TRANSNET

SCOPING AND ENVIRONMENTAL IMPACT ASSESSMENT

Scoping and Environmental Impact Assessment for the proposed Manganese Export Facility and Associated Infrastructure in the Coega Industrial Development Zone, Port of Ngqura and Tankatara area

DRAFT EIA REPORT

CHAPTER 13:

VISUAL IMPACT ASSESSMENT

EXECUTIVE SUMMARY

The visual specialist study of the proposed Manganese Ore Export Terminal in the Coega Industrial Zone was conducted by Henry Holland of Map(this).

The proposed development will be located in a landscape designated for heavy industrial developments with a low sensitivity to the development type. Surrounding landscape types have low or medium sensitivity to the development type since they are in close proximity to an industrial landscape type.

Sensitive visual receptors that will potentially be affected by the development are:

- People working in the Coega IDZ and Port of Ngqura;
- Residents of towns and informal settlements surrounding the IDZ;
- Visual receptors (residents and viewpoints) on farms surrounding the IDZ;
- Visual receptors on surrounding protected areas; and
- Motorists on major roads passing the facility (e.g. N2 national road).

Motorists and visual receptors in the Coega IDZ are most likely to be highly exposed to the development, particularly the Manganese Ore Export Terminal. Motorists have a medium sensitivity to potential changes in the landscape brought about by the development due to the emphasis in the CDC Master Plan on the aesthetic presentation of developments next to the N2 and R334. They will however spend very little time in sections of high visual exposure. Visual intrusion of the Manganese Ore Export Terminal on views of visual receptors in the region is expected to be low since the development will fit in with its industrial surroundings and the planned future of the region.

The compilation yard will extend about 3 km into the Tankatara Trust 643 farm on the northern boundary of the IDZ. Visual receptors in this area are highly sensitive to changes in their views brought about by this type of development, and they are likely to be highly exposed to it. However, there are very few visual receptors in this area. Visual intrusion on their views is medium due to existing structures and quality of views (power lines, railway lines and sidings and industrial buildings in the IDZ). Highly sensitive visual receptors in surrounding protected areas (GAENP) will experience low visual exposure to the development.

The significance of impact on the landscape from the proposed Manganese Ore Export Terminal and compilation yard is **low** since it will not alter the landscape character type.

Construction phase
The significance of visual impact of construction activities at the Manganese Ore Export Terminal on visual receptors is **medium** before mitigation (high visual exposure of medium sensitivity visual receptors) and **low** after mitigation. Mitigation measures include strict adherence to the Transnet standards for construction activities with emphasis on demarcation of construction boundaries and minimising areas of surface disturbance. Night lighting of construction sites should also be minimised within requirements of safety and efficiency.

The significance of the visual impact of construction activities at the compilation yard is predicted to be **medium** before mitigation and **low** with mitigation. Mitigation measures are the same but

particular care should be taken to minimise vegetation clearance, and laydown areas and construction camps should be located in low visibility areas.

Operational phase

Significance of visual impact of manganese ore stockpiles on the existing views of sensitive visual receptors is **low** due to very few highly sensitive visual receptors that will be affected. Motorists will only be highly exposed to them for about 3 minutes.

Significance of visual impact of proposed compilation yard is **medium** (a few highly sensitive visual receptors will potentially be highly exposed to the development). After mitigation the impact should be **low**. Mitigation measures include adherence to CDC Guidelines for Developments, emphasis on retaining and rehabilitating vegetation, a lighting plan which takes cognisance of highly sensitive visual receptors in the GAENP.

The significance of visual impact of the proposed conveyor system is **medium** before mitigation and **low** thereafter due to moderate irreplaceability of visual resources and moderate reversibility of the impact. The preferred route is likely to cause permanent scarring across steep slopes in an area which is visible to motorists along the N2 and which is currently relatively undisturbed. The alternative route is more likely to affect only areas that are already visually disturbed. Mitigation measures include adherence to the CDC Visual Guidelines for Developments, consultation with a landscape architect on prevention and rehabilitation of cut-and-fill scarring, and minimal lighting of the conveyor system at night.

Significance of visual impact of night lighting of the Manganese Ore Export Terminal is **medium** (mainly due to risk posed by glaring lights to motorists on the N2). A careful lighting design with emphasis on minimising light spill onto the N2 and R334 should lower the significance of the impact.

Significance of visual impact of night lighting of the compilation yard is **medium** before mitigation and **low** thereafter. Mitigation measures are similar as for the Manganese Ore Export Terminal but particular attention should be paid to lighting that may affect visual receptors in the GAENP.

Overall significance of visual impact of the proposed development is **medium** before mitigation and **low** thereafter, because very few highly sensitive visual receptors will be highly or even moderately affected by the development.

The preferred route will cause scarring from cut-and-fill against the southern bank of the Coega River in areas where there are currently no developments, but this will be visible to motorists only, and only for a very short period as they approach and cross the N2 from the north. A conveyor system along the alternative route will have a higher visibility, and motorists driving along the N2 will be highly exposed to this route for a longer period, approaching from south or north. Cut-and-fill scarring will occur right next to the N2 where motorists will be highly visually exposed to the scarring, however this particular area near the N2 is already heavily impacted due to construction of the N2. The overall significance of visual impact will therefore be the same for the preferred and alternative conveyor route.

Alternative 2 of the Compilation Yard development is slightly preferred in terms of visual impact since it will affect fewer visual receptors.

The siting of the stockpiles is not ideal since it is in close proximity to a major tourist route (N2) and will have a negative visual impact on motorists driving along the N2 and R334, but this impact will be of short duration since the stockpiles are unlikely to be visible for more than 3 minutes. The topographic screening by the deeply incised Coega River valley at this location is very effective and it is unlikely that there is a better site in the IDZ for locating the stockpiles.

The cumulative visual impact of the proposed Manganese Ore Export Facility is **low** since it will be hosted in a landscape that is designated to industrial developments. There are many industrial developments in various stages of planning, some of which will be built in the Coega IDZ over the next couple of years. Among these there are very large and highly visible developments such as oil refineries, ferro-manganese smelters, as well as several wind energy facilities. As these come on line the visual impact of the terminal will diminish.

The compilation yard will be installed in a relatively undisturbed area of the landscape (in terms of industrial developments) but there are very few highly sensitive visual receptors that will be affected by the development. Appropriate night lighting of the development will minimise the impact on visual receptors in the GAENP.

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CHAPTER 13: VISUAL IMPACT ASSESSMENT

This chapter presents the Visual Specialist study undertaken by Henry Holland, under appointment to CSIR, as part of the Environmental Impact Assessment for the proposed Manganese Ore export facility and associated infrastructure in the Coega Industrial Development Zone, Port of Ngqura and Tankatara Trust 643 farm area.

13.1 INTRODUCTION AND METHODOLOGY

13.1.1 Scope and Objectives

13.1.1.1 Objective

The objective of this study is to assess the potential visual impact that the proposed development will have on sensitive visual receptors in the region.

13.1.1.2 Guiding Concepts for Visual Assessments

This Visual Impact Assessment (VIA) is based on guidelines for visual assessment specialist studies as set out by South Africa's Western Cape Department of Environmental Affairs and Development Planning (DEA&DP) (Oberholzer, 2005) as well as guidelines provided by the Landscape Institute of the UK (GLVIA, 2002). The DEA&DP guideline recommends that a visual impact assessment consider the following specific concepts (from Oberholzer 2005):

- An awareness that 'visual' implies the full range of visual, aesthetic, cultural and spiritual aspects of the environment that contribute to the area's sense of place.
- The considerations of both the natural and cultural landscape, and their interrelatedness.
- The identification of all scenic resources, protected areas and sites of special interest, together with their relative importance in the region.
- An understanding of the landscape processes, including geological, vegetation and settlement patterns, which give the landscape its particular character or scenic attributes.
- The need to include both quantitative criteria, such as 'visibility', and qualitative criteria, such as aesthetic value or sense of place.
- The need to include visual input as an integral part of the project planning and design process, so that the findings and recommended mitigation measures can inform the final design, and hopefully the quality of the project.
- The need to determine the value of visual/aesthetic resources through public involvement.

13.1.1.3 Visual Triggers

Oberholzer (2005) identifies visual triggers which are used to determine the approach and scope of an impact study. The following triggers, related to the receiving environment, are potentially applicable to this project:

- Areas with protection status, such as national parks or nature reserves (Greater Addo Elephant National Park);

Triggers related to the nature of the project:

- High intensity type projects including large-scale infrastructure;
- A change in land use from the prevailing use (in the case of the compilation yard);
- A significant change to the fabric and character of the area;
- Possible visual intrusion in the landscape.

13.1.2 Terms of Reference

Terms of reference for the Visual Specialist include the following:

- A desktop review of existing relevant documentation (e.g. municipal and regional planning policy, spatial development frameworks, legislation, national and international examples of similar developments), and availability of data (sensitive landscapes and visual receptors, spatial data for visibility analyses and landscape assessment), in order to obtain a basis for evaluating the confidence levels for the overall impact assessment.
- A desktop analysis with the use of GIS and available spatial data to determine:
    - Areas of scenic interest (protected areas such as the Greater Addo Elephant National Park, sites of cultural importance, heritage sites).
    - Potential sensitive receptors (viewpoints, residences).
    - Preliminary zone of visual influence.
    - Principal representative viewpoints.
- Description of the affected environment and determination of the status quo in terms of its visual character, visual absorption capacity. Identification of significant visual features or visual disturbances, as well as any sensitive visual receptors within the proposed project area or within viewshed of the proposed project area.
- A photographic survey by conducting fieldwork to provide the following:
    - Photographic record of landscape elements within the study area.
    - Photographic record of the visual baseline for views from principal viewpoints.
    - The actual zone of visual influence by determining the effect of vegetation, buildings and topography on visibility in the study area.
    - Identification of sensitive receptors (viewers and landscape elements that will be affected by the proposed development).
- A description of the landscape baseline incorporating the results from the desktop review and field survey to provide a description of the existing character (such as geology, topography, land cover and human settlements) and condition of the landscape in terms of its current state relating to human impact, as well as considering the development plans for the IDZ and associated changes in visual character in the area.
- Determining the Zone of Visual Influence and the practical extents of the area for the visibility analysis. This will include a description of the visual absorption capacity for the area and the calculation of cumulative viewsheds for various elements of the development where necessary (and for all alternatives).
- Establishment of view catchment area, view corridors, viewpoints and receptors.
- Identification of relevant protocols, legal and permit requirements relating to visual impacts likely to be generated as a result of the proposed project.
- Maps depicting current viewsheds/visual landscape/obstructions, as well as expected visual impacts during both the construction and operational phases of development.
- Schematic portrayals of the visual impact of the proposed project infrastructure on the different viewsheds identified.

- Assessment of visual impacts on the cultural landscape.
- Assessment of visual impacts (in terms of sensitivity of visual receptors, visual exposure and visual intrusion), including potential lighting impacts at night and impacts on sensitive visual receptors within the proposed project area (such as Tankatara Farm, Addo Elephant National Park and surrounding residential areas).

13.1.3 Approach and Methodology

Photographic Survey
The field survey (conducted on 13 July 2012, as well as photographic surveys for various projects in the Coega region since 2008) provided an opportunity to:

- Determine the actual or practical extent of potential visibility of the proposed development, by assessing the screening effect of landscape features;
- Conduct a photographic survey of the landscape surrounding the development;
- Take photos for use in photomontage images;
- Identify sensitive landscape and visual receptors.

Viewpoints were chosen using the following criteria:
- High visibility – sites from where most of the development will be visible.
- High visual exposure – sites at various distances from the proposed site.
- Sensitive areas and viewpoints such as nature reserves and game farms from which the development will potentially be seen.

Additionally, photo sites were chosen to aid in describing the landscape surrounding, and potentially affected by, the proposed development.

Landscape Description
A desktop study was conducted to establish and describe the landscape character of the receiving environment. A combination of data analysis using a Geographic Information System (GIS), literature review and photographic survey was used to identify land cover, landforms and land use in order to gain an understanding of the current landscape within which the development will take place (GLVIA 2002). Landscape features of special interest were identified and mapped, as were landscape elements that may potentially be affected by the development.

Visual Impact Assessment
A GIS is used to calculate viewsheds for various components of the proposed development. The viewsheds and information gathered during the field survey are used to define criteria such as visibility, viewer sensitivity, visual exposure and visual intrusion for the proposed development. These criteria are, in turn, used to determine the intensity of potential visual impacts on sensitive viewers. All information and knowledge acquired as part of the assessment process are then used to determine the potential significance of the impacts according to the standardised rating methodology as described in the Terms of Reference.

13.1.4 Assumptions and Limitations

Spatial Data Accuracy
Spatial data used for visibility analysis originate from various sources and scales. Inaccuracy and errors are therefore inevitable. Where relevant these will be highlighted in the report. Eskom SPOT Building Count data is based on automated remote sensing techniques using SPOT5 satellite imagery which has a resolution of 10m x 10m. Not all the points identified as buildings have been

verified and as such not all points are necessarily buildings - where possible erroneous points have been removed.

Viewshed Calculations
Calculation of the viewsheds does not take into account the potential screening effect of vegetation and buildings.

13.1.5 Source of Information

The visual study is based on the following information:

- Documentation supplied by the client and the CSIR (including various iterations of the CDC EIA documentation and data);
- Digital topocadastral data at 1:50 000 (and 1:10000 where available) scale from National Geo-spatial Information;
- Eskom SPOT Building Count data set of 2008.
- South African digital land cover dataset of 2002, 2009 and data from the draft conservation assessment plan (SRK Consulting 2007);
- Google Earth software and data;
- Protected areas from the South African National Biodiversity Institute GIS database

13.1.6 Declaration of Independence

The declaration of independence by the visual specialist is provided in Box 13.1 below:

BOX 13.1: DECLARATION OF INDEPENDENCE FOR VISUAL IMPACT ASSESSMENT

I, Henry Holland, declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed Manganese Ore Export Terminal, Port of Ngqura, application or appeal in respect of which I was appointed, other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work.

Henry Holland, M.Sc., MapThis Trust

13.2 APPLICABLE POLICIES, LEGISLATION, STANDARDS AND GUIDELINES

According to the CDC East Masterplan (CDC 2010) views from the N2 and R334 are important since this is where the public will formulate their perception of the IDZ.
For example (paragraph 4.5, page 165):

> *"From a tourism and gateway-to-the-city perspective the aesthetics of the structures along the N2 need to be addressed to ensure no negative visual impact along the N2."*

The importance of aesthetic considerations for developments visible from the N2 is also emphasised in the CDC Visual Guidelines for Development (CKA 2002). It further suggests that the greatest visual impact of the IDZ on surrounding land will occur at night and several guidelines are given to minimise the negative effect of lighting on the regional nightscape.

The National Heritage Resources Act (NHRA) (Act 15 of 1999) deals with cultural and heritage resources. There are various permitting provisions, as well as requirements relating to Heritage Impact Assessment (HIA).

> *"3. (1) For the purposes of this Act, those heritage resources of South Africa which are of cultural significance or other special value for the present community and for future generations must be considered part of the national estate and fall within the sphere of operations of heritage resources authorities.*
> *(2) Without limiting the generality of subsection (1), the national estate may include—*
> *(a) places, buildings, structures and equipment of cultural significance;*
> *(b) places to which oral traditions are attached or which are associated with living heritage;*
> *(c) historical settlements and townscapes;*
> *(d) **landscapes** and natural features of cultural significance;*
> *(e)…"*

Other legislation applicable to visual impact assessments:

- The National Environmental Management Act (NEMA) and the Regulations in terms of Chapter 5 of NEMA. (Act No.107 of 1998).
- The Protected Areas Act (PAA) (Act 57 of 2003, Section 17) which refers among other things to the protection of natural landscapes.

13.3 DESCRIPTION OF PROJECT ASPECTS RELEVANT TO VISUAL IMPACTS

An overall project description is provided in chapter 2 of the EIA report. For site locality, refer to Map 13-1. Additional project information relevant to the visual impact assessment is provided below.

13.3.1 Proposed Manganese Ore Export Terminal

Table 13-1 lists structures and buildings of the Manganese Ore Export Terminal that are likely to have a visual impact due to their height and size. The manganese ore stockpiles are the least aesthetically pleasing aspect of the development. The 4 stockpile rows at 800 m long, 50 m wide and 17 m high each are potentially highly visible structures. Reclaimers and stackers are tall, crane like machines for moving the ore from/to stockpiles and conveyors. There will be 2 reclaimers and 3

stackers, with reclaimers potentially 34 m high. These machines move on rails along the length of the stockyard and are therefore potentially visible at any point along these tracks. The tippler accepts ore from the rail wagons and deposits it onto conveyor belts in the tippler vault underground for stacking on a stockpile. The tippler building is 15 m high. The conveyor system contains two conveyor belts next to each other, and is covered. The structure is approximately 4.5 m high and will be raised off the ground in some places, but will mostly be at ground level. A 15 meter high embankment will also be placed in front of the stockyard looking from Motherwell's side.

Structures proposed for the Port of Ngqura will have a negligible visual impact on sensitive visual receptors for the following reasons:

- Proposed structures (e.g. shiploader) are similar to, or the same as, existing structures in the port and will cause negligible or very low visual intrusion on views;
- The port is a small area which is relatively densely packed with tall, visible structures, and;
- New and future developments in the IDZ are likely to require similar changes in the port which means that the port is changing continually and likely to change in future with additions similar to the proposed structures.

These structures are therefore not included in the visual impact assessment of the project.

Table 13-1 Heights of structures associated with the Manganese Ore Export Terminal relevant to this assessment.

Structure	Height
Stockpiles	17 m
Office Buildings	5 m
Tippler	15 m
Reclaimers and Stackers	34 m
Conveyors	4.5 m
Store Building	12.5 m

13.3.2 Proposed Compilation Yard

Apart from railway lines in the compilation yard there will also be a number of single and double storey buildings which are relevant to the visual impact assessment:

- A facility for maintenance of wagons and locomotives;
- Diesel locomotive refuelling facility with above ground storage tanks;
- Locomotive sanding facility (storage shed);
- Locomotive washing bay;
- Security building;
- Two shunter cabins;
- Transnet Freight Rail operations building;
- Three signalling relay rooms.

Table 13-2 Heights of structures associated with the compilation yard relevant to the visual impact assessment.

Structure	Height
Buildings	5 m
Freight Rail Operations building, locomotive and wagon workshops	12 m
Rail Wagons	4 m
Locomotive	5 m

Ore carrying wagons are 4 m high and they will be moving in 2 trains of 100 wagons each, which will see an increase in rail traffic for the region. The trains will attract attention due to their movement, length and the height of the wagons.

Doubling of the railway line between the compilation yard and the stockyard (tippler) will occur along the existing rail reserve which will be widened to accommodate the extra line. The increase in rail traffic and potential scarring caused by cut-and-fill processes along steep slopes will be the major visual impacts of this component of the proposed development. The existing line follows the deeply incised stream valley from the compilation yard to the Coega River valley and is unlikely to be visible beyond the IDZ (Figure 13-1). Visual receptors within the IDZ are unlikely to notice the increase in traffic along this route since it is already an established route with existing traffic.
Furthermore, considerable expansion of the railway system within the IDZ is planned for the future. The visual impact of the railway line doubling is therefore expected to be negligible.

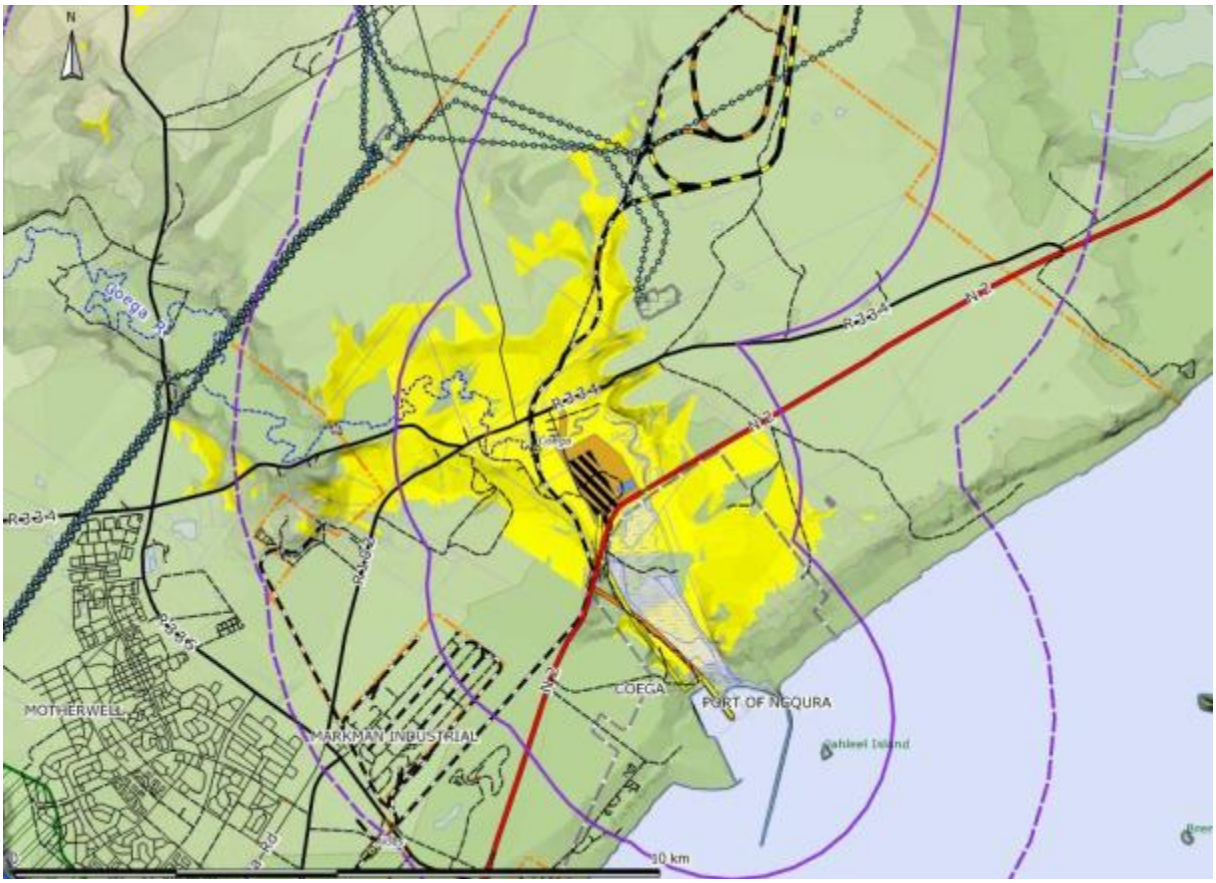

Figure 13-1 A simple viewshed (yellow) of the section of rail which will be expanded (doubling) shows that only visual receptors in the IDZ will potentially be affected.

13.4 DESCRIPTION OF THE AFFECTED ENVIRONMENT

A generic description of the affected environment is provided in chapter 3 of the EIA report, with additional detail on the aspects of the environment relevant to the visual impact assessment provided below.

13.4.1 Landscape Baseline

Landscape baseline	A description of the existing elements, features, characteristics, character, quality and extent of the landscape (GLVIA, 2002).

13.4.1.1 Topography

From the beach near the Coega River mouth the land rises sharply at first onto a palaeo-marine platform (Coega Platform) which is mostly flat and on which most of the Coega IDZ is located. Beyond the IDZ the land rises more steeply again onto a second platform (Grassridge Platform). The Grassridge Platform gives way to foothills of the Groot Winterhoek Mountains near The Springs resort. The two platforms or terraces are dissected by the Coega, Sundays and Swartkops River systems (Map 13-2). The Sundays and Swartkops river floodplains are broad and form major landforms in the study area. The Coega River floodplain bisects the IDZ and the mouth of the river is the location of the Port of Ngqura. The two major terraces are readily seen in the SE-NW profile (Map 13-3c) while the SW-NE profile shows the effect of the three major rivers and their floodplains on the local topography (Map 13-3d).

13.4.1.2 Geology (Map 13-4)

Alluvium/Sand
The three major river floodplains are filled with sediment (alluvium) derived from extensive drainage basins (especially that of the Sundays River), and provides fertile soils for agricultural development.
Dunes of the Alexandria coastal dune field extends along the coast from Cannonvale at the Sundays River mouth eastwards to Woody Cape. The dune field forms when a strong dominant wind blows onshore along a long sandy beach, and it is known as an accretionary sheet dune field (Illenberger and Burkinshaw 2008).

Algoa Group
The *Nanaga Formation* represents coastal palaeo dune fields. It consists mostly of calcareous sandstone which weathers to form surficial calcrete or red, clayey soil (Roberts et al. 2006). These palaeo dunes form high beach ridges and rolling hills, with crests up to 100m above the valleys between dunes and are seen in the landscape east of Colchester (Illenberger and Burkinshaw 2008).
The *Alexandria Formation* underlies the Nanaga Formation in the Algoa Group and represents marine deposits formed during a series of marine transgression/regression cycles (rising and falling sea-level) which was caused by a succession of ice ages (McCarthy and Rubidge 2006). The formation comprises layers of conglomerate, oyster shells and calcareous sandstones. This layer forms the marine terraces or platforms mentioned in section 13.4.1.1 on the topography of the study area.

Grahamstown Formation
The Grahamstown Formation consists of silcrete which is a combination of sand and pebbles cemented in a matrix of hard siliceous material (Partridge, Botha, and Haddon 2006). It formed through deep weathering of rocks during a warm humid period in the Cretaceous. These deposits are erosion resistant and will generally produce positive relief. A few small outcrops occur within the study area.

