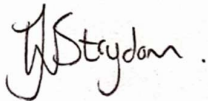


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SECTION 5.5: LAND AND WATER USE

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Author declaration: I declare that appropriate diligence and quality assurance was applied in the compilation of this report. As such I am confident in the results here described and the conclusions drawn.



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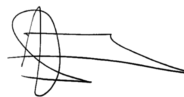
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Date: **2026-03-30**

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AMENDMENT RECORD			
Rev	Draft	Date	Description
0		April 2015	New chapter. Thyspunt Site Safety Report compiled in support of Eskom's Nuclear Installation Site Licence for the Thyspunt site.
0a		March 2024	Revised report submitted to the NNR.
0b		January 2025	Revised to address NNR comments.
0c		September 2025	Revised to address NNR Evaluation comments.
0d		March 2026	Footer revised to be consistent with other TSSR sections.

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EXECUTIVE SUMMARY

The assessment of the land and water use characterisation for the site region and site vicinity that was conducted for the purposes of this section concluded the following:

Key characteristics of the existing and expected future use of land and water in the site region that are important to nuclear safety are the following:

- The site region is characterised by predominantly natural areas (69.9 per cent). Agriculture makes up 24.0 per cent of the regional land cover. Very low levels of urban land cover are present (2.1 per cent), with relatively low industrial development.
- Approximately 1.4 per cent of the region accommodates surface water resources. This water is used for irrigation and potable water supply within the site region. A large part thereof is transferred to the Nelson Mandela Bay Metropolitan Municipality (NMBM) via the Algoa Water Supply System (AWSS). Groundwater is an important water resource for the coastal towns and in the southern part of the region. Towns that rely on groundwater resources for supplementary potable water (i.e. in addition to water received via the AWSS), include Humansdorp, St. Francis Bay, Cape St. Francis, Oyster Bay and Jeffreys Bay. The main aquifer that is utilised comprises of fractured sandstone of the TMG Aquifer.
- Overall, the AWSS is in deficit as a result of over-allocation and the slow implementation of interventions to diversify water supply and reduce water requirements.
- The Kouga Local Municipality has effectively reached the limit of its allocations from the AWSS. Further growth in the municipality's water requirements should therefore be met by the development of new water resources by the Kouga Local Municipality (e.g. groundwater resources).
- The coastal towns in the site vicinity experience seasonal fluctuations in water use as a result of a large number of second homes that are occupied over holiday periods, as well as large numbers of tourists that visit the site region during the Christmas and Easter holiday periods.
- Agriculture occurs throughout the site region, largely along rivers and in coastal plains. Cultivation of fruit and vegetables is concentrated around Hankey and Patensie, with large volumes of citrus being cultivated and exported from the region. Significant dairy farming occurs in the coastal plains surrounding the site. Water for irrigation has been severely impacted by the ongoing drought, with many farmers resorting to drilling boreholes to augment their water supply.
- The overall land use distribution in the site region is expected to remain relatively stable over the nuclear installation lifetime, particularly with respect to the urban settlements within the site vicinity: current spatial planning is directed at restricting outward growth of urban settlements through the implementation of urban edges.

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- In addition, large parts of the site vicinity are indicated for conservation purposes. Given the importance of agriculture and ongoing conservation efforts, it can be expected that land use within the site vicinity will not experience significant changes in the foreseeable future. This takes into account the restrictions on urban development in the area. The Kouga Local Municipality Spatial Development Framework (SDF) indicates that the future development needs in the region are to be directed toward protecting the agricultural and natural resources through the implementation of urban edges. Where major development proposals occur (e.g. the new industrial-focussed development corridor along the R102 between Humansdorp and Jeffreys Bay), these occur outside of the 16 km zone.

The evaluation of land and water use conducted for the purposes of this section have informed **Chapter 7** (Potential Radiological Impact on the Public and the Environment) and **Chapter 8** (Emergency Planning) of this SSR. Key characteristics are the following:

- The evaluation determined that significant agricultural activity is present within the 0.8 km to 3 km EPZ, and therefore it is likely that elements of the food-chain are present in this zone.
- A portion of the urban settlement of Oyster Bay (including the associated informal settlement of Umzamowethu) is located within the 0.8 km to 3 km EPZ. Restrictions on the eastward development of Oyster Bay are required and should be regulated to restrict the number of permanent residents within the 0.8 km to 3 km EPZ, as well as to ensure that the emergency plan remains feasible over the lifetime of the nuclear installation.
- The coastal resort towns are to a large extent dependant on potable water resources from groundwater extraction and springs. Groundwater and water extracted from the Krom River is also used for irrigation of pasture crops and providing water for livestock. The Impofu Dam on the Krom River is an important water resource and forms part of the AWSS. Potential contamination of this water resource therefore has the potential to affect an extended public beyond the site region. The potential for such contamination is described in **Chapter 7** of this SSR.

The respective data have been presented for the EPZs that have been defined for the site. In accordance with regulatory requirements, it has been determined that there are no urban development, institutions or recreational or economic activities that occur within the Exclusion Zone (i.e. 0 km to 0.8 km EPZ) of the nuclear installation.

Monitoring of radionuclide concentrations in agricultural products and surface water and groundwater resources must be included in the nuclear installation monitoring programme that is informed by the potential radiological impact on the public and environment (see **Chapter 7**). Due to the potential risk of radiological exposure from agricultural products produced in the site vicinity and site region, regular monitoring on

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radionuclides in selected elements of the food-chain needs to be implemented by Eskom in the operational stage of the nuclear installation(s).

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5.5 LAND AND WATER USE

5.5.1 Introduction

This section of the Thyspunt Site Safety Report (TSSR) presents the results of the investigation and characterisation of the current and expected future use of land and water¹ for the Thyspunt site (hereinafter referred to as 'the site') region (see **Drawing 5.5.1** for the site region, 50 km). It aims to inform the demonstration of the suitability of the site for the location of a nuclear installation(s) in respect of risk to the public (International Atomic Energy Agency, 2019) and the off-site measures to meet regulatory requirements, in particular with reference to the implementation of a feasible emergency plan. This section is complemented by **Section 5.12** (Water Supply) that addresses in detail the water supply to the site for nuclear installation purposes.

Note that this section has been developed with consideration of aspects relating to ecology covered in **Section 5.3** (Ecology), as well as demographic characteristics discussed in **Section 5.4** (Demography). This section also complements the discussion of activities relating to sea use which are discussed in **Section 5.6** (Adjacent Sea Use), as well as activities relating to transportation, industrial, civil and military facilities discussed in **Section 5.7** (Nearby Transportation, Industrial and Military Facilities). Further, this section provides input into the identification of the critical groups and to the evaluation of public exposure during normal operational conditions (**Chapter 7**, Potential Radiological Impact on the Public and the Environment) and accident conditions (**Chapter 8**, Emergency Planning).

5.5.2 Purpose and Scope

The ultimate purpose of the description of land and water use is to present information (further referred to as 'characterisation') to be used as input in dose calculation, risk assessment and emergency planning in support of the demonstration of the site suitability for the planned construction and operation of a nuclear installation(s) and the decommissioning thereof.

The characterisation of the current and future land and water use is conducted to assess the suitability of the site for the location of a nuclear installation(s), the potential effects of the nuclear installation(s) on the site region and will be used to demonstrate the feasibility of implementing emergency plans over the projected lifetime of the nuclear installation(s).

In accordance with the Technical Specification for Site Safety Reports (Eskom, 2022), the regional evaluation covers the use of land and water

¹ Surface water and groundwater resources.

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on and around the site. The purpose of the characterisation of land and water use is to:

- describe the current and expected future land and inland water use characteristics, together with the associated uncertainties;
- provide input to the identification of the critical groups and to the evaluation of the public exposure during normal operational (see **Chapter 7**) and accident conditions (see **Chapter 8**);
- provide input to the evaluation of the feasibility of the emergency plan for the new nuclear installation(s) on the proposed site;
- identify those site characteristics that require future monitoring during the lifecycle of the nuclear installation(s) in order to provide the assurance that the viability of the site will not be compromised by possible changes in land and water use during the lifetime of the nuclear installation(s);
- provide the assurance that local and regional developments will not compromise the viability of the site over its lifetime.

This section of the TSSR therefore presents the site-specific data and the conclusions with respect to:

- the current and expected future land and inland water use;
- the suitability of the site for the location of a nuclear installation(s);
- the existing and potential effects and hazards for the nuclear installation(s);
- the characteristics that will be needed to demonstrate the feasibility of implementing emergency plans over the projected lifetime of the nuclear installation(s).

5.5.3 Regulatory Framework

The legal and regulatory basis is outlined in **Chapter 2** (Legal and Regulatory Basis). The current national normative acts and associated regulations specifically relevant to aspects of land and water use with regard to the site are set out below, followed by a discussion of relevant national and international standards and guidelines.

5.5.3.1 Legal Requirements

The national regulations relevant to this section are The Regulations on Licensing of Sites for New Nuclear Installations, R927 (Department of Energy, 2011). The following is of specific relevance:

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“5. A Site Safety Report referred to in Regulation 3(2)(a) must contain the following –

- (3) The characteristics of the site relevant to the design assessment, risk and dose calculations, including inter alia:

 - (c) land use;*
 - (e) regional development;*
 - (f) projections of the above data commensurate with the design life of the nuclear installation(s).”**
- (7) The identification of emergency planning zones using the characteristics of the site...”*

5.5.3.2 Requirements, Documents and Guidelines

Although not legal requirements, national and international standards and recommendations were also considered as guideline documents to ensure that the characterisation of the land and water use for the proposed site was performed and presented in line with best practice. In this regard, the following should be noted:

- The National Nuclear Regulator (NNR) Interim Guidance for the Siting of Nuclear Facilities RG-0011 (National Nuclear Regulator, 2016) requires *inter alia*: (refer to compliance matrix in **Table 5.5.33**):
 - Section 6.1(1)(b): *“Characteristics of the site and its environment which could influence the transfer of released radioactive materials to persons”;*
 - Section 6.1(4): *“Characteristics of the natural environment in the region that may be affected by potential radiological impacts in operational and accident conditions should be investigated”;*
 - Section 8.2(1): *“The uses of land and water should be characterised in order to assess the potential effects of the nuclear facility on the site region and particularly for the purpose of preparing emergency plans”;*
 - Section 8.2(2): *“The investigation should cover land and bodies of water that may be used by the population or may serve as habitat for organisms in the food chain”;*
 - Section 8.2(3): *“Investigations of the land and water utilised in the region should cover:

 - (a) land devoted to agricultural uses, its extent, and the main crops and their yields;*
 - (b) land devoted to dairy farming, its extent and yields;**

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- (c) *land devoted to industrial, institutional and recreational purposes, its extent and the characteristics of its use;*
- (d) *bodies of water used for commercial, individual and recreational fishing, including details of the aquatic species fished, their abundance and yield;*
- (e) *bodies of water used for commercial purposes, including navigation, community water supply, irrigation and recreational purposes such as bathing and sailing;*
- (f) *land and bodies of water supporting wildlife and livestock;*
- (g) *direct and indirect pathways for potential radioactive contamination of the food chain;*
- (h) *products imported to or exported from the region which may form part of the food chain;*
- (i) *free foods such as mushrooms, berries and seaweed”.*
- Section 8.2(4): *“The present use of water which could be affected by changes in water temperature and by radioactive material discharged from the nuclear power plant, together with the location, nature and extent of usage, should be identified. Changes in the use of water in the region should also be considered.”*
- Section 8.2(5): *“The information presented should include:*
 - (j) *Maps showing the location of the nearest residences, groundwater supply boreholes, and abandoned boreholes;*
 - (k) *Types of water use both present and projected (life of the facility), e.g. municipal, domestic, agricultural, livestock, and descriptions of the methodology and sources used to develop projections;*
 - (l) *Present and projected (life of facility) water use estimates by type for both groundwater and surface water, including present and projected withdrawal, and descriptions of the methodology and sources used to develop projections;*
 - (m) *Description of existing boreholes, borehole depth, groundwater elevations, borehole drawdowns, and*

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description of the producing aquifer(s).²

- (n) *Descriptions of the nature and extent of projected land use (e.g. agriculture, recreation, industry, grazing and infrastructure) and descriptions of the methodology and sources used to develop projections;*
- (o) *The location of any other nuclear and/or radiological facilities located or proposed within the vicinity of the site.”*
- *Section 8.2(6): “Recent agricultural production data should be tabulated for vegetables, meat, milk and other foodstuffs in addition to predictions for future production by government, industry or institutions within the region surrounding the planned facility. For nuclear facilities, site-specific data should be used based on land and water use and habitation study”.*
- *Section 8.4.5(3): “A count and description should be provided of agricultural and domestic fauna, in particular cattle, sheep and other meat animals that may be involved in the exposure of man to radionuclides. Important game animals should receive similar treatment. A map showing the distribution of the principal plant communities should be provided”.*
- International Atomic Energy Agency (IAEA) Safety Standards No. SSR-1 on Site Evaluation for Nuclear Installations (International Atomic Energy Agency, 2019). This standard requires *inter alia*:
 - consideration of the characteristics of the natural environment in the region that could be affected by the potential radiological impact of the nuclear installation for all operational states and accident conditions and for all stages of the lifetime of the nuclear installation(s);
 - consideration of the characteristics of the site and its environment that could influence the transfer of radioactive material released from the nuclear installation(s) to people and to the environment;
 - collection of any data necessary to assess the impact of the nuclear installation(s) on the public and the environment for operational states and accident conditions;
 - an investigation of surface water characteristics in the site region;
 - an investigation of land and water (surface water and groundwater) resources that might be used by the population or

² These aspects are addressed in sub-section 5.5.2, as well as in detail in **Section 5.11** (Geohydrology).

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that serve as a habitat for organisms in the food chain;

- evaluation of the present and foreseeable future characteristics that could have an impact on the safety of the nuclear installation(s), including *inter alia* the present and future use of land and water that could affect the safety of the nuclear installation(s) or the feasibility of planning effective emergency response actions.
- IAEA Safety Guide No. NS-G-3.2, Dispersion of Radioactive Material in Air and Water and Consideration of Population Distribution in Site Evaluations for Nuclear Power Plants (International Atomic Energy Agency, 2002). This requires *inter alia*:
 - an investigation of the characteristics of the land and water utilised in the local and regional environment;
 - an investigation of:
 - land devoted to agricultural uses, its extent, the main crops and their yields;
 - land devoted to dairy farming, its extent and yields;
 - land devoted to industrial, institutional and recreational purposes, its extent and the characteristics of its use;
 - bodies of water used for commercial, individual and recreational freshwater fishing, including details of the aquatic species fished, their abundance and yield;
 - bodies of water used for commercial purposes, including navigation, community water supply, irrigation and recreational purposes such as bathing;
 - land and bodies of water supporting wildlife and livestock;
 - direct and indirect pathways for potential radioactive contamination of the food chain;
 - products imported to or exported from the region which may form part of the food chain;
 - free foods such as mushrooms and berries.
 - an investigation of the current land and water uses in the local and regional environment that could be affected by changes in the water temperature and by radioactive material discharged from a nuclear installation(s), together with the location, nature and extent of usage - Changes in uses of water in the site region, such as for irrigation, freshwater fishing and recreational activities, should also be considered.
 - an investigation of population centres for which drinking water is obtained from water bodies, including groundwater, that may

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be affected by a nuclear installation(s) - Future water flow and water uses should be projected over the lifetime of the nuclear installation(s).

- collection of information on levels of background activity for environmentally relevant substances such as soils and for vegetables and other foodstuffs.
- United States Nuclear Regulatory Commission Regulatory Guide 4.7, General Site Suitability Criteria for Nuclear Power Stations (U.S. Nuclear Regulatory Commission, 2024). This requires, in particular, the identification of physical characteristics unique to the proposed site that could pose a significant impediment to the development of emergency plans.

5.5.4 Approach to Characterisation of Land and Water Use

On the basis of the Technical Specification for Site Safety Reports (Eskom, 2022), the evaluation of land and water use was performed and is presented in this section in a way that:

- determines current and future characteristics and activities associated with the use of land and water at the site, in the site region (50 km) and site vicinity (16 km);
- determines the current and future land and water use distribution;
- identifies the important land and water use characteristics to be used for the evaluation of the potential consequences to the public and the environment during normal operational and accidental nuclear installation conditions (to be addressed in **Chapter 7** and **Chapter 8**);
- provides input into the identification of the critical groups and the main pathways for radiological exposure to the public presented in **Chapter 7**;
- presents the site-reference land and water use data in the surrounding region (National Nuclear Regulator, 2016);
- identifies areas of uncertainty;
- identifies critical/important features and characteristics, as well as required future actions, e.g. additional monitoring and confirmatory studies.

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5.5.4.1 Area of Investigation

The characteristics of land and water use were investigated and evaluated for the site region of 50 km and site vicinity of 16 km around the site (as illustrated in **Drawing 5.5.1**).

The areas of investigation have been chosen on the basis of the Technical Specification for Site Safety Reports (Land and Water Use) (Eskom, 2022). Eskom has adopted the following Emergency Planning Zones (EPZs) for new nuclear installations (expressed as radii measured from the extremities of the station footprint in which the nuclear installations are located) (Eskom, 2022):

- an 800 m Exclusion Zone³;
- a 3 km LPZ;
- an overall EPZ of 40 km.

The scope of the characterisation includes the general land cover pattern in the site region. The general land cover description provided in this section therefore encompasses an area that includes the Regulations on Licensing of Sites' (Department of Energy, 2011) overall 40 km EPZ and the 50 km site region. The description provides an understanding of the land cover types and an indication of land and water use in the region. The land cover analysis is presented in geospatial format (see **Drawing 5.5.2**). The basis of the assessment and characterisation of regional land use is the 2020 South African National Land-Cover (SANLC) data set (Department of Forestry, Fisheries and the Environment, 2021).

Following international standards and good practice (International Atomic Energy Agency, 2019), this section also presents a detailed description of the agricultural land use and production in the site vicinity. Particular attention has been given to agricultural uses and their extent, as well as main crops and their yields in the site vicinity. The information was obtained through telephonic interviews with the land owners and managers, as well as from field inspections.

Information is also provided on the main collection points, processing and distribution facilities for agricultural produce in the site region.

³ The Exclusion Zone is determined for the purposes of evacuating persons in the event of a nuclear accident. Within the boundaries of that zone or within any even intersecting with that zone, there must be no members of the public resident, no uncontrolled recreational activities, no commercial activities, or institutions which are not directly linked to the operation of nuclear installations situated within this zone, or for which an authorisation has been granted.

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The information presented forms the basis for determining the direct and indirect pathways for potential radioactive contamination of the food chain of the population around the site. The purpose of this information is to assist Eskom SOC Limited (further referred to as Eskom) and other relevant authorities and organisations in the rapid assessment of potential contamination of food associated with fallout of radioactive materials during an emergency situation (National Nuclear Regulator, 2016).

The land and water characteristics that must be observed and monitored throughout the lifetime of the nuclear installation were identified on the basis of the requirements of the NNR Interim Guidance for the Siting of Nuclear Facilities RG-0011 (National Nuclear Regulator, 2016), as well as the Technical Specification for Site Safety Reports (Eskom, 2022). The data presented in this section form the baseline from which future studies will be conducted.

5.5.4.2 Topics

The following main topics of characterisation of the site that were determined and evaluated are presented in this section:

- land devoted to agricultural uses, its extent, the main crops and their yields;
- land devoted to dairy farming, its extent and yields;
- land devoted to industrial, institutional and recreational purposes, its extent and the characteristics of its use;
- bodies of water used for commercial, individual and recreational freshwater fishing, including details of the aquatic species fished, their abundance and yield;
- bodies of water used for commercial purposes, including navigation, community water supply, irrigation and recreational purposes such as bathing;
- land and bodies of water supporting wildlife and livestock;
- direct and indirect pathways for potential radioactive contamination of the food chain;
- products imported to or exported from the region which may form part of the food chain;
- free foods such as mushrooms and berries.

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5.5.4.3 Data Sources

The evaluation of the current and future land and water use was performed in the period 2023/2024, based on information obtained from the following sources:

- current (2022/2023) cadastral information from the Surveyor General;
- the 2020 SANLC (Department of Forestry, Fisheries and the Environment, 2021);
- aerial photography and South African 1:50 000 scale topo-cadastral sheets (Chief Directorate: National Geo-spatial Information, 2014);
- field checks;
- telephonic/email surveys with landowners, managers and tenants in the site vicinity, supported by field checks (Planning Partners, 2024d);
- interviews with landowners, managers and tenants in the site region;
- relevant strategic spatial planning reports at a regional and municipal level (e.g. Spatial Development Frameworks, SDFs);
- municipal records;
- the internet;
- site-specific investigations conducted for the purpose of this section.

The respective SDFs applicable to the region guide the expected development in the site vicinity and site region. In addition to the high-level strategies and policy objectives contained in the SDFs, they also earmark specific land parcels and areas for specific types of development, such as residential, industrial or commercial development. The implementation of development projects generally takes place in accordance with the SDFs proposals, and for this reason the estimated future land use in the site region and vicinity was based on information contained in the current SDFs.

Each topic described in this section includes a description of data sources used.

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5.5.4.4 Presentation of Data

The description of land and water use is provided in terms of segments, sectors and annuli. **Figure 5.5.1** illustrates these terms.

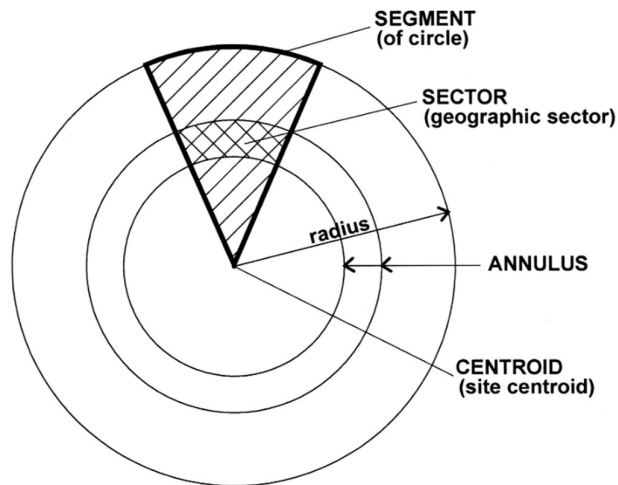


Figure 5.5.1
Illustration of Terms: Segment, Sector and Annulus

All distances in the drawings, figures and tables in this section are measured in a straight line from the co-ordinate below, i.e. the site centroid (unless otherwise stated), which is located at a central position on the site (see **Drawing 5.5.1**). The site co-ordinates (transverse Mercator 19 Hartbeeshoek) are:

Redacted

To align the analysis and presentation of data of this section with **Section 5.4**, **Section 5.6** and its future use in **Chapter 7** and **Chapter 8**, data presented in this section are presented in terms of the following radial grids:

- 5 km radial interval and 22.5° grid for the site region (50 km);
- 2.5 km, 5 km, 7.5 km, 10 km and 16 km radii and a 22.5° grid for the site vicinity (16 km).

Land and water data were further evaluated for the EPZs, i.e. Exclusion Zone (800 m), LPZ (3 km) and overall EPZ (40 km), as defined in **Chapter 8**.

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5.5.5 Land and Water Use in the Site Region

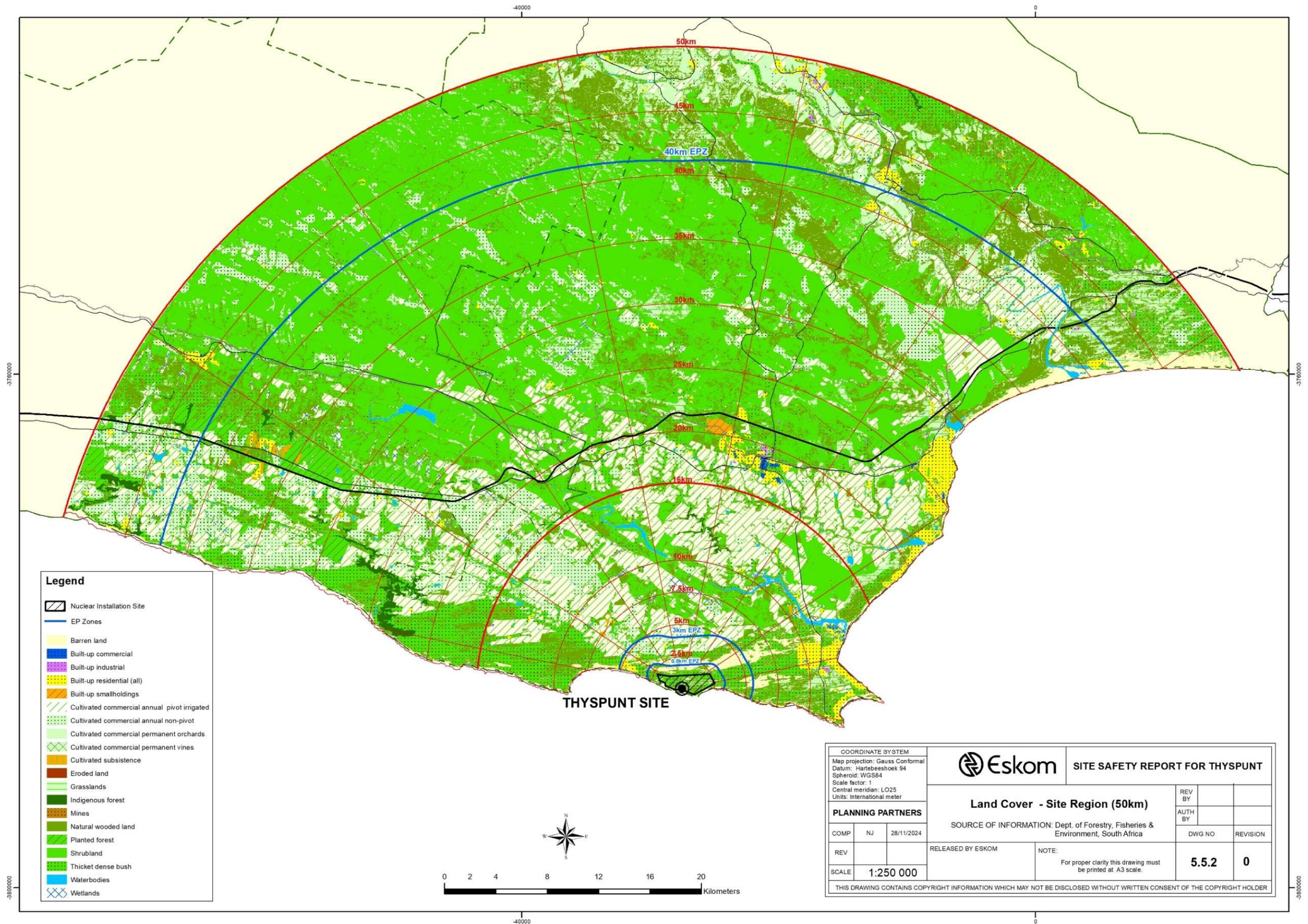
The description of land and water use is presented for the site region (50 km) in relation to where the new nuclear installation(s) is planned to be built.

5.5.5.1 Current Land Use

A regional land use analysis was undertaken, based on the 2020 SANLC (Department of Forestry, Fisheries and the Environment, 2021). The land cover analysis is illustrated in **Drawing 5.5.2** and is based on the 20 × class land cover change legend⁴ (Department of Forestry, Fisheries and the Environment, 2022), the classes of which are listed below:

- barren land;
- built-up commercial;
- built-up industrial;
- built-up residential (all);
- built-up smallholdings;
- cultivated commercial annuals non-pivot irrigated;
- cultivated commercial annuals pivot irrigated;
- cultivated commercial permanent orchards;
- cultivated commercial permanent vines;
- cultivated subsistence;
- eroded land;
- grassland;
- indigenous forest;

⁴ Information presented in **Drawing 5.5.2** utilises the 20 × class land cover change legend prescribed by the Department of Forestry, Fisheries and the Environment (DFFE) (Department of Forestry, Fisheries and the Environment, 2022). It is important to note that although the legend in **Drawing 5.5.2** is different to the legend used in the SANLC map contained in the previous version of TSSR (Eskom, 2015), as well as different to the list of “land use categories in the site vicinity” as presented in **Subsection 5.5.6** of the Technical Specification (Eskom, 2022), the map does present the SANLC information using the prescribed format provided by the DFFE (Department of Forestry, Fisheries and the Environment, 2022).



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- mines;
- natural wooded land;
- planted forest;
- shrubland;
- thicket/dense bush;
- waterbodies;
- wetlands.

Drawing 5.5.2 illustrates land cover data for the 5 km by 22.5° grid covering the site region. The land cover distribution is summarised in 10 km bands extending from the site centroid to the edge of the site region in **Appendix 5.5.A**, as required in terms of the Technical Specification for Site Safety Reports (Eskom, 2022).

The land area in the site region amounts to approximately 292 296 ha. The percentage land cover per category is as follows:

- **natural areas**: 69.9 per cent of the land (38.5 per cent shrubland; 16.2 per cent natural wooded land; 9.6 per cent thicket dense bush; 5.1 per cent grasslands; and 0.5 per cent indigenous forest);
- **agricultural areas**: 24.0 per cent of the land (13.9 per cent cultivated commercial annual pivot irrigated; 8.3 per cent cultivated commercial annual non-pivot; 1.7 per cent cultivated commercial permanent orchards; and 0.1 per cent cultivated subsistence);
- **urban areas**: 2.1 per cent of the land (1.9 per cent residential; 0.1 per cent industrial; and 0.1 per cent commercial; and 0.1 per cent smallholdings);
- **planted forest areas**: 1.4 per cent of the land;
- **waterbodies and wetlands**: 1.3 per cent of the land (approximately 0.7 per cent wetlands and 0.6 per cent other waterbodies);
- **barren and eroded land**: 1.3 per cent of the land (consisting of predominantly barren land);
- **mines and quarries**: 0.04 per cent of the land.

Figure 5.5.2 provides a graphic illustration of the percentage cover per category listed above.

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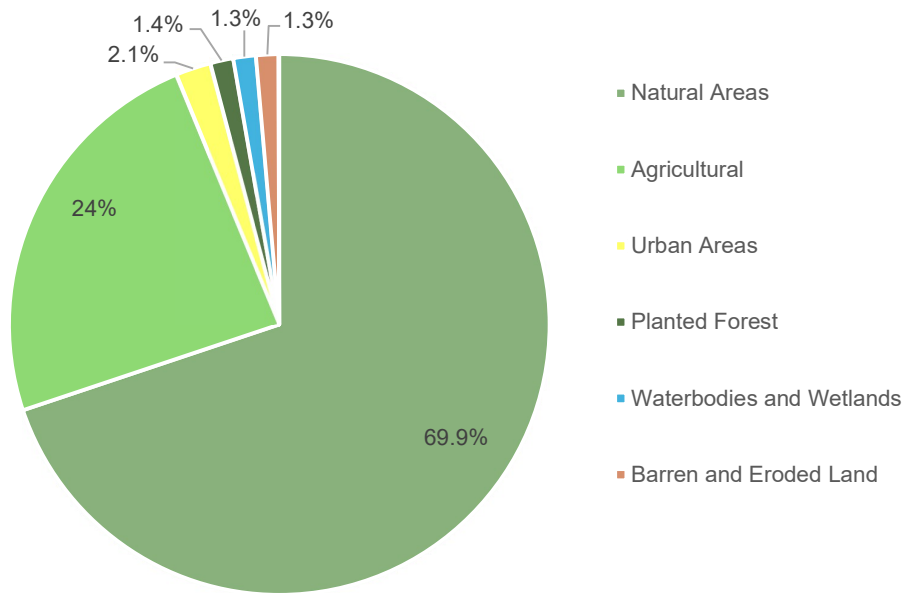


Figure 5.5.2
Percentage of Land Cover Categories in the Site Region⁵

Land cover within the site region consists of predominantly natural and agricultural areas. The associated land use is predominantly conservation, grazing for livestock and pastures, pivot irrigated farmland, extensive cultivation of dryland and fragmented areas of forests. Crops consist mainly of vegetables, pastures, citrus and fodder. Protected areas also occupy large portions of the site region.

The urban settlement pattern is characterised by an array of rural agricultural towns associated with areas of intense agricultural cultivation, education, institutions and commerce, as well as various coastal resort towns (see **Drawing 5.5.1**).

Natural Areas

The site region contains portions of natural vegetation, predominantly covered by shrubland⁶ (112 499 ha), but also vast areas of grassland, natural wooded areas and thicket. Only 1 477 ha of indigenous forest areas were identified within the region (Department of Forestry, Fisheries and the Environment, 2021). It can be assumed that wildlife would exist within these areas that correspond with natural areas, as well as within commercially forested areas (i.e. 'planted forest', as per **Appendix 5.5.A**). A detailed wildlife survey was not conducted to

⁵ (Planning Partners, 2024a)

⁶ Including Fynbos (Department of Forestry, Fisheries and the Environment, 2022)

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determine their numbers for the purpose of preparing this report. Natural areas are located within formalised conservation areas throughout the site region as illustrated in **Drawing 5.5.4** and discussed in **Subsection 5.5.5.2** of this report.

