

# **ENVIRONMENTAL MANAGEMENT FRAMEWORK FOR THE ALBERT FALLS DEVELOPMENT NODE**



## **ENVIRONMENTAL MANAGEMENT FRAMEWORK**

### **VOLUME II**

#### **Environmental Sensitivity Zones and Assessment Guideline**

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# ENVIRONMENTAL MANAGEMENT FRAMEWORK FOR THE ALBERT FALLS DEVELOPMENT NODE

## VOLUME II Environmental Sensitivity Zones and Assessment Guideline

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*Prepared For*



**Umshwathi Local Municipality**

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# 1. INTRODUCTION

## 1.1 Background

The uMshwathi Municipality has identified an area with development potential. The area is approximately 20 000 ha in extent and draws on its strategic location around the junction of the R33 and R614, its close proximity to Pietermaritzburg and the tourism and recreational opportunities provided by the Albert Falls Dam (AFD). The Municipality held local development summits in 2007 through which they established broad political, economic and investor support for a concept titled 'uMshwathi City' that proposed the establishment of mixed urban, tourism and recreational infrastructure in the area. The attraction of the node has subsequently been expressed through the relatively high number of development applications that have recently either been lodged or approved. In keeping with the Municipality's responsibility to promote 'sustainable development' the Municipality in consultation with the Department of Agriculture and Environmental Affairs (DAEA) selected an Environmental Management Framework (EMF) as the tool to guide development in the node in a sustainable manner. The Municipality appointed the Institute of Natural Resources (INR) to develop the EMF on their behalf.

## 1.2 Project Purpose and Structure

The aim of the EMF is to: "Guide development within the Albert Falls Development Node towards Sustainability" by:

- Informing development planning
- Informing the EIA process for specific development applications, and
- Providing guidance for addressing key sustainability issues.

This is in line with the aims of an EMF as defined below in the extract from the EMF regulations.

### **PURPOSE OF AN ENVIRONMENTAL MANAGEMENT FRAMEWORK**

The EMF regulations (Section 2) list the purpose of the regulation as: *Compilation of information and maps specifying the attributes of the environment in a particular geographical area:*

- a) *For such information to inform environmental management, and*
- b) *For such maps and information to be used as environmental management frameworks in the consideration of applications for environmental authorisations in or affecting the geographical areas to which those frameworks apply.*

Section 2 (3) further explains that EMFs are aimed at:

- a) Promoting sustainability.
- b) Securing environmental protection.
- c) Promoting cooperative environmental governance.

The project is structured into four phases each of which builds on the outcomes of the preceding phase in working towards the overall outcomes. The objectives and deliverables of each phase are summarised below.

### **INCEPTION**

**Purpose – To document the required outcomes of the project, how they will be achieved and the mechanisms for managing the process.**

- i.* A common understanding and the purpose, nature and format of desired project outcomes for each phase,
- ii.* The relationship between each phase and the associated outcomes,
- iii.* The approach and methods for achieving these outcomes,
- iv.* Project management mechanisms required to efficiently and effectively achieve the outcomes.

**Output – Inception Report**

### **STATE OF ENVIRONMENT**

**Purpose - Establish a baseline understanding of the state of the environment within the development node and more specifically:**

- i.* Map the location and extent of land-use, natural systems and features in the receiving environment.
- ii.* Classify the mapped systems and resources within different components of the receiving environment (social, cultural, biophysical).
- iii.* Establish the present state (PS) of resources within the different components of the environment.
- iv.* Document the factors responsible for the current state of the environment components.

**Output – State of Environment Report**

### **STRATEGIC ENVIRONMENTAL ASSESSMENT**

**Purpose - Establish a desired future state.**

- i.* Summarise the state of natural systems and discuss their socio-economic value.
- ii.* Identify, analyse and discuss the implications of key environmental issues – how the current state of natural systems is affecting people’s well-being and economic prosperity.
- iii.* Establish a Desired Future State – objectives, targets and thresholds that will minimise/reverse negative impacts of the current situation and/or enhance positive aspects.

**Output – Strategic Environmental Assessment Report**

### **ENVIRONMENTAL MANAGEMENT FRAMEWORK**

**Purpose – Guide the municipality in planning and implementing sustainable development in the development node, through a range of tools that comprise the EMF including:**

- i.* Strategic Environmental Management Plan (SEMP) - provides guidance on how to move from the Present to Desired future state by detailing the actions, methods and responsibilities for addressing key environmental issues and maximizing opportunities.
- ii.* Environmental Information Management System (EIMS) – spatial tool for data management and decision support.
- iii.* Development Planning Zones & Guidelines – guides location of development types & conditions for planning approval. Also informs the update of other planning instruments like the SDF and LUMS.
- iv.* Environmental Sensitivity Zones & EIA Guidelines – defines the sensitivity of areas in relation to natural systems and guides the nature and level of investigation during the EIA process.
- v.* Training and guidelines for use of the EMF.

**Output – Volume 1: Strategic Environmental Management Plan**

**Volume II: Environmental Assessment Guideline**

**Volume III: Environmental Planning Guideline**

**GIS: Spatial Information System**

### 1.3 Location and Extent of the Development Node

The EMF study area is approximately 20 684ha in extent or 11.4% of the total municipal area (Figure 1). The boundaries of the study area are detailed in Figure 2. The node is located within the south-western section of the uMshwathi Municipality and is bordered by the Mgeni Municipality in the West and the Msunduzi Municipality in the south. The Mpolweni River forms the eastern boundary until its confluence with the Umgeni River downstream of AFD. From this point, the boundary runs roughly parallel to the R33 until it intersects the boundary of the Msunduzi Municipality above Copesville.



**Figure 1** Location of the study area in relation to the municipality

The study area is larger than that of the original area defined for the uMshwathi City Development Node. The node boundary was extended to include the Mpolweni area in the East. It was also extended in the West, from the boundary of the AFD to the Otto's Bluff Road to account for the development pressure being exerted on the area surrounding the dam. It is important to note that 2 826 ha or 13.4% (including a 730ha section of AFD) of the study area south west of AFD is located within the Mgeni Municipality. This area was included because it forms the immediate catchment to AFD and the dam is recognised as a strategic asset to both municipalities in terms of its value for tourism and recreation, and to the province in terms of its role as a water storage facility.

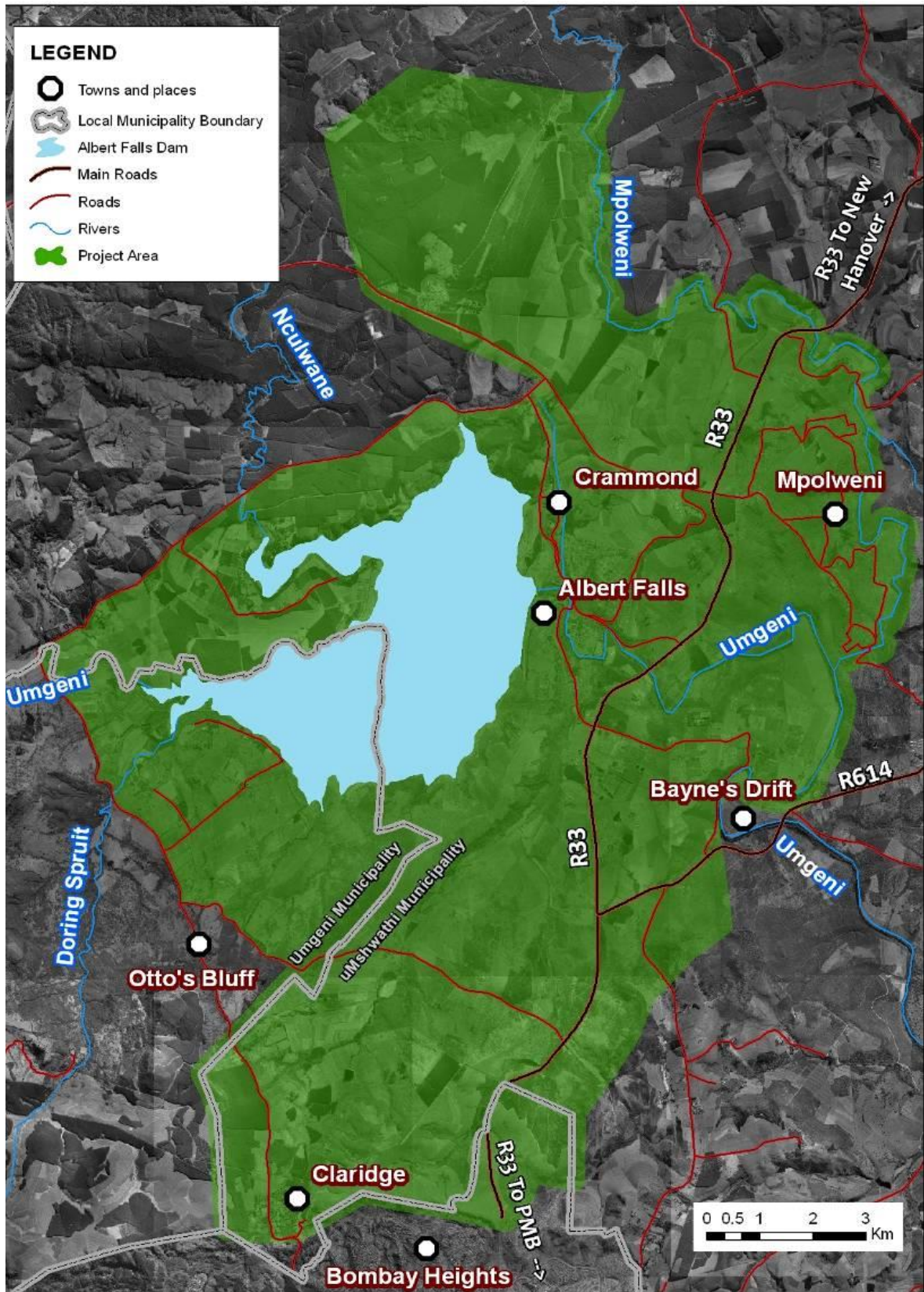


Figure 2 Study area and spatial context



## 2. STRUCTURE OF THE EMF

The broad aim of the Environmental Management Framework (EMF) is to “*Inform sustainable development planning for the Albert Falls Development Node and to streamline the EIA process for specific development applications*”, while the EMF regulations include more specific requirements. The four outputs summarised in the figure below constitute the EMF and all have a role to play in meeting the project aims and the legal requirements. **This document is Volume II** of the suite of outputs.