Uitenhage Group
The Enon, Kirkwood and Sundays River Formations represent the Uitenhage Group in this region. Rocks from this group were deposited in basins formed along the southern margin of Africa during the break-up of Gondwana. The *Enon Formation*, the lower most layer, consists mainly of conglomerate with large pebbles and cobbles and were deposited under high energy conditions, generally attributed to initiation of the extensional tectonics prevalent at the time. Above this lie sandstones and mudstones of the *Kirkwood Formation* which were deposited in rivers further from the basin scarps. Rocks of the *Sundays River Formation* represent shallow marine environments such as estuaries and lagoons and comprise thin layers of sandstone, siltstones and mudstones (Shone 2006; McCarthy and Rubidge 2006). The conglomerates of the Enon Formation were therefore deposited at the steep scarps at the edge of the developing Algoa Basin, while the Kirkwood formation represents lower energy river systems inside the basin, and the Sundays River Formation indicate the coastal boundary of the basin (which gradually moved inland as water from the ocean filled the expanding basin).

Suurberg Group
The Suurberg volcanic rocks were extruded during the extensional tectonics of the Gondwana break-up. It consists of basalt, tuff (volcanic ash) and breccia.

Cape Supergroup
The *Peninsula Formation* and *Nardouw Subgroup* (Table Mountain Group) consist of a sequence of relatively pure sandstone (arenite) layers deposited in shallow seas and fluvial braided plains. Later the sedimentary rocks were altered by compressional tectonic forces and heat to produce hard, erosion resistant metamorphic rocks known as quartzites. The *Ceres Subgroup* (Bokkeveld Group) was deposited in numerous deltas, and consists of finer grained material in layers of mudstone and arenite. Overlying the Ceres Subgroup are rocks of the Traka Subgroup (Bokkeveld Group) which consists of layers representative of deeper marine environments at the front of deltas. Mudstones and siltstones are the main rock types with some sandstone layers. These rocks tend to weather quicker relative to the harder quartzites and often form valleys between quartzite ridges or mountains. The *Weltevrede Formation* is the basal layer of the Witteberg Subgroup in the Eastern Cape. It consists of alternating layers of shale, sandstone and siltstone and represents fluvial and deltaic deposits. The Zuurberg mountain range north of Addo Elephant National Park is made up of Witteberg Subgroup rocks.

Gamtoos Inlier
Rocks of the Gamtoos Group are exposed along the northern flank of the Algoa Basin (Uitenhage Group). These layers were deposited in pre-Cambrian times and imprints of a number of tectonic events obscure accurate interpretation of their origins (Gresse, Von Veh, and Frimmel 2006).

Geological History
A number of tectonic events produced the topography of the study area. After deposition of the Cape Supergroup rocks, a subduction zone formed along the southern margin of Gondwana. The sediments (Cape Supergroup) on the seafloor were compressed and buckled, and a mountain range similar to that of the Andes was formed (Cape Fold Belt). The break-up of Gondwana occurred during the late Jurassic and Cretaceous Periods along the southern African boundary. Most

sedimentation during this time occurred either off-shore (in the Atlantic and Indian Oceans), or in small inland basins caused by extensional tectonics. The Algoa Basin is an example of one of these basins, and it was filled with sediments of the Uitenhage Group. As Gondwana continued to break up the sea flooded into these basins and the southern African continental shelf was developed. Differential erosion of the softer Bokkeveld Group rocks created longitudinal valleys between the mountain ridges formed by harder quartzites of the Table Mountain Group. Various ice-ages subsequent to the establishment of the continental shelf caused changes in sea level which produced marine and fluvial terraces along the coast. In particular, two major continental uplift events in the last 20 million years caused major terracing and drainage rejuvenation. Marine terraces were deeply incised during regression of sea level as stream erosion was renewed.

13.4.1.3 Land Cover (Map 13-5)

The Manganese Ore Export Terminal and Compilation Yard will be located in the Coega IDZ and Port of Ngqura, with the Compilation Yard extending approximately 3 km onto the Tankatara farm north of the IDZ. The IDZ is currently under development with a number of projects in the construction phase, while many others are planned for the future. South and west of the IDZ are formal and informal urban areas and further industrial zones. Among the urban settlements are coastal resorts such as Bluewater Bay, and rapidly expanding townships such as Motherwell and Kwanobuhle. Suburbs of Port Elizabeth are also within the study area, as are Uitenhage and Despatch. West and north-west of the IDZ are agricultural land with crops, livestock and game farming (or private nature reserves). The floodplain of the Sundays River is under irrigated cultivation. There are numerous opencast mining operations and quarries in the surrounding landscape. Much of the land north of Colchester is protected as part of the Greater Addo Elephant National Park (GAENP), as are the dune fields east of the Sundays River mouth. The three islands off Coega River mouth (Jahleel, Brenton and St Croix) are also designated protected areas.

13.4.1.4 Built Environment (Map 13-6)

The Coega IDZ falls within the Nelson Mandela Bay Municipal Metropole and is surrounded by formal and informal settlements and industrial areas. Port Elizabeth, Uitenhage and Despatch are the main industrial centres, and numerous other urban areas have developed around these. The closest residential areas to the Coega IDZ are Motherwell (which abuts the IDZ) and St Georges Strand. No residential development is planned within the IDZ. Colchester, Cannonvale and Bluewater Bay are coastal resorts with some seasonal flux in population.

A network of major roads surrounds and dissects the IDZ, and a major railway line passes through the area. Various high voltage power lines and substations are common features of the landscape, as are large industrial buildings and structures. The nearby deep water port of Ngqura contains cranes and other tall structures.

13.4.2 Landscape Character Sensitivity

Landscape character	The distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape, and how this is perceived by people. It reflects particular combinations of geology, landform, soils, vegetation, land use and human settlement. It creates the particular sense of place of different areas of the landscape (GLVIA, 2002).

Landscape Character sensitivity	This provides an indication of the ability of a landscape to absorb change from the proposed development without changing character. A pristine landscape prized for its natural beauty, or a landscape of high cultural value will have high sensitivity to changes brought about by new developments.

13.4.2.1 Urban and industrial areas

The proposed development will be constructed in an industrial landscape with some urban elements surrounding it. The sensitivity to the proposed development for this landscape character type is expected to be low since the structures associated with the development are seen as congruent with industrial landscapes, and this is clearly not a pristine landscape. It is constantly changing and large industrial type activities and structures are expected in this landscape type. The urban areas that will be affected are surrounded by industrial developments and activities.

13.4.2.2 Agricultural landscape

The agricultural land west and north-west of the IDZ will have a medium to low sensitivity to the proposed development since it is surrounded and encroached on by urban, peri-urban and industrial developments. High voltage power lines cross the landscape and are often visible against the skyline. A network of major roads dissects the landscape. It is a landscape that is rapidly changing.

13.4.2.3 River floodplain agriculture

A medium to low sensitivity to the proposed development is expected since this landscape is under intense cultivation and large structures such as warehouses and irrigation equipment are visible in the landscape. Very little pristine landscape remains outside the GAENP.

13.4.2.4 Coastal dune fields

The coastal dune fields east of Colchester are relatively devoid of man-made structures and other signs of human activity. It is also a protected area and the potential for pristine landscapes exist although these are more likely to be seaward of the development. A medium sensitivity to the development is therefore expected.

13.4.2.5 Protected areas on the plateau above Colchester

This area is also relatively free of man-made structures, but due to its elevation above the surrounding landscape many views contain structures more suited to the surrounding agricultural and industrial landscapes. The proposed development is therefore unlikely to change this landscape character since industrial developments will be expected in the surrounding landscape and a medium sensitivity is expected.

13.5 IDENTIFICATION OF KEY ISSUES

The anticipated key issues identified during the scoping phase are as follow:

- Change in the rural character of the surrounding countryside and sense of place of the landscape.
- Visual impacts on sensitive receptors.
- The cumulative visual impact with other approved projects (e.g. wind farms in the area, proposed manganese smelter, etc.).

Issues raised by I&APs during the Scoping phase of the EIA concerns "what the stockyard would look like", visual impact on Tankatara farm, visibility of the proposed stockyard from the N2, potential impact on the nightscape of the region, and in particular the effect of night lighting of the proposed compilation yard on the Greater Addo Elephant National Park (GAENP).

13.6 ASSESSMENT OF VISUAL IMPACTS

The assessment and mitigation of impacts is conducted in the following steps:

- Identification of visual impact criteria (key theoretical concepts).
- Conducting a visibility analysis.
- Assessment of impacts of the project on the landscape and on receptors (viewers) taking into consideration factors such as sensitive viewers and viewpoints, visual exposure and visual intrusion.

13.6.1 Visual Impact Concepts and assessment Criteria

13.6.1.1 Visual assessment criteria used in assessing magnitude and significance

The potential visual impact of the proposed Manganese Ore Export Terminal and associated infrastructures is assessed using a number of criteria which provide the means to measure the magnitude and determine the significance of the potential impact (Oberholzer, 2005). The **visibility** (Section 0) of the project is an indication of where in the region the development will potentially be visible from. The rating is based on viewshed size only and is an indication of how much of a region will potentially be affected visually by the development. A high visibility rating does not necessarily signify a high visual impact, although it can if the region is densely populated with sensitive visual receptors. **Viewer (or visual receptor) sensitivity** (Section 13.6.1.3) is a measure of how sensitive potential viewers of the development are to changes in their views. Visual receptors are identified by looking at the development viewshed, and include scenic viewpoints, residents, motorists and recreational users of facilities within the viewshed. Their distance from the development (measured as **visual exposure** – Section 0) and the current composition of their views (measured as **visual intrusion** – Section 13.6.1.5) will determine impact intensity. The results of the analysis is summarised in Table 13-14**.**

The rating methodology for the impact assessment is provided In Chapter 4 Section 4.8.1 of the EIA report.

13.6.1.2 Visibility

Visibility of Project	The geographic area from which the project will be visible, or view catchment area. (The actual zone of visual influence of the project may be smaller because of screening by existing trees and buildings). The definition also relates to the number of receptors affected (Oberholzer, 2005). • *High visibility* - visible from a large area (e.g. several square kilometres). • *Moderate visibility* – visible from an intermediate area (e.g. several hectares). • *Low visibility* – visible from a small area around the project site.

In this report there is also another sense in which 'visibility' is used. Cumulative viewsheds indicate not only where a feature is visible from (the meaning of visibility as used in the definition above), but also how much of the feature will be visible from that point or area.

Manganese Ore Export Terminal
Viewsheds were calculated for various components of the terminal which are expected to affect sensitive viewers. Viewshed areas in km^2 are provided in Table 13-3 for an area within a 10 km radius around these components. Map 13-7 to Map 13-11 show cumulative viewsheds for various components and alternatives of the stockyard and conveyor corridors. The main contributors to high visibility are the tippler (due to its height and location), stackers and reclaimers, and the conveyors (due to their length). Viewsheds of terminal components are mostly constrained to within the IDZ and port, although visibility from the sea is quite high. Visibility of the stockpiles, potentially the least aesthetically pleasing aspect of the development, is limited due to its location on a low lying terrace in the Coega River valley (Map 13-7).

Table 13-3 View catchment areas for structures and components of the Manganese Ore Export Terminal (for a 10 km radius).

Structure	Viewshed Area (km^2)
Stockpiles	61
Buildings	23
Tippler	70
Reclaimers and Stackers	109
Preferred Conveyor	151.7
Alternative Conveyor	152.1
Stockyard[1] & Preferred Conveyor	210
Stockyard & Alternative Conveyor	206

[1] Stockyard includes all highly visible structures associated with the stockyard such as stockpiles, tippler, reclaimers and stackers.

Compilation Yard

Table 13-4 shows that the viewshed of layout alternative 2 of the compilation yard is slightly smaller than that of alternative 1. Their cumulative viewsheds are shown on Map 13-12 to Map 13-13.

Table 13-4 View catchment areas for Compilation Yard alternatives (for a 10 km radius).

Structure	Viewshed Area (km²)
Compilation Yard Alt 1	181
Compilation Yard Alt 2	171
Railway Doubling	23

Combined Terminal and Compilation Yard

Viewshed areas for the development as a whole for combinations of various alternative conveyor routes and compilation yard layouts are shown in
Table *13-5*, and viewshed maps for these combinations are shown on Map 13-14 to Map 13-17. The viewshed of combinations which include alternative 2 of the Compilation Yard is consistently slightly smaller than other combinations.

Table 13-5 Total view catchment areas for proposed development alternatives (for a 10 km radius).

Development Alternative	Viewshed Area (km²)
Stock Yard, Preferred Conveyor & Comp Yard Alt 1	344
Stock Yard, Preferred Conveyor & Comp Yard Alt 2	332
Stock Yard, Alternative Conveyor & Comp Yard Alt 1	327
Stock Yard, Alternative Conveyor & Comp Yard Alt 2	323

13.6.1.3 Sensitive Viewers and Viewpoints

Viewer sensitivity	The assessment of the receptivity of viewer groups to the visible landscape elements and visual character and their perception of visual quality and value. The sensitivity of viewer groups depends on their activity and awareness within the affected landscape, their preferences, preconceptions and their opinions.

A rating system provided by the Landscape Institute of the United Kingdom was used to determine viewer sensitivity:

	Definition (GLVIA, 2002)
Exceptional	Views from major tourist or recreational attractions or viewpoints promoted for or related to appreciation of the landscape, or from important landscape features.
High	Users of all outdoor recreational facilities including public and local roads or tourist routes whose attention may be focussed on the landscape; Communities where the development results in changes in the landscape setting or valued views enjoyed by the community; Residents with views affected by the development.
Moderate	People engaged in outdoor sport or recreation (other than appreciation of the landscape).
Low	People at their place of work or focussed on other work or activity; Views from urbanised areas, commercial buildings or industrial zones; People travelling through or passing the affected landscape on transport routes
Negligible (uncommon)	Views from heavily industrialised or blighted areas.

Sensitive viewers identified from viewshed maps (Map 13-7 to Map 13-17) are:

- People working in the Coega IDZ and Port of Ngqura;
- Residents of towns and informal settlements surrounding the IDZ;
- Visual receptors (residents and viewpoints) on farms surrounding the IDZ;
- Visual receptors on surrounding protected areas; and
- Motorists on local roads.

Protected areas

Areas within the GAENP just north of Colchester may provide views of the proposed development. Visual receptors in protected areas are highly sensitive to changes in the surrounding landscape. Existing views towards the IDZ include industrial elements and the introduction of an industrial development into the landscape will not be unexpected. The three islands in Algoa Bay are also protected areas and some of the components of the development will be visible from these. Table 13-7 lists the protected areas in which visual receptors will potentially be affected and the components of the development that may be visible from them (see Table 13.6) for definition of protected area types according to the Subtropical Thicket Ecosystem Project (STEP)).

Table 13-6 Protected area types as defined by STEP

STEP PROTECTED AREA TYPE	TYPE DESCRIPTION
Type 1	A protected area owned and run by the State, Province or a local authority. Conservatio legislation is strong.
Type 2	Public or private land managed for conservation and other land uses. Conservatio legislation is weak or non-existent.
Type 3	Areas potentially available for conservation, owing to the existence of a structure fo communication between conservation planners and landowners.

Table 13-7 STEP Protected Areas which may be affected by the proposed development and their distance from the nearest component.

Protected Area	STEP Type	Distance (km)	Proposed Development Components
Jahleel Island	1	1.5	Conveyor routes, tippler.
GAENP	1	6.1	All components.
Brenton Island	1	7.1	Conveyor routes.
St Croix Island	1	7.3	Conveyor routes, compilation yard (1 and 2).
Tregathlyn	3	8.9	Compilation yard will potentially be visible on hills in the north of the PA.
The Penhurst Railway Reserve	2	9.2	Small parts of compilation yard may be visible.
Grassridge Private Nature Reserve	2	12.1	Conveyor routes, tippler, reclaimers & stackers.
GAENP (Coastal)	1	14.2	Conveyor routes, tippler, reclaimers & stackers, and compilation yard.
Springs Local Nature Reserve	1	19.8	Tippler, reclaimers & stackers, stockpiles.

Residents of surrounding towns and informal settlements

Residents are seen as highly sensitive visual receptors since they have an active interest in their surrounding landscape. However, according to the viewsheds there are very few residents in surrounding towns that will have views on the proposed development and most of them will have existing views with industrial elements in them.

Some residents of Motherwell will potentially have views of elements of the Manganese Ore Export Terminal. The Alternative Conveyor Route is also likely to be more visible to Motherwell residents than the Preferred Conveyor Route. The manganese ore stockpiles are unlikely to be visible to residents of surrounding towns.

Aspects of the compilation yard, regardless of layout alternative, will potentially be visible to a few residents of Motherwell.

Residents living on the ridge above Bethelsdorp, Algoa Park and Korsten will also potentially see parts of the whole proposed development, but they are between 9 and 10 km from the terminal site and their existing views contain many industrial structures.

Residents of Riverside Park, Cannonville and Colchester may have views of parts of the compilation yard (regardless of layout). These villages on the Sundays River are located between 8 and 12 km from the compilation yard site.

Surrounding farms
Residents are highly sensitive to changes in their views or surrounding landscape. There are a few farms north, north-west and in the Sundays River valley where visual receptors may be affected by the proposed development. Residents or viewpoints on the plateau north-west of the IDZ boundary and east of the R335 will potentially have views that will include all the components of the development regardless of layout alternative. Farm residents and viewpoints in the Sundays River valley will only potentially be affected by the compilation yard (regardless of layout alternative). There are also a few farms west of the IDZ and south of Coega River with potential views on the whole development.

Coega IDZ and Port of Ngqura
Workers in the industrial area have a low to negligible sensitivity to changes in the landscape since their attention is not focussed on the landscape and their views already include industrial structures and developments. There are few areas in the IDZ and port that will not have views of some parts of the proposed development regardless of layout alternatives (although vegetation and buildings will reduce visibility somewhat).

Motorists
Motorists are generally classified as visual receptors with a low sensitivity to changes in the surrounding landscape since they pass through it in a short time and their attention is not focussed on the landscape. The attention of motorists will only occasionally focus on the landscape, and the landscape is continuously changing. However, the CDC views the N2 and R334 as important lines of contact with the public and have emphasised visual aesthetics for industrial developments along these routes. Tourists travelling on the N2 will be more interested in the landscape, but the N2 is a busy road and their existing views include industrial developments of the IDZ. Motorists are therefore given a medium sensitivity rating in this case. Other major roads include R102, R344 and R335. Table 13-8 provides a summary of the potential duration that motorists on these major routes will be exposed to various components of the proposed development and combinations of alternative layouts. It is clear from the table that for all proposed component combinations there is little to choose among the combinations when considering their duration of visibility to motorists.

Table 13-8 Duration of development component visibility for motorists on major roads in the region.

Component	Structure	Road	Speed (km/h)	Distance (km)	Duration (min)
Manganese Ore Export Terminal	Stockpiles	N2	100	4.0	2.5
		R334	80	3.7	3.0
	Reclaimers & Stackers	N2	100	7.8	5.0
		R334	80	3.7	3.0
		R335	100	1.7	1.0
	Tippler	N2	100	5.2	3.0
		R334	80	2.3	2.0
		R335	100	2.2	1.0
	Preferred Conveyor Route	N2	100	4.8	3.0
		R334	80	2.3	2.0
		R335	100	1.5	1.0
	Alternative Conveyor Route	N2	100	7.7	5.0
		R334	80	2.5	2.0
		R335	100	1.6	1.0
	Stockyard & Preferred	N2	100	10.7	6.5

Component	Structure	Road	Speed (km/h)	Distance (km)	Duration (min)
	Conveyor Route	R334	80	6.0	4.5
		R102	80	5.0	4.0
		R335	100	2.3	1.5
	Stockyard & Alternative Route	N2	100	10.5	6.5
		R334	80	5.6	4.0
		R102	80	5.0	4.0
		R335	100	2.3	1.5
Compilation Yard	Alternative 1	N2	100	18.7	11.0
		R334	80	9.3	7.0
		R102	80	3.2	2.5
		R335	100	1.0	1.0
	Alternative 2	N2	100	16.5	10.0
		R334	80	9.4	7.0
		R102	80	2.7	2.0
		R335	100	1.0	1.0
Manganese Ore Export Terminal & Compilation Yard	Stockyard, Preferred Conveyor Route & Compilation Yard Alt 1	N2	100	24.3	14.5
		R334	80	13.2	10.0
		R102	80	4.3	3.0
		R335	100	2.5	1.5
	Stockyard, Preferred Conveyor Route & Compilation Yard Alt 2	N2	100	23.6	14.0
		R334	80	12.0	9.0
		R102	80	4.5	3.0
		R335	100	3.0	2.0
	Stockyard, Alternative Conveyor Route & Compilation Yard Alt 1	N2	100	24.0	14.5
		R334	80	14.4	11.0
		R102	80	4.4	3.0
		R335	100	2.9	2.0
	Stockyard, Alternative Conveyor Route & Compilation Yard Alt 2	N2	100	24.3	14.5
		R334	80	13.3	10.0
		R102	80	4.4	3.0
		R335	100	3.1	2.0

Table 13-9 provides a list of sites visited as part of the photographic survey to record existing landscapes and views of sensitive visual receptors that may be affected by the development.

Table 13-9 Sites visited during the photographic survey ("PS" = "Photo Site"). Map 13-34 shows the localities of these sites in relation to the proposed development.

SITE	LONGITUDE	LATITUDE
PS01	25.805967	-33.668889
PS02	25.809603	-33.675691
PS03	25.770427	-33.681467
PS04	25.724204	-33.745178
PS05	25.708504	-33.752718
PS06	25.666646	-33.779659
PS07	25.648516	-33.835253
PS08	25.614590	-33.827814

SITE	LONGITUDE	LATITUDE
PS09	25.594401	-33.860990
PS10	25.534765	-33.829464
PS11	25.496486	-33.716105
PS12	25.562417	-33.771736
PS13	25.676352	-33.753752
PS14	25.675777	-33.750253
PS15	25.636074	-33.700163
PS16	25.591479	-33.712368
PS17	25.591955	-33.657718
PS18	25.623189	-33.805623
PS19	25.735654	-33.623054
PS20	25.697874	-33.623964
PS21	25.697180	-33.675974
PS22	25.666833	-33.754388
PS23	25.661661	-33.775671
PS24	25.666411	-33.778880
PS25	25.701236	-33.775422
PS26	25.684477	-33.764185
PS27	25.740460	-33.629954
PS28	25.671503	-33.742331
PS29	25.693251	-33.729107
PS30	25.663304	-33.763561
PS31	25.667254	-33.765119
PS35	25.833350	-33.623729
PS36	25.754176	-33.630007
PS37	25.818490	-33.625419
PS38	25.809350	-33.630869
PS40	25.651936	-33.668148

13.6.1.4 Visual Exposure

Visual exposure	Visual exposure refers to the relative Visibility of a project or feature in the landscape (Oberholzer, 2005). Exposure and visual impact tend to diminish exponentially with distance. It is classified as follows: • *High exposure* – dominant or clearly noticeable; • *Moderate exposure* – recognisable to the viewer; • *Low exposure* – not particularly noticeable to the viewer

Visual exposure is calculated using visibility (i.e. how much of the development is visible) and distance from the nearest component of the development for an area within 10 km of development components. Visual exposure beyond 10 km is likely to be very low as structures of the proposed development will make up a small part of views, and are unlikely to be distinguished from other structures in the IDZ and port.

Manganese Ore Export Terminal (*Map 13-18, Map 13-19, Map 13-26, Map 13-27*)
Views from Jahleel Island will experience low to moderate exposure to Terminal structures (slightly higher for the preferred conveyor route than the alternative) and cranes at the berth. Views from the other two islands and other protected areas (including GAENP) in the region will experience low visual exposure to the Manganese Ore Export Terminal due to their distance from it.

Residents of surrounding villages will experience low visual exposure to the Terminal since they live more than 5 km from the development.

Potentially affected farm residents and viewpoints will experience low visual exposure to the Manganese Ore Export Terminal regardless of layout alternative since they are more than 5 km from any structures.

Viewpoints within the Coega IDZ and Port of Ngqura are likely to experience moderate to high visual exposure due to their proximity to the proposed development.

If existing buildings are used as a proxy for visual receptors then it can be seen that high and medium visual exposure is limited to visual receptors within the Coega IDZ. Table 13-10 lists the number of buildings (within 10 km of the development) and their visual exposure ratings for the Manganese Ore Export Terminal. There is very little difference between the two conveyor route layouts.

Table 13-10 Number of buildings (as proxy for visual receptors) that will potentially be affected by the proposed Manganese Ore Export Terminal.

Component	High Visual Exposure	Medium Visual Exposure	Low Visual Exposure	Total
Stockyard & Preferred Conveyor Route	70	96	6243	6409
Stockyard & Alternative Conveyor Route	70	99	6240	6409

Table 13-11 shows the duration motorists will spend in high visual exposure sections of the major roads (the screening effect of existing vegetation and buildings adjacent to roads will reduce times). No significant difference can be seen between the two conveyor route layouts for motorists.

Table 13-11 High visual exposure to Manganese Ore Export Terminal for motorists.