The site region contains 3 943 ha of barren land, representing predominantly the sand dunes located to the west and east of the Gamtoos River mouth in the coastal area between 30 km and 50 km northeast, as well as immediately north, northeast and east-northeast of the site between 0 km to 7.5 km (Department of Forestry, Fisheries and the Environment, 2021).

Forest Areas

The total extent of planted forested areas within the region is 4 031 ha (Department of Forestry, Fisheries and the Environment, 2021).

There are no commercial forest areas within the site region. Commercial plantations associated within the Tsitsikamma Forest (e.g. Bluebelliesbush, Lottering and Witelsbos) are located between 50 km and 60 km to the west-northwest and the plantations associated with the Longmore and Otterford forests lie between 50 km and 65 km northeast (Department of Forestry, Fisheries and the Environment, 2021).

Areas of mixed forest plantation are located between 20 km northwest and 45 km west-northwest (refer to **Drawing 5.5.2**).

Urban Areas

Urban settlement patterns in the region are characterised by coastal resort towns and agricultural towns associated with areas of intense agricultural cultivation.

The three main towns in the site region located nearest to the site are St. Francis Bay, Humansdorp and Jeffreys Bay (see **Drawing 5.5.1** and **Drawing 5.5.2**):

- **St. Francis Bay**: St. Francis Bay (13 km east) is a coastal resort town and is one of the premier tourism destinations within the Kouga region. Port St. Francis includes a commercial and recreational harbour built to host the squid industry freezing vessels, as well as to serve the small harbour resort village. It lies in a sheltered area of the bay and provides a safe anchorage for fishing boats, pleasure craft and oceangoing yachts (Planning Partners, 2024a).
- **Humansdorp**: Humansdorp (17 km north-northeast) was founded in 1849 and is the centre of the wider district's light industry and agricultural activities. The town lies at the foot of the Kouga

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Mountains and is the gateway to the Krom River or Kromme River (Afrikaans: *Krommerivier*) estuary and the coastal resort towns of St. Francis Bay and Cape St. Francis (Planning Partners, 2024a).

- **Jeffreys Bay**: Jeffreys Bay (25 km northeast) is a coastal resort town known for its beaches and surfing waves, including the world-renowned *Super Tubes*. It also caters to a wide array of other leisure activities, including scuba diving, skydiving and quad biking (Planning Partners, 2024a).

Numerous smaller towns are spread throughout the rural area (see **Drawing 5.5.1**), including Clarkson (32 km west-northwest), Hankey (38 km north-northeast), Kareedouw (45 km northwest), Loerie (46 km north-northeast) and Patensie (49 km north-northeast).

Coastal towns and neighbourhoods within the site region include Oyster Bay (4 km west-northwest), Cape St. Francis (12 km east), Paradise Beach (18 km east-northeast), Aston Bay (22 km east-northeast), Pellsrus (23 km east-northeast) and Gamtoos Mouth (41 km northeast).

The nearest city to the site is Gqeberha (formerly known as Port Elizabeth) located approximately 80 km northeast (i.e. outside of the site region).

Industrial, Institutional and Recreational Use

Humansdorp (17 km north-northeast) contains the nearest important industrial area to the site, with 39.3 ha of industrially active land, comprising both light and heavy industrial activities (Department of Forestry, Fisheries and the Environment, 2021). St. Francis Bay has a small industrial area characterised by small service-related industries, including boat building and repairs, as well as cold storage associated with the fishing industry. The total extent of industrial land within the region is approximately 316 ha. More details on industrial areas in the site region are presented in **Section 5.7**.

Institutional facilities (e.g. schools, hospitals, clinics, prisons, etc.) are discussed in **Section 5.4**.

The coastal towns within the site region all contain popular beaches, which are used for recreational activities such as fishing, surfing and scuba diving. Other popular recreational activities include skydiving, quad biking, hiking, bird watching, sand boarding and horse riding (Planning Partners, 2024a).

Mines and Quarries

The total extent of mines and quarries (including tailings and dumping

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sites) within the region is approximately 107 ha. Most mines and quarries are located within the 16 km to 50 km annuli to the northeast, with other pockets occurring in the 10 km to 16 km annulus west-northwest and around the town of Kareedouw, located approximately 45 km northwest of the site (Department of Forestry, Fisheries and the Environment, 2021).

Agricultural Areas

a. Regional agricultural distribution and production

According to Stats SA (Statistics South Africa, 2022), the Eastern Cape economy expanded by 2.1 per cent in 2022, which was the third highest growth rate in the country behind Gauteng (2.8 per cent) and the Western Cape (2.6 per cent). In 2023, the agricultural sector showed an upward growth in Gross Value Added (GVA) with recovery from -12 per cent (Quarter one) to 4.2 per cent (Quarter two). The growth was primarily driven by higher production and delivery levels of summer field crops and various horticulture products (Planning Partners, 2024e). Overall, the outlook for the agriculture sector remains positive despite the risks posed by high input costs, electricity supply constraints and port handling delays (Eastern Cape Provincial Treasury, 2022).

A total of 69 915 ha of land within the site region (24 per cent of the total land area) is classified as agricultural land (Department of Forestry, Fisheries and the Environment, 2021). The agricultural land can be further broken down as follows:

- cultivated commercial annuals pivot irrigated (40 654 ha, representing 58.1 per cent of agricultural land);
- cultivated commercial annuals non-pivot irrigated (24 141 ha, representing 34.5 per cent of agricultural land);
- cultivated commercial permanent orchards (4 882 ha, representing 7.0 per cent of agricultural land);
- cultivated subsistence (238 ha, representing 0.3 per cent of agricultural land).

The distribution of agricultural land cover in the site region is shown in **Drawing 5.5.2** (Department of Forestry, Fisheries and the Environment, 2021). The land cover distribution is summarised below:

- Cultivated commercial annuals pivot irrigated: Pivot irrigated farmland occurs throughout the 3 km to 25 km annuli between the west-northwest and east-northeast segments. Other intensive areas of pivot irrigated cultivation occur between the 25 km to 50 km annuli

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west-northwest of the site, as well as between the 30 km to 45 km annuli northeast.

- Cultivated commercial annuals non-pivot irrigated: Commercial dryland agriculture occurs throughout the site region, with the most intensive clusters occurring in the 3 km to 25 km annuli between the west-northwest and east-northeast segments, between the 25 km to 50 km annuli west-northwest of the site and the 30 km to 35 km annulus north-northeast and northeast.
- Cultivated commercial permanent orchards: Orchards occur around the towns of Hankey and Patensie in the 35 km to 50 km annuli north and north-northeast of the site, respectively.
- Cultivated subsistence: Cultivated subsistence farming occurs primarily in and around the small rural town of Clarkson between the 35 km to 40 km annuli west-northwest of the site. Other small pockets occur between the 7.5 km to 11 km annuli northwest and around the smallholding area of Amaninzi (11 km northeast).

The following agricultural products form the basis of the regional agricultural production⁷ (listed in alphabetical order) (Planning Partners, 2024b). The data are dated 2017, which are the latest officially published data (Statistics South Africa, 2020b).

- Citrus: The Eastern Cape had the second largest amount of land dedicated to citrus production in the country in 2019 (23 020 ha), ranking only behind Limpopo (36 039 ha). The relatively cool climate means that citrus growing areas and production are focused primarily on lemons and limes (6 833 ha) and Navel oranges (6 256 ha), with other orchards being dedicated to Valencia oranges (4 872 ha), soft citrus (4 748 ha) and grapefruit (311 ha). In 2017, the Sarah Baartman District Municipality was a key contributor to citrus production in the province, with its two major local municipalities, Kouga and Sundays River Valley, producing significant volumes of various citrus fruits. Kouga Local Municipality produced 100 301 t of oranges, 29 419 t of lemons, 25 961 t of soft citrus or "easy peelers," 11 018 t of naartjies, and 2 682 t of grapefruit, primarily around the towns of Hankey and Patensie, located 35-50 km north and north-northeast of the site (refer to **Drawing 5.5.3**). Similarly, Sundays River Valley Local Municipality contributed 186 745 t of oranges, 107 164 t of lemons, 55 874 t of soft citrus, 12 408 t of naartjies, and 1 670 t of grapefruit. Collectively, these municipalities made the Sarah Baartman District a vital hub for citrus production, with a total output of 287 046 t of oranges, 136 583 t of lemons,

⁷ For the purposes of the analysis, regional agricultural production (i.e. site region and surrounds) constitutes production recorded in the Kouga Local Municipality and the KouKamma Local Municipality.

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81 835 t of soft citrus, 23 426 t of naartjies, and 4 352 t of grapefruit in 2017. Much of this produce was exported, with oranges (231 470 t), lemons (122 744 t), soft citrus (58 235 t), and naartjies (20 190 t) being the most prominent export products.

- **Deciduous fruit:** In 2019, the Eastern Cape ranked second in the country behind the Western Cape in the production of apples and pears, with production primarily occurring in the fertile Langkloof Valley in the KouKamma Local Municipality (located outside of the site region, approximately 80 km northwest of the site). In 2017, the KouKamma Municipality produced a total of 96 314 t of apples and 37 447 t of pears, while no production of these fruits were recorded in the Kouga Local Municipality. Additionally, relatively small amounts of peaches (3 185 t) and plums (6 137 t) were produced in the KouKamma Local Municipality in 2017 (but outside of the site region).
- **Eggs:** The Eastern Cape produced only 4 per cent of South Africa's eggs in 2022, the lowest of the country's nine provinces. A total volume of 5 165 217 dozen eggs were produced in the Kouga Local Municipality in 2017, with no production being recorded in the KouKamma Local Municipality. There was a total number of 176 545 layer chickens within the Kouga Local Municipality as at 30 September 2018, with none being recorded in the KouKamma Local Municipality.
- **Fodder:** According to the results recorded in the national Census of Commercial Agriculture (CoCA 2017) (Statistics South Africa, 2020b), the Eastern Cape had the second largest area of land planted for fodder production in the country in 2017 (26 686 ha) and also produced the second highest amount of fodder (58 705 ha) in the same year. Fodder production within the site region and surrounds is not significant within the wider context of the Eastern Cape, with only 7.3 per cent of provincial production occurring within the Kouga and KouKamma local municipalities. A total of 10 421 t were grown in the site region and surrounds in 2017, with the vast majority (91.8 per cent) being grown in the Kouga Local Municipality.
- **Grains/cereals:** With only 50 075 ha under cultivation, the Eastern Cape is not significant when it comes to the production of grain crops⁸ within the national context, ranking seventh in the production of maize (232 395 t or 2.15 per cent), sixth in the production of wheat (13 987 t or 1.4 per cent of national production), third in the production of barley (3 889 t or 2.7 per cent), fourth in the production

⁸ Grains included in the CoCA 2017 are wheat, maize, barley, oats and sorghum (Statistics South Africa, 2020a) (Statistics South Africa, 2020b).

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of oats (3 389 t or 3.2 per cent) and sixth in the production of sorghum (817 t or 1 per cent). A further analysis of each category of grain production within the site region and surrounding areas is provided below (listed in alphabetical order):

- Barley: 2 268 t of barley were produced within the site region and surrounds in 2017, all of which originated in the KouKamma Local Municipality. This equates to 58.3 per cent of the total production in the Eastern Cape.
- Maize: Only 3 475 t of maize were produced within the site region and surrounds in 2017, 97.4 per cent of which originated in the Kouga Local Municipality. This represents a mere 1.5 per cent of the total production in the Eastern Cape.
- Oats: 1 217 t of oats were produced within the site region and surrounds in 2017, with the vast majority (93.8 per cent) being produced in the Kouga Local Municipality.
- Sorghum: No sorghum was produced within the site region and surrounds in 2017.
- Wheat: No wheat was produced within the site region and surrounds in 2017.
- Meat: Based on the results recorded in the national CoCA 2017, out of South Africa's nine provinces, the Eastern Cape ranks sixth in the production of chicken (38 426 250 kg or 2.9 per cent of national production), sixth in the production of beef (23 757 510 kg or 8.2 per cent), first in the production of pork (19 883 596 kg or 21.3 per cent), second in the production of mutton/lamb (6 647 849 kg or 19.5 per cent), second in the production of goat (878 746 kg or 41.5 per cent), third in the production of ostrich (185 845 kg or 2.8 per cent) and sixth in the production of offal (6 999 kg or 0.08 per cent). A further analysis of each category of meat production within the site region and surrounding areas is provided below (listed in alphabetical order):
 - Beef: 442 393 kg of beef were produced within the site region and surrounding areas in 2017, which equates to 1.8 per cent of the total production in the Eastern Cape. Of this, 295 832 kg were produced within the Kouga Local Municipality and 146 561 kg were produced in the KouKamma Local Municipality. There were a total number of 11 710 meat producing cows within the site region and surrounding areas as at 30 September 2018 (1.6 per cent of all meat producing cows in the Eastern Cape), with 7 688 occurring in the Kouga Local Municipality and 4 022 occurring in KouKamma Municipality.
 - Chicken: An insignificant amount of chicken meat (129 kg) was

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produced within the site region and surrounds in 2017, all of which originated in the KouKamma Local Municipality. This represents a fraction of total production in the Eastern Cape.

- **Game:** Unlike the other meat production categories, the CoCA 2017 Eastern Cape does not contain data pertaining to game meat production in kilograms. However, the CoCA 2017 Eastern Cape does record the number of game animals within the various municipalities within the province. There was a total of 1 560 game animals recorded within the site region and surrounding areas as at 30 September 2018, with the species recorded as follows: Springbok (98), Impala (277), Kudu (327), Wildebeest (161), Zebra (35) and other (660).
- **Goat:** No goat meat was produced within the site region and surrounds in 2017, nor were any meat producing goats reared.
- **Mutton/lamb:** 310 807 kg of mutton/lamb meat were produced within the site region and surrounding areas in 2017, which equates to a mere 4.7 per cent of total production in the Eastern Cape. Of this, the majority of mutton/lamb was produced within the KouKamma Local Municipality (70.5 per cent). There were a total number of 7 587 meat producing sheep within the site region and surrounding areas as at 30 September 2018, with the majority (61.5 per cent) being reared within the KouKamma Local Municipality.
- **Offal:** 5 999 kg of offal were produced within the site region and surrounds in 2017, all of which originated in the Kouga Local Municipality.
- **Ostrich:** No ostrich meat was produced within the site region and surrounds in 2017, nor were any meat producing ostriches reared.
- **Pork:** Only 22 600 kg of pork were produced within the site region and surrounding areas in 2017 (all within the Kouga Local Municipality), which equates to just 0.1 per cent of the total production in the Eastern Cape. There were a total number of 273 meat producing pigs within the site region and surrounding areas as at 30 September 2018, with the majority (89 per cent) being reared within the Kouga Local Municipality.
- **Milk:** The Eastern Cape dairy industry is growing rapidly. The province was the second largest milk producer in South Africa in 2022, providing 28.5 per cent of the country's milk. Data contained in the CoCA 2017 Eastern Cape recorded that the site region and surrounding areas contained 116 640 dairy cows as at 30 September 2018 and produced approximately 357 589 874 l of milk and cream in 2017. Of this total, 80 per cent of dairy cows in the

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site region and surrounds were located in the Kouga Local Municipality as at 30 September 2018, with a corresponding proportion of milk/cream produced in the Kouga Local Municipality in 2017.

- **Subtropical fruits:** Subtropical fruit production is not particularly significant in the Eastern Cape, although the province does produce the most pineapples by volume (188 300 t) in the country. A total of 679 t of subtropical fruit were produced within the site region and surrounding area in 2017, made up of avocados (410 t, all originating in the Kouga Local Municipality) and berries (269 t, with 92.9 per cent being produced in the Kouga Local Municipality).
- **Vegetables:** With only 5 081 ha of land under cultivation, the Eastern Cape is generally not a significant producer of vegetables⁹ within the national context: the largest production volume of all vegetables grown in the province is potatoes, with 69 729 t being produced during 2017 (which equates to only 3.5 per cent of national production). In 2017, the Kouga Local Municipality produced the most potatoes in the province (22 648 t or 32.5 per cent). A relatively small amount of other vegetables was produced in the site region and surrounding areas in 2017, i.e.: cabbages (8 411 t), beetroot (480 t), peppers (455 t), pumpkins (434 t), carrots (430 t), butternut (392 t), sweet potatoes (120 t), tomatoes (90 t) and onions (5 t), most of which were grown in the Kouga Local Municipality.
- **Wool:** The Eastern Cape produced the most wool (3 412 520 kg) in the country in 2017. However, only 51 510 kg (1.5 per cent) of this wool were produced within the site region and surrounding areas. There was a total number of 17 215 wool producing sheep within the site region and surrounding areas as at 30 September 2018, with the majority (61.9 per cent) being reared within the Kouga Local Municipality.

b. Products imported to or exported from the site region which may form part of the food chain

In the event of a nuclear incident or accident, contaminated crops and animal products could be taken to agricultural collection, processing and distribution facilities in the site region, and thereby enter the food chain. If eaten, the public could be exposed to radionuclides. It is therefore necessary to compile an up-to-date database of all entities/facilities that collect, process and/or distribute agricultural products in the site region

⁹ Vegetables included in the CoCA 2017 are beetroots, butternut, cabbage, carrots, green beans, onions, peppers, potatoes, pumpkins, sweet potatoes and tomatoes (Statistics South Africa, 2020a) (Statistics South Africa, 2020b).

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(Eskom, 2022; National Nuclear Regulator, 2016).

A site visit was conducted to collect data pertaining to agricultural collection, processing and distribution facilities in the site region and the database is illustrated in **Drawing 5.5.3** (Planning Partners, 2024b). The drawing should be read in conjunction with **Appendix 5.5.B**, which provides the specific data for each facility, produce type, and distance and direction of the particular facility from the site¹⁰. The results can be summarised as follows:

- **Milk and other dairy products**: Milk is collected from dairy farms throughout the site region and transported to Woodlands Dairy in Humansdorp (18.5 km north-northeast) and Nestlé in Kareedouw (47.5 km northwest) within the site region (refer to **Table 5.5.B.1** and **Drawing 5.5.3**). Milk is also transported to other large dairy processing facilities located outside of the site region, including Clover (91.4 km east-northeast) and Coega Dairy (101.3 km east-northeast) in Gqeberha.
- **Fresh fruit and vegetables**: Fresh fruit and vegetables are generally collected from farms and taken to warehouses/cold storage facilities, from where they are either transported to processing facilities, wholesale distributors or markets (including retail supermarkets and shops) or the Port of Gqeberha/Port Elizabeth or Port of Ngqura for export. **Table 5.5.B.2** lists fresh fruit and vegetable collection, processing and distribution facilities¹¹ in the site region and **Drawing 5.5.3** shows their spatial location. It is evident that most fruit and vegetable facilities associated with the site region are located in the towns of the Gamtoos River Valley (i.e. Hankey, Patensie and Loerie).
- **Chicken and egg production**: Chicken broiler farms and hatcheries in the site region are concentrated between the 30 km and 50 km radius in the northeast segment (refer to **Table 5.5.B.3** and **Drawing 5.5.3**).
- **Meat**: The two major abattoirs in the site region are Redline Quality Meat (13.3 km north-northeast) and Fonte Abattoir (20.7 km west-northwest). These large abattoirs, as well as various smaller abattoirs located within the site region, are included in the meat production data set and are presented in **Table 5.5.B.4** and

¹⁰ Each facility has a unique identifier which links the facility to the sector where it is located (see **Drawing 5.5.3**).

¹¹ It must be noted that the previous TSSR 2012 (Eskom, 2015) included retail supermarkets with fresh produce as part of the database. However, it is not considered necessary to include these in the database because if fruit and/or vegetables originating from the site region are sold in these supermarkets then they would come from other collection, processing and distribution facilities already listed in the database.

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Drawing 5.5.3.

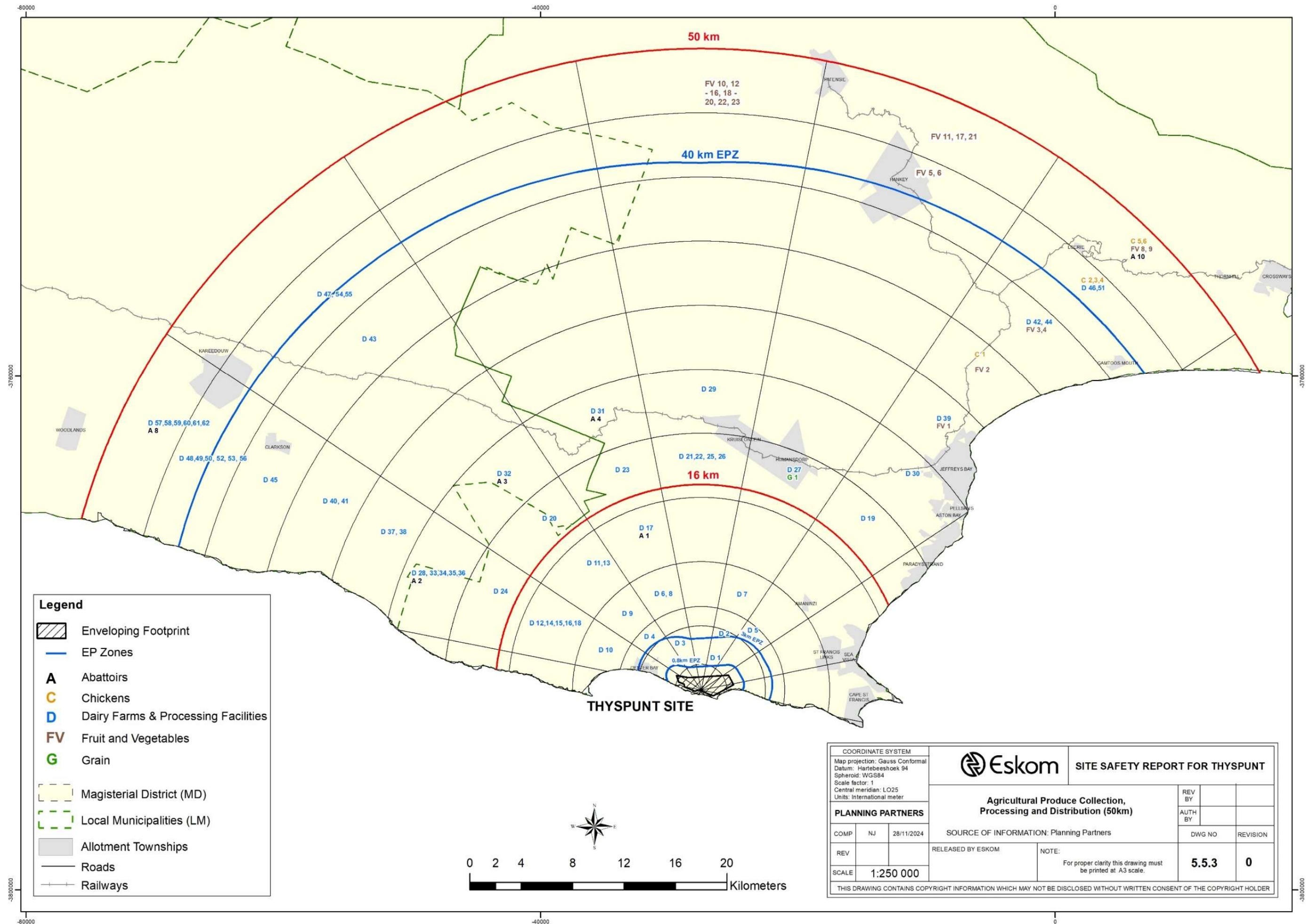
- **Grain/cereal crops:** There is only one grain silo located within the site region (19.2 km north-northeast), which is owned and operated by the Humansdorp Co-op (refer to **Table 5.5.B.5** and **Drawing 5.5.3**).
- **Fish:** Recreational fishing for freshwater fish occurs in the rivers and farm dams in the region, but yields and distribution are not regulated or known. There are currently no aquaculture facilities located within the site region (Eastern Cape Department of Rural Development and Agrarian Reform, 2023). The distribution of fish processing facilities in the region that are associated with the commercial marine fishery is described in **Section 5.6**.
- **Free foods:** The Department of Water Affairs and Forestry has previously confirmed that the soil conditions within the region are not ideal for wild mushrooms to grow in (Planning Partners, 2010) and no picking of wild mushrooms was identified. As the soil conditions would have remained the same since 2010 and the land cover analyses have similar results, no further evidence is found to suggest that this has changed. Free foods associated with the coastline and maritime environment are discussed in **Section 5.6**.

c. Market distribution of agricultural produce

The CoCA 2017 contains data relating to distribution channels for selected vegetables and fruits when going to market. According to the CoCA 2017 (Statistics South Africa, 2020b), fresh produce enters the distribution chain through one of the following channels:

- fresh produce markets;
- direct to retailers and chain stores;
- processing factories;
- direct sales from farmer to consumers;
- export.

There are no significant fresh produce markets located within the site region. The main point of exports for agricultural produce (either fresh or processed) is the Port of Gqeberha/Port Elizabeth (95.6 km east-northeast) and the Port of Ngqura (105.3 km east-northeast), which are both located outside of the site region.



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Exports of agricultural produce originating from the site region and surrounding areas are summarised below (agricultural products listed in alphabetical order) (Planning Partners, 2024b):

- **Barley**: No barley was exported from the Eastern Cape in 2020.
- **Beef**: No beef was exported from the Sarah Baartman District Municipality in 2021.
- **Citrus**: Volumes of citrus fruits distributed from the Sarah Baartman District in 2017 are detailed in **Table 5.5.C.1** in **Appendix 5.5.C**. It is evident that significant volumes of citrus fruits produced in the Kouga and Sundays River Valley Local Municipalities, both located within the Sarah Baartman District, were exported. In Kouga, 87 748 t of oranges, 22 312 t of lemons, 22 040 t of soft citrus or "easy peelers," and 8 535 t of naartjies were exported, while in Sundays River Valley, even larger export volumes were recorded, including 143 722 t of oranges, 100 432 t of lemons, 36 195 t of soft citrus, and 11 655 t of naartjies. Citrus produced in South Africa for the export market is primarily exported to Asia and Europe, with some fruit also destined for local markets.
- **Deciduous fruit**: Volumes of deciduous fruits distributed from the site region in 2017 are detailed in **Table 5.5.C.2** in **Appendix 5.5.C** and it can be seen that relatively large volumes of apples (34 071 t) and pears (16 555 t) produced in the KouKamma Local Municipality were exported. However, the vast majority of production occurs outside of the site region in the Langkloof Valley.
- **Eggs**: Eggs exported from the Sarah Baartman District Municipality represented only a fraction (approximately 0.001 per cent) of the total eggs exported from the country in 2021. Export markets are Mozambique (82 per cent), followed by Eswatini (13 per cent) and Botswana (3 per cent), with most of the remainder of eggs exported being distributed to other Southern African Development Community (SADC) countries.
- **Maize**: Minimal maize was exported from the Eastern Cape in 2021, with only a fraction of maize exports originating from within the Sarah Baartman District Municipality.
- **Milk/cream**: The Sarah Baartman District Municipality was responsible for a significant portion of the dairy products exported from the Eastern Cape in 2020 (exact volumes not available). South African milk and dairy product export markets in 2020 were SADC countries: Botswana commanding the greatest market share of the export market (41 per cent), followed by Namibia (13 per cent), Mozambique (13 per cent), Eswatini (13 per cent) and Lesotho

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(9 per cent), with the remaining 11 per cent being distributed to countries such as Zambia, Zimbabwe and Malawi.

- Mutton/lamb: No mutton/lamb was exported from the Sarah Baartman District Municipality in 2021.
- Oats: No oats were exported from the Eastern Cape in 2019.
- Pork: No pork was exported from the Sarah Baartman District Municipality in 2021.
- Subtropical fruits: Volumes of subtropical fruits distributed from the site region in 2017 are detailed in **Table 5.5.C.3** in **Appendix 5.5.C** and it can be seen that a minimal volume of berries (19 t) produced in the KouKamma Local Municipality were exported.
- Vegetables: Volumes of vegetables distributed from the site region in 2017 are detailed in **Table 5.5.C.4** in **Appendix 5.5.C**. It is evident that relatively minor volumes of potatoes (429 t) produced in the Kouga Local Municipality were exported. 93 per cent of the South Africa's potatoes produced for export were sent to SADC and Southern African Customs Union countries such as Mozambique, Namibia, Botswana, Lesotho and Angola.

Water Bodies and Wetlands

Based on the 2020 SANLC (Department of Forestry, Fisheries and the Environment, 2021), 1 811 ha of water bodies and 2 124 ha of wetlands occur in the site region. **Drawing 5.5.2** illustrates their distribution in relation to the site region and the site vicinity (also refer to **Drawing 5.5.4** and **Drawing 5.5.5**). Water bodies are made up of rivers and dams. The main rivers in the site region (from west to east) include the Klipdrift River, Slang River, Krom River, Seekoei River and Gamtoos River. Other rivers in the site region include the Swart River, Kabeljous River, Tsitsikamma River, Klasies River, Klein River, Gheis River, Loerie River, Diep River, Kaapsedrif River, Groot River, Hol River and Doringkraal River.

Major dams within the site region include the Impofu Dam (13 km north-northwest), Churchill River Dam (28 km northwest) and Loerie Dam (47 km northeast).

There are various important estuaries in the site region, including the Klipdrift Estuary located just east of Oyster Bay; the Krom Estuary, which lies just north of St. Francis Bay; the Seekoei Estuary located between Paradise Beach and Aston Bay; the Kabeljous Estuary lying north of Jeffreys Bay; and the Gamtoos Estuary located near the small settlement of Gamtoos Mouth. Further details of the various estuaries are provided in **Section 5.6**.

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There are numerous wetland areas adjacent to the region's rivers and on the coastal platform. The Papiessfontein wetlands between the Kabeljous and Gamtoos Rivers, the wetland system connected to the Seekoei Estuary, and the interdune wetlands in the Oyster Bay/Thysbaai dunefield are regarded as wetland systems with high biodiversity importance.

5.5.5.2 Land and Water Bodies Supporting Wildlife

The site region is characterised by a significant amount of natural vegetation occurring within protected natural environments, afforested areas, dams, rivers or wetlands, as is confirmed by the 2020 SANLC, which demonstrates that natural areas are the most predominant land use in the site region (refer to **Figure 5.5.2**).

The site region contains two portions of the Cape Floral Region Protected Area, which is a declared United Nations Educational, Scientific and Cultural Organisation (UNESCO World Heritage Site: a large portion of the Garden Route Biosphere Reserve and a fractional portion of the Baviaanskloof Nature Reserve (Department of Forestry, Fisheries and the Environment, 2024; Cape Nature, 2024)¹². In addition, several declared nature reserves and protected areas fall within the site region, as illustrated in **Drawing 5.5.4** (Department of Forestry, Fisheries and the Environment, 2024).

The main protected areas that occur within the site region are discussed below (Planning Partners, 2024a):

- Garden Route Biosphere Reserve: Part of the Cape Floristic Region, the Garden Route Biosphere Reserve covers an area of approximately 700 000 ha and extends from the coastline south of the George Airport, north along the eastern boundary of its neighbouring Gouritz Cluster Biosphere Reserve and along the coastline into the Eastern Cape to include Jeffreys Bay and St. Francis Bay.
- Cape St. Francis Nature Reserve: Measuring approximately 100 ha, the Cape St. Francis Nature Reserve lies between the villages of Cape St. Francis and St. Francis Bay and extends to the tip of the Cape St. Francis headland, locally referred to as Shark Point. Animals include bushbuck, grysbok, common duiker, bushpig, porcupine, vervet monkey, caracal, yellow and grey mongoose and otters. Bird sightings include African black oystercatcher and occasionally an endangered Jackass penguin. A unique feature is

¹² The Cape Floral Region is made up of thirteen protected area clusters covering an area of more than 1 million ha and is one of the richest plant areas in the world, containing almost 9 000 plant species, with 1 736 species identified as threatened and 3 087 species of conservation concern.