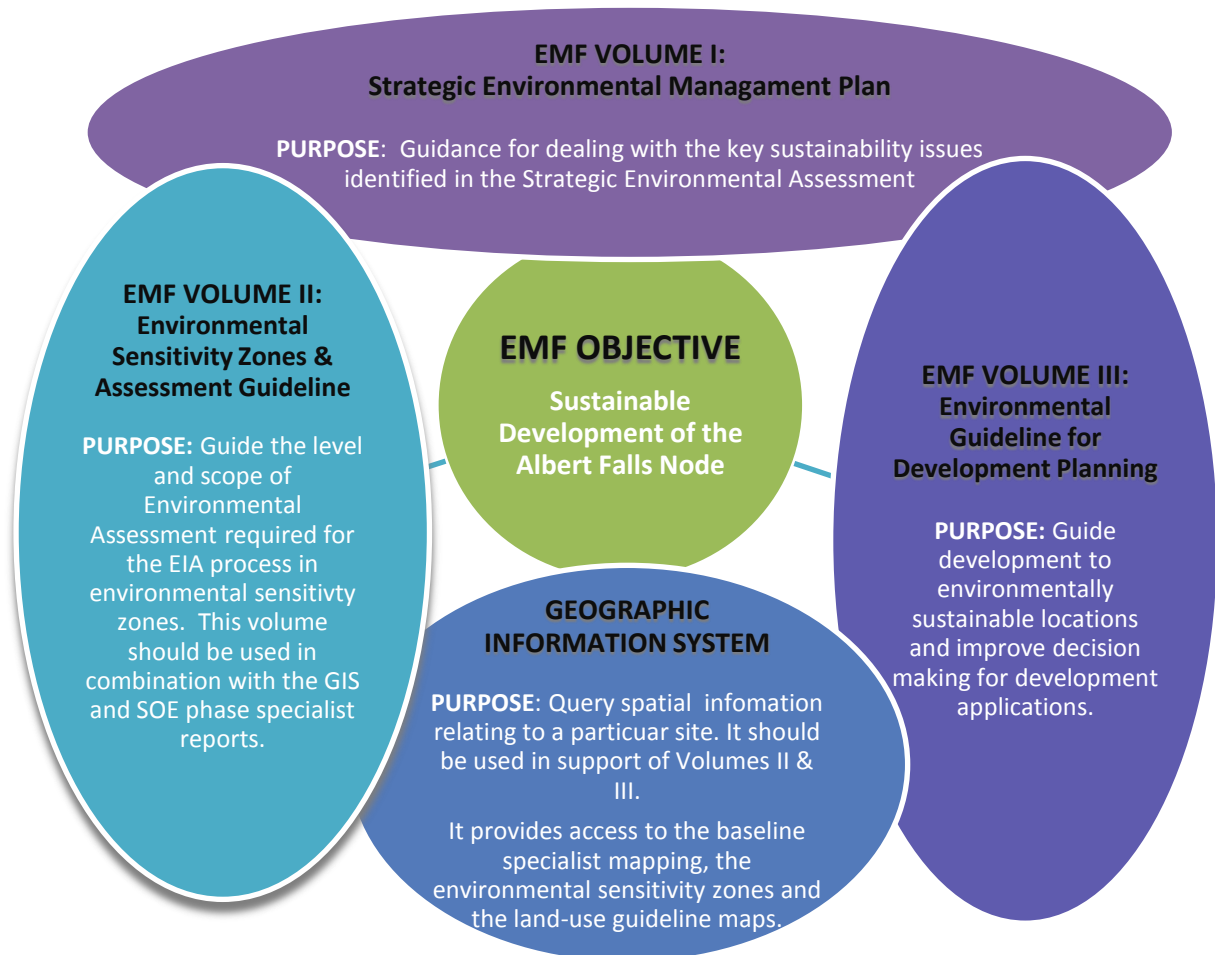


Figure 3 Structure and components of the EMF

### 2.1 Purpose of this Guideline

The EMF regulations define an EMF as the “**Compilation of information and maps** specifying the **attributes of the environment** in a particular geographical **area**: and for such maps and information to be used in the **consideration of applications for environmental authorisations** in or affecting the geographical areas to which those frameworks apply”.

This guideline responds directly to this requirement – by providing guidance on the scope and level of environmental assessment considered appropriate for the different levels of sensitivity within the main environmental zones identified through the EMF process. **This guideline can, and should be applied to all development applications – not only those that require an EIA.**

## 2.2 Who should Use this Guideline

This guideline is primarily for use by Environmental Assessment Practitioners and the associated specialist team responsible for managing and undertaking the EIA process for specific development applications. The information is also relevant to consultants responsible for managing other relevant regulatory processes that require information relating to the environmental impact of an activity, in support of the applications. Examples of other such processes include water-use licences, heritage development permits, CARA licences, and mining permits. The guideline is also valuable to the decision makers responsible for administering the relevant legislation and for making decisions on applications in terms of the various processes and Acts. It also aids the municipality to assess the sustainability of development activities, which do not trigger the EIA regulations but which will nevertheless have an impact. The guideline provides the basis for the municipality to motivate for appropriate assessments in terms of planning authorisation.

## 2.3 Reporting Structure

The report is structured as follows.

- **Section 3** Explains how the different information provided in the guideline should be used in different aspects of environmental assessment and management. It also indicates which of the other information and outputs developed during the EMF should be used in combination with this guideline.
- **Section 4** This section provides a graphic overview and descriptive summary of the sensitivity of all the environmental features which have been defined according to the following broad and associated sub-components:

<i><b>Aquatic</b></i>	<i><b>Terrestrial</b></i>	<i><b>Social</b></i>
Aquatic Biodiversity	Terrestrial Biodiversity	Air Quality
Water Quality	Geotechnical Conditions	Cultural Resources
Wetlands	Agricultural Potential	Socially Sensitive Features

- **Section 5** provides the following detail for each of the nine environmental components listed above.
  - i. A summary of the current status of the environmental system or feature that defines the zone, and its subcomponents.
  - ii. The key sustainability issues and objective [defined in the strategic assessment and sustainability framework – see SEA report].
  - iii. A definition and background to the sensitivity levels used [the thresholds that have been used to define the sensitivity levels].
  - iv. A map showing the spatial extent of the sensitivity levels.
  - v. Recommendations for undertaking Environmental Assessment in these zones in terms of the nature and scope of specialist investigations required.

## 2.4 Understanding Sensitivity

In considering the sensitivity zones it is important understand the two way relationship between environmental features and development activities described below.

### *i. Impact of the Environment on Development*

The first is where the development activity impacts the environmental feature or system. For example, urban development on grassland will permanently transform that system resulting in a reduction of habitat and ecosystem services provided by that system. In this

case, the level of constraint imposed on development increases with the level of environmental sensitivity of the system.

*ii. Impact of the Environment on Development*

The second scenario is where the environmental feature impacts development activities. A prime example is the impact of flooding. There is a risk to building or growing anything in the flood zone. The higher the frequency of the flood occurrence, the higher the risk of impact to development and therefore the associated level of constraint.

### 3. USING THE GUIDELINE

The EMF regulations require that the EMF must inform the EIA process. This guideline however has relevance at various stages in the development life cycle. The following points explain what other resources developed during the EMF process should be used in conjunction with this guideline to optimize the value of this resource at different points in the development life cycle.

- i. Baseline Specialist Report:* These reports provide detail that informed the definition of the sensitivity zones including the location, extent and state of the various systems as well as their conservation status. This detail should be analysed to establish relevant features at a site scale. The drivers of the status quo are also listed in these reports. If an application is for a land use that has already been identified as contributing to the degraded state of the environmental feature in question, it has the potential to add to the cumulative loss of the system. This understanding assists in highlighting the need for an appropriate level of assessment and mitigation of the impacts common to this land-use, during the EIA phase.
- ii. GIS:* This tool contains all the baseline information and is spatially defined e.g. the location and extent of environmental features. It can therefore be queried to identify all sensitive features occurring within a development site, and the level of sensitivity defined for the system or features at the site in question. The higher the number of environmental features occurring on a site, the higher the cumulative impact. By providing an understanding of the range of features occurring on a site, the GIS assists in providing a quick and high level understanding of the potential specific (particular features) and cumulative impact.
- iii. Sustainability Framework:* The sustainability framework has value at various points in the development life cycle as described below:
  - a. Project Planning*

Development proposals must show how they contribute to the achievement of the sustainability objectives relevant to their project through layout, design, choice of technology and on-going management i.e. the sustainability objectives should inform project planning.
  - b. Environmental Assessment*

The acceptability of the project should be assessed against the sustainability framework and specifically the sustainability objective during the EIA. This as it has been informed by an assessment of cumulative impact within the SEA undertaken for the EMF. The assessment accounts for the relationship between natural, economic and social systems because it was founded on an ecosystem services approach. This framework therefore holds much greater value than developing a project specific assessment framework that provide scores for impacts.
  - c. Environmental Management Programme*

The criteria, indicators and targets in the framework can also be integrated into the Environmental Management Programme (EMP) that must be submitted with the Impact Assessment Report.

**iv. Stakeholder Database:**

The stakeholder lists generated in the EMF process, provides a starting point for developing an I&AP database as part of the public participation process required in the EIA for specific projects.

**v. Legal & Institutional Framework:**

The legal and institutional framework described in the state of environment phase is a useful tool for ensuring that all regulatory processes relevant to a particular application are identified. This needs to be done at an early stage in the process in order that developer is able to plan accordingly in terms of time and budgets. It also assists the EAP to develop a project plan for the EIA that accounts for the information requirements of the other processes, and provides for alignment in terms of consultation i.e. it facilitates co-operative governance and co-ordinated decision making – one of the other key objectives of the EMF.

## 4. ENVIRONMENTAL SENSITIVITY PATTERNS

Figure 4 presents the spatial extent of the sensitivity levels for each of the nine environmental features. These patterns translate into varying constraints based on the number of sensitive features at a particular site and the sensitivity levels. As a summary, the following points are evident regarding the overall sensitivity patterns shown.

**i. Large Scale/High Level Sensitivity**

The following zones all present high levels of sensitivity across large areas of the development node.

- *Water quality* - Pollution in terms of nutrient and bacteria, is a significant issue across the entire study area with domestic and recreational use standards exceeded significantly and frequently across the entire study area.
- *Highly productive agriculture land*: Covers almost the entire northern third and southern sections of the study area. The remainder of the area is classified as having a moderate level of sensitivity – so the entire node is important to agriculture. Careful consideration is therefore required for any alternative land-uses especially urban type development which result in the permanent transformation of arable land.
- *Terrestrial biodiversity*: While not as extensive as water quality and agricultural land, a large proportion of the areas surrounding and to the south of Albert Falls Dam are classified as having high sensitivity (conservation value). It is these areas to immediately surrounding and stretching further south with views over the dam that are in high demand for residential and tourism developments.

**ii. Overlap of Social with Air Quality Sensitivity**

A large proportion of the people living within the node, are located in the area to the east of Albert Falls Dam, within the lower lying areas of the Mgeni River Valley. This includes the Thokozani residential area and the Albert Falls 'village'. As a consequence these people are exposed to the high sensitivity air quality zones – arising mainly from odour issues emanating from the feedlot, poultry production, composting sites that are located nearby. This poorer air quality also drains down into the valley.

**iii. Limited areas with Low Sensitivity Levels**

What these patterns translate to is that the majority of the development node falls within 2 or 3 highly sensitive zones so that detailed investigation will be required to assess the impact, particularly of urban land-uses proposed on high value biodiversity of agricultural land.