Structure	Road	Speed (km/h)	Distance (km)	Duration (min)
Mn ore Stockpiles	N2	100	3.7	2.5
	R334	80	3.8	3.0
Stockyard & Preferred Conveyor Route	N2	100	3.3	2.0
	R334	80	3.3	2.5
Stockyard & Alternative Conveyor Route	N2	100	3.5	2.0
	R334	80	3.2	2.5

Compilation Yard (Map 13-20, Map 13-21, Map 13-28, *Map 13-29,)*
Visual exposure will be low for visual receptors in protected areas (including GAENP) surrounding the proposed compilation yard, regardless of layout alternative. All the protected areas in the region are more than 5 km from the compilation yard site, apart from Jahleel Island, from which the compilation yard is unlikely to be visible.

Towns and settlements surrounding the compilation yard site are more than 5 km away and residents will experience low visual exposure to the development.

The proposed compilation yard extends beyond the northern boundary of the IDZ (approximately 3 km) and there are a small number of areas on farms where viewers may potentially experience high visual exposure to parts of the compilation yard, but there are no farmsteads where high or medium visual exposure occurs –buildings with high visual exposure ratings are within the IDZ.

The proposed site for the compilation yard is located away from the major roads in the region and where motorists will be able to see some of the yard their visual exposure will be low for all layout options.

Table *13-12* shows the number of buildings and the visual exposure that they will potentially experience for an area within 10 km of the compilation yard. Most of the buildings with medium and high visual exposure ratings are within the IDZ and are therefore not residential.

Table 13-12 Visual exposure and number of buildings within 10 km of the proposed compilation yard.

Component	High Visual Exposure	Medium Visual Exposure	Low Visual Exposure	Total
Compilation Yard Alternative 1	53	46	2618	2717
Compilation Yard Alternative 2	49	24	5113	5186

Combined Terminal and Compilation yard
The number of buildings potentially affected by the various combinations of layout alternatives for Manganese Ore Export Terminals and Compilation Yard as shown in Table 13-13 provides a simple way to compare layouts in terms of their potential visual impact, although it should be emphasised that buildings with high visual exposure ratings are almost all within the IDZ and are not residences.

Table 13-13 Visual exposure and number of potentially affected buildings within 10 km of the proposed development.

Component	High Visual Exposure	Medium Visual Exposure	Low Visual Exposure	Total
Stockyard, Preferred Conveyor Route & Compilation Yard Alternative 1	76	141	9054	9271
Stockyard, Preferred Conveyor Route & Compilation Yard Alternative 2	76	141	9054	9271
Stockyard, Alternative Conveyor Route & Compilation Yard Alternative 1	91	179	9151	9421
Stockyard, Alternative Conveyor Route & Compilation Yard Alternative 2	75	141	9055	9271

13.6.1.5 Visual Intrusion

Visual intrusion	Visual intrusion indicates the level of compatibility or congruence of the project with the particular qualities of the area – its *sense of place*. This is related to the idea of context and maintaining the integrity of the landscape (Oberholzer, 2005). It can be ranked as follows: *High* – results in a noticeable change or is discordant with the surroundings; *Moderate* – partially fits into the surroundings, but is clearly noticeable; *Low* – minimal change or blends in well with the surroundings.

Sense of place is defined by (Oberholzer, 2005) as: '*The unique quality or character of a place...[It] relates to uniqueness, distinctiveness or strong identity*.' It describes the distinct quality of an area that makes it memorable to the observer. Sites visited during the photographic survey are shown on Map 13-34., (also refer to Table 13-9 for a list of sites visited).

Protected Areas

Components of the development will theoretically be visible from the GAENP and visitors to the park may see parts of the development from access roads. Existing views from these areas include most of the larger structures in the IDZ, such as the wind turbine, Cerebos building, as well as the ship loader cranes in the Port. The proposed Manganese Ore Export Terminal and compilation yard will form a small part of views from the park and will fit in with the existing structures in the IDZ. A low visual intrusion on sensitive visual receptors in the GAENP is expected (Figure 13-2, Figure 13-3).

Visual intrusion on views from islands off the port will similarly be low since they already include large port structures and the new development will fit in with the industrial landscape.

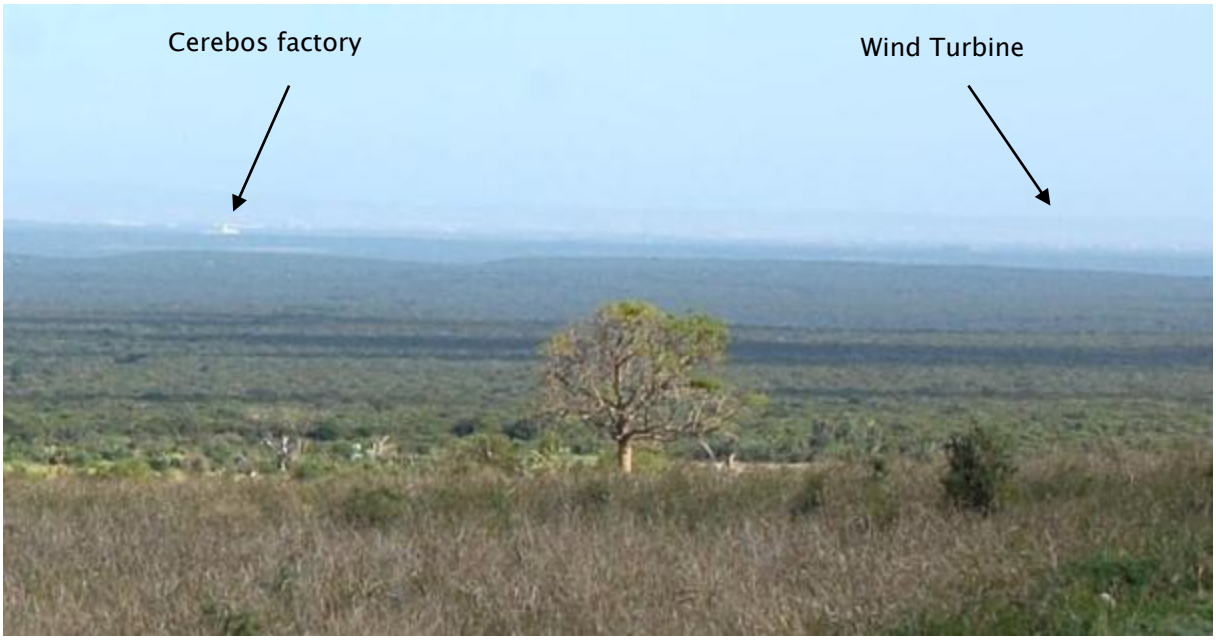

Figure 13-2 View towards Coega IDZ from within GAENP (PS35 on Map 13-34). Cerebos salt factory to the left, and the wind turbine is faintly visible to the right.

Figure 13-3 View similar to the previous, from photo site PS38 (Map 13-34) in GAENP.

Surrounding Settlements

Residents of Colchester, Canonville and Riverside Park are likely to only have glimpses of the Compilation Yard if anything at all since these settlements are located in the low lying Sundays River Valley. Visual intrusion on their views will be low (Figure 13-4).

Views from settlements south of Coega IDZ are complex, containing many contrasting visual elements, patterns and colours since they include urban and industrial elements. Not many residents will be able to see any part of the Terminal and Compilation Yard. Visual intrusion is expected to be low for those who do (Figure 13-5, Figure 13-6).

Figure 13-4 View south from within the Sundays River valley (PS03 on Map 13-34). Sections of the Compilation Yard will be visible on the ridge in the background. Views from areas in Colchester where the Compilation Yard is potentially visible will be similar to this.

Figure 13-5 Motherwell as seen from photo site PS08 (Map 13-34.).

Figure 13-6 View north-east from photo site PS08 (Map 13-34) in Motherwell towards the proposed development site.

Residents and viewpoints on surrounding farms

Visual receptors on farms in the Sundays River valley north and north-west of the proposed Compilation Yard are currently least affected by developments in the Coega IDZ. Their existing views include high voltage power lines, railway lines and activity, and farm buildings and structures

related to farming irrigated crops. Their views are therefore not pristine, but are relatively unaffected by industrial structures. The Compilation Yard and activities related to the yard will potentially be visible to these visual receptors, although they will have only partial views and their visual exposure will be low. A medium to low visual intrusion is expected for visual receptors on farms along the Sundays River.

Visual receptors on farms on the plateau above the Sundays River (north and west of the IDZ) are likely to already have industrial structures in views towards the IDZ. Other elements of their views may include quarries/mines, high voltage power lines, densely populated settlements and substations. They will experience low visual intrusion on their existing views since the proposed structures are expected in an area set aside for industrial developments. They will blend in with the planned future of their surroundings (Figure 13-10a).

Coega IDZ and Port of Ngqura
Visual receptors in the IDZ and Port will be highly exposed to the development due to their proximity to the structures (Figure 13-10b). However, the structures are industrial in nature and will not be unexpected in the IDZ landscape (Figure 13-7 to 13-9). A low visual intrusion on their views is expected.

Figure 13-7 New development in the IDZ (Agri Steels SA, a steel recycling plant)

Figure 13-8 Large structures in the IDZ.

Figure 13-9 Large structures in the Port of Ngqura.

Figure 13-11 Panoramic views of proposed sites: a). View from photo site PS40 (6 km from the Compilation Yard) towards Compilation Yard site. b). View from photo site PS22 (about 1 km from the stockyard site and 5 km from the port) towards Manganese Ore Export Terminal site. (Refer to Map 13-34 for photo site localities).

Table 13-14 Visual impact criteria and impact intensity for various components and combinations of layouts of the proposed development.

Development Component	Sensitive Viewer	Criteria	Rating	Reasoning
Manganese Ore Export Terminal (either conveyor route)	Visual receptors in protected areas	Visual Sensitivity	High	Visitors to protected areas have an active interest in its surrounding landscape.
		Visual Exposure	Low	Apart from Jahleel Island, all protected areas are further than 5 km from the proposed site. Visual receptors on Jahleel Island will experience low to medium visual exposure.[2]
		Visual Intrusion	Low	Existing views include large industrial type structures and buildings. The Manganese Ore Export Terminal will be congruent with the planned landscape of the IDZ.
		Impact Intensity	Low	Highly sensitive viewers will experience low visual exposure to the proposed development component and low visual intrusion on their existing views.
	Residents of surrounding settlements	Visual Sensitivity	High	Residents are highly sensitive to changes in their surrounding landscape and views.
		Visual Exposure	Low	Settlements are more than 5 km from the site proposed for the terminal.
		Visual Intrusion	Low	Existing views of residents who may be affected (Motherwell & Wells Estate) are complex with industrial type structures common.
		Impact Intensity	Low	Low visual exposure and intrusion.
	Visual receptors on surrounding farms	Visual Sensitivity	High	Residents have an active interest in their surrounding landscape and are sensitive to changes in their existing views.

[2] Note that the island is also not accessible to the public or anyone without research permits.

Development Component	Sensitive Viewer	Criteria	Rating	Reasoning
		Visual Exposure	Low	Farms and farmsteads with potential views on the development are more than 5 km from the site.
		Visual Intrusion	Low	Existing views towards the IDZ already include large industrial buildings and structures.
		Impact Intensity	Low	Highly sensitive visual receptors will potentially experience low visual exposure to the proposed terminal and low visual intrusion on their views.
	Visual receptors in Coega IDZ and Port of Ngqura	Visual Sensitivity	Low	The landscape is made up of industrial structures and activity, and workers are not focussed on the landscape.
		Visual Exposure	High	Much of the IDZ and Port will experience high visual exposure to the development since it is a large structure with long linear components (conveyors, power lines).
		Visual Intrusion	Low	An industrial development will be expected in an industrial zone. It will fit in with current and future plans of the IDZ.
		Impact Intensity	Low	Low sensitivity visual receptors will experience high exposure to the development, but low intrusion on their existing views.
	Motorists using major roads in the region (N2, R334, R102 and R335)	Visual Sensitivity	Medium	The attention of motorists will only occasionally focus on the landscape, and little time is spent in the same landscape. However, the CDC views the N2 and R334 as important lines of contact with the public and have emphasised visual aesthetics for industrial developments along these routes.
		Visual Exposure	High	Sections of the N2, R334 and R102 will experience high visual exposure due to their proximity to elements of the development.

Development Component	Sensitive Viewer	Criteria	Rating	Reasoning
		Visual Intrusion	Low	Motorists are passing through an industrial area containing large structures and buildings commonly associated with industrial developments.
		Impact Intensity	Medium	Medium sensitivity visual receptors experiencing high visual exposure for short durations and low visual intrusion on their views.
Compilation Yard (all layout alternatives)	Visual receptors in protected areas	Visual Sensitivity	High	Visitors to protected areas have an active interest in its surrounding landscape.
		Visual Exposure	Low	Apart from Jahleel Island, all protected areas are further than 5 km from the proposed site. The compilation yard is unlikely to be visible from Jahleel Island.
		Visual Intrusion	Low	Existing views include large industrial type structures and buildings. The compilation yard will extend about 3 km beyond the IDZ boundary, but will be associated with the IDZ from the distance of protected areas such as the GAENP.
		Impact Intensity	Low	Highly sensitive viewers will experience low visual exposure to the proposed development component and low visual intrusion on their existing views.
	Residents of surrounding settlements	Visual Sensitivity	High	Residents are highly sensitive to changes in their surrounding landscape and views.
		Visual Exposure	Low	Settlements are more than 5 km from the site proposed for the terminal.
		Visual Intrusion	Low	Views from Colchester and Canonville will include only small parts of the Compilation Yard (less than 15%).
		Impact Intensity	Low	Low visual exposure and intrusion.
	Visual receptors on surrounding	Visual Sensitivity	High	Residents have an active interest in their surrounding

Development Component	Sensitive Viewer	Criteria	Rating	Reasoning
	farms			landscape and are sensitive to changes in their existing views.
		Visual Exposure	High	There are areas on Tankatara farm where viewpoints will have high visual exposure to the compilation yard. There are no farmsteads in the high visual exposure areas.
		Visual Intrusion	Medium	Existing views in these areas include high voltage power lines, railways and railway sidings.
		Impact Intensity	Medium	Highly sensitive visual receptors will potentially experience high visual exposure to the proposed terminal and medium visual intrusion on their views. However, there are very few of these visual receptors and they are constrained to the property on which the compilation yard will be located, Tankatara, and possibly the neighbouring farm, Steins Valley.
	Visual receptors in Coega IDZ and Port of Ngqura	Visual Sensitivity	Low	The landscape is made up of industrial structures and activity, and workers are not focussed on the landscape.
		Visual Exposure	High	The northern part of the IDZ (Zone 11 and 12) is currently relatively free of developments and, therefore, visual receptors, but this is likely to change in the future. Zone 11 and 12 will experience high visual exposure to the compilation yard.
		Visual Intrusion	Low	An industrial development will be expected in an industrial zone. It will fit in with current and future plans of the IDZ.
		Impact Intensity	Low	Low sensitivity visual receptors will experience high exposure to the development, but low intrusion on their existing views.
	Motorists using major roads in	Visual Sensitivity	Medium	The attention of motorists will only occasionally focus on

Development Component	Sensitive Viewer	Criteria	Rating	Reasoning
	the region (N2, R334, R102 and R335)			the landscape, and little time is spent in the same landscape. However, the CDC views the N2 and R334 as important lines of contact with the public and have emphasised visual aesthetics for industrial developments along these routes.
		Visual Exposure	High	Sections of the N2, R334 and R102 will experience high visual exposure due to their proximity to elements of the development.
		Visual Intrusion	Low	Motorists are passing through an industrial area containing large structures and buildings commonly associated with industrial developments.
		Impact Intensity	Medium	Low sensitivity visual receptors experiencing high visual exposure for short durations and low visual intrusion on their views.

13.6.2 Significance of Visual Impact on the Landscape

Landscape impacts	Change in the elements, characteristics, character and qualities of the landscape as the result of development (GLVIA, 2002). These effects can be positive or negative, and result from removal of existing landscape elements, addition of new elements, or the alteration of existing elements.

13.6.2.1 Impact 1: Impact of introducing a Manganese Ore Export Terminal and Compilation Yard into an industrial landscape

The sensitivity of the landscape character of the Coega IDZ to changes brought about by introducing the Manganese Ore Export Terminal and Compilation Yard is low. It will not change the industrial nature of the landscape. The compilation yard extends into land that is currently zoned as agricultural. However, it is only a short distance beyond the boundary (3 km) and will be associated with the IDZ. It has also been part of the CDC and Transnet plans since at least 2010 as an arrivals and departure terminal for freight rail.

Mitigation Measures
Mitigation measures to lower the intensity of visual impact (below) will also have an effect on the landscape impact of the development.

Significance Rating
The spatial extent of the impact is local since it is unlikely to affect the surrounding landscape character types. Intensity of the landscape impact is low since the landscape character type has a low sensitivity to the proposed development. The impact, in as much as it occurs, will be long term. Some changes to the landscape will be permanent (cut-and-fill on steep slopes) although appropriate rehabilitation methods should reduce the effect of these alterations. Reversibility is therefore medium to high. Irreplaceability is low since it is an industrial landscape which is being filled with industrial developments. The probability of a landscape impact occurring is low (improbable) since it is an industrial development in a demarcated industrial landscape. Given the above, the significance of the impact of introducing a Manganese Ore Export Terminal and compilation yard into an industrial landscape is predicted to be **low** and its status negative (only because of the short extension into an agricultural landscape).

Table 13-15 Significance of landscape impact

Operational Phase

Direct Impacts

Impact Description	Mitigation	Spatial Extent	Intensity	Duration	Reversibility	Irreplaceability	Probability	Significance & Status		Confidence
								Without Mitigation	*With Mitigation*	
Proposed Development										
Impact 1: Landscape Impact	None	Regional	Low	Long Term	Medium to high	Low	Improbable	Low Negative	Low Negative	High

13.6.3 Significance of visual impact on viewers

Visual impacts	Changes to the visual character of available views resulting from the development that include: obstruction of existing views; removal of screening elements thereby exposing viewers to unsightly views; the introduction of new elements into the viewshed experienced by visual receptors and intrusion of foreign elements into the viewshed of landscape features thereby detracting from the visual amenity of the area

13.6.3.1 Impact 2: Intrusion of activity associated with construction of the Manganese Ore Export Terminal on existing views of sensitive visual receptors

There are various aspects of the construction phase of the terminal that will potentially affect sensitive visual receptors. Among visual disturbances are the following:

- Large areas have to be cleared of existing vegetation and prepared for the manganese ore stockyard, associated buildings and dams, and access roads. This will expose bare soil creating strong visual contrast with surrounding vegetation.
- Increase in traffic, both small vehicles for workers and large construction-related vehicles such as excavators and graders.
- Trenching for pipelines and underground cables.
- Soil stockpiles and heaps of cleared vegetation.
- Soil scars and exposed slope faces along the conveyor route.
- Worker presence and activity.
- Dust emissions from construction activity.

Mitigation Measures

Transnet provides a set of minimum standards for environmental management, as specified in the Standard Environmental Specifications (SES) document to which Contractors on a Transnet construction site must comply (Transnet 2011). Among these are standards that apply to potential visual impacts during the construction phase:

- Management of dust.
- Rehabilitation of all areas affected by the project in a manner congruent with the surrounding biophysical environment.
- Fire prevention.
- Maintenance of construction site – good housekeeping on site to avoid litter and minimise waste.
- Rehabilitation of cleared areas.

Additional mitigation measures to minimise visual disturbance during construction:

- Project developers should demarcate construction boundaries and minimise areas of surface disturbance.
- Night lighting of construction sites should be minimised within requirements of safety and efficiency.

Significance Rating

The spatial extent of impact will for the most part be local since only parts of the conveyor system will extend above the terrace south of the Coega River. The rest of the Manganese Ore Export Terminal is within the Coega River valley and visibility of construction activities will be constrained by the topography for the larger duration of the construction phase. Duration of impact is short term (construction is expected to last no more than 36 months). Impact intensity is medium since very few highly sensitive visual receptors will be affected, but some of the construction activities will be very visually disturbing (large areas cleared of vegetation, extensive cut-and-fill processes

along the conveyor route which will create areas of high contrast against the slopes of the southern terrace). A moderate reversibility is expected since some facets of the construction phase will take very long to return to their current states once started (e.g. rehabilitation of cuttings in the southern terrace for the conveyor system or clearance and preparation of stockyard area). Irreplaceability is low for the Manganese Ore Export Terminal since the stockyard area is currently of low visual quality (highly disturbed vegetation, exposed soil and a large marshalling yard in the background). The impact will probably occur since, although only a small number of visual receptors will be affected, the impact intensity is medium. The significance of the impact is **medium** before mitigation due to its medium intensity. Mitigation measures will lower the intensity, and the significance of the impact will become **low**. The status is negative.

13.6.3.2 Impact 3: Intrusion of activity associated with construction of the Compilation Yard on existing views of sensitive visual receptors

- Large areas have to be cleared of existing vegetation to accommodate structures and buildings of the compilation yard, construction laydown areas and parking areas.
- Increase in traffic in an area that is relatively quiet.
- Soil stockpiles, cleared vegetation.
- Worker presence and activity.
- Dust emissions from construction activity.
- Large earthmoving equipment and vehicles.

Mitigation Measures

Mitigation measures specific to the site (in addition to the standards set out by Transnet):

- Minimise vegetation clearance since the site contains relatively high thicket which should be used to conceal/screen construction activities and equipment as much as possible.
- Night lighting of construction sites should be minimised within requirements of safety and efficiency.
- Laydown areas and construction camps should be located in low visibility areas where possible.
- Construction of new roads should be minimised.
- Project developers should demarcate construction boundaries and minimise areas of surface disturbance.

Significance Rating

The visual impact of construction activities is unlikely to extend more than 5 km from the site (local spatial extent). Duration of impact is short term (construction is expected to last no more than 36 months). Impact intensity is medium since very few highly sensitive visual receptors will be affected, but some of the construction activity will be very visually disturbing (large areas cleared of vegetation, large construction equipment in a relatively quiet area). A moderate reversibility is expected since some facets of the construction phase will take very long to return to their current states once started (e.g. rehabilitation of vegetation clearance). Irreplaceability is low since the landscape is not pristine (an existing railway and siding, and disturbed vegetation due to grazing). The impact will probably occur since, although only a small number of visual receptors will be affected, the impact intensity is medium. The significance of the impact is **medium** before mitigation due to its medium intensity. Mitigation measures will lower the intensity, and the significance of the impact will become **low**. The status is negative.

13.6.3.3 Impact 4: Visual intrusion of Manganese Ore Stockpiles on the existing views of sensitive visual receptors

The manganese ore stockpiles are the least aesthetically pleasing aspect of the proposed development since they are large, high structures that contrast strongly in colour with their surroundings. In particular they will be visible to motorists on the N2 and R334. These roads are highlighted in the CDC Masterplan (CDC 2010) as important since they provide a window on the IDZ from which the public will formulate their impression of the IDZ. Motorists driving along the N2 and R334 will spend about 2.5 or 3 minutes[3] respectively in sections of the road where they will be highly exposed to the stockpiles. They will be in close proximity (within 200 m) and, due to their elevated positions, will be able to see most of the stockpiles/stockyard. The location of the stockpiles in the Coega River valley means that the topography conceals them from most sensitive visual receptors in the region (high visual absorption).

Fugitive dust from the ore at various points along the transport route to and from the stockpiles, as well as at the stockpiles will increase the spatial extent of the visual impact of the stockpiles. The stockpiles will also potentially affect the aesthetics of neighbouring buildings and vegetation by covering them in a dark layer of dust.

Mitigation Measures

It would be very difficult to conceal the stockpiles from motorists more than they are by the topography due to the following considerations:

- The N2 and R334 are elevated above the river valley and consequently views will be from above the proposed stockyard site.
- The stockpiles will be up to 17 m high which will take high trees to screen if planted around the site.
- Trees or high vegetation will have to be planted adjacent to the road in order to screen motorists from the stockpiles, but often the critical sections of the road are bordered by steep slopes, and in the case of the N2 there is the bridge where trees/vegetation cannot be used for screening.

At most a minute of view time will be taken off at considerable cost. Screening the stockpiles is therefore not seen as a practical mitigation measure.

Use best management practices for dust suppression at the stockpiles and other points of ore transfer (as discussed in Chapter 5: Air Quality and Human Health Risk Study, Section 5.8).

Significance Rating

The visual impact of the stockpiles is very well contained by the topography of the landscape and its spatial extent is within 5 km of the site (local). Duration of impact is long term – life of project. Impact intensity is low since motorists and workers in the IDZ are seen as low sensitivity visual receptors, and visual intrusion is low. Motorists will be highly exposed to the stockpiles for only a short period. Reversibility of the impact is high since the stockpiles can be completely removed. Irreplaceability is low since the area is currently very disturbed and views towards the proposed site are of low quality (Figure 13-13). It is highly probable that the impact will occur since motorists will pass in close proximity to the stockpiles and will get a good view of them (if for only a short period). The significance of impact is **low** negative without mitigation measures.

[3] The actual duration for which a motorist will be exposed will be shorter since they will pass the site, looking away from the stockpiles, while theoretically still highly exposed to it. Passengers may still look at it and will be highly exposed visually.

Figure 13-13 The area where the proposed stockyard will be built is not pristine and the terrain and vegetation are already disturbed/altered.

Figure 13-14 View towards stockyard site from the N2 just above the bridge.

