agriculture, Forestry and Fisheries 04 March 2020	<ul style="list-style-type: none"> • The Department of Agriculture, Forestry and Fisheries (DAFF) appreciated the opportunity to register as an interested and affected party for the abovementioned project. • DAFF through the sub-directorate Forestry Regulations and Support is the authority mandated to implement the National Forest Act (NFA, Act No. 84 of 1998) by regulating the use of natural forests and protected tree species in terms of the said Act. • With reference to the BID received on 02 March 2020, the project proposes to establish a 2.3 million m³ dam located in Winterton within the uThukela District Municipality, KwaZulu-Natal. • The list of triggered activities includes 'The clearance of an area of 20 hectares or more of indigenous vegetation'. • It is brought to your attention that DAFF's concerns pertain to the potential of the proposed project impacting on existing natural forests as well as protected tree species in terms of the NFA. • The DAFF requests that a Vegetation Assessment be conducted for the proposed site and be included in the Draft Basic Assessment Report. • This assessment should include the type and condition of the vegetation species found within the site as well as the extent of which they will be impacted upon. • Furthermore, DAFF requests that the study addresses the potential impacts of the proposed activities on natural forests as well as protected tree species occurring within or in close proximity to the proposed project site. • Further comments will be issued upon receipt and review of the EIA document inclusive of the Vegetation Assessment. • Should any further information be required, please do not hesitate to contact this office. • This letter does not exempt you from considering other legislations. 	<ul style="list-style-type: none"> • Noted. • This has been noted. Thank you. <p>Please note that the Applicant is now proposing the establishment of a 1.6 million m³ dam.</p> <ul style="list-style-type: none"> • This is correct. The proposed project will require the clearance of more than 20 ha of indigenous vegetation. • A Biodiversity Assessment has been compiled for the proposed project (Refer to Appendix I). There are no natural forests or protected tree species within the proposed study sites. • See above response. • Refer to Appendix I for the Biodiversity Assessment. • See above response. • Noted. A hard copy of the Draft EIA Report has been couriered to your offices. • Thank you. • The EAP is aware of this.
Dan Ramalingum	<ul style="list-style-type: none"> • I have no objection to the proposed development, subject to the 	<ul style="list-style-type: none"> • The following comments have been taken into

<p>uThukela District Municipality 06 March 2020</p>	<p>following:</p> <ul style="list-style-type: none"> • The liberation of dust into the surrounding environment must be effectively controlled. • Noise disturbance must be kept to a minimum. • Chemical toilet facilities or other approved toilet facilities must be provided. • All refuse pending removal must be stored in a container and must be disposed of at a recognised disposal facility. • Potable water must be provided. • Measures must be taken to prevent the pollution of ground and surface water. • No environmental degradation must take place. 	<p>consideration.</p> <ul style="list-style-type: none"> • Mitigation measures surrounding dust related nuisances have been included in the EMPr which forms part of this Report (Refer to Appendix P). • Mitigation measures surrounding noise related nuisances have been included in the EMPr which forms part of this Report (Refer to Appendix P). • Portable toilets will be provided by the contractor who is responsible for the establishment of the proposed dam. These portable toilets will be utilised for the disposal of domestic sewage generated by the construction labour. Refer to Section 5.1.3 for a description of services. • Mitigation measures surrounding the management of waste has been included in the EMPr which the Applicant will be required to adhere to (Refer to Appendix P). • Potable water for use during the construction phase of the proposed project will be sourced from an existing supply on either Lush Valley Farm or Prairie Farm. This potable water will be abstracted from an existing and licensed water source. • Mitigation measures surrounding the management of water resources has been included in the EMPr which forms part of this Report (Refer to Appendix P). • Noted. The Applicant will be required to adhere to all the recommendations included in this Report and the conditions of the Environmental Authorisation. Monitoring by an Environmental Control Officer (ECO) will also be required to be undertaken to ensure that no environmental non-compliances take place during the construction phase of the proposed project.
<p>Lauron Jelliman I&AP 07 March 2020</p>	<ul style="list-style-type: none"> • I am sorry my correspondence is so last minute. • This Corona story has our lives upside down at the moment. • L & S Farm Trust are waiting on advice from Dr Roy Mottram as to the terms that a private dam only benefiting two farmers can be built across a river course (Lush Valley Estates Sable Hills dam). 	<ul style="list-style-type: none"> • I&APs are allowed to provide comments throughout the Scoping and EIA Process. • No problem. Thank you for your comment. • This has been noted. Comment from Roy Mottram was received and has been included in Table 1 and 3 of this Report.

	<ul style="list-style-type: none"> • We are towards the bottom end of the river and are worried that there will be no summer water reaching us if the dam is built. • In principal, we are not against the building of a dam as stored water is crucial. • We would like something in place to ensure that a portion of river flow will be allowed past. • In times of excess, the rains are not as abundant in the early season as before and if all the water is trapped this will negatively affect L & S Farm Trust and the Coloured community below us. 	<ul style="list-style-type: none"> • As part of the conditions of the WUL, the Applicant will be required to release a specific volume of water from the proposed dam on a monthly basis. An Ecological Reserve Determination and Water Yield Analysis has been compiled for the proposed project (Refer to Appendix G). The total overflow from the proposed dam was calculated to be 28 470 240 m³ / year which is sufficient to meet the needs of downstream water users (i.e. 1 299 500 m³ / year), as well as the EWR (i.e. 3 314 687 m³ / year) from the proposed dam. • The EAP agrees with this comment. • As part of the conditions of the WUL, the Applicant will be required to compile some sort of water agreement which will ensure that the required volume of water is released from the proposed dam for downstream water users. • See above response.
<p>Samantha Naicker Eskom 18 March 2020</p>	<ul style="list-style-type: none"> • With reference to your application and accompanying plans dated 02 March 2020, we confirm that an investigation has been carried out with regard to the supply of electricity, as well as any encroachment into Eskom's Servitudes, in respect to the application as set out above. • Winterton Network Breaker 2 11-kV Overhead Power Lines are the only Eskom assets showing to exist on our system. • The Power Lines are depicted on the attached diagram i.e. ER_INV_73/2020. • The following Eskom regulations shall apply: Building Restrictions for a 11-kV Overhead Power Lines. No building or structures may be erected or installed above or below the surface of the ground, neither may any material which might endanger the safety of this power line be place within 12 (twelve) metres from the centre line of this power line, on either side (overall servitude width 24 metres), without prior written confirmation from Eskom. The Applicant will adhere to all relevant environmental legislation. Any cost incurred by Eskom as a result of non-compliance will be 	<ul style="list-style-type: none"> • The following comments have been taken into consideration. • The EAP and Engineer are familiar with the Eskom power lines in the vicinity of the proposed study sites. • Thank you. • The following comments have been included as a recommendation of this Report.

	<p>charged to the Applicant.</p> <p>Dimensions and specifics will be in accordance to Eskom's standards so as to not obstruct Eskom's existing infrastructure in any way.</p> <p>Eskom shall not be liable for the death of or injury to any person or for the loss of or damage to any property whether as a result of the encroachment or of the use of the servitude area by the Applicant, his / her agent, contractors, employees, successors in title, and assigns.</p> <p>The Applicant indemnifies Eskom against loss, claims or damages including claims pertaining to consequential damages by third parties and whether as a result of damage to or interruption of or interference with Eskom's services or apparatus or otherwise.</p> <p>Eskom will not be held responsible for damage to the Applicant's equipment.</p> <p>The Applicant's attention is drawn to the Electricity Act (Act No. 41 of 1987, as amended in 1994), Section 27(3), which stipulates that the Applicant can be fined and / or imprisoned as a result of damage to Eskom's apparatus.</p> <p>No mechanical equipment, mechanical excavators or high lifting machinery, shall be used in the vicinity of Eskom's apparatus and / or services, without prior written permission having been granted by Eskom.</p> <p>If such permission is granted the Applicant must give at least seven working days prior notice of the commencement of work.</p> <p>This allows time for arrangements to be made for supervision and / or precautionary instructions to be issued.</p> <p>The clearances between Eskom's live electrical equipment and the proposed construction work shall be observed as stipulated by Regulation 15 of the Electrical Machinery Regulations of the Occupational Health and Safety Act No. 85 of 1993.</p> <p>Equipment shall be regarded electrically live and therefore dangerous at all times.</p> <p>Any third party servitudes encroaching on Eskom land shall be registered against Eskom's Notaries deed at the Applicant's own cost.</p> <p>If such a servitude is brought into being, its existence should be endorsed on the Eskom servitude deed concerned, while the third party's servitude deed must also include the rights of the affected Eskom servitude.</p> <p>A developer taking a new supply from Eskom, an increase of supply or line deviation is required to make an application to Eskom via the Eskom toll free number 0860037566.</p>	
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	<ul style="list-style-type: none"> • This application will be processed in terms of Eskom’s standard customer connection tariffs, conditions and policies at the developers cost. • Customers requiring Substation or Powerlines to be installed for their purpose / supply their development must grant all servitudes (a piece of ground on the property to be developed) to Eskom at no cost. Prior any construction activity, the Applicant is required to contact Eskom and detailed Surveyed Plans are to be submitted to this office. This letter outlines the Eskom (Distribution) building restrictions and is by no means an approval for construction works. 	<ul style="list-style-type: none"> • Noted. A hard copy of the Draft EIA Report has been couriered to your offices. • Thank you for these comments. We have communicated this with the Applicant.
<p>Roy Mottram I&AP 08 April 2020</p>	<ul style="list-style-type: none"> • Please register me as an interested person for this proposed dam. • You may already know that this dam falls within the Lindequespruit Irrigation Board that presumably has a constitution and bye-laws. 	<ul style="list-style-type: none"> • This has been done. • The EAP is aware of this. The Applicant is a member of the Lindequespruit Irrigation Board.

7.5 PRE-APPLICATION MEETING

A Pre-application meeting was held at the proposed dam site on 30 November 2020. The Pre-application meeting agenda, attendance register and minutes are included in **Appendix D**.

Comments received during the Pre-application meeting are summarised and responded to in **Table 3**. Additional information has also been provided where it has become available.

Table 3: Comments received during the Pre-application meeting.

COMMENT (DEDTEA)	RESPONSE (EAP)
<ul style="list-style-type: none"> What type of dam is proposed to be constructed? 	<ul style="list-style-type: none"> The proposed dam will be constructed on the Lindequespruit River (i.e. an instream dam). It will have a clay core and a concreted spillway. The proposed dam site has the same soils and geology as the existing Glen Gray Dam, thus their designs will be similar. Refer to Section 5.2 of this Report and Appendix F.
<ul style="list-style-type: none"> What is the Situlwane River? 	<ul style="list-style-type: none"> The Situlwane River is the same river as the Lindequespruit River.
<ul style="list-style-type: none"> How much water does the Lindeque Dam / Glen Gray Dam hold? 	<ul style="list-style-type: none"> Approximately 4.5 million m³ of water.
<ul style="list-style-type: none"> How many members form part of the Sable Hill Dam Educational Fund NPC? 	<ul style="list-style-type: none"> Sable Hill Dam Educational Fund NPC consists of two members (Refer to Figure 6).
<ul style="list-style-type: none"> How many members are part of the Lindequespruit Irrigation Board? 	<ul style="list-style-type: none"> There are six members who form part of the Lindequespruit Irrigation Board (Refer to Figure 6).
<ul style="list-style-type: none"> Approximately how many hectares of land is irrigated from the Glen Gray Dam.? 	<ul style="list-style-type: none"> Approximately 900 ha of land.
<ul style="list-style-type: none"> Are there any settlements downstream of the proposed dam site? 	<ul style="list-style-type: none"> No. There are settlements along a tributary which joins onto the Lindequespruit River downstream of the proposed dam site, thus the proposed dam will not have an impact on any settlements. The Lindequespruit Irrigation Board flows for approximately 9 km along the Lindequespruit River. It starts at the Glen Gray Dam and ends near to the abandoned factory which is where the last farms are of two of the Lindequespruit Irrigation Board members.
<ul style="list-style-type: none"> Where are the labour on the farms housed? 	<ul style="list-style-type: none"> Some labour are accommodated on the farm and the remaining labour come from Winterton.
<ul style="list-style-type: none"> Where do the labour get water from? 	<ul style="list-style-type: none"> The labour get water from a borehole on the farm. If this borehole is dirty, then clean water from another borehole on the farm is transported in a water tanker to the labour accommodation.
<ul style="list-style-type: none"> In terms of the Listed Notice 3 (GNR 324) activities, Part 12 will be triggered due to the clearance of indigenous vegetation. 	<ul style="list-style-type: none"> Noted. The following Listed Activity is applicable to the proposed project and has been included in this Report. GNR 324, Part 12: <i>“The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.</i> <i>d. KwaZulu-Natal...</i> <i>ii. Community Conservation Areas;</i> <i>iii. Biodiversity Stewardship Programme Biodiversity Agreement areas;</i> <i>iv. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the</i>

	<p><i>National Spatial Biodiversity Assessment 2004;</i> <i>v. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</i> <i>vi. Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuarine functional zone, whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas;</i> <i>vii. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning;</i> <i>viii. A protected area identified in terms of NEMPAA, excluding conservancies;</i> <i>ix. World Heritage Sites;</i> <i>x. Sites or areas identified in terms of an international convention;</i> <i>xi. Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose;</i> <i>xii. Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; or</i> <i>xiii. In an estuarine functional zone.”</i></p>
<ul style="list-style-type: none"> • The Public Information Session minutes must have a column stating which I&AP raised the question. 	<ul style="list-style-type: none"> • Noted. This has been done and included in Table 4 of this Report.
<ul style="list-style-type: none"> • Most of the comments raised by the surrounding neighbours includes the need for water to be released from the proposed dam for downstream users 	<ul style="list-style-type: none"> • Noted. The I&APs who attended the Public Information Session were the members of the Lindequespruit Irrigation Board. The Applicant encouraged the members to attend so that they could get a better understanding of the proposed project. All the members were given the opportunity to form part of the Applicant applying for the proposed dam, however; these members were not interested. An Ecological Reserve Determination and Water Yield Analysis has been compiled for the proposed project (Refer to Appendix G). The total overflow from the proposed dam was calculated to be 28 470 240 m³ / year which is sufficient to meet the needs of downstream water users (i.e. 1 299 500 m³ / year), as well as the EWR (i.e. 3 314 687 m³ / year) from the proposed dam.
<ul style="list-style-type: none"> • Will some of the trees need to be removed to allow for the proposed pivot lands? 	<ul style="list-style-type: none"> • Yes. However, please note that the proposed dam comprises alien invasive vegetation and the grassland habitat within the proposed cultivation sites is not of conservation concern. Refer to Appendix I for the Biodiversity Assessment.
<ul style="list-style-type: none"> • All labour residing on the farms must be included as Interested and 	<ul style="list-style-type: none"> • All labour have been informed of the proposed project. The proposed

<p>Affected Parties (I&APs) and form part of the Public Participation Process.</p>	<p>project will benefit the labour and their families.</p>
<ul style="list-style-type: none"> • The I&AP map must be updated to show all surrounding neighbours and members of the Lindequespruit Irrigation Board. This map must also include the member's information. 	<ul style="list-style-type: none"> • Refer to Figure 6 of this Report.
<ul style="list-style-type: none"> • Should the need arise for additional Specialist Studies to be conducted, these Specialists must be appointed and their information included in the EIA Report. 	<ul style="list-style-type: none"> • The EAP is aware of this.

7.6 SCOPING PHASE PUBLIC INFORMATION SESSION

A Scoping Phase Public Information Session was held at the Lush Valley offices on 11 August 2020. The purpose of the Public Information Session was to provide information to I&APs of the proposed project, present the major issues raised to date regarding the proposed project and give I&APs the opportunity to raise any additional issues which they feel must be addressed during the Environmental Authorisation Process. All I&APs were personally invited by fax, e-mail, phone or post from 27 July 2020.

The Public Information Session took place in the form of a presentation (handout format) where all available information on the proposed project and Environmental Authorisation Process to be followed was provided in handout format. The meeting attendees were given the opportunity to raise questions and provide comments to the EAP once the presentation of the handout was complete.

The following project team member was present:

- Kerryn Arbuthnot – Green Door Environmental (EAP).

The Public Information Session notification, attendance register, handout, minutes and a photograph is included in **Appendix E7**.

Comments received before, during and after the Public Information Session are summarised and responded to in **Table 4**. Additional information has also been provided where it has become available.

Table 4: Comments received before, during and after the Scoping Phase Public Information Session.

I&AP	COMMENT	RESPONSE
Henry Honiball	<ul style="list-style-type: none"> I won't be attending the Public Information Session and have no objections. 	<ul style="list-style-type: none"> Noted.
Cobus Honiball	<ul style="list-style-type: none"> My concern regards the regulation of the overflow and release of water to downstream users. We have irrigation rights. 	<ul style="list-style-type: none"> As part of the conditions of the WUL, the Applicant will be required to release a specific volume of water from the proposed dam. An Ecological Reserve Determination and Water Yield Analysis has been compiled for the proposed project (Refer to Appendix G). The total overflow from the proposed dam was calculated to be 28 470 240 m³ / year which is sufficient to meet the needs of downstream water users (i.e. 1 299 500 m³ / year), as well as the EWR (i.e. 3 314 687 m³ / year) from the proposed dam.
Neil Sclanders	<ul style="list-style-type: none"> We are in favour of the dam in principle. The water released to the downstream users cannot be part of our scheduled releases. 	<ul style="list-style-type: none"> See above response. As part of the conditions of the WUL, the Applicant will be required to compile some sort of water agreement to ensure that the required volume of water is released to downstream water users.
Joyce Goosen	<ul style="list-style-type: none"> We are in favour of the dam as we are in favour of the storage of water, and not wasting water resources; however we must be able to access this water when needed. 	<ul style="list-style-type: none"> See above response.
Chris Jelliman	<ul style="list-style-type: none"> We cannot have two people taking water in summer and winter; winter is a critical time as water is scarce. 	<ul style="list-style-type: none"> See above response.
Chris Jelliman	<ul style="list-style-type: none"> We all feel that the proposed dam will be beneficial; it just needs to be fair and properly managed. 	<ul style="list-style-type: none"> See above response. The Applicant will be required to release a specific volume of water from the dam for downstream users (Refer to Appendix G).
Neil Sclanders	<ul style="list-style-type: none"> Who will control the water? Will it belong to the Applicant? Or will it fall into the constitution of the Lindequespruit Irrigation Board? 	<ul style="list-style-type: none"> The Applicant will control the water; however the WUL will specify the management of water on a monthly basis. Monitoring equipment will be required to be installed, so there will be accountability. The Applicant will be responsible for the maintenance of the dam.
Joyce Goosen	<ul style="list-style-type: none"> The Applicant is management of the Lindequespruit Irrigation Board. 	<ul style="list-style-type: none"> Noted.
Cobus Honiball	<ul style="list-style-type: none"> With regards to scheduled water releases, how are they going to manage this? There needs to be rules and regulations in place. 	<ul style="list-style-type: none"> See above response. The management of water will be closely monitored and in line with the conditions which will form part of the WUL.

Roy Mottram	<ul style="list-style-type: none">• Thank you for these documents. I will be submitting further comments. One point I noticed is the 'Applicant will control releases' – this cannot be within an Irrigation Board even though he/they might currently be committee members. The water is controlled by the Board and must be transparent to all members. One cannot have the applicant abstracting water when they need it to the detriment of others – thus the wording needs to ensure that this is taken care of. The fact that they are paying for the dam should not give them only, additional benefits. If they want such in recompense then a legal document needs to be drafted that is acceptable to all irrigators and DWS (National Water Act). Schedules and releases must be set out before each season and include restriction measures.	<ul style="list-style-type: none">• See above response. Please note that the management of water will be closely monitored. The WUL will specify the volume of water which must be released on a monthly basis. Monitoring equipment will be required to be installed by the Applicant and this will be inspected by the DWS. Please note that all other Lindequespruit Irrigation Board members were given the option to join into the dam project.
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7.7 CIRCULATION OF THE DRAFT SCOPING REPORT

Copies of the Draft Scoping Report were circulated to the following I&APs for review and comment:

- Onwabile Ndzumo – Department of Economic Development, Tourism and Environmental Affairs;
- Bayo Ogunnaike – Department of Agriculture and Rural Development;
- Karen Moodley – Department of Environment, Forestry and Fisheries;
- Zama Hadebe – Department of Water and Sanitation;
- Michelle Nicol – Eskom;
- Michele Schmid – Department of Transport;
- Dominic Wieners – Ezemvelo KZN Wildlife;
- Weziwe Tshabalala – Amafa Heritage Kwazulu-Natal;
- Dan Ramalingum – uThukela District Municipality; and
- Samke Msibi – Okhahlamba Local Municipality.

The Draft Scoping Report was circulated to all I&APs for a 30 day comment period from 13 January 2021. All I&APs were notified of the availability of this Report and their opportunity to provide comment. Due to the Corona Virus (Covid-19) pandemic and associated Regulations, electronic copies of the Draft Scoping Report were made available to all I&APs on request.

Comments received following circulation of the Draft Scoping Report are summarised and responded to in **Table 5** (Refer to **Appendix E8**). Additional information has also been provided where it has become available.

Please note that prior to the Final Scoping Report being submitted, and although comments had been compiled by the DEDTEA, the EAP was informed that their offices were broken into and their computers stolen. As a result, it is understood that their comments were not able to be saved or signed off, and only verbal comments were received by the DEDTEA. Due to the urgency for the EAP to submit the Final Scoping Report within the stipulated timeframes, the verbal comments were included in the Final Scoping Report. To date, no hard copy of these verbal comments have been received from the DEDTEA.

Table 5: Comments received following circulation of the Draft Scoping Report.

I&AP	COMMENT	RESPONSE
Khanyisa Vundle Department of Environment, Forestry and Fisheries 27 January 2021	<ul style="list-style-type: none"> The Department of Environment, Forestry and Fisheries (DEFF) appreciates the opportunity given to review and comment on the DSR for the abovementioned project. DEFF reiterates the comments sent on 04 March 2020, for the Background Information Document (BID). Should any further information be required, please do not hesitate to contact this office. This letter does not exempt you from considering other legislations. 	<ul style="list-style-type: none"> Noted. This has been noted. This comment has been included and addressed in Table 1 above. Thank you. The EAP is aware of this.
Lauron Jelliman I&AP 13 January 2021	<ul style="list-style-type: none"> Please get Green Door Environmental to check page 38, point 7 in the Draft Scoping Report, as it states that the irrigation board members farms end at the abandoned factory. We and the Honiball's are well below that. 	<ul style="list-style-type: none"> Noted. This has been amended in Table 2 above. See above response.
Nerissa Pillay Ezemvelo KZN Wildlife 04 February 2021	<ul style="list-style-type: none"> Thank you for forwarding the Draft Scoping Report, dated 13 January 2021, for the abovementioned application to Ezemvelo KZN Wildlife (Ezemvelo) for review and comment. Ezemvelo will not be providing comment on this application, but trust that all significant biodiversity related concerns have been clearly identified and made known in this assessment together with appropriate measures (viz. avoid, mitigate and thereafter ameliorate) to safeguard the ecological integrity of the developable area. 	<ul style="list-style-type: none"> Noted. A Biodiversity Assessment has been compiled for the proposed project (Refer to Appendix I). In terms of floral species, the proposed dam site is currently dominated by alien invasive vegetation; namely, <i>Populus candescens</i> and <i>Poplar candescens</i>. The impacts associated with the loss of habitat for faunal species will be minimal, and the proposed dam will in fact benefit and promote the presence of faunal species. In terms of the floral species, the proposed cultivation sites comprise a graminoid environment, and thus the impacts on this habitat are likely to be minimal. It is important to note that although portions of the proposed cultivation sites fall within an 'optimal' CBA, this CBA is not 'irreplaceable' or 'environmentally sensitive'. Although <i>Otomys auratus</i> (vlei rat) and <i>Aonyx capensis</i> (Cape clawless otter), as well as <i>Opisthophthalmus praedo</i> (Tugela burrowing scorpion) are identified as 'near threatened' and 'protected' respectively, and have the potential to occur within the proposed study sites; it is unlikely that these faunal species will be

	<ul style="list-style-type: none"> • Please be advised that the potential impacts upon biodiversity will be evaluated by the Competent Authority who may, upon identification of a potential biodiversity concern, refer the biodiversity concern to this organisation for evaluation and advice regarding the specific concern, prior to making a decision. • In such case, the environmental principles prescribed in the National Environmental Management Act 107 of 1998, the objectives of the National Environmental Management Biodiversity Act 10 of 2004 and best practice will be applied. 	<p>impacted should the recommendations and mitigation measures included in this Report be adhered to.</p> <ul style="list-style-type: none"> • The EAP is aware of this. See above response. • This has been noted.
<p>Onwabile Ndzumo Department of Economic Development, Tourism and Environmental Affairs 16 February 2021</p>	<ul style="list-style-type: none"> • Why is a Desktop Geotechnical Assessment being conducted, given the extent of the proposed dam site? • With regards to dam safety and potential failure of the dam wall, which Specialist Studies will look into these issues? • Since the Public Participation Process was not inclusive of the proposed cultivation areas, how has the cultivation component been addressed and included in the Public Participation Process? 	<ul style="list-style-type: none"> • The Desktop Geotechnical Assessment has been compiled for the proposed project (Refer to Appendix M). This assessment investigated the feasibility of the underlying geology and soils for the wall of the proposed dam. Should the proposed project obtain Environmental Authorisation, a detailed Geotechnical Assessment will be required to be compiled. This has been included as a recommendation of this Report. • The Engineer has provided dam specifications which will ensure that all dam safety requirements are adhered to (Refer to Appendix F). Mitigation measures surrounding dam safety have also been included in the EMPr which the Applicant will be required to adhere to (Refer to Appendix P). • Please note that the cultivation was included in the Pre-application meeting. The cultivation only came about during the Scoping Phase. As such, it was included in the Draft Scoping Report which was circulated to all I&APs for a 30 day comment period. The EAP is of the opinion that this is sufficient in terms of the initial Public Participation Process stages of the proposed project. I&APs have also been given an opportunity to provide comment on the Final Scoping Report which thoroughly addresses the cultivation component. The EAP is of the opinion that circulating additional newspaper adverts, site posters and a BID will be

		futile given the fact that the Scoping Report contains far more information and maps on the cultivation component in comparison to what the abovementioned public participation documents would.
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7.8 CIRCULATION OF THE FINAL SCOPING REPORT

The Final Scoping Report was submitted to the DEDTEA on 18 February 2021 for decision. All I&APs were notified of the availability of this Report and their opportunity to provide comment. Electronic copies of the Final Scoping Report were made available to all I&APs on request.