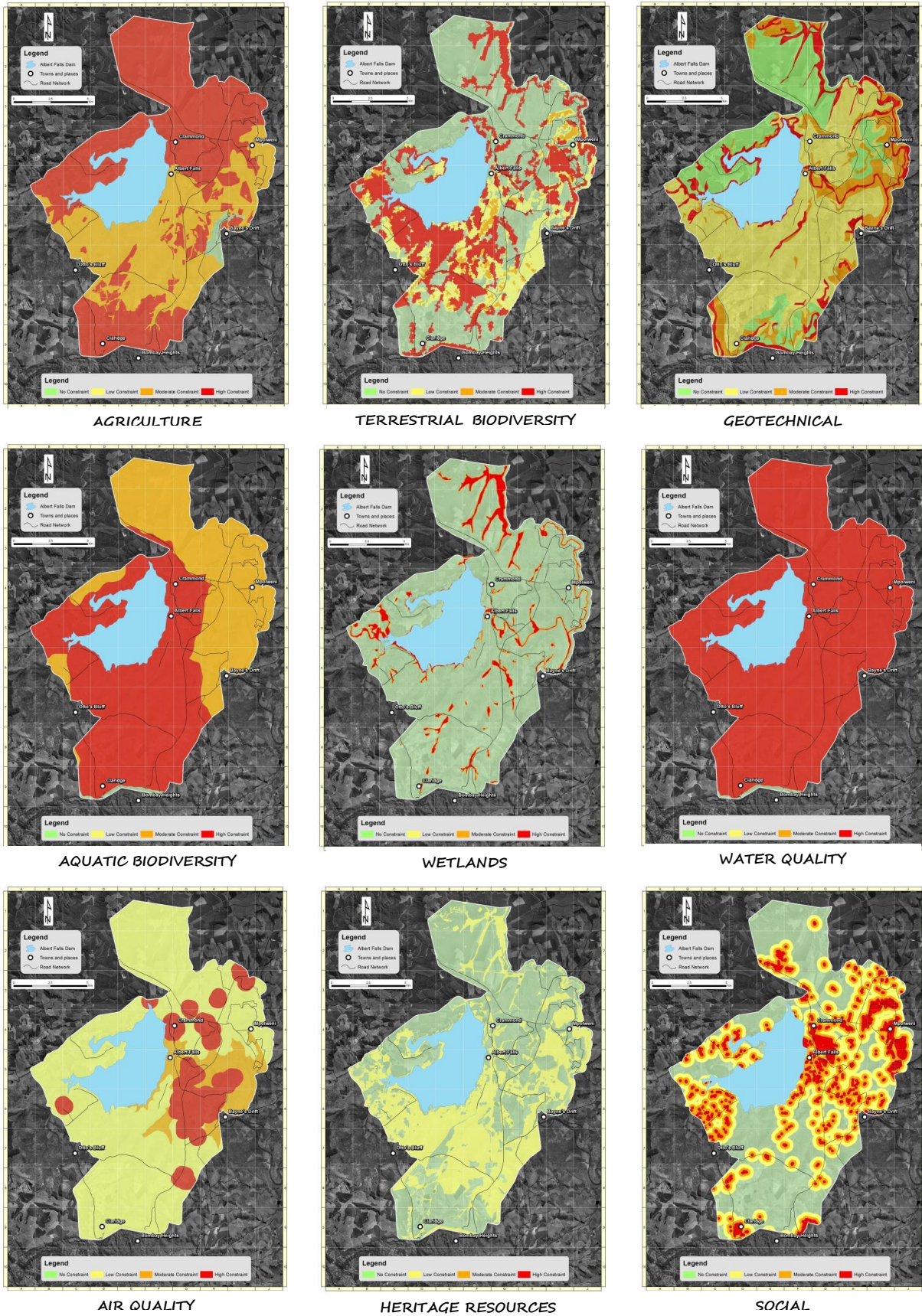


Figure 4 Spatial overview of all environmental sensitivity zones

## 5. TERRESTRIAL BIODIVERSITY

### 5.1 Status Quo

**Summary Statement:** *Low levels of formal protection combined with high levels of transformation and degradation diminish the options for meeting conservation targets and deriving benefit from the associated tourism/recreational economic opportunities that are supported by areas of high value, well conserved natural areas.*

The overall situation is due to the following key issues:

- i. **Level of protection:** While a range of areas are currently being managed with biodiversity protection as the primary objective, no areas are formally protected within the study area. This poses a significant threat to the long term security of conservation in the study area.
- ii. **High levels of transformation:** Nearly 60% of the study area has already been transformed. Certain vegetation types are more affected than others, with up to 80% of vegetation types already transformed within the study area. This affects the distribution of species in affected areas and reduces connectivity between areas of remaining untransformed habitat.
- iii. **Grassland condition:** Although previously dominated by grassland, much of the grassland area has been transformed through development or has become encroached by woody species. Of the grassland areas that remain, most are in fair to poor condition, with few areas of grassland in good condition still remaining.
- iv. **Species status:** A wide range of species are regarded as rare or threatened within the study area, requiring protection to safeguard remaining habitats and populations. Several of these utilise grasslands.
- v. **Alien invasive plants:** High Infestation levels are evident across much of the study area, particularly along watercourses and in higher rainfall areas. The current extent and intensity of infestation has not been quantified but problem species include syringa, wattle, gum, bugweed and bramble.

### 5.2 Sustainability Objective

*Secure high value biodiversity required to meet Provincial Targets, and improve the condition, and thereby the functional value, of all remaining natural areas to support appropriate tourism and recreational activities.*

### 5.3 Sensitivity Zones

The sensitivity zones are based on the conservation planning process which is undertaken at a provincial scale. At the core of the systematic conservation planning framework are clearly stated conservation targets or goals for biodiversity features. These features include all the major terrestrial and aquatic ecosystems and processes. In addition they cover a selected number of species which are either endemic to KwaZulu-Natal (i.e. their worldwide distribution occurs exclusively within the borders of the province) or are nationally or internationally endangered and KwaZulu-Natal can make a significant contribution to their conservation. At the heart of each biodiversity features target is the objective to conserve a representative and viable sample of the feature.

**Irreplaceability analysis**

The first product of the conservation planning analysis in C-Plan is an irreplaceability map of the planning area. Each cell has associated with it an ‘Irreplaceability Value’ which is one reflection of the cells importance with respect to the conservation of biodiversity. Irreplaceability reflects the planning units ability to meet set ‘targets’ for selected biodiversity ‘features’. The irreplaceability value is scaled between 0 and 1.

**Conservation Irreplaceability value – 0.** Where a planning unit has an irreplaceability value of 0, all biodiversity features recorded here are conserved to the target amount, and there is unlikely to be a biodiversity concern with the development of the site.

**Irreplaceability value – 1.** These planning units are referred to as totally irreplaceable and the conservation of the features within them are critical to meet conservation targets. (EIA very definitely required and depending on the nature of the proposal unlikely to be granted).

**Irreplaceability value > 0 but < 1.** Some of these planning units are required to meet biodiversity conservation targets. If the value is high (e.g. 0.9) then most units are required (few options available for alternative choices). If the value is low, then many options are available for meeting the biodiversity targets. (EIA required and depending on the nature of the proposed development, permission could be granted).

The scale of the provincial conservation plan makes it too broad to apply with a high level of confidence the scale of the study area. The biodiversity features (systems and species) identified as important in the study area were used in defining a c-plan at a refined scale for the development node. The resolution is therefore far higher and relevant to the scale of the node. The C-plan depicted in Figure 1 therefore shows areas within the study area that need to be conserved for the node to contribute to meeting provincial targets. The C-plan categories have been applied as defined in Table 1 in categorizing sensitivity zones for terrestrial biodiversity in the development node. While the C-plan is at a higher level of resolution than the provincial version specific investigations are still required at a site specific level as described in the guidelines below.

**TABLE 1 Terrestrial biodiversity sensitivity thresholds**

<b>SENSITIVITY LEVEL</b>	<b>THRESHOLD</b> Irreplaceability Value
<b>High Sensitivity</b>	0.8 - 1.0
<b>Medium Sensitivity</b>	0.6 - 0.8
<b>Low Sensitivity</b>	0.2 - 0.6
<b>Very Low Sensitivity</b>	0.0 – 0.2

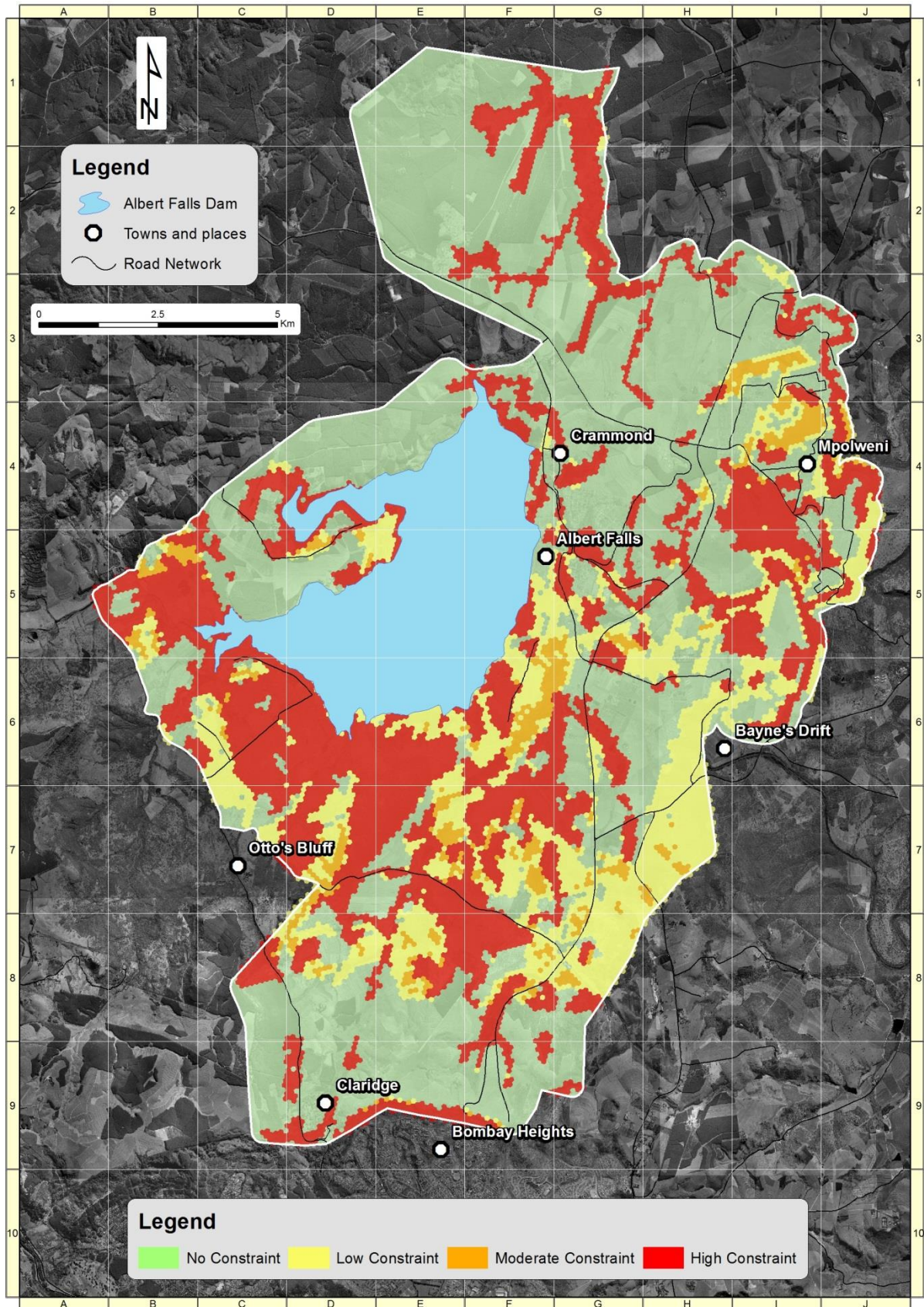


FIGURE 5 Terrestrial biodiversity sensitivity zones



## 5.4 Guidelines

SENSITIVITY LEVEL	DEVELOPMENT OBJECTIVES	EIA GUIDELINES
		Specialist Investigations
<b>High Sensitivity</b>	<ul style="list-style-type: none"> <li>▪ Development must have biodiversity conservation as the primary objective.</li> <li>▪ Development plans must show how they will:                             <ul style="list-style-type: none"> <li>○ Enhance and/or improve the habitat and ecological functioning.</li> <li>○ Secure the high value biodiversity asset/s identified through appropriate legal and or mechanisms.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Biodiversity Assessment Mandatory</li> <li>▪ Query GIS to identify feature's, system's and or species responsible for the sensitivity level assigned to the area. This will inform the specifics of the biodiversity assessment.</li> <li>▪ Apply EKZNW guidelines for specialist ecological assessment.</li> <li>▪ In the event that the biodiversity assessment confirms a high residual impact the EKZNW Norms and Standards on Biodiversity Offsets may need to be applied. A decision to apply the Biodiversity Offsets policy needs be a combined decision taken by the relevant authorities (DAEA and EKZNW).</li> </ul>
<b>Medium Sensitivity</b>	<ul style="list-style-type: none"> <li>▪ The development type should be compatible with biodiversity conservation objectives.</li> <li>▪ Development plans need to show how they will enhance and/or improve the habitat and ecological functioning.</li> </ul>	
<b>Low Sensitivity</b>	Development planning should attempt to enhance any remaining natural systems and features to improve their biodiversity/functional value.	<ul style="list-style-type: none"> <li>▪ Need for a detailed Biodiversity Assessment is dependant on GIS analysis and screening of area. This must involve ground truthing.</li> </ul>
<b>Very Low Sensitivity</b>	Development should enhance any biodiversity features.	<ul style="list-style-type: none"> <li>▪ No Assessment Required</li> </ul>

### References and Resources

- Ezemvelo KZN Wildlife. 2010. Biodiversity Impact Assessment Guideline Handbook for KwaZulu-Natal. IEM Section
- Ezemvelo KZN Wildlife. 2009. Norms and Standards for Biodiversity Offsets: KwaZulu-Natal Province South Africa.
- Contact: [www.kznwildlife.com](http://www.kznwildlife.com) Tel: 033 845 1346.