13.6.3.4 Impact 5: Visual intrusion of Conveyor System on the existing views of sensitive visual receptors

The conveyor system is a long, linear structure which will potentially be highly visible (many visual receptors will see at least parts of it). It will potentially contrast sharply with background vegetation, and at least some cut-and-fill will occur against steep slopes of the southern terrace

which will expose highly contrasting soil/rock against dark surrounding vegetation. The section exiting (south) underneath the N2 and running along the N2 (north) will also require clearing and cut/fill and will be right next to the N2. It is unlikely that these scars will be completely rehabilitated, particularly since an access road is also required.

Mitigation Measures

The alternative conveyor route will require less cut-and-fill of steep slopes, and where these occur they will be next to the N2 in areas that are already disturbed. Most of this conveyor route follows the road from the Port and will not require new areas to be cleared and sculpted (apart from the sections near the N2). However, it should be pointed out that the alternative conveyor route has a larger viewshed than the preferred route and it is likely that motorists on the N2 will be highly exposed to the conveyor route whether approaching from the south or north-east whereas in the case of the preferred route, only N2 motorists approaching from the north will be affected and they will only be highly exposed for a short period as they cross the Coega River valley. Regardless of the route, the following mitigation measures should reduce the intensity of the impact:

- The Visual Guidelines for Development (CKA 2002) should be followed, particularly in regard to painting of the structure – no glossy or reflective surfaces and muted shades such as olive, ochre or rust.
- A landscape architect should be consulted to rehabilitate the cut-and-fill scars and reduce their visual intrusion.
- Lighting of the conveyor system should be included in the general lighting plan for the development which documents the design, layout and technology used for lighting and indicates how nightscape impacts will be minimised.

Significance Rating

The spatial extent of the impact is local since medium to high visual exposure is limited to the Coega IDZ. Duration is long term. Intensity of impact is low for all visual receptors (see Table 13-14 above). It will be possible to remove the conveyor structures completely from view, but the visual intrusion of erosion scars that will remain will depend on successful rehabilitation and it is unlikely to be completely successful since large sections of the terrace slopes will be removed. Reversibility is therefore moderate. Irreplaceability is moderate since the southern bank on the seaward side of the N2 is still relatively untouched (in the higher sections where the preferred conveyor route is located - Figure 13-13). It is highly probable that the impact will occur, regardless of the route since it is a large structure. The significance of the impact is **medium** before mitigation due to moderate irreplaceability and reversibility. Reversibility is higher and irreplaceability lower for the alternative route than the preferred route, particularly if mitigation measures are followed and care is taken to rehabilitate cut-and-fill areas. The impact will be negative. The significance of impact before and after mitigation will be the same for either conveyor route.

Figure 13-15 View towards the southern bank of the Coega River. A conveyor system along the preferred route will cut through mid-to-upper slope of the terrace and is likely to cause some scarring. The alternative route will follow the road at the bottom of the terrace.

13.6.3.5 Impact 6: Visual intrusion of Manganese Ore Export Terminal on the existing views of sensitive visual receptors

It is highly unlikely that the berth and ship loader structures in the port will affect any visual receptors other than workers in the port since views of the port are already very complex with many tall, highly visible, highly contrasting structures in them (Figure 13.9). It is also expected to have these structures in a deep water port, and so if any new structures adhere to CDC and Port aesthetic guidelines (CKA 2002) it is unlikely that they will be noticed specifically.

Structures and components of the stockyard other than stockpiles and conveyor system that will potentially intrude on views of sensitive visual receptors are buildings housing tipplers, and stacker and reclaimer equipment. These components are tall and contribute most to the high visibility of the stockyard. The terrace south of the stockyard is approximately 30 m above the Coega River valley floor and the tippler, stackers and reclaimers are more than 30 m tall. The location of the tippler is 8 to 10 m above the valley floor but the tippler shouldn't extend above the terrace. The northern terrace (hosting the wind turbine) is about 10 m higher and will reduce visibility of these structures to the north.

Mitigation Measures

- Strict adherence to the CDC visual and aesthetic guidelines for structures and buildings (CKA, 2002) is essential since these will be visible to users of the N2 and R334.
- Use best management practices for dust suppression at the stockpiles and other points of ore transfer (as discussed in Chapter 5: Air Quality and Human Health Risk Study, Section 5.8 of this EIA).

Significance Rating

The viewshed of the Manganese Ore Export Terminal extends beyond the IDZ due to contributions by the tipplers, stacker and reclaimers[4], and conveyor system. The spatial extent of the impact is therefore regional. Duration of impact is long term to permanent, depending on whether all the structures can be removed (e.g. it is not clear whether the floor on which the stockpiles will rest can be completely removed and the area rehabilitated). Intensity of impact is medium since motorists driving along sections of the N2 and R334 will be highly exposed to the development. Reversibility of impact is medium since it is unlikely that all structures and changes in landscape can be recovered to the current state. Irreplaceability is low since current views are not of high aesthetic quality. The impact will definitely occur since it is a large development with highly contrasting visual elements (large black stockpiles) in close proximity to visual receptors (motorists using the N2 and R334). The significance of the impact is **medium** before mitigation (including those for stockpiles and conveyor system) due to its medium intensity, long duration and probability of occurrence. The visual impact will be negative due to the low aesthetic appeal of manganese ore stockpiles. Mitigation measures will lower contrast with the surrounding landscape which will lower the intensity of the visual impact. The significance of the visual impact will be **low** after mitigation.

13.6.3.6 Impact 7: Visual intrusion of a compilation yard on the existing views of sensitive visual receptors

The compilation yard is a large structure which will be introduced into a relatively empty area at the northern boundary of Zone 11 of the IDZ, extending into the Tankatara farm for 3 km. The structures (rails and buildings) will not be high, but the rail wagons are about 4 m high when empty and will be in motion which attracts attention. The trains are long (2 trains with 100 wagons) and will pass through the area about 4 or 5 times a day.

Mitigation Measures

- Follow the CDC guidelines for developments (CKA 2002) (even though some of the compilation yard will fall outside the IDZ it will be associated with other developments in the IDZ).
- Where possible, and in line with CDC's future expansion plans, retain existing vegetation since the thicket is relatively high and will screen some of the development.
- Rehabilitate cleared areas that are not required after construction.
- A lighting plan that takes cognisance of the GAENP to the north and which generally minimises light pollution should be part of the design of the compilation yard and should document ways in which light spill, glare and sky glow are minimised.

The difference in visual impact among the two route alternatives is slight with Alternative 2 potentially affecting marginally fewer visual receptors. If all else are equal then the preferred route in terms of visual impact is the one that requires least clearance of vegetation and cut-and-fill operations which alters the landscape permanently. In the case that no clear best route can be chosen this way, then route alternative 2 should be used.

Significance Rating

The spatial extent of the impact is regional since the viewshed extends beyond Tankatara farm and Coega IDZ. High visual exposure is localised. Duration of impact is long term. Impact intensity is medium to low since there are very few highly sensitive visual receptors that will be

[4] These structures were modelled for viewshed calculation as continuous along the lengths of the stockpiles since their positions can change and they can be visible anywhere along their tracks. In reality their viewsheds will be smaller although they can still potentially be seen from areas in the viewshed as modelled.

highly exposed to the development and visual intrusion is mostly low. Reversibility of impact is medium since some changes to the landscape will occur that are not completely reversible (cut-and-fill of steep slopes for rails). Irreplaceability is low since there is an existing railway with sidings and a loading facility for PPC near or on the site, and vegetation has been considerably transformed by grazing and invasive plants (Figure 13-14). The impact will probably occur since it is a large development and the increase in rail activity is likely to be noticed, but there are very few visual receptors in the area and vegetation tends to be high which will screen much of the development. The significance of the impact is **medium** before mitigation due to medium impact intensity, long to permanent duration and medium reversibility of impact. It will be **low** after mitigation since the intensity of the impact will be lowered. The impact will be negative since rail traffic will increase drastically in an otherwise relatively quiet area (in visual terms or sense of place).

Figure 13-16 Compilation yard site. Invasive plant species abound and the effect of overgrazing is evident in this area.

13.6.3.7 Impact 8: Visual impact of night lighting of the Manganese Ore Export Terminal on the nightscape of the region.

The Manganese Ore Export Terminal will add new lights to the region, potentially adding to light pollution such as glare and sky glow. The existing nightscape of the region is very bright with considerable sky glow (particularly when overcast, which is often) and glare. Major light sources are Motherwell township (many very bright lights at height), Port of Ngqura, N2 street lights south

of Coega River, industrial developments in Coega and Markman, Colchester and suburbs of Port Elizabeth (including Summerstrand and Central across the bay).

Mitigation Measures

The lighting design should minimise nightscape impacts such as sky glow, light spill and glare.

- Particular attention should be paid to lighting that may pose a risk to motorists driving along the N2 and R334.
- Where possible keep bright lights below the level of the terrace above the stockyard site.
- Lighting of the facility should not exceed, in number of lights and brightness, the minimum required for safety and security.
- Uplighting and glare (bright light) should be minimised using appropriate light screening features on all external lights.
- Light fixtures should not spill light beyond the project boundary (light trespass).
- Timer switches or motion detectors should be used to control lighting in areas that are not occupied continuously.
- Minimal lighting should be used for the conveyor system.

Significance Rating

The spatial extent of the impact is local since it is unlikely that visual receptors beyond the Coega IDZ will notice new lights with so much existing light pollution as a background. Duration of impact is long term. Impact intensity is medium since motorists will come in close proximity to the lights when travelling on the N2. Reversibility of impact is high since removal of the buildings and structures will also remove the lights. Irreplaceability is low since the nightscape is already highly disturbed. The significance of the impact is **medium** before mitigation, and **low** after the implementation of mitigation measures. Impact probability is probable due to motorists on the N2 who are likely to notice the new lights when they drive past. Impact status is negative since lighting will add to light pollution in the region.

13.6.3.8 Impact 9: Visual impact of night lighting of the Compilation Yard on the nightscape of the region.

The existing nightscape of the area where the compilation yard will be built is relatively dark with few lights in the immediate vicinity, apart from a few bright lights at farm steads. The compilation yard will therefore introduce a new node of potential light pollution in the region if care is not taken to minimise light spill, glare and sky glow.

Mitigation Measures

- Particular attention in the lighting design should be paid to potential glare and light spill which may affect visual receptors in the GAENP (views will be from elevated positions).
- Uplighting and lights in elevated positions should be avoided.
- Refer to mitigation measures for night lighting of the Manganese Ore Export Terminal.

Significance Rating

The spatial extent of the impact is potentially regional since the existing nightscape is quite dark and new, glaring security lights will be noticed over a long distance. Duration is long term. Intensity of impact can be high if sensitive visual receptors in the GAENP are highly affected. Mitigation measures should prevent this if adhered to. Reversibility is high since the lights will be removed at the end of life of the development. Irreplaceability will potentially be low if care is not taken to minimise glare and light spill with regards to visual receptors in the GAENP. The significance of the impact will be **medium** before mitigation and **low** thereafter. Impact status is

negative since night lighting of the compilation yard will contribute to light pollution in a relatively dark area.

13.6.3.9 Impact 10: Overall visual impact of proposed Manganese Ore Export Terminal and Compilation Yard on existing views of sensitive visual receptors

The proposed development covers a large area, from Tankatara Farm in the north to Port of Ngqura at the coast. A number of new structures and buildings will be introduced into the landscape and the views of visual receptors will be altered by them.

Mitigation Measures
All mitigation measures have been discussed in previous sections (13.6.3.3 to 13.6.3.6). Additionally, the visual impact of the whole development will be lowest when using the Alternative route for the conveyor and Alternative 2 for the compilation yard.

Significance Rating
The spatial extent of the impact is potentially regional since the viewsheds extend beyond Coega IDZ and Tankatara, but high visual exposure is localised. Duration of impact is long term overall with some aspects potentially permanent (altering of the landscape along steep slopes causing scarring). Intensity of impact is medium to low due to the small number of highly sensitive visual receptors that will be affected. After mitigation the intensity will in most cases be low. Reversibility of the whole development is moderate to high (again there are some aspects that are unlikely to be reversible). Irreplaceability is for the most part low. The impact will definitely occur in the case of the stockpiles, conveyor system and alteration of the nightscape around the compilation yard. Overall significance of impact is **medium** before mitigation and **low** thereafter. This is because very few highly sensitive visual receptors will be highly affected (or even moderately). The status of the impact is negative since few visual receptors will find manganese ore stockpiles aesthetically appealing, even in an industrial landscape.

13.6.3.10 Cumulative visual impacts

The Coega IDZ is slowly filling up with industrial developments. The most recent development is that of the Agri Steels SA recycling plant which is currently under construction (see large building in Figure 13-13). In 2011/2012 the Coega Development Corporation reported 7 new investors who "committed to the Coega IDZ, which is higher than the targeted number." Environmental authorisation has been given to four renewable energy developments in the IDZ, three of which are wind energy facilities and one a photovoltaic facility. This does not guarantee that these facilities will be built, but it is likely that at least a few will. There are also a number of Environmental Impact Assessments underway for planned developments such as the Oiltanking Grindrod Calulo (OTGC) tank farm on the east side of the Port of Ngqura, a cement grinding plant by Osho Cement and a waste water treatment plant. There are furthermore large, heavy industrial developments planned for the IDZ such as two ferro-manganese smelters and the PetroSA Mthombo Project oil refinery.

It is therefore clear that the Coega IDZ landscape will change radically in the next couple of years and that it will be transformed into an industrial landscape with several large industrial developments and structures dominating the landscape. The significance of the visual impact of the Manganese Ore Export Terminal will be much reduced by the changes in landscape and the cumulative visual impact is therefore **low**.

Table 13-16 Significance of visual impacts

Construction Phase

Direct Impacts

Impact Description	Mitigation	Spatial Extent	Intensity	Duration	Reversibility	Irreplaceability	Probability	Significance & Status		Confidence
								Without Mitigation	*With Mitigation*	
Manganese Ore Export Terminal										
Impact 2: Intrusion of activity associated with construction of the Manganese Ore Export Terminal on existing views of sensitive visual receptors	• Demarcate construction boundaries and minimise areas of surface disturbance. • Night lighting of construction sites should be minimised within requirements of safety and efficiency.	Local	Medium	Long Term	Medium	Low	Probable	Medium Negative	Low Negative	**High**
Compilation Yard										
Impact 3: Intrusion of activity associated with construction of the compilation yard on existing views of sensitive visual receptors	• Minimise vegetation clearance – use existing vegetation to conceal construction activities and equipment. • Rehabilitate cleared areas and prevent/remove alien invaders. • Minimise night lighting of construction sites within requirements of safety and	Local	Medium	Long Term	Medium	Low	Probable	Medium Negative	Low Negative	**High**

	efficiency. • Laydown areas and construction camps should be located in low visibility areas. • Construction of new roads should be minimised.									

Operational Phase

Direct Impacts

Impact Description	Mitigation	Spatial Extent	Intensity	Duration	Reversibility	Irreplaceability	Probability	Significance & Status		Confidence
								Without Mitigation	*With Mitigation*	
Manganese Ore Export Terminal (Stockpiles)										
Impact 4: Visual intrusion of Manganese ore Stockpiles on the existing views of sensitive visual receptors	• None beyond what is planned in adherence with CDC guidelines and specifications (CKA 2002).	Local	Low	Long Term	High	Low	Highly Probable	Low Negative	Low Negative	**High**
Conveyor route										

Impact 5: Visual intrusion of Conveyor System on the existing views of sensitive visual receptors	• Follow CDC visual guidelines for developments (CKA 2002). • Consult landscape architect to minimise and rehabilitate cut-and-fill scars and reduce their visual intrusion. • Lighting of conveyor system should be kept at a minimum.	Local	Low	Long Term to Permanent	Medium	Moderate	Highly Probable	Medium Negative (the same for either corridor)	Low Negative (the same for either corridor)	**High**
Manganese Ore Export Terminal										
Impact 6: Visual intrusion of Manganese Ore Export Terminal on the existing views of sensitive visual receptors	• Adhere to CDC visual and aesthetic guidelines for structures and buildings (CKA 2002). • Use best management practices for dust suppression at the stockpiles.	Regional	Medium	Long Term to Permanent	Medium	Low	Definite	Medium Negative	Low Negative	High
Compilation Yard										
Impact 7: Visual intrusion of a compilation yard on the existing views of sensitive visual receptors	• Retain as much existing vegetation as possible, particularly inside the loop (but must also be in line with CDC future plans). • Rehabilitate cleared areas not required after construction – remove alien invasives. • A lighting plan with emphasis on minimising light spill and glare towards the GAENP. • All else being equal, the	Regional	Mediumto low.	Long Term	Medium	Low	Probable	Medium Negative	Low Negative	**High**

	preferred rail layout is firstly one requiring the least permanent alteration of the landscape, otherwise alternative 2.									
Manganese Ore Export Terminal										
Impact 8: Visual impact of night lighting of the Manganese Ore Export Terminal on the nightscape of the region.	• The lighting design should minimise nightscape impacts such as sky glow, light spill and glare. • Particular attention should be paid to lighting that may pose a risk to motorists driving along the N2 and R334. • Keep bright lights below terrace above stockyard site. • Lighting should be kept to the minimum required for safety and security. • Uplighting and glare should be minimised using appropriate light screening features on all external lights. • Light fixtures should not spill light beyond the project boundary (light trespass). • Timer switches or motion detectors should be used to control lighting in areas that are not occupied continuously. • Minimal lighting should be	Local	Medium	Long Term	High	Low	Probable	Medium Negative	Low Negative	**High**

	used for the conveyor system.									
Compilation Yard										
Impact 9: Visual impact of night lighting of the Compilation Yard on the nightscape of the region.	• The lighting design should minimise nightscape impacts such as sky glow, light spill and glare. • Particular attention should be paid to potential glare and light spill which may affect visual receptors in the GAENP (views will be from elevated positions). • Lighting should be kept to the minimum required for safety and security. • Uplighting and glare should be minimised using appropriate light screening features on all external lights. • Light fixtures should not spill light beyond the project boundary (light trespass). • Timer switches or motion detectors should be used to control lighting in areas that are not occupied continuously.	Local to Regional	Medium t High	Long Term	High	Low	Probable	Medium Negative	Low Negative	**High**
Manganese Ore Export Terminal and Compilation Yard										
Impact 10: Overall visual impact of	• Mitigation measures as for impacts above.	Regional	Medium to low	Long Term	High	Low	Definite	Medium Negative	Low Negative	High

proposed Manganese Ore Export Terminal and Compilation Yard on existing views of sensitive visual receptors	• Layout options that will have the lowest visual impact: o Berth and port structures; o Stockyard (with tipplers preferably located closer to stockyard and on the same level); o Compilation yard with alternative route 2.									

13.7 BEST MANAGEMENT PRACTICES

A number of best management practices that are relevant to visual impact of the development:

13.7.1 Rehabilitation of disturbed sites

An appropriately qualified professional:

- Provides monitoring to ensure the plan is properly implemented;
- Ensures that the construction area is minimised and limited to approved plans; and
- Provides long term monitoring until green-up is established and soils at the site are stable.

13.7.2 Erosion and sediment control plan

Develop a plan for erosion and sediment control with the assistance of an appropriately qualified professional before construction begins. The plan should include:

- Methods to minimize the extent of area cleared at any one time and to promptly revegetate disturbed areas (with native plants);
- Conserve topsoil with leaf litter and organic matter, and reapply this material to local disturbed areas to promote growth of local native vegetation;
- Apply erosion control measures before rainy season begins and after each season of construction;
- Stabilise cut and fill slopes, sliver fills, upland barren areas, or gullies with brush layers, rock structures, vegetative contour hedgerows or other biotechnical measures.
- Detailed directions to contractors to ensure that no erosion or sediment movement occurs and no silt is released to watercourses during the construction and post-construction phases;
- Plant appropriate native plant species that will quickly re-establish vegetation cover, especially in riparian areas;
- Maintain and reapply erosion control measures until vegetation is successfully established;
- Use fertilisers in areas of poor, nutrient deficient soils to promote faster growth and better erosion control.

13.7.3 Dust Control

Dust control measures and best practices are discussed in Chapter 5: Air Quality and Human Health Risk Study, Section 5.8 of this EIA.

13.7.4 US Bureau of Land Management guidelines for reducing contrast of man-made structure

Textbox 13-1 Extract of best management practices relevant to this project, from US Bureau fo Land Management (BLM 2007)

- Natural surfaces are usually well-textured and have shade and shadow effects that darken them surfaces of structures are usually smooth and reflect light even if dull-finish paint is used. So, as a general rule of thumb, colors on smooth manmade structures need to be two or three shades darke than the background colors to compensate for the shadow patterns created by naturally textured surfaces that make colors appear darker.
- Galvanized steel on utility structures should be darkened to prevent glare. Low lustre paints should be used wherever possible to help reduce glare. It is almost impossible to remove all sun glare.
- Color (hue) is most effective within 1,000 feet. Beyond that point, color becomes more difficult to distinguish and tone or value determines visibility and resulting visual contrast.
- Surface disturbance of western mineralized soils can result in strong color contrasts. In many situations, this suggests that the area should be avoided as a location for the proposed development, or that color selections for the manmade facilities or disturbance might need to reflect the lighter colored soil revealed by the disturbance.
- Colors should be selected from a distance that permits viewing of the entire landscape surrounding the proposed development.
- Colors that blend with or are in harmony with the existing colors of the earth, rocks, and vegetation are usually more visually pleasing and attract less attention than colors that are chosen to match the color of the sky.

13.8 CONCLUSIONS

A Manganese Ore Export Facility is a large industrial development and the ore stockpiles are problematic since few viewers find them aesthetically pleasing. They attract attention due to their size and their strong contrast in colour and texture with most settings. The other components of the development are common to most heavy industrial landscapes and if care is taken to minimise disturbance of sites and visual contrast with surroundings then these structures will be congruent with the industrial landscape as envisaged by the CDC. The topographic screening by the deeply incised Coega River at this location is very effective and it is unlikely that there is a better site in the IDZ for locating the stockpiles.

The assessment has shown that the significance of visual impacts will all be **low** with mitigation for the Manganese Ore Export Terminal. The conveyor system will potentially cause visual impact of **medium** significance without mitigation, but of **low** significance with mitigation.

The compilation yard will be constructed in a relatively undisturbed area of the landscape (in terms of industrial developments) but there are very few highly sensitive visual receptors that will be affected by the development. Appropriate night lighting of the development will minimise the impact on visual receptors in the GAENP. The visual impacts associated with the compilation yard are therefore predicted to be of **low** significance with mitigation.

It should also be taken into consideration that there are many more industrial developments planned for the Coega IDZ and that the Manganese Ore Export Facility will increasingly fit into the landscape. It is an industrial type development in a landscape designated to industrial developments.