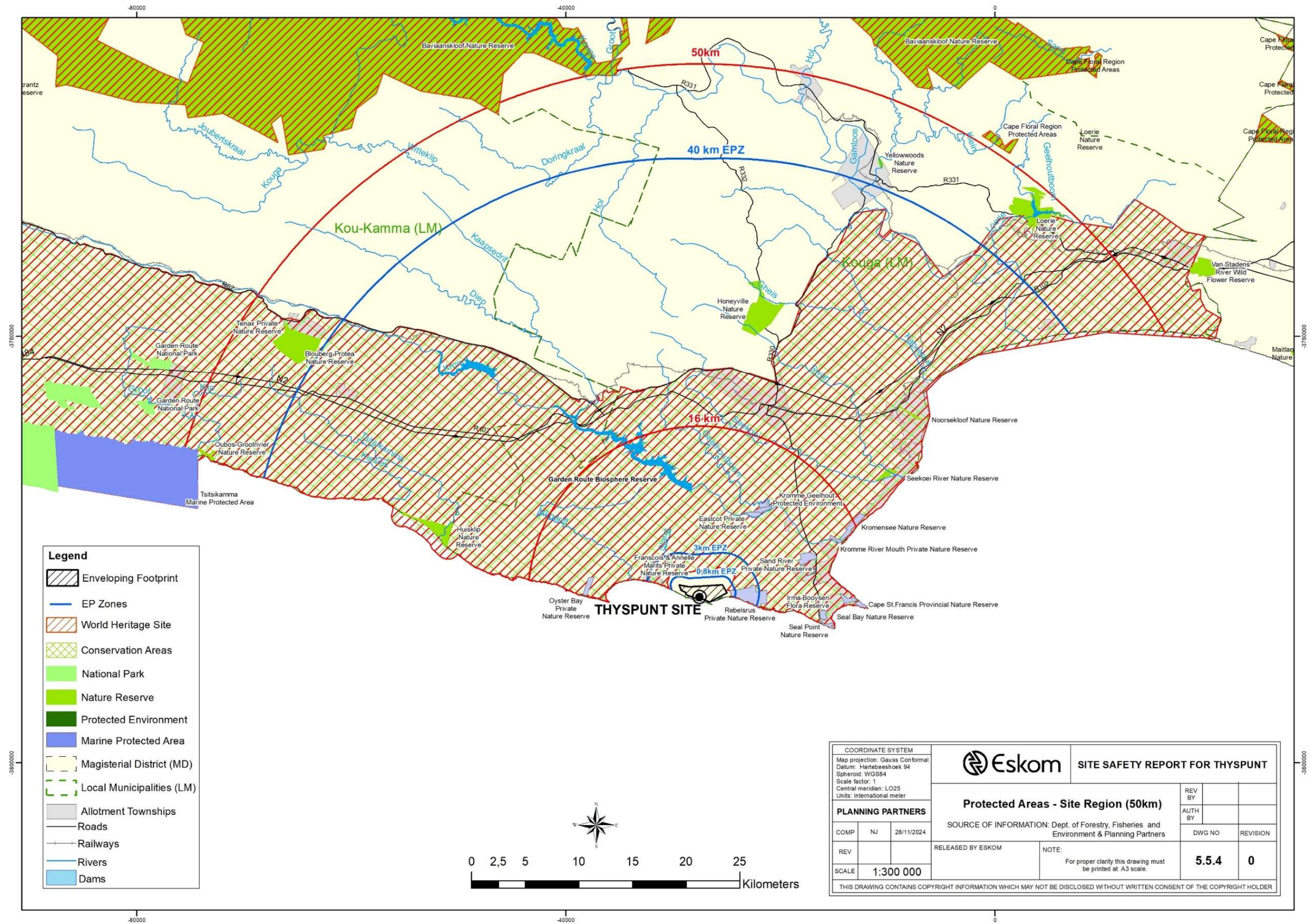
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the dune field at the eastern end of the Cape St. Francis beach towards Shark Point. It comprises a corridor of mobile dunes which allow sand to move from Seal Bay into St. Francis Bay and is termed a “headland-bypass dune field”. It is regarded as one of the best remaining (semi) active examples of its kind in the world and serves as an integral part of the coastal sand transport system.

- Baviaanskloof Nature Reserve: The Baviaanskloof Nature Reserve consists of more than 500 ha of land owned by the government and the private sector, which is collaboratively managed by the Eastern Cape Parks and Tourism Agency. Seven of South Africa’s eight biomes (major natural regions) are represented in the nature reserve including fynbos, forest, grassland, succulent Karoo, Nama-karoo, sub-tropical thicket and savanna. Only a fractional portion of the Baviaanskloof Nature Reserve is located within the site region (see **Drawing 5.5.4**).

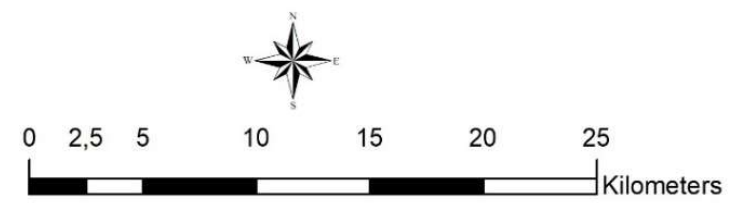
Smaller protected areas within the site region include the following (listed in alphabetical order) (Planning Partners, 2024a):

- Blouberg Protea Nature Reserve: Located immediately south of the rural town of Kareedouw, the Blouberg Protea Nature Reserve spans approximately 812 ha. The reserve is managed by the KouKamma Local Municipality.
- Eastcot Private Nature Reserve: Located approximately 8 km northwest of St. Francis along the banks of the Krom River, the Eastcot Private Nature Reserve measures approximately 50 ha in extent.
- Francois and Annelle Marits Private Nature Reserve: Located immediately to the east of Oyster Bay, this reserve was established in 2009 and measures approximately 2 ha in extent.
- Honeyville Nature Reserve: Honeyville Nature Reserve is located approximately 5 km northwest of Jeffreys Bay. The nature reserve is composed of 800 ha of land, of which 45 ha is earmarked for sustainable development in the form of an eco-village, including subsistence farming based on the principles of permaculture.
- Huisklip Coastal Nature Reserve: Huisklip Coastal Nature Reserve is located along the coastline approximately 65 km west of Cape St. Francis. The reserve measures roughly 300 ha in extent and is home to a variety of wildlife, indigenous plants and rock formations. The reserve also features rivers cascading towards the coast, lined with rocky crags and white, sandy beaches. Further, the reserve is also home to ancient trees such as yellowwood, stinkwood, hard pear, ironwood and kamassi.



Legend

- Enveloping Footprint
- EP Zones
- World Heritage Site
- Conservation Areas
- National Park
- Nature Reserve
- Protected Environment
- Marine Protected Area
- Magisterial District (MD)
- Local Municipalities (LM)
- Allotment Townships
- Roads
- Railways
- Rivers
- Dams



COORDINATE SYSTEM		Eskom		SITE SAFETY REPORT FOR THYSPUNT	
Map projection: Gauss Conformal					
Datum: Hartbeeshoek 94					
Spheroid: WGS84					
Scale factor: 1					
Central meridian: LO25					
Units: International meter					
PLANNING PARTNERS		Protected Areas - Site Region (50km)		REV BY	
COMP	NJ	28/11/2024	SOURCE OF INFORMATION: Dept. of Forestry, Fisheries and Environment & Planning Partners	AUTH BY	
REV			RELEASED BY ESKOM	DWG NO	REVISION
SCALE	1:300 000		NOTE: For proper clarity this drawing must be printed at A3 scale.	5.5.4	0
THIS DRAWING CONTAINS COPYRIGHT INFORMATION WHICH MAY NOT BE DISCLOSED WITHOUT WRITTEN CONSENT OF THE COPYRIGHT HOLDER					

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- Irma Booysen Flora Reserve: Irma Booysen Flora Reserve is a small veld reserve covering 64 ha located immediately west of the coastal resort town of Cape St. Francis. The reserve contains a mix of fynbos and thicket vegetation.
- Kromensee Nature Reserve: Encompassing an area of approximately 146 ha, the Kromensee Nature Reserve is positioned along the coastline to the north of the Krom River estuary. The reserve includes sensitive ecological features such as a network of primary coastal sand dunes, a perennial dune stream and a pristine coastline that extends all the way from Paradise Beach to the Krom River estuary. The Kromensee Nature Reserve contains a fynbos-thicket mosaic, known as St. Francis Strandveld, which is a critically endangered vegetation type that is unique to the coastal areas around St. Francis Bay and Cape St. Francis.
- Kromme-Geelhout Protected Environment: Formerly known as the Kromme-Geelhout Conservancy, the Kromme-Geelhout Protected Environment was formally declared as a protected area in 2019 (Province of the Eastern Cape, 2019). The Kromme-Geelhout Protected Environment lies on the peninsula bounded by the Kromme and Geelhoutboom rivers covering an area of approximately 148 ha. The protected area contains a number of different vegetation types, including fynbos, Gamtoos (riverine) thicket, tidal wetlands and seasonal freshwater wetlands.
- Krom River Mouth Private Nature Reserve: The Krom River Mouth Private Nature Reserve covers approximately 30 ha of land immediately north of the Krom River estuary.
- Loerie Nature Reserve: Measuring approximately 780 ha, the Loerie Nature Reserve is situated just north of the small village of Loerieheuwel. The reserve encompasses the Loerie Dam and is popular with water sport enthusiasts and anglers. Other recreational activities include birdwatching, hiking and mountain biking.
- Noorsekloof Nature Reserve: Noorsekloof Nature Reserve is situated in the heart of Jeffreys Bay, spanning roughly 200 m wide at its narrowest and widening to about 400 m in the heart of the kloof (measuring approximately 2.7 ha in total). Vegetation in the nature reserve is predominantly valley bushveld. Over 50 bird species, including the Knysna loerie, Knysna woodpecker and paradise flycatcher are found in the reserve.
- Oubos Grootrivier Nature Reserve: Oubos Grootrivier Nature Reserve is located immediately east of the Groot River mouth approximately 48 km west of the site. Measuring 49 ha in extent, the site is extremely diverse and contains a variety of habitats, including

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sand beaches, rocky coastlines, coastal thickets and fynbos, as well as estuarine habitats.

- Oyster Bay Private Nature Reserve: The Oyster Bay Private Nature Reserve is located approximately 5 km to the west of the coastal resort town of Oyster Bay. The reserve was established in 1993 and encompasses 80 ha of land.
- Rebelsrus Private Nature Reserve: The Rebelsrus Private Nature Reserve is located just outside Humansdorp, 7 km northeast of St. Francis Bay. Encompassing approximately 400 ha, it contains one of the best-preserved examples of a headland bypass dunefield ecosystem, which is a very dynamic ecological system with a diverse range of habitat types. The nature reserve is recognized as a Critical Biodiversity Area in both the Eastern Cape Biodiversity Conservation Plan and the Garden Route Initiative Biodiversity Sector Plan. Archaeologically, its dunefields contain a rich heritage of ancient Khoisan relics such as shell middens, stone-age artefacts and locally extinct animal remains that add to the overall conservation value of the area. Approximately 40 per cent of the reserve land surface area is owned by Eskom.
- Sand River Private Nature Reserve: Covering approximately 136 ha of land situated immediately north of the St. Francis Links golf course, the Sand River Private Nature Reserve contains part of the dynamic Sand River system, as well as one of the finest examples of a headland bypass dunefield. Together, these ecological features create a unique combination of mobile sand dunes, wetland systems and dune streams and pools which create a diverse range of terrestrial and aquatic habitats. The nature reserve also contains endangered and critically endangered vegetation types that form a natural fynbos-thicket mosaic. Extremely rare faunal species have also been recorded on the reserve, including the Salt Marsh Gecko (*Cryptactites peringueyi*), which is only found around the Krom River area. Furthermore, the dunefields found on the reserve also contain a number of ancient Khoisan middens and artefacts that are of great archaeological value.
- Seal Bay Nature Reserve: The Seal Bay Nature Reserve spans approximately 38 ha of land immediately abutting the beach at Cape St. Francis. The reserve is a good example of a prolonged fire-free area where thicket is taking over from fynbos and individual forest trees have established.
- Seal Point Nature Reserve: Covering approximately 38 ha, Seal Point Nature Reserve is situated at the Cape St. Francis lighthouse at the southernmost tip of the cape. A unique community of miniature plants occupies a narrow (10 m to 20 m) band of shell shingle

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immediately above the high-water mark along the Seal Point peninsula and around the lighthouse. The reserve is home to eight endangered plant species.

- Seekoei Nature Reserve: The Seekoei Nature Reserve lies between the coastal villages of Aston Bay and Paradise Beach, approximately 5 km south of Jeffreys Bay. The nature reserves consist of an area of about 66 ha at the estuary of the confluence of the Seekoei and Swart rivers. Vegetation is mainly Kaffrarian thicket, which consists of non-succulent subtropical transitional thicket communities. Bushbuck, grysbok, blue duiker, bush pig, porcupine, caracal, yellow and grey mongoose are some of the faunal species that occur.
- Tenax Private Nature Reserve: Tenax Private Nature Reserve is located immediately south of Kareedouw. The reserve was established in 1992 and encompasses 55 ha of land.
- Yellowwoods Nature Reserve: Located just north beyond of Hankey, this reserve contains 25 ha of ancient yellowwood and white stinkwood trees. The reserve is also home to a variety of forest birds, including African Firefinch, Green Woodhoopoe, Lesser Honeyguide, Grey Cuckooshrike, Knysna Woodpeckers and Knysna Turaco.

5.5.5.3 Current Water Use

Water Resources

Water bodies and resources in the site region consist of rivers, dams, groundwater (i.e. aquifers) and reservoirs, which are mapped in **Drawing 5.5.5**.

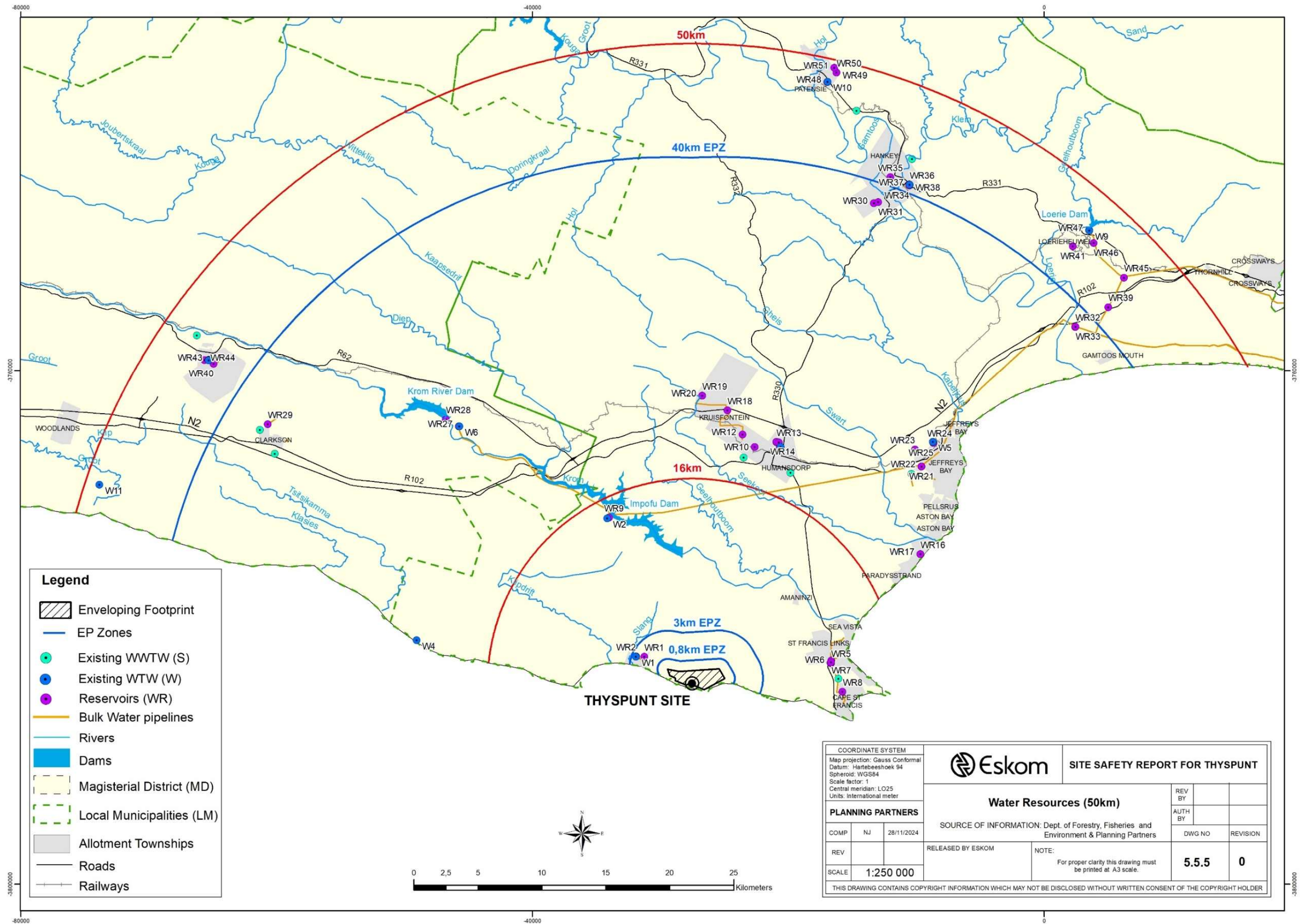
a. Rivers

The Krom River and Gamtoos River are significant sources of water supply in the site region. Other smaller rivers include the Klipdrift, Slang, Seekoei, Swart and Kabeljous rivers.

Drainage throughout the site region occurs from a generally northerly and north-westerly direction towards the sea.

b. Dams

There are three major dams located within the site region which supply water to the various water supply schemes in the region, namely the Impofu, Churchill and Loerie dams (refer to **Table 5.5.1** and **Drawing 5.5.5**). Other major dams contributing to water supply in the broader region that fall outside of the site region are the Kouga, Groendal and Sand dams.



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Table 5.5.1
Dams in the Site Region¹³

Dam	Storage Capacity (1 × 10 ⁶ m ³)	Distance (km)	Direction
Impofu Dam	105.8	12	NNW
Churchill Dam	35.2	28	NW
Loerie Dam	3.0	48	NE

These water supply dams are described below (listed in order of capacity) (Department of Water and Sanitation, 2023a).

- Impofu Dam: The Impofu Dam is located on the mainstem of the Krom River approximately 20 km downstream of Churchill Dam. Its total capacity is 105.8 × 10⁶ m³ and its surface area is 570 ha.
- Churchill Dam: The Churchill Dam, originally named the Kromrivier Dam, is located on the mainstem of the Krom River. The dam has a storage capacity of 35.2 × 10⁶ m³ and a surface area of 253 ha.
- Loerie Dam: The Loerie Dam, which is located just outside of the small town of Loerie, is a balancing dam with a capacity of 3.0 × 10⁶ m³. The dam is currently being operated at 80 per cent of its capacity to minimise spills.

c. Groundwater

The site region comprises two aquifers: the upper Algoa Aquifer (primary intergranular) and the basal TMG Aquifer (fractured rock). The Algoa Aquifer, formed from calcareous aeolian sands and aeolianite of the Nanaga Formation, overlies the TMG Aquifer, which extends into the Indian Ocean. Key characteristics of these aquifers, including their distribution, are detailed in **Drawing 5.11.4** and **Figure 5.11.28** in **Section 5.11** (Geohydrology), with further classification provided in **Figure 5.5.3** (Western Cape Department of Agriculture, 2024).

¹³ (Department of Water and Sanitation, 2023a)

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Figure 5.5.3
Aquifer Classification¹⁴

Kouga Local Municipality

Following a prolonged period of drought in the region, the Kouga Local Municipality sought to reduce their reliance on surface water from the Churchill and Kouga dams. In 2018/19 and 2022/23 numerous boreholes were drilled, some of which have been equipped and are operational. The potential yield from the collective boreholes in the Kouga Local Municipality is shown in **Table 5.5.2**¹⁵.

¹⁴ (Planning Partners, 2024a)

¹⁵ The potential yield shown in **Table 5.5.2** is based on borehole yield recommendations obtain from consultants working for the Kouga Local Municipality and is subject to further assessment and verification (Department of Water and Sanitation, 2023a).

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Table 5.5.2
Potential Yield of Existing Boreholes within the Kouga Local Municipality¹⁶

Town	Potential Yield		Supplied Yield		Remaining Potential	
	Mℓ/day	m ³ /a	Mℓ/day	m ³ /a	Mℓ/day	m ³ /a
Jeffreys Bay	8.53	3.12	5.5	2.01	3.03	1.11
Humansdorp	4.59	1.68	2.9	1.06	1.69	0.62
Hankey	1.5	0.55	0.6	0.22	0.9	0.33
Patensie	0.63	0.23	0.63	0.23	0	0
St. Francis Bay	1.78	0.65	0.96	0.35	0.83	0.30
Oyster Bay	0.79	0.29	0.71	0.26	0.08	0.03
Loerie	0.38	0.14	0	0	0.38	0.14
Thornhill *	0.06	0.02	0	0	0.06	0.02
Total	18.3	6.7	11.3	4.1	7	2.5

* Located outside of the site region

It is important to note that groundwater abstracted from many of the boreholes within the Kouga Local Municipality has high iron and manganese concentrations. The Kouga Local Municipality has adopted a strategy to reduce these concentrations by installing a device in some boreholes that injects activated oxygen into boreholes away from the production boreholes to oxidise the soluble Fe²⁺ and Mn²⁺ ions before reaching the production boreholes. The sustainability of this solution *vis-à-vis* long term water supply is still being analysed by the Kouga Local Municipality (Department of Water and Sanitation, 2023a).

KouKamma Local Municipality

The KouKamma Local Municipality has 17 productive boreholes, 3 of which are located in the site region at Kareedouw and Clarkson (KouKamma Local Municipality, 2023a). The respective yields of these boreholes are currently unknown.

Irrigation groundwater schemes

While there are no groundwater irrigation schemes in the site region, numerous farmers rely on borehole water for irrigation and drinking water for livestock. This is particularly the case where farmlands are located on

¹⁶ (Department of Water and Sanitation, 2023a)

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TMG geological formations, such as north and north-west of Oyster Bay (mostly south of the Krom River catchment boundary). Borehole yields are higher in the TMG geological structure called the Jeffreys Arch, on which the Humansdorp, Jeffreys Bay and Hankey municipal boreholes are located, and farmers located on this structure have single or clusters of boreholes that provide approximately 0.5 Ml/d to 1 Ml/d. Besides these pockets of abstraction, there is little groundwater use in the site region (Department of Water and Sanitation, 2023a).

The exception, however, is the Gamtoos Basin. Following the drought-induced restrictions placed on use from the Kouga Dam irrigation canal, farmers have drilled many boreholes (potentially hundreds) in the last few years. Groundwater was generally unused as the shallow borehole water is saline, but once fresh water was found at depth, drilling increased markedly. It is uncertain how many of these boreholes have been registered with the Department of Water and Sanitation (DWS), and how many water use licence applications are in the process of being successfully processed (i.e. where DWS has all the necessary information to process them) (Department of Water and Sanitation, 2023a).

d. Reservoirs

Reservoirs are an important part of the water reticulation system in the site region, helping the water reticulation system to cope with periods of peak demand. Water is supplied to reservoirs at a fairly constant rate from the various water treatment works (WTW) situated throughout the site region.

There are 39 water supply reservoirs within the site region (refer to **Table 5.5.3** and **Drawing 5.5.5**). The reservoirs are distributed throughout the settlements located in the site region: Humansdorp/Kruisfontein (9 reservoirs); Jeffreys Bay (8); Patensie/Loerie (6); St. Francis Bay/Cape St. Francis (5); Clarkson/Kareedouw (5); Hankey (4); and Oyster Bay (2).

In addition to the reservoirs listed in **Table 5.5.3**, there are also various balancing reservoirs located throughout the site region as shown in **Drawing 5.5.5**, namely Elandsjagt (WR9); Churchill Tunnel (WR27); Churchill Booster (WR28); Gamtoos New (WR37); Gamtoos Old (WR38); Summit Confluence (WR40); Loerie BPT (WR47); and Summit (WR48).

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Table 5.5.3
Water Supply Reservoirs in the Site Region¹⁷

Code	Reservoir Name	Storage Capacity (1 × 10 ⁶ m ³)	Distance (km)	Direction
Oyster Bay				
WR1	Umzamowethu Reservoir	0.8	4.5	WNW
WR2	Oyster Bay Reservoir (Concrete)	0.53	5.1	WNW
St. Francis Bay/Cape St. Francis				
WR3	St. Francis Reservoir 2	4.0	11.8	E
WR4	Sea Vista Grey Water Tower	0.01	11.9	E
WR5	St. Francis Reservoir 1	4.0	11.9	E
WR6	Sea Vista Red Water Tower	0.01	11.9	E
WR8	Cape St. Francis Reservoir	0.50	12.8	E
Humansdorp/Kruisfontein				
WR10	Johnson Ridge Reservoir	0.3	17.6	NNE
WR11	Gill Marcus Elevated Tower	0.5	18.0	NNE
WR12	Water Treatment Reservoir	3.77	18.2	NNE
WR13	Gill Marcus Old Elevated Tower (Steel)	0.003	18.4	NNE
WR14	Gill Marcus Reservoir	0.8	18.4	NNE
WR15	Humansdorp Tower (Concrete)	0.5	18.5	NNE
WR16	Kruisfontein Proper Reservoir (Steel)	0.21	19.5	N
WR17	Berg Reservoir	0.035	20.3	N
WR18	Kruisfontein Reservoir	0.56	20.3	N
Jeffreys Bay				
WR19	Paradise Beach Water Tower	2.5	21.4	ENE
WR20	Paradise Beach Reservoir 1	4.0	21.4	ENE
WR21	Borehole Reservoir 2 (Concrete)	3.0	24.7	NE
WR22	Borehole Reservoir 1 (Concrete)	2.5	24.7	NE
WR23	Fountains Reservoir (Concrete)	5.0	25.1	NE
WR24	Churchill Reservoir 2 (Concrete)	0.68	26.6	NE
WR25	Churchill Reservoir 1 (Concrete)	8.0	26.6	NE

¹⁷ (Department of Water and Sanitation, 2024)

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Code	Reservoir Name	Storage Capacity (1 × 10 ⁶ m ³)	Distance (km)	Direction
WR26	Borehole Water Tower (Steel)	0.2	26.5	NE
Hankey				
WR29	Weston (Steel and concrete)	0.5	37.2	NNE
WR30	Weston Reservoir (Steel)	0.25	37.4	NNE
WR31	Centerton Reservoir (Concrete)	1.5	39.4	NNE
WR32-35	WTW Reservoirs	1.0	39.6	NNE
Patensie/Loerie				
WR39	WTW Reservoir (Concrete)	0.50	43.9	NNE
WR41	Loerie (New) Reservoir 2 (Concrete)	149.02	44.6	NE
WR42	High Reservoir 1 (old) (Concrete)	0.50	44.7	NNE
WR43	High Reservoir 2 (new) (Concrete)	0.0	44.7	NE
WR44	WTW Reservoir (Steel)	4.0	45.1	NE
WR45	Loerie (Old) Reservoir 1 (Concrete)	0.5	46.0	NNE
Clarkson/Kareedouw				
WR36	Clarkson WTW Reservoir	0.33	40.3	WNW
WR46	Assegaai/DrieKrone Reservoir 4	1.3	46.3	WNW
WR49	Assegaai/DrieKrone Reservoir 2	0.126	46.8	WNW
WR50	Assegaai/DrieKrone Reservoir 1	0.0	46.9	WNW
WR51	Assegaai/DrieKrone Reservoir 3	3 070.0	47.2	WNW

e. Desalination

There are currently no desalination plants located in the site region. The Nelson Mandela Bay Municipality (NMBM) has planned two new desalination plants: the 60 Ml/d phased Schoenmakerskop Desalination Scheme and the Coega Special Economic Zone 15 Ml/day Desalination Scheme, but both of these fall outside of the site region and neither have been implemented (Department of Water and Sanitation, 2023a).

Water Management Area

The National Water Act No. 36, 1998 (Republic of South Africa, 1998) requires the Minister of Water Affairs and Forestry to establish a national water resource strategy for the protection, use, development, conservation, management and control of water resources within South Africa. As part of the National Water Resource Strategy (Department of Water Affairs, 2013), nine Water Management Areas (WMAs) have been

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established across South Africa (refer to **Figure 5.5.4**)¹⁸. The entire site region falls within the Mzimvubu-Tsitsikamma WMA.

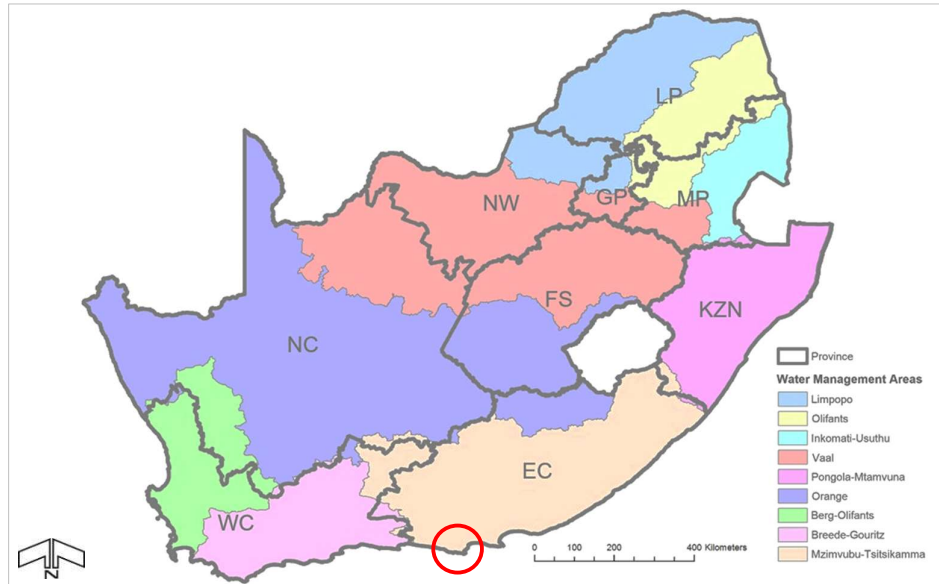


Figure 5.5.4
Water Management Areas in South Africa¹⁹

The Mzimvubu-Tsitsikamma Catchment Management Agency (CMA) was formally established on 10 March 2023 (Department of Water and Sanitation, 2023b). The CMA has yet to release any formal documentation detailing use of water resources within the Mzimvubu-Tsitsikamma WMA.

The region has experienced a significant and ongoing drought since November 2015 due to below average rainfall, which has resulted in declining dam levels and water storage capacities, and subsequent water restrictions over several years²⁰.

¹⁸ South Africa's National Department of Water and Sanitation previously divided the country into 19 Water Management Areas (WMAs). In 2012, the then Department of Water Affairs made a decision to reduce the number of WMAs from 19 to 9. This reduction included the amalgamation of the Berg WMA and Olifants/Doorn WMA into the Berg-Olifants WMA and the amalgamation of the Breede WMA and Gouritz WMA into the Breede-Gouritz WMA (Department of Water Affairs, 2013).

¹⁹ (Statistics South Africa, 2017)

²⁰ To reduce water consumption, the Department of Water and Sanitation, as well as the various municipalities located in the Mzimvubu-Tsitsikamma WMA, issued various water restriction notices over the past 8 years, beginning in September 2016) (Department of Water and Sanitation, 2023b). Water restrictions placed on the Kouga-Loerie Sub-system, which supplies *inter alia* the towns of Hankey and Patensie, were lifted in October 2023 (Planning Partners, 2024a).

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Current Water Supply Sources

a. Algoa Water Supply System

Water supply in the site region is dominated by the Algoa Water Supply System (AWSS), which integrates various river systems and water sources. The AWSS spans from the Kouga River system in the west to the Sundays River system in the east, providing water to the Gamtoos Irrigation Board, the Nelson Mandela Bay Municipality (NMBM), and several smaller towns within the Kouga Local Municipality.

Key components of the AWSS include three major dams in the west (Kouga, Churchill, and Impofu), several smaller dams and a spring near NMBM, and an inter-basin transfer scheme from the Orange River via the Fish and Sundays Rivers to the east. Notably, the AWSS demonstrates significant interconnectivity: water is transferred between the Kouga and Kromme river systems via shared infrastructure, while the Orange River contributes to the Sundays River system through the Orange-Fish-Sundays Transfer Scheme. These interconnected systems enable the AWSS to meet regional irrigation, municipal, and industrial water demands. The significant dams in the AWSS are listed in **Table 5.5.4** and the primary bulk infrastructure components of the AWSS are schematised in **Figure 5.5.5** and (Department of Water and Sanitation, 2023b).

Table 5.5.4
Major AWSS Dams²¹

Dam Name	Full Capacity (1 × 10 ⁶ m ³)	Surface Area (km ²)	Operator
Kouga *	128.7	5.63	Gamtoos Irrigation Board
Impofu	107.5	6.37	NMBM
Churchill	35.7	2.43	NMBM
Groendal *	11.7	0.92	NMBM
Loerie	3.4	0.52	NMBM
Sand *	2.88	0.34	NMBM
Bulk *	0.293	0.07	NMBM

* Located outside of the site region

²¹ (Department of Water and Sanitation, 2023a)

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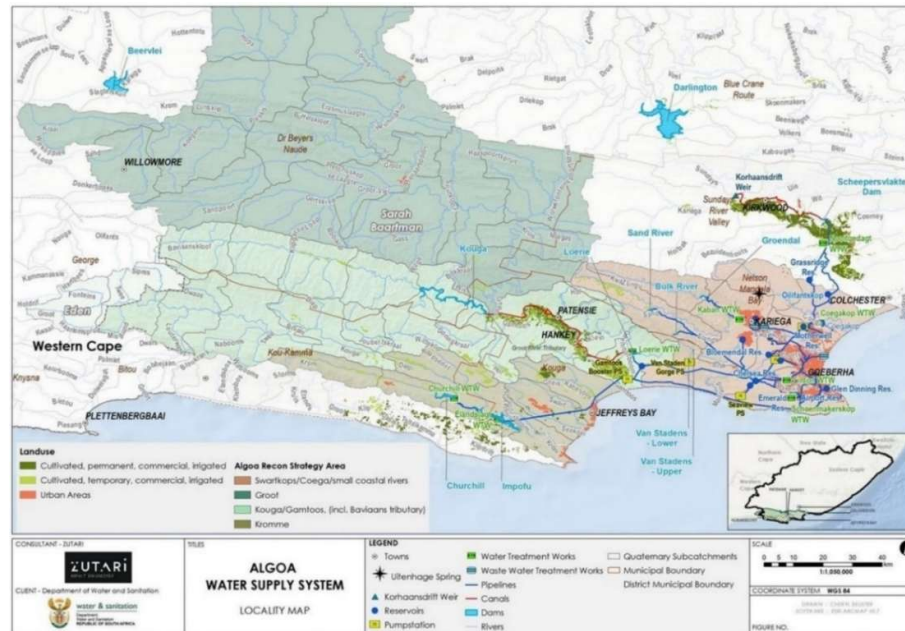


Figure 5.5.5
Algoa Water Supply System

A total of $213.3 \times 10^6 \text{ m}^3$ per annum has been allocated for use in the AWSS, with a summary of allocations to the water users as follows (**Department of Water and Sanitation, 2023a**):

- NMBM: $148.986 \times 10^6 \text{ m}^3$ per annum;
- Kouga Local Municipality: $0.930 \times 10^6 \text{ m}^3$ per annum;
- Irrigation: $63.384 \times 10^6 \text{ m}^3$ per annum.