### Relevant Stakeholders

- EKZN Wildlife:
  - District conservation officer,
  - IEM Section
- Local Conservancies.

## 6. AGRICULTURAL SYSTEMS

### 6.1 Status Quo

**Summary Statement:** *The high production potential areas support a well-developed, diverse and highly integrated agricultural sector which is the foundation of the regional economy. These arable and production areas represent a significant natural asset at a regional and provincial scale.*

The status quo is summarised as follows:

- i. **Optimization of high and good potential arable soils for primary production:** The majority of productive areas are intensively utilised for primary production of key crops (sugar-cane) and timber over
- ii. **Well-developed secondary sector activities:** Outputs from the primary production sector support a range of secondary activities in the form of sugar cane mills, saw mills, timber processing, furniture manufacturing etc, many of which are located outside the node.
- iii. **Integrated Sector:** In addition to directly related primary and secondary activities, there are several other well developed agricultural enterprises in the area that enjoy a symbiotic relationship with the primary activities. These include poultry industry, feedlot and the crocodile farm. For example, the crocodiles are fed chickens and sugar production benefits from organic material from feedlots and chicken farms which is used as fertiliser.
- iv. **Threat from Competing Land-use:** The proposal for increased urban related development in the area poses a risk to primary production, and thereby the dependent secondary activities like the mills. This risk comes in the form of the 'uMshwathi City' concept, the cumulative impact of smaller numerous residential and tourism related development, and large scale infrastructure such as the significant ESKOM powerline and alternative route for the N3, which include options for routes through this development node. A further threat is the restriction placed on the expansion of agricultural processing activities by developing socially sensitive land-use in close proximity to these existing facilities.

### 6.2 Sustainability Objective

*Maintain and where possible enhance the value of the Agricultural Sector to the regional economy and household food security by securing productive land for agricultural use and protecting secondary agricultural activities from competing land-uses.*

### 6.3 Sensitivity Zones

The thresholds defining the sensitivity zones for agricultural systems are defined in Table 3. As depicted in Figure 2 the majority of the area is classified as being of either high or moderate sensitivity, based on the fact that a large proportion has high potential, is highly developed and utilised. Areas nearby water are included because irrigation increases the potential of land. Areas of high agricultural potential include existing facilities for secondary or intensive production, such as poultry farms and feedlots as these are important components of the agricultural system and economy.

**TABLE 2 Agricultural system sensitivity thresholds**

<b>SENSITIVITY LEVEL</b>	<b>THRESHOLD</b> Agricultural Potential/Value
<b>High Sensitivity</b>	Land defined as having high agricultural value, and areas currently under agricultural use, including intensive producers and secondary activities.
<b>Medium Sensitivity</b>	Land defined as having moderate agricultural potential and in close proximity to water sources.
<b>Low Sensitivity</b>	Areas defined as having low agricultural potential.
<b>Very Low Sensitivity</b>	Non applicable.

## 6.4 Guidelines

<b>SENSITIVITY LEVEL</b>	<b>DEVELOPMENT OBJECTIVES</b>	<b>EIA GUIDELINES</b>
		<b>Specialist Investigations</b>
<b>High Sensitivity</b>	<ul style="list-style-type: none"> <li>▪ No loss of land under sugar-cane and timber to alternative land-use.</li> <li>▪ The development proposal must have increased agricultural production as the primary objective.</li> </ul>	<ul style="list-style-type: none"> <li>▪ An agricultural specialist study is mandatory where an alternative land-use is proposed. The study must establish the following where there are existing agricultural activities:                             <ul style="list-style-type: none"> <li>○ The impact on the viability of an existing enterprise associated with the affected property, and</li> <li>○ The secondary/cumulative impacts on related to secondary/associated agricultural activities.</li> </ul> </li> </ul>
<b>Medium Sensitivity</b>	<ul style="list-style-type: none"> <li>▪ Development should contribute to improving/enhancing existing agricultural activities.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Where no agricultural activity occurs on the land earmarked for development, feasible agricultural development options should be included as alternatives. An agricultural specialist investigation is required to understand the production value of the land and associated economic viability.</li> </ul>
<b>Low Sensitivity</b>	<ul style="list-style-type: none"> <li>▪ The development activity should not present a constraint to surrounding agricultural landuse/activities (secondary production).</li> </ul>	<ul style="list-style-type: none"> <li>▪ The assessment must consider the proximity of the development to nearby agricultural land-use and the potential for negative impacts on the proposed use – particularly air and health issues.</li> </ul>
<b>Very Low Sensitivity</b>	Non applicable	<ul style="list-style-type: none"> <li>▪ No Assessment Required</li> </ul>

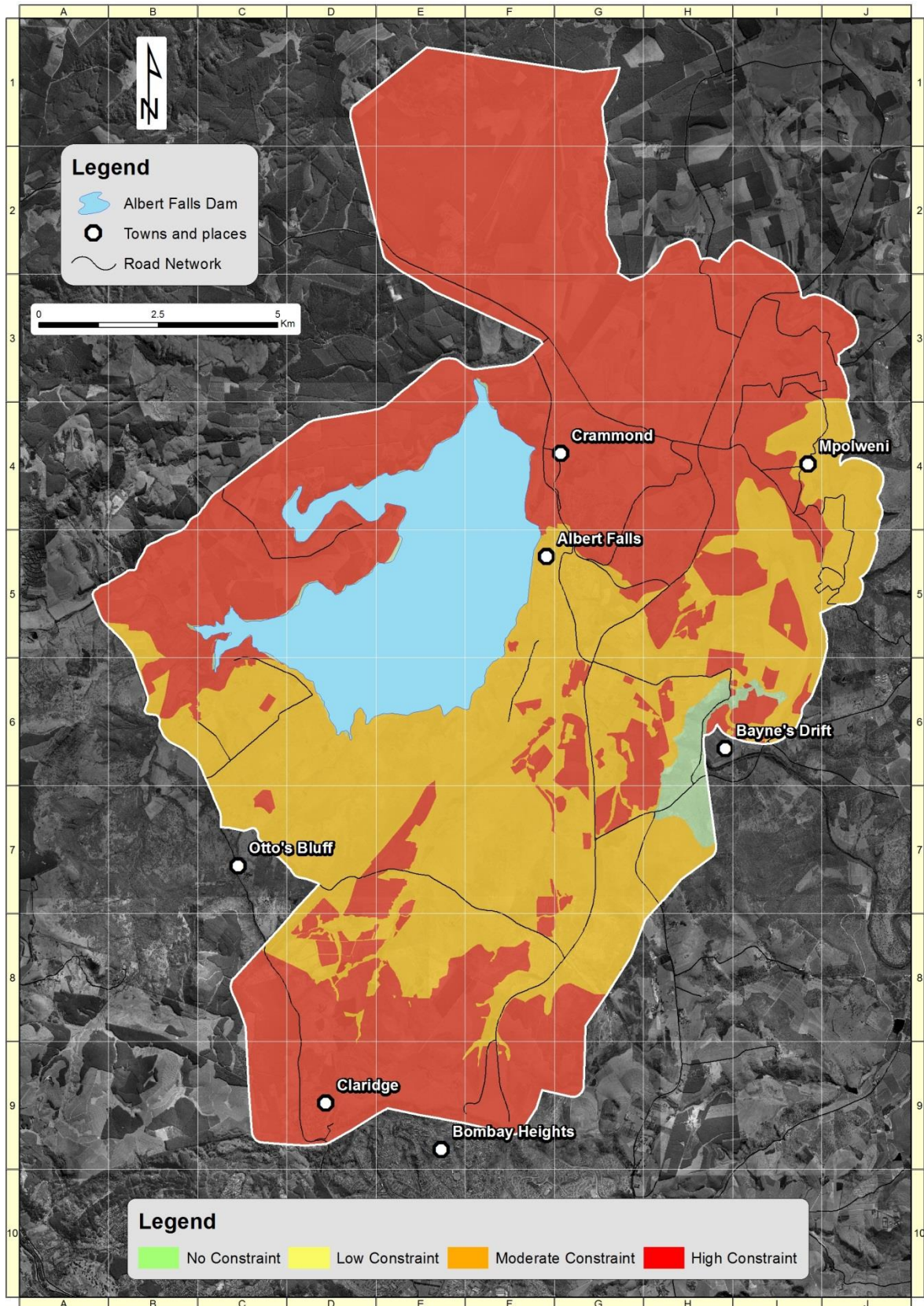


FIGURE 6 Agricultural system sensitivity zones.

## 7. DEVELOPMENT POTENTIAL ZONES

Unlike the other environmental features where the development activity impacts the environmental feature, in this case the environmental features places a constraint on development. Given the nature of the relationship, the terminology differs from the other environmental features and there is no need to set a sustainability objective. The focus therefore lies in understanding the constraint categories, and how to consider these in the EIA process.

### 7.1 Constraint Zones

The Development Potential Zonation (DPZ) specialist study delineated eight different DPZ's based on a combined analysis of; Geology, Slope and Land Type. These eight categories have been categorized into the constraint levels detailed in Table 4. The constraints imposed by DPZ's relate directly to the cost of constructing in these zones and the risk of damage. For example, it is more costly to construct on steep slopes and unstable geology. Similarly, the risk of damage from floods is higher the closer infrastructure is located to water sources.

**TABLE 3 Development Potential Zone Constraints**

CONSTRAINT LEVEL	THRESHOLD Development Potential Zones
High Constraint	DPZs 7- 8
Medium Constraint	DPZs 5 -6
Low Constraint	DPZs 3-4
Very Low Constraint	DPZs 1-2

The constraint zones indicated in Figure 3 show that:

- The south-western sections of the study area near Otto's bluff present a high constraint level due to the steep slopes along the bluff and adjacent slopes.
- The drainage lines and the valley bottoms also present a high constraint relating to the high risk of flooding and the wetland soils which make it difficult and costly to construct infrastructure and/or buildings.