13.9 REFERENCES

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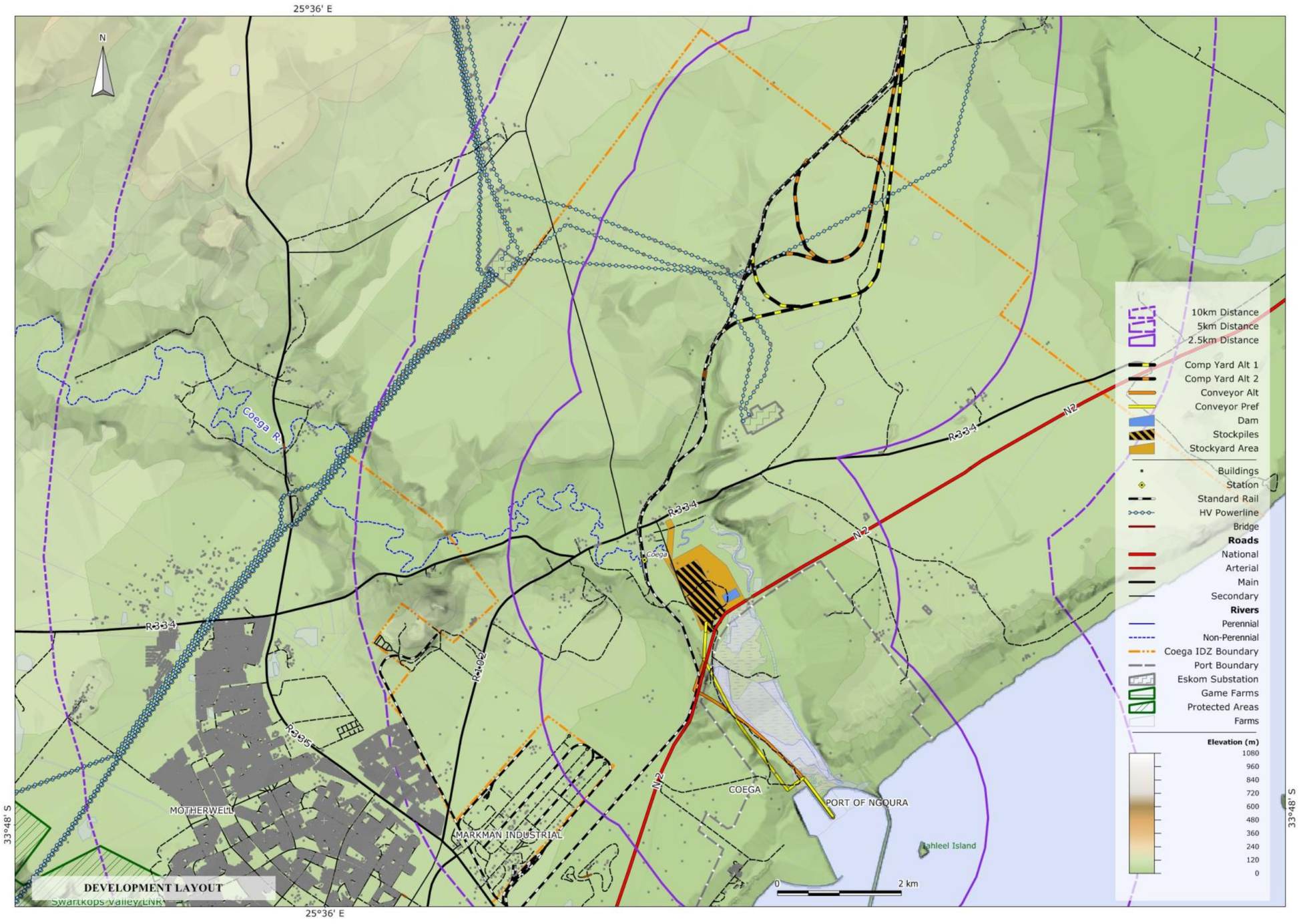
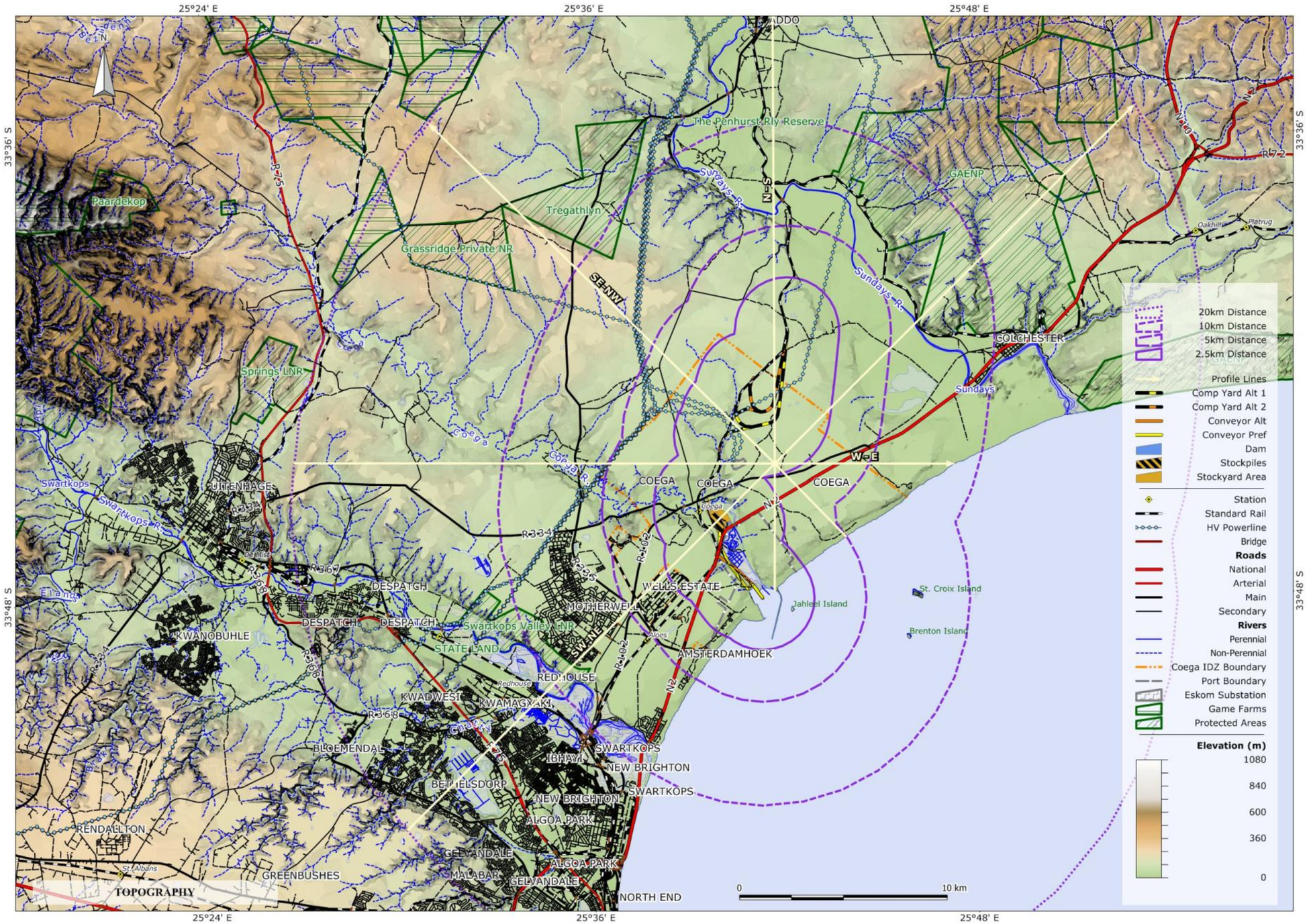
13.10 MAPS

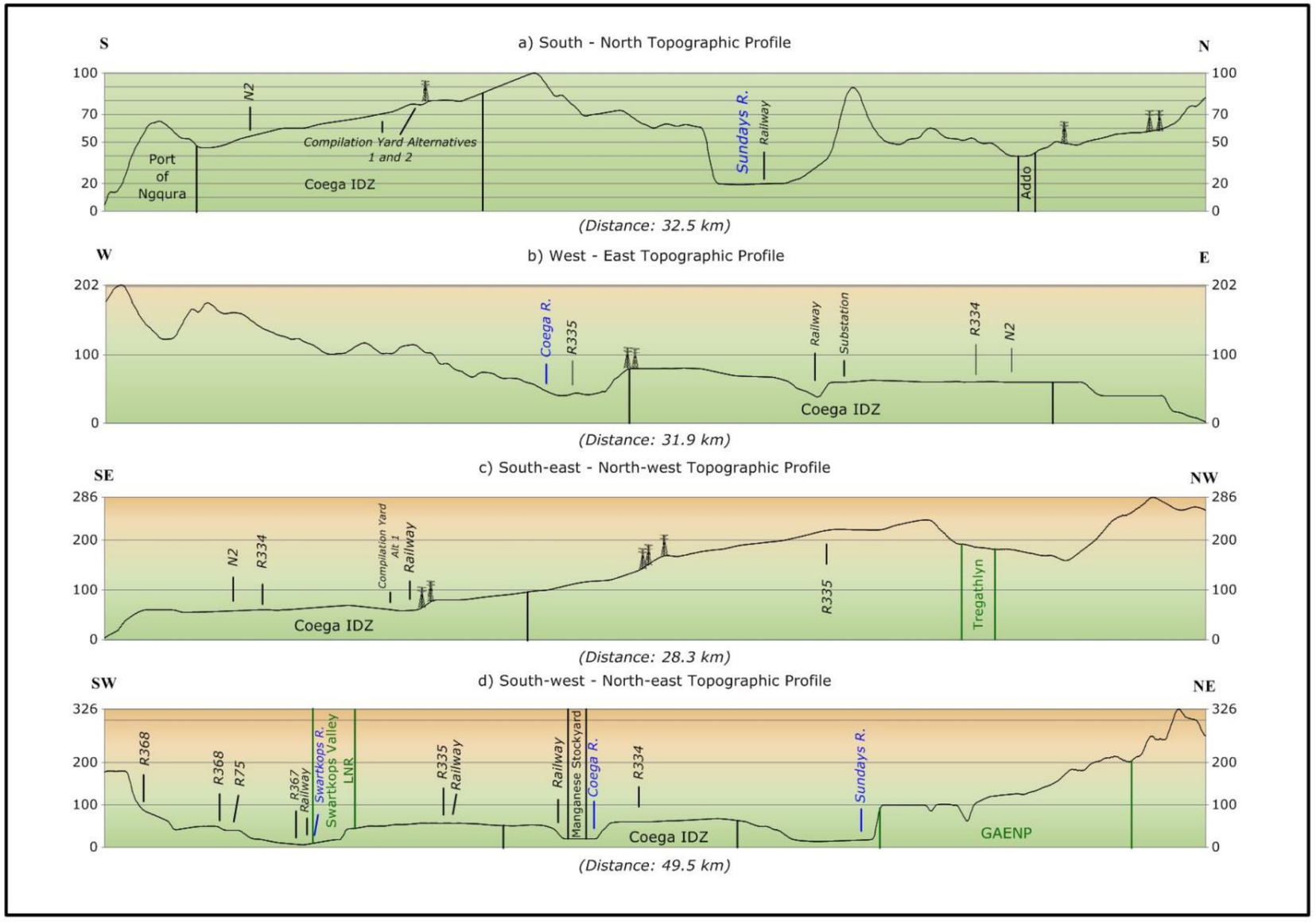
Map 13-1 Schematic layout of the proposed development.



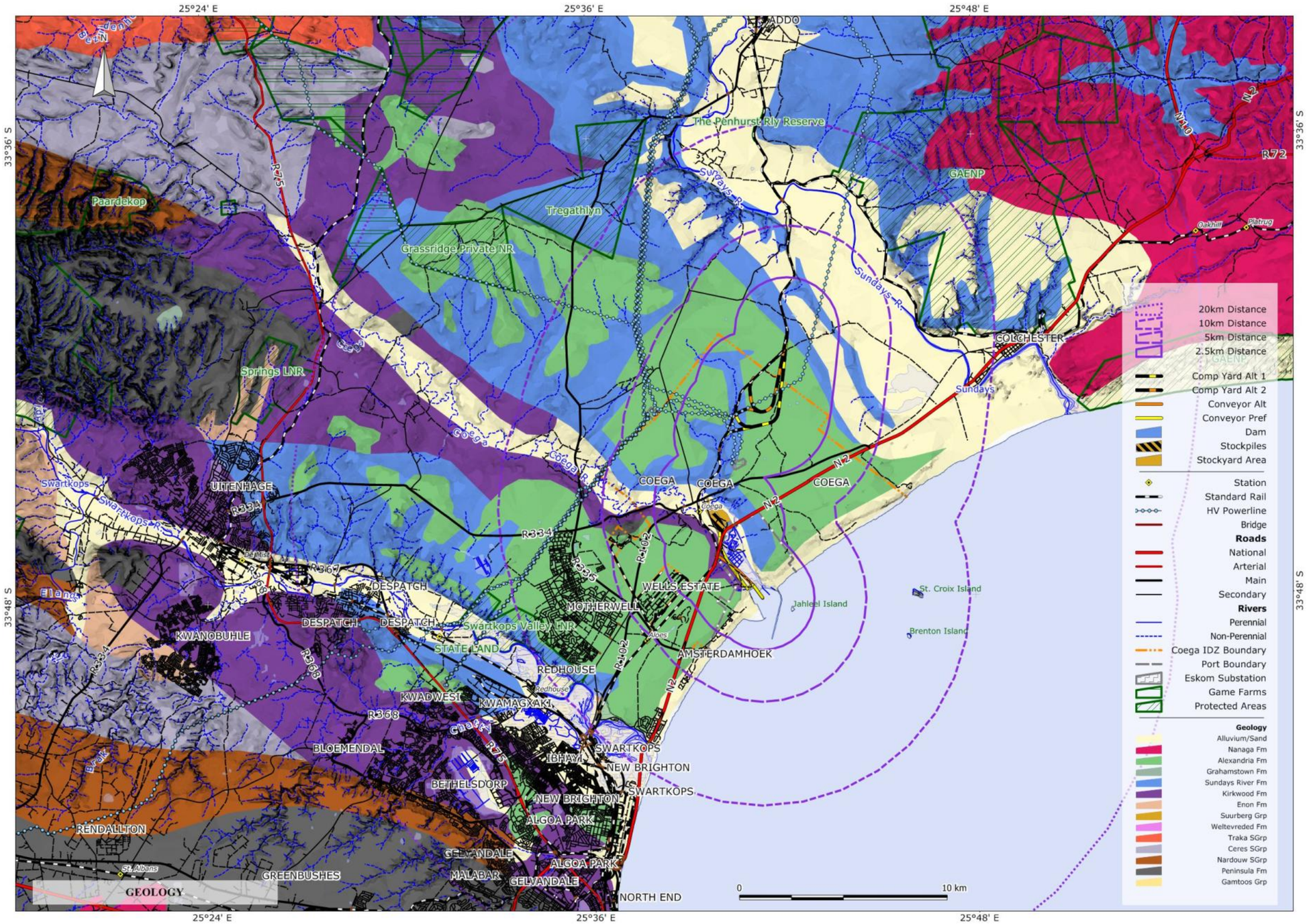
Map 13-2 Topography of the Coega region.



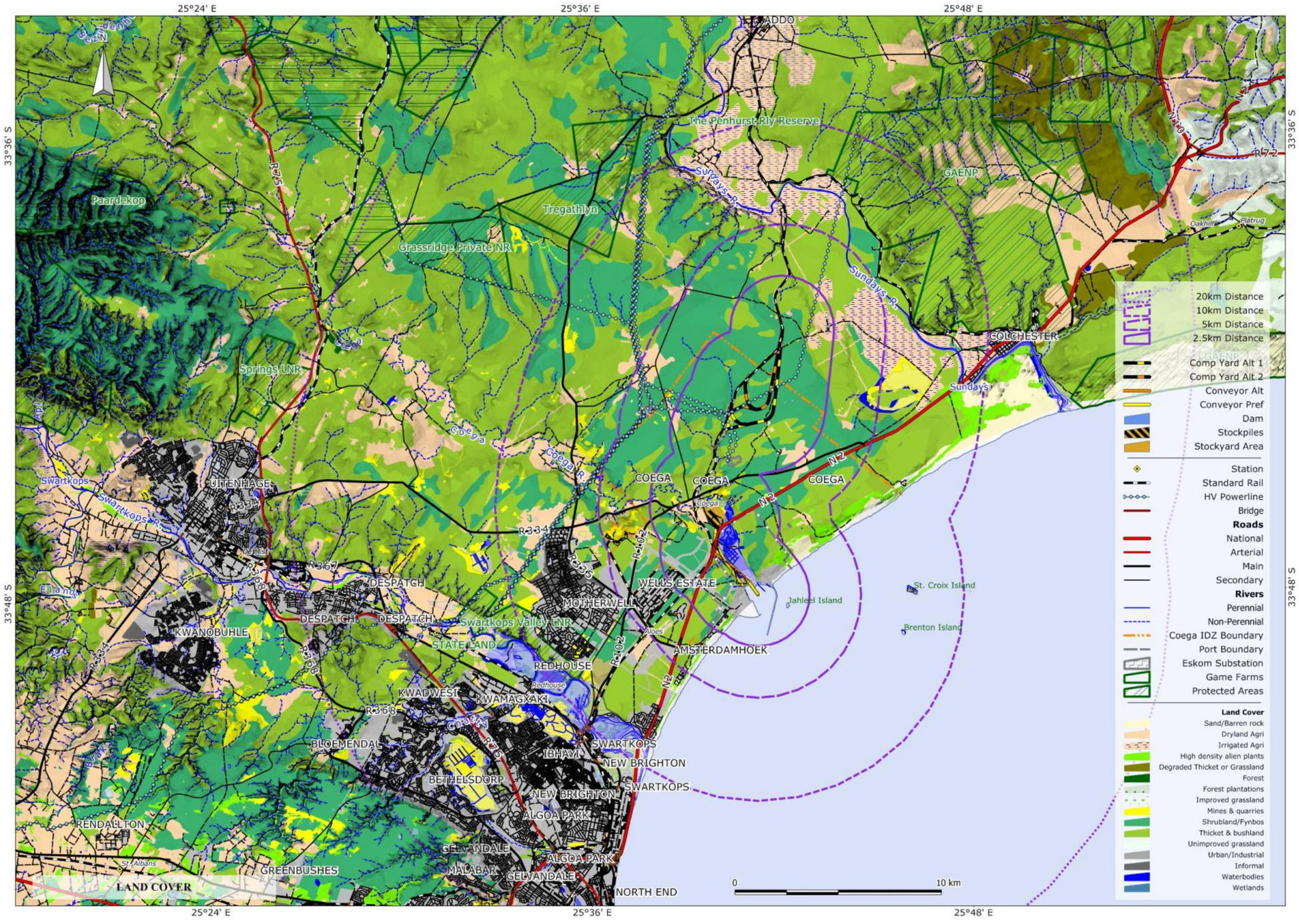
Map 13-3 Topographic cross-sections of the region. Profile lines are shown on the topographic map.



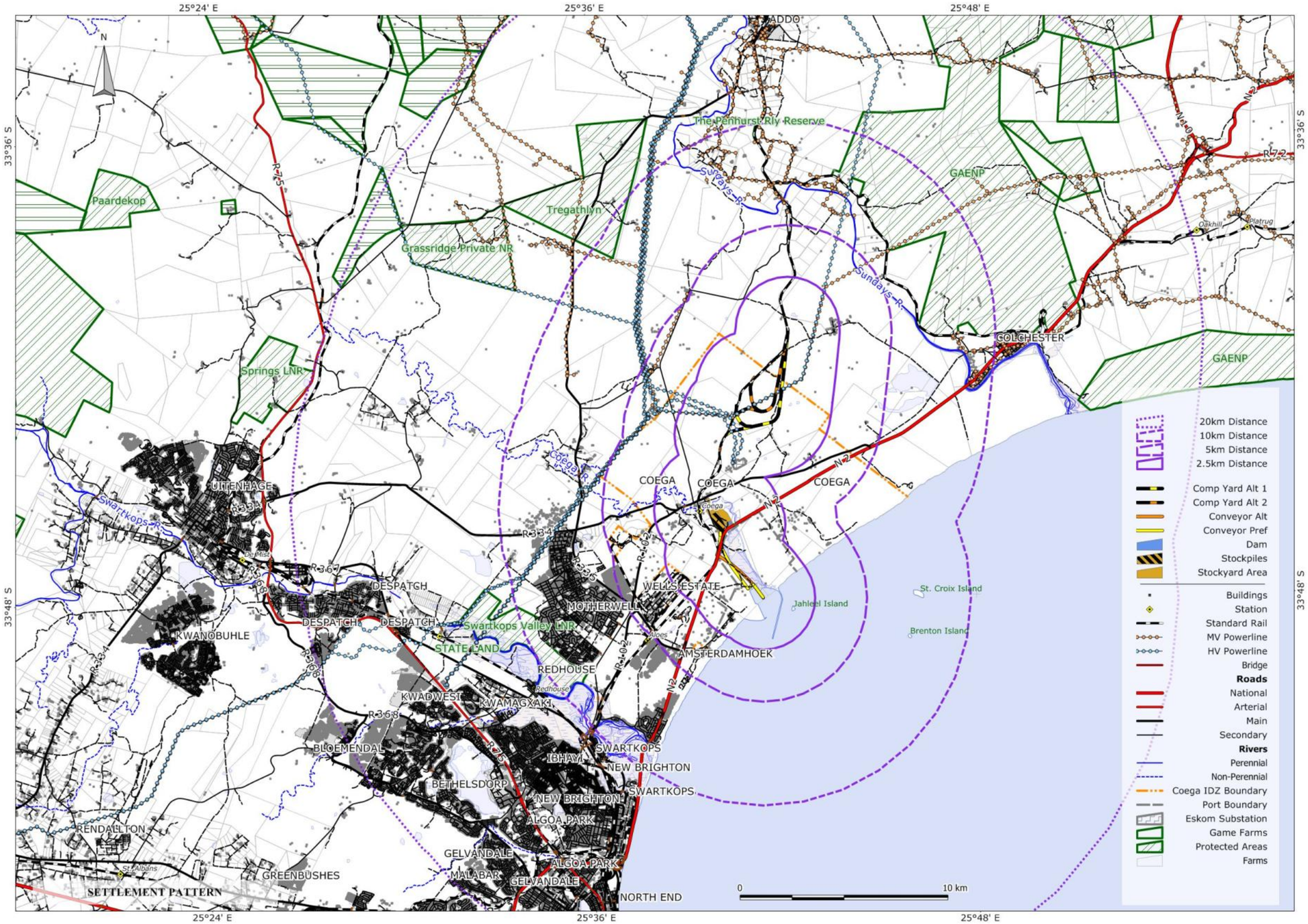
Map 13-4 Simplified geology of the Coega region.



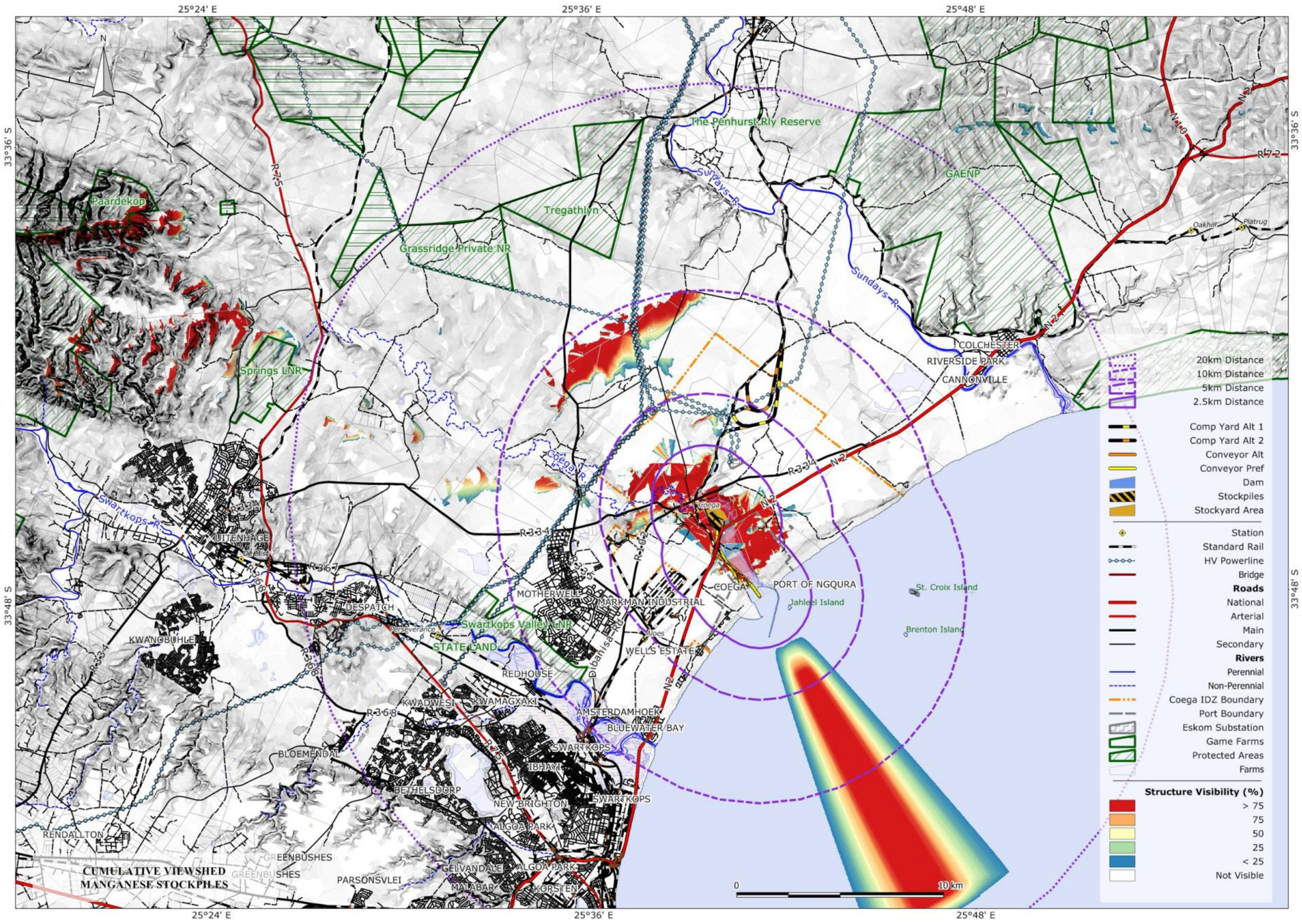
Map 13-5 Land cover of the Coega region.