Comments received following submission of the Final Scoping Report are summarised and responded to in **Table 6** (Refer to **Appendix E9**). Additional information has also been provided where it has become available. The Scoping Phase acceptance was obtained on 25 March 2021 (Refer to **Appendix E1**).

Table 6: Comments received following submission of the Final Scoping Report.

I&AP	COMMENT	RESPONSE
<p>Bayo Ogunnaike Department of Agriculture and Rural Development 17 February 2021</p>	<ul style="list-style-type: none"> • Purpose • To provide comments from the KZN Department of Agriculture and Rural Development (DARD): Agricultural Resources Management (ARM) – Land Use Regulatory Unit (LURU), in response to the application for the proposed establishment of a 2.3 million m³ dam and cultivation of 102 ha of land, located on Portion 1 of Meersig No. 15550; Portion 1, Portion 3, Portion 4 and Rem of Smaldeel No. 1390; and Portion 2, Portion 3 and Portion 10 f Lindeques Laager No. 1039, Lush Valley Farm and Prairie Farm, within the Okhahlamba Local and uThukela District Municipality, Winterton, KwaZulu-Natal. • Background • The proposed project is called Sable Hill Dam Educational Fund is a 2.3 million m³ dam and cultivation of 102 ha of land, located on located on Portion 1 of Meersig No. 15550; Portion 1, Portion 3, Portion 4 and Rem of Smaldeel No. 1390; and Portion 2, Portion 3 and Portion 10 f Lindeques Laager No. 1039, Lush Valley Farm and Prairie Farm. Others are the installation of associated pipelines for irrigation purposes, potential wetland rehabilitation measures and biodiversity rehabilitation measures. • The proposed dam has a wall height of 15 m, wall length of 378 m, and water depth of 15 m. The dam capacity is 2.3 million m³ and occupies an area of approximately 45 ha. • The dam site falls on the Lindequespruit River, within the V13D quaternary catchment and the Pongola to Mtamvuna Water Management Area (WMA). The dam will fall on Lush Valley Farm which is located on the northern banks of the Lindequespruit River, and on Prairie Farm which is located on the southern banks of the Lindequespruit River. The Glen Gay Dam is an existing dam located upstream of the proposed dam site, and is approximately 4.5 million m³ in capacity, managed by the Lindequespruit Irrigation Board, made up of six members. • The cultivation of 102 ha of land is proposed for the area on Lush 	<ul style="list-style-type: none"> • The following comments have been taken into consideration. • Noted. Please note that a 1.6 million m³ dam is now proposed to be established, and 106.62 ha of land is proposed to be cultivated. • The following background comments have been taken into consideration. • These comments are correct. Please note that a 1.6 million m³ dam is now proposed to be established, and 106.62 ha of land is proposed to be cultivated. • The new dam specifications have been included in Appendix F. • These comments are correct. • The Applicant is now proposing the cultivation of

	<p>Valley Farm which is located on the northern banks of the Lindequespruit River. It is to be planted for forage and for grazing, which will include pastures comprising kikuyu and grass mixtures. There are currently approximately 1500 head of cattle and with additional forage and grazing, the cattle head will be increased to 2000 heads of cattle.</p> <ul style="list-style-type: none"> • The cultivation is proposed to take place on the following properties: 22 ha pivot located on Portion 4 of Smaldeel No. 1390; 30 ha pivot located on Portion 3 of Smaldeel No. 1390 and Portion 10 of Lindeques Laager No. 1039; 10 ha pivot located on Portion 10 of Lindeques Laager No. 1039; and 10 ha pivot located on Portion 2 and Portion 10 of Lindeques Laager No. 1039. • On Lush Valley Farm, the 102 ha of land proposed to be cultivated for forage and grazing, is to be irrigated from the proposed dam. • There is an additional 106 ha of existing land to be irrigated from the proposed dam. • On Prairie Farm, there is approximately 188 ha of existing cultivated land which is to be irrigated from the proposed dam. • The application report noted that, due to the extent of the proposed dam and cultivation sites, there may be a potential need for the implementation of both wetland and biodiversity rehabilitation measures to address wetland and biodiversity offsets respectively. • Comments • A site inspection was conducted to the farms Lush Valley and Prairie on 02 February 2021, as well as the Sable Hill project site of the proposed dam, which is currently under thick bushy vegetation/ • Lush Valley and Prairie Farms produce potatoes, wheat, soya beans, peas and butternut which are planted on a rotational basis, as well as beef. • Water from the dam is proposed to be pumped via the associated pipelines to surrounding lands on both farms for irrigation purposes. • Considering the amount of water to be abstracted from the proposed dam, it is very important to stress that full compliance is encouraged on the part of Applicant, to ensure the release of sufficient water from the proposed dam into the Lindequespruit River for further abstraction for other users downstream for irrigation purposes. 	<p>106.62 ha of land.</p> <ul style="list-style-type: none"> • Refer to Section 5 of this Report for the sizes of the proposed cultivation sites. • The Applicant is proposing the cultivation of 106.62 ha of land. • This is correct. • This is correct. • The implementation of wetland and biodiversity rehabilitation measures are no required for the proposed project. • The following comments have been taken into consideration. • This has been noted. • Noted. • This is correct. • Noted. As part of the conditions of the WUL, the Applicant will be required to release a specific volume of water from the proposed dam. An Ecological Reserve Determination and Water Analysis has been compiled for the proposed project (Refer to Appendix G).
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	<ul style="list-style-type: none"> • The Agricultural Potential Assessment report emanating from the EIA Report shows that, the freshwater ecosystems within 500 m of the proposed dam and cultivation sites will be mapped. • The 100 m radius of the proposed sites will then be delineated according to DWS guideline document, • The level of ecosystem functioning and present ecological state (PES) of the site will be assessed. • All mitigation measures and offsets must be followed fully during the construction and operational phase of the proposed project. <p>• It must however be noted that the cultivation of a large tract of land as 102 ha warrants the need to provide a Natural Resource Survey of the land, by a SACNASP accredited scientist.</p> <p>• Recommendation</p> <ul style="list-style-type: none"> • This office has no objection to the proposed establishment of a 2.3 million m³ dam, however, the cultivation of 102 ha of land is subject to the provision of a detailed study report as indicated in 3.5 above. 	<ul style="list-style-type: none"> • An Agricultural Potential and Impact Assessment has been compiled for the proposed study sites (Refer to Appendix N). • This has been done (Refer to Figure 2). • This is correct. • This is correct. All Specialist Study recommendations and mitigation measures have been included in the EMPr which the Applicant will be required to adhere to (Refer to Appendix P). • An Agricultural Potential and Impact Assessment which is in line with the DARD and Natural Resource Survey requirements has been compiled for the proposed cultivation sites (Refer to Appendix N). Based on the soils samples undertaken, the soils at the proposed cultivation sites are suitable for agricultural activities. The Avalon and Shortlands soils have a high agricultural potential and although portions of the low lying areas were identified to be characterised by Bonheim soils which tend to comprise a high moisture content, careful management of the agricultural activities and irrigation will be required. • The following recommendations have been taken into consideration. • This has been done (Refer to Appendix N). Please note that 106.62 ha is now proposed to be cultivated.
<p>Zinhle Ntshingila Department of Economic Development, Tourism and Environmental Affairs 25 March 2021</p>	<ul style="list-style-type: none"> • The Scoping Report for the abovementioned activity, submitted in terms of the requirements of the Environmental Impact Assessment (EIA) Regulations, 2014, as amended, and acknowledged as having received by this Department on the 18 February 2021. • The Department has reviewed the report and it complies with the requirements of the EIA Regulations, 2014, as amended, and was found to be acceptable provided the following issues are addressed: • Maps 	<ul style="list-style-type: none"> • Noted. • Thank you. • The following comments relating to maps have

	<ul style="list-style-type: none"> • Layout plans for the proposed dam and locality maps must be attached to the EIA Report. • The sensitivity map must be appended and incorporate all the sensitivity buffers and no development must occur within the buffer zones. • The members of the Sable Hill Dam Educational Fund NPC and Lindequespruit Irrigation Board must be illustrated on a map. • Miscellaneous • On page 34 of the report mentioned that portable water for use during the construction phase of the project will be sourced from an existing supply. • Please clearly indicate the source and quantity of potable water to be used during the construction phase of the project. • A caption and the direction at which the appended photographs were taken must be provided. • The Applicant should proceed with the tasks contemplated in the plan of study for the environmental impact assessment incorporating the abovementioned conditions. • Please note that the activity applied for may not commence prior to the relevant authorisation being granted by this Department. • Please contact this Department if you have any queries regarding this correspondence. 	<p>been taken into consideration.</p> <ul style="list-style-type: none"> • This has been done (Refer to Figure 1 to 6). • This has been done (Refer to Figure 2). • This has been done (Refer to Figure 6). • The following comments related to miscellaneous have been taken into consideration. • Potable water for use during the construction phase of the proposed project will be sourced from an existing supply on either Lush Valley Farm or Prairie Farm. This potable water will be abstracted from an existing and licensed water source. • Potable water, for use during the construction phase of the proposed project, will be sourced from the Lindequespruit River. The EAP is unsure of the quantity of water however, it will be a couple of litres to be used for mixing of concrete for the wall of the proposed dam. • This has been done (Refer to Figure 7). • Noted. • We have communicated this with the Applicant. • Thank you.
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7.9 SUMMARY OF ISSUES RAISED DURING THE SCOPING PHASE

The main issues which have been raised during the Scoping Phase Public Participation Process are:

- All conditions stipulated by Eskom must be adhered to;
- The location of the Eskom powerlines must be taken into consideration;
- The need for a Biodiversity Assessment to be compiled to address the potential impacts on natural forests, protected tree species and other biodiversity;
- The management of water resources, waste, noise and dust nuisances must be taken into consideration;
- The need for ablution facilities and potable water must be provided during the construction phase;
- The potential impacts on downstream water users must be investigated, as well as the volume of water required to be released from the proposed dam;
- The need for the relevant bye-laws and regulations to be taken into consideration since the proposed dam falls within the Lindequespruit Irrigation Board;
- The type of dam proposed to be established must be addressed;
- The need for clarification on the location of the Situlwane River;
- The members of the Sable Hill Dam Educational Fund NPC and Lindequespruit Irrigation Board must be illustrated on a map;
- The need to include all farm labour in the Public Participation Process of the proposed project;
- Certain Listed Notice 3 activities are applicable to the proposed project;
- A column showing the I&APs must be included in the Public Information Session minutes;
- The need to address why the proposed cultivation was not included in the Public Participation Process documentation;
- Dam safety and potential dam failure must be addressed;
- The potential need for a detailed Geotechnical Assessment to be compiled must be investigated;
- The need for an Agricultural Potential and Impact Assessment to be compiled to assess the proposed cultivation sites; and
- The need for a sensitivity map showing all sensitivities, and captions and directions of the photographs must be provided.

7.10 EIA PHASE PUBLIC INFORMATION SESSION

Please note that due to the poor attendance during the Scoping Phase Public Information Session, an EIA Phase Public Information Session was not held. Should an I&AP wish for an EIA Phase Public Information Session to be held, then this must be communicated with the EAP. With the Corona Virus (Covid-19) pandemic and associated Regulations taken into consideration, a virtual (Zoom) Public Information Session will be conducted if required.

7.11 CIRCULATION OF THE DRAFT EIA REPORT

Copies of the Draft EIA Report have been circulated to the following I&APs for review and comment:

- Onwabile Ndzumo – Department of Economic Development, Tourism and Environmental Affairs;

- Bayo Ogunnaike – Department of Agriculture and Rural Development;
- Karen Moodley – Department of Environment, Forestry and Fisheries;
- Zama Hadebe – Department of Water and Sanitation;
- Michelle Nicol – Eskom;
- Michele Schmid – Department of Transport;
- Dominic Wieners – Ezemvelo KZN Wildlife;
- Weziwe Tshabalala – Amafa Heritage Kwazulu-Natal;
- Dan Ramalingum – uThukela District Municipality; and
- Samke Msibi – Okhahlamba Local Municipality.

The Draft EIA Report has been circulated to all I&APs for a 30 day comment period. All I&APs have been notified of the availability of this Report and their opportunity to provide comment. Due to the Corona Virus (Covid-19) pandemic and associated Regulations, electronic copies of the Draft EIA Report have been made available to all I&APs on request.

Comments received following circulation of the Draft EIA Report will be summarised and responded to in the Final EIA Report which will be submitted to the DEDTEA for decision. All I&APs will be notified of this decision.

8 POTENTIAL IMPACTS ON THE SOCIAL AND ECONOMIC ENVIRONMENTS

8.1 CORONA VIRUS (COVID-19) PANDEMIC

Description

The Corona Virus (Covid-19) pandemic is far more than a health crisis. It is not only affecting societies but also economies at their core. Although the impact of the pandemic will vary from country to country, the extent of its impacts are not yet known. However, it will most likely increase poverty and inequalities on a global scale. As such, there is and will be a continuous need for countries to be self-sufficient whereby food is grown and produced within these countries to feed growing populations.

Implication / Risk / Impact

- Both temporary and permanent jobs will be created during the planning, construction and operational phase of the proposed project;
- With the increased water storage and availability, and additional lands, there will be sufficient capacity to irrigate lands during the dry months, and sufficient grazing and fodder for livestock;
- Not only will the proposed project ensure the farms long-term sustainability through increased yields, and crops and livestock production, as well as increased employment opportunities, it will also result in positive knock on effects to the surrounding population and the local economy;
- Crops and livestock will be sold to surrounding businesses whereby it will be packaged and processed to feed the surrounding population; and
- As such, although the pandemic has been and will continue to be widespread, the proposed project will play a beneficial role in alleviating its impacts within the surrounding area.

Mitigation / Recommendations

- Local businesses and unemployed people in the immediate area must be considered first, before employing labour and services from further afield; and
- Where possible, any additional employment opportunities on the farms must include labour from surrounding local communities.

8.2 LOCAL ECONOMY AND EMPLOYMENT OPPORTUNITIES

Description

The uThukela District Municipality, of which the Okhahlamba Local Municipality forms a part, is predominantly rural in character. It is one of ten district municipalities in KwaZulu-Natal, covers an area of approximately 11 500 km², and comprises a population of approximately 706 589 people. It is characterised by high levels of poverty, based on both income inequality and low levels of development.

Agriculture and tourism make up the core components of the district municipality's economy. However, the agricultural sector has a limited base for economic expansion, and it is not fully exploited. The district municipality comprises favourable conditions for the development of the agricultural sector, and as such

agriculture, whether it is subsistence or commercial, plays an important role in the economy. Agricultural employment opportunities and skills development are thus increasingly valuable in the area.

Implication / Risk / Impact

- During the construction phase, the proposed project will contribute positively to the local economy and the social environment through spending of capital at local businesses;
- A number of temporary employment opportunities will be generated during the planning phase, which includes Engineers and Specialists;
- A number of temporary employment opportunities will also be generated during the construction phase, which includes Engineers, contractors and labour (skilled, semi-skilled and unskilled labour);
- To allow for livestock herds to expand and to obtain maximum crop yields, there needs to be both lands and water available;
- With the increased water storage and availability, and additional lands, there will be sufficient capacity to irrigate lands during the dry months, and sufficient grazing and fodder for livestock;
- The proposed project will ensure the long-term sustainability of both farms, through increased yields, and crop and livestock production, as well as increased employment opportunities. This in turn will result in skills development, income generation and improved quality of life. It will also result in positive knock on effects to the surrounding population and the local economy;
- Crops and livestock will be sold to surrounding businesses whereby it will be packaged and processed to feed the surrounding population;
- During the operational phase, the proposed project will provide job security for approximately 60 labour employed on the farm; and
- In KwaZulu-Natal, one job supports seven dependents. Thus, approximately 420 additional labour will benefit from the proposed project, as well as their dependents.

Mitigation / Recommendations

- Local businesses and unemployed people in the immediate area must be considered first, before employing labour and services from further afield; and
- Where possible, any additional employment opportunities on the farms must include labour from surrounding local communities.

8.3 NEED AND DESIRABILITY

Description

In terms of the need and desirability, the proposed project will be in keeping with the surrounding land use. The proposed project will not alter the sense of place or the visual aesthetics of the area.

Lush Valley Farm and Prairie Farm are commercial agricultural operations comprising maize, potatoes, wheat, soya beans, peas and butternut which is planted on a rotational basis, as well as beef cattle. Water from the dam is proposed to be pumped via the associated pipelines to surrounding lands on both farms for irrigation purposes. On Lush Valley Farm, the 106.62 ha of land proposed to be cultivated, is to be irrigated

from the proposed dam. There is an additional 106 ha of existing cultivated land that is also to be irrigated from the proposed dam. Water is to be released from the proposed dam and into the Lindequespruit River where it will be abstracted further downstream for irrigation purposes. On Prairie Farm, there is approximately 188 ha of existing cultivated land which is to be irrigated via existing pipelines from the proposed dam. These lands comprise maize, wheat, soya beans and peas which are planted on a rotational basis. A portion of the existing lands also comprise pecan nuts which will be required to be irrigated from the proposed dam. The proposed dam will thus allow for increased water storage and availability for supplementary irrigation during the summer months, and a back-up during the dry, winter months. There are currently approximately 1500 head of cattle, and with the additional cultivated land which is proposed to be irrigated, the cattle herd will be able to be expanded by approximately 500 cattle. Although there is a significant once off cost associated with the establishment of a dam, there are minimal maintenance costs. In the agricultural industry, it is becoming increasingly important for farmers to utilise economies of scale in order to remain sustainable. The job security of the labour employed on both Lush Valley Farm and Prairie Farm relies on its sustainability. To allow for livestock herds to expand and to obtain maximum crop yields, there needs to be both lands and water available. With the increased water storage, and thus availability, and additional lands, there will be sufficient capacity to irrigate lands during the dry months, and sufficient grazing and fodder for livestock. The proposed project will thus ensure the long-term sustainability of both farms, through increased yields, and crop and livestock production, as well as increased employment opportunities. This in turn will result in skills development, income generation and improved quality of life. Should the WULA for the proposed project not be approved, the lands proposed to be irrigated will be for dry land agricultural activities.

Multiple HGM units were identified within the proposed dam site; namely, four hillslope seepage wetland systems and one depression wetland system (Refer to **Appendix B**). Six riparian channels were also identified within the proposed dam site. Although the proposed dam will result in the inundation of portions of the wetland systems, this loss is considered limited based on the extent of the wetland systems. Due to the impacts being limited to a loss of 0.3 ha equivalents of wetland habitat, wetland rehabilitation measures are not required to be implemented. Under natural conditions, the proposed dam site would have been characterised by Northern KwaZulu-Natal Moist Grassland (Gs 4), which falls under the Sub-Escarpment Grassland (Gs) Group 4 bioregion. In terms of floral species, the proposed dam site is currently dominated by alien invasive vegetation; namely, *Populus candescens* and *Poplar candescens* (Refer to **Appendix I**). The impacts associated with the loss of habitat for faunal species will be minimal, and the proposed dam will in fact benefit and promote the presence of faunal species. Due to several fish species likely to occur within the Lindesquespruit River, and which have a conservation status of 'vulnerable', a fishway is required to be established on the wall of the proposed dam to allow for the migration of fish species (Refer to **Appendix J**). It is important to note that the existing Glen Gray Dam has resulted in the proposed dam site being subject to transformation which is associated with alterations to flood events, restrictions during low flow periods and changes in water flow and volumes etc., as well as alteration to the riverine and terrestrial habitats. As such and although the proposed dam is viewed as an expansion of the impacts on biodiversity arising from the existing Glen Gray Dam, the recommendations included in this Report will

address such impacts.

Feedback from the Ecological Reserve Determination and Water Analysis confirmed that there is sufficient water available in the catchment for the proposed dam, as well as to sustain the EWR (Refer to **Appendix G**). Based on water uses within the quaternary catchment, the total registered surface water abstractions total 19 294 041 m³ / year, and the total registered downstream water use totals 1 299 500 m³ / year. As such, the proposed dam was calculated to have a yield of approximately 1 265 211 m³ / year with a 75 % assurance of supply, and the total releases or EWR for the proposed dam was calculated to be 3 314 687 m³ / year, which is more than enough to meet the ecological requirements from the sub-catchment. The proposed dam will result in a minimal reduction in water flows, and would be feasible to meet the normal flow and legal flow requirements, and the proposed abstractions for irrigation purposes. The water balance shows that the dam yield is sufficient to meet the demand of the areas proposed to be irrigated. As such, the impacts associated with the proposed dam on the ecological reserve and downstream water users are considered low.

Based on historical imagery, portions of the proposed cultivation sites have been used for agricultural activities prior to 1937 (Refer to **Appendix K**). Portions of the proposed cultivation sites comprise erosion gullies due to these historical agricultural activities. Although five HGM units were identified within the proposed cultivation sites and are classified as hillslope seepage wetland systems, the proposed cultivation sites have since been realigned to fall outside of the identified wetland systems and the recommended 20 m buffer. As such, should the recommendations and mitigation measures included in this Report be adhered to, the impacts of the proposed cultivation on the wetland systems are considered to be low. Portions of the low lying areas were identified to be characterised by Bonheim soils which tend to comprise a high moisture content, thus careful management of the agricultural activities and irrigation will be required. In terms of the floral species, the proposed cultivation sites comprise a graminoid environment, and thus the impacts on this habitat are likely to be minimal (Refer to **Appendix I**). It is important to note that although portions of the proposed cultivation sites fall within an 'optimal' CBA, this CBA is not 'irreplaceable' or 'environmentally sensitive'. Although *Otomys auratus* (vlei rat) and *Aonyx capensis* (Cape clawless otter), as well as *Opisthophthalmus praedo* (Tugela burrowing scorpion) are identified as 'near threatened' and 'protected' respectively, and have the potential to occur within the proposed study sites; it is unlikely that these faunal species will be impacted should the recommendations and mitigation measures included in this Report be adhered to.

Although the Heritage Specialist identified portions of the proposed cultivation sites to comprise stone walled Later Iron Age sites which are considered to have a high local significance and must therefore be retained as heritage sites; the proposed cultivation sites have since been realigned to fall outside of the identified heritage sites and the recommended 20 m buffer (Refer to **Appendix L**).

Although the WUL will specify monthly release volumes, the proposed dam will be beneficial for downstream water users during times of drought, as additional water will be able to be released. The loss

of wetland habitat associated with the proposed dam is considered to be low, and thus wetland rehabilitation measures are not required to be implemented. Faunal, floral and aquatic communities will thus benefit as a result of the presence of additional open water and wetland habitat. The implementation of the recommendations and mitigation measures will allow for the surrounding wetland systems and floral species to be maintained and monitored, which will have significant benefits, as well as providing habitat and foraging for faunal species.

Implication / Risk / Impact

- During the construction phase, the proposed project will contribute positively to the local economy and the social environment through spending of capital at local businesses;
- A number of temporary employment opportunities will be generated during the planning phase, which includes Engineers and Specialists;
- A number of temporary employment opportunities will also be generated during the construction phase, which includes Engineers, contractors and labour (skilled, semi-skilled and unskilled labour);
- To allow for livestock herds to expand and to obtain maximum crop yields, there needs to be both lands and water available;
- With the increased water storage and availability, and additional lands, there will be sufficient capacity to irrigate lands during the dry months, and sufficient grazing and fodder for livestock;
- The proposed project will ensure the long-term sustainability of both farms, through increased yields, and crop and livestock production, as well as increased employment opportunities. This in turn will result in skills development, income generation and improved quality of life. It will also result in positive knock on effects to the surrounding population and the local economy;
- Crops and livestock will be sold to surrounding businesses whereby it will be packaged and processed to feed the surrounding population;
- During the operational phase, the proposed project will provide job security for approximately 60 labour employed on the farm;
- In KwaZulu-Natal, one job supports seven dependents. Thus, approximately 420 additional labour will benefit from the proposed project, as well as their dependents;
- There is sufficient water available in the catchment for the proposed dam, as well as to sustain the EWR;
- The proposed dam will result in the creation of wetland systems, thus faunal, floral and aquatic communities benefit as a result of the presence of an additional body of water as well as wetland habitat; and
- The implementation of the recommendations and mitigation measures will allow for the surrounding wetland systems and floral species to be maintained and monitored, which will have significant benefits, as well as providing habitat and foraging for faunal species.