### 7.2 Guidelines

SENSITIVITY LEVEL	EIA GUIDELINES
	Specialist Investigations
High Sensitivity	A specialist geotechnical study is mandatory. The scope of the investigation should be informed by reviewing the GIS and specialist DPZ to understand the basis for the constraint level i.e whether it is slope, geology or flood risk. The flood risk assessment undertaken in the specialist study complements the DPZ zones and should be consulted.
Medium Sensitivity	
Low Sensitivity	No assessment required.
Very Low Sensitivity	

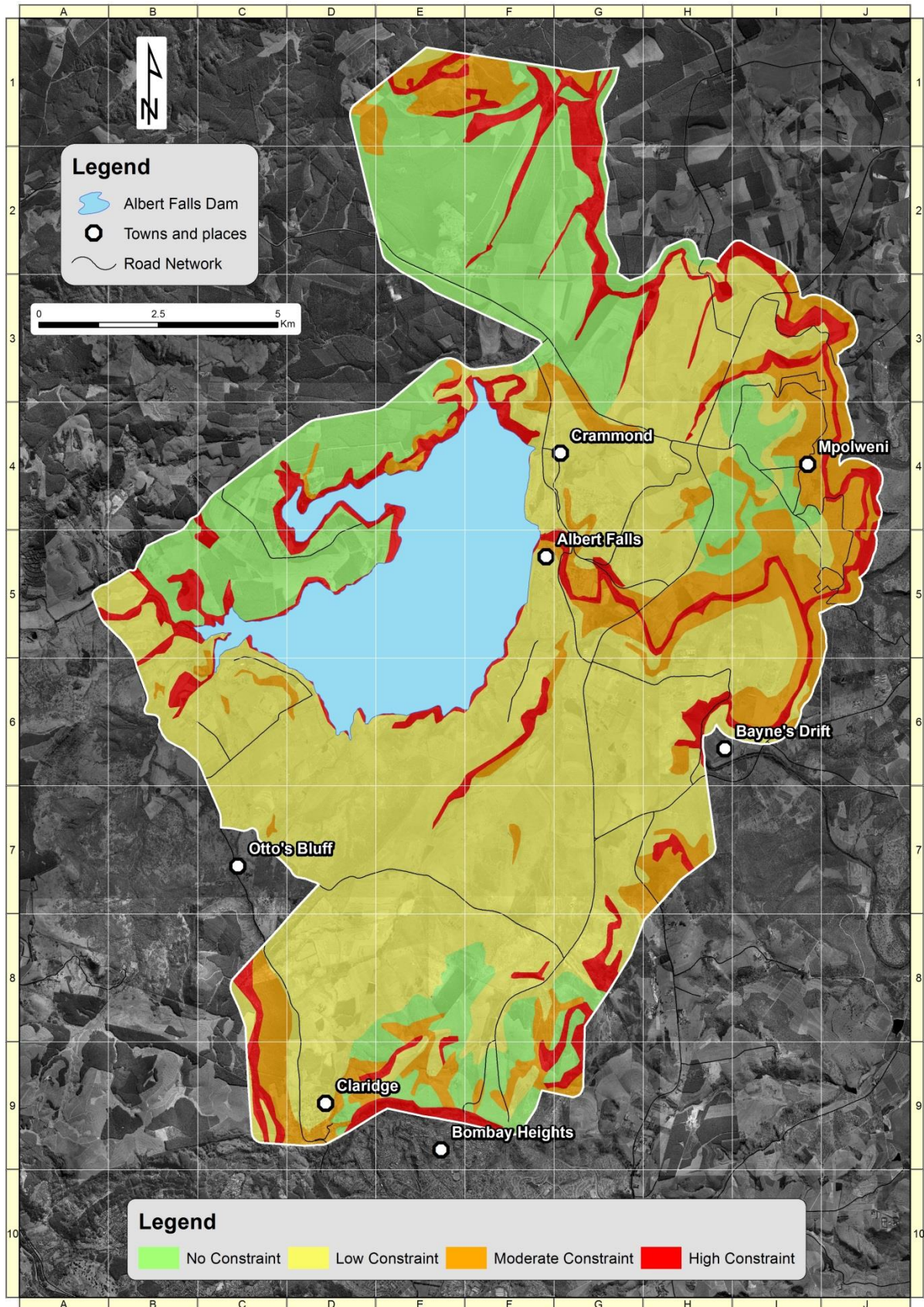


FIGURE 7 Development Potential constraint zones

## 8. WATER QUALITY

### 8.1 Status Quo

**Summary Statement:** *Poor and rapidly declining water quality due to high generation of nutrients and bacterial levels throughout the Mgeni River catchment is negatively impacting people's health, increasing costs of treating water and poses a significant risk to the economy in terms of loss in the existing and potential value of the tourism, recreation and real estate value associated with Albert Falls Dam i.e. the pollution dilution capacity of the rivers and Albert Falls Dam have been exceeded to the point that the legal standards are also exceeded on a regular basis.*

The current situation is due to the following factors.

- i. **Backlogs and basic level of sanitation infrastructure** - most individual dwellings operate off a septic tank, including tourism and recreational facilities within the immediate periphery of Albert Falls Dam. Furthermore, VIPs have been used in dense formal settlement such as at Thokozana and Mpolweni which are in close proximity to the main Mgeni River. 52 % of the total households used pit latrines with no ventilation, whilst 13, 8% had no toilet facilities at all (2001 Stats in IDP).*
- ii. **Inadequate Waste Water Treatment** – The 2011 Green Drop Report (DWA 2011) reported that none of the treatment works within the Umgungundlovu District – which includes uMshwathi and the upstream Mgeni Municipality (Howick) are meeting effluent quality standards i.e. there is high and frequent pollution from under-performing Waste Water Treatment Works (WWTW).*
- iii. **Agricultural activities** – are a dominant land-use throughout the catchment, including the study area. They generate widespread inputs of nutrients from in the form of fertilisers and pesticides. Animal production, particularly in concentrated production such as poultry, piggeries, dairies and feedlots contributes to bacteria and nutrient levels and bacteria in the system. Secondary agricultural production (saw mills, sugar mills, abattoirs) contributes further to effluent levels in the system.*

### 8.2 Sustainability Objective

*Improve water quality to levels which sustain ecological functioning and recreational and domestic users/uses.*

### 8.3 Sensitivity Zones

There are many elements or constituents that make up water quality from metals to bacterial contamination that comprise water quality and impact different users in different ways. The specialist investigation revealed that the components that are at the core of the quality issue are excessive bacteria and nutrient loading. The sensitivity levels are therefore categorised according to whether or not the DWA water quality Guidelines are exceeded with respect to these constituents. Given that the impact is on human health – in terms of recreation and drinking standards, the thresholds are taken from these two standards.

**TABLE 4 Water quality sensitivity thresholds.**

SENSITIVITY LEVEL	THRESHOLD DWA Water Quality Guideline Targets for Bacteria (Faecal Coliforms) and Nutrients (Ph)
High Sensitivity	DWA targets exceeded by significant levels on a regular basis.
Medium Sensitivity	DWA targets met for the majority of the time but exceeded infrequently.
Low Sensitivity	Levels within DWA targets all the time.
Very Low Sensitivity	Levels well within DWA targets.

As illustrated in figure 4, the DWA target levels for all nutrients (Ph) and Bacterial Coliforms (E.Coli) exceed the thresholds in all the catchments within the study area at significant levels and frequently. This highlights the significance of this use as described in the SEA and the impact on the state of the Mgeni River and therefore Albert Falls and Nagle Dams.

## 8.4 Guidelines

SENSITIVITY LEVEL	DEVELOPMENT OBJECTIVES	EIA GUIDELINES Specialist Investigations
High Sensitivity	No net increase in nutrient and bacterial levels in the catchment.	<p>Given the need to improve the situation and avoid adding to the cumulative impact, specialist investigations are necessary for any development type that will add nutrients and or bacterial inputs to the system.</p> <p>These investigations need to analyse the effectiveness of the proposed technology and other mechanisms (biological/natural systems) for treating and disposing of bacteria and nutrients from both point and non-point sources.</p>
Medium Sensitivity		
Low Sensitivity		
Very Low Sensitivity		



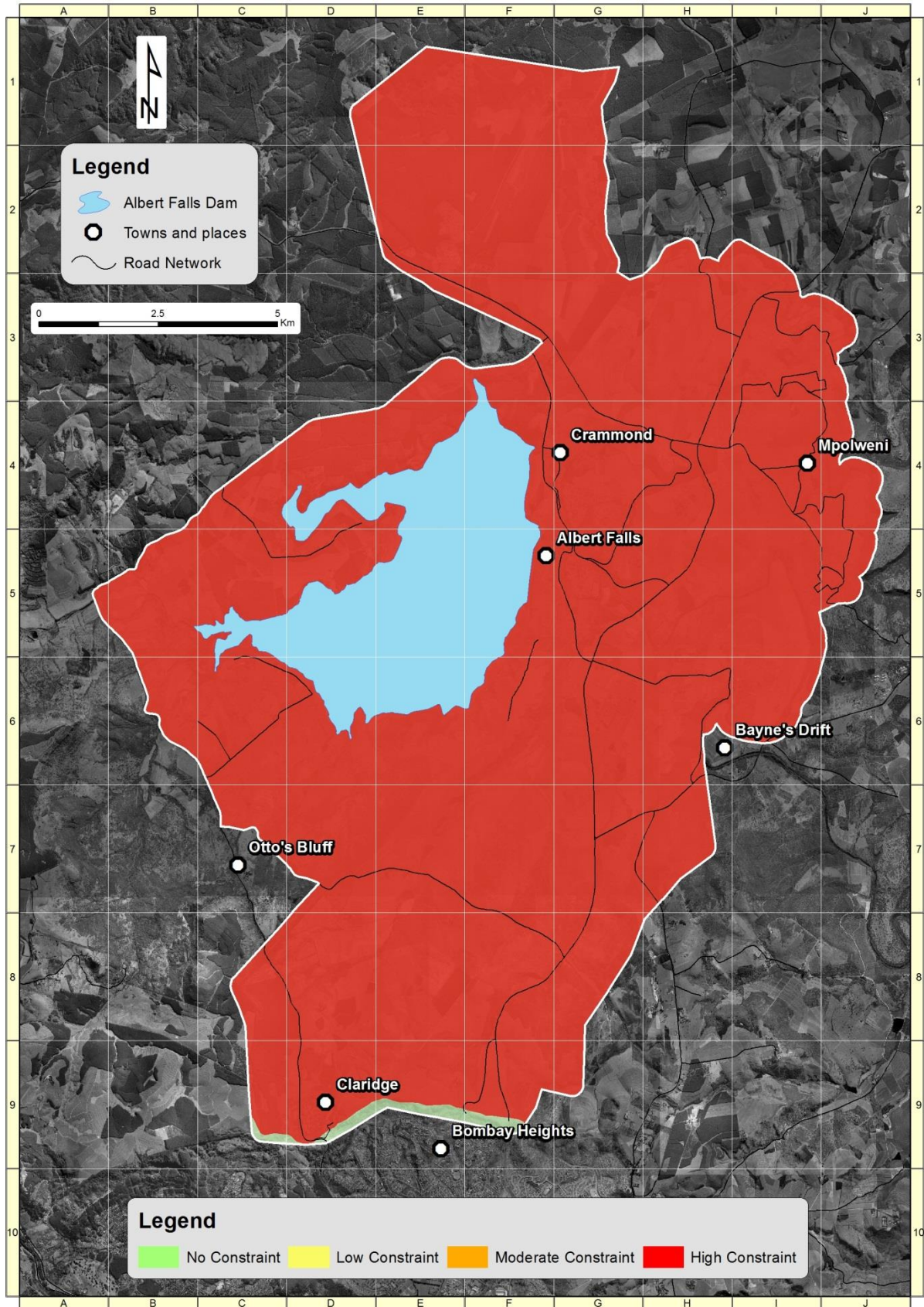


FIGURE 8 Water quality sensitivity zones

## 9. AQUATIC HEALTH

### 9.1 Status Quo

**Summary Statement:** All sub-catchments were assessed as having a ‘Good’ Present Ecological State (PES).’ The exceptions are the Blackspruit and immediate catchment of the Albert Falls Dam.

While water quality has been identified as a very poor in terms of nutrient loading and high levels of bacterial contamination, other indices (SASS, IHI and benthic diatoms) indicated fairly healthy river ecosystems. The current health would suggest: adequate flows to sustain species, and riparian vegetation in fairly good condition.