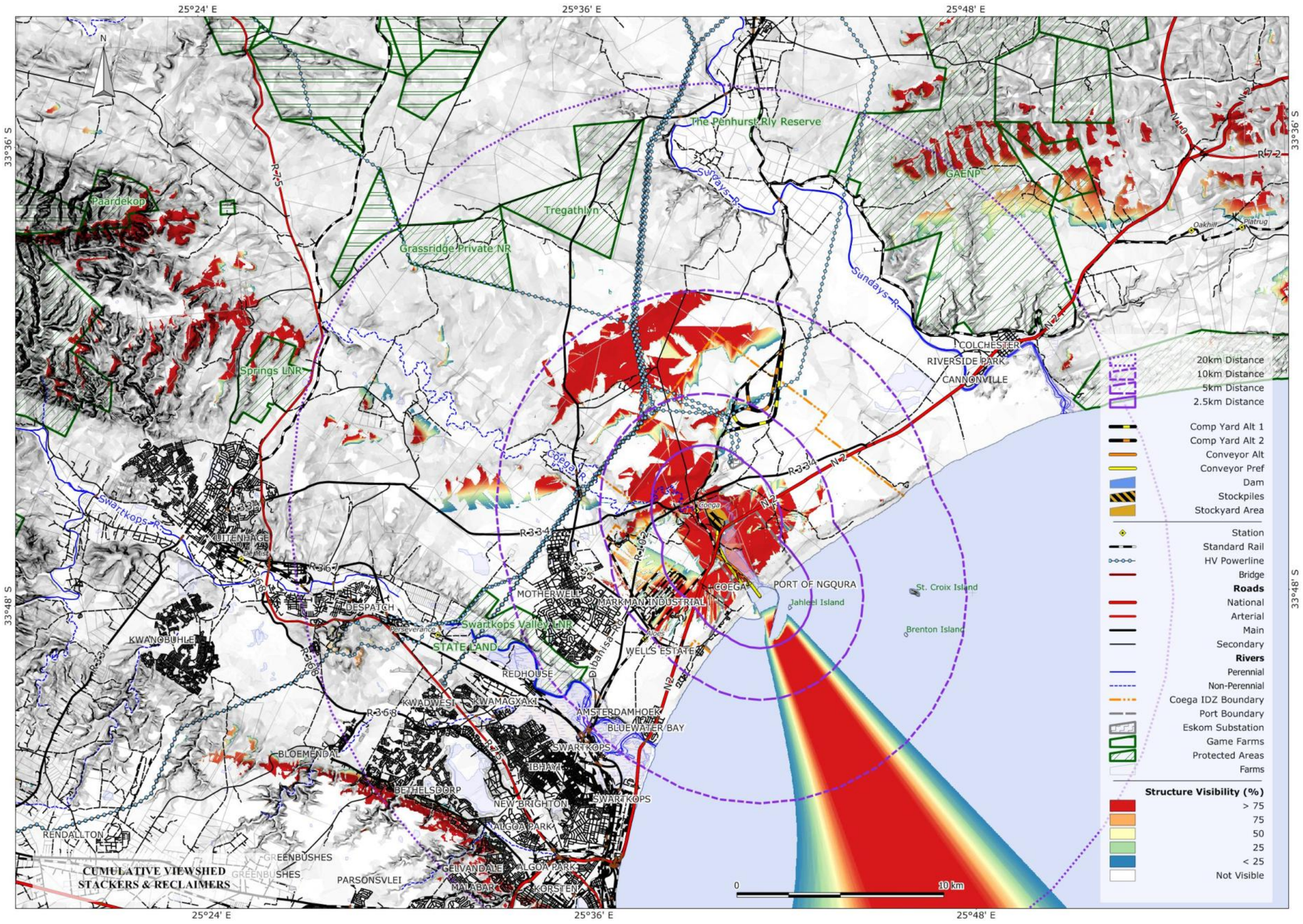
Map 13-6 Settlement pattern of the Coega region.



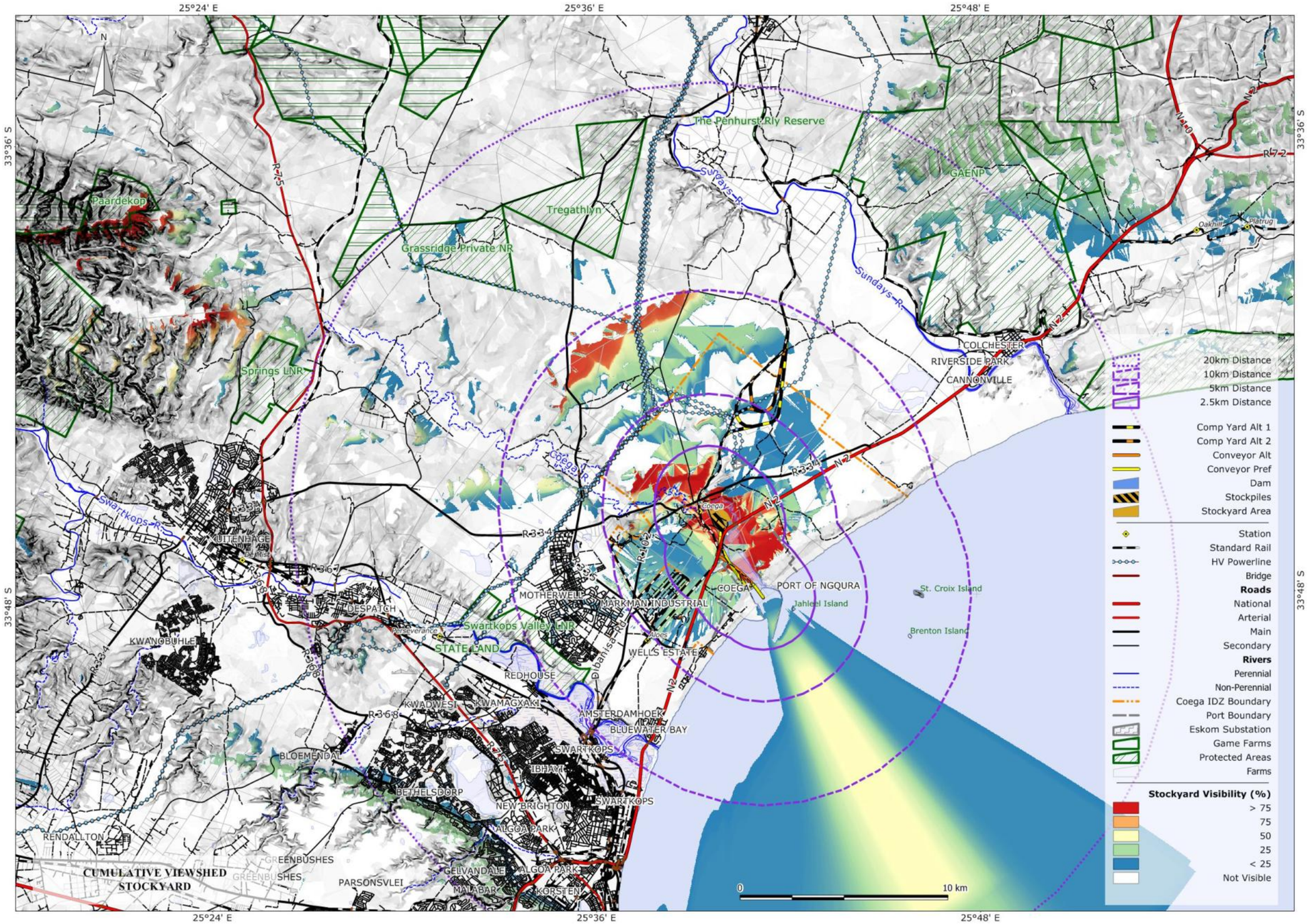
Map 13-7 Cumulative viewshed of the Manganese ore Stockpiles.



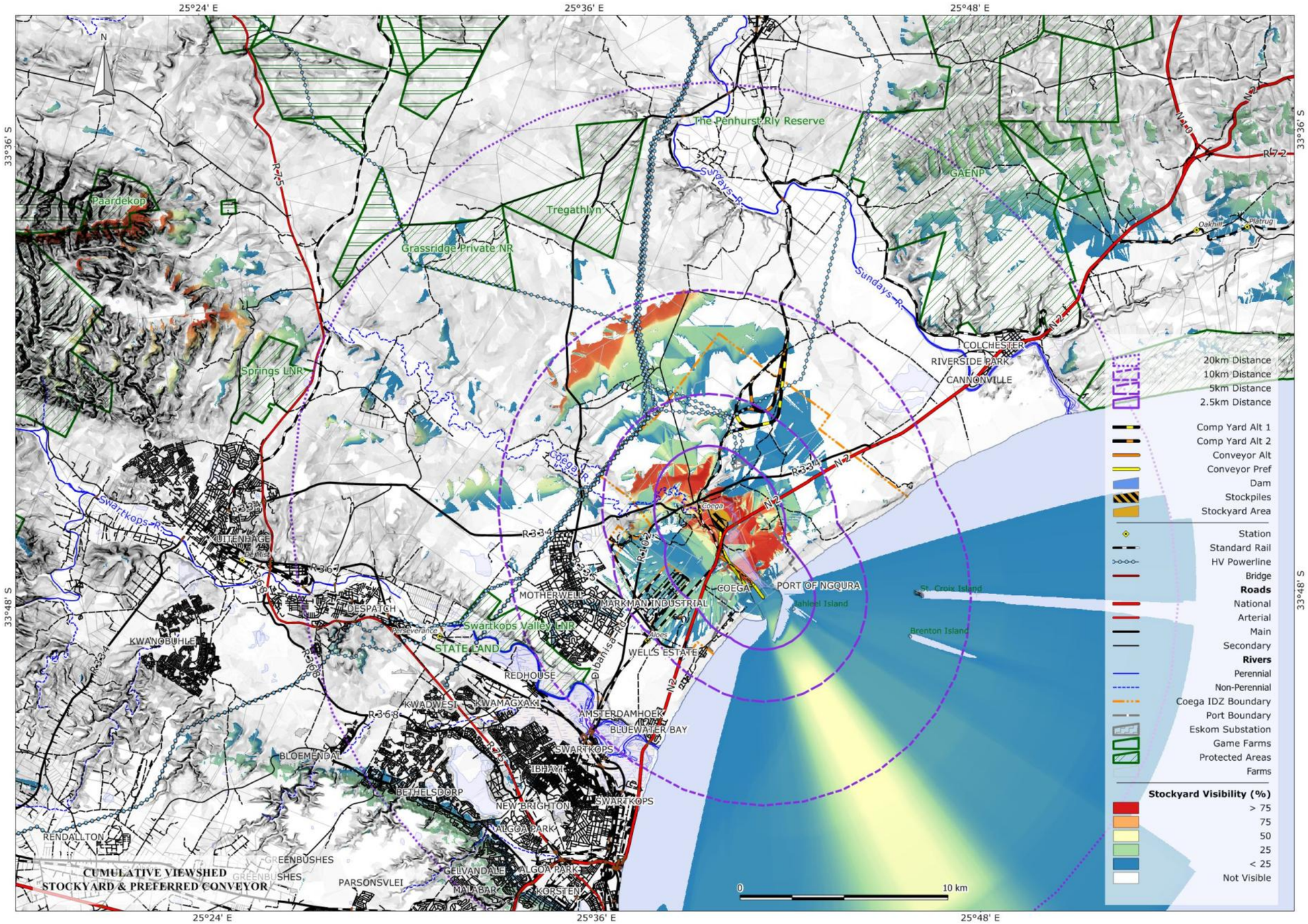
Map 13-8 Cumulative viewshed of reclaimers and stackers in the Manganese ore Stockyard.



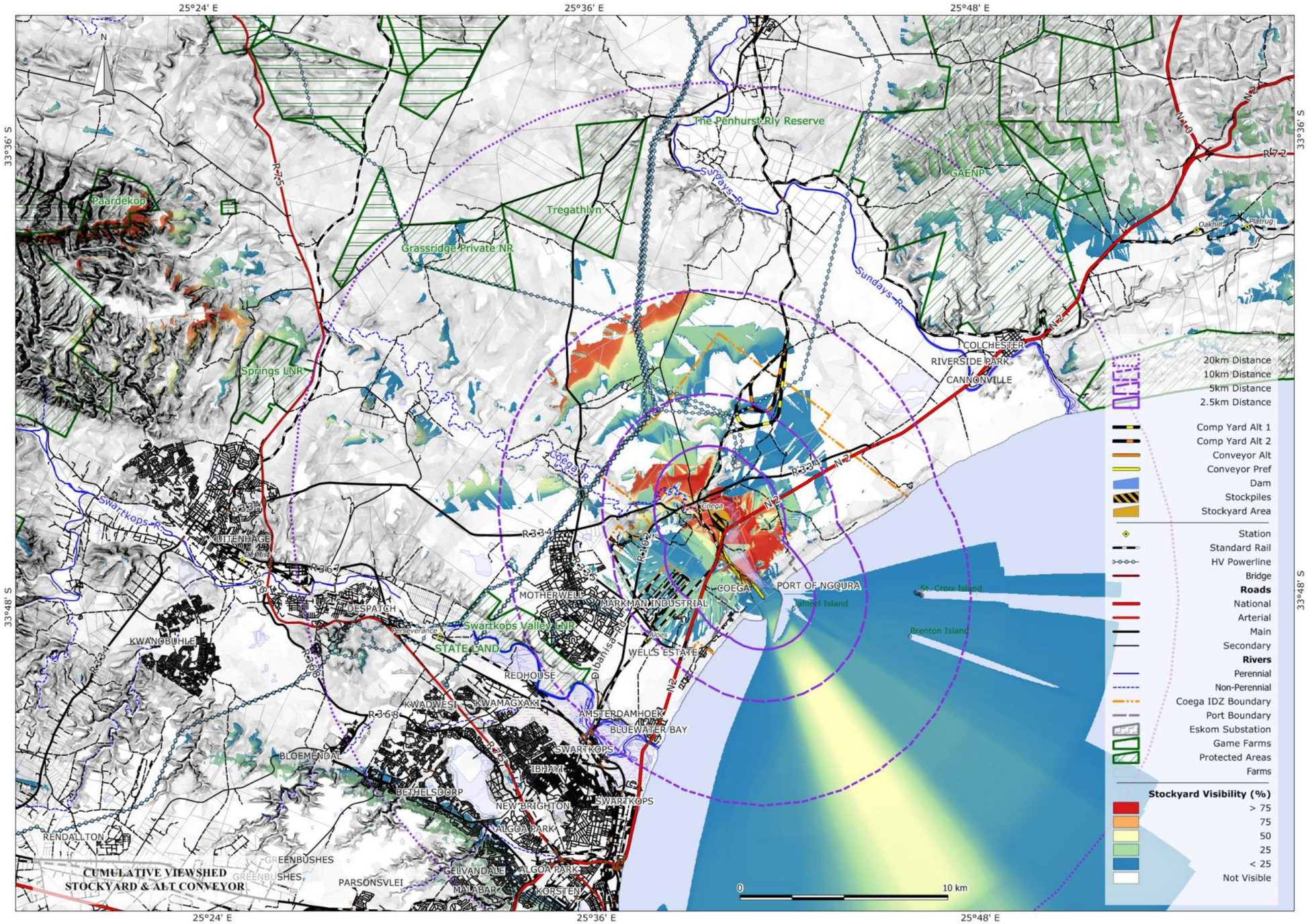
Map 13-9 Cumulative viewshed of the stockyard without the conveyor.



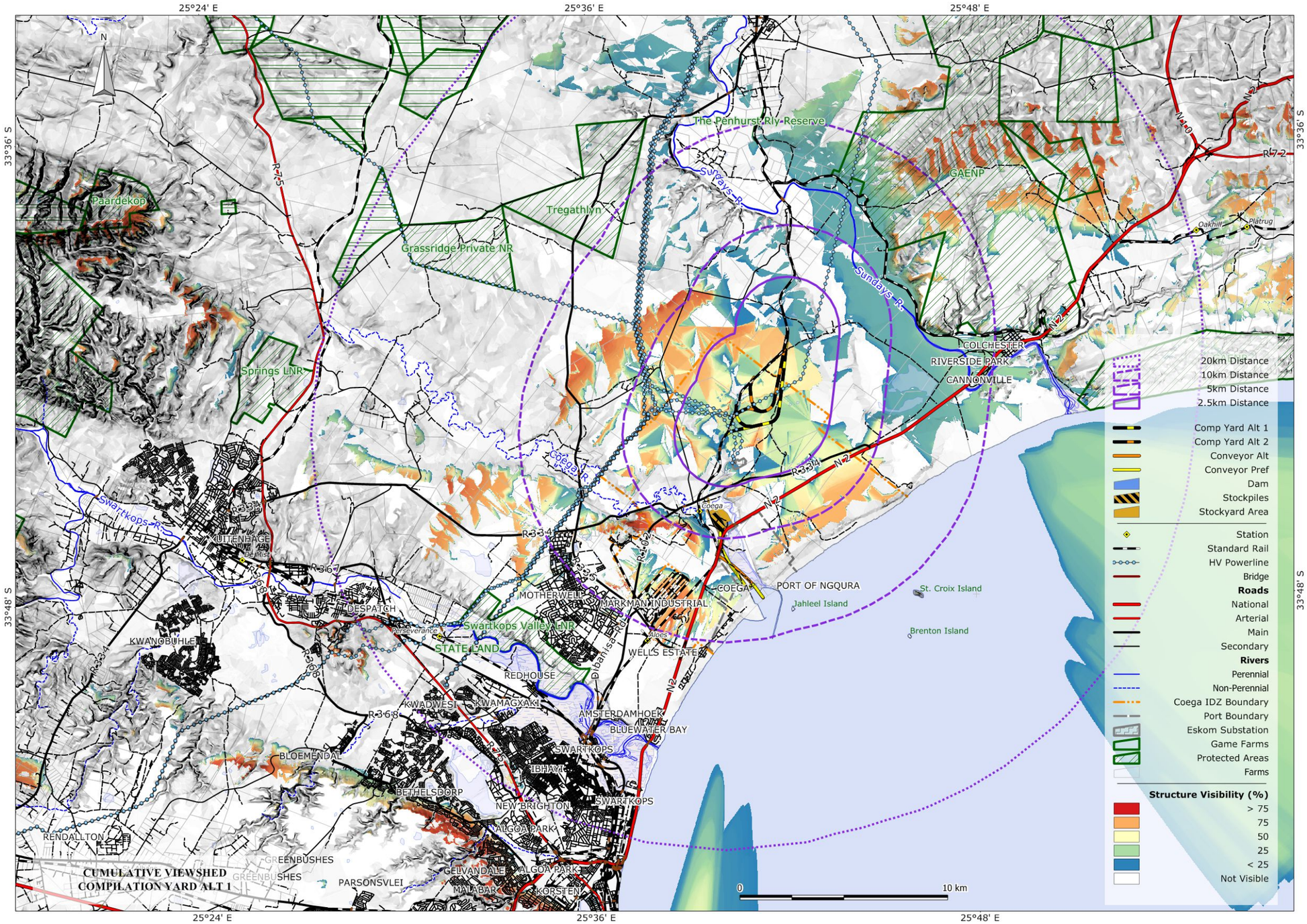
Map 13-10 Cumulative viewshed of the stockyard and the preferred conveyor corridor.



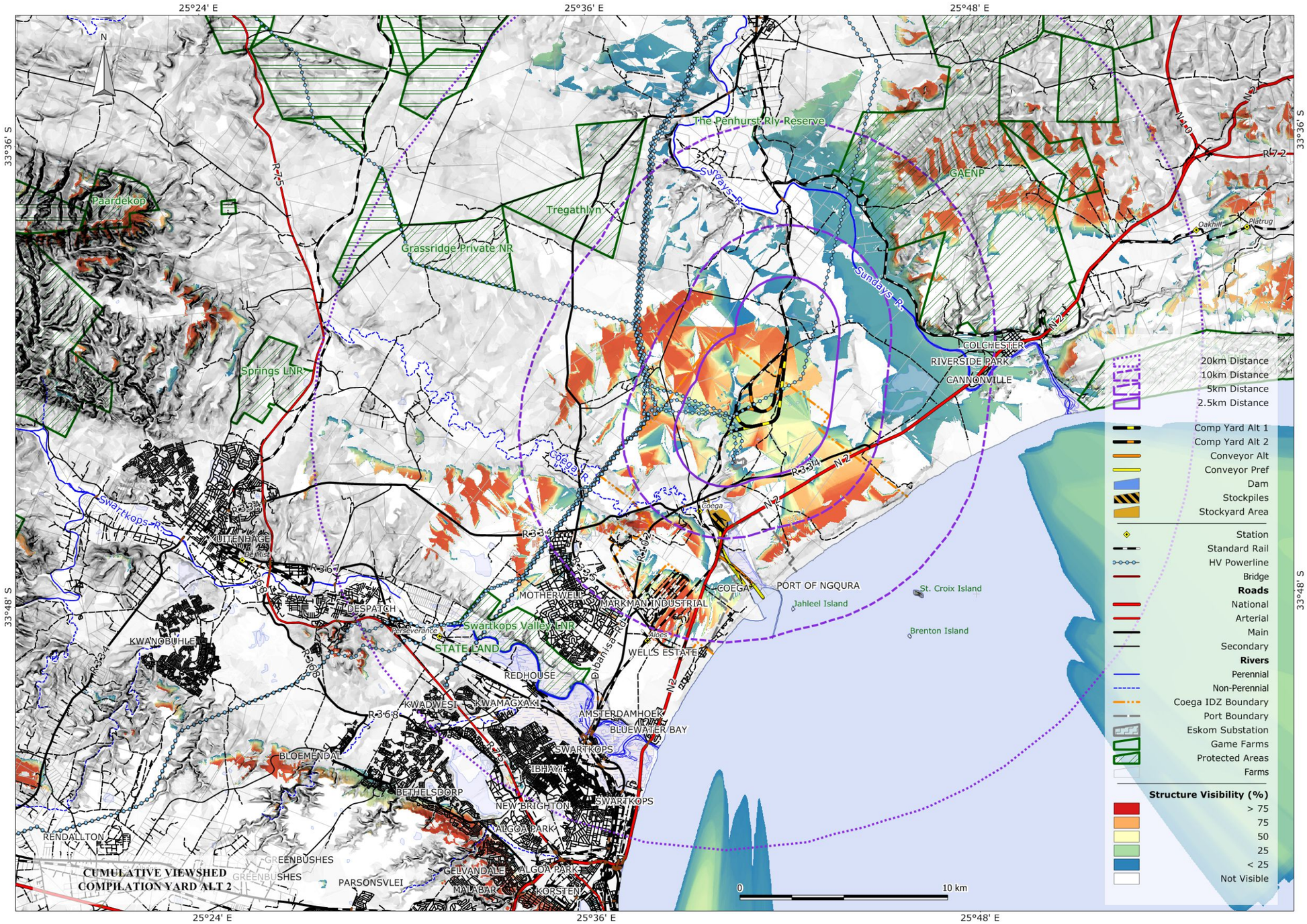
Map 13-11 Cumulative viewshed of the stockyard and alternative conveyor corridor.



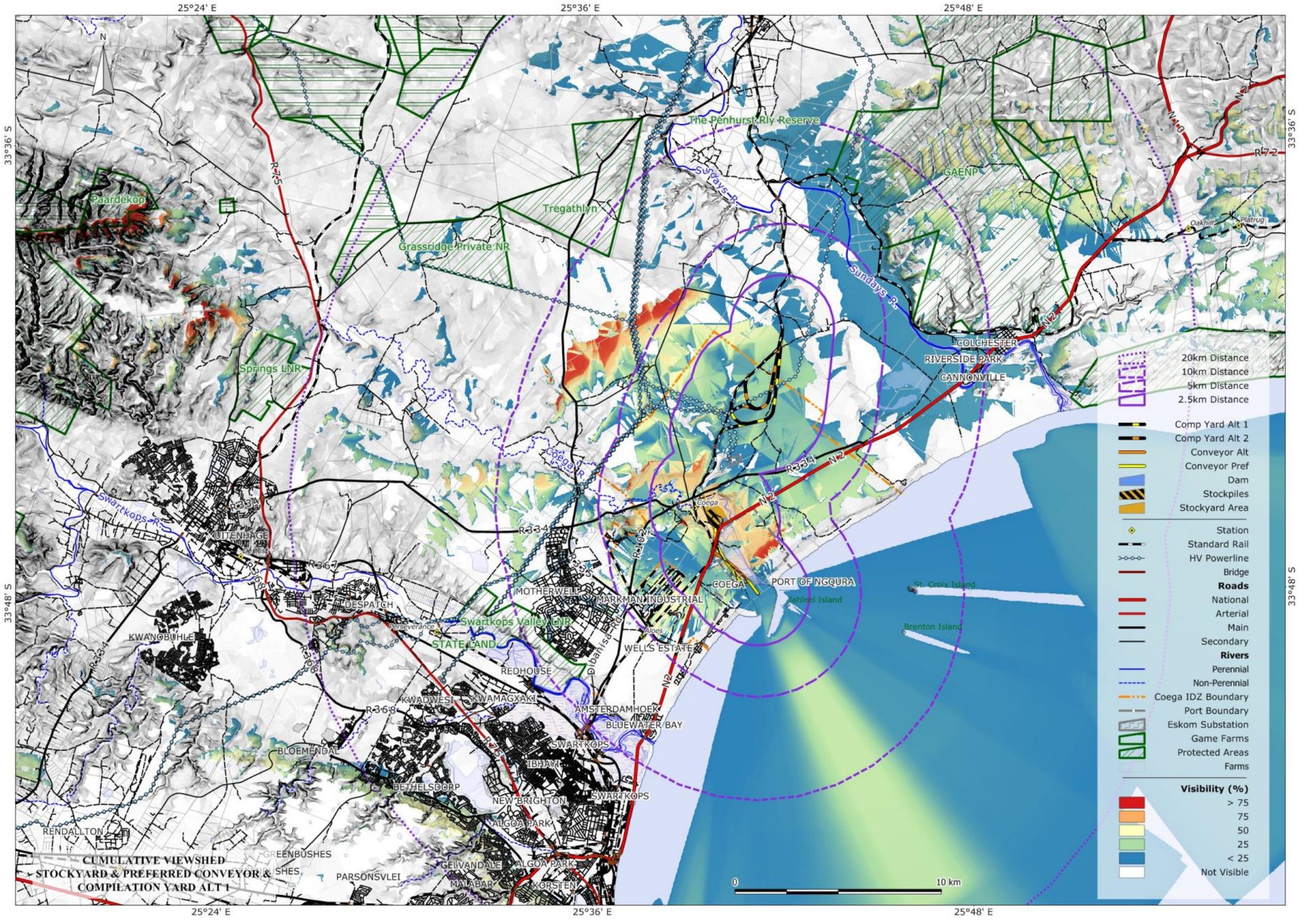
Map 13-12 Cumulative viewshed for the compilation yard with layout alternative 1.