Mitigation / Recommendations

- Local businesses and unemployed people in the immediate area must be considered first, before employing labour and services from further afield;

- Where possible, any additional employment opportunities on the farm must include labour from surrounding local communities; and
- The required water volumes must be released from the proposed dam as stipulated by the DWS in the conditions of the WUL.

8.4 PLANNING INITIATIVES

8.4.1 National Development Plan

The National Development Plan (NDP) offers a long-term perspective on development in South Africa. It defines a desired destination and identifies the role different sectors of society need to play in order to reach that destination by 2030.

The NDP aims to eliminate poverty and reduce inequality in South Africa, by drawing on the energies of its people, growing an inclusive economy, enhancing the capacity of the state, and promoting leadership and partnerships throughout society.

Although there has been significant progress, 25 years into democracy, South Africa remains a highly unequal society where too many people live in poverty and too few people work. The quality of school education for black learners is poor. The Apartheid spatial divide continues to dominate the landscape. A large proportion of young people feel that the odds are stacked against them. These immense challenges can only be addressed through a step change in the country's performance. To accelerate progress, deepen democracy and build a more inclusive society, South Africa must translate political emancipation into economic wellbeing for all.

8.4.2. Provincial Growth and Development Strategy

Inequalities exist within the current South African economy, and there is a legacy of inequitable spatial development and associated economic development and potential. This has had a negative impact on public sector investment. This is evident in the unbalanced economic and social costs for poor communities in locations far from employment and other economic opportunities. The Provincial Growth and Development Strategy (PGDS) is a vehicle to address the legacies of the apartheid system's long-term impacts to the economy and to promote sustainable development and ensure the eradication of poverty and unemployment through the creation of additional employment opportunities and the rectification of past inequitable spatial development.

The South African Government has a mandate to restructure the process of development and service delivery in KwaZulu-Natal. This is to be achieved through the three spheres of government, the various government sectors and the different strategic frameworks. The keys challenges it faces, in the achievement of this mandate, is to effectively align and harmonise these structures towards this end, and to harness and align fiscal, financial and human resources at its disposal towards eradicating poverty, creating employment and laying the foundations for accelerated economic growth.

The PGDS offers a tool through which provincial government can direct and articulate its strategy and similarly for local government to reflect the necessary human, financial and fiscal support it needs to achieve these outcomes. It facilitates proper coordination between different spheres of government and aims to prevent provincial departments from acting out of concert with local municipalities. It enables intergovernmental alignment and guides activities of various role players and agencies (provincial sector departments, parastatals, district and local municipalities). Thus, the PGDS aims to enhance service delivery.

It is a framework for public and private sector investment, indicating areas of opportunities and development priorities. It addresses key issues of implementation blockages whilst providing strategic direction. The PGDS implies a developmental approach to government. This implies a pro-active and facilitative approach to development and not one based on formulating and applying regulations and restrictions. The PGDS on the one hand involves preparing policies, strategies and guidelines and on the other hand, it involves preparing mechanisms to align and facilitate the implementation, monitoring and evaluation of key growth and development priorities.

8.4.3 uThukela District Municipality Integrated Development Plan (2019 / 2020)

The uThukela District Municipality IDP undertook a comprehensive review and analysis of the district municipality, specifically highlighting the socio-economic and infrastructural backlogs, together with the developmental challenges. As a result, the district municipality is rural in nature, and is characterised by high levels of poverty, based on both income inequality and low levels of development.

As a result of its rural nature, terrain and topography, both challenges and opportunities result. According to the uThukela District Municipality IDP, the challenges faced by the agricultural sector include stock theft, poor herd quality, failure of land reform, lack of farming experience and threats of land claims etc.

In order to address the challenges, the district municipality is committed to paying more attention to the following:

- Good governance and public participation;
- Municipal transformation and organisational development;
- Service delivery and infrastructural development;
- Local economic development;
- Municipal financial viability and management; and
- Spatial integration and environmental sustainability.

8.4.4 Alignment with Local Municipal Goals and Objectives

The proposed project complies with the goals and objectives of the uThukela District Municipality IDP, and Okhahlamba Local Municipality IDP. During the construction phase, the proposed project will result in the generation of temporary employment opportunities, which in turn result in skills development, income generation and improved quality of life. This is beneficial in alleviating poverty. During the operational

phase, the proposed project will result in the long-term sustainability of both the farms due to increased water storage and availability. This has positive impacts on the job security of the labour employed on the farm, as well as additional labour required due to increased yields, and crop and livestock production. This in turn has the potential to reduce food insecurity and malnourishment rates in the area.

Implication / Risk / Impact

- The proposed project complies with all of the above Planning Initiatives, most notably the generation of employment opportunities, job security and investment in the agricultural sector;
- The uThukela District Municipality is predominantly rural in nature, with a low density of roads and public transport, and low levels of education; and
- The Okhahlamba Local Municipality and surrounding local communities thus relies disproportionately on the agricultural sector for the generation of employment opportunities and the associated skills development, income generation and improved quality of life.

Mitigation / Recommendations

None.

8.5 CULTURAL, HISTORICAL AND ARCHAEOLOGICAL RESOURCES

Description

A Heritage Impact Assessment was compiled for the proposed project (Refer to **Appendix L**). No heritage sites, features or graves were identified within the proposed study sites and the surrounding area is not part of any known cultural landscape. However, areas surrounding the proposed cultivation sites were identified to comprise stoned walled Later Iron Age sites (Refer to **Figure 2 and Table 7**). These stone walled Later Iron Age sites are rated Local Grade 111A. They were considered to have a high local significance and must be retained as heritage sites. These sites were most notably inhabited by amaZizi people who inhabited the area around 1700 to 1830. They were established in stone and have a typical bilobal patterning. During the period of tribal turmoil associated with the expanding of the Zulu kingdom, these settlements were attacked by other tribal groupings. Please note that the proposed cultivation sites fall outside of the identified heritage sites and features and the associated 20 m buffer. Although a graveyard was identified within the area, it is not located near to the proposed study sites.

Table 7: GPS coordinates of the heritage sites, features and graves.

HERITAGE SITES, FEATURES AND GRAVES	GPS COORDINATES
Proposed Later Iron Age site	28°49'11.97" S and 29°27'27.21" E
Later Iron Age site 1	28°49'07.54" S and 29°27'47.76" E
Later Iron Age site 2	28°49'12.71" S and 29°27'47.26" E
Later Iron Age site 3	28°49'11.48" S and 29°27'53.81" E
Later Iron Age site 4	28°49'16.48" S and 29°27'49.25" E
Later Iron Age site 5	28°49'16.37" S and 29°27'50.88" E
Later Iron Age site 6	28°49'17.37" S and 29°27'52.46" E
Later Iron Age site 7	28°49'16.32" S and 29°27'55.32" E
Graveyard	28°49'44.62" S and 29°28'05.99" E

A Phase 1 Paleontological Impact Assessment was required to be compiled for the proposed project as per the recommendations of the Heritage Impact Assessment (Refer to **Appendix O**). No fossil material was identified within the proposed study sites. Although the rocks within the area are highly fossiliferous, there is potential for fossil material to be identified within the surrounding area. As a result, portions of the proposed study site which are underlain by Beaufort bedrock have a high paleo-sensitivity rating, and portions of the proposed study site which are underlain by Quaternary alluvium have a moderate paleo-sensitivity rating.

Two graves were identified approximately 3.5 km from the proposed study sites and will not be impacted by the proposed project. Several circular and linear stone walled features were identified within portions of the proposed cultivation sites and likely to have been kraals or remnants of houses which represent a Late Iron Age settlement or historical Bantu village.

Implication / Risk / Impact

- Stoned walled Later Iron Age sites were identified surrounding the proposed cultivation sites;
- Although a graveyard was identified within the area, it is not located near to the proposed study sites; and
- Although no fossil material was identified within the proposed study sites, there is potential for fossil material to be identified within the surrounding area.

Mitigation / Recommendations

- A buffer of 20 m must be implemented around each Later Iron Age site;
- Robbing of stone circles must be prohibited;
- Attention is drawn to the National Heritage Resources Act (Act No. 25 of 1999) which, requires that projects that expose archaeological or historical remains should cease immediately, pending evaluation by Amafa KwaZulu-Natal;
- Fossiliferous bedrock must be avoided for the establishment of the dam wall, and dolerite which is non-fossiliferous must be used (i.e. grey areas) (Refer to **Figure 11**);
- A Phase 2 Paleontological Impact Assessment must be undertaken during the construction phase of the proposed project to monitor any potential fossil material which may be excavated; and
- If palaeontological resources are identified during the construction phase, construction activities must cease immediately. A Palaeontologist must be informed and will be required to conduct a site inspection to evaluate palaeontological resources before the construction phase may continue.

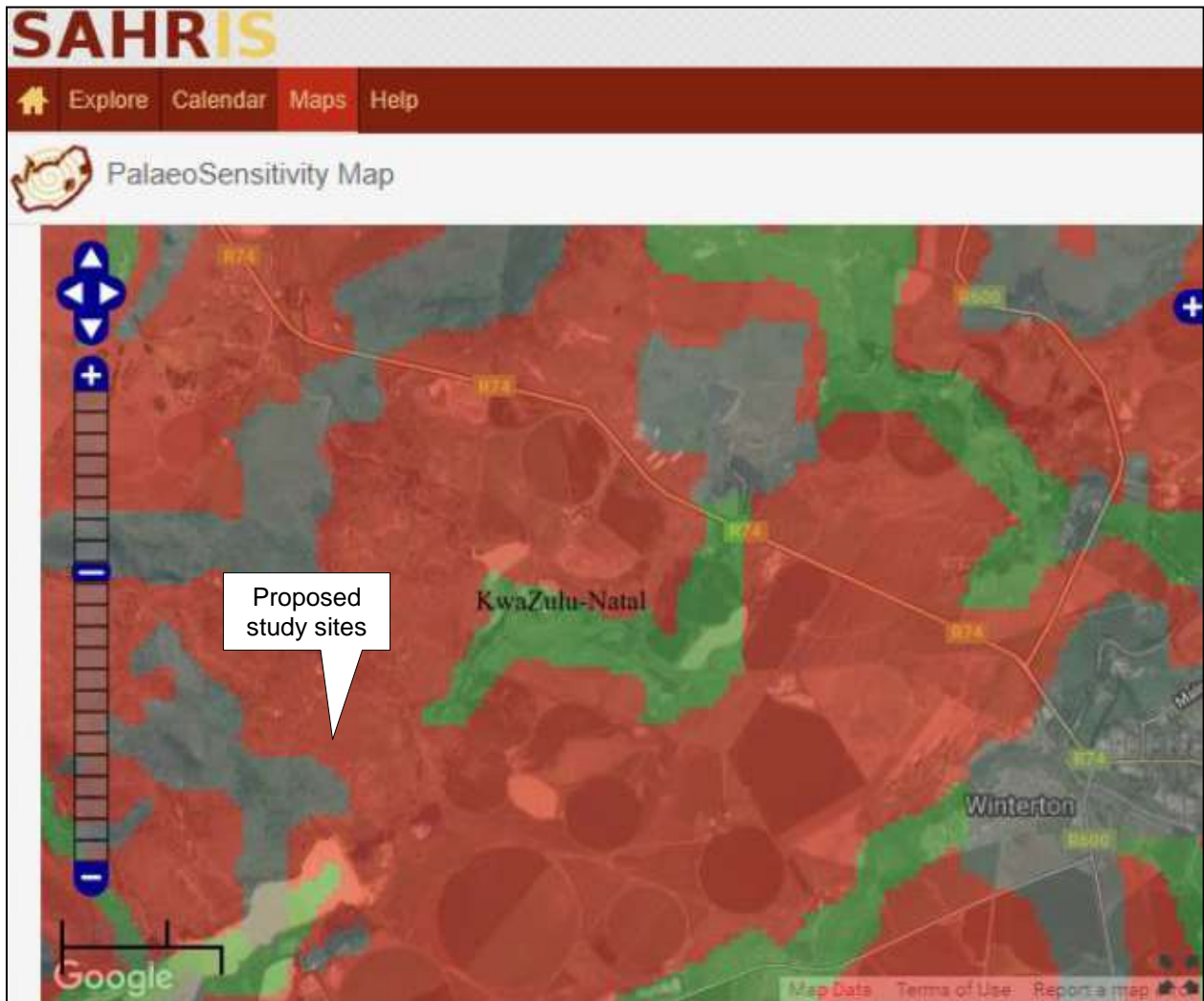


Figure 11: Map showing the dolerite which is non-fossiliferous which is to be used should rock be required for the establishment of the dam wall (grey areas) (Source: Gary Trower).

8.6 SURROUNDING LAND USE AND AESTHETICS

Description

Lush Valley Farm and Prairie Farm are commercial agricultural operations comprising maize, potatoes, wheat, soya beans, peas and butternut which is planted on a rotational basis, as well as beef. As such, the proposed project is unlikely to visually impact on surrounding landowners.

Implication / Risk / Impact

- The proposed project is to take place on an existing and operational farm, thus it is in keeping with the surrounding land use and aesthetics; and
- It will not alter the sense of place of the area or have a significant visual impact.

Mitigation / Recommendations

- Alien invasive vegetation clearing, and rehabilitation and revegetation of disturbed areas must be undertaken regularly;

- The planting of non-indigenous vegetation species must be prohibited; and
- Noise and dust nuisances generated during the construction phase must be controlled.

8.7 TRAFFIC, ROADS AND ACCESS

Description

The proposed dam site is located on Portion 1 of Meersig No. 15550, and Portion 1, Portion 4 and Rem of Smaldeel No. 1390, at GPS coordinates 28°48'31.80" S and 29°28'42.60" E. The dam will fall on Lush Valley Farm which is located on the northern banks of the Lindequespruit River, and on Prairie Farm which is located on the southern banks of the Lindequespruit River. The cultivation of 106.62 ha of land is proposed to take place on Lush Valley Farm which is located on the northern banks of the Lindequespruit River.

To access the proposed dam and cultivation sites, from Pietermaritzburg travel on the N3 towards Johannesburg. Turn left at the Bergville / Colenso off ramp and continue straight on the R74 Road through Winterton. Approximately 4 km outside Winterton on the R74 Road, turn left into Doveton Farm. Continue straight to the Doveton Farm office, and the farmer will provide directions to the proposed dam and cultivation sites, since they can only be accessed along farm roads.

Traffic volumes are not expected to increase as a result of the proposed project, nor are the type of vehicles utilising the roads anticipated to change. During the construction phase, there will be construction vehicles and equipment onsite, but this machinery will continue to remain onsite until project completion and will therefore not impact on traffic or access routes. Crops being sold to customers has the potential to result in the minimal increase in traffic volumes during the operational phase. Thus, no significant traffic related impacts are anticipated during the construction and operational phase of the proposed project.

Implication / Risk / Impact

- There is potential for a minimal increase in traffic during the construction phase;
- Excessive speed poses a threat to both road users and fauna; and
- Increased use of the access roads on the farms may result in accelerated deterioration.

Mitigation / Recommendations

- Vehicles accessing the proposed study sites must be driven cautiously and within the required speed limits; and
- Maintenance of access roads on the farm must be undertaken as and when necessary.

8.8 CONSTRUCTION ACTIVITIES, NOISE AND DUST

Description

During the construction phase, earthworks and use of construction vehicles and equipment will be required. These construction activities have the potential to generate noise and dust nuisances, which labour employed on the farms may experience. However, the construction activities are unlikely to have a

significant impact, as the labour will be working a considerable distance from the proposed dam and cultivation sites, and there are no surrounding landowners in close proximity.

Implication / Risk / Impact

It is unlikely that the level of noise and dust nuisances generated during the construction phase will negatively impact on surrounding landowners, as there are none in close proximity.

Mitigation / Recommendations

- Construction activities must be limited to regular working hours (Monday to Saturday, 07h00 to 17h00), and construction on public holidays must not be permitted;
- Construction vehicles and equipment must be maintained and regularly serviced to ensure that unnecessary noise nuisances are prevented;
- Construction labour onsite must not generate unnecessary noise such as hooting or shouting;
- Dust suppressions measures, such as spraying of water on bare soil, must be undertaken during dry and windy conditions; and
- Vehicles accessing the proposed study sites must be driven cautiously within the required speed limits.

8.9 AIR QUALITY AND SURFACE WIND

Description

The proposed study sites are located within an agricultural area, thus air quality is generally of a good quality. They are also located away from all current land uses that could potentially impact on air quality. There are no surrounding landowners located in close proximity.

Implication / Risk / Impact

Potential exists for dust to be generated during the construction phase. However, dust nuisances are unlikely to impact on surrounding landowners.

Mitigation / Recommendations

- Dust suppressions measures, such as spraying of water on bare soil, must be undertaken during dry and windy conditions; and
- Vehicles accessing the proposed study sites must be driven cautiously within the required speed limits.

8.10 SECURITY

Description

Whether existing farm labour or construction labour from elsewhere are used for the proposed project, it is unlikely that the proposed project will pose any significant security related risks to surrounding landowners.

Implication / Risk / Impact

- Potential exists for labour to trespass onto adjacent properties; and
- There is potential for crime in the area to increase during the construction phase, as a result of people

seeking employment opportunities onsite.

Mitigation / Recommendations

- Local businesses and unemployed people in the immediate area must be considered first, before employing labour and services from further afield;
- Where possible, any additional employment opportunities on the farms must include labour from surrounding local communities;
- All construction labour must remain within the boundaries of the farms at all times;
- Access onsite and offsite must be controlled;
- The construction labour must be issued with name badges and clearly identifiable uniforms; and
- Attendance registers for construction labour and visitors must be kept throughout the construction phase.

9 POTENTIAL IMPACTS ON THE BIOPHYSICAL ENVIRONMENT

9.1 TOPOGRAPHY

The proposed dam site falls on the Lindequespruit River, within the V13D quaternary catchment and the Pongola to Mtamvuna WMA. The dam will fall on Lush Valley Farm which is located on the northern banks of the Lindequespruit River, and on Prairie Farm which is located on the southern banks of the Lindequespruit River. A Desktop Geotechnical Assessment was compiled for the proposed project (Refer to **Appendix M**). The proposed dam site is controlled by the northeast flowing Lindequespruit River with gradients sloping towards the river. The invert level of the proposed dam site lies at an elevation of 1046 metres above sea level (masl) and the upper reaches have an elevation of 1057 masl. The centre of the river has a gradient of 1:150 vertical to horizontal.

The proposed cultivation sites are located on Lush Valley Farm which is located on the northern banks of the Lindequespruit River.

Implication / Risk / Impact

- The proposed dam site is the preferred option due to the natural topography of the area and the extent of the catchment;
- As such, this will allow for the proposed dam to be naturally contained and thus reduce the extent of earthworks required;
- The proposed cultivation sites are located in the preferred positions due to the natural topography of the land, and the quality of the soils, as well as being located outside of the identified sensitive areas (i.e. freshwater ecosystems and heritage sites); and
- Clearing of vegetation, stockpiling of material and construction activities have the potential to result in increased surface runoff, soil erosion and sedimentation of surrounding water resources.

Mitigation / Recommendations

- Nearby undisturbed areas must be protected from soil erosion by demarcating the construction site. No vehicular or pedestrian access must be allowed beyond the demarcated area;
- Soil erosion control measures must be implemented where necessary (Refer to **Appendix P**);
- Alien invasive vegetation clearing, and rehabilitation and revegetation of disturbed areas must be undertaken regularly; and
- The planting of non-indigenous vegetation species must be prohibited.

9.2 CLIMATE

Description

A Hydrological Assessment was compiled for the proposed project (Refer to **Appendix H**). The proposed study sites were identified to fall within the Koppen-Geiger Climate Classification zone Cwb. The 'Cw' is associated with a warm and temperate climate with a dry climate and the 'b' is associated with a warm summer. As such, the area is characterised by a wet summer and a temperate, and dry winter. KwaZulu-

Natal in general experiences rainfall during the summer, and winters are relatively dry. In Winterton, most rainfall is received during the summer months of January, with an average of 141 mm, and the lowest rainfall of 0 mm is experienced in June. January is the hottest month with the average temperature being 22.7 °C, and the coolest average temperature being 10.5 °C.

The area experiences a Mean Annual Precipitation (MAP) and Mean Annual Evapotranspiration (MAE) of 814 mm and 1400 mm respectively. The V13D quaternary catchment falls within a summer rainfall area where peak rainfall is experienced during December and January. The catchment drains a total area of 284 km² and lies at the foot of the Drakensberg Mountains. The Mean Annual Runoff (MAR) for the catchment was estimated to be 49 026 556 m³ / year.

Implication / Risk / Impact

- Topsoil which is stockpiled during the construction phase has the potential to be wind-blown, thus causing dust nuisances;
- Soil disturbance has the potential to result in the encroachment of alien invasive vegetation;
- Clearing of vegetation, stockpiling of material and construction activities have the potential to result in increased surface runoff, soil erosion and sedimentation of surrounding water resources;
- Potential exists for high intensity rainstorm events to cause severe soil erosion at the proposed study sites; and
- During dry and windy conditions, there is an increased risk for runaway fires. Thus, care must be taken throughout the construction phase to minimise these risks.

Mitigation / Recommendations

- Appropriate mitigation measures must be implemented to minimise the area of soil disturbance and the potential for mobilisation of bare areas;
- Soil erosion control measures must be implemented where necessary (Refer to **Appendix P**);
- Stockpiled topsoil must be dampened or covered during times of high wind to prevent dust nuisances;
- Vegetation must remain intact where possible to limit high surface flows and mobilisation of sediment;
- Alien invasive vegetation clearing, rehabilitation and revegetation of disturbed areas must be undertaken regularly;
- Planting of non-indigenous vegetation species must be prohibited;
- Dust suppression measures, such as spraying of water on bare soil, must be undertaken during dry and windy conditions;
- Measures must be taken to cover exposed areas during high intensity rainfall events;
- Care must be taken throughout the construction phase to minimise risks of runaway fires occurring; and
- The construction phase must be undertaken during the dry, winter months.

9.3 GEOLOGY AND SOILS

Description

A Desktop Geotechnical Assessment was compiled for the proposed project (Refer to **Appendix M**). The proposed dam site is underlain by alluvium, and shales and mudstones of the Adelaide Subgroup which is a subdivision of the larger Beaufort Group. These sediments have been locally intruded by Jurassic age dolerite. Winterton comprises soils with a 'N' value of 2, and is thus characterised by deep weathering soil profiles and a predominance of chemical weathering processes. The proposed dam site is underlain by alluvium, colluvium and residual soils that are derived from the weathering of the underlying shale and mudstone. Soil thickness of these soils is expected to extend to at least 1.5 m below the existing ground level.

A Phase 1 Paleontological Impact Assessment was compiled for the proposed project (Refer to **Appendix O**). The geology identified within the proposed study sites was identified to comprise dolerite, Late Permian deposits of the Beaufort Group and Quaternary alluvial deposits. An Agricultural Potential and Impact Assessment was compiled for the proposed project (Refer to **Appendix N**). Due to the visible changes in the soil character within the proposed dam site, 61 soil profiles were assessed. The proposed dam site was identified to comprise soils of the Pietermaritzburg Formation of the Ecca Group of the Karoo Sequence. Towards the east from the proposed dam site significant dolerite intrusions were identified which has resulted in the presence of high yield potential soils. The Pietermaritzburg Formation has weathered to dark grey shale, siltstone and subordinate sandstone, which has resulted in Mispah, Bonheim and Mayo soils onsite. A Freshwater Ecosystem Assessment was compiled for the proposed project (Refer to **Appendix B**). The wetland systems were identified to comprise dark grey (10 year 4/1), dark greyish brown (10 year 4/2), and grey (10 year 5/1) soils within 50 cm of the ground surface, with the presence of yellowish brown (10 year 5/8) mottles. A Wetland Assessment was compiled for the proposed project (Refer to **Appendix K**). The underlying geology within the proposed cultivation sites comprises Mudstone with clay and loamy soils that are shallow, duplex and of a moderate to poor drainage that may present an erosion hazard is not managed correctly.