### 9.2 Sustainability Objective

*Maintain the current good aquatic health and improve sub catchments in fair condition to good.*

### 9.3 Sensitivity Zones

SENSITIVITY LEVEL	THRESHOLD
High Sensitivity	Catchments identified as being in fair condition (the Blackspruit and the catchments immediately bordering Albert Falls Dam).
Medium Sensitivity	Catchments classified as being in a good ecological state.
Low Sensitivity	Not applicable
Very Low Sensitivity	Not applicable

### 9.4 Guidelines

SENSITIVITY LEVEL	DEVELOPMENT OBJECTIVES	EIA GUIDELINES
		Specialist Investigations
High Sensitivity	Contribute to the improved condition of the aquatic ecology.	<ul style="list-style-type: none"> <li>▪ Delineation of the riparian zone and assessment of condition of the riparian vegetation.</li> <li>▪ Delineation of an appropriate buffer to protect the riparian zone.</li> <li>▪ Assessment of any direct inputs to system e.g. storm-water run-off, and effluent disposal and the potential impact on receiving aspects of the aquatic system i.e. stream bank stability, riparian vegetation, flows, in-stream habitat.</li> </ul>
Medium Sensitivity	Maintain the condition of the aquatic ecology.	
Low Sensitivity	<ul style="list-style-type: none"> <li>▪ NA</li> </ul>	<ul style="list-style-type: none"> <li>▪ NA</li> </ul>
Very Low Sensitivity		

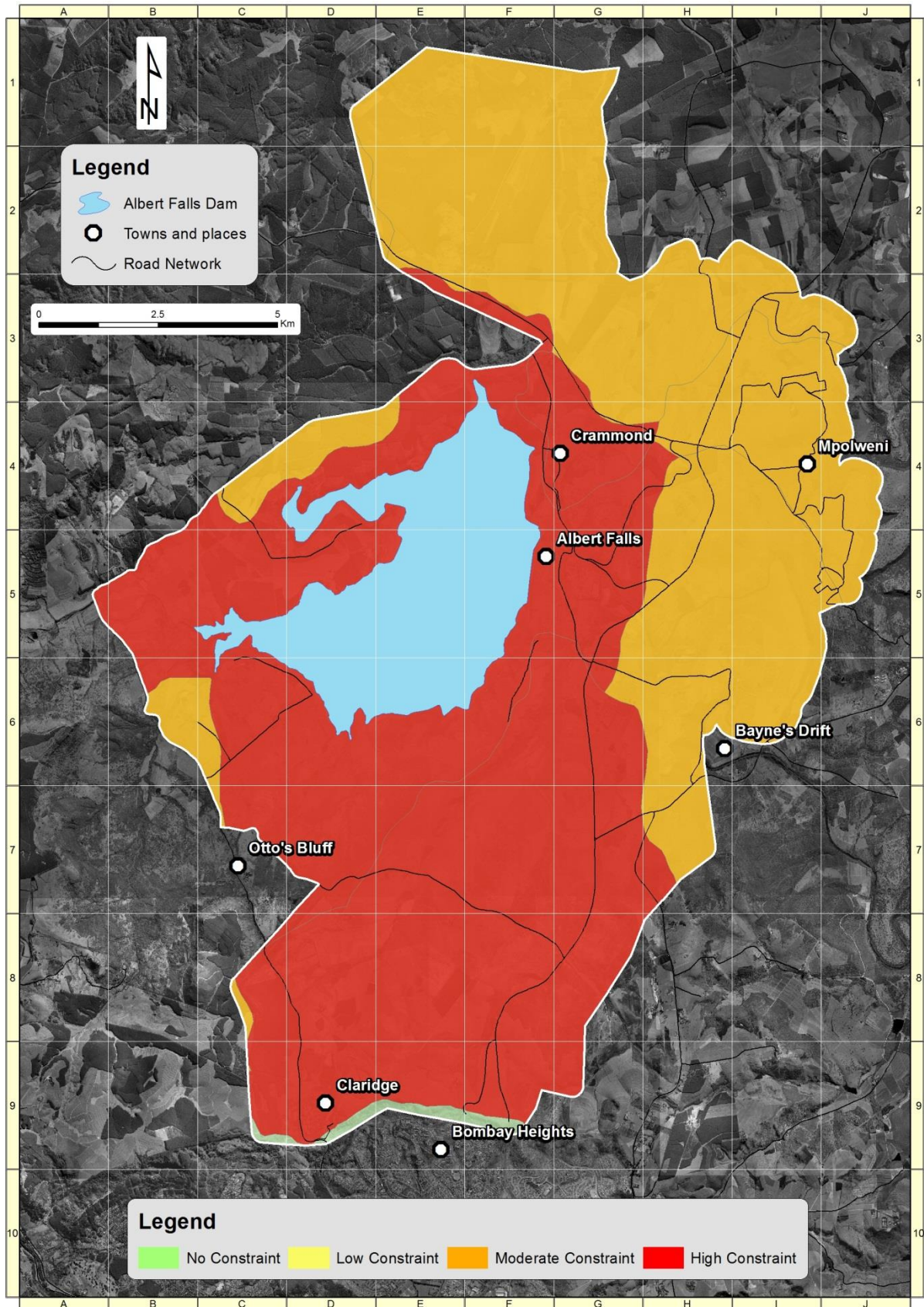


Figure 9 Aquatic Ecology sensitivity zones

## 10. WETLANDS

### 10.1 Status Quo

**Summary Statement:** *Extremely high levels of loss and degradation have reduced the capacity of wetlands to ameliorate the serious water quality issues in the catchment and sustain species with high conservation value.*

The situation summarised above is due to the following factors and drivers

- i. *Increased infestation by alien species due to disturbance with land transformation.*
- ii. *Reduction in natural flows from afforestation.*
- iii. *Total conversion of wetland habitat through draining and planting to sugar cane and timber.*
- iv. *Increased toxic and nutrient inputs (associated with fertiliser and insecticide application) to adjacent wetlands.*
- v. *Increased sediment inputs from agriculture.*

### 10.2 Sustainability Objective

*Increase the ecological health and functional value of all wetlands.*

### 10.3 Sensitivity Zones

The sensitivity zones relate to the extent of the wetland. The actual body of the wetland is the most sensitive, given that direct impacts result in the loss of the habitat and ecological functioning. The buffer zones represents a zone of lesser, but still significant sensitivity as activities in the buffer and even the immediate catchment can indirectly alter the condition of a system. This threat relates particularly to activities that alter the hydrology (volume, frequency and amplitude of run-off) in the wetland's catchment as flows represent the life blood of the system.

**TABLE 5 Wetland sensitivity categories**

SENSITIVITY LEVEL	THRESHOLD Wetland area, buffer and catchment.
High Sensitivity	Wetland body
Medium Sensitivity	Wetland buffer and catchment.
Low Sensitivity	Non-applicable
Very Low Sensitivity	Non-applicable

## 10.4 Guidelines

SENSITIVITY LEVEL	DEVELOPMENT OBJECTIVES	EIA GUIDELINES
		Specialist Investigations
High Sensitivity	Net gain of wetland health and function through rehabilitation of existing systems on development sites to optimum levels of functioning and defined management plan to maintain this state.	<ul style="list-style-type: none"> <li>▪ <i>Wetland Delineation.</i> The mapping undertaken for the EMF was at a broad level. Where it is suspected that a wetland occurs on site a specialist should be required to confirm this. If wetland/s occur then they need to be delineated according to DWA delineation guidelines.</li> <li>▪ <i>Wetland Health Assessment</i> A wetland health and functional assessment using the WET-Health and WET-Eco services tools.</li> <li>▪ <i>Wetland Rehabilitation and Management</i> The EMP should include a wetland management component that details how existing systems in good condition will be protected and managed, and how degraded systems will be restored and managed to achieve the sustainability objective. This management should include the delineation of a buffer zone that is appropriate to the nature of the land-use and associated impacts. The most recent/accepted guidelines for determining wetland buffers should be applied. In this regard the WRC has commissioned a project to establish procedures for delineating wetland buffers (WRC project: K5/2200 – in prep).</li> </ul>
Medium Sensitivity		
Low Sensitivity	NA	NA
Very Low Sensitivity		

### References and Resources

- Macfarlane, D.M., Kotze, D.C., Ellery, W.N., Walters, D., Koopman, V., Goodman, P. & Goge, C. (2006). *Wet-Health: A technique for rapidly assessing wetland health*. Version 1.
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- Department of Water affairs and Forestry (2005). *A practical field procedure for identification and delineation of wetland and riparian areas*. Edition 1, September 2005. DWAF, Pretoria.
- Department of Water affairs and Forestry (2006). *Delineation of Wetland and Riparian Areas*. DWAF, Pretoria.
- SANBI (2009). *Further Development of a Proposed National Wetland Classification System for South Africa. Primary Project Report*. Prepared by the Freshwater Consulting Group (FCG) for the South African National Biodiversity Institute (SANBI).
- WRC project K5/2200: *Development Of A Methodology To Determine The Appropriate Buffer Zone Width And Type For Developments Associated With Wetlands, Watercourses And Estuaries (in prep)*.

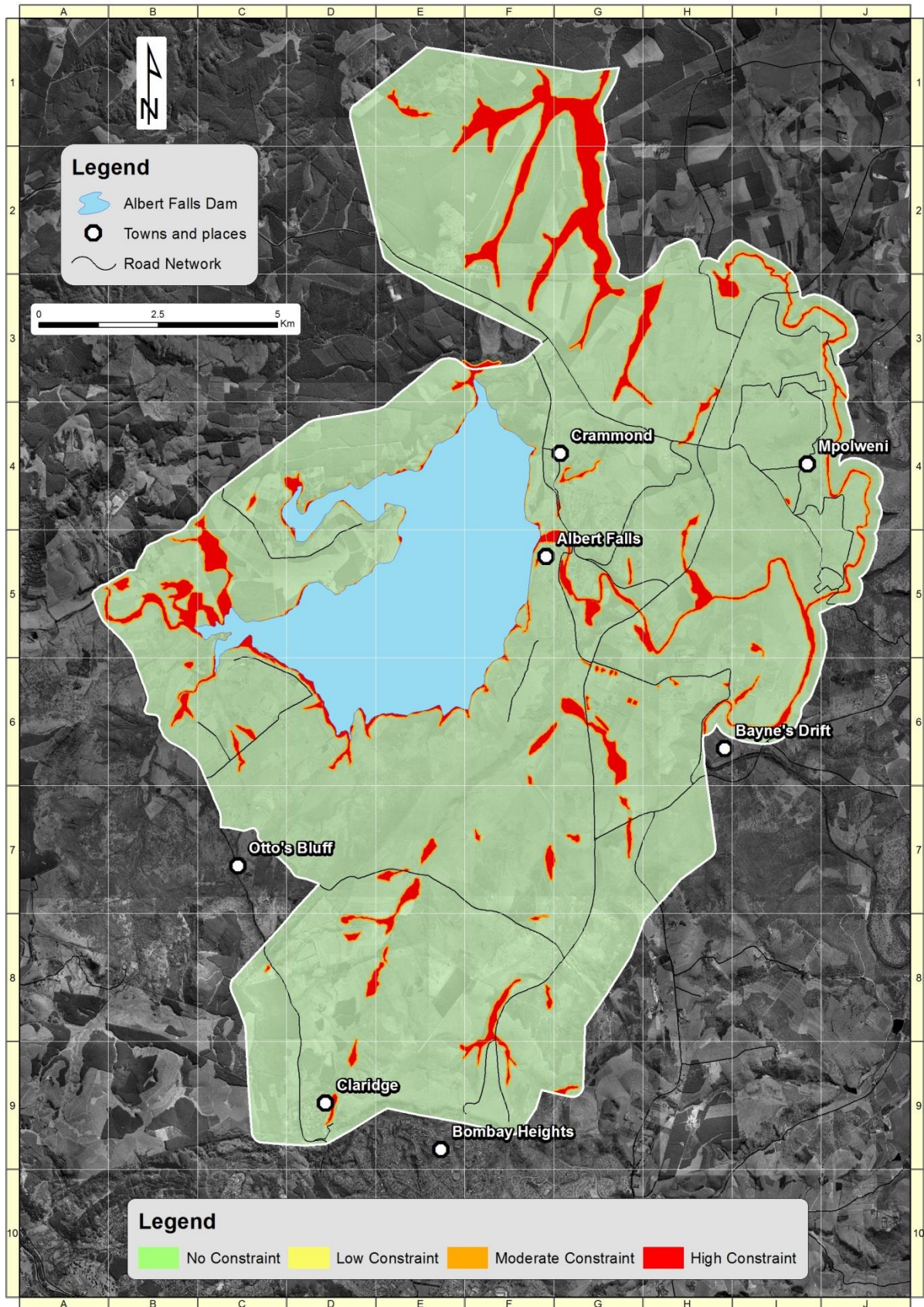


FIGURE 10 Wetland sensitivity zones.