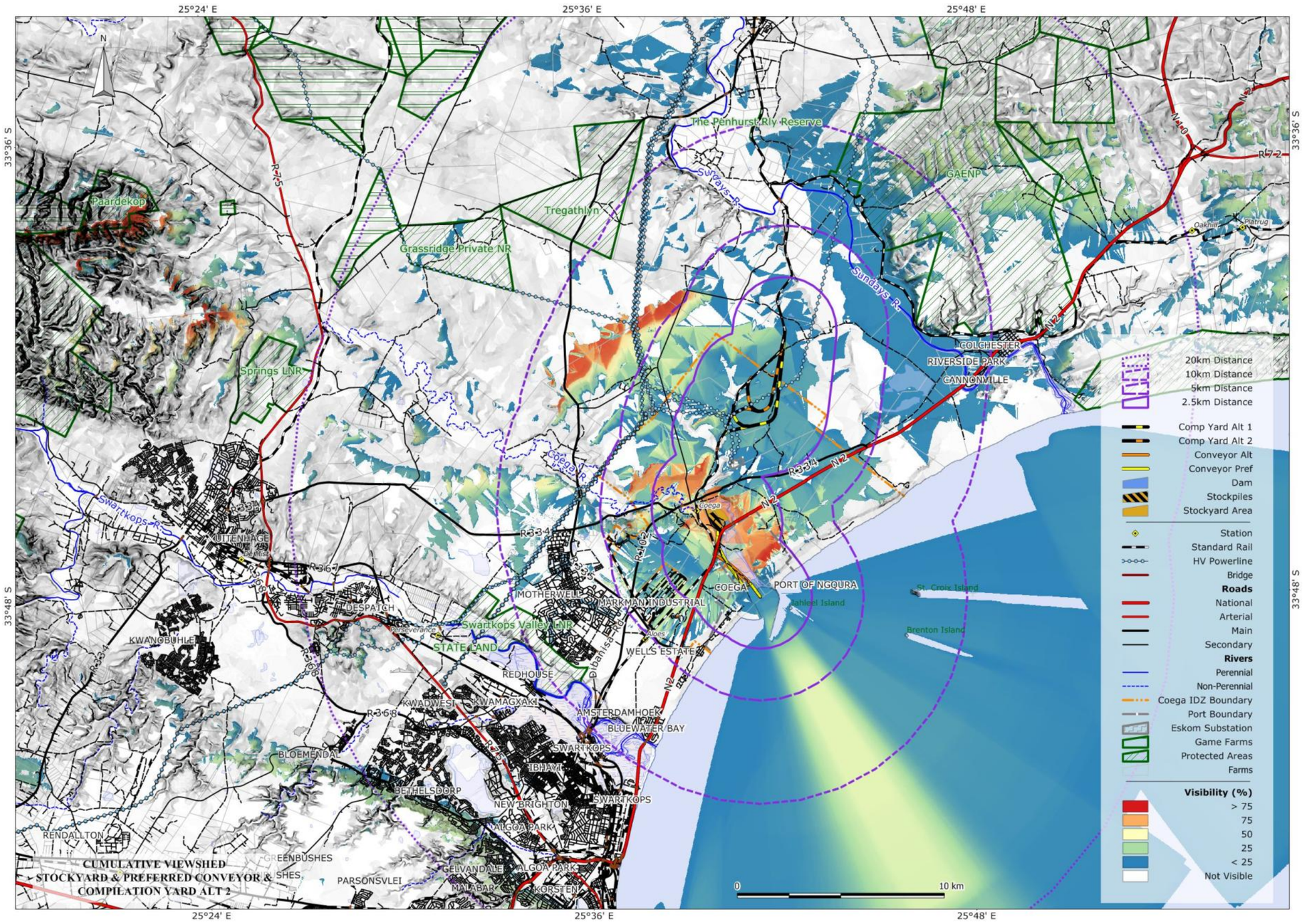
Map 13-13 Cumulative viewshed of compilation yard with layout alternative 2.



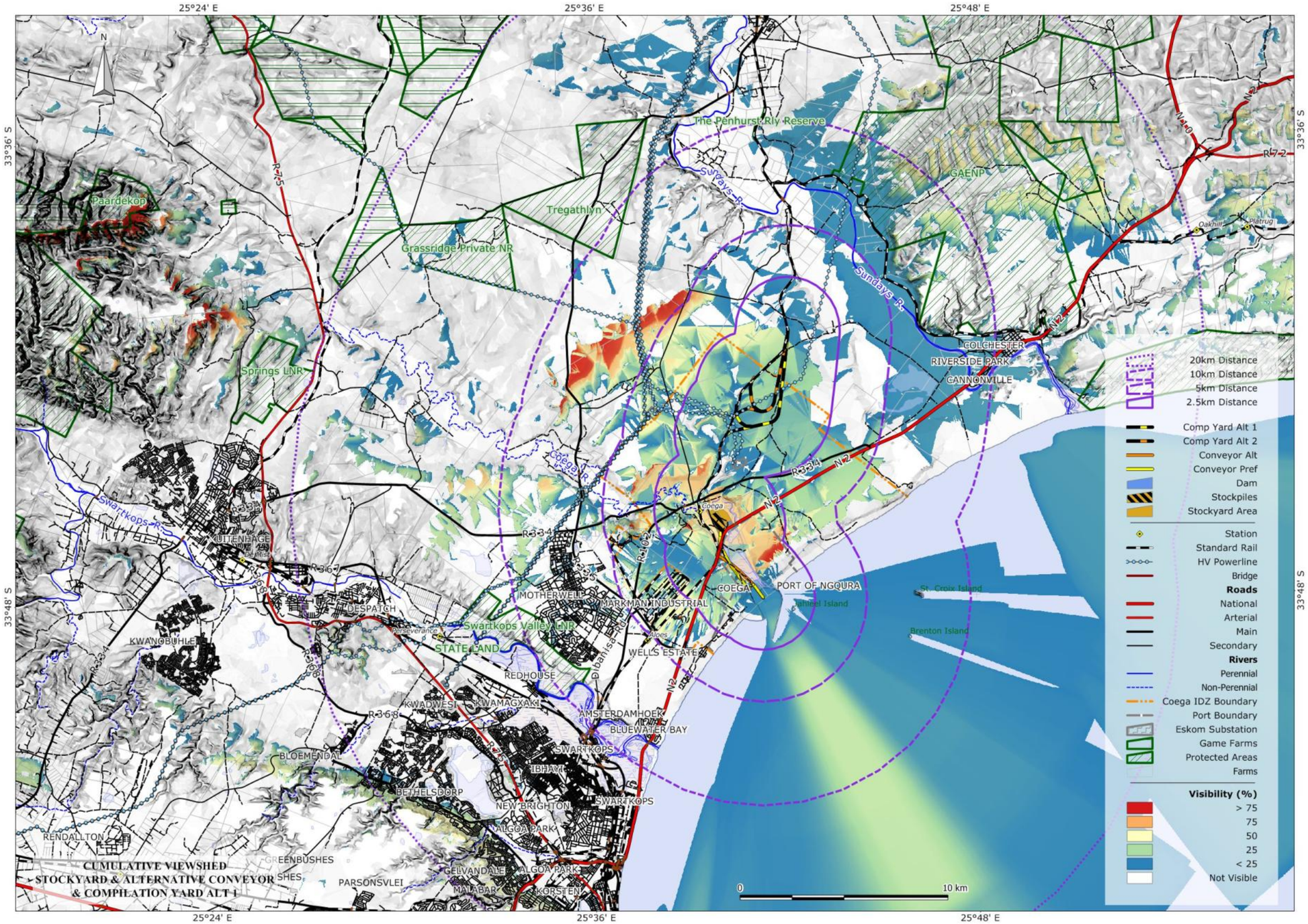
Map 13-14 Cumulative viewshed of the stockyard with preferred conveyor corridor combined with compilation yard layout alternative 1.



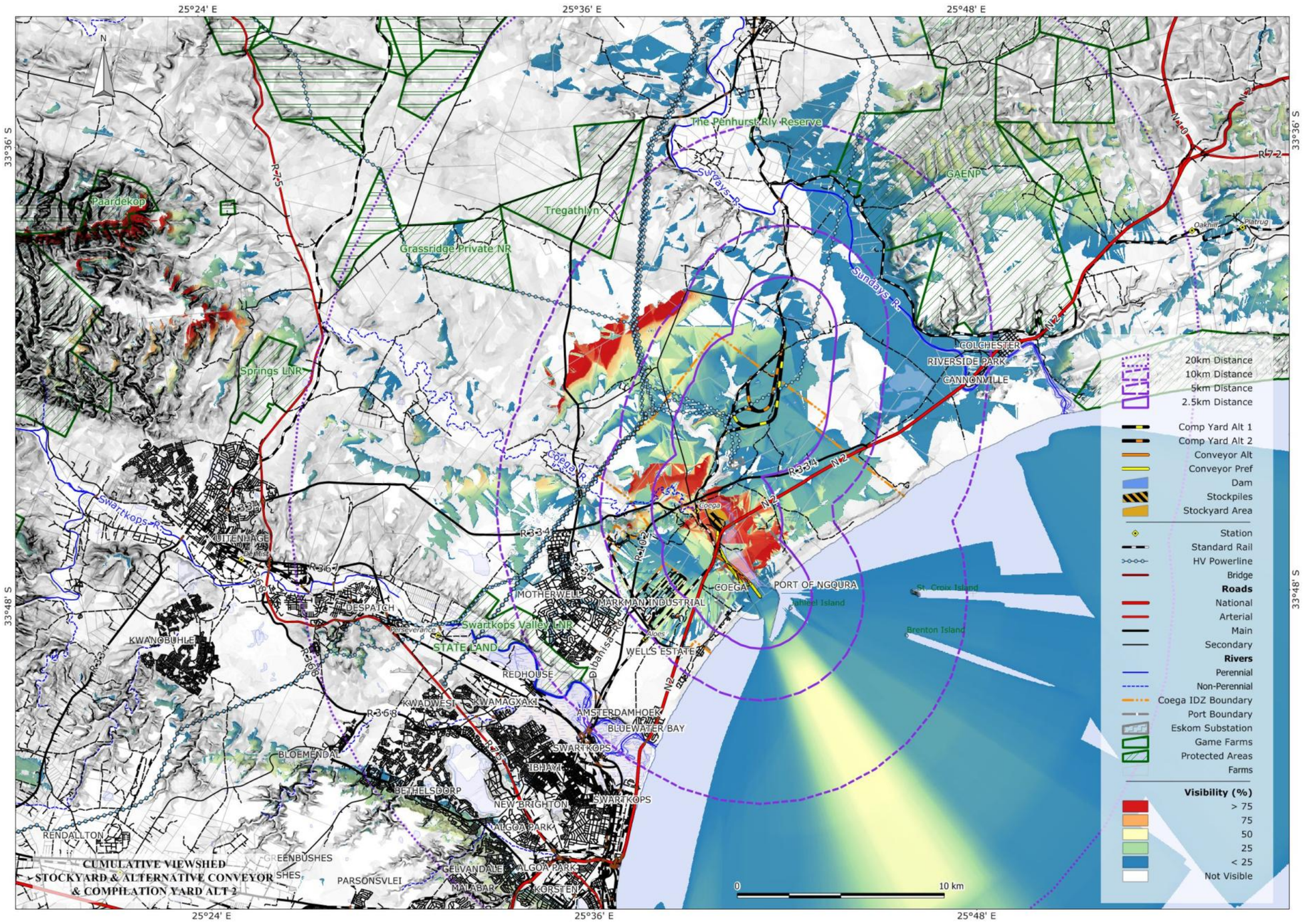
Map 13-15 Cumulative viewshed of the stockyard with preferred conveyor corridor combined with compilation yard layout alternative 2.



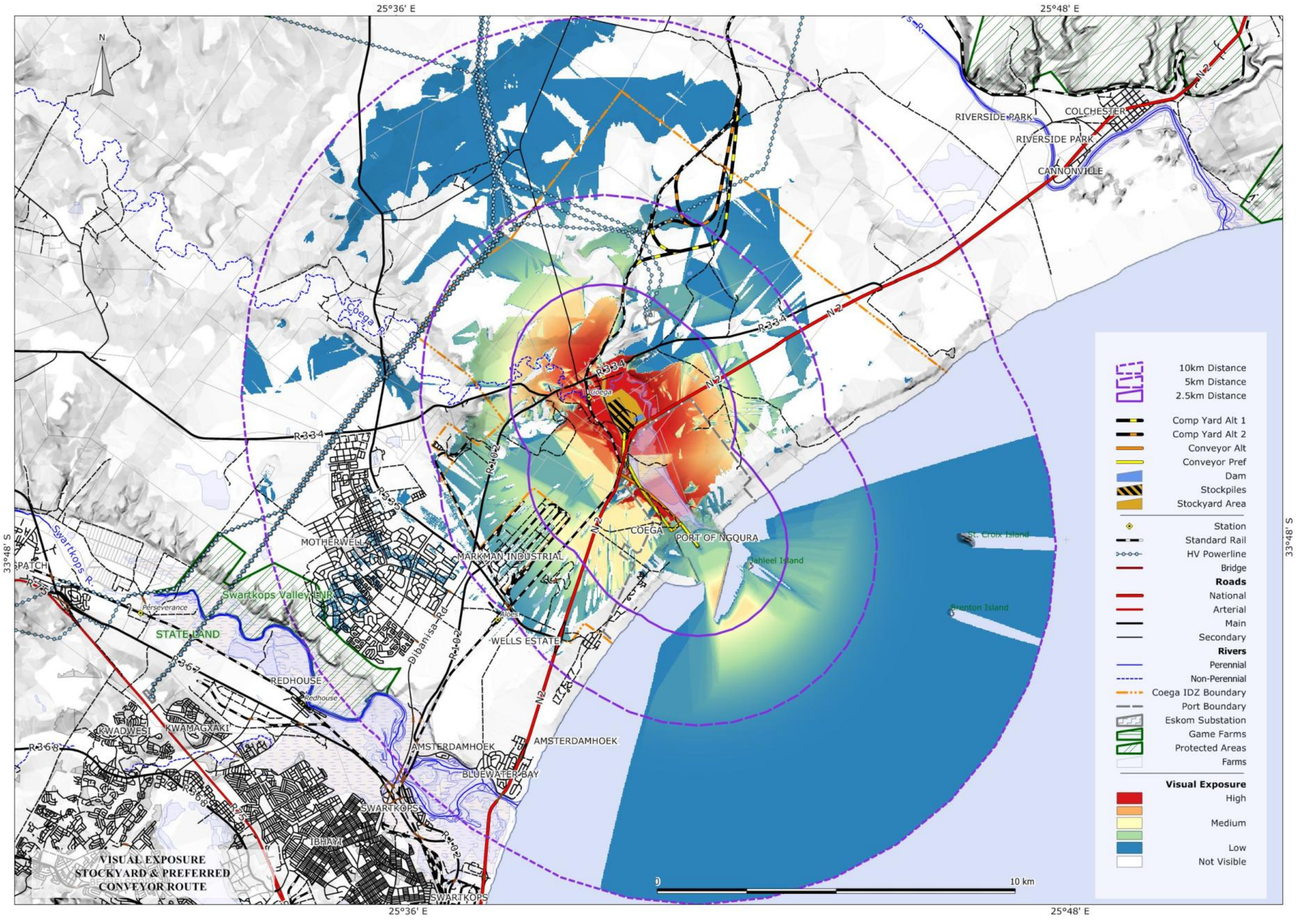
Map 13-16 Cumulative viewshed of the stockyard with alternative conveyor corridor combined with compilation yard layout alternative 1.



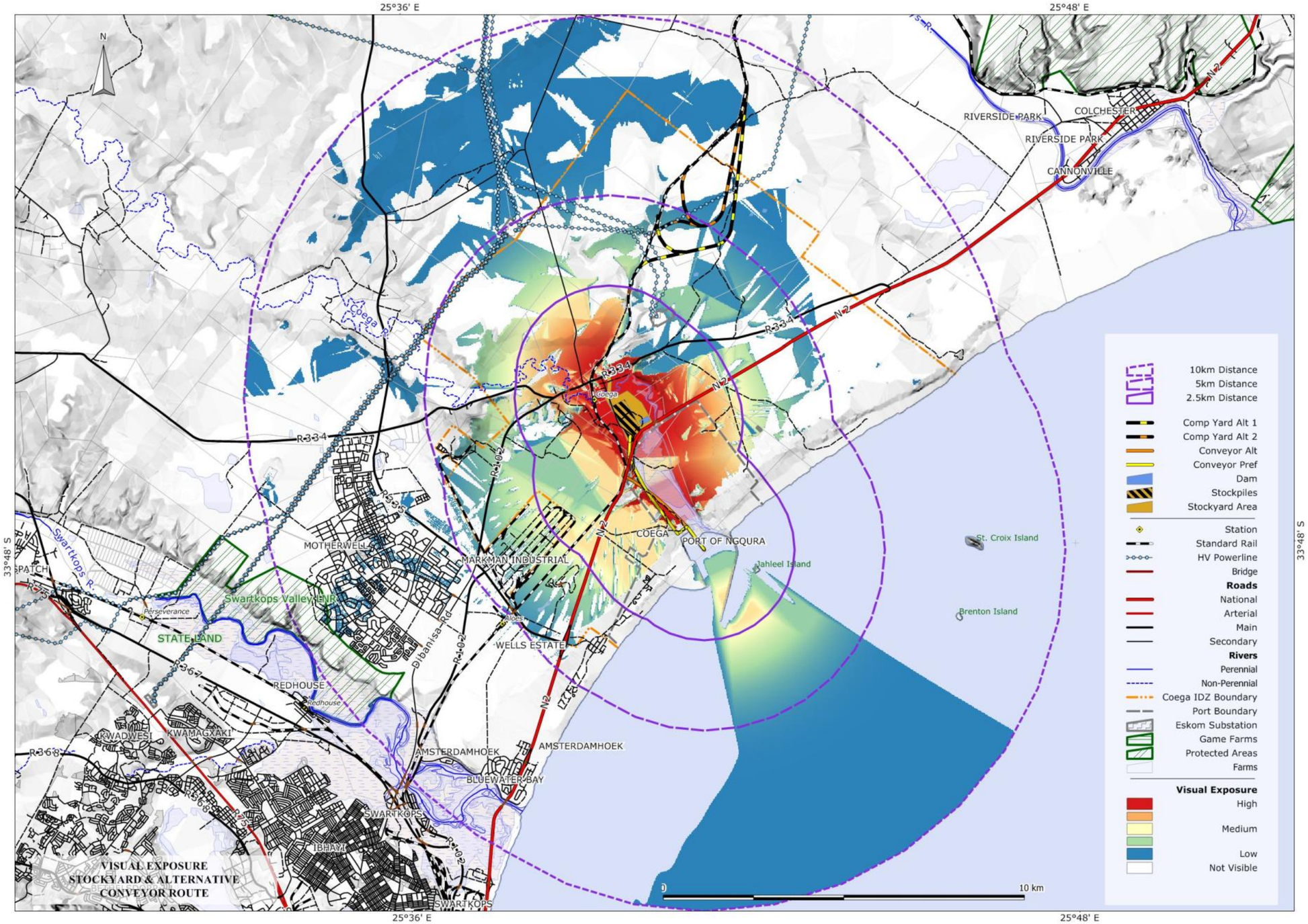
Map 13-17 Cumulative viewshed of the stockyard with alternative conveyor corridor combined with compilation yard layout alternative 2.



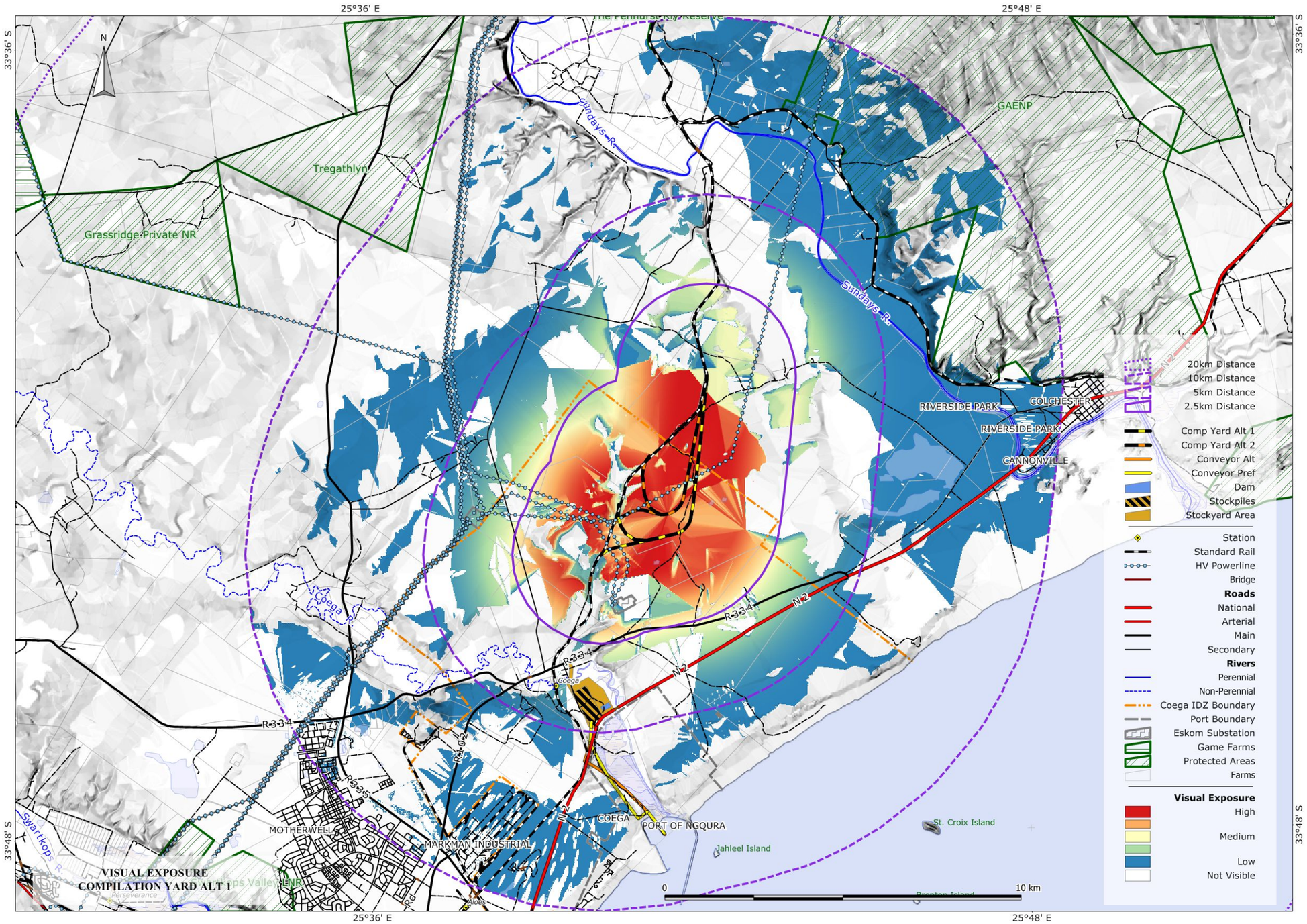
Map 13-18 Visual exposure for stockyard and preferred conveyor route calculated for 10 km distance around the structures.



Map 13-19 Visual exposure for stockyard and alternative conveyor route calculated for 10 km distance around the structures.

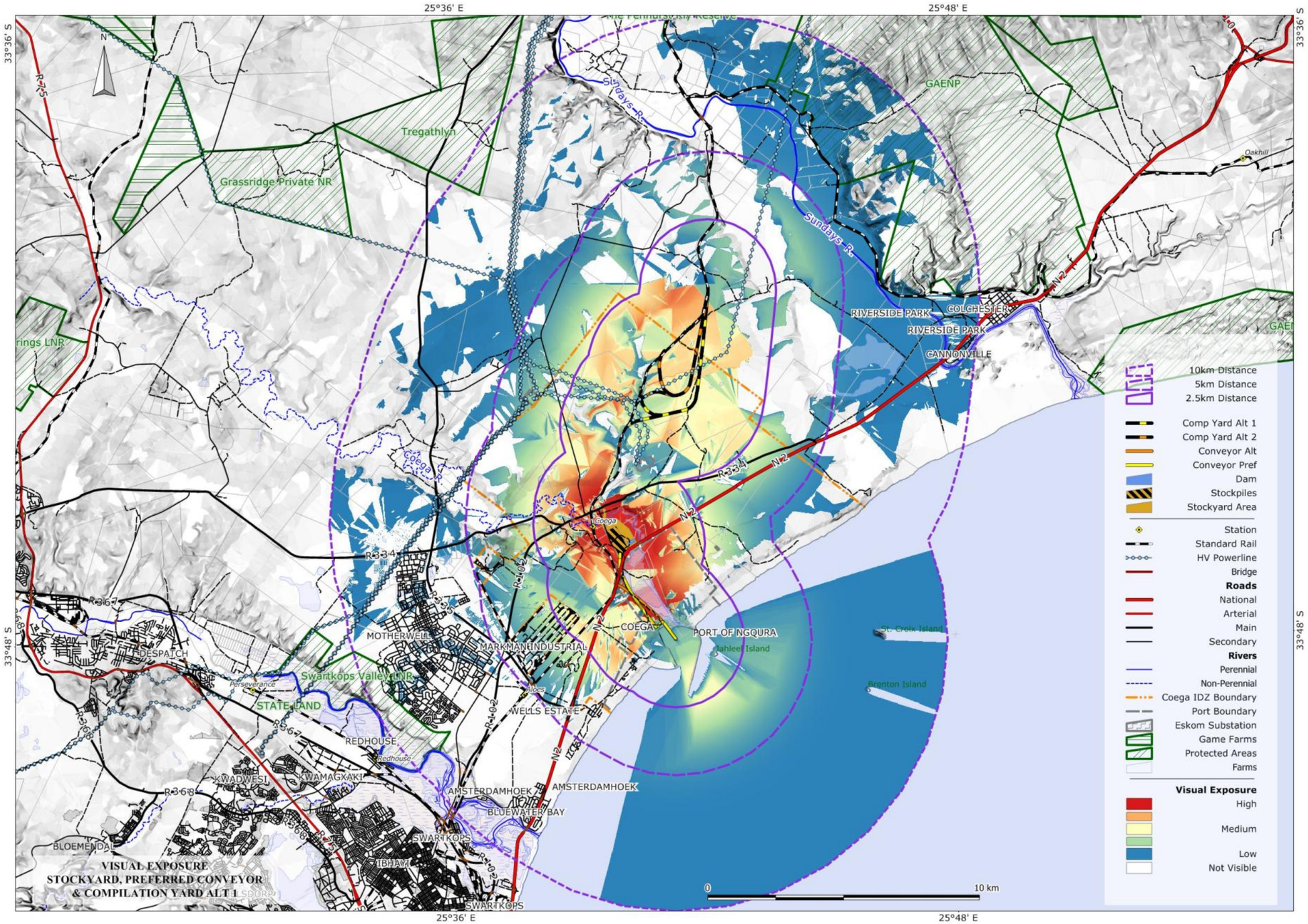


Map 13-20 Visual exposure for compilation yard alternative 1, calculated for an area within 10 km of proposed structures.