Implication / Risk / Impact

- Construction activities in areas of instability, irresponsible design and construction methods, and the use of inappropriate materials have the potential to result in the cracking or collapse of dam walls. This in turn has significant environmental and financial consequences;
- Topsoil which is stockpiled during the construction phase has the potential to be wind-blown, thus causing dust nuisances;
- Clearing of vegetation, stockpiling of material and construction activities have the potential to result in increased surface runoff, soil erosion and sedimentation of surrounding water resources;
- Soil disturbance has the potential to result in the encroachment of alien invasive vegetation;
- Potential exists for high intensity rainstorm events to cause severe soil erosion at the proposed study sites;
- There is potential for failure of the dam wall if it is not maintained;
- During the dry winter months, there is an increased risk for runaway fires. Thus, care must be taken throughout the construction phase to minimise these risks; and

- A detailed Geotechnical Assessment must be compiled prior to the construction phase commencing to confirm the findings of the Desktop Geotechnical Assessment.

Mitigation / Recommendations

- Appropriate mitigation measures must be implemented to minimise the area of soil disturbance and the potential for mobilisation of bare areas;
- Portions of the low lying areas were identified to be characterised by Bonheim soils which tend to comprise a high moisture content, thus careful management of the agricultural activities and irrigation will be required;
- Soil erosion control measures must be implemented where necessary (Refer to **Appendix P**);
- Stockpiled topsoil must be dampened or covered during times of high wind to prevent dust nuisances;
- Vegetation must remain intact where possible to limit high surface flows and mobilisation of sediment;
- Alien invasive vegetation clearing, rehabilitation and revegetation of disturbed areas must be undertaken regularly;
- Planting of non-indigenous vegetation species must be prohibited;
- Dust suppression measures, such as spraying of water on bare soil, must be undertaken during dry, windy conditions; and
- Measures must be taken to cover exposed areas during high intensity rainfall events.

9.4 SURFACE WATER AND WETLAND SYSTEMS

Description

A Freshwater Ecosystem Assessment was compiled for the proposed dam site (Refer to **Appendix B**). The proposed dam site falls within the V13D quaternary catchment and the Pongola to Mtamvuna WMA. According to the available NFEPA wetland system coverage, there are no high priority FEPA wetland systems located within the proposed study site (Refer to **Figure 1**). However, there are several low priority artificial FEPAs which coincide with dams within the surrounding area. The Lindequespruit River is identified as a high priority FEPA river.

Multiple HGM units were identified within the proposed dam site and include four hillslope seepage wetland systems and one depression wetland system. Six riparian channels were also identified within the proposed dam site (Refer to **Figure 12**). The Lindequespruit River is the major system which drains the immediate catchment and can be classified as an upper foothills stream (Riparian channel 1). Riparian channel 2 is a major tributary of the Lindequespruit River. Riparian channel 3, 4 and 5 are small tributaries of riparian channel 2. Riparian channel 3 and 4 are first order streams and riparian channel 5 is a second order stream. Riparian channel 6 is a small tributary of the Lindequespruit River. It can be classified as a mountain stream.

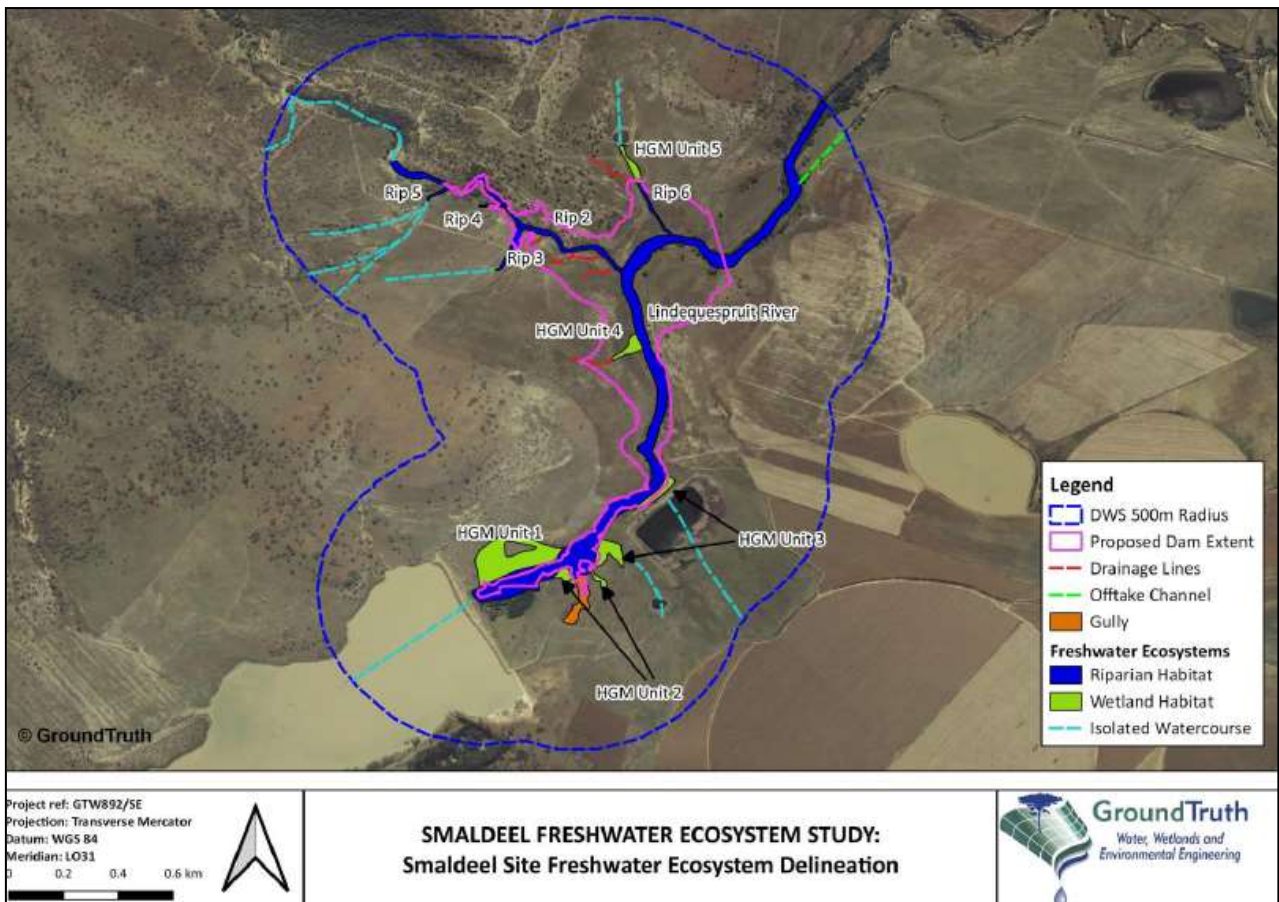


Figure 12: Freshwater ecosystems identified within a 500 m radius of the proposed study sites (Source: GroundTruth).

HGM unit 5 which is classified as a depression seepage wetland system is located at the head of riparian channel 6. This wetland system receives hydrological inputs predominantly from sub-surface inputs and is dominated by seasonal wetness. HGM unit 1 is classified as a depression seepage wetland system as majority of the hydrological inputs are received from seepage from surrounding slopes. The wetland system comprises a paleo-channel which is seasonally to permanently wet. The areas surrounding the ox-bow feature are characterised by temporary to seasonal wetness and they support a mixed grassy vegetation community. HGM unit 2 to 4 are hillslope seepage wetland systems that fringe the Lindequespruit River. They are similar in nature as they are smaller in size, occur on steep slopes and comprise of a mix of wetland vegetation species.

The proposed dam will result in the inundation of portions of the wetland systems, namely; 1 % of HGM unit 1, 2 % of HGM unit 2, 26 % of HGM unit 3, 100 % of HGM unit 4, and 10 % of HGM unit 5. This loss is considered limited based on the extent of the wetland systems. Although HGM unit 4 will be completely inundated, this wetland system is only 0.32 ha in extent, and thus its current contribution to ecosystem service provision is limited. The largest anticipated loss of ecosystem service provision is associated with biodiversity maintenance as a result of the direct flooding of wetland habitat. Other losses include water quality enhancement due to the loss of vegetation cover. The proposed dam will result in the loss of 0.3 ha equivalents of wetland habitat, and the wetland habitat is likely to function at approximately 78 % in the

post-development scenario. Based on the above, rehabilitation measures are not required to be implemented to mitigate the impacts on the wetland habitat. However, in this case, the impacts on the wetland habitat are limited to a loss of 0.3 ha equivalents of wetland habitat. Since it is challenging to rehabilitate small wetland areas and a large amount of money is invested for limited ecological gain, the relevant rehabilitation measures have been explained below. This approach provides a functional area of wetland habitat within the surrounding area.

A Wetland Assessment was compiled for the proposed cultivation sites (Refer to **Appendix K**). Based on historical imagery (1937 is the earliest), the proposed cultivation sites have been historically cultivated and grazed by livestock (Refer to **Figure 17**). The identified erosion gullies have not expanded overall over the years and are stable with good vegetation establishment. More recent imagery reveals that cultivation and livestock grazing has increasingly ceased, potentially due to the establishment of Glen Gray Dam or a potential land claim process. Since the Applicant has recently purchased the farm, a management regime has been undertaken which has resulted in annual fire breaks and selected burning of previously cultivated lands. These activities resulted in the establishment of wetland systems and erosion gullies within the low lying areas of the proposed study site.

Although 19 HGM units were identified within a 500 m radius of the proposed study site, only five HGM units were identified within the proposed cultivation sites (Refer to **Figure 13**). HGM unit 1 to 4 are classified as seepage wetland systems. They are situated within the low lying areas of the proposed study site and receive majority of water inputs from subsurface flows. During heavy rainfall, overflow is directed to these low lying areas which is received by the wetland systems. Several drainage lines which are directed to the wetland systems has resulted in flow input confinement and an increase in velocity which has resulted in erosional and depositional impacts. Intersections of access roads has also resulted in impacts associated with increased water inputs. HGM unit 5 has not been significantly impacted apart from some alteration to the upper catchment and being bounded by an access road which has resulted in some reduced hydrological flow.

Should the proposed recommendations and mitigation measures be implemented, the impacts are considered to be 'low' and will not detrimentally impact on the wetland systems. Given the abovementioned information, a 20 m buffer has been proposed to be implemented (Refer to **Figure 14**). Please note that the proposed cultivation sites have been realigned to fall outside of the recommended 20 m buffer.

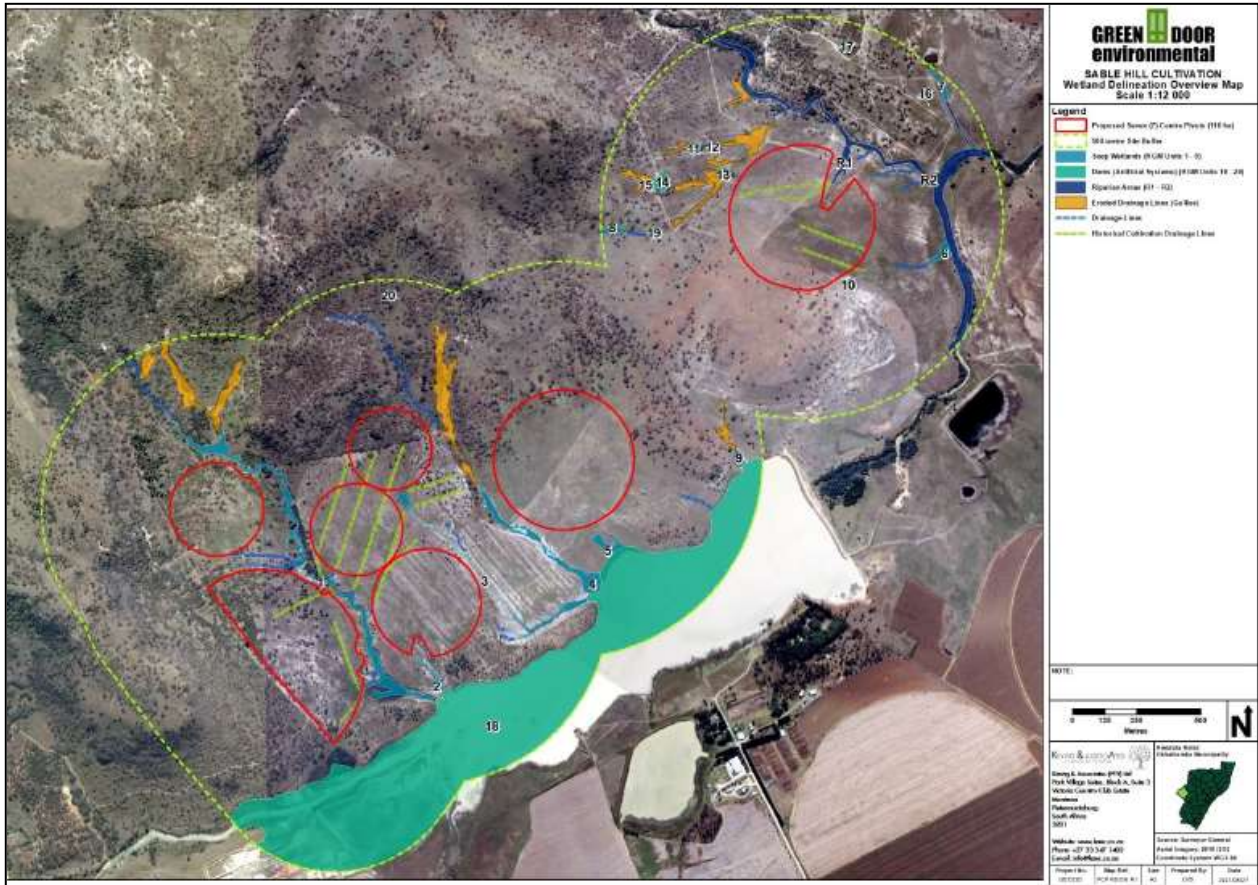


Figure 13: Map showing the identified wetland systems (Source: Kinvig and Associates).



Figure 14: Map showing the proposed 20 m wetland system buffer (Source: Google Earth).

Implication / Risk / Impact

- Loss of 0.3 ha equivalents of wetland habitat;
- Loss of ecosystem services associated with the wetland habitat;
- Destruction and degradation of adjacent and downstream wetland habitat;
- Hydrological and geomorphic impacts to downstream aquatic resources i.e. reduced water inputs, water contamination, siltation, pollution and reduced sediment transport and erosion downstream;
- Pollution as a result of runoff entering into the watercourses during the construction phase;
- Soil disturbance has the potential to result in the encroachment of alien invasive vegetation, and the loss of natural habitat for fauna and flora;
- Vegetation clearing, stockpiling of material and construction activities have the potential to result in increased surface runoff, erosion and sedimentation of surrounding watercourses; and
- Excavation of a trench intersecting the wetland systems for the proposed pipeline.

Mitigation / Recommendations

- A 1 ha portion of the dams fringe must be manipulated and managed to ensure that an indigenous wetland vegetation community is established and maintained. Wetland vegetation will establish along the dams fringe in areas that are shallow enough for the vegetation to survive (Refer to **Figure 15**);
- A 2 m wide terrace must be constructed on the dams fringe to provide shallow water for the establishment of wetland vegetation (less than 0.3 m in depth) (Refer to **Figure 16**);

- Construction vehicles and equipment must be maintained on a regular basis;
- The construction site must be demarcated and designated entry and exit points must be provided;
- Overnight parking and storage areas must be demarcated;
- Washing of construction vehicles and equipment must be undertaken within designated and bunded areas;
- Drip trays must be used by all construction vehicles and equipment to prevent spillage of harmful substances;
- All harmful substances must be stored appropriately, and all containers must be inspected on a regular basis for leaks. Should a leak occur, the source must be isolated and the spill contained. Contaminated soil must be disposed of appropriately;
- Appropriate mitigation measures must be implemented to minimise the area of soil disturbance and the potential for mobilisation of bare areas;
- Soil erosion control measures must be implemented where necessary (Refer to **Appendix P**);
- Vegetation must remain intact where possible to limit high surface flows and mobilisation of sediment;
- Alien invasive vegetation clearing, rehabilitation and revegetation of disturbed areas must be undertaken regularly;
- The proposed cultivation sites must fall outside of the recommended 20 m buffer and the buffer must be rehabilitated and revegetated;
- Eroded areas must be monitored and controlled, and repaired where applicable to prevent headward erosion;
- Shaping of the proposed cultivation sites must ensure that no preferential water flow paths are created and that overland flow is distributed as diffusely as possible;
- The proposed pipelines must be installed along the access road intersections and must take place within the immediate adjacent area and on the downstream portion of the access roads;
- Installation of the proposed pipeline within the wetland system and associated 20 m buffer must be restricted to an established 2 m construction right of way corridor. These areas must be hand excavated and the right of way must be as narrow and constrained as possible;
- The proposed pipeline trenches intersecting the wetland systems must not be left excavated for more than two days, and all activities within these areas must be completed as soon as possible;
- Reinstatement of the soils must occur with the returned soils to the same levels prior to the proposed pipeline trenching and installation activities being undertaken;
- The proposed project must be undertaken during the times of low rainfall or dry periods;
- The *Populus alba* stand onsite must be removed and revegetation with a suitable wetland vegetation must be undertaken; and
- The erosion gullies must be monitored and mitigation measures implemented to prevent their degradation.



Figure 15: Example of the establishment of wetland vegetation on a dam fringe terrace area (Source: GroundTruth).



Figure 16: Example of the creation of a terrace on the dam fringe to allow for the establishment of wetland vegetation (Source: GroundTruth).

9.5 FAUNA

Description

A Biodiversity Assessment was compiled for the proposed project (Refer to **Appendix I**). Based on the samples taken in the Lindequespruit River, *Clarias gariepinus* was identified at the downstream sample site. Based on data, the following additional fish species have the potential to occur within the Lindequespruit River, namely; *Barbus natalensis*, *Barbus trimaculatus*, *Clarias gariepinus*, *Labeo molibdenus* and *Oerochromis mossambicus*, *Labeobarbus polylepis* and *Cyprinus carpio*. The commonly encountered fish species have the potential to adapt to the lacustrine environment that will be associated with the proposed dam.

A Baseline Aquatic Assessment was compiled for the proposed project (Refer to **Appendix J**). Based on the fish species recordings within the area, only one fish species has been recorded approximately 5.5 km east of the Lindequespruit River, namely the *Cyprinus carpio*. Other fish species likely to occur within the Lindequespruit River include *Anguilla mossambica*, *Amphilius natalensis*, *Enteromius anoplus*, *Labeobarbus natalensis*, *Clarias gariepinus*, *Cyprinus carpio*, *Labeo rubromaculatus* and *Oreochromis mossambicus*. *Cyprinus carpio*, *Labeo rubromaculatus* and *Oreochromis mossambicus* have a conservation status of vulnerable.

The aquatic ecosystem identified within the proposed study sites was representative of a modified system in terms of the biota present as they were recorded to be in a seriously modified ecological condition. This altered stream flow and associated change in instream habitat and lack of diversity of macroinvertebrate communities is linked to impoundments such as dams, weirs and bridges, agricultural activities, as well as the outcomes of the Index of Habitat Integrity (IHI) and Invertebrate Habitat Assessment (IHAS). Approximately 28 taxa were sampled, and the composition of taxa was dominated by environmentally tolerant species that have low sensitivity ratings, namely *Belostomatidae* and *Chironomidae*.

Many of the large terrestrial faunal species onsite are part of a wildlife management regime, indicated by the presence of game. *Otomys auratus* (vlei rat) and *Aonyx capensis* (Cape clawless otter) were identified as 'near threatened' mammals which have the potential to occur within the proposed study sites. However, it is unlikely that these species would be impacted; on condition that the recommendations and mitigation measures are implemented. The proposed dam has the potential to benefit and promote the presence of these mammals. Although other mammals have the potential to occur within the proposed study sites, they are not considered of conservation importance, and the impacts associated with the loss of habitat will be minimal.

Approximately 197 bird species are associated with the proposed study sites. Birds associated with grassland environments have the potential to be impacted by the proposed project associated with the loss of habitat, namely; *Vanellinae* and *Macronyx capensis*. However, the proposed dam has the potential to serve as a compensatory mechanism for other birds. Approximately 33 reptiles are anticipated to be endemic to the area, and only two reptiles, namely; *Lycodonomorphus laevisissimus* and *Crocodylus*

niloticus are listed in the Red Data Book. The habitat associated with these reptiles will not be compromised by the proposed project. Approximately 17 amphibians have the potential to occur within the area and all of which are considered 'least concern'. *Breviceps adspersus* is a fossorial and wetland associated amphibian, and as such, may be impacted by the proposed project. However, from a broader perspective, the impact on amphibians is likely to be limited. A number of invertebrates are associated with the area which include dragonflies, butterflies and moths. Although these invertebrates are considered to be of 'least concern', the loss of terrestrial land associated with the proposed dam has the potential to have a minimal impact on the presence of these species. Most invertebrates directly associated with grassland habitat within the area are likely to relocate to other areas of similar habitat. *Opisthophthalmus praedo* (Tugela burrowing scorpion) is listed as 'protected', and it is not only difficult to locate this species, but it is unlikely to be successfully relocated. It is thus unlikely these this invertebrate will be impacted should the recommendations included in this Report be adhered to.

It is important to note that the existing Glen Gray Dam has resulted in the proposed dam site being subject to transformation which is associated with alterations to flood events, restrictions during low flow periods and changes in water flow and volumes etc., as well as alteration to the riverine and terrestrial habitats. As such and although the proposed dam is viewed as an expansion of the impacts on biodiversity arising from the Glen Gray Dam, the recommendations included in this Report will address such impacts.

Implication / Risk / Impact

- Disturbance and compaction of soils has the potential to result in the encroachment of alien invasive vegetation and the loss of natural habitat for faunal species;
- Alteration in the aquatic nature of a 4 km stretch of the Lindequespruit River from a lotic to a lacustrine environment;
- Migratory aquatic species such as *Labeobarbus sp*, may be impacted by the proposed dam which has the potential to result in further separation and loss of habitat; and
- Fossorial species are the most likely faunal species to be impacted by the proposed project.

Mitigation / Recommendations

- The founding of the Glen Gray Dam must be assessed as the wall was identified to be subject to under cutting with potential failure arising. The proposed dam has the potential to further exacerbate this under cutting;
- A fishway must be established on the wall of the proposed dam to allow for the migration of fish species upstream into the Glen Gray Dam;
- Due to the ecological threat posed by *Micropterus salmoides*, it is recommended that the proposed dam not be stocked with this fish species. Indigenous fish species of angling potential may be stocked following consultation with Ezemvelo KZN Wildlife;
- If long periods of flow obstruction is required, intermittent releases of water during period of flow must be undertaken;

- The EWR must be released from the proposed dam to ensure that the water quality and aquatic habitat is conserved; and
- A fishway or some sort of structure must be installed during the construction phase to allow for fish migration. A fish ladder or fish way are structures consisting of a series of interconnected pools, a channel fitted with flow-directing baffles, or similar devices that dissipate the energy of artificially induced high flowing water to the point that allows migrating fish to negotiate an upstream and downstream passage across the artificial barrier. They have traditionally consisted of a series of step-like pools that get progressively higher.

9.7 FLORA

Description

A Biodiversity Assessment was compiled for the proposed project (Refer to **Appendix I**). The proposed study sites fall within an area which is dominated by the Northern KwaZulu-Natal Moist Grassland vegetation type. This vegetation type is considered 'vulnerable' from a conservation perspective and impacts on this vegetation type are associated with agricultural activities, dams as well as urban development. The Lindequespruit catchment is considered to have a 'moderate' ecological sensitivity. It is important to note that although portions of the proposed cultivation sites fall within an 'optimal' CBA, this CBA is not 'irreplaceable' or 'environmentally sensitive'.

The proposed dam site comprises approximately 29 ha of graminoid and riparian environment. The riparian system associated with the Lindequespruit River is classified as 'critically modified', and this condition is associated with the high level of alien invasive vegetation along the riparian edge. The proposed dam site was identified to be dominated by *Populus candescens* and *Phragmites australis* which are alien invasive vegetation species. Other vegetation species identified include *Persicaria senegalensis* which is associated with high nitrate inundated environments, as well as secondary grasses which include *Hyparrhenia hirt.* *Acacia mearnsii* and *Lantana camara* were also identified within the proposed dam site.

The raised water table associated with the Glen Gray Dam has resulted in a change in nature of the proposed cultivation sites. As a result, these sites are dominated by a mosaic of wetland and mesic graminoid environments which have given rise to variable grassland habitat which comprises primarily of *Aristida congesta*, *Digitaria tricholaenoids*, *Eliomurus muticus*, *Eragrostic racemosa*, *Harpochloa falx* and *Hyparrhenia hirta*. Other graminoids associated with the proposed cultivation sites include *Themeda triandra*, *Echinocloa colona* and *Tristachya leucothrix*. Sound management, burning regimes and clearing of alien invasive vegetation was noted within the proposed cultivation sites primarily for improving veld conditions for the game. As such, proposed cultivation sites will result in minimal impacts on biodiversity within the area, and although they may result in the loss of a mosaic of mesic and moist grassland, the proposed dam will compensate or offset for this loss through the establishment of a similar habitat.