Water requirements have significantly reduced as a result of water restrictions, especially for irrigation use. Total water use in 2021/2022 was $127.9 \times 10^6 \text{ m}^3$ per annum, with 89 per cent used by the urban and industrial sector. Urban users exceeded their restricted allocations²², while irrigators kept to the restrictions (Department of Water and Sanitation, 2023a). Overall, the AWSS is in deficit as a result of over-allocation, and the slow implementation of interventions to diversify water supply and reduce water requirements (Department of Water and Sanitation, 2023a).

From an operational perspective, the AWSS comprises the following three main systems (Department of Water and Sanitation, 2023a;

²²Water restrictions imposed by the Department of Water and Sanitation and municipalities.

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Department of Water and Sanitation, 2016):

Western System

The Western System consists of the Kouga-Loerie and Kromme sub-systems, which provides water to the Gamtoos Irrigation Board, NMBM and several smaller towns within the Kouga Local Municipality, from three major dams (Impofu and Churchill dams in the Krom River and Kouga Dam in the Kouga River). This system is relevant to the site region.

Central System

The Central System consists of older dams on the Sand, Bulk, Van Stadens and KwaZunga (a tributary of the Swartkops) rivers, as well as the Kariega Springs. These are all owned by the NMBM. This system is not relevant to the site region.

Eastern System

The Eastern System receives water transferred from the Gariep Dam on the Orange River via the Orange-Fish Tunnel, the Fish River, the Fish-Sundays Canal, Skoenmakers River, Darlington Dam and abstraction from the lower Sundays River at the Korhaansdrift Weir. This system is not relevant to the site region.

b. Relevant sub-systems of the AWSS

Kromme sub-system

The Churchill Water Supply Scheme utilises the water of the Krom River (for supplies mainly to the NMBM area) and small towns in the Kouga Local Municipality.

The scheme consists of the Churchill and Impofu dams and the Churchill and Elandsjacht WTW, as well as the pipelines and pumps that convey the water to the NMBM area. Humansdorp, Jeffreys Bay and St. Francis Bay are also partially supplied from this scheme, as well as minor amounts to Thornhill and Paradise Beach. Towns rely as far as possible on their own groundwater schemes (Department of Water and Sanitation, 2023a).

The Kromme Sub-system has an allocation of 38.9×10^6 m³ per annum (Department of Water and Sanitation, 2023a).

Kouga-Loerie sub-system

The Gamtoos Government Water Scheme comprises the Kouga and

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Loerie dams. Water is conveyed from the Kouga Dam to Loerie WTW via the Gamtoos main canal, with irrigation offtakes and branch canals off the Gamtoos Irrigation Scheme along the route from which irrigation requirements are abstracted. Except for water supplied to Hankey and Patensie, all water for urban use is discharged from the Loerie Dam to the Loerie WTW. The yield of the scheme is allocated to NMBM, as well as to Hankey and Patensie in the Kouga Local Municipality for urban use, with the balance allocated to irrigation.

The Loerie Water Scheme consists of the Loerie Dam and the Loerie WTW at the dam. Treated water is pumped to the Summit Reservoir and from there to the Chelsea Reservoir (the latter is located outside of the site region) (Department of Water and Sanitation, 2023a). The Kouga-Loerie Sub-system has an allocation of $84.2 \times 10^6 \text{ m}^3$ per annum (Department of Water and Sanitation, 2023a).

c. Water supply to towns located in the KouKamma Municipality

The KouKamma Local Municipality has 12 water supply systems that abstract water from both surface and ground water resources. The abstractions associated with the towns located within the site region are detailed below (KouKamma Local Municipality, 2023a):

Kareedouw

Water supply for Kareedouw is obtained from the Driekrone Waterfall and Assegai River (only in peak periods), as well as five boreholes (one currently in operation). The system is designed to abstract 2 400 kℓ per day.

Clarkson

Water supply for Clarkson is obtained from mountain springs and streams (inclusive of two boreholes, one of which is currently operational).

Water Use

a. Water Treatment Works

The various WTWs located in the site region are listed in **Table 5.5.5** and are spatially illustrated in **Drawing 5.5.5**. The WTWs treat the raw water from dams and supply schemes before being conveyed to users.

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Table 5.5.5
Water Treatment Works in the Site Region²³

Code	WTW Name	Distance (km)	Direction	Operator
W1	Oyster Bay WTW	4.9	WNW	Kouga Local Municipality
W2	Elandsjacht WTW	14.5	NNW	NMBM
W3	Humansdorp WTW	19.7	NNE	Kouga Local Municipality
W4	Clarkson WTW	21.8	W	KouKamma Local Municipality
W5	Jeffreys Bay WTW	26.6	NE	Kouga Local Municipality
W6	Churchill WTW	27.1	NW	NMBM
W7	Hankey WTW	42.5	NNE	Kouga Local Municipality
W8	Patensie WTW	45.8	NNE	Kouga Local Municipality
W9	Loerie WTW	47.1	NE	NMBM
W10	Kareedouw WTW	48.2	NW	KouKamma Local Municipality
W11	Woodlands WTW	48.9	WNW	KouKamma Local Municipality

b. Community water use

Kouga Local Municipality

Urban and industrial water use in the Kouga Local Municipality for 2021/2022 is shown in **Table 5.5.6** (Department of Water and Sanitation, 2023a).

Table 5.5.6
Water Use for the Kouga Local Municipality (2021/2022)²⁴

Towns	Source	Water Use/Annum (1 × 10 ⁶ m ³)	Water Use/Day (Mℓ/day)	Percentage of Total Use (AWSS)
Hankey, Patensie, Loerie and Thornhill	Kouga-Loerie Sub-system (AWSS)	0.91	2.50	0.7
Jeffreys Bay, Humansdorp, Cape St. Francis, St. Francis Bay and Oyster Bay	Kromme Sub-system (AWSS)	3.85	10.54	3.0

²³ (Department of Water and Sanitation, 2023a; Department of Water and Sanitation, 2024)

²⁴ (Department of Water and Sanitation, 2023a)

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Towns	Source	Water Use/Annum (1 × 10 ⁶ m ³)	Water Use/Day (Mℓ/day)	Percentage of Total Use (AWSS)
Jeffreys Bay, Humansdorp, Cape St. Francis, St. Francis Bay, Oyster Bay and Patensie	Groundwater	3.03	8.30	n/a
Sub-total		7.79	21.34	3.7

Clarifications of the water uses contained in **Table 5.5.6** in comparison with water allocations are as follows (Department of Water and Sanitation, 2023a):

- Loerie receives water from the Loerie Dam via the Loerie WTW and the town's supply is included in the NMBM allocation from the Kouga-Loerie sub-system.
- The volume of $3.85 \times 10^6 \text{ m}^3$ (annual consumption) for Humansdorp, Cape St. Francis, St. Francis Bay and Jeffreys Bay is included in NMBM's full raw water allocation of $38.075 \times 10^6 \text{ m}^3$ (annual allocation) from the Kromme Sub-system.
- Current groundwater use of towns in the Kouga Local Municipality is estimated at $3.03 \times 10^6 \text{ m}^3$ (8.3 Mℓ/d) annual consumption, which is based on recommended yields and measured yields.

The coastal towns in the site vicinity, in particular, experience seasonal fluctuations in water use as a result of a large number of second homes that are occupied over holiday periods, as well as large numbers of tourists that visit, in particular over the Christmas and Easter holiday periods.

KouKamma Local Municipality

Urban and industrial water use in the KouKamma Local Municipality for 2014 is shown in **Table 5.5.7** (Department of Water and Sanitation, 2023a). Please note that these amounts are estimates by the KouKamma Local Municipality due to lack of raw data from installed water meters (mostly outdated and affected by vandalism).

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Table 5.5.7
Water Use for the KouKamma Local Municipality (2014)²⁵

Towns	Source	Water Use/Annum (1 × 10 ⁶ m ³)	Water Use/Day (Mℓ/day)	Percentage of Total Use (AWSS)
Clarkson	Mountain springs, streams and one borehole.	0.84	2.30	n/a
Mountainview, Uitkyk and Kagiso, Newrest and Kareedouw Town	Driekrone Waterfall and Assegai River and five boreholes (AWSS)	1.71	2.60	n/a
Sub-total		2.55	4.90	n/a

Table 5.5.7 summarises water usage in the KouKamma Local Municipality for 2014, detailing the sources and amounts used by specific towns:

- Clarkson relies on mountain springs, streams, and a single borehole for its water supply, using $0.84 \times 10^6 \text{ m}^3$ annually, equivalent to 2.30 Mℓ per day. The percentage of total use is not available (n/a).
- The combined settlements of Mountainview, Uitkyk, Kagiso, Newrest, and Kareedouw Town are supplied by the Driekrone Waterfall, Assegai River, and five boreholes. Their total water use is $1.71 \times 10^6 \text{ m}^3$ annually, or 2.60 Mℓ/day, with no percentage of total use provided.
- The sub-total for these towns is $2.55 \times 10^6 \text{ m}^3$ annually, equating to a combined daily usage of 4.90 Mℓ/day.

These data highlight the dependency of these towns on local natural water sources and boreholes for their water needs.

Recent water use data for the KouKamma Local Municipality are not currently available.

²⁵ (Department of Water and Sanitation, 2023a)

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c. Irrigated agriculture

Gamtoos Irrigation Scheme

Water use in the Gamtoos Irrigation Scheme has been severely impacted by the ongoing drought. The Gamtoos Irrigation Board's 2021/2022 water use was $8.15 \times 10^6 \text{ m}^3$ and the Gamtoos canal losses and unaccounted-for-water amounted to $5.45 \times 10^6 \text{ m}^3$ for the same period (such high losses percentage-wise are typical with very low canal flows). Total use plus losses for 2021/2022 amounted to $13.6 \times 10^6 \text{ m}^3$ (Department of Water and Sanitation, 2023a).

Farmers have resorted to drilling boreholes to augment their water supply, but there is a significant concern that this is unsustainable, as prehistoric water is likely being mined, and the water quality of the underlying aquifer can be irrevocably damaged if the situation is not urgently managed. The Gamtoos Irrigation Board is currently undertaking a geohydrological study to determine the nature of groundwater in the Gamtoos River Valley (Department of Water and Sanitation, 2023a).

Impofu Dam

One irrigator (Woodlands Farms) is provided with water directly from the Impofu Dam for agricultural use, with an allocation is $0.836 \times 10^6 \text{ m}^3$ per annum (Department of Water and Sanitation, 2023a).

Water Bodies Used for Commercial and Recreational Freshwater Fishing and other Recreational Purposes

None of the rivers in the site region are used for commercial fishing purposes.

Recreational freshwater fishing occurs in some of the rivers in the site region. The Gamtoos River, in particular, is extremely popular with recreational anglers. Kob is the main attraction, with white steenbras and grunter also commonly caught (Emfuleni Corridor Tourism, 2018).

Major dams in the site region where fishing is allowed include the Impofu, Churchill and Loerie dams. The Impofu Dam is especially popular, with anglers targeting carp, barbel, kurper, bluegill, spotted bass and largemouth bass (Tracks4Africa, 2024; Anglinks, 2024).

The Gamtoos, Krom and Geelhout rivers are used for non-motorised recreation (boating, canoeing, and swimming) at a few locations in the site region. Boats require registration (Kouga Local Municipality, 2022).

Recreational fishing along the coast, in estuaries and offshore within the

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site region also occurs (refer to **Section 5.6**).

5.5.5.4 The Impact of Climate Change on Land and Water Use in the Site Region

The following climate change vulnerability projections can be highlighted out of the internal Eskom Report (RES/RR/16) on climate change vulnerability projections prepared by Engelbrecht *et al.* (Engelbrecht, et al., 2016):

- For the period 2021 to 2050 relative to the period 1961 to 1990, under low mitigation, temperature increases of 1 to 2.5°C may plausibly occur over the southern coastal regions of South Africa (including the Eastern Cape). Under modest-high mitigation, temperature increases will be somewhat less.
- Under both low and high mitigation, maximum temperatures are projected to rise faster than minimum temperatures.
- In association with rising maximum temperatures, the frequency of occurrence of very hot days is also projected to increase drastically under climate change.
- Increases in the occurrence of very hot days occur in association with projected changes in the frequency of occurrence of heat-wave days and high fire-danger days. These changes may impact on human and animal health through increased heat stress, are likely to impact negatively on crop yield and are conducive to the occurrence of veld and forest fires.
- A general decrease in rainfall is plausible over southern Africa under enhanced anthropogenic forcing. However, for the period 2021 to 2050 relative to the period 1971 to 2000, under low mitigation, rainfall is projected to increase over the central interior and east coast.²⁶

Soil and Land

The two principal drivers of plant growth and the turnover of soil organic material are temperature and precipitation. Climate change in the medium to long-term may result in a change in observed carbon stocks and fluxes within soil profiles. Predicted warming and drying in certain

²⁶ The projected changes in rainfall patterns over South Africa display more uncertainty than in the case of projected changes in temperature. This implies that adaptation policy makers need to take into account a range of different rainfall futures, often of different signal (i.e. drier and wetter) during the decision-making process (Engelbrecht, et al., 2016).

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areas may lead to a decrease in net primary productivity and an associated decrease in above and below-ground carbon stocks. Protracted warm and dry periods may, in addition, lead to increases in the frequency and intensity of fire. However, the heterogeneity of changes in climate across the Eastern Cape, topography and variability in response and resilience between species makes projections of changes in carbon stocks very difficult (African Climate and Development Initiative and SmartAgri, 2016).

Water Resources

The Eastern Cape Province is projected to experience substantial reductions in both annual and daily precipitation in the coming years, with an estimated levelling of the annual rainfall cycle. The region is expected to experience a higher frequency of extreme rainfall events and drier conditions. The region is arguably one of the most vulnerable areas to climate change in the Southern Africa sub-region (Aprakua, et al., 2023).

The impact of climate change on hydrological cycles of the Eastern Cape (and the nation as a whole) has changed the onset of river/stream flow because of changes in precipitation patterns. This has also affected the amount of water in all the various storage sources of water, including runoff water. It is estimated that an approximate 8 per cent reduction in rainfall in South Africa could result in a 30 per cent and above reduction in surface water in South Africa (Aprakua, et al., 2023).

Climate change could potentially impact on the AWSS through changes in precipitation and streamflow, changed intensity of runoff and elevated flood risks, changes in water temperature and water quality, as well as increasing demands (particularly for irrigation). In terms of assessing the specific potential impacts, the two primary impacts are on water supply and on water demand. There is however still significant uncertainty regarding the influence of climate change (Department of Water and Sanitation, 2023a).

Agricultural Production

The agriculture sector is an important component of the Eastern Cape Province's food system. The assessment of risk and impact of climate change on the agricultural sector requires an integrated view of the linkages between climate drivers, direct and indirect consequences on crops, livestock and the productive environment. Agriculture is generally highly exposed to, and often highly sensitive to climate variability and climate change, leading to significant impacts on production. The potential for climate change to disrupt this sector and food security is a very serious issue.

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A study conducted by the African Climate and Development Initiative and Smartagri (2016) provides a general overview of climate change impacts on crops and livestock farmed in the Western Cape. While the study is focussed on the Western Cape, many of the findings are generic enough to be applicable to other regions of the country, including the Thyspunt site region:

- *Grain*: Staple grain crops such as wheat are generally shown to experience reductions in yield under climate warming, although rising atmospheric CO₂ concentrations counter this effect. It is expected that flexible adaptation approaches, the use of rotational production systems and an increasing shift to conservation agriculture combined with the fertilising effects of rising atmospheric CO₂ could provide sufficient resilience to warming of up to approximately 2.5°C for winter grains (i.e. wheat and barley).
- *Citrus fruit*: The Gamtoos Valley, especially the area around the towns of Hankey, Patensie and Loerie, is a major citrus production area in South Africa. Citrus trees require water all year round supplied by a combination of rainfall and irrigation. Predictions are that citrus could benefit from slight warming and drying within the context of a Mediterranean climate, provided that access to sufficient irrigation water is not limiting.
- *Fodder*: Climate change is expected to impact fodder production and quality, driven largely by atmospheric and climatic factors (e.g. CO₂ concentration, temperature and rainfall) and indirectly through changes in species composition and interactions, bush encroachment and other invasive alien plants and animals, the frequency and intensity of fire and drought and interactions with land use.
- *Extensive livestock production*: Livestock farmed on an extensive basis in the site region (including cattle and sheep) will be primarily impacted by changes in production of fodder (lower pasture and crop yields), changes in pests and diseases, as well as availability of water. Projections are that climate change will have a direct impact on the dairy industry by affecting the intensity and frequency of cattle heat stress and hence, will adversely affect reproductive performance, milk yield and quality.
- *Intensive livestock production*: The commercial livestock farmed on an intensive basis (e.g. pigs and poultry) in the site region is characterised by intensive production systems where animals are mostly housed and feed is provided to them (although there is also a slow emergence of free range farming). The impact of climate change

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will affect the pig and poultry industries via the feed supply chain. Significant amounts of maize and soybean fed to poultry and pigs are produced in the crop growing areas of South Africa in the Free State, Northwest and Mpumalanga. The shortfall is imported largely from South America. Local South African crop production is largely under the influence of the climate change induced intensity of weather events like droughts and floods. This determines how much of the feeds are imported, which has a direct impact on cost of production. Another important consideration in connection with climate change is the increase of heat stress in animals (in most commercial production outfits animals are housed indoors all the time and higher temperatures may result in increased heat stress).

It is evident that climate change may have a significant impact on agricultural production (e.g. lower productivity levels and loss of harvest) in the site region in the future. These impacts therefore need to be continuously monitored in relation to the site region and reported in subsequent reviews and updates of the TSSR.

5.5.5.5 Future Development in the Site Region

Future Land Requirements

Future land development in the site region is to a large extent determined by spatial planning policy and the control of land use. Future regional activities are therefore presented by discussing strategic spatial planning strategies and policies, i.e. Integrated Development Plans (IDPs) and SDFs.

The Kouga Local Municipality SDF (Kouga Local Municipality, 2021a) and the KouKamma Local Municipality SDF (KouKamma Local Municipality, 2023b) provide a good basis for considering potential future development and land use in the site region. **Section 5.4** discusses these SDFs in greater detail.

Guiding principles contained in the relevant SDFs that determine future land use in the site region include the following (Kouga Local Municipality, 2021a; KouKamma Local Municipality, 2023b):

- Rural and high potential agricultural land should be retained for agricultural purposes as far as possible.
- Urban development of settlements in the site region will mostly be contained within the proposed urban edges²⁷, where applicable.

²⁷ Urban edges are intended to control growth and limit lateral expansion of settlements.

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Section 5.4 discusses urban development and expansion in greater detail. Future urban development in the site vicinity is also discussed in **Subsection 5.5.6.4** of this report.

- Industrial expansion in the site region is discussed in detail in **Section 5.7**. The SDFs relevant to the site region generally propose future industrial development to be located within the existing industrial areas of each settlement, as well as in expansion areas associated with existing industrial areas (e.g. Humansdorp). In addition, the Kouga Local Municipality SDF proposes a new industrial focussed development corridor along the R102 between Humansdorp and Jeffreys Bay.

Large-scale infrastructure projects have a major impact on economic growth, spatial development and environmental features. Given the current and growing challenges in generating sustainable electricity supply to the whole of South Africa, the demand for renewable/alternative energy has grown and will continue to increase as infrastructure development and the growing population require more electricity in future. The windy climate means that a number of renewable energy projects have agglomerated in the site region in recent years, including several established and future wind farms in the vicinity of urban settlements in the site region such as Oyster Bay, St. Francis Bay, Humansdorp and Jeffreys Bay. Specific wind farm projects that have been implemented (or at least phases thereof) are the Kouga Wind Farm located immediately to the north of the site and the Gibson Wind Farm located to the west of Oyster Bay.

It is anticipated that wind farms will continue to be attracted to the region and any future additional wind farm projects will need to be monitored and reported in subsequent reviews and updates of the TSSR.

Future Water Requirements

Factors influencing future water requirement growth include:

- population growth;
- urban and industrial development (economic growth);
- climatic variability and drought occurrence;
- efficiency of water conservation and water demand management;
- intensification of use (new water supply to existing rural areas or improved urban service delivery);

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- regulations and policies;
- seasonal variability (holiday periods);
- water tariffs;
- water availability and infrastructure constraints.

High variability in these various factors makes the accurate prediction of short term growth rates extremely difficult. Due to the great variability in water requirement growth rates, the accurate prediction of long term future water requirement growth is of great importance to ensure adequate supply for the increase in requirements. The Algoa Status Report 2023 (Department of Water and Sanitation, 2023a) confirms that the AWSS, which supplies the NMBM, parts of Kouga Local Municipality, and irrigators, is already in deficit under current allocations due to over-allocation and slow implementation of augmentation schemes. The DWS therefore recommends that demand projections should be annually updated by the relevant authorities (Department of Water and Sanitation, 2023a).

a. Kouga Local Municipality

Future water requirements for the Kouga Local Municipality are limited to the municipality's existing allocation from the AWSS, which is detailed in **Table 5.5.8**²⁸ (Department of Water and Sanitation, 2023a).

Table 5.5.8
Future Water Requirements for the Kouga Local Municipality²⁹

Allocation	Volume (1 × 10 ⁶ m ³ /annum)
Kromme sub-system (allocation held by NMBM)	3.600
Kouga-Loerie sub-system (Hankey & Patensie)	0.450
Own allocation ³⁰	0.428
Total allocation from the AWSS	4.478

²⁸ Also considering the portion of their allocation from the Kromme sub-system, where the allocation is held by NMBM.

²⁹ (Department of Water and Sanitation, 2023a)

³⁰ Own allocation: This represents smaller, locally managed water sources, such as minor surface water or groundwater schemes, that are outside the AWSS conveyance system and directly controlled by Kouga Local Municipality (Department of Water and Sanitation, 2023a).

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The Kouga Local Municipality has effectively reached the limit of its allocations from the AWSS. The Algoa Coast Sub-Area, encompassing Jeffreys Bay, Humansdorp, and St. Francis Bay, is projected to face a supply deficit by 2030 under the *Climate Change and High Per Capita Growth* scenario. To meet future needs beyond current allocations, Kouga Local Municipality will need to pursue alternative water sources, including further groundwater development (building on recent borehole drilling in multiple towns), managed aquifer recharge and consideration of potential desalination options (Department of Water and Sanitation, 2023a).

b. KouKamma Local Municipality

KouKamma Local Municipality's water consumption data are incomplete due to outdated and vandalised meters, with estimates provided by the Technical Services Manager suggesting that per capita consumption may exceed earlier projections. This is partly attributable to rural irrigation draw-offs and distribution losses. KouKamma Local Municipality lies within the Langkloof Sub-area, which has high agricultural demand, modest urban growth and significant drought vulnerability, due to its dependence on the Kouga Dam and Loerie Dam supplies (Planning Partners, 2024f).

c. Algoa Status Report 2023: Water Demand Projections

As stated above, the Algoa Status Report 2023 (Department of Water and Sanitation, 2023a) states that the AWSS is already in deficit under current allocations. Total water use in 2021/2022 was 127.9 million m³/a, with 89 per cent consumed by the urban and industrial sectors. Irrigators remain restricted to their existing allocations, while municipal users have exceeded their restrictions.

High per capita growth plus climate change scenario projections applied in the Algoa Status Report 2023 indicate that water requirements for the AWSS will increase from 127.9 million m³/a in 2025 to 227.9 million m³/a by 2055.

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Table 5.5.9
Projected Total Water Requirements (Climate Change
and High Per Capita Growth Scenario)³¹

Year	Projected Total Water Requirement (million m ³ /a)
2025	127.9
2030	144.6
2035	161.2
2040	177.9
2045	194.6
2050	211.2
2055	227.9

*Note: Start and end values are from the Algoa Status Report (Department of Water and Sanitation, 2023a). Intermediate values are linearly interpolated for illustrative purposes only.

5.5.6 Land and Water Use in the Site Vicinity

5.5.6.1 Current Land Use

An assessment of the current land use within a 20 km radius of the site was conducted in 2024 (Planning Partners, 2024c) and is illustrated in **Drawing 5.5.6**. The analysis was based on a study of aerial photography and subsequent 'ground truthing' survey fieldwork. The 2024 land use assessment covered the 20 km radius around the site to ensure correspondence with the meteorological analysis in **Section 5.8** (Meteorology).

The assessment of the current land use is a refinement of the results from the 2020 SANLC (Department of Forestry, Fisheries and the Environment, 2021). Moreover, the physical land use survey also served as a control to test land use change between the various updates of the TSSR.

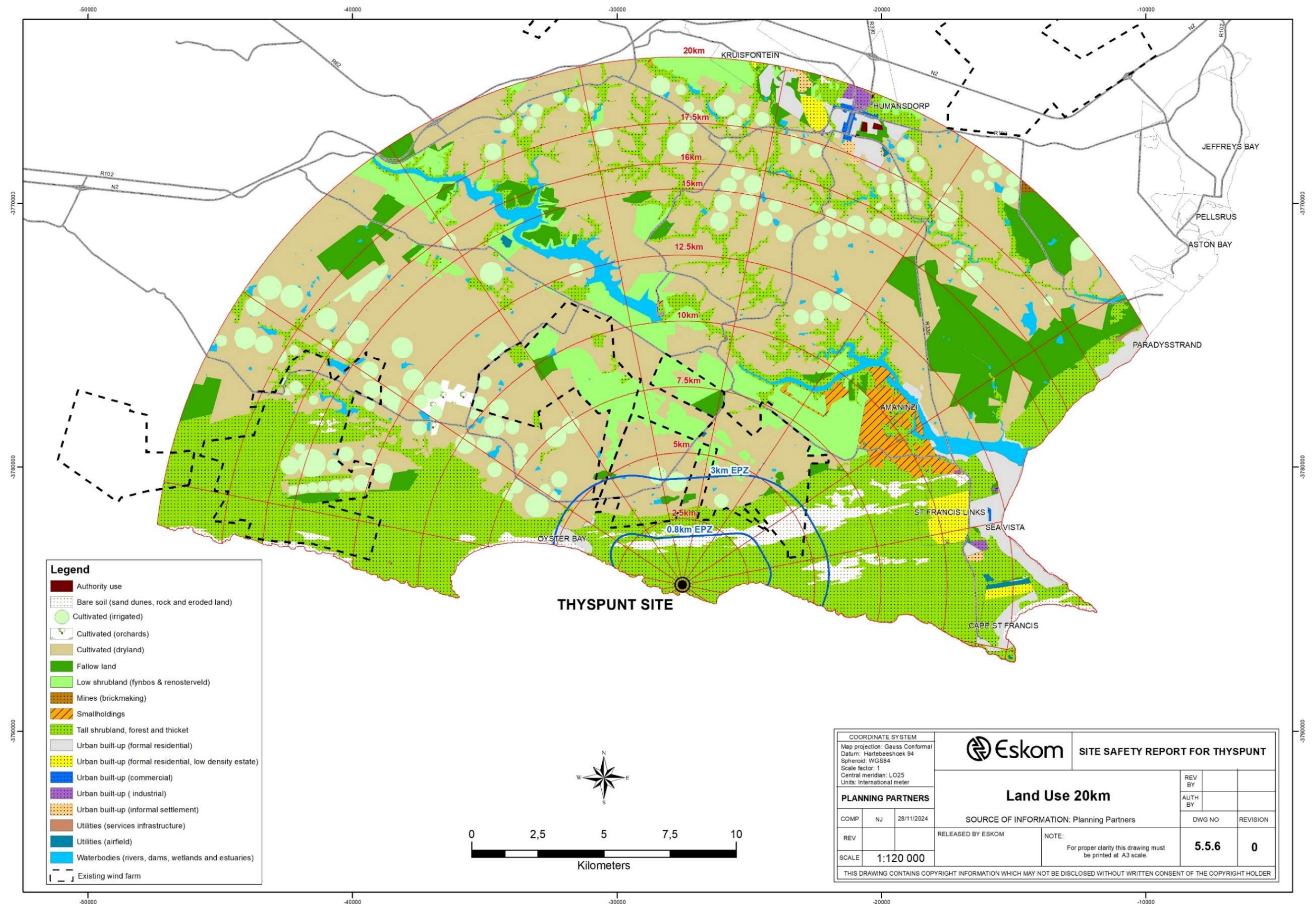
The land use survey conducted classifies land uses within a 20 km radius of the site in the following categories (Planning Partners, 2024c):

- tall shrubland, forest and thicket;

³¹ (Department of Water and Sanitation, 2023a)

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- low shrubland;
- cultivated, dryland;
- cultivated, irrigated;
- cultivated, orchards;
- fallow land (areas previously disturbed by agriculture);
- smallholdings and agricultural industry;
- mines and quarries (surface-based mining);
- bare soil (sand dunes, rock and eroded land);
- watercourses, wetlands and waterbodies;
- urban built-up (formal residential);
- urban built-up (formal residential, low-density estate);
- urban built-up (informal settlement);
- urban built-up (commercial);
- urban built-up (industrial);
- utilities (services infrastructure);
- utilities (airfield);
- authority use.



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The results of the 2024 survey of the present land use (approximate areas and percentages for each land use type per annulus) are summarised in **Table 5.5.10**³².

The land in the 20 km radius amounts to approximately 57 420 ha, which consists of the following land use categories (see **Figure 5.5.6**):

- natural areas (low shrubland, tall shrubland, forest and thicket) – 33.4 per cent of the total land area;
- agricultural areas – 58.0 per cent of the land area, consisting of 42.8 per cent dryland, 6.6 per cent irrigated, 0.2 per cent orchards, 1.3 per cent smallholdings and agricultural industry, and 7.1 per cent fallow land;
- urban areas – 3.5 per cent of the land area, consisting of 2.35 per cent formal residential areas, 0.7 per cent low-density residential estate areas, 0.2 per cent informal settlements, 0.2 per cent industrial development and 0.1 per cent commercial development;
- waterbodies (including wetlands and watercourses) – 2.7 per cent of the land area;
- mines and bare soil (including sand dunes and eroded land) – 2.2 per cent of the land area, comprising predominantly bare soil (2.2 per cent) and only a minimal area for mining (0.03 per cent);
- utilities and authority use – 0.03 per cent of the land area.

³² The data presented in **Table 5.5.10** are land use data sourced from a study of aerial photography and subsequent 'ground truthing' survey fieldwork conducted (Planning Partners, 2024c). The land cover data presented in **Appendix 5.5.A** and **Appendix 5.5.D** were sourced from the 2020 SANLC data set (Department of Forestry, Fisheries and the Environment, 2021). These two sources applied a different methodology to how the land use/land cover is recorded, hence the difference in the presentation of the data.