## 11. AIR QUALITY

### 11.1 Status Quo

**Summary Statement:** *In terms of human health standards, air quality is perceived to be good and an asset across a large proportion of the node which is appreciated by residents and supports residential, tourism and recreational uses. The exception is the high intensity odour issues related to agricultural activities in the eastern and low lying sections of the development node.*

The status quo is due to the following factors:

- *A lack of noxious industry means that air quality (smoke) is considered to fall within health standards. The burning of sugar cane is the primary source of smoke, of which particles sized below PM10 are particularly harmful. The synergistic effect of the PM10 particles with other gases may be toxic and is harmful to the health of humans through chronic (up to lifetime) exposure. While considered to be below target levels this needs to be verified. It is however a seasonal issue.*
- *Intensive agricultural activities (poultry, feedlot, crocodile farm) generate odour issues that affect the lower lying areas below and east of Albert Falls Dam where they are concentrated and where air naturally drains, particularly in winter months.*
- *Sawmills and timber processing activities also generate noise and odour as does the main provincial access route, the R33.*

### 11.2 Sustainability Objective

*Maintain air quality at current levels to sustain present levels of social wellbeing and support residential, tourism and recreational activities.*

### 11.3 Sensitivity Zones

In the case of air quality, sensitivity relates to the impact on people's health and quality of life. The sensitivity therefore relates to applications to establish residential, commercial or tourism land-uses that would bring large numbers of people into contact with air quality issues. The air quality investigation identified point sources of air pollution. Air pollution is however not static and moves according to a range of factors of which climate and topography, which are interlinked, and are the main drivers of where pollution travels and is dispersed. The specialist investigation therefore also established areas of general sensitivity based on the location of the pollution sources analysed in combination with local topography and climatic conditions.

The concentric circles in Figure 6 represent buffers around existing point sources of pollution. The buffers are 500m distance from the point source. It is important to understand that where a pollution source is located at ground level the impact is experienced more acutely immediately adjacent the source, than if there is a stack which is releasing the pollutant at higher elevation as the stack facilitates the pollution being more easily dispersed. The point sources of air pollution in the area are all agricultural in nature and located at ground level.

It should also be noted that because the levels of pollution in the general sensitivity zones are considered to be within legal standards the sensitivity is rated as medium and not high. What the sensitivity map shows is that the point sources of pollution are located in the lower lying areas which are more sensitive to an accumulation of pollutants. The analysis and sustainability objective suggests that:

- No highly noxious industry should be considered in the study area, unless it can be clearly demonstrated that the pollution can be mitigated to sustain current levels.
- Development activities that are sensitive to air quality issues (involve people such as residential-use) should be located outside the lower reaches of the Umgeni Valley below Albert Falls dam.
- There is a need to verify the ambient air quality in the development node - across seasons and topography.

**TABLE 6 Air quality sensitivity zones**

SENSITIVITY LEVEL	THRESHOLD
<b>High Sensitivity</b>	500m buffers around existing point sources of pollution.
<b>Medium Sensitivity</b>	Low lying areas where pollution sources are located and pollution naturally accumulates due to a combination of climatic and topographic factors.
<b>Low Sensitivity</b>	Higher lying areas where there are less pollution sources and pollution is more easily dispersed.
<b>Very Low Sensitivity</b>	Non applicable.

## 11.4 Guidelines

SENSITIVITY LEVEL	DEVELOPMENT OBJECTIVE	EIA GUIDELINES
		Specialist Investigations
<b>High Sensitivity</b>	Retain current air quality by either: <ul style="list-style-type: none"> <li>- Excluding activities that negatively impact current levels of air quality, and/ or implementing mitigation measures that secure current levels.</li> </ul>	<ul style="list-style-type: none"> <li>▪ An air quality specialist study is mandatory and should focus on understanding the:                             <ul style="list-style-type: none"> <li>- Nature of the pollutants (noise, dust, gas, odour).</li> <li>- The concentrations, intensity and frequency of pollution events.</li> <li>- The extent and scale of the impact – how far the pollution will be experienced and at what concentrations under different climatic conditions.</li> <li>- The cumulative impact on pollution levels in the airshed.</li> </ul> </li> <li>▪ Given the current lack of baseline data, this would need to be established to inform the assessment of cumulative impact.</li> </ul>
<b>Medium Sensitivity</b>		Specialist study required to assess: <ul style="list-style-type: none"> <li>- The direct impact on neighbouring sensitive land-uses/activities.</li> <li>- The cumulative impact on high and medium sensitivity zones due to the combined influence of climatic and topographical factors.</li> </ul>
<b>Low Sensitivity</b>		<ul style="list-style-type: none"> <li>- The direct impact on neighbouring sensitive land-uses/activities.</li> <li>- The cumulative impact on high and medium sensitivity zones due to the combined influence of climatic and topographical factors.</li> </ul>
<b>Very Low Sensitivity</b>		Non applicable.



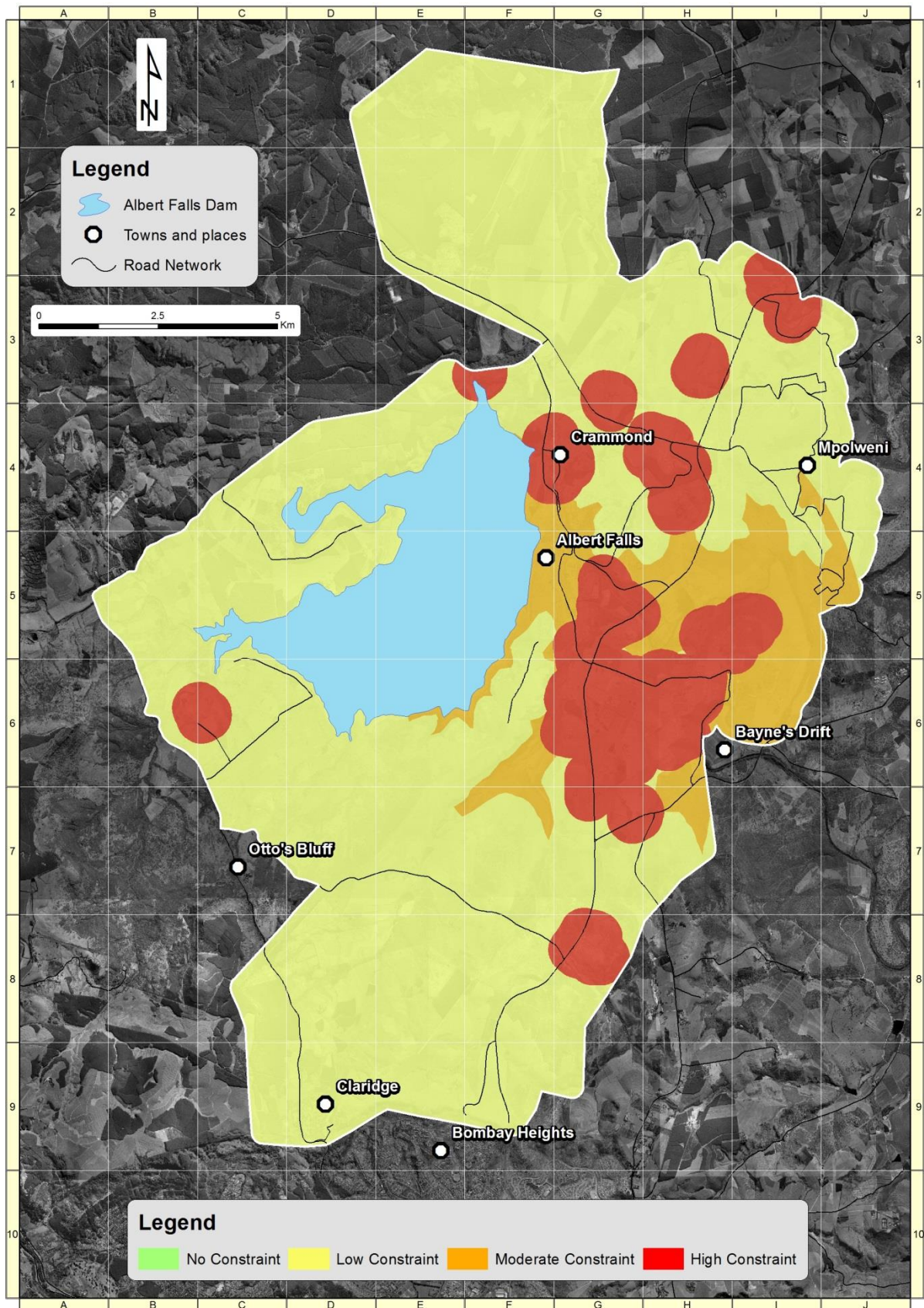


FIGURE 11 Air quality sensitivity zones

## 12. SOCIAL ENVIRONMENT

### 12.1 Status Quo

**Summary Statement:** *A large proportion of the population is vulnerable to poor environmental quality (poor water/air quality), environmental crises (floods) and/or economic crises (loss of family members providing welfare grants) due to high levels of poverty, poor levels of basic service delivery and low literacy levels. The lack of resources (finance) and capacity (education) limits the ability of people to improve their situation. Lack of certainty around land claims on a large proportion of the land in the study area further reduces access to an asset that could assist people to reduce the levels of vulnerability.*

The status quo is a factor of the following issues:

- i. High dependency ratio,*
- ii. High poverty levels,*
- iii. Lack of access to basic services and/or poor levels of services supplied,*
- iv. Low literacy and education levels, and*
- v. Lack of access to/security of tenure.*
- vi. Service delivery will not improve the situation if it is not appropriate e.g. VIP sanitation solutions are likely to contribute further to the water quality issues*

### 12.2 Sustainability Objective

*Improved levels of social well-being through prioritization of sustainable economic growth and service delivery.*

### 12.3 Sensitivity Zones

The level of information that informed the social analysis was not obtained at a household or even settlement level. It is therefore not possible to spatially delineate areas of higher or lower sensitivity in terms of vulnerability. Nor can the sensitivity zones account for the impacts of economic crises on people.

The approach has therefore been to try protect people from the impact of decreased environmental quality by establishing buffers around sensitive social receptors (sites where people live, work, recreate and utilize for other reasons e.g. clinics). The buffers aim to protect the people living in the area from development activities that generate, predominantly air related impacts such as noise, smoke, odour etc. Careful assessment is required before the following type of activities and infrastructure that generate these impacts are located in close proximity to the social receptors. Examples of such activities include certain agri-processing and intensive animal production, noxious industry, waste disposal sites, sewage treatment plants, large transport infrastructure (rail, primary roads). The buffers relate primarily to air pollution but serves to highlight the location of social receptors and the buffers should be reviewed depending on the specific scale and nature of the activity and its impacting outputs.

**TABLE 7 Social sensitivity zones categories**

SENSITIVITY LEVEL	THRESHOLD
<b>High Sensitivity</b>	100m buffer around social sites.
<b>Medium Sensitivity</b>	250m buffer around social sites
<b>Low Sensitivity</b>	500m buffer around social sites.
<b>Very Low Sensitivity</b>	Non applicable.