Agricultural Potential and Impact Assessments were compiled for the proposed project (Refer to **Appendix N**). The northern banks of the Lindequespruit River comprise poor quality grasses that grow on sandy and

steep slopes. The southern banks of the river comprise shallow steep soils, as well as areas of gently sloping open veld which is currently being grazed by game. The proposed dam site was identified to fall within the UVc2 Winterton Bio-Resource Unit (BRU) and Moist Tall Grassveld (BRG 12). The proposed cultivation sites fall within the Sub-Escarpment Grassland bioregion of the Grassland Biome (Gs 4). They are dominated by poor quality veld and scattered *Acacia sieberiana*, *Acacia savannah*, as well as poor quality grassland interspersed with *Acacia* trees.

The wetland systems were identified to be dominated by a mix of grass and sedge vegetation species. Wetter portions of the wetland systems comprises *Phragmites australis*, *Juncus effuses*, *Cyperus dives* and *Cyperus latifolius*. Alien invasive vegetation identified within the wetland systems included *Lantana camara*, *Ipomoea purpurea*, *Solanum mauritianum*, *Solanum viarum* and *Rubus cuneifolius*. A large stand of *Populus alba* was identified within HGM unit 1 which has resulted in a reduced stream flow.

Implication / Risk / Impact

- Vegetation clearing has the potential to result in soil being wind-blown, and generating dust nuisances;
- Vegetation clearing along with high intensity rainfall, have the potential to result in increased surface runoff, erosion and sedimentation of surrounding water resources;
- Disturbance and compaction of soils has the potential to result in the encroachment of alien invasive vegetation and the loss of natural habitat for floral communities;
- Clearing of vegetation, stockpiling of material and construction activities have the potential to result in increased surface runoff, soil erosion and sedimentation of surrounding water resources;
- Inundation of primarily exotic, woody habitat, and associated loss of channel banks and grassland habitat;
- Alteration in the aquatic nature of a 4 km stretch of the Lindequespruit River from a lotic to a lacustrine environment;
- Change in the riverine habitat downstream of the proposed dam site due to change in flow velocities and water volumes;
- The loss of primarily graminoid habitat surrounding the proposed cultivation sites has the potential to result in minor change in habitat; and
- Alteration of the wetland environments through regular irrigation have the potential to alter surface runoff chemistry and indirectly impact on faunal species and the ethos of the Lindequespruit River.

Mitigation / Recommendations

- Vegetation must remain intact where possible to limit high surface flows and mobilisation of sediment;
- Alien invasive vegetation clearing, rehabilitation and revegetation of disturbed areas must be undertaken regularly;
- Planting of non-indigenous vegetation species must be prohibited; and
- The Alien Invasive Vegetation Management Programme must be implemented (Refer to **Appendix P**).

9.7 FIRE MANAGEMENT

Description

As the proposed study sites are located within an area that experiences dry, winter months, and due to the highly flammable nature of veld, fires can be easily ignited by careless human activities and can spread very quickly and cause significant damage to the farms as well as surrounding properties.

Implication / Risk / Impact

- During the dry, winter months, there is an increased risk for runaway fires. Thus, care must be taken throughout the construction phase to minimise these risks; and
- Runaway fires have the potential to cause severe damage to the farms, as well as surrounding properties.

Mitigation / Recommendations

- During the operation phase, the proposed dam may potentially serve as a useful barrier to prevent fires from spreading as well as a source of water for fire fighting;
- Open fires must not be lit for cooking or heating purposes;
- The farm must have appropriate fire breaks and safety measures in place in terms of the National Veld and Forest Fire Act (Act No. 101 of 1998);
- All construction labour must be educated on methods to reduce the risks of fires and the procedures to follow on the occurrence; and
- Construction vehicles and equipment must be regularly checked for oil or fuel leaks.

10 ASSESSMENT OF ENVIRONMENTAL IMPACTS

In order to assess potential environmental issues associated with the proposed project, each aspect addressed in Section 8 and 9 have been given a qualitative rating in relation to its environmental impact (Refer to **Table 8**). Each aspect has been divided into a number of different classes, each of which has been assigned various criteria.

Where relevant, the following methods have been used to predict the characteristics of identified impacts:

- Professional judgement;
- Quantitative mathematical models;
- Experiments and physical models;
- Physical or visual simulations or maps (including GIS tools);
- Case studies; and
- Past experience.

Table 8: Summary of aspects used for assessing environmental impacts.

ASPECT	CLASS	CRITERIA
NATURE OF IMPACT	Positive	The impact on the environment will be positive.
	Negative	The impact on the environment will be negative.
	Direct	The impact is caused directly by the activity and generally occurs at the same time and at the place of the activity.
	Indirect	The impact induces changes that may occur as a result of the activity.
	Cumulative	The impact is a result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities.
OCCURRENCE OF IMPACT	Construction	The impact will happen during construction.
	Operation	The impact will happen during operation.
	Decommissioning	The impact will happen during decommissioning.
	Immediate	The impact will happen immediately
	Delayed	There will be a delay in the impact occurring.
PROBABILITY OF IMPACT OCCURRING (with mitigation)	Definitely	The impact will definitely occur even with mitigation (100%).
	Likely	It is likely that the impact will occur (60%-99%).
	Fair	There is a fair chance that the impact will occur (30% -59%).
	Unlikely	It is unlikely that the impact will occur (0% - 29%)
REVERSIBILITY (with mitigation)	Possible	It is possible to reverse the impact.
	Partly	It is partly possible to reverse the impact.
	Not possible	It is not possible to reverse the impact.
EXTENT OF IMPACT (with mitigation)	Site	The impact will be limited to the site.
	Local	The impact will affect the local area (within a radius of 40km).
	Provincial	The impact will affect areas beyond the site but within the boundaries of the province.
	National	The impact will affect areas beyond the province but within the boundaries of South Africa.

DURATION (with mitigation)	Short-term	0-5 years (construction phase).
	Medium-term	5-40 years (construction and operation).
	Long-term	(>40 years).
	Permanent	Permanent damage to the environment.
SIGNIFICANCE OF IMPACT WITHOUT MITIGATION	Low	Small impact / disturbance.
	Medium	Moderate impact / disturbance expected.
	High	Significant impact / disturbance expected.
SIGNIFICANCE OF IMPACT POST- MITIGATION	Low	Small impact / disturbance.
	Medium	Moderate impact / disturbance expected.
	High	Significant impact / disturbance expected.

Table 9 lists potential impacts associated with the proposed project, and details what mitigation measures must be undertaken to minimise these impacts.

Table 9: Assessment of potential impacts associated with the proposed project.

DESCRIPTION OF IDENTIFIED ENVIRONMENTAL IMPACT	MITIGATION	NATURE OF IMPACT	DEGREE TO WHICH IMPACT CAN BE MITIGATED	PROBABILITY OF IMPACT OCCURRING		REVERSIBILITY OF IMPACT		EXTENT OF IMPACT		DURATION OF IMPACT		SIGNIFICANCE OF IMPACT WITHOUT MITIGATION	SIGNIFICANCE OF IMPACT WITH MITIGATION
				WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION		
<p>CORONA VIRUS COVID-19) PANDEMIC</p> <ul style="list-style-type: none"> Both temporary and permanent jobs will be created during the planning, construction and operational phase of the proposed project; With the increased water storage and availability, and additional lands, there will be sufficient capacity to irrigate lands during the dry months, and sufficient grazing and fodder for livestock; Not only will the proposed project ensure the farms long-term sustainability through increased yields, and crops and livestock production, as well as increased employment opportunities, it will also result in positive knock on effects to the surrounding population and the local economy; Crops and livestock will be sold to surrounding businesses whereby it will be packaged and processed to feed the surrounding population; and As such, although the pandemic has been and will continue to be widespread, the proposed project will play a beneficial role in alleviating its impacts within the surrounding area. 	<ul style="list-style-type: none"> Local businesses and unemployed people in the immediate area must be considered first, before employing labour and services from further afield; and Where possible, any additional employment opportunities on the farms must include labour from surrounding local communities. 												

DESCRIPTION OF IDENTIFIED ENVIRONMENTAL IMPACT	MITIGATION	NATURE OF IMPACT	DEGREE TO WHICH IMPACT CAN BE MITIGATED	PROBABILITY OF IMPACT OCCURRING		REVERSIBILITY OF IMPACT		EXTENT OF IMPACT		DURATION OF IMPACT		SIGNIFICANCE OF IMPACT WITHOUT MITIGATION	SIGNIFICANCE OF IMPACT WITH MITIGATION
				WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION		
<p>LOCAL ECONOMY AND EMPLOYMENT OPPORTUNITIES</p> <ul style="list-style-type: none"> During the construction phase, the proposed project will contribute positively to the local economy and the social environment through spending of capital at local businesses; A number of temporary employment opportunities will be generated during the planning phase, which includes Engineers and Specialists; A number of temporary employment opportunities will also be generated during the construction phase, which includes Engineers, contractors and labour (skilled, semi-skilled and unskilled labour); To allow for livestock herds to expand and to obtain maximum crop yields, there needs to be both lands and water available; With the increased water storage and availability, and additional lands, there will be sufficient capacity to irrigate lands during the dry months, and sufficient grazing and fodder for livestock; The proposed project will ensure the long-term sustainability of both farms, through increased yields, and crop and livestock production, as well as increased employment opportunities. This in turn will result in skills development, income generation and improved quality of life. It will also result in positive knock on effects to the surrounding population and the local economy; Crops and livestock will be sold to surrounding businesses whereby it will be packaged and processed to feed the surrounding population; During the operational phase, the proposed project will provide job security for approximately 60 labour employed on the farm; and In KwaZulu-Natal, one job supports seven dependents. Thus, approximately 420 additional labour will benefit from the proposed project, as well as their dependents. 	<ul style="list-style-type: none"> Local businesses and unemployed people in the immediate area must be considered first, before employing labour and services from further afield; and Where possible, any additional employment opportunities on the farms must include labour from surrounding local communities. 	<p>Positive Direct</p>	-	Definite	Definite	-	-	Local	Local	Short-term during Construction Medium-term during Operation	Short-term during Construction Medium-term during Operation	High Positive	High Positive

DESCRIPTION OF IDENTIFIED ENVIRONMENTAL IMPACT	MITIGATION	NATURE OF IMPACT	DEGREE TO WHICH IMPACT CAN BE MITIGATED	PROBABILITY OF IMPACT OCCURRING		REVERSIBILITY OF IMPACT		EXTENT OF IMPACT		DURATION OF IMPACT		SIGNIFICANCE OF IMPACT WITHOUT MITIGATION	SIGNIFICANCE OF IMPACT WITH MITIGATION
				WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION		
<p>NEED AND DESIRABILITY</p> <ul style="list-style-type: none"> During the construction phase, the proposed project will contribute positively to the local economy and the social environment; A number of temporary employment opportunities will be generated during the planning phase; A number of temporary employment opportunities will also be generated during the construction phase; To allow for livestock herds to expand and to obtain maximum crop yields, there needs to be both lands and water available; With the increased water storage and availability, and additional lands, there will be sufficient capacity to irrigate lands during the dry months, and sufficient grazing and fodder for livestock; The proposed project will ensure the long-term sustainability of both farms, through increased yields, and crop and livestock production, as well as increased employment opportunities. This in turn will result in skills development, income generation and improved quality of life; Crops and livestock will be sold to surrounding businesses whereby it will be packaged and processed to feed the surrounding population; During the operational phase, the proposed project will provide job security for approximately 60 labour employed on the farm; and In KwaZulu-Natal, one job supports seven dependents. Thus, approximately 420 additional labour will benefit from the proposed project, as well as their dependents; There is sufficient water available in the catchment for the proposed dam, as well as to sustain the EWR; and The proposed dam will result in the creation of wetland systems, thus faunal, floral and aquatic communities benefit. 	<ul style="list-style-type: none"> Local businesses and unemployed people in the immediate area must be considered first, before employing labour and services from further afield; Where possible, any additional employment opportunities on the farm must include labour from surrounding local communities; and The required water volumes must be released from the proposed dam as stipulated by the DWS in the conditions of the WUL. 	Positive Direct and Indirect	-	Definite	Definite	-	-	Local	Local	Short-term during Construction Medium-term during Operation	Short-term during Construction Medium-term during Operation	High Positive	High Positive

DESCRIPTION OF IDENTIFIED ENVIRONMENTAL IMPACT	MITIGATION	NATURE OF IMPACT	DEGREE TO WHICH IMPACT CAN BE MITIGATED	PROBABILITY OF IMPACT OCCURRING		REVERSIBILITY OF IMPACT		EXTENT OF IMPACT		DURATION OF IMPACT		SIGNIFICANCE OF IMPACT WITHOUT MITIGATION	SIGNIFICANCE OF IMPACT WITH MITIGATION
				WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION		
<p>PLANNING INITIATIVES</p> <ul style="list-style-type: none"> The proposed project complies with all of the above Planning Initiatives, most notably the generation of employment opportunities, job security and investment in the agricultural sector; and The uThukela District Municipality is predominantly rural in nature, with a low density of roads and public transport, and low levels of education; and The Okhahlamba Local Municipality and surrounding local communities thus relies disproportionately on the agricultural sector for the generation of employment opportunities and the associated skills development, income generation and improved quality of life. 	<p>None.</p>	<p>Positive Direct and Indirect</p>	-	Definite	Definite	-	-	Local	-	Medium-term & long-term	Medium-term & long-term	High Positive	High Positive
<p>CULTURAL AND HISTORICAL RESOURCES</p> <ul style="list-style-type: none"> Stoned walled Later Iron Age sites were identified surrounding the proposed cultivation sites; Although a graveyard was identified within the area, it is not located near to the proposed study sites; and Although no fossil material was identified within the proposed study sites, there is potential for fossil material to be identified within the surrounding area; 	<ul style="list-style-type: none"> A buffer of 20 m must be implemented around each Later Iron Age site; Robbing of stone circles must be prohibited; Attention is drawn to the National Heritage Resources Act (Act No. 25 of 1999) which requires that projects that expose archaeological or historical remains should cease immediately, pending evaluation by Amafa KwaZulu-Natal; Fossiliferous bedrock must be avoided for the establishment of the dam wall, and dolerite which is non-fossiliferous must be used (i.e. grey areas) (Refer to Figure 11); A Phase 2 Paleontological Impact Assessment must be undertaken during the construction phase of the proposed project to monitor any potential fossil material which may be excavated; and If palaeontological resources are identified during the construction phase, construction activities must cease immediately. A Palaeontologist must be informed and will be required to conduct a site inspection to evaluate palaeontological resources before the construction phase may continue. 	<p>Negative Direct</p>	Highly likely	Unlikely	Unlikely	Possible	Possible	Site & local	Site & local	Medium-term	Medium-term	Med	Low

DESCRIPTION OF IDENTIFIED ENVIRONMENTAL IMPACT	MITIGATION	NATURE OF IMPACT	DEGREE TO WHICH IMPACT CAN BE MITIGATED	PROBABILITY OF IMPACT OCCURRING		REVERSIBILITY OF IMPACT		EXTENT OF IMPACT		DURATION OF IMPACT		SIGNIFICANCE OF IMPACT WITHOUT MITIGATION	SIGNIFICANCE OF IMPACT WITH MITIGATION	
				WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION			
SURROUNDING LANDUSE AND AESTHETICS	<ul style="list-style-type: none"> The proposed project is to take place on an existing and operational farm, thus it is in keeping with the surrounding land use and aesthetics; and It will not alter the sense of place of the area or have a significant visual impact. 	<ul style="list-style-type: none"> Alien invasive vegetation clearing, and rehabilitation and revegetation of disturbed areas must be undertaken regularly; The planting of non-indigenous vegetation species must be prohibited; and Noise and dust nuisances generated during the construction phase must be controlled. 	Negative Direct & Indirect	Partly	Definitely	Fair	Not Possible	Possible	Site & local	Site & local	Long-term	Medium-term	High	Low
TRAFFIC, ROADS AND ACCESS	<ul style="list-style-type: none"> There is potential for a minimal increase in traffic during the construction phase; Excessive speed poses a threat to both road users and fauna; and Increased use of the access roads on the farms may result in accelerated deterioration. 	<ul style="list-style-type: none"> Vehicles accessing the proposed study sites must be driven cautiously and within the required speed limits; and Maintenance of access roads on the farm must be undertaken as and when necessary. 	Negative Direct	Partly	Definitely	Definitely	Partly	Possible	Site & local	Site & local	Short-term during Construction	Medium-term during Operation	High	Low
CONSTRUCTION ACTIVITIES, NOISE AND DUST NUISANCES	<ul style="list-style-type: none"> It is unlikely that the level of noise and dust nuisances generated during the construction phase will negatively impact on surrounding landowners, as there are none in close proximity. 	<ul style="list-style-type: none"> Construction activities must be limited to regular working hours (Monday to Saturday, 07h00 to 17h00), and construction on public holidays must not be permitted; Construction vehicles and equipment must be maintained and regularly serviced to ensure that unnecessary noise nuisances are prevented; Construction labour onsite must not generate unnecessary noise such as hooting or shouting; Dust suppressions measures, such as spraying of water on bare soil, must be undertaken during dry and windy conditions; and Vehicles accessing the proposed study sites must be driven cautiously within the required speed limits. 	Negative Direct	Partly	Definitely	Fair	Partly	Partly	Site & local	Site & local	Short-term during Construction	Medium-term during Operation	Med	Low

DESCRIPTION OF IDENTIFIED ENVIRONMENTAL IMPACT	MITIGATION	NATURE OF IMPACT	DEGREE TO WHICH IMPACT CAN BE MITIGATED	PROBABILITY OF IMPACT OCCURRING		REVERSIBILITY OF IMPACT		EXTENT OF IMPACT		DURATION OF IMPACT		SIGNIFICANCE OF IMPACT WITHOUT MITIGATION	SIGNIFICANCE OF IMPACT WITH MITIGATION	
				WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION			
AIR QUALITY AND SURFACE WIND	<ul style="list-style-type: none"> Potential exists for dust to be generated during the construction phase. However, dust nuisances are unlikely to impact on surrounding landowners. 	<ul style="list-style-type: none"> Dust suppressions measures, such as spraying of water on bare soil, must be undertaken during dry and windy conditions; and Vehicles accessing the proposed study sites must be driven cautiously within the required speed limits. 	Negative Direct	Partly	Definitely	Fair	Partly	Partly	Site & local	Site & local	during Construction Medium-term during Construction Medium-term during	Med	Low	
SECURITY	<ul style="list-style-type: none"> Potential exists for labour to trespass onto adjacent properties; and There is potential for crime in the area to increase during the construction phase, as a result of people seeking employment opportunities onsite. 	<ul style="list-style-type: none"> Local businesses and unemployed people in the immediate area must be considered first, before employing labour and services from further afield; Where possible, any additional employment opportunities on the farms must include labour from surrounding local communities; All construction labour must remain within the boundaries of the farms at all times; Access onsite and offsite must be controlled; The construction labour must be issued with name badges and clearly identifiable uniforms; and Attendance registers for construction labour and visitors must be kept throughout the construction phase. 	Negative Direct	Highly likely	Fair	Unlikely	Partly	Possible	Site & local	Site	Short-term during Construction. Medium-term during Operation	Short-term during Construction. Medium-term during Operation	Medium	Low
TOPOGRAPHY	<ul style="list-style-type: none"> The proposed dam site is the preferred option due to the natural topography of the area and the extent of the catchment; As such, this will allow for the proposed dam to be naturally contained and thus reduce the extent of earthworks required; The proposed cultivation sites are located in the preferred positions due to the natural topography of the land, and the quality of the soils, as well as being located outside of the identified sensitive areas (i.e. freshwater ecosystems and heritage sites); and Clearing of vegetation, stockpiling of material and construction activities have the potential to result in increased surface runoff, soil erosion and sedimentation of surrounding water resources. 	<ul style="list-style-type: none"> Nearby undisturbed areas must be protected from soil erosion by demarcating the construction site. No vehicular or pedestrian access must be allowed beyond the demarcated area; Soil erosion control measures must be implemented where necessary (Refer to Appendix P); Alien invasive vegetation clearing, and rehabilitation and revegetation of disturbed areas must be undertaken regularly; and The planting of non-indigenous vegetation species must be prohibited. 	Negative Direct and Indirect	Likely	Definitely	Unlikely	Partly	Possible	Site & local	Site	Medium-term	Short-term	Medium	Low

DESCRIPTION OF IDENTIFIED ENVIRONMENTAL IMPACT	MITIGATION	NATURE OF IMPACT	DEGREE TO WHICH IMPACT CAN BE MITIGATED	PROBABILITY OF IMPACT OCCURRING		REVERSIBILITY OF IMPACT		EXTENT OF IMPACT		DURATION OF IMPACT		SIGNIFICANCE OF IMPACT WITHOUT MITIGATION	SIGNIFICANCE OF IMPACT WITH MITIGATION
				WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION		
<p>CLIMATE</p> <ul style="list-style-type: none"> Topsoil which is stockpiled during the construction phase has the potential to be wind-blown, thus causing dust nuisances; Soil disturbance has the potential to result in the encroachment of alien invasive vegetation; Clearing of vegetation, stockpiling of material and construction activities have the potential to result in increased surface runoff, soil erosion and sedimentation of surrounding water resources; Potential exists for high intensity rainstorm events to cause severe soil erosion at the proposed study sites; and During dry and windy conditions, there is an increased risk for runaway fires. Thus, care must be taken throughout the construction phase to minimise these risks. 	<ul style="list-style-type: none"> Appropriate mitigation measures must be implemented to minimise the area of soil disturbance and the potential for mobilisation of bare areas; Soil erosion control measures must be implemented where necessary (Refer to Appendix P); Stockpiled topsoil must be dampened or covered during times of high wind to prevent dust nuisances; Vegetation must remain intact where possible to limit high surface flows and mobilisation of sediment; Alien invasive vegetation clearing, rehabilitation and revegetation of disturbed areas must be undertaken regularly; Planting of non-indigenous vegetation species must be prohibited; Dust suppression measures, such as spraying of water on bare soil, must be undertaken during dry and windy conditions; Measures must be taken to cover exposed areas during high intensity rainfall events; Care must be taken throughout the construction phase to minimise risks of runaway fires occurring; and The construction phase must be undertaken during the dry, winter months. 	<p>Negative Direct & Indirect</p>	<p>Partly</p>	<p>Likely</p>	<p>Fair</p>	<p>Partly</p>	<p>Possible</p>	<p>Site & Local</p>	<p>Site</p>	<p>Medium-term</p>	<p>Short-term</p>	<p>Medium</p>	<p>Low</p>

DESCRIPTION OF IDENTIFIED ENVIRONMENTAL IMPACT	MITIGATION	NATURE OF IMPACT	DEGREE TO WHICH IMPACT CAN BE MITIGATED	PROBABILITY OF IMPACT OCCURRING		REVERSIBILITY OF IMPACT		EXTENT OF IMPACT		DURATION OF IMPACT		SIGNIFICANCE OF IMPACT WITHOUT MITIGATION	SIGNIFICANCE OF IMPACT WITH MITIGATION
				WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION		
<p>GEOLOGY AND SOILS</p> <ul style="list-style-type: none"> Construction activities in areas of instability, irresponsible design and construction methods, and the use of inappropriate materials have the potential to result in the cracking or collapse of dam walls. This in turn has significant environmental and financial consequences; Topsoil which is stockpiled during the construction phase has the potential to be wind-blown, thus causing dust nuisances; Clearing of vegetation, stockpiling of material and construction activities have the potential to result in increased surface runoff, soil erosion and sedimentation of surrounding water resources; Soil disturbance has the potential to result in the encroachment of alien invasive vegetation; Potential exists for high intensity rainstorm events to cause severe soil erosion at the proposed study sites; There is potential for failure of the dam wall if it is not maintained; During the dry winter months, there is an increased risk for runaway fires. Thus, care must be taken throughout the construction phase to minimise these risks; and A detailed Geotechnical Assessment must be compiled prior to the construction phase commencing to confirm the findings of the Desktop Geotechnical Assessment. 	<ul style="list-style-type: none"> Appropriate mitigation measures must be implemented to minimise the area of soil disturbance and the potential for mobilisation of bare areas; Portions of the low lying areas were identified to be characterised by Bonheim soils which tend to comprise a high moisture content, thus careful management of the agricultural activities and irrigation will be required; Soil erosion control measures must be implemented where necessary (Refer to Appendix P); Stockpiled topsoil must be dampened or covered during times of high wind to prevent dust nuisances; Vegetation must remain intact where possible to limit high surface flows and mobilisation of sediment; Alien invasive vegetation clearing, rehabilitation and revegetation of disturbed areas must be undertaken regularly; Planting of non-indigenous vegetation species must be prohibited; Dust suppression measures, such as spraying of water on bare soil, must be undertaken during dry, windy conditions; and Measures must be taken to cover exposed areas during high intensity rainfall events. 	Negative Direct and Indirect	Partly	Definitely	Unlikely	Partly	Possible	Site & Local	Site	Medium-term	Short-term	Medium	Low