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Table 5.5.10
Annular Land Use within the 20 km Radius

Land Use	Area	Annulus (km)						Total Area / Category
		0.0 - 2.5	2.5 - 5.0	5.0 - 7.5	7.5 - 10	10 - 16	16 - 20	
Tall shrubland, thicket and forest	ha	898.86	1 104.50	1 248.13	2 656.65	5 146.58	4 052.55	15 107.27
	%	85.40	40.66	26.08	37.34	22.27	21.74	26.31
Low shrubland	ha	0	51.01	743.14	1 455.03	901.79	937.17	4 088.14
	%	0	1.88	15.53	20.45	3.90	5.03	7.12
Cultivated, dryland	ha	0	1 062.72	2 021.39	1 945.17	10 782.43	8 748.03	24 559.74
	%	0	39.13	42.23	27.34	46.66	46.92	42.77
Cultivated, irrigated	ha	0	100.33	208.19	262.97	1 636.04	1 569.85	3 777.38
	%	0	3.69	4.35	3.70	7.08	8.42	6.58
Cultivated, orchards	ha	0	0	0	0	123.29	0	123.9
	%	0	0	0	0	0.53	0	0.22
Fallow land	ha	0	45.03	128.39	85.64	1 907.52	1 947.68	4 114.26
	%	0	1.66	2.68	1.20	8.26	10.45	7.17
Smallholdings and agricultural industry	ha	0	0	0	392.84	330.41	4.72	727.97
	%	0	0	0	5.52	1.43	0.03	1.27
Mines and quarries (surface-based mining)	ha	0	0	0	2.24	0	15.52	17.76
	%	0	0	0	0.03	0	0.08	0.03
Bare soil (sand dunes, rock and eroded land)	ha	153.01	290.33	427.50	153.58	200.12	36.05	1 260.59
	%	14.51	10.69	8.93	2.16	0.87	0.16	2.20
Watercourses, wetlands and waterbodies	ha	0.90	11.16	14.34	85.64	1 014.49	411.63	1 538.16
	%	0.09	0.41	0.30	1.20	4.39	2.21	2.68
Urban built-up (formal residential)	ha	0	54.72	13.24	0	712.26	569.18	1 349.42
	%	0	2.01	0.28	0	3.08	2.83	2.35
Urban built-up (formal residential, low-density estate)	ha	0	0	0	59.15	269.35	97.48	425.97
	%	0	0	0	0.83	0.88	0.52	0.74
Urban built-up (informal settlement)	ha	0	0	0	0	20.76	67.40	88.16
	%	0	0	0	0	0.09	0.36	0.15
Urban built-up (commercial)	ha	0	0	0	0	5.00	62.06	67.06
	%	0	0	0	0	0.02	0.33	0.12
Urban built-up (industrial)	ha	0	0	0	0	27.10	73.51	100.61
	%	0	0	0	0	0.12	0.39	0.18
Utilities (airfield)	ha	0	0	0	0	0	12.11	12.11
	%	0	0	0	0	0	0.06	0.02
Utilities (services infrastructure)	ha	0	0	2.41	0.27	53.51	6.28	62.48
	%	0	0	0.05	0.00	0.52	0.03	0.11
Authority	ha	0	0	0	0	0.36	18.45	18,81
	%	0	0	0	0	0.00	0.10	0.03
Total	ha	1 051.99	2 716.21	4 786.47	7 114.36	23 106.29	18 644.89	57 420.21

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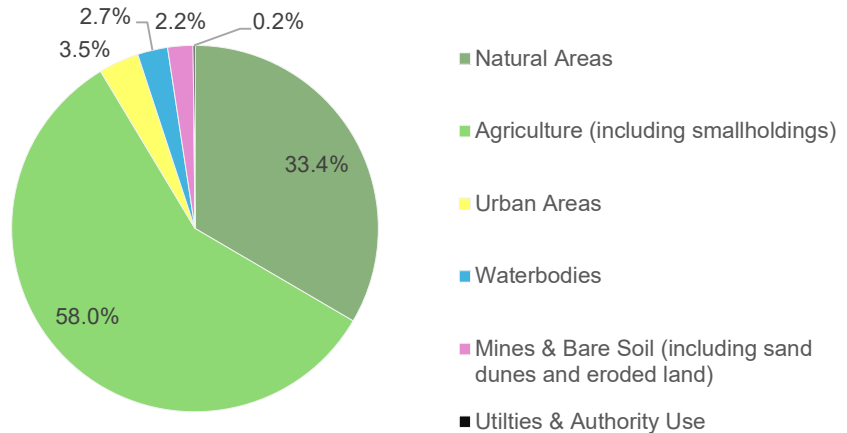


Figure 5.5.6
Percentage of Land Use Categories within the 20 km Radius

Natural Areas

a. Soils

The profile of the soils in the site vicinity is illustrated in **Figure 5.5.7** (Department of Agriculture, Land Reform and Rural Development, 2024).

The soils in the site vicinity are described as follows:

- Sandy soils with limited pedological development: The greyish, sandy soils are typically associated with the coastal dune areas, along an approximate 6 km wide band from St. Francis Bay westwards, as well as along a narrow coastal strip north-eastwards from St. Francis Bay towards Jeffreys Bay. These soils support dune strandveld and dune fynbos vegetation types and are considered unsuitable for dryland crops. There are two large headland bypass dunefields located in this zone immediately north and northeast of the site: the Oyster Bay dunefield and the Thysbaai dunefield. These large dunefields are the only remaining large dunefields of this type that are still active in South Africa. The Oyster Bay dunefield, at 16 km long, is the longest existing headland bypass dunefield in South Africa and one of the largest of its kind in the world (Kromme Enviro-Trust, 2023).
- Soils with a plinthic cantina: Inland from the coastal sands, stretching north-westwards from St. Francis Bay along the southern banks of the Krom River, is a 4 km to 6 km wide band of red, yellow and/or greyish soils with low to medium base status. These soils support

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large tracts of sandstone fynbos in certain elevated positions.

- Soils with a strong texture contrast: The northern and north-eastern parts of the site (north of the Krom River) are comprised of soils with a marked clay accumulation, strongly structured and a non-reddish colour. These soils originally supported shale renosterveld, but are today largely transformed by agriculture.



Figure 5.5.7
Soil Profile (16 km)

b. Vegetation

Extensive dune fynbos occurs along the coast (along elevated sandstone or quartzite ridges) up to 16 km from the site in the west, west-northwest, east-northeast and east segments. A similar vegetation profile is evident between the 12 km to 16 km in the east-northeast and along the banks of the Krom River. Dune strandveld and fynbos are dominant in the west-northwest segment and between the east-northeast and east segments (i.e. along the coast).

Extensive areas of dune strandveld, dune fynbos and Gamtoos thicket are still present between the west and west-northwest segments, as well as in the east-northeast segments along the coast. The strandveld west of St. Francis Bay is heavily infested with alien acacias. Gamtoos thicket also follows the main valleys of the Krom and Seekoei rivers upstream for some distance.

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d. Forest areas

Two large patches of indigenous forest occur in the following locations: 9 km north-west (127.42 ha); and 13 km northwest/north-northwest (140.77 ha). There are no commercial forested plantations located within the 20 km radius.

Cultivated Areas for Agricultural Uses

a. Overview

This section describes the agricultural production within the site vicinity and the data presented focus on the commercial farming activity within 16 km of the site, which were obtained via an agricultural production survey in 2008 (Planning Partners, 2024d), which was undertaken through a telephonic/email survey of farm owners and managers as well as site visits. In addition to collecting data in connection with commercial agriculture, the survey also indicated that there are several smallholding areas within the site vicinity. Updated data on 2023 production rates of cattle, dairy cows, milk, fodder crop, sheep, pigs, game, honey and wheat were collected as part of the 2024 agricultural survey.

There are significant and extensive agricultural activities within the site vicinity, with dairy farming and associated fodder crops being the main agricultural activities.

The 5 km to 10 km annulus accommodates extensive centre-pivot irrigation (fodder crops), especially between the west-northwest and northwest segments (see [Drawing 5.5.6](#)).

Commercial dryland crops are the predominant land use in the 10 km to 16 km annulus, especially between the northwest and northeast segments. Most of the crops under irrigation also occur in these sectors.

b. Agricultural survey

The data on production rates of cattle, dairy cows, milk, fodder crop, sheep, pigs, game, honey and wheat are presented in [Table 5.5.11](#) to [Table 5.5.23](#). These data were obtained through a telephonic survey with farmers, farm managers, tenants and site verification conducted from February to July 2024 (Planning Partners, 2024d). Data were captured per cadastral unit within 16 km of the site and farming units mapped to ensure that the entire area of 16 km around the site was covered (see [Drawing 5.5.7](#)). Those land units for which no data are provided are not commercially farmed and in most cases are used for conservation, residential or vacation purposes.

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The cadastral subdivision of land and the extent and distribution of farming units recorded in 2024 are illustrated in **Drawing 5.5.7**. In some cases, non-contiguous cadastral units are managed as a farming unit consisting of several geographically dispersed cadastral units (e.g. the farms Kleinplaas, Klippedrift, Pennisands and Buffelsbos). These can be identified in **Drawing 5.5.7** as parts of land that are not contiguous but are shaded the same colour. The estimated agricultural production per sector in the 16 km zone is illustrated in **Drawing 5.5.8** in terms of the number of cattle, number of dairy cows, milk production, fodder amount, number of sheep, number of pigs, number of game, mass of honey (kg) and wheat (t) production.

During the 2024 survey it was determined that agricultural industry within the 16 km radius is based on extensive centre-pivot irrigation of pasture crops and intensive milk production. Extensive cattle and sheep farming are present in the higher lying land (10 km to 16 km annulus) and generally dryer areas. The vegetated dune areas along the coast are largely uncultivated due to the presence of sandy soil of low agricultural value.

Chicken and eggs

Table 5.5.11 and **Table 5.5.12** illustrate the distribution of chicken and egg production within the site vicinity, respectively. Recorded chicken and egg production are mostly found between 10 km and 16 km in the north northeast and northwest sectors (Planning Partners, 2024d). There are also farms and smallholdings within the site vicinity with small numbers of non-commercial chickens, two to three chickens per property, and domestic egg collection is limited and infrequent. These domestic chicken and egg production figures have therefore not been included in the data set (Planning Partners, 2024d).

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Table 5.5.11
Chicken production (2023 Results)³³

Distance (km)	Number of chickens per Sector							
	N	NNE	NE	NNW	NW	W	WNW	ENE
0.0 to 2.5	0	0	0	0	0	0	0	0
2.5 to 5.0	0	0	0	0	0	0	0	0
5.0 to 7.5	0	0	0	0	0	0	0	0
7.5 to 10.0	0	0	0	0	0	0	0	0
10.0 to 16.0	0	2 190	0	0	12 000	0	0	0
Total in Segment	0	2 190	0	0	12 000	0	0	0

Table 5.5.12
Egg production (2023 Results)³⁴

Distance (km)	Number of Cattle per Sector							
	N	NNE	NE	NNW	NW	W	WNW	ENE
0.0 to 2.5	0	0	0	0	0	0	0	0
2.5 to 5.0	0	0	0	0	0	0	0	0
5.0 to 7.5	0	0	0	0	0	0	0	0
7.5 to 10.0	0	0	0	0	0	0	0	0
10.0 to 16.0	0	399 675	0	0	0	0	0	0
Total in Segment	0	399 675	0	0	0	0	0	0

Cattle

The distribution of cattle in the site vicinity is shown in **Table 5.5.13**. The highest number of cattle occurs in the northwestern segment, followed by the north-northeastern. No cattle farming occurs within 2.5 km, west of the site (Planning Partners, 2024d).

Since the 2007/2008 agricultural survey, there has been a marked decrease of 45% in the number of beef cattle in the site vicinity. Differences in cattle distribution between adjacent sectors can be attributed to farmers relocating cattle within multi-sector farming units.

³³ (Planning Partners, 2024d)

³⁴ (Planning Partners, 2024d)

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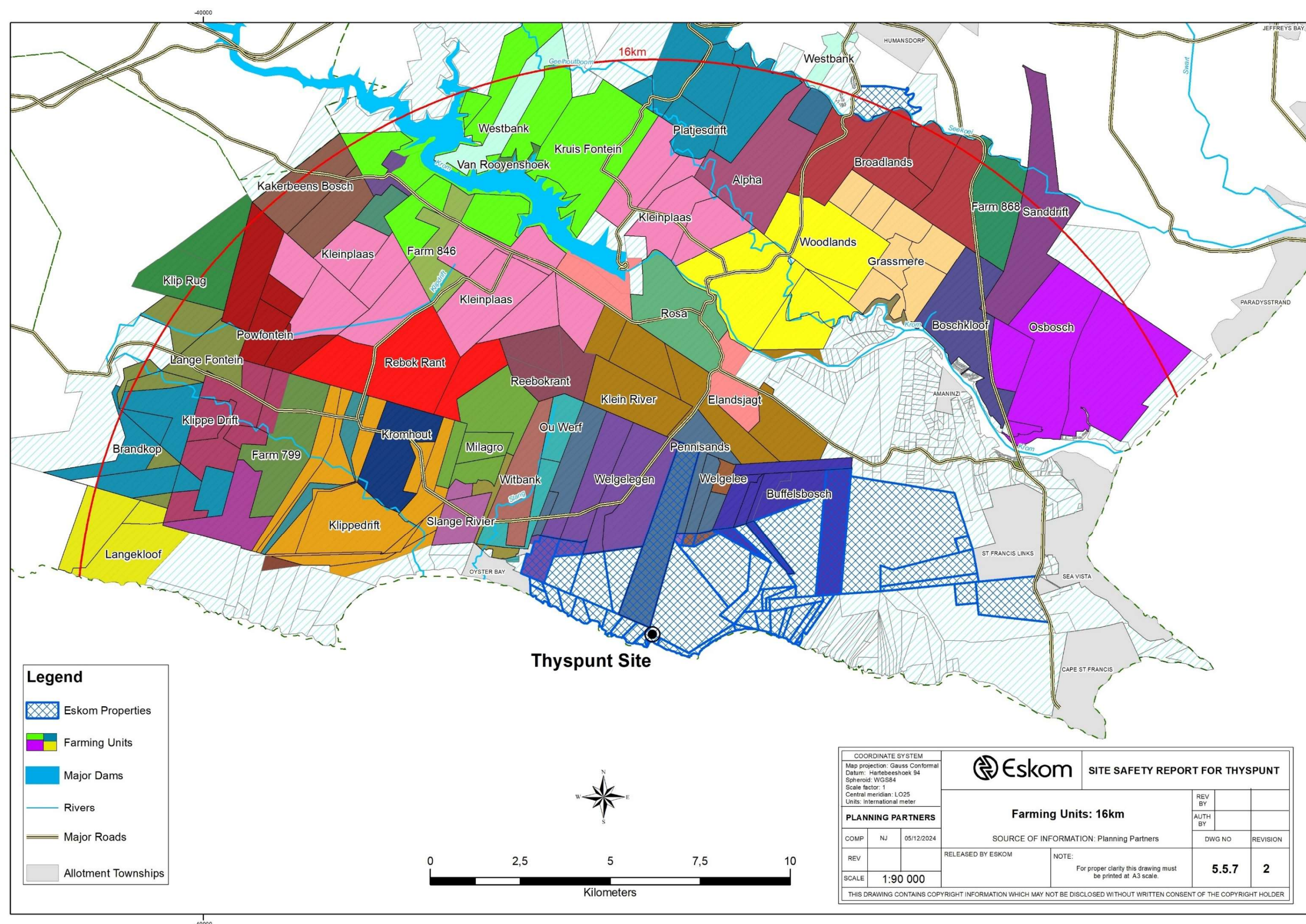
Table 5.5.13
Cattle (2023 Results)³⁵

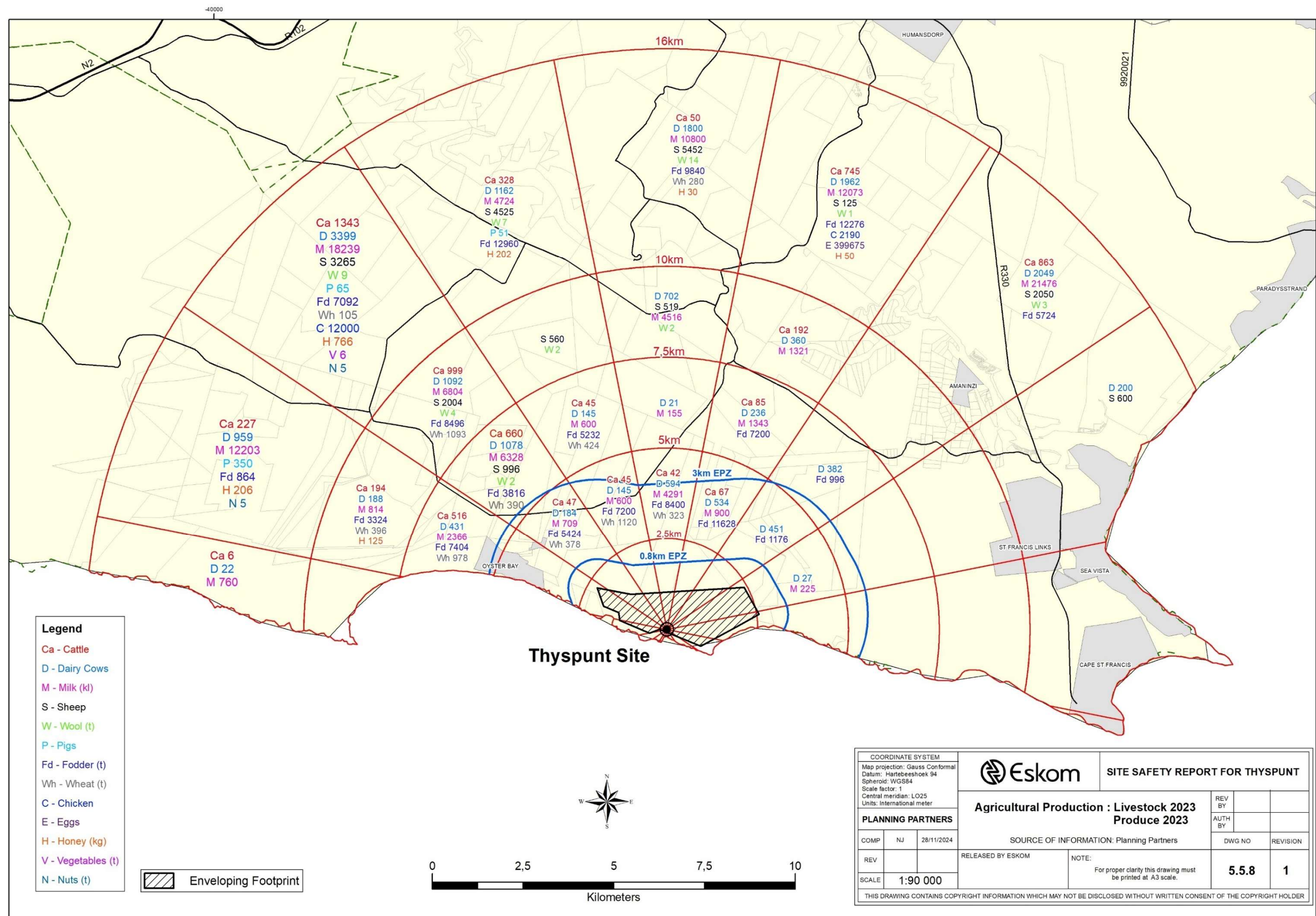
Distance (km)	Number of Cattle per Sector							
	N	NNE	NE	NNW	NW	W	WNW	ENE
0.0 to 2.5	0	0	0	0	0	0	0	0
2.5 to 5.0	42	67	0	45	47	0	0	0
5.0 to 7.5	0	85	0	45	660	0	516	0
7.5 to 10.0	0	192	0	0	999	0	194	0
10.0 to 16.0	50	745	863	328	1 343	6	227	200
Total in Segment	92	1 089	863	418	3 049	6	937	200

Dairy cows and milk production

Table 5.5.14 illustrates the distribution of dairy cows within 16 km of the site, and **Table 5.5.15** shows the distribution of milk production. It is evident that there is a strong correlation between the distribution of dairy cows and milk production. Milk production is concentrated in the areas beyond the 2.5 km radius throughout the northwest to northern segments. These two segments reflect higher than average milk production data. This is due to the location of major dairies within these two sectors. Where sectors reflect lower than average milk production, the dairy cows are taken to nearby dairies to be milked. $11\,247 \times 10^3$ l of milk were produced within the 16 km radius around the site in 2023, with a significant proportion of the production (72.2 per cent) occurring within the 10 km to 16 km annulus (Planning Partners, 2024d).

³⁵ (Planning Partners, 2024d)





COORDINATE SYSTEM Map projection: Gauss Conformal Datum: Hartbeeshoek 94 Spheroid: WGS84 Scale factor: 1 Central meridian: LO25 Units: International meter			 Eskom		SITE SAFETY REPORT FOR THYSPUNT				
PLANNING PARTNERS			Agricultural Production : Livestock 2023 Produce 2023				REV BY		
COMP NJ 28/11/2024							AUTH BY		
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Table 5.5.14
Dairy Cows (2023 Results)³⁶

Distance (km)	Number of Dairy Cows in Sector							
	N	NNE	NE	NNW	NW	W	WNW	ENE
0.0 to 2.5	0	0	0	0	0	0	0	0
2.5 to 5.0	594	534	451	145	184	0	0	27
5.0 to 7.5	21	236	382	145	1 078	0	431	0
7.5 to 10.0	702	360			1 092	0	188	0
10.0 to 16.0	1 800	1 962	2 049	1 162	3 399	22	959	0
Total in Segment	3 117	3 092	2 882	1 452	5 753	22	1 578	27

Table 5.5.15
Milk Production (2023 Results)³⁷

Distance (km)	Milk Production in Sector (10 ³ l)							
	N	NNE	NE	NNW	NW	W	WNW	ENE
0.0 to 2.5	0	0	0	0	0	0	0	0
2.5 to 5.0	4 291	900	0	600	709	0	0	225
5.0 to 7.5	155	1 343	0	600	6 328	0	2 366	0
7.5 to 10.0	4 516	1 321	0	0	6 804	0	814	0
10.0 to 16.0	10 800	12 073	21 476	4 724	18 239	760	12 203	0
Total in Segment	19 762	15 637	21 476	5 924	32 080	760	15 383	225

Fodder production

The estimated distribution of fodder production is presented in **Table 5.5.16**.

The 2023 fodder production data reveals significant variations across distances and sectors, with no production within the 0 to 2.5 km zone, mirroring trends from 2008. Substantial production is observed in the 2.5 to 5 km band, particularly in the north-northeast, north, and north-northwest sectors. The 5 to 7.5 km range shows peak production in the west northwest and north-northeast sectors, while the 7.5 to 10 km band is notable for production in the northwest and west northwest. The

³⁶ (Planning Partners, 2024d)

³⁷ (Planning Partners, 2024d)

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10 to 16 km band remains highly productive, especially in the north northwest and north-northeast sectors.

Overall, the north-northeast sector leads with the highest total production (31 104 t), followed by the north northwest (25 392 t) and northwest (24 828 t) sectors. Compared to 2008, fodder production in 2023 is more widely distributed, with increases in certain sectors attributed to shifts in agricultural practices, such as the rise in dairy farming, crop selection, and environmental factors.

Table 5.5.16
Fodder Production (2023 Results)³⁸

Distance (km)	Fodder Crop Production in Sector (tonne)							
	N	NNE	NE	NNW	NW	W	WNW	ENE
0.0 to 2.5	0	0	0	0	0	0	0	0
2.5 to 5.0	8 400	11 628	1 176	7 200	5 424	0	0	0
5.0 to 7.5	0	7 200	996	5 232	3 816	0	7 404	0
7.5 to 10.0	0	0	0	0	8 496	0	3 324	0
10.0 to 16.0	9 840	12 276	5 724	12 960	7 092	0	864	0
Total in Segment	18 240	31 104	7 896	25 392	24 828	0	11 592	0

Sheep

Table 5.5.17 indicates the presence of large-scale sheep farming in the northwest to east-northeast segments of the site (mostly occurring beyond the 7.5 km radius).

Table 5.5.17
Sheep (2023 Results)³⁹

Distance (km)	Number of Sheep in Sector							
	W	WNW	NW	NNW	N	NNE	NE	ENE
0.0 to 1.0	-	-	-	-	-	-	-	-
1.0 to 2.5	-	-	-	-	-	-	-	-
2.5 to 5.0	-	-	100	-	-	-	18	-
5.0 to 7.5	-	-	100	400	70	53	36	-
7.5 to 10.0	-	-	-	1 000	30	-	-	-

³⁸ (Planning Partners, 2024d)

³⁹ (Planning Partners, 2024d)

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Distance (km)	Number of Sheep in Sector							
	W	WNW	NW	NNW	N	NNE	NE	ENE
10.0 to 16.0	-	-	3 480	2 920	5 700	400	760	800
Total in Segment	-	-	3 680	4 320	5 800	453	814	800

Wool

Wool production (refer to **Table 5.5.18**) in 2023 is concentrated in the 10 to 16 km distance band, with the north sector leading (14 t), followed by the northwest (9 t). The 7.5 to 10 km band also contributed, mainly from the northwest sector (4 t). No production was recorded within the 0 to 5 km bands. Despite increased sheep farming, wool production remains focused in specific areas, particularly in the north and northwest sectors farther from the site.

Table 5.5.18
Wool (2023 Results)⁴⁰

Distance (km)	Number of Sheep in Sector							
	N	NNE	NE	NNW	NW	W	WNW	ENE
0.0 to 2.5	0	0	0	0	0	0	0	0
2.5 to 5.0	0	0	0	0	0	0	0	0
5.0 to 7.5	0	0	0	0	2	0	0	0
7.5 to 10.0	2	0	0	2	4	0	0	0
10.0 to 16.0	14	1	3	7	9	0	0	0
Total in Segment	16	1	3	9	15	0	0	0

Pigs

Pig farming in the site vicinity is minimal and occurs exclusively in the 10 km to 16 km band (refer to **Table 5.5.19**). The west-northwestern sector has the highest concentration (350 pigs), with smaller numbers in the northwest (65 pigs) and north-northwest (51 pigs) sectors. No pig farming is observed within the 0 to 10 km bands, and it is limited to the farming units Kakerbeens Bosch, Van Rooyenshoek, and Goede Hoop.

⁴⁰ (Planning Partners, 2024d)

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Table 5.5.19
Pigs (2023 Results)⁴¹

Distance (km)	Number of Pigs in Sector							
	N	NNE	NE	NNW	NW	W	WNW	ENE
0.0 to 2.5	0	0	0	0	0	0	0	0
2.5 to 5.0	0	0	0	0	0	0	0	0
5.0 to 7.5	0	0	0	0	0	0	0	0
7.5 to 10.0	0	0	0	0	0	0	0	0
10.0 to 16.0	0	0	0	51	65	0	350	0
Total in Segment	0	0	0	51	65	0	350	0

Game

The presence of game around the site is restricted to a few nature reserves or private farms where game is kept and may be hunted for recreational purposes and for meat. None of the respondents reported commercial game production on the farming units.

Honey

Honey production has increased significantly between 2007/2008 and 2023 in both volume and sector participation (refer to **Table 5.5.20**). This growth likely reflects improved environmental or agricultural conditions, such as enhanced beekeeping practices. Data collection methods, which include hive counts and average yield calculations, also contribute to the recorded increase. Bee hives were additionally observed in February 2024 in the smallholding area east of St. Francis, although production volumes for this area remain unknown.

Table 5.5.20
Honey Production (2023 Results)⁴²

Distance (km)	Honey Production in Sector (kg)							
	N	NNE	NE	NNW	NW	W	WNW	ENE
0.0 to 2.5	0	0	0	0	0	0	0	0
2.5 to 5.0	0	0	0	0	0	0	0	0
5.0 to 7.5	0	0	0	0	0	0	0	0

⁴¹ (Planning Partners, 2024d)

⁴² (Planning Partners, 2024d)

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Distance (km)	Honey Production in Sector (kg)							
	N	NNE	NE	NNW	NW	W	WNW	ENE
7.5 to 10.0	0	0	0	0	0	0	125	0
10.0 to 16.0	30	50	0	202	766	0	203	0
Total in Segment	30	50	0	202	766	0	331	0

Wheat

Wheat production in 2023 (refer to **Table 5.5.21**) shows significant growth and geographical expansion compared to 2008. The northwest and north-northwest sectors experienced notable increases, with production in the northwest rising from 892 t in 2008 to 1 966 t in 2023.

Table 5.5.21
Wheat Production (2023 Results)⁴³

Distance (km)	Wheat Production in Sector (tonne)							
	N	NNE	NE	NNW	NW	W	WNW	ENE
0.0 to 2.5	0	0	0	0	0	0	0	0
2.5 to 5.0	323		0	1 120	378	0	0	0
5.0 to 7.5	0	0	0	424	390	0	978	0
7.5 to 10.0	0	0	0	0	1 093	0	396	0
10.0 to 16.0	280	0	0	0	105	0	0	0
Total in Segment	603	0	0	1 544	1 966	0	1 374	0

Wheat farming also expanded into the west-northwest sector (5-10 km band), which was not recorded in 2008. However, some sectors, such as north-northeast, northeast, west, and east-northeast, remain unsuitable or unused for wheat farming. Overall, the data reflect improved conditions or practices that have boosted and diversified wheat production, particularly in the northwest and north-northwest sectors.

Vegetable and fruit production

The 2023 survey reveals minimal vegetable production in the site vicinity, with only the northwest sector (10 to 16 km band) reporting cultivation, totalling 6 t (refer to **Table 5.5.22**). The vegetables, described as mixed and rotated, are not classified by type. This aligns with the Eastern Cape's generally minor role in national vegetable production. No

⁴³ (Planning Partners, 2024d)

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commercial fruit production was reported on the surveyed farming units.

Table 5.5.22
Vegetable and Fruit Production (2023 Results)⁴⁴

Distance (km)	Vegetable and Fruit Production in Sector (tonne)							
	N	NNE	NE	NNW	NW	W	WNW	ENE
0.0 to 2.5	0	0	0	0	0	0	0	0
2.5 to 5.0	0	0	0	0	0	0	0	0
5.0 to 7.5	0	0	0	0	0	0	0	0
7.5 to 10.0	0	0	0	0	0	0	0	0
10.0 to 16.0	0	0	0	0	6	0	0	0
Total in Segment	0	0	0	0	6	0	0	0

Nut production

The 2023 agricultural survey indicates macadamia nut production in the site vicinity, limited to the 10-16 km band in the northwest and west-northwest sectors, with a total output of 10 t (refer to **Table 5.5.23**). No production was recorded in other sectors or the 0 to 10 km band. This indicates the introduction of macadamia farming in the area, as none was reported in 2008.

Table 5.5.23
Nut Production (2023 Results)⁴⁵

Distance (km)	Nut Production in Sector (tonne)							
	N	NNE	NE	NNW	NW	W	WNW	ENE
0.0 to 2.5	0	0	0	0	0	0	0	0
2.5 to 5.0	0	0	0	0	0	0	0	0
5.0 to 7.5	0	0	0	0	0	0	0	0
7.5 to 10.0	0	0	0	0	0	0	0	0
10.0 to 16.0	0	0	0	0	5	0	5	0
Total in Segment	0	0	0	0	5	0	5	0

Summary

Table 5.5.24 provides a summary of the volume and numbers associated

⁴⁴ (Planning Partners, 2024d)

⁴⁵ (Planning Partners, 2024d)

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with the different agricultural activities that are practiced within the site vicinity.

Table 5.5.24
Summary of Production in the Site Vicinity: Crops and Livestock (2023)

Product	0 to 5 km	2,5 to 5 km	5 to 7,5 km	7,5 to 10 km	10 to 16 km	Total
Chicken	0	0	0	0	14 190	14 190
Eggs	0	0	0	0	399 675	399 675
Cattle	0	201	1 306	1 385	3 762	6 654
Milk Cows	0	1 935	2 293	2 342	11 353	17 923
Milk (10 ³ ℓ)	0	6 725	10 792	13 455	80 275	111 247
Pigs	0	0	0	0	466	466
Sheep	0	0	996	3 083	16 017	20 096
Wool (t)	0	0	2	8	34	44
Fodder (t)	0	33 828	24 648	11 820	48 756	119 052
Wheat (t)	0	1 821	1 792	1 489	385	5 487
Vegetables (t)	0	0	0	0	6	6
Honey (kg)	0	0	0	125	1254	1 379
Nuts (t)	0	0	0	0	10	10

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Based on the data presented in **Table 5.5.11** to **Table 5.5.24**, it is evident that no farming activities are present within 2.5 km of the site centroid. This is largely attributed to the Eskom ownership of land within this annulus and the presence of predominantly natural vegetation (refer to **Drawing 5.5.6**). Agricultural activities within the 2.5 km to 5 km annulus and beyond are predominantly associated the dairy industry, containing mostly milk cows, milk production and fodder production.

c. Smallholdings

The largest proportion (49.6 per cent) of the agricultural land within a 20 km radius of the site is devoted to commercial farming (both dryland and irrigated land). There are, however, also three smallholding areas within the site vicinity, as presented in **Drawing 5.5.7** that are characterised by natural vegetation and pastures, namely:

- Ongegunde Vryheid, located along the coast to the east of the site;
- Kleinrivier, located on the northern and southern banks of the Krom River;
- Krommerivier, located along the southern bank of the Krom River.

These areas are predominantly used for residential, tourism and conservation purposes, with no commercial farming practices recorded (Planning Partners, 2024d).

d. Collection of free foods

Observation records and interviews conducted within the 16 km radius provide detailed accounts of free food consumption and harvesting practices (PSI Risk Consultants CC, 2024). These data encompass a wide range of edible resources sourced primarily from the PIA (Potential Impact Area) but also occasionally from areas outside its boundaries. Please note that these data focused on non-commercial collection of free foods and were not part of the agricultural survey.

Mushroom consumption

Observation records reported annual mushroom consumption of 24 kg per individual (PSI Risk Consultants CC, 2024). The mushroom sources were not disclosed and likely include a combination of local produce and mushrooms sourced elsewhere. Considering the South African average of 0.149 kg/day per portion (SA Food: Mushroom, raw), this suggests approximately 161 days of mushroom consumption per year.