## 12.4 Guidelines

SENSITIVITY LEVEL	DEVELOPMENT OBJECTIVE	EIA GUIDELINES
		Specialist Investigations
<b>High Sensitivity</b>	Development should show how it will contribute to addressing social issues: <ul style="list-style-type: none"> <li>- Include skills development, and employ local people.</li> <li>- Service delivery must be of appropriate standard and type e.g VIPs are likely to add to the bacterial pollution of water resources and alternative solutions/technology should be</li> <li>- Development of a green economy opportunities across that improve ecological quality (recycling business, eradication of alien invasive plants, wetland rehabilitation).</li> <li>- Investigate opportunities to develop sustainable projects – such as biofuel pellets from agricultural waste products generated in timber and saw milling industry.</li> </ul>	Specialist studies mandatory and required to analyse: Negative impacts on people from development activity relating to: <ul style="list-style-type: none"> <li>- Air quality - Noise, odour, gas, smoke</li> <li>- Impacts of increased traffic.</li> <li>- Effluent.</li> <li>- Visual impacts.</li> <li>- Access</li> </ul> Identification of and Optimization of opportunities to benefit local people such as employment and skills development. Non applicable.
<b>Medium Sensitivity</b>		
<b>Low Sensitivity</b>		
<b>Very Low Sensitivity</b>		

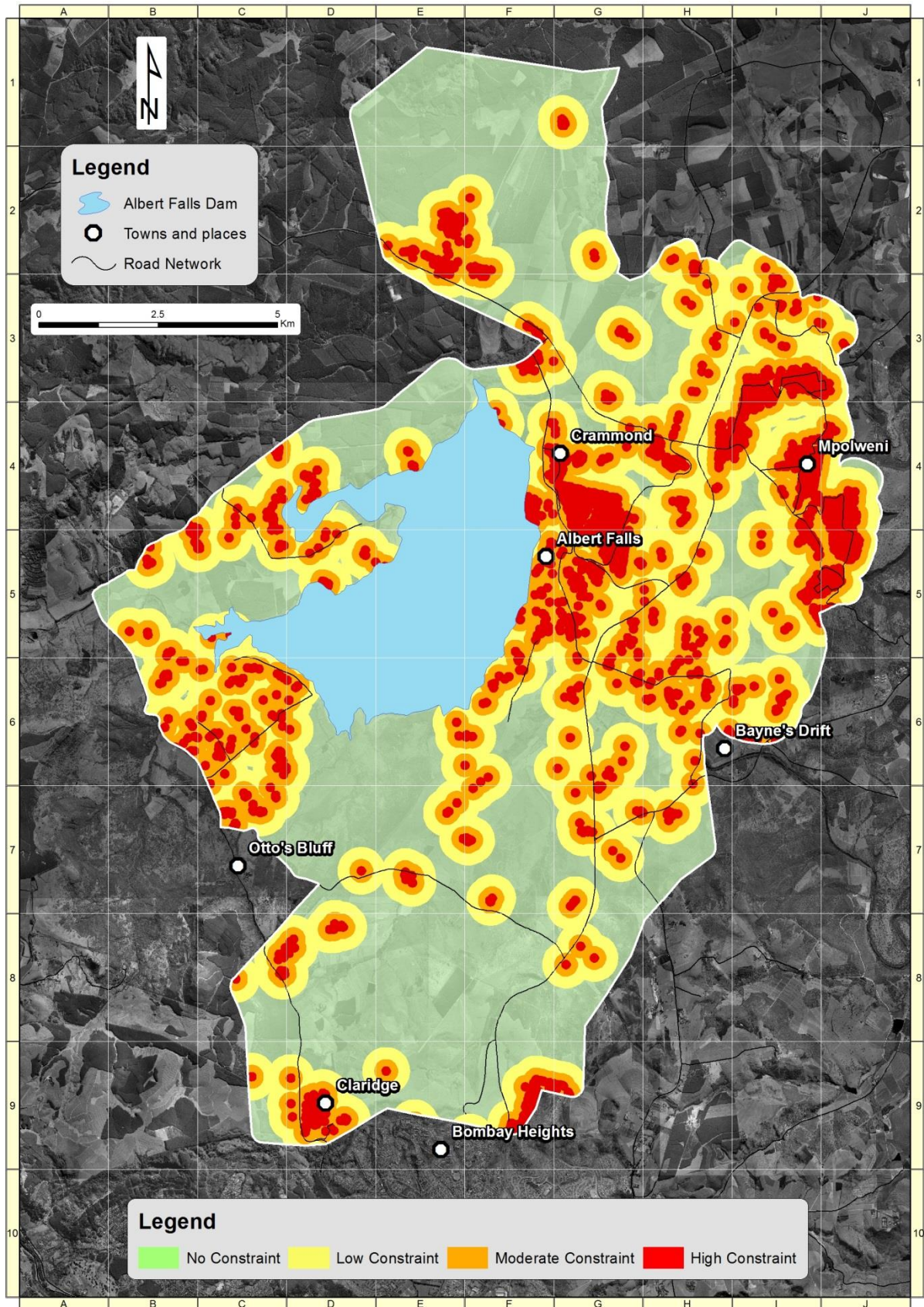


FIGURE 12 Social sensitivity zones

## 13. Heritage Resources

### 13.1 Status Quo

**Summary Statement:** *There are no listed archaeological resources in the study area based on current knowledge which is limited to assessments for specific development applications. The most significant heritage resources potentially at risk to development and agricultural expansion are buildings and structures older than 60 years and ancestral graves of labour tenants and farm workers. The agrarian landscape setting and association with the Albert Falls Dam, and the conservation, tourism and hospitality initiatives that have developed around these resources, make the receiving environment highly sensitive to changes in view-scape, nocturnal lighting, power lines and uncontrolled urban and peri-urban expansion.*

The status quo is a factor of the following issues:

- i. *The high levels of transformation due to primarily agricultural activities which would have damaged archaeological resources that occur in the substrate.*
- ii. *Low levels of understanding regarding heritage resources.*
- iii. *Well-developed and settled landscape.*

### 13.2 Sustainability Objective

*Develop an improved understanding of heritage resources and measures to protect and manage them.*

### 13.3 Sensitivity Zones

The definition of sensitivity zones for heritage resources is complicated by the wide range of different heritage resources including archaeological, historical and cultural (graves, landscape). The sensitivity categories have been informed by the following factors:

- Despite a range of sites, places and structures are recorded within the study area none of these are listed as having a high conservation value.
- The area does not have a rich archaeological wealth – rated as almost invisible by the specialist team in the status quo.
- Resources such as archaeological and stone-age resources occur in the substrate. Where the soils and upper levels of geology have been significantly altered through cultivation such heritage resources will have been destroyed and the sensitivity is therefore lower.

Based on the above there are no areas or sites rated as having high or medium sensitivity. Areas still under natural vegetation are rated as having low sensitivity, because although the chances of archaeological resources occurring here are higher than in disturbed areas, the low likelihood of heritage resources occurring generally in the area results in natural areas being rated as low sensitivity rather than medium or high.

**TABLE 8 Heritage Resources sensitivity categories**

SENSITIVITY LEVEL	THRESHOLD
<b>High Sensitivity</b>	Non applicable
<b>Medium Sensitivity</b>	Non applicable
<b>Low Sensitivity</b>	Untransformed areas under natural vegetation.
<b>Very Low Sensitivity</b>	Transformed areas under agriculture and urban land use.

### 13.4 Guidelines

SENSITIVITY LEVEL	DEVELOPMENT OBJECTIVE	EIA GUIDELINES
		Specialist Investigations
<b>High Sensitivity</b>	<ul style="list-style-type: none"> <li>▪ NA</li> </ul>	<ul style="list-style-type: none"> <li>▪ NA.</li> </ul>
<b>Medium Sensitivity</b>	<ul style="list-style-type: none"> <li>▪ NA</li> </ul>	
<b>Low Sensitivity</b>	Identify and evaluate the conservation significance of any built infrastructure, and/or graves.	- Undertake site reconnaissance/screening to identify the existence of any heritage resources, with a specific focus on graves and historical buildings. Investigation to be undertaken by registered heritage specialist according to process defined by the heritage provincial heritage agency (Amafa).
<b>Very Low Sensitivity</b>		

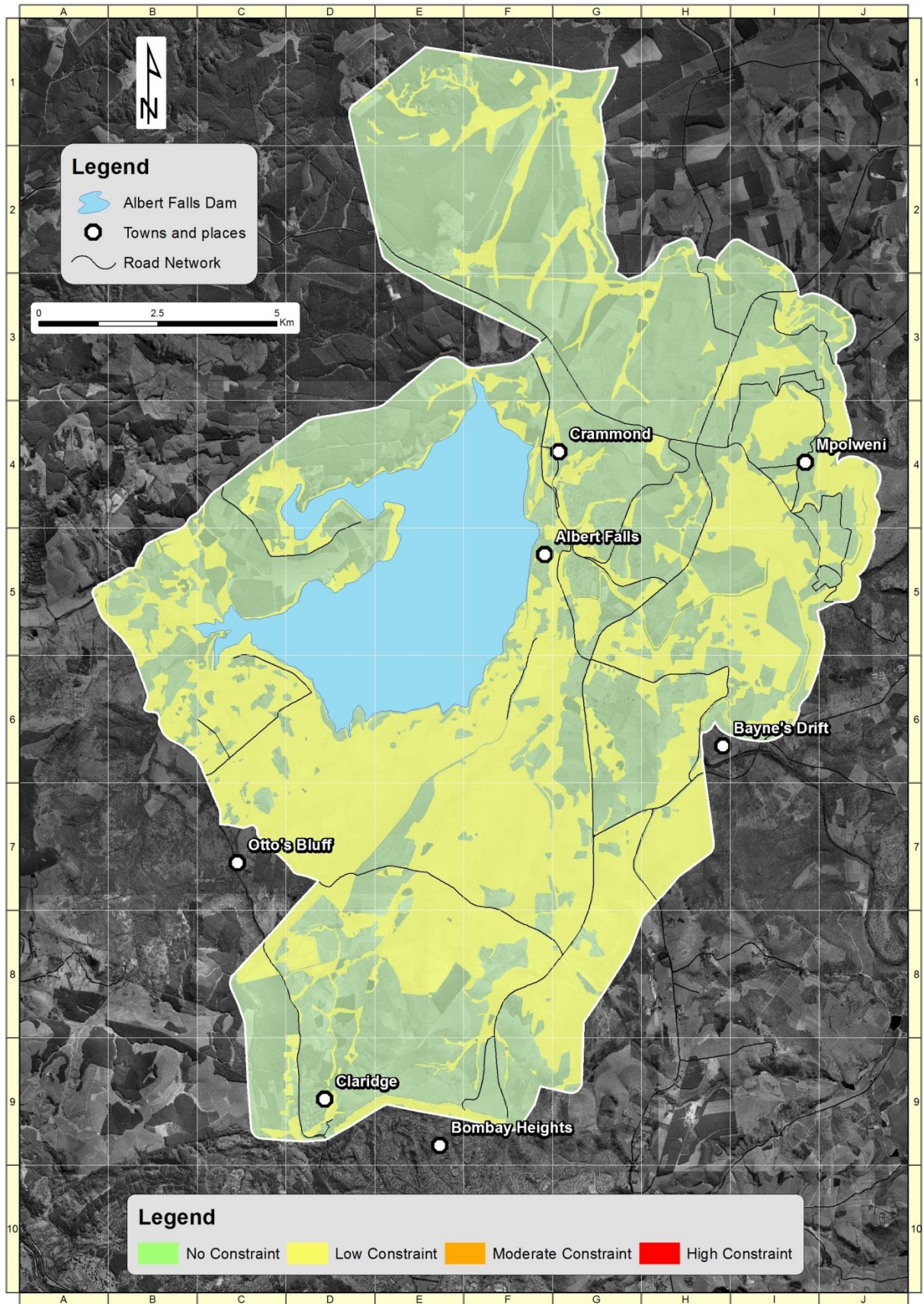


FIGURE 13 Heritage Resources sensitivity zones