DESCRIPTION OF IDENTIFIED ENVIRONMENTAL IMPACT	MITIGATION	NATURE OF IMPACT	DEGREE TO WHICH IMPACT CAN BE MITIGATED	PROBABILITY OF IMPACT OCCURRING		REVERSIBILITY OF IMPACT		EXTENT OF IMPACT		DURATION OF IMPACT		SIGNIFICANCE OF IMPACT WITHOUT MITIGATION	SIGNIFICANCE OF IMPACT WITH MITIGATION
				WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION		
<p>SURFACE WATER AND WETLAND SYSTEMS</p> <ul style="list-style-type: none"> Loss of 0.3 ha equivalents of wetland habitat; Loss of ecosystem services associated with the wetland habitat; Destruction and degradation of adjacent and downstream wetland habitat; Hydrological and geomorphic impacts to downstream aquatic resources i.e. reduced water inputs, water contamination, siltation, pollution and reduced sediment transport and erosion downstream; Pollution as a result of runoff entering into the watercourses during the construction phase; Soil disturbance has the potential to result in the encroachment of alien invasive vegetation, and the loss of natural habitat for fauna and flora; Vegetation clearing, stockpiling of material and construction activities have the potential to result in increased surface runoff, erosion and sedimentation of surrounding watercourses; and Excavation of a trench intersecting the wetland systems for the proposed pipeline. 	<ul style="list-style-type: none"> A 1 ha portion of the dams fringe must be manipulated and managed to ensure that an indigenous wetland vegetation community is established and maintained (Refer to Figure 15); A 2 m wide terrace must be constructed on the dams fringe (Refer to Figure 16); Construction vehicles and equipment must be maintained on a regular basis; The construction site must be demarcated; Washing of construction vehicles and equipment must be undertaken within designated and bunded areas; Appropriate mitigation measures must be implemented to minimise the area of soil disturbance and the potential for mobilisation of bare areas; Soil erosion control measures must be implemented (Refer to Appendix P); Alien invasive vegetation clearing, rehabilitation and revegetation of disturbed areas must be undertaken regularly; The proposed cultivation sites must fall outside of the recommended 20 m buffer; Eroded areas must be monitored and controlled; Shaping of the proposed cultivation sites must ensure that no preferential water flow paths are created; The proposed pipelines must be installed along the access road intersections; Installation of the proposed pipeline within the wetland system and associated 20 m buffer must be restricted to an established 2 m construction right of way corridor. The proposed pipeline trenches intersecting the wetland systems must not be left excavated for more than two days; Reinstatement of the soils must occur with the returned soils to the same levels; The proposed project must be undertaken during the times of low rainfall or dry periods; The Popular alba stand onsite must be removed and revegetation with a suitable wetland vegetation must be undertaken; and The erosion gullies must be monitored and mitigation measures implemented 	Negative Direct and Indirect	Highly likely	Definitely	Fair	Partly	Possible	Site & local	Site	Long-term	Medium-term	High Negative	Low

DESCRIPTION OF IDENTIFIED ENVIRONMENTAL IMPACT	MITIGATION	NATURE OF IMPACT	DEGREE TO WHICH IMPACT CAN BE MITIGATED	PROBABILITY OF IMPACT OCCURRING		REVERSIBILITY OF IMPACT		EXTENT OF IMPACT		DURATION OF IMPACT		SIGNIFICANCE OF IMPACT WITHOUT MITIGATION	SIGNIFICANCE OF IMPACT WITH MITIGATION
				WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION		
<p>FAUNA</p> <ul style="list-style-type: none"> Disturbance and compaction of soils has the potential to result in the encroachment of alien invasive vegetation and the loss of natural habitat for faunal species; Alteration in the aquatic nature of a 4 km stretch of the Lindequespruit River from a lotic to a lacustrine environment; Migratory aquatic species such as Labeobarbus sp. may be impacted by the proposed dam which has the potential to result in further separation and loss of habitat; Fossorial species are the most likely faunal species to be impacted by the proposed project. 	<ul style="list-style-type: none"> The founding of the Glen Gray Dam must be assessed as the wall was identified to be subject to under cutting with potential failure arising. The proposed dam has the potential to further exacerbate this under cutting; A fishway must be established on the wall of the proposed dam to allow for the migration of fish species upstream into the Glen Gray Dam; Due to the ecological threat posed by Micropterus salmoides, it is recommended that the proposed dam not be stocked with this fish species. Indigenous fish species of angling potential may be stocked following consultation with Ezemvelo KZN Wildlife; If long periods of flow obstruction is required, intermittent releases of water during period of flow must be undertaken; The EWR must be released from the proposed dam to ensure that the water quality and aquatic habitat is conserved; and A fishway or some sort of structure must be installed during the construction phase to allow for fish migration. A fish ladder or fish way are structures consisting of a series of interconnected pools, a channel fitted with flow-directing baffles, or similar devices that dissipate the energy of artificially induced high flowing water to the point that allows migrating fish to negotiate an upstream and downstream passage across the artificial barrier. They have traditionally consisted of a series of step-like pools that get progressively higher. 	Negative Direct and Indirect	Likely	Definitely	Unlikely	Not possible	Partly	Site & Local	Site & Local	Medium-term	Short-term	High Negative	Low

DESCRIPTION OF IDENTIFIED ENVIRONMENTAL IMPACT	MITIGATION	NATURE OF IMPACT	DEGREE TO WHICH IMPACT CAN BE MITIGATED	PROBABILITY OF IMPACT OCCURRING		REVERSIBILITY OF IMPACT		EXTENT OF IMPACT		DURATION OF IMPACT		SIGNIFICANCE OF IMPACT WITHOUT MITIGATION	SIGNIFICANCE OF IMPACT WITH MITIGATION
				WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION		
<p>FLORA</p> <ul style="list-style-type: none"> Vegetation clearing has the potential to result in soil being wind-blown, and generating dust nuisances; Vegetation clearing along with high intensity rainfall, have the potential to result in increased surface runoff, erosion and sedimentation of surrounding water resources; Disturbance and compaction of soils has the potential to result in the encroachment of alien invasive vegetation and the loss of natural habitat for floral communities; Clearing of vegetation, stockpiling of material and construction activities have the potential to result in increased surface runoff, soil erosion and sedimentation of surrounding water resources; and Inundation of primarily exotic, woody habitat, and associated loss of channel banks and grassland habitat; Alteration in the aquatic nature of a 4 km stretch of the Lindequespruit River from a lotic to a lacustrine environment; Change in the riverine habitat downstream of the proposed dam site due to change in flow velocities and water volumes; The loss of primarily graminoid habitat surrounding the proposed cultivation sites has the potential to result in minor change in habitat; and Alteration of the wetland environments through regular irrigation have the potential to alter surface runoff chemistry and indirectly impact on faunal species and the ethos of the Lindequespruit River. 	<ul style="list-style-type: none"> Vegetation must remain intact where possible to limit high surface flows and mobilisation of sediment; Alien invasive vegetation clearing, rehabilitation and revegetation of disturbed areas must be undertaken regularly; Planting of non-indigenous vegetation species must be prohibited; The Alien Invasive Vegetation Management Programme must be implemented (Refer to Appendix P). 	Negative Direct and Indirect	Likely	Definitely	Unlikely	Not possible	Partly	Site & Local	Site & Local	Medium-term	Short-term	High Negative	Low

DESCRIPTION OF IDENTIFIED ENVIRONMENTAL IMPACT	MITIGATION	NATURE OF IMPACT	DEGREE TO WHICH IMPACT CAN BE MITIGATED	PROBABILITY OF IMPACT OCCURRING		REVERSIBILITY OF IMPACT		EXTENT OF IMPACT		DURATION OF IMPACT		SIGNIFICANCE OF IMPACT WITHOUT MITIGATION	SIGNIFICANCE OF IMPACT WITH MITIGATION
				WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION	WITHOUT MITIGATION	WITH MITIGATION		
<p>FIRE MANAGEMENT</p> <ul style="list-style-type: none"> During the dry, winter months, there is an increased risk for runaway fires. Thus, care must be taken throughout the construction phase to minimise these risks; and Runaway fires have the potential to cause severe damage to the farms, as well as surrounding properties. 	<ul style="list-style-type: none"> During the operation phase, the proposed dam may potentially serve as a useful barrier to prevent fires from spreading as well as a source of water for fire fighting; Open fires must not be lit for cooking or heating purposes; The farm must have appropriate fire breaks and safety measures in place in terms of the National Veld and Forest Fire Act (Act No. 101 of 1998); All construction labour must be educated on methods to reduce the risks of fires and the procedures to follow on the occurrence; and Construction vehicles and equipment must be regularly checked for oil or fuel leaks. 	Negative Direct and Indirect	Likely	Definitely	Unlikely	Not possible	Partly	Site & Local	Site & Local	Medium-term	Short-term	High Negative	Low

11 ENVIRONMENTAL MANAGEMENT PROGRAMME

In terms of the Regulations stated in Appendix 4 of Chapter 8 of the NEMA, GNR 326, an EMPr has been compiled which contains guidelines for ensuring that all activities associated with the proposed project are carried out in an environmentally responsible and acceptable manner (Refer to **Appendix P**). Specific management objectives and mitigation measures have been specified for the entire duration of the proposed project.

The EMPr is based on the principles of the NEMA as well as the recommendations made during both the Scoping Phase and the EIA Phase. It identifies roles and responsibilities of management personnel onsite, and will be used as a framework for environmental compliance monitoring and reporting, should the proposed project be authorised.

An EMPr is a legally-binding document that contains guidelines with which contractors must comply, and which must be strictly implemented and regularly monitored. If this is done, it is likely that the majority of the potentially adverse impacts associated with construction activities can be minimised or prevented. An ECO should be appointed by the Applicant to ensure compliance with the EMPr during the construction and operational phase of the proposed project. Should non-compliance occur, this must be brought to the attention of the DEDTEA who will conduct the required prosecution procedure.

Specific management objectives and mitigation measures are specified in the EMPr for the entire duration of the proposed project, including the following stages:

- Planning and design;
- Pre-construction and construction activities;
- Operation or undertaking of the activity;
- Rehabilitation of the environment; and
- Closure, where relevant.

The EMPr includes the following:

- Spill Contingency Plan;
- Alien Invasive Vegetation Management Programme;
- Erosion Control Measures; and
- Water Management Measures.

12 RECOMMENDATIONS

12.1 ENVIRONMENTAL IMPACT STATEMENT

12.1.1 Summary of key findings and recommendations

The following Specialist Studies have been compiled for the proposed project:

- Freshwater Ecosystem Assessment;
- Ecological Reserve Determination;
- Hydrological Assessment;
- Biodiversity Assessment;
- Baseline Aquatic Assessment;
- Wetland Assessment;
- Heritage Impact Assessment;
- Desktop Geotechnical Assessment;
- Agricultural Potential and Impact Assessments; and
- Paleontological Impact Assessment.

FRESHWATER ECOSYSTEM ASSESSMENT

A Freshwater Ecosystem Assessment was compiled for the proposed dam (Refer to **Appendix B**). The proposed dam site was identified to be dominated by the Northern KwaZulu-Natal Moist Grassland (Gs 4) vegetation type which occurs within the Sub-Escarpment Grassland (Gs) group 4 bioregion. This vegetation type is considered 'vulnerable'. The proposed dam site falls within the V13D quaternary catchment which experiences a MAP of 813.6 mm and a Potential Evapotranspiration of 1867.6 mm.

According to the available NFEPA wetland system coverage, there are no high priority FEPA wetland systems located within the proposed study site (Refer to **Figure 1**). However, there are several low priority artificial FEPAs which coincide with dams within the surrounding area. The Lindequespruit River is identified as a high priority FEPA river.

Multiple HGM units were identified within the proposed dam site and include four hillslope seepage wetland systems and one depression wetland system. Six riparian channels were also identified within the proposed dam site (Refer to **Figure 12**).

The wetland systems were identified to comprise dark grey (10 year 4/1), dark greyish brown (10 year 4/2), and grey (10 year 5/1) soils within 50 cm of the ground surface, with the presence of yellowish brown (10 year 5/8) mottles. The vegetation within the wetland systems was identified to be dominated by facultative, facultative positive and obligate wetland vegetation species, namely; *Cyperus spp.*, *Carex cf austro-africanus*, *Kyllinga erecta*, *Juncus effuses*, *Fimbristylis complanata*, *Phragmites australis*, *Imperata cylindrical* and *Hyparrhenia cf tamba*.

The Lindequespruit River is the major system which drains the immediate catchment and can be classified as an upper foothills stream (Riparian channel 1). The river is characterised by cobble and gravel dominated beds, bedrock dominated portions, steeper gradients, unvegetated channel walls, narrower riparian areas, as well as large alluvial flood levees and a shallower braided channel. Riparian channel 2 is a major tributary of the Lindequespruit River and is characterised by a relatively uniform channel morphology, with steep sided banks, and a flat bottom which sits on bedrock. Riparian channel 3, 4 and 5 are small tributaries of riparian channel 2. Riparian channel 3 and 4 are first order streams and riparian channel 5 is a second order stream. These smaller tributaries have been incised, and the eroded banks are infested with alien invasive vegetation. Riparian channel 6 is a small tributary of the Lindequespruit River. It can be classified as a mountain stream.

HGM unit 5 which is classified as a depression seepage wetland system is located at the head of riparian channel 6. This wetland system receives hydrological inputs predominantly from sub-surface inputs and is dominated by seasonal wetness. Impacts to the wetland system are associated with a dam, which reduces inputs into the wetland system. HGM unit 1 is classified as a depression wetland system as majority of the hydrological inputs are received from seepage from surrounding slopes. The wetland system comprises a paleo-channel which is seasonally to permanently wet. The areas surrounding the ox-bow feature are characterised by temporary to seasonal wetness and they support a mixed grassy vegetation community. HGM unit 2 to 4 are hillslope seepage wetland systems that fringe the Lindequespruit River. They are similar in nature as they are smaller in size, occur on steep slopes and comprise of a mix of wetland vegetation species. Hydrological inputs are received from sub-surface flows. Impacts to these HGM units are associated with the encroachment of alien invasive vegetation.

The proposed dam will result in the inundation of portions of the wetland systems, namely; 1 % of HGM unit 1, 2 % of HGM unit 2, 26 % of HGM unit 3, 100 % of HGM unit 4, and 10 % of HGM unit 5. This loss is considered limited based on the extent of the wetland systems. Although HGM unit 4 will be completely inundated, this wetland system is only 0.32 ha in extent, and thus its current contribution to ecosystem service provision is limited. The largest anticipated loss of ecosystem service provision is associated with biodiversity maintenance as a result of the direct flooding of wetland habitat. Other losses include water quality enhancement due to the loss of vegetation cover. Given the abovementioned information, approximately 4.5 ha of wetland habitat associated with the proposed dam is considered to be equivalent to 3.8 ha or 86 % of intact wetland habitat. The proposed dam will result in the loss of 0.3 ha equivalents of wetland habitat, and the wetland habitat is likely to function at approximately 78 % in the post-development scenario.

Based on the above, rehabilitation measures are required to be implemented to mitigate the impacts on the wetland habitat. However, in this case, the impacts on the wetland habitat are limited to a loss of 0.3 ha equivalents of wetland habitat. Since it is challenging to rehabilitate small wetland areas and a large amount of money is invested for limited ecological gain, the relevant rehabilitation measures have been explained below. This approach provides a functional area of wetland habitat within the surrounding area.

The following potential impacts are associated with the establishment of the proposed dam:

- Direct loss of freshwater ecosystem habitat;
- Loss of ecosystem services associated with the freshwater ecosystem habitat;
- Destruction and degradation of adjacent and downstream freshwater ecosystem habitat; and
- Hydrological and geomorphic impacts to downstream aquatic resources i.e. reduced water inputs, water contamination, siltation, pollution and reduced sediment transport and erosion downstream.

Mitigation / Recommendations

- A 1 ha portion of the dams fringe must be manipulated and managed to ensure that an indigenous wetland vegetation community is established and maintained. Wetland vegetation will establish along the dams fringe in areas that are shallow enough for the vegetation to survive (Refer to **Figure 15**);
- A 2 m wide terrace must be constructed on the dams fringe to provide shallow water for the establishment of wetland vegetation (less than 0.3 m in depth) (Refer to **Figure 16**);
- Alien invasive vegetation must be regularly cleared along the dams fringe;
- Construction vehicles and equipment must be maintained on a regular basis;
- The construction site must be demarcated and designated entry and exit points must be provided;
- Overnight parking and storage areas must be demarcated;
- Washing of construction vehicles and equipment must be undertaken within designated and bunded areas;
- Drip trays must be used by all construction vehicles and equipment to prevent spillage of harmful substances;
- All harmful substances must be stored appropriately, and all containers must be inspected on a regular basis for leaks. Should a leak occur, the source must be isolated and the spill contained. Contaminated soil must be disposed of appropriately; and
- Bare or disturbed areas must be rehabilitated and revegetated.

ECOLOGICAL RESERVE DETERMINATION AND WATER YIELD ANALYSIS

An Ecological Reserve Determination and Water Yield Analysis was compiled for the proposed project (Refer to **Appendix G**). The proposed study sites experience a MAP of 814 mm and a MAE of 1400 mm. The MAR for the V13D quaternary catchment was estimated to be 49 026 556 m³ / year. The MAR for the sub-catchment of the proposed dam equates to 27 788 156 m³ / year. Based on the category B classification of the quaternary catchment, the reserve requirements equate to 32.83 % or 16 095 418 m³ / year of the total MAR.

Based on water uses within the quaternary catchment, the total registered surface water abstractions total 19 294 041 m³ / year, and the total registered downstream water use totals 1 299 500 m³ / year. The maximum possible stream flow reduction due to the presence of alien invasive vegetation within the quaternary catchment equates to 640 100 m³ / year and was taken into consideration when modelling the yield of the proposed dam. The yield of the proposed dam was calculated to determine the volume of water that can be abstracted sustainably, and the overflow from upstream dams was taken into consideration

when determining this. As such, the total yield of the proposed dam was calculated to be 1 265 211 m³ / year with a 75 % assurance of supply. This dam yield accounts for evaporative losses from the surface of the proposed dam, releases to satisfy the EWR and proposed irrigation. The total releases or EWR for the proposed dam was calculated to be 3 314 687 m³ / year which is more than enough to meet the ecological requirements from the sub-catchment. The total overflow from the proposed dam was calculated to be 28 470 240 m³ / year which is sufficient to meet the needs of downstream water users (i.e. 1 299 500 m³ / year), as well as the EWR (i.e. 3 314 687 m³ / year) from the proposed dam.

Mitigation / Recommendations

- Care must be taken in the design of the proposed dam due to the dispersive nature of the soils within the upstream catchment; and
- A WULA must be undertaken in terms of the NWA.

HYDROLOGICAL ASSESSMENT

A Hydrological Assessment was compiled for the proposed project (Refer to **Appendix H**). The proposed study sites were identified to fall within the Koppen-Geiger Climate Classification zone Cwb. The 'Cw' is associated with a warm and temperate climate with a dry climate and the 'b' is associated with a warm summer. As such, the area is characterised by a wet summer and a temperate, and dry winter. The vegetation identified within the proposed study sites falls within the Savanna biome which is characterised by dispersed clusters of trees as well as a dominant grass layer.

The area experiences a MAP and MAE of 814 mm and 1400 mm respectively. The V13D quaternary catchment falls within a summer rainfall area where peak rainfall is experienced during December and January. The catchment drains a total area of 284 km² and lies at the foot of the Drakensberg Mountains. The MAR for the catchment was estimated to be 49 026 556 m³ / year.

The water balance reveals that there would be 28 470 240 m³ of water / year from the dam, which equates to 78 000 m³ / day, all of which will be allocated to agricultural activities or lost to evaporation and release of water to downstream water users.

Based on the delineated 1:50 year and 1:100 year flood lines, it is revealed that there is no impact on permanent structures along the Lindequespruit River. There is however, an existing dam and agricultural lands which will be submerged in the event of a 1:50 year or 1:100 year flood. These elements are not applicable to the proposed project.

Mitigation / Recommendations

Bi-annual water quality monitoring of the Lindequespruit River must be undertaken to determine the suitability of the water for irrigation purposes.

BIODIVERSITY ASSESSMENT

A Biodiversity Assessment was compiled for the proposed project (Refer to **Appendix I**). The proposed study sites fall within an area which is dominated by the Northern KwaZulu-Natal Moist Grassland vegetation type. This vegetation type is considered 'vulnerable' from a conservation perspective and impacts on this vegetation type are associated with agricultural activities, dams as well as urban development. The proposed study sites fall within the V13D quaternary catchment and the Upper Thukela River catchment. The Lindequespruit catchment is considered to have a 'moderate' ecological sensitivity. Although the surrounding area comprises some areas which are designated as Critical Biodiversity Areas (CBAs), the proposed study sites are not considered 'irreplaceable' or 'ecologically sensitive' CBAs.

The proposed dam site comprises approximately 29 ha of graminoid and riparian environment. The riparian system associated with the Lindequespruit River is classified as 'critically modified', and this condition is associated with the high level of alien invasive vegetation along the riparian edge. The proposed dam site was identified to be classified dominated by *Populus candescens* and *Phragmites australis* which are alien invasive vegetation species. *Populus candescens* alters the bed and banks of rivers, and disrupts the ecological function within these systems. *Phragmites australis* is indicative of environments which experience regular or continuous water flow. Other vegetation species identified include *Persicaria senegalensis* which is associated with high nitrate inundated environments, as well as secondary grasses which include *Hyparrhenia hirt.* *Acacia mearnsii* and *Lantana camara* were also identified within the proposed dam site.

Water quality at the two sample sites were identified to comprise high pH and electro conductivity which may be associated with recent high flows and erosion of bank materials. Oxygen levels were identified to be relatively low. Based on the water quality results and although evidence of contamination from surrounding land uses may arise, the water quality within the river is considered to be largely natural.

Clarias gariepinus was identified at the downstream sample site. Based on data, the following additional fish species have the potential to occur within the Lindequespruit River, namely; *Barbus natalensis*, *Barbus trimaculatus*, *Clarias gariepinus*, *Labeo molibdenus* and *Oerochromis mossambicus*. In addition to the abovementioned fish species, *Labeobarbus polylepis* and *Cyprinus carpio* have the potential to occur within the system. The commonly encountered fish species have the potential to adapt to the lacustrine environment that will be associated with the proposed dam. Although migratory fish species have the potential to be compromised as a result of the proposed dam, the Glen Gray Dam offers limited opportunity for a passage for fish species. With regards to macro-invertebrates, a 'poor' river health condition was recorded. However, this condition can be largely associated with recent high flows prior to the sampling being undertaken, as well as the deep channelled, mud bottom river which would not support a high macro-invertebrate diversity.

The proposed cultivation sites are underlain primarily by shale and sandstone, and erosion gullies have arisen from surface flow which has resulted in a variable edaphic. The raised water table associated with

the Glen Gray Dam has resulted in a change in nature of the proposed cultivation sites. As a result, these sites are dominated by a mosaic of wetland and mesic graminoid environments which have given rise to variable grassland habitat which comprises primarily of *Aristida congesta*, *Digitaria tricholaenoids*, *Eliomurus muticus*, *Eragrostic racemosa*, *Harpochloa falx* and *Hyparrhenia hirta*. Other graminoids associated with the proposed cultivation sites include *Themeda triandra*, *Echinocloa colona* and *Tristachya leucothrix*. Sound management, burning regimes and clearing of alien invasive vegetation was noted within the proposed cultivation sites primarily for improving veld conditions for the game. As such, the grassland is generally in a good condition with *Chamaecrista mimosoides* and *Oxalis sp* being the dominant species.

Many of the large terrestrial faunal species onsite are part of a wildlife management regime, indicated by the presence of game. *Otomys auratus* and *Aonyx capensis* were identified as 'near threatened' mammals which have the potential to occur within the proposed cultivation sites. However, it is unlikely that these species would be impacted; on condition that maintenance of the surrounding wetland systems and grassland takes place. The proposed dam has the potential to benefit and promote the presence of these mammals. Although other mammals have the potential to occur within the proposed study sites, they are not considered of conservation importance, and the impacts associated with the loss of habitat will be minimal.

Approximately 197 bird species are associated with the proposed study sites. Birds associated with grassland environments have the potential to be impacted by the proposed project associated with the loss of habitat, namely; *Vanellinae* and *Macronyx capensis*. However, the proposed dam has the potential to serve as a compensatory mechanism for other birds. Approximately 33 reptiles are anticipated to be endemic to the area, and only two reptiles, namely; *Lycodonomorphus laevissimus* and *Crocodylus niloticus* are listed in the Red Data Book. The habitat associated with these reptiles will not be compromised by the proposed project. Approximately 17 amphibians have the potential to occur within the area and all of which are considered 'least concern'. *Breviceps adspersus* is a fossorial and wetland associated amphibian, and as such, may be impacted by the proposed project. However, from a broader perspective, the impact on amphibians is likely to be limited. A number of invertebrates are associated with the area which include dragonflies, butterflies and moths. Although these invertebrates are considered to be of 'least concern', the loss of terrestrial land associated with the proposed dam has the potential to have a minimal impact on the presence of these species. Most invertebrates directly associated with grassland habitat within the area are likely to relocate to other areas of similar habitat. *Opisthophthalmus praedo* is listed as 'protected', and it is not only difficult to locate this species, but is it unlikely to be successfully relocated. As such, this species is likely to be directly impacted by the proposed project.