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Vegetable and fruit gardens

One observation from Oyster Bay recorded a home garden producing vegetables and fruits. Key components include 40 blueberry bushes, a pomegranate tree, a large grapevine, and various vegetables such as broad beans, spinach, tomatoes, potatoes, and sweet potatoes. Although exact fruit consumption rates were unavailable, an estimate of 59 kg/year (based on 0.325 g/day during spring and summer) was adopted (PSI Risk Consultants CC, 2024). This estimate contributes to understanding dietary intake but may integrate external influences beyond the PIA.

Wild plants and herbal teas

Observation records documented the collection of uncultivated veldt plants, such as *Lessertia frutescens* (gansies), *Carissa macrocarpa* (melkies), *Scutia myrtina* (droogies), *Zanthoxylum capense* (perde pram), *Clausena anisata* (perde pis), *Hilliardiella oligocephala* (groenne mare), *Bulbine latifolia* (rooi wortel), and *Carpobrotus edulis* (ghaukum). These plants are consumed seasonally, with an estimated intake of 50 g/day over approximately 90 days annually. Additionally, herbal teas made from "gansies" and "perdepis/wilde als" were frequently cited in observation records, being used primarily for health recovery purposes (PSI Risk Consultants CC, 2024).

Free foods associated with the coastline and maritime environment are described in **Section 5.6**.

Urban Areas

Residential land uses in the 20 km radius are largely concentrated in the north-northwest (Humansdorp), east (St. Francis Bay and Cape St. Francis), east-northeast (St. Francis Bay and Paradise Beach) and west-northwest (Oyster Bay) segments. Types of residential use range from informal settlements to low-density residential, such as the St. Francis Links Golf Estate. St. Francis Bay, located to the east/east-northeast is the largest urban area in the site vicinity. Oyster Bay is the nearest residential area to the site (approximately 4 km west-northwest).

The urban built-up areas within the 20 km radius can be described as follows:

- Humansdorp: Humansdorp (17 km north-northeast) is the centre of the wider district's light industry and agricultural activities. The town contains a relatively large industrial area, including the regionally important Woodlands Dairy, as well as the largest agglomeration of commercial activity in the site vicinity. Humansdorp includes

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Kruisfontein and KwaNomzamo, both of which contain various informal settlements located within the 20 km radius (refer to **Table 5.5.25** and **Drawing 5.5.9**).

- St. Francis Bay: St. Francis Bay (13 km east) is a coastal resort town and is one of the premier tourism destinations within the Kouga region. Port St. Francis includes a commercial and recreational harbour, built to host the squid industry freezing vessels, as well as a small harbour resort village. The town also contains commercial areas and an industrial area, which is mainly focussed on boat building and repairs, as well as services relating to the fishing industry (e.g. cold storage). St. Francis Bay includes the informal settlement of Sea Vista.
- Cape St. Francis: The seaside resort village of Cape St. Francis (14 km east) is known for its sandy beaches and historic Seal Point lighthouse. The village is served by a small commercial centre.
- Paradise Beach: Paradise Beach (18 km east-northeast) is a quiet residential suburb situated to the south of Jeffreys Bay. The area is bordered by natural reserves and picturesque estuaries.
- Oyster Bay: Oyster Bay (4 km west-northwest) is a small coastal hamlet renowned for its secluded sandy beach. Oyster Bay includes the informal settlement of Umzamowethu.

The settlements listed above all consist of a large number of guest houses, timeshare and private residences (holiday homes) for hire.

Informal Settlements

Informal settlements located within a 20 km radius of the site are listed in **Table 5.5.25** and mapped in **Drawing 5.5.9**. The estimated number of structures for each informal settlement, based on the evaluation of latest aerial photography (ESRI, 2024), is also included in **Table 5.5.25**.

Informal settlements are discussed in further detail in **Section 5.4**.

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Table 5.5.25
Informal Settlements within 20 km Radius

Code	Informal Settlement	Estimated No. Structures	Distance (km)	Direction
IS1	Umzamowethu (Oyster Bay)	179	4.14	NW
IS2	Sea Vista (St. Francis Bay)	609	11.00	E
IS3	Golf Course 153 (Humansdorp)	347	17.38	NNE
IS4	Beda Street (Humansdorp)	55	17.64	NNE
IS5	Golf Course 400 (Humansdorp)	209	17.77	NNE
IS6	Bungalows (Humansdorp)	267	17.78	NNE
IS7	Polar Park (Humansdorp)	351	18.11	NNE
IS8	Polar Park Sewer (Humansdorp)	425	18.13	NNE
IS9	Shukushukuma (Humansdorp)	94	18.30	NNE
IS10	Mooi Uitsig (Kruisfontein)	517	19.39	NNE
IS11	Donkerhoek (Kruisfontein)	320	19.79	NNE

Land for Industrial, Institutional and Recreational Purposes

The main industrial area within the site vicinity is located within the town of St. Francis Bay, which contains 16 ha of industrial land. The activities can be characterised as light industry, comprising small service-related industries, including boat building and repairs, as well as cold storage associated with the fishing industry. Refer to **Section 5.7** for more details on industrial activities.

Land for institutional uses that constitute schools, hospitals, clinics, police stations, fire stations, etc. are predominantly located within the urban areas and are described in more detail in **Section 5.4** and **Section 5.7**.

Public recreational areas within the 16 km zone include the popular beaches of Oyster Bay, Cape St. Francis, St. Francis Bay and the Krom River. Popular coastal recreational destinations and associated facilities are described in **Section 5.4** and **Section 5.6**.

Water Bodies and Groundwater

The Krom River is the largest river system inside the 16 km zone. Other rivers include the Geelhoutboom, Klipdrift and Slang rivers. The Impofu Dam (12 km north-northwest), which falls along the Krom River, is the only prominent dam in the site vicinity.

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Groundwater is an important water resource for the coastal towns and farms in the site vicinity. Towns located in the 20 km radius of the site that rely on groundwater resources for potable water include Humansdorp, Jeffreys Bay (including Paradise Beach), St. Francis Bay, Cape St. Francis and Oyster Bay. The main aquifer tapped comprises of fractured sandstone of the TMG Aquifer. This aquifer is discussed in more detail in **Section 5.11** (Geohydrology).

Mines and Quarries

There is currently only one active quarry within the site vicinity (9.38 km north). Stone is currently being extracted from this quarry by a contractor appointed by the Kouga Local Municipality for the purposes of resurfacing the gravel roads within the site vicinity.

Disused quarries are located within the north-northeast sector within the 7.5 km to 10.0 km annulus.

5.5.6.2 Land and Water Bodies Supporting Wildlife

Although agriculture and, to a lesser degree, urban development, have transformed much of the site vicinity, a diverse range of natural vegetation types are still present, with areas of fynbos and renosterveld occurring in the interior. Dune fynbos and Gamtoos thicket are still dominant in the coastal region and along the river valleys. A few areas of indigenous forest are also present in the northwest and west-northwest segments.

There are various wetlands in the site vicinity, which are categorised as follows (Freshwater Consulting Group, 2011; Kromme-Geelhout Conservancy, 2012):

- Wetland depressions: Also referred to as duneslack wetlands, these are associated with the mobile dunefields to the north, northeast and east of the site.
- Permanently to seasonally saturated hillslope seeps: three distinct types of hillslope seeps occur within the site vicinity, namely: hillslope seeps, which occur where groundwater daylights along the coast; hillslope seeps arising in the area between the two mobile dunefields to the immediate north/northwest of the site (the largest of these is the Langefonteinvelei); and hillslope seeps within the largely agricultural area of the site vicinity.
- Permanently to seasonally saturated valley bottom wetlands: there are two distinct types of this wetland in the site vicinity, namely: artificially and naturally channelled valley bottom wetlands; and

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unchanneled valley bottom wetlands.

- Tidal wetlands: There are a number of tidal wetlands along the banks of both the Krom and the Geelhoutboom rivers. These wetland areas are only flooded at very high spring tides.

These wetland systems serve as habitat for a range of plant and animal species and make a significant contribution to the overall biodiversity of the site vicinity.

The proclaimed conservation areas, contained wholly or partially within the site vicinity, are listed in **Table 5.5.26** (also refer to **Drawing 5.5.9**).

Table 5.5.26
Nature Reserves within the Site Vicinity

Nature Reserve	Size (ha)	Distance (km)	Direction
Francois and Annelle Marits Private Nature Reserve	2	3.71	WNW
Rebelsrus Private Nature Reserve	397	4.80	E
Eastcot Private Nature Reserve	50	9.23	NNE
Kromme-Geelhout Protected Environment	90	10.28	NE
Oyster Bay Private Nature Reserve	80	10.44	W
Sand River Private Nature Reserve	120	10.60	ENE
Irma Booysen Flora Reserve	64	11.65	E
Seal Point Nature Reserve	38	12.25	ESE
Kromme River Mouth Private Nature Reserve	30	13.76	ENE
Seal Bay Nature Reserve	38	13.83	E
Cape St. Francis Provincial Nature Reserve	36	14.99	E
Kromensee Nature Reserve*	155	15.73	ENE

* Located partially within the site vicinity

5.5.6.3 Current Water Use

Water Bodies used for Commercial and Freshwater Recreational Fishing and Other Recreational Purposes

None of the rivers in the site region are used for commercial fishing purposes.

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Recreational freshwater fishing does occur in the Krom and Geelhout rivers. The Krom River, in particular, has numerous fishing spots on its banks and boat launching facilities, including at Marina Martinique in Paradise Beach. Main catches include kob, leervis, spotted grunter and elf (Sealine, 2014).

The Impofu Dam is popular with local anglers, who target carp, barbel, kurper, bluegill, spotted bass and largemouth bass (Tracks4Africa, 2024; Anglinks, 2024).

The Krom and Geelhout rivers are used for non-motorised recreation (boating, canoeing, and swimming) at a few locations in the site region. Boats require registration (Kouga Local Municipality, 2022).

Recreational fishing along the coast, in estuaries and offshore within the site region also occurs (refer to **Section 5.6**).

Water Bodies Used for Community Water Supply and Irrigation

The Impofu Dam is the only dam located in the site vicinity which supplies water to the various water supply schemes in the region. The Impofu Dam receives most of its water from the Krom River and its associated tributaries (including the Geelhout River).

In an effort to reduce its reliance on surface water resources, the Kouga Local Municipality drilled numerous boreholes in the site vicinity including at St. Francis Bay and Oyster Bay. The boreholes located within the site vicinity include the boreholes located at Oyster Bay (potential yield of 0.79 Ml/day) and at St. Francis Bay (potential yield of 1.78 Ml/day) (Department of Water and Sanitation, 2023a).

Community Water Use

Community water supply to the towns located in the site vicinity is described below:

a. Oyster Bay

Oyster Bay has two sources of raw water: (Kouga Local Municipality, 2010; Department of Water and Sanitation, 2023a), namely:

- Nearby springs: Water gravitating from nearby springs is collected in a reservoir located at a lower point from the Oyster Bay WTW. The accumulated water is pumped through a pump station to the inlet of the WTW for treatment before being transferred into two reservoirs (one located within the WTW and the other one located uphill from the WTW).

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- Katonkel borehole: Water from the borehole is transferred directly into the reservoir, collecting water from springs. The combined raw water is pumped to the WTW for treatment.

Current water consumption data for Oyster Bay are not available.

b. St. Francis Bay and Cape St. Francis

St. Francis and Cape St. Francis both receive their potable water from the Churchill bulk supply pipeline, which is further supplemented by borehole water (Department of Water and Sanitation, 2023a).

The Churchill bulk supply pipeline delivers bulk water into the St. Francis reservoir which is located on a higher level than the Cape St. Francis reservoir. The Cape St. Francis reservoir is gravity fed from the overflow of the St. Francis reservoir before the water is distributed into the networks (Kouga Local Municipality, 2010).

Five boreholes delivering a combined yield of 1 200 kℓ per day are connected to the existing water supply at the Sea Vista reservoir (Kouga Local Municipality, 2021b).

Current water consumption data for St. Francis Bay and Cape St. Francis are not available.

c. Paradise Beach

Paradise Beach receives its potable water from the Churchill bulk supply pipeline (Department of Water and Sanitation, 2023a).

Current water consumption data for Paradise Beach are not available.

5.5.6.4 Future Development in the Site Vicinity

SDFs, compiled by local authorities every five years, guide development within the areas of jurisdiction of such authorities. In addition to the high-level strategies and objectives contained in these SDFs, they also earmark specific land parcels and areas for specific types of development, such as residential, industrial or commercial development. The implementation of development projects takes place in accordance with the proposals of the SDFs applicable to an area.

The Kouga Local Municipality SDF (Kouga Local Municipality, 2021a) is the primary spatial planning policy document that guides future development and land use within the site vicinity.

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Nature Conservation

The coast is deemed important for nature conservation, tourism and recreation, and although a number of small reserves and protected areas are found within the site vicinity, a large portion of the coast is not protected (see **Drawing 5.5.9**).

There is continued pressure for development on the undeveloped coastline of the site vicinity, as well as within existing built-up areas, particularly Cape St. Francis and St. Francis Bay. As a result, the St. Francis Conservancy Project was conceptualised by the Wildlife and Environment Society of South Africa (in partnership with the Critical Ecosystem Partnership Fund) to assist land owners to establish a private conservation area in the broader St. Francis Bay area (Critical Ecosystem Partnership Fund, 2005). Notwithstanding, the St. Francis Conservancy has not been formally established as a protected area in terms of the National Environmental Management: Protected Areas Act, Act 2003.

Existing nature reserves in the site vicinity are shown in **Drawing 5.5.9** and are listed in **Table 5.5.26** above. There are currently no additional proposed nature reserves.

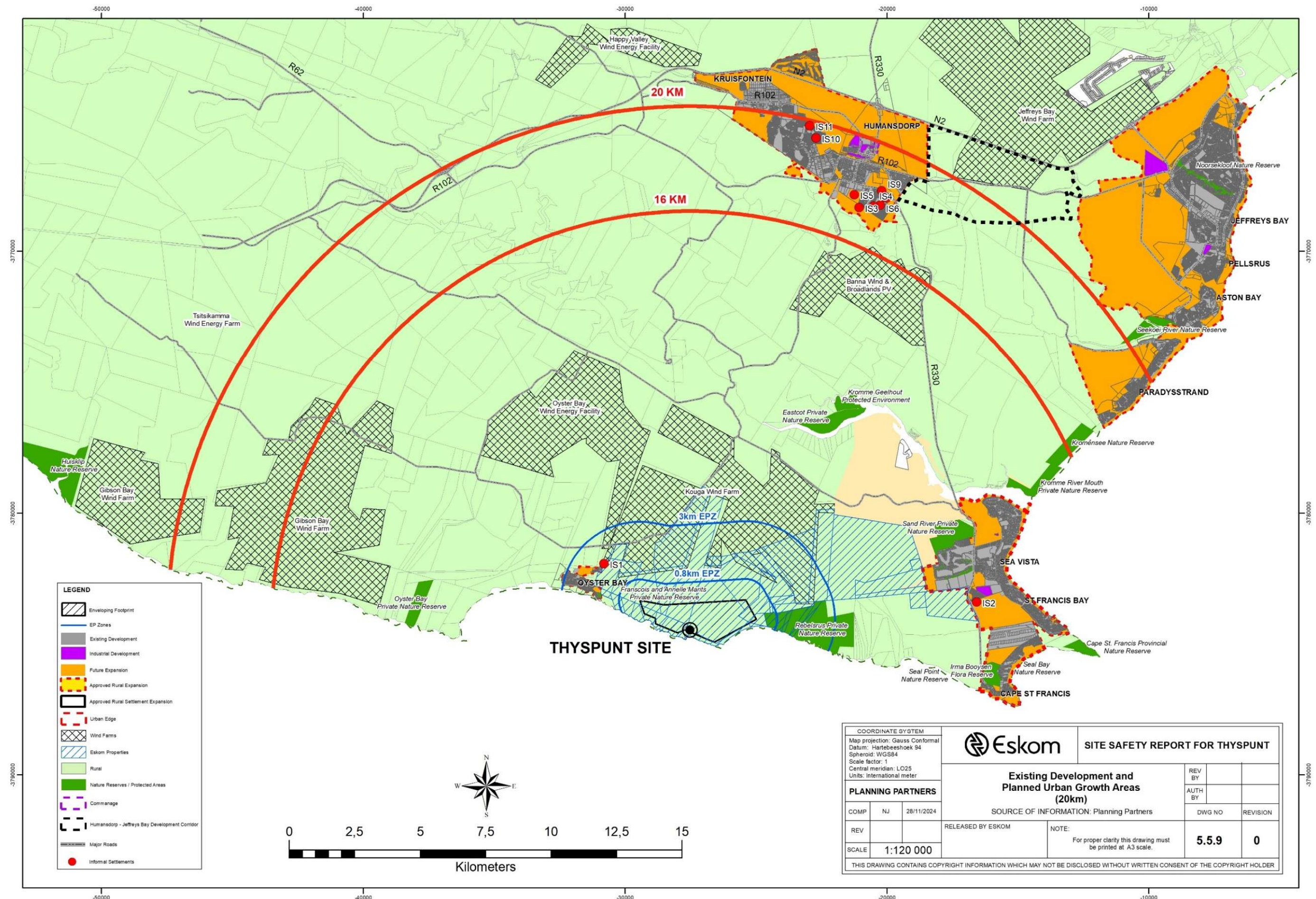
Forest Areas

There are no commercially forested areas or indigenous forests located in the site vicinity. Given the existing land use pattern, it can reasonably be expected that no forest-related developments will occur in the site vicinity in the future.

Agriculture

A large proportion of the site vicinity represents extensive agricultural land, as well as the Ongegunde Vryheid, Kleinrivier and Krommerivier smallholding areas (i.e. rural residential areas). The Kouga Local Municipality SDF promotes the preservation and utilisation of high potential agricultural land and areas currently being used for agricultural purposes by discouraging future conventional urban development in these areas (Kouga Local Municipality, 2021a). It is therefore expected that existing agricultural land will be retained for agricultural purposes.

It is evident in **Drawing 5.5.9** that those significant portions of rural land in the site vicinity, which predominantly comprises agricultural land, have been earmarked for the future development of wind farms (Kouga Local Municipality, 2021a). Certain phases of these approved wind farms have already been implemented (refer to **Drawing 5.5.6**).



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Urban Development

Planned urban growth areas associated with the various towns in the site vicinity, as contained in the Kouga Local Municipality SDF (Kouga Local Municipality, 2021a), are illustrated in **Drawing 5.5.9**.

It is important to note that the Kouga Local Municipality makes use of the urban edge as a planning tool to control the future urban expansion of settlements. Notwithstanding, the Kouga Local Municipality SDF (Kouga Local Municipality, 2021a) makes the following statement in relation to existing development located outside of the defined urban edges: *“Current planning approaches restrict this type of development due to the potential negative impact on the limited agricultural and environmental resources of the area. These developments can, if sensitively approached, create additional housing accommodation without the need for the municipality to provide the normal municipal services beyond road access to the entrance and contribute to the municipal rates base.”*

Moreover, in Chapter 4 (“spatial vision and concept”) (Kouga Local Municipality, 2021a), it is further stated that: *“Development outside the delineated urban edges can be permitted, subject to densities in keeping with the character of the area and within environmental design parameters.”*

In other words, while development outside of the SDF is generally discouraged, such development will be considered for approval by the Kouga Local Municipality if the density of proposed development is contextually appropriate, while adopting a sensitive approach to agricultural/environmental resources and if developers are prepared to install the majority of services infrastructure.

Future urban expansion proposals⁴⁶ for the various towns within a 20 km radius of the site⁴⁷, as contained in the Kouga Local Municipality SDF (Kouga Local Municipality, 2021a), are summarised below:

Humansdorp

The framework plan for Humansdorp is shown in **Figure 5.5.8**. The most significant proposals for future urban expansion are:

- an approximately 300 ha mixed-use (high density residential, retail,

⁴⁶ Expansion areas generally refer to future development of vacant land falling within the demarcated urban edge of each relevant town.

⁴⁷ Although large portions of Jeffreys Bay and Humansdorp fall outside of the 20 km radius, all future urban expansion proposals for these towns are included in **Drawing 5.5.9** for context.

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service industries) expansion to the east of the R330 between the N2 and the R102;

- expansion of the existing Kruisfontein area to the northeast, north, west and southwest;
- expansion of KwaNomzamo to the southwest, south and southeast;
- expansion of the existing industrial area to the north and west, including warehousing and manufacturing related industries;
- a development corridor along the R102 between Humansdorp and Jeffreys Bay, which is intended to accommodate commercial, manufacturing, high tech industry and agricultural related industry.

In addition to the proposed expansion areas, the framework plan also contains proposals to promote the infill/densification of Kruisfontein, as well as to further intensify development within the central business district.

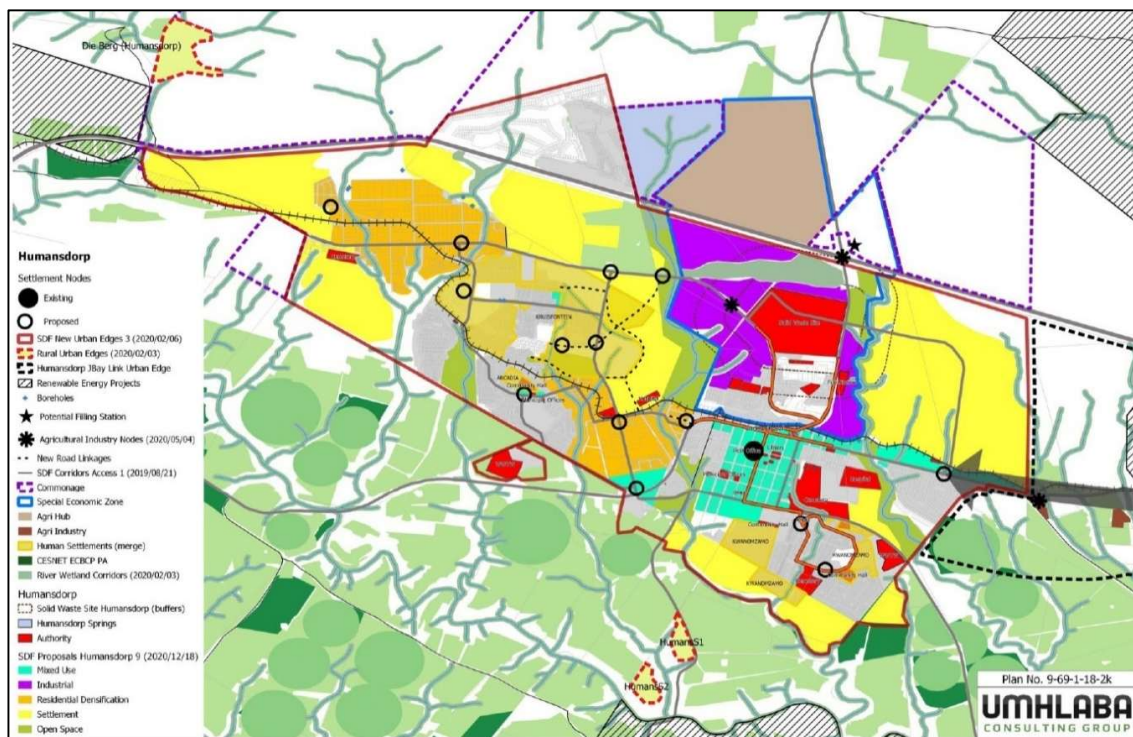


Figure 5.5.8
Humansdorp Framework Plan

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Jeffreys Bay

The framework plan for Jeffreys Bay, including the areas of Paradise Beach, Aston Bay and Pellsrus, is shown in **Figure 5.5.9**. Significant expansion areas are proposed to the northwest of Jeffreys Bay (i.e. the area between the N2, the Kabeljous River, the R102 and St. Francis Street), as well as to the west of Pellsrus/Aston Bay and to the west of Paradise Beach south of the Swart River. In addition, the urban edge associated with the development corridor along the R102 linking Jeffreys Bay to Humansdorp is also shown.

Besides the proposed expansion areas, the framework plan also contains proposals to infill/densify various pockets within the existing settlement footprint.

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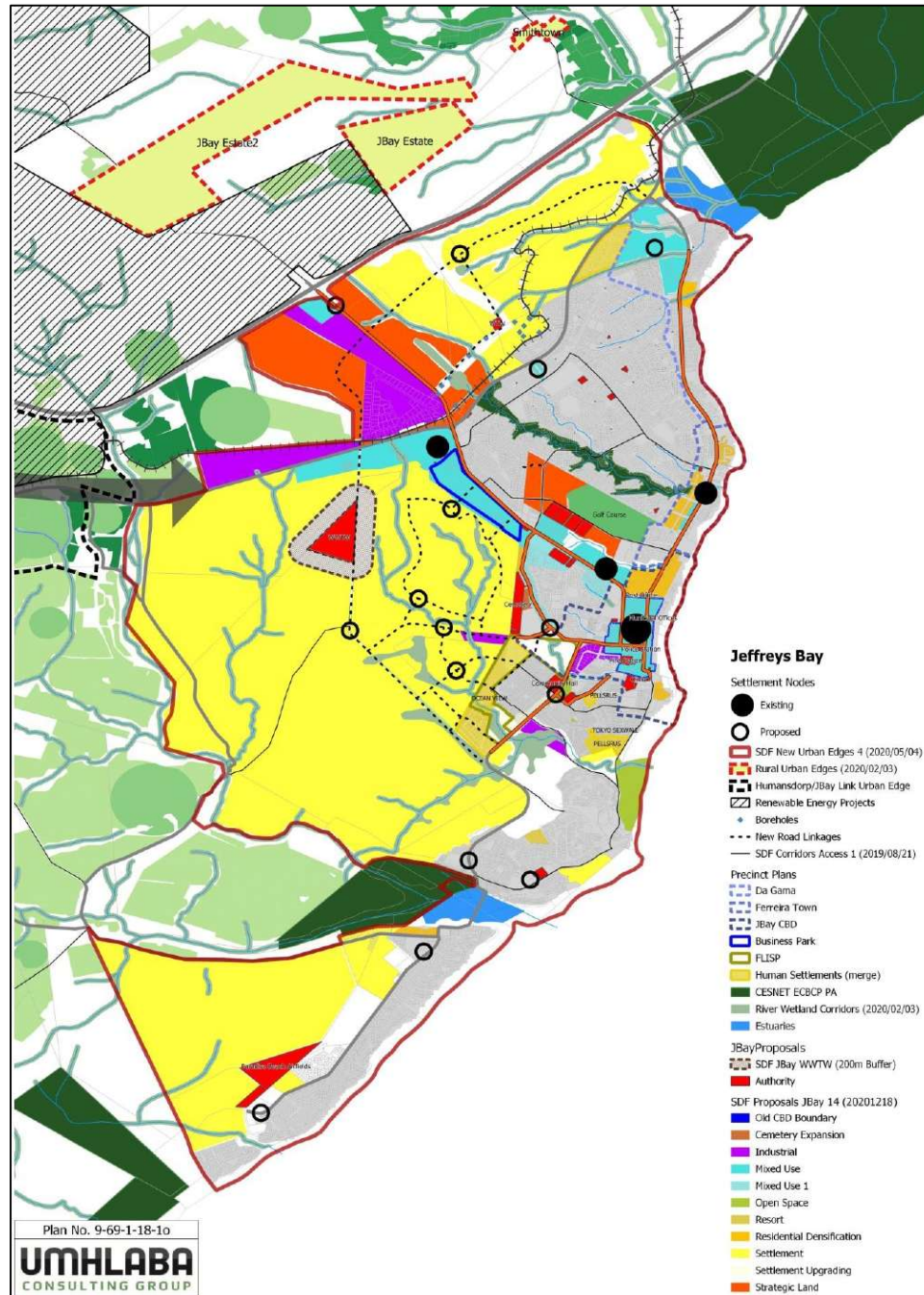


Figure 5.5.9
Jeffreys Bay Framework Plan

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St. Francis Bay and Cape St. Francis

The framework plan for St. Francis Bay and Cape St. Francis is shown in **Figure 5.5.10**.

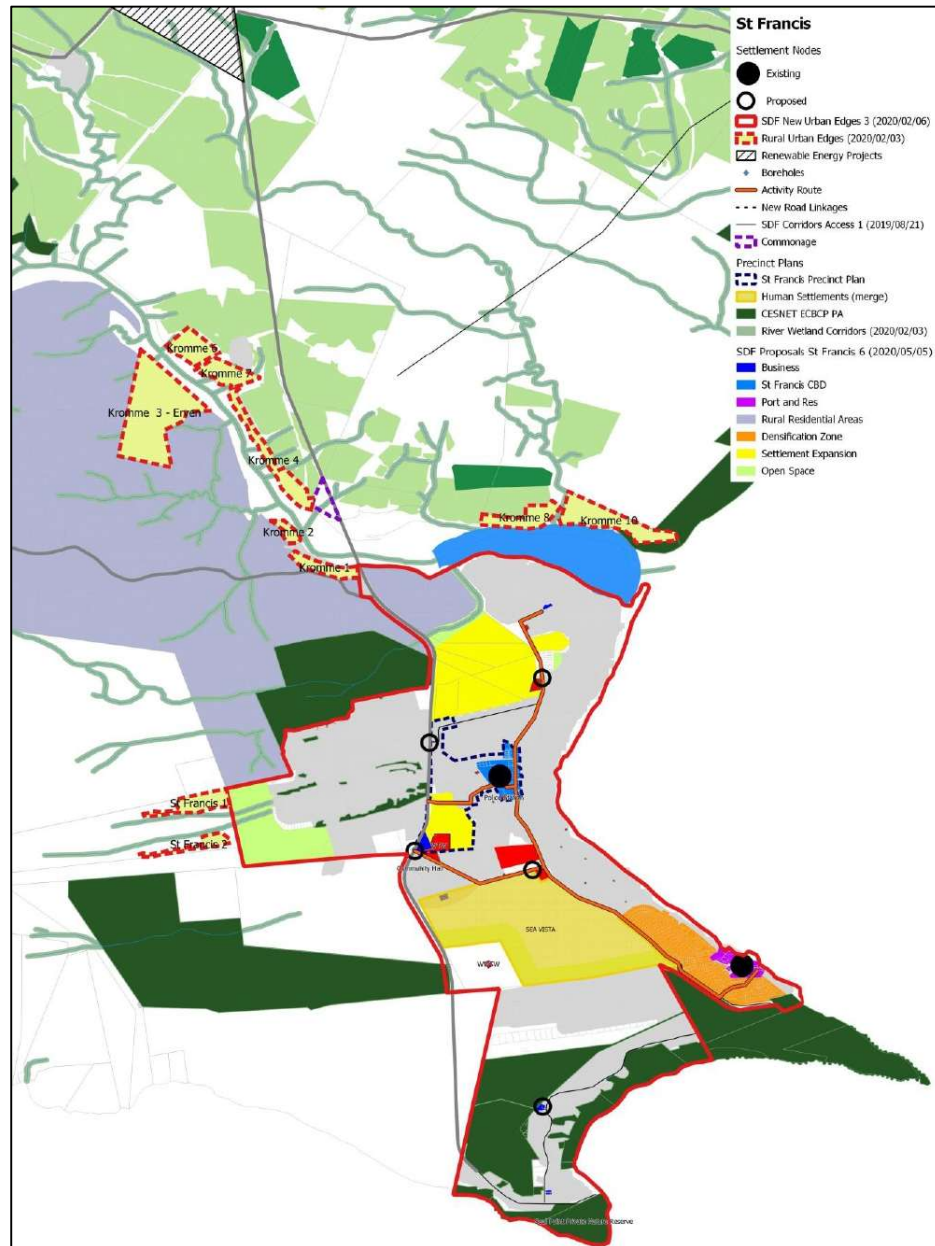


Figure 5.5.10
St. Francis Bay and Cape St. Francis Framework Plan

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The most significant proposals for future urban expansion in St. Francis Bay are:

- expansion of Sea Vista to the south, measuring approximately 137 ha⁴⁸ (notwithstanding, the SDF acknowledges that large portions of this land will not be suitable for development due to environmental or physical constraints);
- expansion area north of Lyme Road, between the R330 and St. Francis Drive, for the purposes of office related uses including professional services and personal services;
- infill of the area located south of Homestead Road and north of the existing industrial area.

Besides the proposed expansion areas, the framework plan also contains proposals to densify/intensify various pockets within the existing settlement footprint, including the Port of St. Francis and the Santareme area. In addition, the framework plan also acknowledges the rural residential area located northwest of St. Francis Bay and south of the Krom River (i.e. the smallholding areas of Kleinrivier and Krommerivier).

There are no proposals for urban expansion in Cape St. Francis.

Oyster Bay

The framework plan for Oyster Bay is shown in **Figure 5.5.11**. Expansion areas are proposed to the east of Oyster Bay and to the west of Umzamowethu.

⁴⁸ According to the Kouga Local Municipality SDF (Kouga Local Municipality, 2021a), Sea Vista is faced with a shortage of land for the construction of low-cost houses and an estimated 52 ha of land is needed to address the backlog of 2 000 prospective beneficiaries registered on the housing needs register.