Given the abovementioned information, the following impacts associated with the proposed project have the potential to have direct and localised impacts on aquatic biodiversity and terrestrial diversity:

- Inundation of primarily exotic, woody habitat, and associated loss of channel banks and grassland habitat;

- Alteration in the aquatic nature of a 4 km stretch of the Lindequespruit River from a lotic to a lacustrine environment;
- Change in the riverine habitat downstream of the proposed dam site due to change in flow velocities and water volumes;
- Migratory aquatic species such as *Labeobarbus sp.*, may be impacted by the proposed dam which has the potential to result in further separation and loss of habitat;
- The loss of primarily graminoid habitat surrounding the proposed cultivation sites has the potential to result in minor change in habitat;
- Fossorial species are the most likely faunal species to be impacted by the proposed project; and
- Alteration of the wetland environments through regular irrigation have the potential to alter surface runoff chemistry and indirectly impact on faunal species and the ethos of the Lindequespruit River.

Although the proposed project has the potential to significantly alter the riparian environments associated with the area, while offering some level of habitat change within the existing graminoid environments; it is important to identify the level and significance of the impacts associated with the presence of the existing Glen Gray Dam. The Glen Gray Dam has resulted in the proposed dam site being subject to indirect transformation which is associated with changes in flood events, restrictions during low flow periods and changes in volumes, rates of flow and the alteration of water chemistry. It has significantly altered the riverine habitats and proximal terrestrial habitats within the area. As such, the impact of this dam and the proposed dam will have downstream impacts on aquatic biodiversity and terrestrial diversity far beyond the wall of the proposed dam. The implementation of the recommended mitigation measures will thus play a role in addressing these existing impacts which will merely be extended as a result of the establishment of the proposed dam.

The proposed cultivation sites will result in minimal impacts on biodiversity within the area, and although they may result in the loss of a mosaic of mesic and moist grassland, the proposed dam will compensate / offset for this loss through the establishment of a similar habitat.

Mitigation / Recommendations

- The founding of the Glen Gray Dam must be assessed as the wall was identified to be subject to under cutting with potential failure arising. The proposed dam has the potential to further exacerbate this under cutting;
- A fish ladder or some sort of by-pass must be established on the wall of the proposed dam to allow for the movement of fish species upstream into the Glen Gray Dam;
- Due to the ecological threat posed by *Micropterus salmoides*, it is recommended that the proposed dam not be stocked with this fish species. Indigenous fish species of angling potential may be stocked following consultation with Ezemvelo KZN Wildlife;
- Ongoing monitoring and clearing of alien invasive vegetation within the riparian environment must be undertaken;

- Water flow must be maintained during the construction phase through use of by-pass channels and attenuation features;
- Sediment trapping systems and flow dissipaters must be implemented downstream of the proposed dam site during the construction phase;
- Measures to prevent hydrocarbon contamination must be implemented i.e. drip trays, maintenance and inspection of construction vehicles and equipment; and
- The establishment of the proposed dam must take place during the winter months.

BASELINE AQUATIC ASSESSMENT

A Baseline Aquatic Assessment was compiled for the proposed project (Refer to **Appendix J**). The proposed study sites fall within the V13D quaternary catchment, Thukela WMA, the Upper Thukela sub-WMA and the North Eastern Uplands ecoregion (Ecoregion 14). Based on this ecoregion, the proposed study sites experience a warm and temperate climate.

The Lindequespruit River was identified to be the main drainage line within the proposed study sites, and falls within a FEPA which is classified as largely natural. However, the sub-quaternary reach of the Lindequespruit River is characterised by a moderately modified Present Ecological State (PES). The state of the reach is associated with impacts to instream habitat, moderated wetland and riparian zone modifications, moderate flow modifications and moderate potential impacts on water quality. The Ecological Importance Sensitivity (EIS) for the reach is considered high and very high respectively.

The proposed dam was estimated to receive a runoff from a 161 km² sub-catchment. The EWR for the quaternary catchment equates to 16 095 418 m³ / year of the total MAR.

Based on the fish species recordings within the area, only one fish species has been recorded approximately 5.5 km east of the Lindequespruit River, namely the *Cyprinus carpio*. Other fish species likely to occur within the Lindequespruit River include *Anguilla mossambica*, *Amphilius natalensis*, *Enteromius anoplus*, *Labeobarbus natalensis*, *Clarias gariepinus*, *Cyprinus carpio*, *Labeo rubromaculatus* and *Oreochromis mossambicus*. *Cyprinus carpio*, *Labeo rubromaculatus* and *Oreochromis mossambicus* have a conservation status of vulnerable.

Five sample sites were investigated to determine their suitability for the application of the South African Scoping System (SASS) protocol, however; the methodology could only be undertaken at two of the sample sites (i.e. FR01 and FR03). As such, visual information of the remaining sample sites was evaluated (i.e. FR02 and FR04). With regards to the water quality at the sample sites, it was noted that the pH values were slightly alkaline and this could be associated with agricultural activities as well as the natural geology of the area. The average temperatures measures at the sampling sites was 24.2 °C, and was not considered to be a limiting factor to aquatic biota. The Total Dissolved Solids (TDS) and Electrical Conductivity (EC) concentrations recorded were regarded as the summer baseline values for the proposed

project. The Dissolved Oxygen (DO) concentrations were recorded to be within acceptable limits for all the sampling sites and was not considered to be a limiting factor to aquatic biota.

In terms of the Index of Habitat Integrity (IHI), both the instream habitat and riparian habitat within the Lindequespruit River was classified as largely modified. This state is associated with the loss and change of natural habitat and biota which is linked to water abstraction, flow and channel modification, as well as inundation. The results of the Invertebrate Habitat Assessment (IHAS) indicated that all the sampling sites has an inadequate habitat availability which is associated the channel being dominated by bedrock, high and low water level and flow, marginal vegetation as well as agricultural related impacts.

The aquatic ecosystem identified within the proposed study sites was representative of a modified system in terms of the biota present as they were recorded to be in a seriously modified ecological condition. This altered stream flow and associated change in instream habitat and lack of diversity of macroinvertebrate communities is linked to impoundments such as dams, weirs and bridges, agricultural activities, as well as the outcomes of the IHI and IHAS. Approximately 28 taxa were sampled, and the composition of taxa was dominated by environmentally tolerant species that have low sensitivity ratings, namely *Belostomatidae* and *Chironomidae*.

In terms of the risk assessment, the proposed dam will have a medium risk on the Lindequespruit River due to the loss of instream vegetation and habitat. These impacts cannot be mitigated due to the loss being permanent. Other risks of less significance include bank destabilising, river sedimentation, changes in water quality, aquatic habitat and connectivity and physical barriers.

Mitigation / Recommendations

- The construction phase must be undertaken during the dry winter months;
- Soil erosion control measures must be implemented (i.e. silt fences, flotation silt curtains, retention basins, detention ponds, interceptor ditches, seeding and sodding, riprap of exposed embankments, erosion mats and mulching);
- Vegetation removal must be limited to the construction areas only;
- Temporary stormwater channels and flow paths must be filled with aggregate and logs to slow flows thus limiting soil erosion;
- Uncontrolled access of vehicles must be limited, and construction vehicles and equipment must use existing access routes where possible;
- The construction site, material stockpiles and chemical storage areas must be located outside of the sensitive areas;
- Spill kits must be made available onsite to ensure that any spills are cleaned up and discarded appropriately;
- Environmental awareness training must be undertaken for all construction labour;
- Adequate ablutions facilities must be provided onsite and outside of the sensitive areas;

- If long periods of flow obstruction is required, intermittent releases of water during period of flow must be undertaken;
- Alien invasive vegetation removal must be undertaken regularly;
- The EWR must be released from the proposed dam to ensure that the water quality and aquatic habitat is conserved; and
- Due to the proposed dam being a barrier to fish migration, a fish ladder or some sort of structure must be installed during the construction phase to allow for fish migration. A fish ladder or fish way are structures consisting of a series of interconnected pools, a channel fitted with flow-directing baffles, or similar devices that dissipate the energy of artificially induced high flowing water to the point that allows migrating fish to negotiate an upstream and downstream passage across the artificial barrier. They have traditionally consisted of a series of step-like pools that get progressively higher.

WETLAND ASSESSMENT

A Wetland Assessment was compiled for the proposed cultivation sites (Refer to **Appendix K**). The proposed cultivation sites are located on historically cultivated land which is situated on a gentle to moderately sloped area between an area of hilly topography to the north and the Glen Gray Dam to the south. Due to historical activities, the proposed study site comprises erosion gullies which are stable with good vegetation establishment. The proposed study site also comprises small dams or artificial depressions.

The underlying geology within the proposed cultivation sites comprises Mudstone with clay and loamy soils that are shallow, duplex and of a moderate to poor drainage that may present an erosion hazard is not managed correctly. The dominant vegetation type includes Northern KwaZulu-Natal Moist Grassland which is dominated by tall tussock grassland of *Themeda triandra*, *Hyparrhenia hirta* and *Vachellia sieberiana*.

Based on historical imagery (1937 is the earliest), the proposed cultivation sites have been historically cultivated and grazed by livestock (Refer to **Figure 17**). Imagery dating 1944 reveals that extensive cultivation was present along with the erosion gullies which have not expanded overall. During 1962, a reduction in cultivated areas is noted, however; livestock grazing still occurred within the proposed study site. During 1985, more commercial agricultural activities is evident. The originally cultivated areas have become vegetated and woody due to the cessation of cultivation and livestock grazing. Based on the historical imagery it is also noted that some of the erosion gullies have been excavated or earthen embankment walls inserted to prevent further soil erosion and for capturing water for the storage of water. More recent imagery reveals that cultivation and livestock grazing has increasingly ceased, potentially due to the establishment of Glen Gray Dam or a potential land claim process. Since the Applicant has recently purchased the farm, a management regime has been undertaken which has resulted in annual fire breaks and selected burning of previously cultivated lands to control the grassland and to suppress the establishment of woody vegetation species. These activities resulted in the establishment of wetland systems and erosion gullies within the low lying areas of the proposed study site.

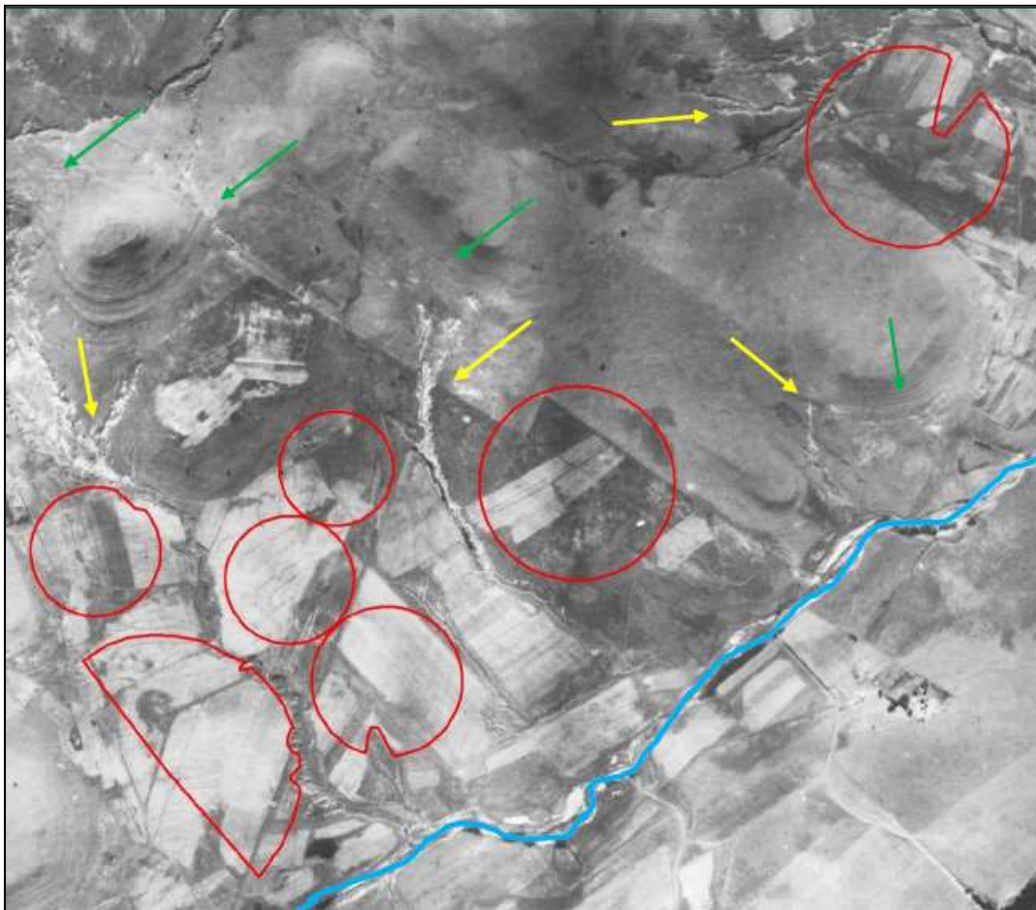


Figure 17: Map showing 1944 imagery of the proposed cultivation sites. The yellow arrows show the erosion gullies and the green arrows show the livestock paths (Source: Kinvig and Associates).

Based on the NFEPA wetland coverage, no wetland systems are located within the proposed study site. However, there are several artificial dams. Although 19 HGM units were identified within a 500 m radius of the proposed study site, only five HGM units were identified within the proposed cultivation sites (Refer to **Figure 13**). HGM unit 1 to 4 are classified as seepage wetland systems. They are situated within the low lying areas of the proposed study site and receive majority of water inputs from subsurface flows. During heavy rainfall, overflow is directed to these low lying areas which is received by the wetland systems. Several drainage lines which are directed to the wetland systems has resulted in flow input confinement and an increase in velocity which has resulted in erosional and depositional impacts. Intersections of access roads has also resulted in impacts associated with increased water inputs. HGM unit 5 has not been significantly impacts apart from some alteration to the upper catchment and being bounded by an access road which has resulted in some reduced hydrological flow. The PES for HGM unit 1 to 4 was identified to be 'largely modified', and the PES for HGM unit 5 was identified to be 'largely natural'. Impacts are associated with a change in the ecosystem processes and the loss of natural habitat and biota.

Historical and current activities have resulted in an alteration to the vegetation regime of the wetland systems. The wetland systems were identified to be dominated by a mix of grass and sedge vegetation species. Wetter portions of the wetland systems comprises *Phragmites australis*, *Juncus effuses*, *Cyperus dives* and *Cyperus latifolius*. Alien invasive vegetation identified within the wetland systems included

Lantana camara, *Ipomoea purpurea*, *Solanum mauritianum*, *Solanum viarum* and *Rubus cuneifolius*. A large stand of *Populus alba* was identified within HGM unit 1 which has resulted in a reduced stream flow.

Impacts associated with the proposed project on the identified wetland systems include:

- Site preparation, vegetation clearing and ploughing of soils;
- Shaping of the centre pivot extents;
- Potential erosion and deposition of sediment;
- Lack of monitoring of erosional areas;
- Excavation of a trench intersecting the wetland systems;
- Compaction of soils and disturbance of vegetation;
- Generation of preferential water flow paths; and
- Increased surface runoff directed to the wetland systems.

Should the proposed recommendations and mitigation measures be implemented, the impacts are considered to be low and will not detrimentally impact on the wetland systems. Given the abovementioned information, a 20 m buffer has been proposed for the HGM units (Refer to **Figure 14**). Please note that the proposed cultivation sites have since been realigned to fall outside of the recommended 20 m buffer.

Mitigation / Recommendations

- The proposed cultivation sites must fall outside of the recommended 20 m buffer;
- The buffer must be rehabilitated and revegetated;
- Eroded areas must be monitored and controlled, and repaired where applicable to prevent headward erosion;
- Shaping of the proposed cultivation sites must ensure that no preferential water flow paths are created and that overland flow is distributed as diffusely as possible;
- Alien invasive vegetation clearing must take place on a regular basis;
- The proposed pipelines must be installed along the access road intersections;
- Installation of the proposed pipeline must take place within the immediate adjacent area and on the downstream portion of the access roads;
- Installation of the proposed pipeline within the wetland system and associated 20 m buffer must be restricted to an established 2 m construction right of way corridor. These areas must be hand excavated and the right of way must be as narrow and constrained as possible;
- The proposed pipeline trenches intersecting the wetland systems must not be left excavated for more than two days, and all activities within these areas must be completed as soon as possible;
- Reinstatement of the soils must occur with the returned soils to the same levels prior to the proposed pipeline trenching and installation activities being undertaken;
- The proposed project must be undertaken during the times of low rainfall or dry periods;
- The exposure of bare soils must be minimised where possible;
- Stormwater management must be implemented;

- The *Popular alba* stand onsite must be removed and revegetation with a suitable wetland vegetation must be undertaken; and
- The erosion gullies must be monitored and mitigation measures implemented to prevent degradation.

HERITAGE IMPACT ASSESSMENT

A Heritage Impact Assessment was compiled for the proposed project (Refer to **Appendix L**). No heritage sites, features or graves were identified within the proposed dam site and the surrounding area is not part of any known cultural landscape. However, portions of the proposed cultivation sites were identified to comprise stoned walled Later Iron Age sites (Refer to **Figure 2 and Table 7**). These stone walled Later Iron Age sites are rated Local Grade 111A. They were considered to have a high local significance and must be retained as heritage sites. These sites were most notably inhabited by amaZizi people who inhabited the area around 1700 to 1830. They were established in stone and have a typical bilobal patterning. During the period of tribal turmoil associated with the expanding of the Zulu kingdom, these settlements were attacked by other tribal groupings. Please note that the proposed study sites fall outside of the identified heritage sites and features and the associated 20 m buffer. Although a graveyard was identified within the area, it is not located near to the proposed study sites.

Mitigation / Recommendations

- The 20 m buffer around the Later Iron Age sites must be adhered to;
- Robbing of stone circles must be prohibited; and
- Attention is drawn to the National Heritage Resources Act (Act No. 25 of 1999) which, requires that projects that expose archaeological or historical remains should cease immediately, pending evaluation by Amafa KwaZulu-Natal.

DESKTOP GEOTECHNICAL ASSESSMENT

A Desktop Geotechnical Assessment was compiled for the proposed project (Refer to **Appendix M**). The proposed dam site is controlled by the northeast flowing Lindequespruit River with gradients sloping towards the river. Winterton comprises an aquifer which is mapped as intergranular and fractured with a low development potential. The invert level of the proposed dam site lies at an elevation of 1046 masl and the upper reaches have an elevation of 1057 masl. The centre of the river has a gradient of 1:150 vertical to horizontal.

The proposed dam site is underlain by alluvium, and shales and mudstones of the Adelaide Subgroup which is a subdivision of the larger Beaufort Group. These sediments have been locally intruded by Jurassic age dolerite. Winterton comprises soils with a 'N' value of 2, and is thus characterised by deep weathering soil profiles and a predominance of chemical weathering processes. The proposed dam site is underlain by alluvium, colluvium and residual soils that are derived from the weathering of the underlying shale and mudstone. Soil thickness of these soils is expected to extend to at least 1.5 m below the existing ground level.

KwaZulu-Natal in general experiences rainfall during the summer, and winters are relatively dry. In Winterton, most rainfall is received during the summer months of January, with an average of 141 mm, and the lowest rainfall of 0 mm is experienced in June. January is the hottest month with the average temperature being 22.7 °C, and the coolest average temperature being 10.5 °C.

Mitigation / Recommendations

- The crest of the proposed dam must be fitted with a spillway on one of the abutments to allow for the safe release of excessive inflows;
- Unstable trench sidewalls will require battering back of the sides; and
- A detailed Geotechnical Assessment must be compiled prior to the construction phase commencing to confirm the findings of the Desktop Geotechnical Assessment.

AGRICULTURAL POTENTIAL AND IMPACT ASSESSMENTS

Two Agricultural Potential and Impact Assessments were compiled for the proposed project (Refer to **Appendix N**). Initially, an Agricultural Potential and Impact Assessment was compiled to assess the loss of land associated with the proposed dam. Following comment being obtained from the DARD, an Agricultural Potential and Impact Assessment assessing the agricultural potential of the proposed cultivation sites was required to be undertaken (Refer to **Table 5**).

Proposed dam

The northern banks of the Lindequespruit River comprises poor quality grasses that grow on sandy and steep slopes. The southern banks of the river comprise shallow steep soils, as well as areas of gently sloping open veld which is currently being grazed by game. The proposed dam site was identified to fall within the UVc2 Winterton Bio-Resource Unit (BRU) and Moist Tall Grassveld (BRG 12). It was identified to comprise *Poplar deltoid*, Silver Wattle and *Acacia siberiana*. The climate capability within this BRU is C5 which refers to a 'Moderately restricted growing season due to low temperatures, frost and moisture stress. Suitably crops at risk of some yield loss.'

Due to the visible changes in the soil character within the proposed dam site, 61 soil profiles were assessed. The proposed dam site was identified to comprise soils of the Pietermaritzburg Formation of the Eccca Group of the Karoo Sequence. Towards the east from the proposed dam site significant dolerite intrusions were identified which has resulted in the presence of high yield potential soils. The Pietermaritzburg Formation has weathered to dark grey shale, siltstone and subordinate sandstone, which has resulted in Mispah, Bonheim and Mayo soils onsite.

The proposed dam will result in the loss of poor quality grazing land for livestock and game, as well as steep, shallow, non-arable soils and a deposit of alluvial sand. Although it is inevitable that the proposed dam will permanently impact the site, this impact will only impact on a few hectares of grazing land, steep, shallow, non-arable soils and a deposit of alluvial sand. This loss is totally irrelevant when compared to the benefits associated with the proposed dam, and the potential to irrigate hectares of high yield arable land.

The proposed dam will serve to supplement existing small dams on the farms and will reduce water abstraction and pumping times. This reduction in lag time is important when crop water demand is at peak levels during the final maturation of the crop.

The NDP places strong emphasis on food security through irrigated crop production. As such, achieving optimum yields from the limited availability of arable land is a national priority that cannot be overlooked. Based on the agronomic considerations specific to the proposed dam site and the background of food production within South Africa, it can be concluded that the site must be reserved for the establishment of the proposed dam.

Proposed cultivation sites

The area surrounding the proposed cultivation sites lies on the mid slopes and foot slopes between a ridge that spans the area, as well as the Lindequespruit River. The proposed study site falls within the Sub-Escarpment Grassland bioregion of the Grassland Biome (Gs 4). It is dominated by poor quality veld and scattered *Acacia sieberiana*, *Acacia* savannah, as well as poor quality grassland interspersed with *Acacia* trees. Due to the presence of old contour lines and erosion gullies, there is evidence of historical agricultural activities having taken place within the proposed study site.

Soils within this area are characterised by shales, mudstones and sandstone of the Ecca Group of the Karoo sequence. Based on the soil samples that were undertaken on the ridge, the high lying areas were identified to be characterised by Avalon and Shortlands soils. Portions of the low lying areas were identified to be characterised by Bonheim soils. The Bonheim soils are characterised by a melanic top soil over heavy clay. Bonheim soils tend to have issues with soil wetness and soil texture, thus careful management of agricultural activities and irrigation is required.

South Africa comprises scarce water resource and limited high yield potential soils. Most food producing countries tend to allocate approximately 70 % of water availability to irrigation for agricultural activities. The remainder of water availability is generally for domestic use and industrial use.

Given the abovementioned information, the proposed cultivation will be long-term and highly beneficial since the proposed cultivation sites have excellent agricultural and agribusiness potential. The proposed cultivation sites have potential for good yields of stable commodity crops. As such, the proposed cultivation will convert the area with an indifferent grazing capacity into a high yield arable crop entity.

Mitigation / Recommendations

- The construction phase must be undertaken during the dry winter months;
- A more accurate assessment of the proposed cultivation sites by a Wetland Specialist is required; and
- Careful management will be required in the areas characterised by Bonheim soils.

PHASE 1 PALEONTOLOGICAL IMPACT ASSESSMENT

A Phase 1 Paleontological Impact Assessment was compiled for the proposed project (Refer to **Appendix O**). The geology identified within the proposed study sites was identified to comprise dolerite, Late Permian deposits of the Beaufort Group and Quaternary alluvial deposits. No fossil material was identified within the proposed study sites. Although the rocks within the area are highly fossiliferous, there is potential for fossil material to be identified within the surrounding area. As a result, portions of the proposed study site which are underlain by Beaufort bedrock have a high paleo-sensitivity rating, and portions of the proposed study site which are underlain by Quaternary alluvium have a moderate paleo-sensitivity rating.

Two graves were identified approximately 3.5 km from the proposed study sites and will not be impacted by the proposed project. Several circular and linear stone walled features were identified within portions of the proposed cultivation sites and likely to have been kraals or remnants of houses which represent a Late Iron Age settlement or historical Bantu village. A Heritage Impact Assessment was compiled for the proposed project to assess these areas (See above).

Mitigation / Recommendations

- It is recommended that should rock be required for the establishment of the dam wall, then the fossiliferous bedrock must be avoided, and the dolerite which is non-fossiliferous must be used (i.e. grey areas) (Refer to **Figure 11**);
- A Phase 2 Paleontological Impact Assessment must be undertaken during the construction phase of the proposed project to monitor any potential fossil material which may be excavated; and
- Should additional fossil material be identified onsite, all construction work must cease and the Paleontologist must be contacted immediately.