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Figure 5.5.11
Oyster Bay Framework Plan

Informal Settlements

There are currently two informal settlements established within the site vicinity, namely Umzamowethu and Sea Vista. Areas of informality, including informal settlements, continue to spring up around the towns of Kouga Local Municipality as a result of rapid urbanisation and population growth. Existing informal settlements also continue to expand. In an attempt to combat unlawful occupation of land, on 14 May 2023 the Kouga Local Municipality promulgated the By-laws Relating to Land Invasion and the Management and Control of Informal Settlements (Kouga Local Municipality, 2023). The by-laws set out procedures and obligations for both the Kouga Local Municipality and private landowners (including Eskom) with regard to land that is unlawfully occupied. Moreover, the by-laws places responsibility on an authorised official appointed or assigned by the Kouga Local Municipality to monitor unlawful occupation of land, as well as for actioning the necessary measures to remove unlawful occupants in a timeous manner.

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Industrial, Institutional and Recreational Purpose

a. Industrial development

Industrial development in the site vicinity is largely focused within the Humansdorp industrial area (18 km north-northeast), where large areas of vacant land are available for future development (refer to **Drawing 5.5.9**). However, much of this land falls outside of the 20 km radius.

Additional future industrial development within the site vicinity is expected to occur in the urban expansion area in St. Francis Bay situated to the north of the existing industrial area adjacent to the R330.

The Kouga Local Municipality SDF identifies an ambitious proposal for a development corridor along the R102 linking Jeffreys Bay to Humansdorp. According to the SDF, this corridor will accommodate predominantly industrial development, including manufacturing, high tech industry, agricultural related industry and distribution centres (Kouga Local Municipality, 2021a).

b. Institutional development

The Kouga Local Municipality SDF states that institutional land uses such as prisons, old age homes and hospitals should not be developed within 16 km of the Thyspunt site because of potential evacuation difficulties. The SDF does, however, make provision for a small school in Oyster Bay to cater for local children (Kouga Local Municipality, 2021a).

Future institutional uses are discussed in **Section 5.4**.

c. Tourism and recreational development

There are no planned new tourist facilities or resorts located in the site vicinity (Kouga Local Municipality, 2021a). Recreational development is discussed in more detail in **Section 5.4**.

Water Bodies and Wetlands

According to the Kouga Local Municipality SDF, no new dams are planned to be built in the site vicinity (Kouga Local Municipality, 2021a).

Wetlands have conservation status according to South African environmental law (e.g. National Environmental Management Act 107 of 1998) and the existing wetlands will therefore remain protected, unless otherwise specified by the relevant government authority.
Future Water Supply to the Site

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The site is not connected to the municipal bulk water supply system and will therefore need to obtain its water supply onsite from either groundwater sources or desalination (or a combination of both). **Section 5.12** provides details of the proposed water supply to the site.

Mines and Quarries

According to the Kouga Local Municipality SDF, no new mines or quarries are planned within the 16 km zone (Kouga Local Municipality, 2021a). Materials needed for new road works may, however, be quarried as the need arises, but only with permission of the relevant government authorities.

5.5.7 Land and Water Use within the Emergency Planning Zones

The characterisation of land and water use was considered within the emergency planning zones (EPZs) that apply to Thyspunt (as defined in **Chapter 8**).

The purpose of the characterisation is to inform emergency planning and remedial measures that must be considered to minimise the preliminary estimation of public exposure in case of a potential radiological incident or accident. Emergency response actions that must be considered include evacuation, shelter, thyroid blocking, temporary relocation, food banning and ongoing monitoring and communication (Eskom, 2022).

Land and water data were evaluated for the EPZs, i.e. Evacuation Zone (800 m), LPZ (3 km) and overall EPZ (40 km), as defined in **Chapter 8**. For the purposes of this section the following data sets were analysed:

- land cover, as illustrated in **Drawing 5.5.2**;
- land use, as illustrated in **Drawing 5.5.6**;
- agricultural collection, processing and distribution facilities, as illustrated in **Drawing 5.5.3**;
- agricultural production, as illustrated in **Drawing 5.5.8**;
- existing and planned development, as illustrated in **Drawing 5.5.9**.

5.5.7.1 Land Cover (40 km)

The 2020 SANLC data set (Department of Forestry, Fisheries and the Environment, 2021) was analysed per sector in terms of the site EPZs. The EPZs were superimposed on the 5 km 22.5° sectoral grid and land cover was determined per EPZ in terms of the land cover classifications

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that represent the 2020 SANLC data set (Department of Forestry, Fisheries and the Environment, 2022). The analysis is recorded in **Appendix 5.5.D** and is illustrated in **Drawing 5.5.2**.

0 km to 0.8 km EPZ (Exclusion Zone)

The 0 km to 0.8 km Exclusion Zone comprises 1 108.2 ha of land.

Land cover within this EPZ consists of approximately 459.0 ha (41.5 per cent) of thicket dense bush; 316.9 ha (28.6 per cent) of natural wooded land; and 95.8 ha (8.7 per cent) of grassland (Department of Forestry, Fisheries and the Environment, 2021). The land cover in this EPZ therefore consists of predominantly natural vegetation (78.7 per cent).

The remainder of the land comprises 235.6 ha (21.3 per cent) of barren land, corresponding largely to the dunefields situated to the north of the site; 0.6 ha of built-up residential (0.06 per cent), which relates to 3 private dwellings adjacent to the coastline; and 0.2 ha (0.02 per cent) of waterbodies (Department of Forestry, Fisheries and the Environment, 2021).

A large portion of this EPZ forms part of the Eskom property that makes up the site. It therefore falls within the area under the control of the operator and the requirements of the regulations on siting can be complied with.

0.8 km to 3 km EPZ

The 0.8 km to 3.0 km EPZ comprises 3 660 ha of land.

Land cover within this EPZ consists of approximately 1 035.3 ha (28.3 per cent) of thicket dense bush; 816.4 ha (22.3 per cent) of natural wooded land; 161.2 ha (4.4 per cent) of grassland; and 47.5 ha (1.3 per cent) of shrubland (Department of Environmental Affairs, 2021). The land cover in this EPZ therefore consists of predominantly natural vegetation (56.3 per cent).

There are 698.3 ha (19.1 per cent) of barren land, which largely consist of the dunefields situated to the north/north-northeast of the site (Department of Forestry, Fisheries and the Environment, 2021).

In terms of agricultural activity in the EPZ, there are approximately 508.5 ha (13.9 per cent) of cultivated commercial annual pivot irrigated land and 287.8 ha (7.9 per cent) of cultivated commercial dryland. The land cover distribution within the 0.8 km to 3 km EPZ therefore demonstrates that there are elements of the food chain that are present

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that would need to be taken into consideration with respect to emergency and remedial measures relating to food-banning and monitoring.

The current land cover distribution within the EPZ shows that there are approximately 95.7 ha (2.6 per cent) of urban built-up residential land, as well as minor components of commercial (0.5 ha) and industrial land cover (2.2 ha). This urban land cover largely comprises the settlement of Oyster Bay and the associated informal settlement of Umzamowethu.

The remainder of the land in the EPZ comprises 6.5 ha (0.2 per cent) of waterbodies.

3 km to 40 km EPZ

The 3 km to 40 km EPZ comprises 208 556.9 ha of land. The analysis demonstrates that the bulk of the EPZ is dominated by natural vegetation (135 530.5 ha or 66.5 per cent) and agricultural activities (55 112.6 ha or 27 per cent) (Department of Forestry, Fisheries and the Environment, 2021).

The EPZ contains 4 630.7 ha (2.3 per cent) of urban land, representing the surrounding towns.

The viable implementation of emergency and remedial measures will require ongoing monitoring of agricultural produce and processing facilities for possible contamination of the food chain and the need for food banning within the 40 km overall EPZ.

5.5.7.2 Land Use (20 km)

Based on the 2024 land use survey (Planning Partners, 2024c), the land use data were analysed per sector in terms of the site EPZs. The EPZs were superimposed on the 5 km 22.5° sectoral grid and land use was determined per EPZ in terms of the land use classifications represented in the land use analysis illustrated in **Drawing 5.5.6**. The land use analysis was conducted up to 20 km from the site and the analysis of land use within the EPZs is therefore limited to the same area.

0 km to 0.8 km EPZ (Exclusion Zone)

The analysis of the land use survey confirmed that land within the Exclusion Zone comprises of only two land uses: tall shrubland, thicket and forest (85.7 per cent); and bare soil (14.3 per cent) (refer to **Drawing 5.5.6**).

A large portion of this EPZ forms part of the Eskom property that make up the site. It therefore falls within the area under the control of the

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operator and the requirements of the regulations on siting can be complied with.

0.8 km to 3 km EPZ

The analysis of the land use survey confirmed that a significant amount of land in the 0.8 km to 3 km EPZ is used for agricultural purposes (36.5 per cent). As such, the analysis confirmed that there are elements of the food chain present within this zone that would need to be taken into consideration with respect to emergency and remedial measures, in particular to food banning and monitoring (Eskom, 2009).

Natural areas in this EPZ are characterised by predominantly tall shrubland, thicket and forest (46.25 per cent) and areas of bare soil associated with the Oyster Bay and Thysbaai headland bypass dunefields (14.2 per cent).

Approximately 64 ha (2.5 per cent) of land are built-up residential, associated with the coastal village of Oyster Bay.

The majority of land falling within this EPZ forms part of the Eskom property that make up the site. It therefore falls within the area under the control of the operator and the requirements of the regulations on siting can be complied with.

3 km to 20 km

The analysis of the land use survey confirmed that land within the 3 km to 20 km zone is predominantly used for agricultural purposes (60.2 per cent). As such, the analysis confirmed that there are elements of the food chain present within this zone that would need to be taken into consideration with respect to emergency and remedial measures, including ongoing monitoring and public communication in line with international best practice (Eskom, 2009).

The urban settlements of St. Francis Bay, Cape St. Francis and Humansdorp, as well as the Jeffreys Bay suburb of Paradise Beach, are located within this zone.

5.5.7.3 Existing and Planned Development (20 km)

An evaluation of the current Kouga Local Municipality SDF (Kouga Local Municipality, 2021a) was conducted for the purposes of this section (see **Subsection 5.5.6.4**). Based on this evaluation, the potential for changes in land use within the respective EPZs were assessed. The analysis of existing and planned development was conducted up to 20 km from the site and the corresponding analysis within the EPZs is therefore limited

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to the same area. Refer to **Drawing 5.5.9** which illustrates existing and planned development within 20 km of the site.

It is noteworthy that the Kouga Local Municipality SDF acknowledges the potential nuclear site at Thyspunt (Kouga Local Municipality, 2021a).

0 km to 0.8 km EPZ (Exclusion Zone)

Eskom owns the bulk of the properties located within this EPZ and therefore already controls the bulk of the area.

There are three existing private dwellings located along the coastline within this EPZ (ESRI, 2024).

0.8 km to 3 km EPZ

A portion of the small coastal village of Oyster Bay, including the associated informal settlement of Umzamowethu, fall within this EPZ. The Kouga Local Municipality's SDF makes use of the urban edge as a growth management tool to manage land development in the various towns of the Kouga Municipality, including Oyster Bay (refer to **Subsection 5.5.6.4**). In addition, the Kouga Local Municipality SDF (Kouga Local Municipality, 2021a) states the following in respect to Oyster Bay within the context of the potential nuclear facility at Thyspunt: *"Urban expansion of Oyster Bay and Umzamowethu, which falls within the 0-5km zone should not be permitted."* Notwithstanding, the future expansion of the Umzamowethu informal settlement will need to be closely monitored. No other future urban development is planned within this EPZ (Kouga Local Municipality, 2021a).

There are five existing residential dwellings situated along the coastline to the east of the delineated urban edge for Oyster Bay (i.e. between Oyster Bay and Wasserna's Beach) (ESRI, 2024).

The majority of the land falling within the 0.8 km to 3 km EPZ forms part of the Garden Route Biosphere Reserve, which is a declared UNESCO World Heritage Site (refer to **Drawing 5.5.4**). Furthermore, a substantial portion of the land in this EPZ falls within the Rebelsrus Private Nature Reserve.

The vast majority of the land falling in this EPZ is owned by Eskom. It is therefore reasonable to expect that no further development will take place within this EPZ.

3 km to 40 km

The land within the 3 km to 40 km EPZ contains predominantly natural

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and agricultural areas. Conservation areas within this EPZ include a portion of the Rebelsrus Private Nature Reserve, Eastcot Private Nature Reserve, Oyster Bay Private Nature Reserve, Seal Point Nature Reserve, Seal Bay Nature Reserve, Irma Booysen Flora Reserve, Cape St. Francis Provincial Nature Reserve, Kromme-Geelhout Protected Environment, Sand River Private Nature Reserve, Kromme River Mouth Private Nature Reserve and a portion of the Kromensee Nature Reserve.

The urban settlements of St. Francis Bay, Cape St. Francis and Humansdorp, as well as the Jeffreys Bay suburb of Paradise Beach, are located within this zone. Future growth and expansion of these settlements is restricted by urban edges imposed in terms of the Kouga Local Municipality SDF (Kouga Local Municipality, 2021a). Notwithstanding, the SDF does permit expansion within certain identified areas within the urban edges of the settlements, with Humansdorp, St. Francis Bay and Paradise Beach all being subject to proposals for relatively intensive future expansion (refer to **Drawing 5.5.9**).

5.5.7.4 Agricultural Production (16 km)

The agricultural production survey conducted in 2023 (Planning Partners, 2024d) analysed agricultural activities in the vicinity of the site, focusing on different products and sectors based on EPZs. Data were superimposed on a 5 km, 22.5° sectoral grid and agricultural products calculated accordingly. The analysis includes production data within a 16 km radius from the site centroid, as detailed in **Drawing 5.5.8**.

0 km to 0.8 km EPZ (Exclusion Zone)

The survey confirmed no agricultural activity within this EPZ. (see **Drawing 5.5.8**).

0.8 km to 3 km EPZ

The main agricultural activities included the following:

- Dairy Farming: Dominates this zone with 1 781 dairy cows producing $4\,892 \times 10^3$ l of milk (**Tables 5.5.30 to 31**).
- Fodder Production: Moderate, with 23 160 t produced (**Table 5.5.32**).
- Wheat: Moderate activity in the northwest and north-northwest segments, with 757 t (**Table 5.5.37**).
- Livestock: Small numbers of cattle (208) recorded (**Tables 5.5.29**).

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3 km to 16 km

The main agricultural activities included the following:

- Dairy Farming: Significant activity, with 16,057 dairy cows producing $68\,209 \times 10^3$ l of milk (**Tables 5.5.30 to 31**).
- Fodder Production: Closely related to the dairy industry, fodder crop production is a major activity, producing 91 908 t (**Table 5.5.32**). Coupled with land used for grazing of cattle.
- Livestock: Ranges from cattle (6360) (**Table 5.5.29**), sheep (20 096) (**Table 5.5.33**) and 466 pigs (**Table 5.5.35**).
- Poultry: Chickens were recorded in the north northeast (2190) and northwest (12 000) sectors. Coupled with Eggs in the north-northeast (399 675) (**Table 5.5.27** and **5.5.28**).
- Other products include wheat (4 730 t) (**Table 5.5.37**) and honey (1379 kg) (**Table 5.5.36**).

Table 5.5.27
Chickens per EPZ (2023 Results)⁴⁹

Distance (km)	Number of Chickens in Sector							
	N	NNE	NE	NNW	NW	W	WNW	ENE
0.0 to 0.8	0	0	0	0	0	0	0	0
0.8 to 3.0	0	0	0	0	0	0	0	0
3.0 to 16.0	0	2190	0	0	12000	0	0	0
Total in Segment	0	2190	0	0	12000	0	0	0

Table 5.5.28
Eggs per EPZ (2023 Results)⁵⁰

Distance (km)	Number of Eggs in Sector							
	N	NNE	NE	NNW	NW	W	WNW	ENE
0.0 to 0.8	0	0	0	0	0	0	0	0
0.8 to 3.0	0	0	0	0	0	0	0	0
3.0 to 16.0	0	399675	0	0	0	0	0	0
Total in Segment	0	399675	0	0	0	0	0	0

⁴⁹ (Planning Partners, 2024d)

⁵⁰ (Planning Partners, 2024d)

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Table 5.5.29
Cattle per EPZ (2023 Results)⁵¹

Distance (km)	Number of Cattle in Sector							
	N	NNE	NE	NNW	NW	W	WNW	ENE
0.0 to 0.8	0	0	0	0	0	0	0	0
0.8 to 3.0	19	67	0	0	122	0	0	0
3.0 to 16.0	50	1022	813	418	2927	6	874	250
Total in Segment	69	1089	813	418	3049	6	874	250

Table 5.5.30
Dairy Cows per EPZ (2023 Results)⁵²

Distance (km)	Number of Dairy Cows in Sector							
	N	NNE	NE	NNW	NW	W	WNW	ENE
0.0 to 0.8	0	0	0	0	0	0	0	0
0.8 to 3.0	461	534	451	0	308	0	0	27
3.0 to 16.0	2583	2558	2431	1452	5445	22	1566	0
Total in Segment	3044	3092	2882	1452	5753	22	1566	27

Table 5.5.31
Milk Production per EPZ (2023 Results)⁵³

Distance (km)	Milk Production in Sector (10 ³ t)							
	N	NNE	NE	NNW	NW	W	WNW	ENE
0.0 to 0.8	0	0	0	0	0	0	0	0
0.8 to 3.0	1291	900	0	0	1392	0	0	225
3.0 to 16.0	18171	14737	21476	5924	30688	760	14965	0
Total in Segment	19462	15637	21476	5924	32080	760	14965	225

⁵¹ (Planning Partners, 2024d)

⁵² (Planning Partners, 2024d)

⁵³ (Planning Partners, 2024d)

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Table 5.5.32
Fodder Production per EPZ (2023 Results)⁵⁴

Distance (km)	Fodder Crop Production in Sector (tonne)							
	N	NNE	NE	NNW	NW	W	WNW	ENE
0.0 to 0.8	0	0	0	0	0	0	0	0
0.8 to 3.0	4416	11628	1176	0	5940	0	0	0
3.0 to 16.0	9840	19476	6720	25392	18888	0	11592	0
Total in Segment	14256	31104	7896	25392	24828	0	11592	0

Table 5.5.33 illustrates the scale and distribution of sheep farming in the site vicinity. Larger numbers of sheep were recorded in the northwest to north segments than elsewhere in the vicinity of the site. Most sheep farming occurs beyond the 3 km radius as illustrated in **Drawing 5.5.8**.

Table 5.5.33
Sheep per EPZ (2023 Results)⁵⁵

Distance (km)	Number of Sheep in Sector							
	N	NNE	NE	NNW	NW	W	WNW	ENE
0.0 to 0.8	0	0	0	0	0	0	0	0
0.8 to 3.0	0	0	0	0	0	0	0	0
3.0 to 16.0	5971	125	1850	5085	6265	0	0	800
Total in Segment	5971	125	1850	5085	6265	0	0	800

⁵⁴ (Planning Partners, 2024d)

⁵⁵ (Planning Partners, 2024d)

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Table 5.5.34
Wool production per EPZ (2023 Results)⁵⁶

Distance (km)	Number of Sheep in Sector							
	N	NNE	NE	NNW	NW	W	WNW	ENE
0.0 to 0.8	0	0	0	0	0	0	0	0
0.8 to 3.0	0	0	0	0	0	0	0	0
3.0 to 16.0	16	1	3	9	15	0	0	0
Total in Segment	16	1	3	9	15	0	0	0

Table 5.5.35
Pigs per EPZ (2023 Results)⁵⁷

Distance (km)	Number of Pigs in Sector							
	N	NNE	NE	NNW	NW	W	WNW	ENE
0.0 to 0.8	0	0	0	0	0	0	0	0
0.8 to 3.0	0	0	0	0	0	0	0	0
3.0 to 16.0	0	0	0	51	65	0	350	0
Total in Segment	0	0	0	51	65	0	350	0

Limited honey production occurred within the site vicinity beyond the 3 km radius in 2023 (refer to **Table 5.5.36**).

Table 5.5.36
Honey Production per EPZ (2023 Results)⁵⁸

Distance (km)	Honey Production in Sector (kg)							
	N	NNE	NE	NNW	NW	W	WNW	ENE
0.0 to 0.8	0	0	0	0	0	0	0	0
0.8 to 3.0	0	0	0	0	0	0	0	0
3.0 to 16.0	30	50	0	202	766	0	331	0
Total in Segment	30	50	0	202	766	0	331	0

⁵⁶ (Planning Partners, 2024d)

⁵⁷ (Planning Partners, 2024d)

⁵⁸ (Planning Partners, 2024d)

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Wheat farming in the 3 km to 16 km zone occurred in 2007/2008 between the west-northwest and northern segments (**Table 5.5.37**).

Table 5.5.37
Wheat Production per EPZ (2023 Results)⁵⁹

Distance (km)	Wheat Production in Sector (tonne)							
	N	NNE	NE	NNW	NW	W	WNW	ENE
0.0 to 0.8	0	0	0	0	0	0	0	0
0.8 to 3.0	323	0	0	0	434	0	0	0
3.0 to 16.0	280	0	0	1544	1532	0	1374	0
Total in Segment	603	0	0	1544	1966	0	1374	0

Table 5.5.38 provides a summary of the agricultural production within the site EPZs.

Table 5.5.38
Vegetables and Fruit per EPZ (2023 Results)⁶⁰

Distance (km)	Vegetable and Fruit production in Sector (tonne)							
	N	NNE	NE	NNW	NW	W	WNW	ENE
0.0 to 0.8	0	0	0	0	0	0	0	0
0.8 to 3.0	0	0	0	0	0	0	0	0
3.0 to 16.0	0	0	0	6	0	0	0	0
Total in Segment	0	0	0	6	0	0	0	0

⁵⁹ (Planning Partners, 2024d)

⁶⁰ (Planning Partners, 2024d)

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Table 5.5.39
Nut production per EPZ (2023 Results)⁶¹

Distance (km)	Nut production in Sector (tonne)							
	N	NNE	NE	NNW	NW	W	WNW	ENE
0.0 to 0.8	0	0	0	0	0	0	0	0
0.8 to 3.0	0	0	0	0	0	0	0	0
3.0 to 16.0	0	0	0	0	5	0	5	0
Total in Segment	0	0	0	0	5	0	5	0

Table 5.5.40
**Summary of Agricultural Production per EPZ: Crops and Livestock
(2023)⁶²**

Product	EPZ			Total
	0 km - 0.8 km	0.8 km - 3.0 km	3.0 km - 16.0 km	
Chickens (no.)	0	0	14190	14190
Eggs (no.)	0	0	399675	399675
Cattle (no.)	0	208	6360	6568
Dairy Cows (no.)	0	1781	16057	17838
Milk (10³ ℓ)	0	3808	106721	110529
Sheep (no.)	0	0	20096	20096
Wool (tonne)	0	0	44	44
Pigs (no.)	0	0	466	466
Fodder (tonne)	0	23160	91908	115068
Wheat (tonne)	0	757	4730	5487
Honey (kg)	0	0	1379	1379
Vegetable and Fruit (tonne)	0	0	6	6
Nuts (tonne)	0	0	10	10

5.5.7.5 Agricultural Produce Collection, Processing and Distribution

⁶¹ (Planning Partners, 2024d)

⁶² (Planning Partners, 2024d)

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(40 km)

Based on the data recorded during the agricultural collection, processing and distribution survey (Planning Partners, 2024b), data on agricultural collection, processing and distribution facilities were analysed per sector in terms of the site EPZs. The EPZs were superimposed on the 5 km 22.5° sectoral grid and agricultural collection, processing and distribution facilities per sector determined (refer to **Drawing 5.5.3**⁶³).

0 km to 0.8 km EPZ (Exclusion Zone)

There are no facilities recorded within the 0 km to 0.8 km EPZ for the processing, collection or distribution of agricultural produce (Planning Partners, 2024b).

0.8 km to 3 km EPZ

As per the agricultural survey results presented in **Subsection 5.5.7.4**, farming in the 0.8 km to 3 km EPZ is characterised by predominantly dairy farming and associated agricultural activities (such as the growing of fodder). The analysis of agricultural collection, processing and distribution facilities occurring in this EPZ confirms that facilities consist of dairy farms for the milking of cows (refer to **Drawing 5.5.3** and **Table 5.5.B.1** in **Appendix 5.5.B**).

3 km to 40 km EPZ

Dairy farms are the dominant type of agricultural collection, processing and distribution facility located within the 3 km to 40 km EPZ (refer to **Drawing 5.5.3** read in conjunction with **Table 5.5.B.1** in **Appendix 5.5.B**). Milk produced is transported to the Woodlands Dairy in Humansdorp (located within the 3 km to 40 km EPZ) and the Nestlé processing facility in Kareedouw (located outside the 3 km to 40 km EPZ but within the 50 km site region), as well as other dairy processing facilities located outside of the site region (including Clover and Coega Dairy in Gqeberha). Tankers collect milk at the numerous dairy farms and transport it directly to the various dairy processing facilities.

Other agricultural collection, processing and distribution facilities located within the 3 km to 40 km EPZ are summarised below (also refer to **Drawing 5.5.3** and **Appendix 5.5.B**):

- two fruit packhouses, both located within the Gamtoos River Basin: Ferreira Citrus Growers (39.68 km northeast) and De Koenig Broers

⁶³ **Drawing 5.5.3** should be read in conjunction with **Appendix 5.5.B**, which provides the specific data for each facility, produce type, as well as distance and direction of the particular facility from the site centroid.

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Highlands (39.91 km northeast);

- six red meat abattoirs, all of which are located between 13.26 km and 28.41 km between the west-northwest and northern segments;
- one chicken broiler located at 32.41 km northeast;
- one grain silo located in Humansdorp (19.19 km north-northeast).

The distribution of fish processing facilities associated with the commercial marine fishery is described in **Section 5.6**. These are predominantly located in St. Francis Bay and Humansdorp.

The distribution of agricultural collection, processing and distribution facilities is indicative of locations where exposure to contamination of food products produced in the region may occur and thereby enter the food chain. Emergency and remedial measures will therefore need to consider the need for ongoing monitoring and public communication in the site region.

5.5.7.6 Water Use (40 km)

0 km to 0.8 km EPZ

There are no agricultural activities located in the 0 km to 0.8 km EPZ that require water for irrigation. The only urban development within this EPZ are three private residential dwellings. Since there is no existing water infrastructure located within this EPZ, it is assumed that these dwellings obtain water from their own on-site boreholes.

Fresh water supply for the operation of the nuclear installation(s) and supporting functions is dealt with in **Section 5.12**.

0.8 km to 3 km EPZ

Water uses within the 0.8 km to 3 km EPZ consist of groundwater used for irrigation on farms and for drinking water for animals and humans on these farms, as well as potable water for the town of Oyster Bay.

3 km to 40 km EPZ

The rural area located within the 3 km to 40 km EPZ receives water from groundwater resources for the irrigation of farms and drinking water for animals and humans on these farms. Potable water for the urban settlements in this zone (i.e. Jeffreys Bay, Humansdorp, St. Francis Bay and Cape St. Francis) is received from groundwater sources, as well as the Kromme Sub-system of the AWSS, which sources its water from the

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Churchill and Impofu dams (refer to **Subsection 5.5.5.3**). Potable water is treated at the WTWs of these settlements before being distributed to individual users. The locations of the reservoirs and WTWs for each settlement are shown in **Table 5.5.3** and **Table 5.5.5**, respectively (read in conjunction with **Drawing 5.5.5**).

5.5.8 Main Activities Relevant to Safety

5.5.8.1 Potential Effects of the Nuclear Installation(s) on Land Use

The site is located on the coast within a region that is dominated by natural areas, conservation and agricultural activities. Urban development is restricted to mostly coastal resort towns and rural settlements associated with intensive cultivation of crops and commercial forestry. Humansdorp, which is centrally located within the region, is the service centre for the agricultural hinterland and is intended to be the focus of future industrial development within the site region.

Current applicable SDFs (Kouga Local Municipality, 2021a) indicate that land use within the region is stable, with the focus remaining on conservation, agriculture and the restricted development of coastal nodes.

It is not certain if the location of the nuclear installation at the site will restrict planned regional development at a strategic level. However, the location of the nuclear installation is definitely expected to affect the future development potential within the site vicinity. The current Kouga Local Municipality SDF already includes guidelines for the restriction of development within the site vicinity, including a specific guideline restricting future development and expansion of Oyster Bay and Umzamowethu (Kouga Local Municipality, 2021a).

In order for the NNR to provide effective control of the protection of persons, property and the environment, it is essential to ensure that the safety and other requirements and needs of the nuclear installation(s) be considered (see **Subsection 5.5.3**). It is recommended that Eskom and the NNR be given the opportunity to provide comments on future draft versions of SDFs applicable to the site region prior to being approved by the relevant authorities.

The evaluation of the land and water use for this SSR showed that regulatory guidance and/or monitoring will be needed to control and manage the development of land and water resources within the formal emergency planning zones surrounding the nuclear installation. Such guidance will need to be developed in consultation with the relevant provincial and/or municipal authorities as provided for by the NNR's Interim Guidance for the Siting of Nuclear Facilities RG-0011 (National

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Nuclear Regulator, 2016). This will ensure that future changes in land and water use within the emergency planning zone would not give rise to activities that may pose an external hazard to the nuclear installation (e.g. a restriction on the location of hazardous industries, or other industries that may have a detrimental impact on emergency planning) or that may expose the public and the environment to undue risk from the nuclear installation(s).

Given the proximity of Oyster Bay and Umzamowethu to the site, consideration must be given to creating regulations to control urban development in the EPZ. In this regard, the following steps are necessary:

- restrict the potential for urban expansion of Oyster Bay and Umzamowethu;
- restrict the establishment of large food processing facilities within the site vicinity;
- control the extent and scale of commercial and community services and facilities within the site vicinity;
- require that all proposals to rezone agricultural land or to facilitate institutional uses (i.e. significant land use changes) be referred to Eskom for comment prior to decisions being made by the local, district or provincial authorities.

In accordance with existing national nuclear regulations, Eskom will perform periodic reviews to assess the current and planned population distribution, the disaster management infrastructure and any new development. In terms of the siting regulations (Department of Energy, 2011), information in this respect is planned to be updated periodically to determine the need to control development within the EPZs.

5.5.9 Management of Uncertainties

5.5.9.1 Limited Information

The development of this section of the TSSR has been based on currently (2023/2024) available information. It was not always possible to obtain current/complete information on all topics/aspects. Complete information on the following was not possible to obtain:

- Potable water consumption data: Current water consumption data for the urban settlements in the site region have been requested from the relevant local municipalities (i.e. Kouga and KouKamma). The KouKamma Municipality's Manager of Technical Services provided

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data. However, he confirmed that the provided data are estimates due to lack of raw data from installed water meters (mostly outdated and affected by vandalism) (Planning Partners, 2024f).

- Fresh water recreational fishing: Information regarding freshwater subsistence and recreational fishing yields in the site region is not known or regulated.

5.5.9.2 Uncertain Information in Respect to Climate Change

Climate change projections are based on probable future outcomes and are therefore associated with uncertainties. These uncertainties arise due to incomplete knowledge that results from a lack of information and/or from disagreement about what is known or even knowable. It has many sources ranging from quantifiable errors in the data to ambiguously defined concepts or terminology to uncertain projections of human behaviour.

5.5.9.3 Approaches to Management of Uncertainties

The following approaches were adopted with respect to the following limited and/or uncertain information data sets:

Potable Water Consumption Data

Potable water consumption data for the urban settlements in the site region have been requested from the relevant local municipalities (i.e. Kouga and KouKamma). The Manager of Technical Services at KouKamma Municipality provided estimated data, citing the lack of raw data due to outdated water meters and vandalism (Planning Partners, 2024f).

Freshwater Recreational Fishing

In the absence of an extensive survey being conducted to determine subsistence and recreational fishing yields, a conservative approach is adopted in the evaluation of the potential impact on the public and the environment. Generic internationally accepted intake rates are applied for both recreational and subsistence fishing activities in the evaluation conducted as part of **Chapter 7**. The uncertainty therefore does not affect the overall results and conclusions reflected in this SSR.

Climate Change

Although the science on the impacts of climate change on land and water use is constantly evolving, current projections indicate that climate change may have a significant impact on agricultural production (e.g.

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lower productivity levels and loss of harvest) within the site region in the future. These impacts therefore need to be continuously monitored in relation to the site region and reported on in subsequent reviews and updates of the TSSR.

5.5.10 Monitoring

5.5.10.1 Monitoring Prior to Nuclear Installation(s) Construction and Operation

The results of the land and water use analysis presented in this section are planned to be reviewed periodically.

5.5.10.2 Monitoring During Nuclear Installation(s) Construction and Operation

During the nuclear installation(s) lifetime, data presented in this section should be reviewed and updated periodically, in order to identify any trends in land and water use (including the impacts of climate change), and agricultural production and processing that may require additional controls to be put in place or may require the revision of the emergency plan. The reason for not specifying exact dates is due to uncertainties in the construction, operation and decommissioning time spans. It will be sufficiently clarified during future updates of this TSSR, when this information is available.

Given the fact that the site region contains a major agricultural component, monitoring of agricultural produce should be considered as part of the emergency plan.

Monitoring is also required to ensure that timely intervention by Eskom will occur, both where an activity poses a potential threat to the nuclear installation(s) and where the nuclear installation(s) may pose an increased risk to the safety of the public and the environment. More specifically, agricultural products produced and processed in the site region are also exported nationally and internationally and the potential for exposure to an extended public therefore exists. It is therefore important that monitoring of radionuclide concentration in agricultural produce at processing facilities is carried out prior to the construction of the nuclear installation in order to determine the background radionuclide concentration levels as a baseline. Monitoring during the nuclear installation operation and termination is also necessary in order to identify any trends or risks to the public over the lifetime of the nuclear installation(s).

Monitoring of radionuclide concentrations in agricultural products and surface water and groundwater resources must be included in the nuclear

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installation monitoring programme that is informed by the potential radiological impact assessment (see **Chapter 7**).

5.5.10.3 Monitoring After Nuclear Installation(s) Operation and Decommissioning

The need for continued monitoring of land use, water use and agricultural produce will be determined in terms of **Chapter 7**.

5.5.11 Management System

As required by the SSR Technical Specification (Eskom, 2022), the assessment and evaluation of present and future land and water use around the site entailed the following components:

- desktop study;
- site investigations;
- receipt/use of data from other TSSR investigations;
- data analysis and reporting;
- use of computer software in particular *Microsoft Excel* sheets and GIS for collating, interpreting and presentation of data;
- mapping and creation of a GIS database and data management system.

A quality assurance programme for land and water use evaluation was established to control the effectiveness of the execution of the site investigation and data analyses. This conforms to the overall management system for this TSSR, as set out in **Chapter 10** (Management Systems) and the Eskom guidelines, i.e. to the appropriate grading for safety classification in terms of the NNR's RD-0034 (National Nuclear Regulator, 2008) and Eskom's NSIP02189 (Eskom, 2021) classification procedure. The evaluation of land and water use of a nuclear installation site has been determined as Safety Level 3, Safety Qualification 3. The details of the management system are set out in **Chapter 10**.

The activities carried out as part of the evaluation of the site and the results achieved are presented and described in this section. The databases are referenced in this section and form part of the GIS database that has been developed for this section. The results of the analyses are presented in the tables and in the drawings prepared for this section.

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The following documents were compiled by the consultant and accepted by Eskom to assist in quality assurance and to present a clear and auditable trail showing how key decisions were made and conclusions reached:

- SRK's Integrated Quality Management System and associated Work Instructions;
- the project-specific Project Quality Plan;
- Method Statement;
- Quality Control Plans;
- Project Process Chart.

The land and water use site characterisation has followed a peer review process to ensure that the work is carried out using standard industry methodologies and approaches. The peer review was carried out by a suitably qualified, independent and experienced professional, accepted by Eskom. Quality assurance is therefore demonstrated through the preparation of:

- process map containing reference to various data files;
- peer review reports.

Electronic records have been stored in a secure central repository with regular off-site back-up procedures and subject to Eskom's approval. The overall quality system complies with that set out in **Chapter 10**. All references cited are saved in the central repository.

Table 5.5.41 lists the activities to be carried out as part of the land and water use evaluation, links to other TSSR chapters/sections and the relevant quality control requirements.

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Table 5.5.41
Summary of Activities, Links and Quality Requirements

Activity	Links		Quality Control Requirements
	Inputs	Outputs	
Land cover analysis	<u>Section 5.1</u> (Geography): Determination of the site centroid. <u>Chapter 8</u>: Determination of the EPZs.	<u>Section 5.7, Chapter 6</u> (Evaluation of External Events), <u>Chapter 7</u> and <u>Chapter 8</u>: Provide information on existing land use. It is used to identify and validate potential sources of external hazards and the identification of potential risk to the population and the environment and informs the feasibility of the emergency plan.	• Method statement; • GIS application and analysis; • Graphical and tabulated presentation illustrating land cover in area and percentage distribution per sector for the site region; • Officially accepted national database; • Peer review.
Agricultural collection, processing and distribution		<u>Chapter 8</u>: Information used in the identification of potential risk to the population and the environment and the feasibility of the emergency plan.	• Method Statement; • Surveys and site verification; • GIS application and analysis; • Graphical and tabulated presentation illustrating agricultural collection, processing and distribution facilities per category per sector for the site region; • Peer review.

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Activity	Links		Quality Control Requirements
	Inputs	Outputs	
Current land and water use analysis	<u>Section 5.3</u> and <u>Section 5.12</u>: Information obtained from hydrologist and ecologist as a key input in the site land and water use description. <u>Chapter 8</u>: Determination of the EPZs. Eskom site investigations.	<u>Section 5.4</u>; <u>Section 5.7</u>; <u>Chapter 7</u> and <u>Chapter 8</u>: Information on existing land use is used to identify potential sources of external hazards and the identification of potential risk to the public and the environment and to inform the feasibility of the emergency plan.	• Method Statement; • Aerial photography, site survey and land use mapping; • GIS application and analysis; • Graphical and tabulated presentation illustrating land and water use in area and percentage distribution per sector per land use category for the site vicinity; • Water use per sector (domestic, industrial and commercial) from municipal records; • Peer review.
Agricultural production survey	<u>Chapter 8</u>: Determination of the EPZs.	<u>Chapter 7</u> and <u>Chapter 8</u>: Information on agricultural produce is used to identify potential radiological exposure pathways and to inform the feasibility of the emergency plan.	• Method Statement; • Telephonic survey; • GIS application and analysis; • Graphical and tabulated presentation illustrating agricultural produce as a total per category per sector for the site vicinity; • Peer review.

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Activity	Links		Quality Control Requirements
	Inputs	Outputs	
Emergency Planning Zones	Chapter 8: Determination of the EPZs.	Chapter 8: Input to the evaluation of the feasibility of the emergency planning and the control and monitoring of water and land use development in the formal EPZs.	• Method Statement; • Peer review.

Table 5.5.42 provides a summary table demonstrating compliance with the regulatory requirements that need to be met, as set out in **Subsection 5.5.3**.

Table 5.5.42
Regulatory Compliance Matrix

Act/Regulation	Regulation	Issue	Section Where Covered
Regulations on Siting (Department of Energy, 2011)	3(5)(c)(e)(f)	Site specific data on land use, regional development and projections.	<u>Subsections 5.5.5, 5.5.6 and 5.5.7</u>
	3(7)	Emergency Planning Zones.	<u>Subsections 5.5.4.1, 5.5.4.4 and 5.5.7</u>
Regulatory Guide: Interim Guidance for the Siting of Nuclear Facilities, RG 011 (National Nuclear Regulator, 2016)	7.1	The foreseeable significant changes in land use, such as expansion of existing facilities and human activities or the construction of high-risk installations.	<u>Subsections 5.5.5.1, 5.5.5.4, 5.5.5.5, 5.5.6.1, 5.5.6.4 and 5.5.7</u>
	8.2(1)	Characterisation of land and water use in the site region.	<u>Subsection 5.5.5</u>
	8.2(2)	Land and bodies of water that may be used by the population or may serve as a habitat for organisms in the food chain.	<u>Subsections 5.5.5.2, 5.5.6.2, 5.5.6.3 and 5.5.7</u>
	8.2(3)(a)	Land devoted to agricultural uses, its extent, and the main crops and their yields.	<u>Subsections 5.5.5.1, 5.5.6.1 and 5.5.7</u>
	8.2(3)(b)	Land devoted to dairy farming, its extent and yields.	

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Act/Regulation	Regulation	Issue	Section Where Covered
	8.2(3)(c)	Land devoted to industrial, institutional and recreational purposes, its extent and the characteristics of its use.	<u>Subsections 5.5.5.1, 5.5.6.1 and 5.5.7</u>
	8.2(3)(d)	Bodies of water used for commercial, individual and recreational fishing, including details of the aquatic species fished, their abundance and yield.	<u>Subsections 5.5.5.3 and 5.5.6.3</u>
	8.2(3)(e)	Bodies of water used for commercial purposes, including navigation, community water supply, irrigation and recreational purposes such as bathing and sailing.	
	8.2(3)(f)	Land and bodies of water supporting wildlife and livestock.	<u>Subsections 5.5.5.2, 5.5.5.3, 5.5.6.2, 5.5.6.3 and 5.5.7</u>
	8.2(3)(g)	Direct and indirect pathways for potential radioactive contamination of the food chain.	<u>Subsections 5.5.5.1, 5.5.6.1 and 5.5.7</u>
	8.2(3)(h)	Products imported to or exported from the region which may form part of the food chain.	
	8.2(3)(i)	Free foods such as mushrooms, berries and seaweed.	<u>Subsection 5.5.5.1 and 5.5.6.1</u>
	8.2(4)	Present use of water in the site region, as well as scope for future change in water use.	<u>Subsections 5.5.5.3, 5.5.5.4, 5.5.5.5 and 5.5.7</u>
	8.2(5)(b)	Types of water use both present and projected (life of facility)	
	8.2(5)(e)	Descriptions of the nature and extent of projected land use.	<u>Subsections 5.5.5.1, 5.5.6.1 and 5.5.7</u>
	8.2.5(f)	The location of any other nuclear and/or radiological	<u>Subsections 5.5.6.4 and 5.5.7</u>

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Act/Regulation	Regulation	Issue	Section Where Covered
		facilities located or proposed within the vicinity of the site.	
	8.2(6)	Recent agricultural production data and predictions for future production	<u>Subsections 5.5.5.1, 5.5.6.1 and 5.5.7</u>
	8.4.2(2)(e)	Information on past, current and anticipated future water uses	<u>Subsections 5.5.5.3, 5.5.5.4, 5.5.5.5, 5.5.6.3 and 5.5.7</u>
	8.6.1(d)	Locations and amount of water used for consumption, industrial, agricultural and recreational purposes.	<u>Subsection 5.5.5.3</u>
	9.1.(4)(g)	Agricultural activities that are sensitive to possible discharges of radionuclides	<u>Subsections 5.5.5.1 and 5.5.6.1</u>

5.5.12 Conclusions

The main conclusions to be drawn from this investigation are:

- Key characteristics of the existing and expected future use of land and water in the site region that are important to safety are the following:
 - The site region is characterised by predominantly natural areas (69.9 per cent). Agriculture makes up 24.0 per cent of the regional land cover. Very low levels of urban land cover are present (2.1 per cent), with relatively low industrial development.
 - Approximately 1.4 per cent of the region accommodates surface water resources. This water is used for irrigation and potable water supply within the site region. A large part thereof is transferred to the NMBM via the Algoa AWSS. Groundwater is an important water resource for the coastal towns and in the southern part of the region. Towns that rely on groundwater resources for supplementary potable water (i.e. in addition to water received via the AWSS), include Humansdorp, St. Francis Bay, Cape St. Francis, Oyster Bay and Jeffreys Bay. The main aquifer tapped comprises of fractured sandstone of the TMG Aquifer.

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- Overall, the AWSS is in deficit as a result of over-allocation, and the slow implementation of interventions to diversify water supply and reduce water requirements.
 - The Kouga Local Municipality has effectively reached the limit of its allocations from the Algoa AWSS. Further growth in the municipality's water requirements should therefore be met by the development of new water resources by the Kouga Local Municipality (e.g. groundwater resources).
 - The coastal towns in the site vicinity experience seasonal fluctuations in water use as a result of a large number of second homes that are occupied over holiday periods, as well as large numbers of tourists that visit, in particular over the Christmas and Easter holiday periods.
 - Agriculture occurs throughout the site region, largely along rivers and in coastal plains. Cultivation of fruit and vegetables is concentrated around Hankey and Patensie, with large volumes of citrus being cultivated and exported from the region. Significant dairy farming occurs in the coastal plains surrounding the site. Water for irrigation has been severely impacted by the ongoing drought, with many farmers resorting to drilling boreholes to augment their water supply.
 - The overall land use distribution in the site region is expected to remain relatively stable over the nuclear installation lifetime, particularly with respect to the urban settlements within the site vicinity: current spatial planning is directed at restricting outward growth of urban settlements through the implementation of urban edges.
 - In addition, large parts of the site vicinity are indicated for conservation purposes. Current data indicate that given the importance of agriculture and ongoing conservation efforts, it can be expected that land use within the site vicinity will not experience significant changes in the foreseeable future. This takes into account the restrictions on urban development in the area. The Kouga Local Municipality SDF indicates that the future development needs in the region are to be directed toward protecting the agricultural and natural resources through the implementation of urban edges. Where major development proposals do occur (e.g. the new industrial focussed development corridor along the R102 between Humansdorp and Jeffreys Bay), these occur outside of the 16 km zone.
- The evaluation of land and water use conducted for the purposes of this section have informed **Chapter 7** and **Chapter 8** of this SSR.

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Key characteristics are the following:

- The evaluation determined that significant agricultural activity is present within the 0.8 km to 3 km EPZ, and therefore it is likely that elements of the food chain are present in this zone.
- The urban settlement of Oyster Bay (including the associated informal settlement of Umzamowethu) is located within the 0.8 km to 3 km EPZ. Restrictions on the eastward development of Oyster Bay are required and should be regulated in order to restrict the number of permanent residents within the 0.8 km to 3 km EPZ, as well as to ensure that the emergency plan remains feasible over the lifetime of the nuclear installation.
- The coastal resort towns are to a large extent dependant for potable water resources on groundwater extraction and springs. Groundwater and water extracted from the Krom River is also used for irrigation of pasture crops and providing water for livestock. The Impofu Dam on the Krom River is an important water resource and forms part of the AWSS. Potential contamination of this water resource therefore has the potential to affect an extended public beyond the site region. The potential for such contamination is described in **Chapter 7** of this SSR.
- The respective data have been presented for the EPZs that have been defined for the site. In accordance with regulatory requirements, it has been determined that there is no urban development, institutions or recreational or economic activities that occur within the Exclusion Zone (i.e. 0 km to 0.8 km EPZ) of the nuclear installation(s) site.
- Monitoring of radionuclide concentrations in agricultural products and surface water and groundwater resources must be included in the nuclear installation monitoring programme that is informed by the human health risk assessment (see **Chapter 7**). Due to the potential risk of radiological exposure from agricultural products produced in the site vicinity and site region, regular monitoring on radionuclides in selected elements of the food chain needs to be implemented by Eskom in the operational stage of the nuclear installation(s).

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Appendix 5.5.A

Annular Land Cover in the Site Region in Hectares and Percentage

The land cover distribution is summarised in 10 km bands/annuli extending from the site up to the 50 km radius. The information was obtained from the 2020 South African National Land Cover data set (Department of Forestry, Fisheries and the Environment, 2021).

Land Cover Category	Area	Distance Bands (km)					Total
		0 to 10	10 to 20	20 to 30	30 to 40	40 to 50	
Barren land	ha	1 323.0	389.0	206.4	700.5	1 325.0	3 943.9
	%	8.5	0.9	0.4	0.9	1.3	1.3
Built-up commercial	ha	0.5	149.1	26.4	0.5	0.0	176.5
	%	0.0	0.4	0.0	0.0	0.0	0.1
Built-up industrial	ha	26.1	63.6	84.9	12.1	130.0	316.7
	%	0.2	0.2	0.1	0.0	0.1	0.1
Built-up residential (all)	ha	263.7	1 591.1	1 728.3	397.6	1 495.1	5 475.8
	%	1.7	3.8	3.0	0.5	1.5	1.9
Built-up smallholdings	ha	0.0	3.5	173.8	0.0	0.0	177.3
	%	0.0	0.0	0.3	0.0	0.0	0.1
Cultivated commercial annual pivot irrigated	ha	4 125.8	16 425.4	9 223.6	5 207.8	5 672.1	40 654.7
	%	26.5	39.5	16.1	6.9	5.6	13.9
Cultivated commercial annual non-pivot	ha	733.7	3 016.0	3 659.5	8 966.7	7 765.1	24 141.0
	%	4.7	7.2	6.4	11.9	7.6	8.3
Cultivated commercial permanent orchards	ha	0.0	0.0	4.8	386.1	4 490.9	4 881.8
	%	0.0	0.0	0.0	0.5	4.4	1.7

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Land Cover Category	Area	Distance Bands (km)					Total
		0 to 10	10 to 20	20 to 30	30 to 40	40 to 50	
Cultivated subsistence	ha	28.6	15.9	0.0	193.2	0.0	237.7
	%	0.2	0.0	0.0	0.3	0.0	0.1
Eroded land	ha	0.0	0.0	0.1	0.0	0.1	0.2
	%	0.0	0.0	0.0	0.0	0.0	0.0
Grasslands	ha	455.1	1 014.0	2 173.4	2 295.2	8 990.9	14 928.6
	%	2.9	2.4	3.8	3.0	8.8	5.1
Indigenous forest	ha	0.0	124.7	765.8	100.3	486.6	1 477.4
	%	0.0	0.3	1.3	0.1	0.5	0.5
Mines	ha	0.0	41.9	30.6	16.3	18.1	106.9
	%	0.0	0.1	0.0	0.0	0.0	0.04
Natural wooded land	ha	3 195.9	5 148.5	7 776.1	10 439.3	20 747.3	47 307.1
	%	20.5	12.4	13.6	13.8	20.3	16.2
Planted forest	ha	0.0	124.1	1 164.4	1 578.8	1 164.4	4 031.7
	%	0.0	0.3	1.1	2.1	1.1	1.4
Shrubland	ha	1 973.9	5 944.1	24 374.9	40 026.9	40 179.3	112 499.1
	%	12.7	14.3	42.5	53.0	39.4	38.5
Thicket dense bush	ha	3 078.6	6 628.1	5 157.3	4 424.3	8 716.2	28 004.5
	%	19.7	15.9	9.0	5.9	8.5	9.6
Waterbodies	ha	77.1	630.7	406.6	353.7	343.1	1 811.2
	%	0.5	1.5	0.7	0.5	0.3	0.6
Wetlands	ha	305.7	303.5	523.0	488.2	503.8	2 124.2
	%	2.0	0.7	0.9	0.6	0.5	0.7

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Land Cover Category	Area	Distance Bands (km)					Total
		0 to 10	10 to 20	20 to 30	30 to 40	40 to 50	
Total	ha	15 587.8	41 613.2	57 352.5	75 587.4	102 067.9	292 296.3

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Appendix 5.5.B

Agricultural Produce Collection, Processing and Distribution Facilities in the Site Region (50 km)

The location, distance and direction of agricultural collection, processing and distribution facilities within 50 km of the site are presented in the following **Tables 5.5.B.1** to **5.5.B.5**.

Table 5.5.B.1
Milk and Other Dairy Products

No.	Name of Entity / Facility	Type of Facility	Distance (km)	Direction
D1	Welgelegen 735	Dairy Farm	2.42	N
D2	Pennisands	Dairy Farm	2.73	NNE
D3	Welgelegen 2	Dairy Farm	3.25	NNW
D4	Grass Ridge	Dairy Farm	5.16	NW
D5	Buffelsbosch	Dairy Farm	5.27	NE
D6	Kleinrivier	Dairy Farm	6.69	NNW
D7	Buffelspos	Dairy Farm	6.77	NNE
D8	Reebokrant	Dairy Farm	8.50	NNW
D9	Kromhout	Dairy Farm	9.06	NW
D10	Klippedrift	Dairy Farm	9.19	WNW
D11	Goede Hoop	Dairy Farm	10.18	NW
D12	Sandwater Boerdery	Dairy Farm	10.28	NNE
D13	Powfontein	Dairy Farm	11.74	WNW
D14	Duonevlei	Dairy Farm	12.00	NW
D15	Brandkop	Dairy Farm	13.06	WNW
D16	Brakkenduinen	Dairy Farm	13.06	WNW
D17	Van Rooyenshoek	Dairy Farm	13.14	WNW
D18	Mooiutsig	Dairy Farm	13.32	NNW
D19	Sanddrift	Dairy Farm	14.45	WNW
D20	Kakebeenbos	Dairy Farm	16.54	NE
D21	Die Glen	Dairy Farm	16.61	NW
D22	Plaatjiesdrift	Dairy Farm	17.16	N
D23	Leeubos	Dairy Farm	17.28	N
D24	Rosenhof	Dairy Farm	17.56	NNW
D25	Doringrus	Dairy Farm	17.64	WNW

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No.	Name of Entity / Facility	Type of Facility	Distance (km)	Direction
D26	Orange Grove	Dairy Farm	17.84	N
D27	Woodlands Dairy	Dairy Processing Facility	18.46	N
D28	Villa Fonte	Dairy Farm	19.72	NNE
D29	Bergstroom	Dairy Farm	20.23	WNW
D30	Boplaas	Dairy Farm	20.54	N
D31	Hartebeesfontein	Dairy Farm	21.51	NE
D32	Diepriviermond	Dairy Farm	22.67	NNW
D33	Sarnia	Dairy Farm	22.95	NW
D34	Palmietvlei	Dairy Farm	23.39	WNW
D35	Die Hoek	Dairy Farm	23.54	WNW
D36	Schoonfontein	Dairy Farm	23.69	WNW
D37	Dairy Group	Dairy Farm	24.81	WNW
D38	Lanark	Dairy Farm	27.90	WNW
D39	Waterval	Dairy Farm	28.55	WNW
D40	Snyklip Dairy Partnership	Dairy Farm	29.88	NE
D41	Langfontein	Dairy Farm	30.63	WNW
D42	Mondplaas	Dairy Farm	32.55	WNW
D43	Essenbos	Dairy Farm	37.20	NE
D44	Vlakte @ Mondplaas	Dairy Farm	37.69	NW
D45	Arbeidsgenot	Dairy Farm	39.35	NE
D46	Case-moo-selot	Dairy Farm	39.79	WNW
D47	Waterfall	Dairy Farm	40.30	NE
D48	Velmoed	Dairy Farm	40.81	NW
D49	Onderwerf	Dairy Farm	42.29	WNW
D50	Lactimar	Dairy Farm	42.43	WNW
D51	Klein Loerievlaakte	Dairy Farm	42.80	WNW
D52	Brakfontein	Dairy Farm	42.80	NE
D53	Hofmansbos	Dairy Farm	43.97	WNW
D54	Assagaibos	Dairy Farm	44.24	WNW
D55	Uitvlucht	Dairy Farm	44.49	NW
D56	Tamil	Dairy Farm	44.53	NW
D57	Hillmac	Dairy Farm	44.61	WNW
D58	Eersterivier	Dairy Farm	45.00	WNW
D59	Just Milk (Greenside A)	Dairy Farm	45.19	WNW

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No.	Name of Entity / Facility	Type of Facility	Distance (km)	Direction
D60	Carmel	Dairy Farm	46.41	WNW
D61	Nestle	Dairy Processing Facility	46.77	WNW
D62	Berg en Dal	Dairy Farm	47.49	WNW

Table 5.5.B.2
Fruit and Vegetables

No.	Name of Entity / Facility	Type of Facility	Distance (km)	Direction
FV1	Sonop Tamaties	Fruit Production	29.39	NE
FV2	Vrede	Fruit Production	30.50	NE
FV3	Ferreira Citrus Growers (Umzomnye Farm)	Pack House	39.68	NE
FV4	De Koning Broers Highlands Pakstoor	Pack House	39.91	NE
FV5	Hankey Citrus Packers	Pack House	43.66	NNE
FV6	Sonop Pack House	Pack House	43.74	NNE
FV7	Moorland Seedlings	Fruit & Vegetable Production / Distribution	44.60	NE
FV8	Nocton Organic Farm	Fruit & Vegetable Production / Distribution	45.71	NE
FV9	Loerie Veg	Fruit & Vegetable Distribution	46.31	NE
FV10	AIN Pack House	Pack House	46.35	N
FV11	Omnipack	Pack House	47.09	NNE
FV12	SG Ferreira	Pack House	47.12	N
FV13	Sonop Pack House	Pack House / Cold Store	47.39	N
FV14	Nuwelande	Pack House	47.45	N
FV15	Wisteria Boerdery	Cold Storage	47.90	N
FV16	Handleigh Packhouse and Cold Rooms	Pack House / Cold Store	48.09	N
FV17	Patensie Cold Storage	Pack House / Cold Store	48.41	NNE
FV18	Klipstoot	Pack House	48.41	N
FV19	Endulini Fruit	Pack House / Cold Store	48.66	N
FV20	Entabeni	Pack House	48.69	N
FV21	Oorlogspoort Pakhuis	Pack House / Cold Store	48.76	NNE
FV22	Acht Farming	Pack House	48.96	N
FV23	Kouga Berries	Pack House	49.26	N

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Table 5.5.B.3
Chicken and Eggs

No.	Name of Entity / Facility	Type of Facility	Distance (km)	Direction
C1	Sovereign Chicken	Broiler	32.41	NE
C2	Sovereign Hillside	Broiler	41.59	NE
C3	Sovereign Bosbokrand	Hatchery	43.72	NE
C4	Sovereign Chicken	Broiler / Hatchery	44.84	NE
C5	Sovereign Handsworth	Broiler	45.69	NE
C6	Sovereign Loerie	Broiler	47.00	NE

Table 5.5.B.4
Meat

No.	Name of Entity / Facility	Type of Facility	Distance (km)	Direction
A1	Redline Abattoir	Abattoir	13.26	NNW
A2	Fonte Abattoir	Abattoir	20.24	WNW
A3	Tsitsikamma Meat Company	Abattoir	22.73	NW
A4	Bosbok Abattoir	Abattoir	24.38	NNW
A5	Rosedale Abattoir	Abattoir	27.02	NNW
A6	Dieprivier Abattoir	Abattoir	28.41	N
A7	Wancor Abattoir	Abattoir	42.67	NNE
A8	Modderfontein Hoenders	Abattoir	46.64	WNW
A9	Moirabattoir	Abattoir	49.13	NW
A10	Geelhoutboom Abattoir	Abattoir	49.68	NE

Table 5.5.B.5
Grain

No.	Name of Entity / Facility	Type of Facility	Distance (km)	Direction
G1	The Co-op	Grain Silo	19.19	NNE

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Appendix 5.5.C

Market Distribution of Agricultural Produce

The volume of selected agricultural products that enter the respective distribution channels in relation to the municipalities located within and partly within the site region are presented in the following **Tables 5.5.C.1** to **5.5.C.4**.

Table 5.5.C.1
Market Distribution of Selected Citrus per Municipality

Municipality	Fresh produce market	Direct to retailers & chain stores	Processing factories	Exported	Direct sales from farmer to consumer	Total
Metric Tons						
Oranges						
Kouga	8 422	643	3 456	87 748	30	100 301
Sundays River Valley	2 503	0	40 485	143 722	34	186 745
Total	10 925	643	43 941	231 470	64	287 046
Lemons						
Kouga	4 987	1 016	452	22 312	650	29 419
Sundays River Valley	1 058	232	5 412	100 432	29	107 164
Total	6 045	1 248	5 864	122 744	679	136 583
Naartjies						
Kouga	2 182	300	0	8 535	0	11 018
Sundays River Valley	131	0	620	11 655	0	12 408
Total	2 313	300	620	20 190	0	23 426
Other soft fruits or 'easy peelers'						
Kouga	3 329	455	127	22 040	8	25 961

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Municipality	Fresh produce market	Direct to retailers & chain stores	Processing factories	Exported	Direct sales from farmer to consumer	Total
Metric Tons						
Sundays River Valley	69	0	19 609	36 195	0	55 874
Total	3 398	455	19 736	58 235	8	81 835
Grapefruit						
Kouga	509	509	349	1 314	0	2 682
Sundays River Valley	76	0	0	1 594	0	1 670
Total	585	509	349	2 908	0	4 352

Table 5.5.C.2
Market Distribution of Selected Deciduous Fruit per Municipality

Municipality	Fresh Produce Market	Direct to Retailers and Chain Stores	Processing Factories	Exported	Direct Sales from Farmer to Consumer	Total
Metric Tons						
Apples						
KouKamma	20 427	14 929	25 169	34 071	1 716	96 314
Total	20 427	14 929	25 169	34 071	1 716	96 314
Pears						
KouKamma	9 440	2 868	8 337	16 555	245	37 447
Total	9 440	2 868	8 337	16 555	245	37 447
Peaches						

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Municipality	Fresh Produce Market	Direct to Retailers and Chain Stores	Processing Factories	Exported	Direct Sales from Farmer to Consumer	Total
Metric Tons						
KouKamma	270	194	0	0	2 720	3 185
Total	270	194	0	0	2 720	3 185
Plums						
KouKamma	1 537	1 992	9	2 597	0	6 137
Total	1 537	1 992	9	2 597	0	6 137

Table 5.5.C.3
Market Distribution of Selected Subtropical Fruit per Municipality

Municipality	Fresh Produce Market	Direct to Retailers and Chain Stores	Processing Factories	Exported	Direct Sales from Farmer to Consumer	Total
Metric Tons						
Avocados						
Kouga	376	33	0	0	0	410
Total	376	33	0	0	0	410
Berries						
Kouga	250	0	0	0	0	250
KouKamma	0	0	0	19	0	19
Total	250	0	0	19	0	269

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Table 5.5.C.4
Market Distribution of Selected Vegetables per Municipality

Municipality	Fresh Produce Market	Direct to Retailers and Chain Stores	Processing Factories	Exported	Direct Sales from Farmer to Consumer	Total
Metric Tons						
Beetroot						
Kouga	480	0	0	0	0	480
Total	480	0	0	0	0	480
Butternut						
Kouga	256	0	0	0	20	276
KouKamma	116	0	0	0	0	116
Total	372	0	0	0	20	392
Cabbage						
Kouga	1 874	6 427	10	0	100	8 411
Total	1 874	6 427	10	0	100	8 411
Carrots						
Kouga	27	2	400	0	0	430
Total	27	2	400	0	0	430
Onions						
Kouga	3	2	0	0	0	5
Total	3	2	0	0	0	5
Peppers						
Kouga	26	428	0	0	0	455
Total	26	428	0	0	0	455

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Municipality	Fresh Produce Market	Direct to Retailers and Chain Stores	Processing Factories	Exported	Direct Sales from Farmer to Consumer	Total
Metric Tons						
Potatoes						
Kouga	18 620	2 349	467	429	782	22 648
KouKamma	0	0	0	0	80	80
Total	18 620	2 349	467	429	782	22 728
Pumpkins						
Kouga	391	28	2	5	8	434
Total	391	28	2	5	8	434
Sweet Potatoes						
Kouga	120	0	0	0	0	120
Total	120	0	0	0	0	120
Tomatoes						
Kouga	90	0	0	0	0	90
Total	90	0	0	0	0	90

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Appendix 5.5.D Annular Land Cover within the EPZs

Land Cover Category	Area	0 km to 0.8 km EPZ	0.8 km to 3 km EPZ	3 km to 40 km EPZ	Total
Barren land	Ha	235.6	462.2	2 181.5	2 879.3
	%	21.3	18.1	1.1	1.4
Built-up commercial	Ha	0.0	0.5	179.0	179.5
	%	0.0	0.0	0.1	0.1
Built-up industrial	Ha	0.0	2.2	195.5	197.7
	%	0.0	0.1	0.1	0.1
Built-up residential (all)	Ha	0.6	95.1	4 079.0	4 174.7
	%	0.1	3.7	2.0	2.0
Built-up smallholdings	Ha	0.0	0.0	177.2	177.2
	%	0.0	0.0	0.1	0.1
Cultivated commercial annual pivot irrigated	Ha	0.0	508.5	36 124.9	36 633.3
	%	0.0	19.9	17.7	17.7
Cultivated commercial annual non-pivot	Ha	0.0	287.8	17 967.4	18 255.2
	%	0.0	11.3	8.8	8.8
Cultivated commercial permanent orchards	Ha	0.0	0.0	782.6	782.6
	%	0.0	0.0	0.4	0.4
Cultivated subsistence	Ha	0.0	0.0	237.7	237.7
	%	0.0	0.0	0.1	0.1
Eroded land	Ha	0.0	0.0	0.1	0.1
	%	0.0	0.0	0.0	0.0
Grasslands	Ha	95.8	65.4	6 912.1	7 073.3
	%	8.6	2.6	3.4	3.4
Indigenous forest	Ha	0.0	0.0	990.8	990.8
	%	0.0	0.0	0.5	0.5
Mines	Ha	0	0.0	90.0	90.0
	%	0.0	0.0	0.0	0.0
Natural wooded land	Ha	316.9	498.9	28 856.4	29 672.2
	%	28.6	19.6	14.2	14.3
Planted forest	Ha	0.0	0.0	2 946.4	2 946.4
	%	0.0	0.0	1.4	1.4
Shrubland	Ha	0.0	47.5	79 390.3	79 437.8
	%	0.0	1.9	39.0	38.3
Thicket dense bush	Ha	459.0	576.3	19 380.9	20 416.2
	%	41.4	22.6	9.5	9.8
Waterbodies	Ha	0.2	6.3	1 573.7	1 580.2

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Land Cover Category	Area	0 km to 0.8 km EPZ	0.8 km to 3 km EPZ	3 km to 40 km EPZ	Total
	%	0.0	0.2	0.8	0.8
Wetlands	Ha	0.0	0.0	1 722.4	1 722.4
	%	0.0	0.0	0.8	0.8
TOTAL	Ha	1 108.1	2 550.6	203 787.9	207 447.6