12.1.2 Positive and negative implications of the proposed project

POSITIVE

- The proposed project complies with all of the above Planning Initiatives, most notably the generation of employment opportunities, job security and investment in the agricultural sector;
- The uThukela District Municipality is predominantly rural in nature, with a low density of roads and public transport, and low levels of education. The Okhahlamba Local Municipality and surrounding local communities thus relies disproportionately on the agricultural sector for the generation of employment opportunities and the associated skills development, income generation and improved quality of life;
- Both temporary and permanent jobs will be created during the planning, construction and operational phase of the proposed project;
- With the increased water storage and availability, and additional lands, there will be sufficient capacity to irrigate lands during the dry months, and sufficient grazing and fodder for livestock;
- Not only will the proposed project ensure the farms long-term sustainability through increased yields, and crops and livestock production, as well as increased employment opportunities, it will also result in positive knock on effects to the surrounding population and the local economy;

- The proposed project will ensure the financial viability of the farm thus contributing to local economic development;
- Crops and livestock will be sold to surrounding businesses whereby it will be packaged and processed to feed the surrounding population;
- During the construction phase, the proposed project will contribute positively to the local economy and the social environment through spending of capital at local businesses;
- During the operational phase, the proposed project will provide job security for approximately 60 labour employed on the farm;
- In KwaZulu-Natal, one job supports seven dependents. Thus, approximately 420 additional labour will benefit from the proposed project, as well as their dependents;
- There is sufficient water available in the catchment for the proposed dam, as well as to sustain the EWR;
- The proposed dam will result in a minimal reduction in water flows, and would be feasible to meet the normal flow and legal flow requirements, and the proposed abstractions for irrigation purposes;
- The water balance shows that the dam yield is sufficient to meet the demand of the areas proposed to be irrigated. As such, the impacts associated with the proposed dam on the ecological reserve and downstream water users were considered low;
- The proposed dam will result in the creation of wetland systems, thus faunal, floral and aquatic communities benefit as a result of the presence of an additional body of water as well as wetland habitat;
- The implementation of the recommendations and mitigation measures will allow for the surrounding wetland systems and floral species to be maintained and monitored, which will have significant benefits, as well as providing habitat and foraging for faunal species;
- The proposed project is to take place on an existing and operational farm, thus it is in keeping with the surrounding land use and aesthetics;
- It will not alter the sense of place of the area or have a significant visual impact;
- Alien invasive vegetation clearing, and rehabilitation and revegetation of disturbed areas will be undertaken regularly;
- Construction activities must be limited to regular working hours (Monday to Saturday, 07h00 to 17h00), and construction on public holidays must not be permitted;
- During the operation phase, the proposed dam may potentially serve as a useful barrier to prevent fires from spreading as well as a source of water for fire fighting;
- A fishway will be installed during the construction phase to allow for fish migration;
- The proposed dam will be beneficial for downstream users during times of drought, as additional water will be able to be released, if necessary;
- The centre pivot irrigation systems will remove the rainfall risk and it will facilitate an improved level of crop husbandry;
- The proposed dam will result in the loss of steep, shallow and non-arable soils, thus minimal grazing land will be lost, and its benefits will far outweigh this loss of land; and

- The identified heritage sites, features and graves, and associated 20 m fall outside of the proposed study sites.

NEGATIVE

- Although no fossil material was identified within the proposed study sites, there is potential for fossil material to be identified within the surrounding area;
- Potential for noise and dust nuisances to be generated during the construction phase;
- Vegetation clearing along with high intensity rainfall, have the potential to result in increased surface runoff, erosion and sedimentation of surrounding water resources;
- Disturbance and compaction of soils has the potential to result in the encroachment of alien invasive vegetation and the loss of natural habitat for floral communities;
- The proposed dam will result in the loss of primarily exotic, woody habitat, and associated loss of channel banks and grassland habitat;
- The proposed dam will result in the alteration of the aquatic nature of a 4 km stretch of the Lindequespruit River from a lotic to a lacustrine environment;
- Potential change in the riverine habitat downstream of the proposed dam site due to change in flow velocities and water volumes;
- Alteration of the wetland environments through regular irrigation have the potential to alter surface runoff chemistry and indirectly impact on faunal species and the ethos of the Lindequespruit River.
- Construction activities in areas of instability, irresponsible design and construction methods, and the use of inappropriate materials have the potential to result in the cracking or collapse of dam walls. This in turn has significant environmental and financial consequences;
- Migratory aquatic species such as *Labeobarbus sp*, may be impacted by the proposed dam which has the potential to result in further separation and loss of habitat; and
- Loss of 0.3 ha equivalents of wetland habitat.

12.1.3 Positive and negative implications of the identified alternatives

DO-NOTHING

POSITIVE

- If the do-nothing alternative is chosen, the farms will continue to operate with the existing water supply and cultivated lands;
- As there would be no construction phase, there would be no potential for negative impacts, such as noise and dust nuisances, soil erosion and sedimentation, pollution potential and encroachment of alien invasive vegetation;
- The identified freshwater ecosystems and floral, faunal and aquatic communities will not be impacted, and instead will be conserved;
- Time, money and effort will no longer need to be put into the implementation of the recommendations and mitigation measures;

- The hydrological flow and stream flow characteristics will not be altered, thus water flow to downstream water users and the surrounding catchment, and to maintain the ecological reserve will continue at its current rate.

NEGATIVE

- If the do-nothing alternative is chosen, the farms will continue to operate with the existing water supply and cultivated lands;
- As such, it is highly unlikely that the farms will remain sustainable given the importance of farmers to utilise economies of scale;
- The job security of the labour employed on the farms relies on its sustainability;
- When water is scarce, and during times of desperation, water would need to be brought in with tankers, or obtained from alternative water sources for the irrigation of existing cultivated lands;
- Thus, this will have an impact on the crop yield and livestock production, and in turn will have an impact on the sustainability of the farms and thus the job security of the labour;
- The areas which would have benefited from the implementation of the recommendations and the mitigation measures will not benefit;
- There will minimal water storage for use in times of drought, which would reduce the resilience of the farming operations, and which would have both social and economic impacts during and post times of drought; and
- This will negatively impact on the skills development, income generation and quality of life of the labour. It also has the potential to have long-term impacts on the area, the local municipality as well as the local economy.

DAM SIZE

POSITIVE

- The currently preferred dam specifications optimise the ratio of the dam wall height and length to volume, and thus allows for maximum storage capacity with relatively lower construction costs;
- The proposed dam will have minimal impacts on the surrounding freshwater ecosystems and biodiversity;
- The dam size is adequate for the operation and sustainability of the farms, and irrigation of the proposed cultivation sites and the existing cultivated land;
- It will result in the long-term sustainability through increased yields, and crop and livestock production, as well as increased employment opportunities for both farms. This in turn will result in the generation of skills development, income generation, improved quality of life and benefits to the local economy;
- It will result in the generation of wetland systems, thus faunal, floral and aquatic communities will benefit as a result of an additional body of water as well as wetland habitat;
- The implementation of the recommendations and mitigation measures will allow for the surrounding freshwater ecosystems and biodiversity to be maintained and monitored;

- Feedback from the Ecological Reserve Determination and Water Analysis confirmed that there is sufficient water available in the catchment for the proposed dam, as well as to sustain the EWR (Refer to **Appendix G**);
- The proposed dam will result in a minimal reduction in water flows, and would be feasible to meet the normal flow and legal flow requirements, and the irrigation demand of the farms; and
- As such, the impacts associated with the proposed dam on the ecological reserve and downstream water users are considered low.

NEGATIVE

- The size of the proposed dam will result in the loss of 0.3 ha of wetland habitat equivalents; and
- Although the proposed dam is viewed as an expansion of the impacts on biodiversity arising from the existing Glen Gray Dam, the recommendations included in this Report will address such impacts.

DAM WALL LOCATION

POSITIVE

- The natural topography maximises the dam size. As such, it will result in relatively lower construction costs;
- The proposed dam minimises the impacts on surrounding freshwater ecosystems and biodiversity;
- There is sufficient water available within the Lindequespruit River and at the proposed dam wall site; and
- There are limited impacts on downstream water users and hydrological flow.

NEGATIVE

- The location of the wall of the proposed dam will result in the loss of 0.3 ha of wetland habitat equivalents; and
- Although the proposed dam is viewed as an expansion of the impacts on biodiversity arising from the existing Glen Gray Dam, the recommendations included in this Report will address such impacts.

DAM CONFIGURATION

POSITIVE

- The establishment of a single dam in comparison to multiple smaller dams of the equivalent storage capacity allows for a shorter construction phase and relatively lower construction costs. As such, it allows the disturbed areas to be rehabilitated and revegetated as soon as possible;
- A single dam has the potential to result in less impacts to surrounding freshwater ecosystems and biodiversity;
- The need for the implementation of recommendations and mitigation measures for a single dam are far less and easier to implement in comparison to multiple dams;
- The earth fill storage ratio is a measurement of cost feasibility. Earth fill required for the embankment and spillway of a single dam will thus be less costly; and

- Water loss in dams is related to evaporation from wind and the sun, and from heavy rainfall which results in overflow of water via the spillway. The more efficient a dam, the lower the water loss is per square metre of storage capacity. The yield of a dam is thus greater from a single dam in comparison to multiple smaller dams. A single dam is thus more beneficial from a water conservation point of view.

NEGATIVE

Potential for less 'edge' and thus less suitable habitat for faunal, floral and aquatic communities.

CULTIVATION SITE LOCATION AND SIZE

POSITIVE

- The proposed cultivation sites are located on Lush Valley Farm which is owned by the Applicant;
- They respect the wetland systems and associated 20 m buffer;
- They are located outside of the identified erosion gullies;
- They respect the heritage sites and associated 20 m buffer;
- The proposed cultivation site locations have resulted in their size being maximised;
- They are located in close proximity to the proposed dam which reduces costs associated with installation of pipelines;
- Potential impacts on surrounding freshwater ecosystems and biodiversity has been minimised; and
- Majority of these which will thus result in the preservation of any faunal, floral and aquatic communities; and
- Majority of the proposed cultivation sites have been historically cultivated.

NEGATIVE

Careful management of agricultural activities and irrigation will be required in the areas characterised by Bonheim soils.

12.2 ENVIRONMENTAL OPINION

The EAP is of the opinion that the proposed project, with the recommendations and mitigation measures, must be authorised. This authorisation must be granted provided that the following is made conditions of the Environmental Authorisation.

SAFETY AND MONITORING

The appended EMPr must be strictly enforced. During the construction phase of the proposed project, the construction activities must be monitored on a monthly basis by an independent ECO.

FRESHWATER ECOSYSTEM

- A 1 ha portion of the dams fringe must be manipulated and managed to ensure that an indigenous wetland vegetation community is established and maintained;
- A 2 m wide terrace must be constructed on the dams fringe to provide shallow water for the establishment of wetland vegetation (less than 0.3 m in depth);

- The proposed cultivation sites must fall outside of the recommended 20 m buffer and the buffer must be rehabilitated and rehabilitated;
- Eroded areas must be monitored and controlled, and repaired where applicable to prevent headward erosion;
- Shaping of the proposed cultivation sites must ensure that no preferential water flow paths are created and that overland flow is distributed as diffusely as possible;
- The proposed pipelines must be installed along the access road intersections and must take place within the immediate adjacent area and on the downstream portion of the access roads;
- Installation of the proposed pipeline within the wetland system and associated 20 m buffer must be restricted to an established 2 m construction right of way corridor. These areas must be hand excavated and the right of way must be as narrow and constrained as possible;
- The proposed pipeline trenches intersecting the wetland systems must not be left excavated for more than two days, and all activities within these areas must be completed as soon as possible;
- Reinstatement of the soils must occur with the returned soils to the same levels prior to the proposed pipeline trenching and installation activities being undertaken;
- The *Populus alba* stand onsite must be removed and revegetation with a suitable wetland vegetation must be undertaken; and
- The erosion gullies must be monitored and mitigation measures implemented to prevent degradation.

HYDROLOGICAL

- Care must be taken in the design of the proposed dam due to the dispersive nature of the soils within the upstream catchment;
- The required EWR must be released from the proposed dam (i.e. 3 314 687 m³ / year); and
- Bi-annual water quality monitoring of the Lindequespruit River must be undertaken to determine the suitability of the water for irrigation purposes.

BIODIVERSITY

- The founding of the Glen Gray Dam must be assessed as the wall was identified to be subject to under cutting with potential failure arising;
- A fish ladder or some sort of by-pass must be established on the wall of the proposed dam to allow for the movement of fish species upstream into the Glen Gray Dam;
- The proposed dam must be stocked if indigenous fish species following consultation of Ezemvelo KZN Wildlife, and not *Micropterus salmoides*;
- Water flow must be maintained during the construction phase through use of by-pass channels and attenuation features; and
- Sediment trapping systems and flow dissipaters must be implemented downstream of the proposed dam site during the construction phase.

AQUATIC

- The EWR must be released from the proposed dam to ensure that the water quality and aquatic habitat is conserved; and
- A fish ladder or some sort of structure must be installed during the construction phase to allow for fish migration. A fish ladder or fish way are structures consisting of a series of interconnected pools, a channel fitted with flow-directing baffles, or similar devices that dissipate the energy of artificially induced high flowing water to the point that allows migrating fish to negotiate an upstream and downstream passage across the artificial barrier. They have traditionally consisted of a series of step-like pools that get progressively higher.

CULTURAL

- The 20 m buffer around the Later Iron Age sites must be adhered to;
- Robbing of stone circles must be prohibited;
- It is recommended that should rock be required for the establishment of the dam wall, then the fossiliferous bedrock must be avoided, and the dolerite which is non-fossiliferous must be used;
- A Phase 2 Paleontological Impact Assessment must be undertaken during the construction phase of the proposed project to monitor any potential fossil material which may be excavated; and
- Attention is drawn to the National Heritage Resources Act (Act No. 25 of 1999) which, requires that projects that expose archaeological or historical remains should cease immediately, pending evaluation by Amafa KwaZulu-Natal.

GEOTECHNICAL

- The crest of the proposed dam must be fitted with a spillway on one of the abutments to allow for the safe release of excessive inflows;
- Unstable trench sidewalls will require battering back of the sides; and
- A detailed Geotechnical Assessment must be compiled prior to the construction phase commencing to confirm the findings of the Desktop Geotechnical Assessment.

AGRICULTURAL

Careful management of agricultural activities will be required in the areas characterised by Bonheim soils.

GENERAL

- Local businesses and unemployed people in the immediate area must be considered first, before employing labour and services from further afield;
- Where possible, any additional employment opportunities on the farms must include labour from surrounding local communities;
- The construction phase must be undertaken during the dry, winter months;
- The required water volumes must be released from the proposed dam as stipulated by the DWS in the conditions of the WUL;

- Alien invasive vegetation clearing, and rehabilitation and revegetation of disturbed areas must be undertaken regularly;
- Noise and dust nuisances generated during the construction phase must be controlled;
- All construction labour must remain within the boundaries of the farms at all times;
- Vehicles accessing the proposed study sites must be driven cautiously and within the required speed limits;
- Maintenance of access roads on the farm must be undertaken as and when necessary;
- Construction activities must be limited to regular working hours (Monday to Saturday, 07h00 to 17h00), and construction on public holidays must not be permitted;
- Construction vehicles and equipment must be maintained and regularly serviced to ensure that unnecessary noise nuisances are prevented;
- Access onsite and offsite must be controlled;
- Appropriate mitigation measures must be implemented to minimise the area of soil disturbance and the potential for mobilisation of bare areas;
- The construction site must be demarcated and designated entry and exit points must be provided;
- The farm must have appropriate fire breaks and safety measures in place in terms of the National Veld and Forest Fire Act (Act No. 101 of 1998); and
- All construction labour must be educated on methods to reduce the risks of fires and the procedures to follow on the occurrence.

13 CONCLUSION

The Applicant, Sable Hill Dam Educational Fund NPC, proposes to establish a 1.6 million m³ dam, and cultivate 106.62 ha of land, located on Portion 1 of Meersig No. 15550; Rem, Portion 1, Portion 3 and Portion 4 of Smaldeel No. 1390; and Portion 2, Portion 3 and Portion 10 of Lindeques Laager No. 1039, Lush Valley Farm and Prairie Farm, within the Okhahlamba Local and uThukela District Municipality, Winterton, KwaZulu-Natal.

Please note that the proposed cultivation of land only came about during the Scoping Phase. As such, during the initial Public Participation Process, only mention was made of the proposed dam. Prior to the Engineer undertaking a detailed dam investigation, a 2.3 million m³ dam was proposed. Due to the significant inundation associated with a dam of this extent, a 1.6 million m³ dam is now being proposed. During the Scoping Phase, 102 ha of land was proposed to be cultivated. Based on feedback from the Specialist Studies, the cultivation sites have since been realigned outside of the identified freshwater ecosystems and heritage sites, and a total of 106.62 ha is now proposed to be cultivated.

The proposed project comprises the following components:

- Establishment of a 1.6 million m³ dam;
- Cultivation of 106.62 ha of land; and
- Installation of associated pipelines for irrigation purposes.

The proposed dam site is located on Portion 1 of Meersig No. 15550, and Rem, Portion 1 and Portion 4 of Smaldeel No. 1390, at GPS coordinates 28°48'31.80" S and 29°28'42.60" E, and along the Lindequespruit River. The dam will fall on Lush Valley Farm which is located on the northern banks of the Lindequespruit River, and on Prairie Farm which is located on the southern banks of the Lindequespruit River. The existing Glen Gray Dam is located upstream of the proposed dam site, and is approximately 4.5 million m³ in extent. The Lindequespruit Irrigation Board was established for the six members who have shares in the Glen Gray Dam. Please note that in the Specialist Studies, both the Lindequespruit River and the Situlwane River have been referred to, as they are the same river. The currently preferred dam design comprises the following specifications:

- Storage capacity – 1.6 million m³;
- Area – 34 ha;
- Wall height – 13.95 m;
- Wall length – 311.83 m; and
- Water depth – 13.33 m.

Based on water uses within the quaternary catchment, the total registered surface water abstractions total 19 294 041 m³ / year, and the total registered downstream water use totals 1 299 500 m³ / year. As such, the proposed dam was calculated to have a yield of approximately 1 265 211 m³ / year with a 75 % assurance of supply, and the total releases or EWR for the proposed dam was calculated to be 3 314 687

m³ / year, which is more than enough to meet the ecological requirements from the sub-catchment. In the event of a 1:50 year or a 1:100 year flood, no permanent structures will be impacted along the Lindequespruit River.

The proposed dam site falls within the V13D quaternary catchment and the Pongola to Mtamvuna WMA. Multiple HGM units were identified within the proposed dam site; namely, four hillslope seepage wetland systems and one depression wetland system. Six riparian channels were also identified within the proposed dam site. Although the proposed dam will result in the inundation of portions of the wetland systems, this loss is considered limited based on the extent of the wetland systems. Due to the impacts being limited to a loss of 0.3 ha equivalents of wetland habitat, wetland rehabilitation measures are not required to be implemented. Under natural conditions, the proposed dam site would have been characterised by Northern KwaZulu-Natal Moist Grassland (Gs 4), which falls under the Sub-Escarpment Grassland (Gs) Group 4 bioregion. In terms of floral species, the proposed dam site is currently dominated by alien invasive vegetation; namely, *Populus candescens* and *Poplar candescens*. The impacts associated with the loss of habitat for faunal species will be minimal, and the proposed dam will in fact benefit and promote the presence of faunal species. Due to several fish species likely to occur within the Lindequespruit River, and which have a conservation status of 'vulnerable', a fishway is required to be established on the wall of the proposed dam to allow for the migration of fish species. It is important to note that the existing Glen Gray Dam has resulted in the proposed dam site being subject to transformation which is associated with alterations to flood events, restrictions during low flow periods and changes in water flow and volumes etc., as well as alteration to the riverine and terrestrial habitats. As such and although the proposed dam is viewed as an expansion of the impacts on biodiversity arising from the existing Glen Gray Dam, the recommendations included in this Report will address such impacts.

The cultivation of 106.62 ha of land is proposed to take place on Lush Valley Farm which is located on the northern banks of the Lindequespruit River. This will involve the installation of centre pivot irrigation systems and associated pipelines. The Applicant is proposing to plant these lands to crops and pastures, comprising kikuyu and other grass mixtures. Water from the dam is proposed to be pumped via pipelines that will run from the dam to the cultivation sites. The proposed pipelines will have a total length of approximately 7 km and a diameter of 20 mm to 25 mm.

The cultivation is proposed to take place on the following properties:

- 22.87 ha pivot located on Portion 4 of Smaldeel No. 1390 at GPS coordinates 28°48'41.79" S and 29°28'11.36" E;
- 23.49 ha pivot located on Portion 3 of Smaldeel No. 1390, and Portion 10 of Lindeques Laager No. 1039, at GPS coordinates 28°49'10.34" S and 29°27'37.32" E;
- 8.06 ha pivot located on Portion 2, Portion 3 and Portion 10 of Lindeques Laager No. 1039, at GPS coordinates 28°49'8.15" S and 29°27'12.05" E;
- 10.17 ha pivot located on Portion 2, Portion 3 and Portion 10 of Lindeques Laager No. 1039, at GPS coordinates 28°49'18.36" S and 29°27'7.44" E;

- 12.22 ha pivot located on Portion 2 and Portion 10 of Lindeques Laager No. 1039, at GPS coordinates 28°49'26.88" S and 29°27'16.82" E;
- 9.80 ha pivot located on Portion 3 of Lindeques Laager No. 1039, at GPS coordinates 28°49'15.44" S and 29°26'46.80" E; and
- 20.01 ha pivot located on Portion 2, Portion 3 and Portion 10 of Lindeques Laager No. 1039, at GPS coordinates 28°49'31.91" S and 29°26'57.60" E.

Based on historical imagery, portions of the proposed cultivation sites have been used for agricultural activities prior to 1937. Portions of the proposed cultivation sites comprise erosion gullies due to these historical agricultural activities. Although five HGM units were identified within the proposed cultivation sites and are classified as hillslope seepage wetland systems, the proposed cultivation sites have since been realigned to fall outside of the identified wetland systems and the recommended 20 m buffer. As such, should the recommendations and mitigation measures included in this Report be adhered to, the impacts of the proposed cultivation on the wetland systems are considered to be low. Portions of the low lying areas were identified to be characterised by Bonheim soils which tend to comprise a high moisture content, thus careful management of the agricultural activities and irrigation will be required. In terms of the floral species, the proposed cultivation sites comprise a graminoid environment, and thus the impacts on this habitat are likely to be minimal. It is important to note that although portions of the proposed cultivation sites fall within an 'optimal' CBA, this CBA is not 'irreplaceable' or 'environmentally sensitive'. Although *Otomys auratus* (vlei rat) and *Aonyx capensis* (Cape clawless otter), as well as *Opisthophthalmus praedo* (Tugela burrowing scorpion) are identified as 'near threatened' and 'protected' respectively, and have the potential to occur within the proposed study sites; it is unlikely that these faunal species will be impacted should the recommendations and mitigation measures included in this Report be adhered to.

Although the Heritage Specialist identified portions of the proposed cultivation sites to comprise stone walled Later Iron Age sites which are considered to have a high local significance and must therefore be retained as heritage sites; the proposed cultivation sites have since been realigned to fall outside of the identified heritage sites and the recommended 20 m buffer.

Lush Valley Farm and Prairie Farm are commercial agricultural operations comprising maize, potatoes, wheat, soya beans, peas and butternut which is planted on a rotational basis, as well as beef cattle. Water from the dam is proposed to be pumped via the associated pipelines to surrounding lands on both farms for irrigation purposes. On Lush Valley Farm, the 106.62 ha of land proposed to be cultivated, is to be irrigated from the proposed dam. There is an additional 106 ha of existing cultivated land that is also to be irrigated from the proposed dam. Water is to be released from the proposed dam and into the Lindequespruit River where it will be abstracted further downstream for irrigation purposes. On Prairie Farm, there is approximately 188 ha of existing cultivated land which is to be irrigated via existing pipelines from the proposed dam. These lands comprise maize, wheat, soya beans and peas which are planted on a rotational basis. A portion of the existing lands also comprise pecan nuts which will be required to be irrigated from the proposed dam. The proposed dam will thus allow for increased water storage and

availability for supplementary irrigation during the summer months, and a back-up during the dry, winter months. There are currently approximately 1500 head of cattle on Lush Valley Farm, and with the additional cultivated land which is proposed to be irrigated, the cattle herd will be able to be expanded by approximately 500 cattle. The proposed project will thus ensure the long-term sustainability of both farms, through increased yields, and crop and livestock production, as well as increased employment opportunities. This in turn will result in skills development, income generation and improved quality of life. Should the WULA for the proposed project not be approved, the proposed cultivation sites will be for dry land agricultural activities.

Given the abovementioned information and provided that the EMPr and recommendations and mitigation measures made in this Report are strictly adhered to, there should be no significant, detrimental impacts on the environment, and a number of positive ecological and socio-economic impacts associated with the proposed project will be realised should it be approved.

14 REFERENCES

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15 APPENDICES

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