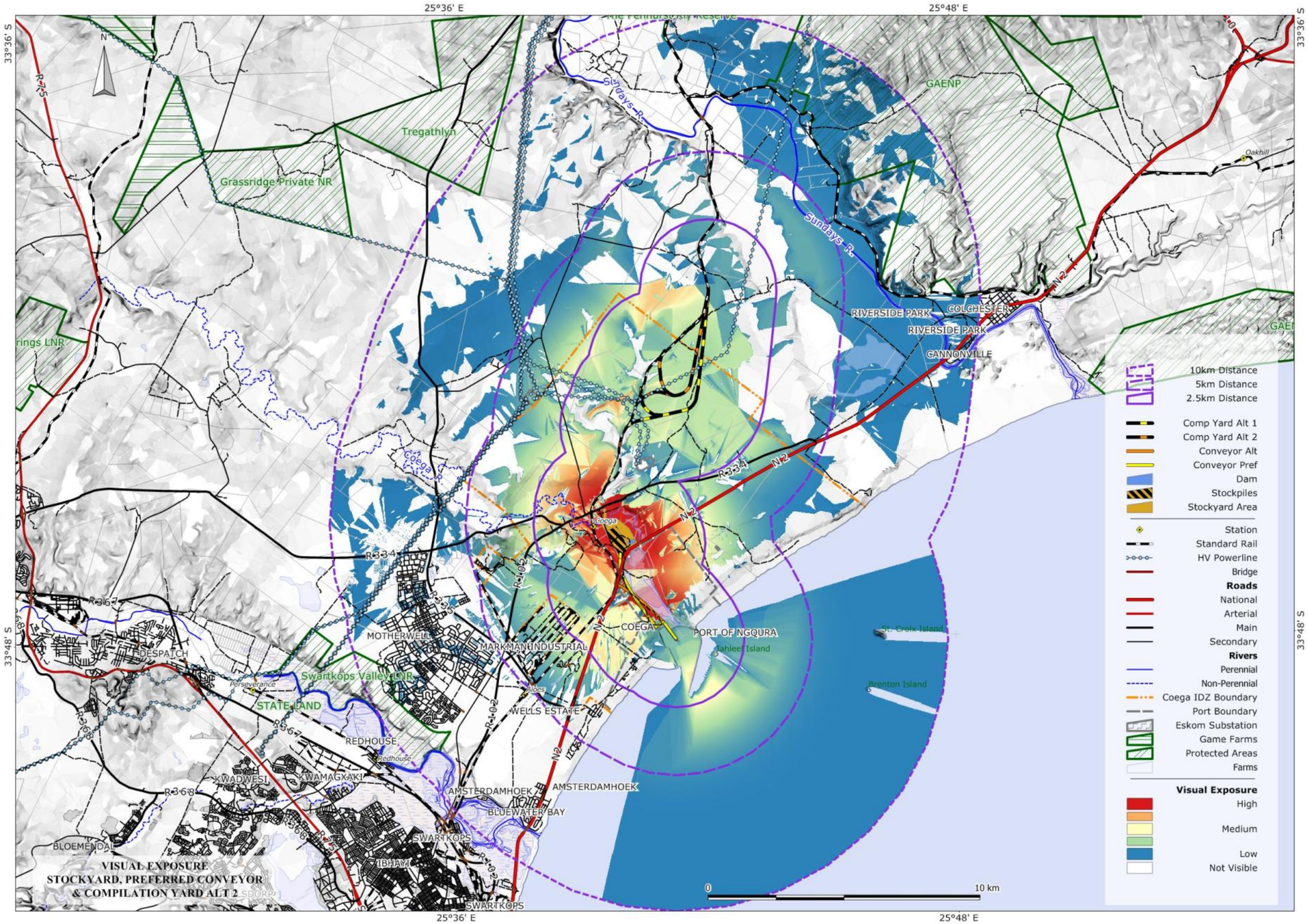


Map 13-21 Visual exposure for compilation yard alternative 2, calculated for an area within 10 km of proposed structures.

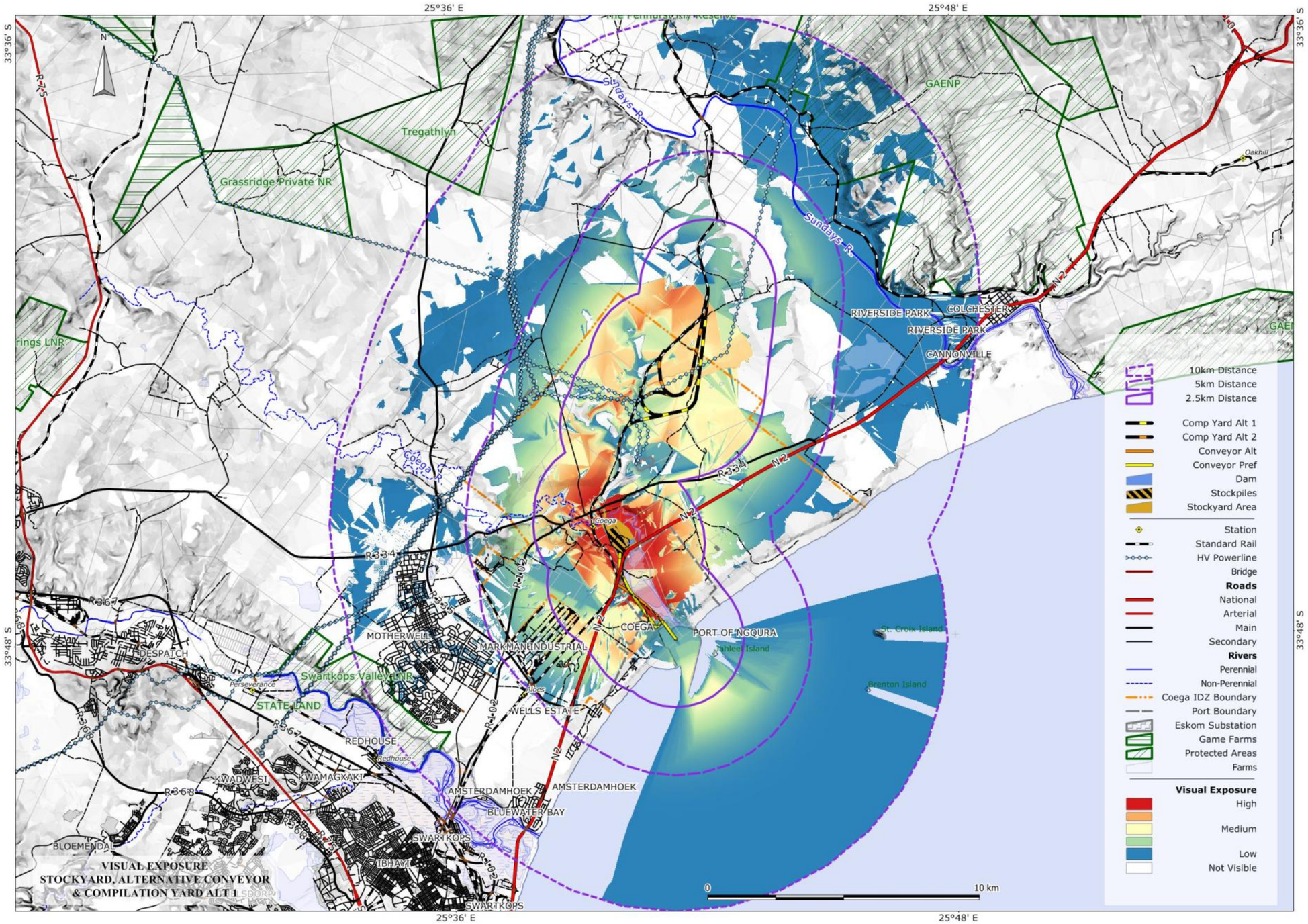
Map 13-22 Visual exposure for the whole development with Stockyard, Preferred Conveyor route and Compilation Yard Alternative 1. (Calculated for an area within 10 km of proposed structures.)



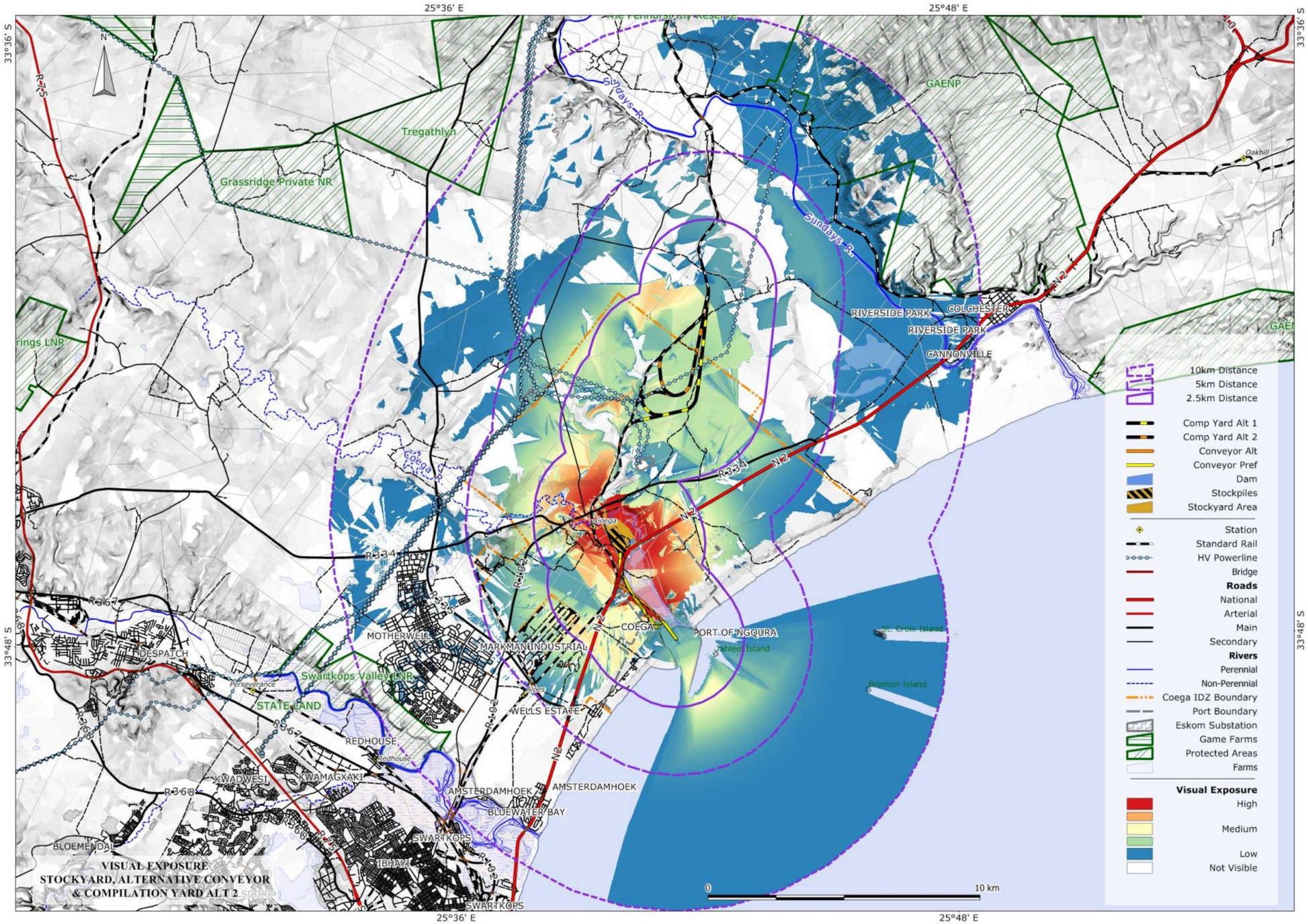
Map 13-23 Visual exposure for the whole development with Stockyard, Preferred Conveyor route and Compilation Yard Alternative 2. (Calculated for an area within 10 km of proposed structures.)



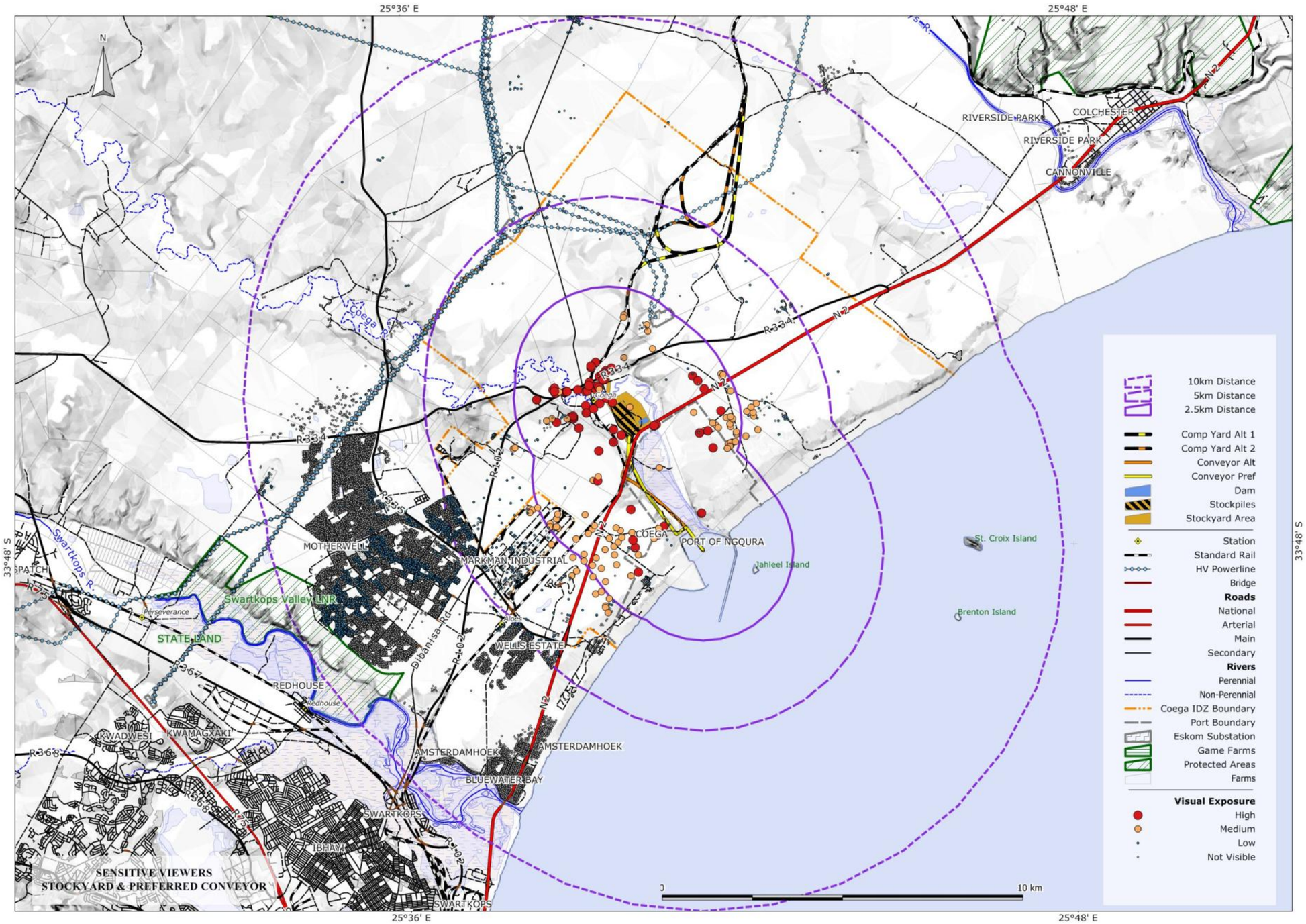
Map 13-24 Visual exposure for the whole development with Stockyard, Alternative Conveyor route and Compilation Yard Alternative 1. (Calculated for an area within 10 km of proposed structures.



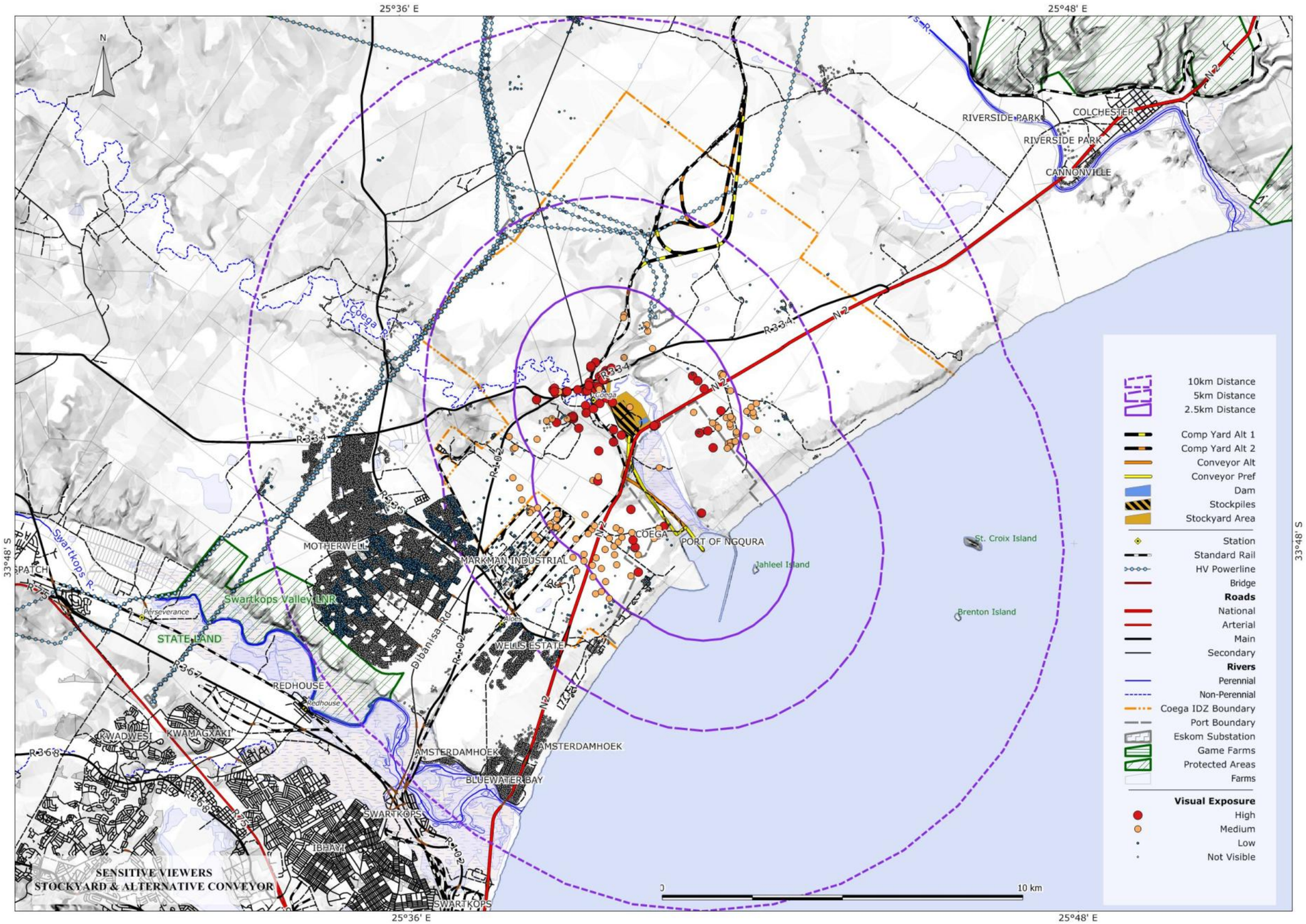
Map 13-25 Visual exposure for the whole development with Stockyard, Alternative Conveyor route and Compilation Yard Alternative 2. (Calculated for an area within 10 km of proposed structures.



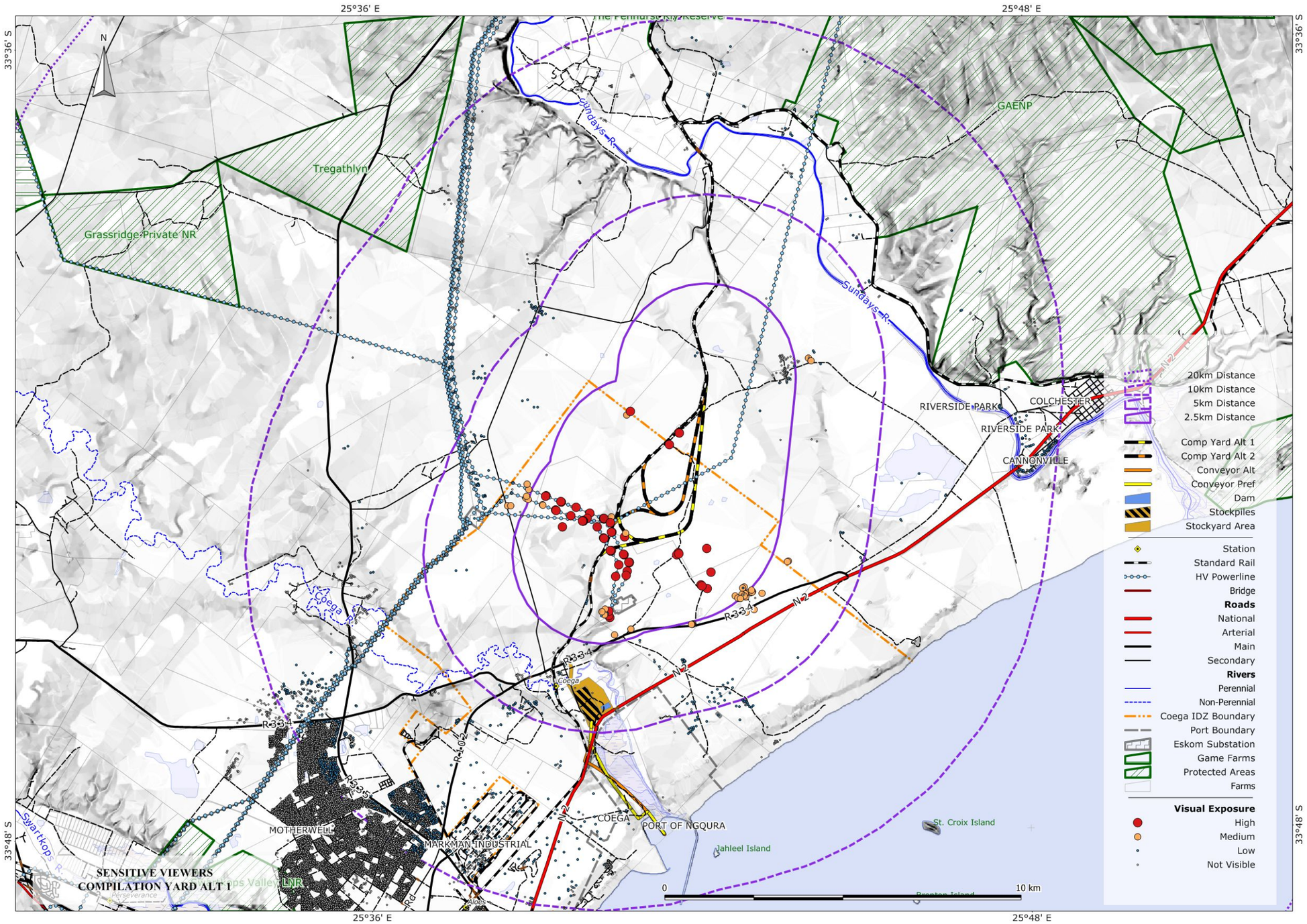
Map 13-26 Visual exposure for sensitive viewers. Stockyard and preferred conveyor route.



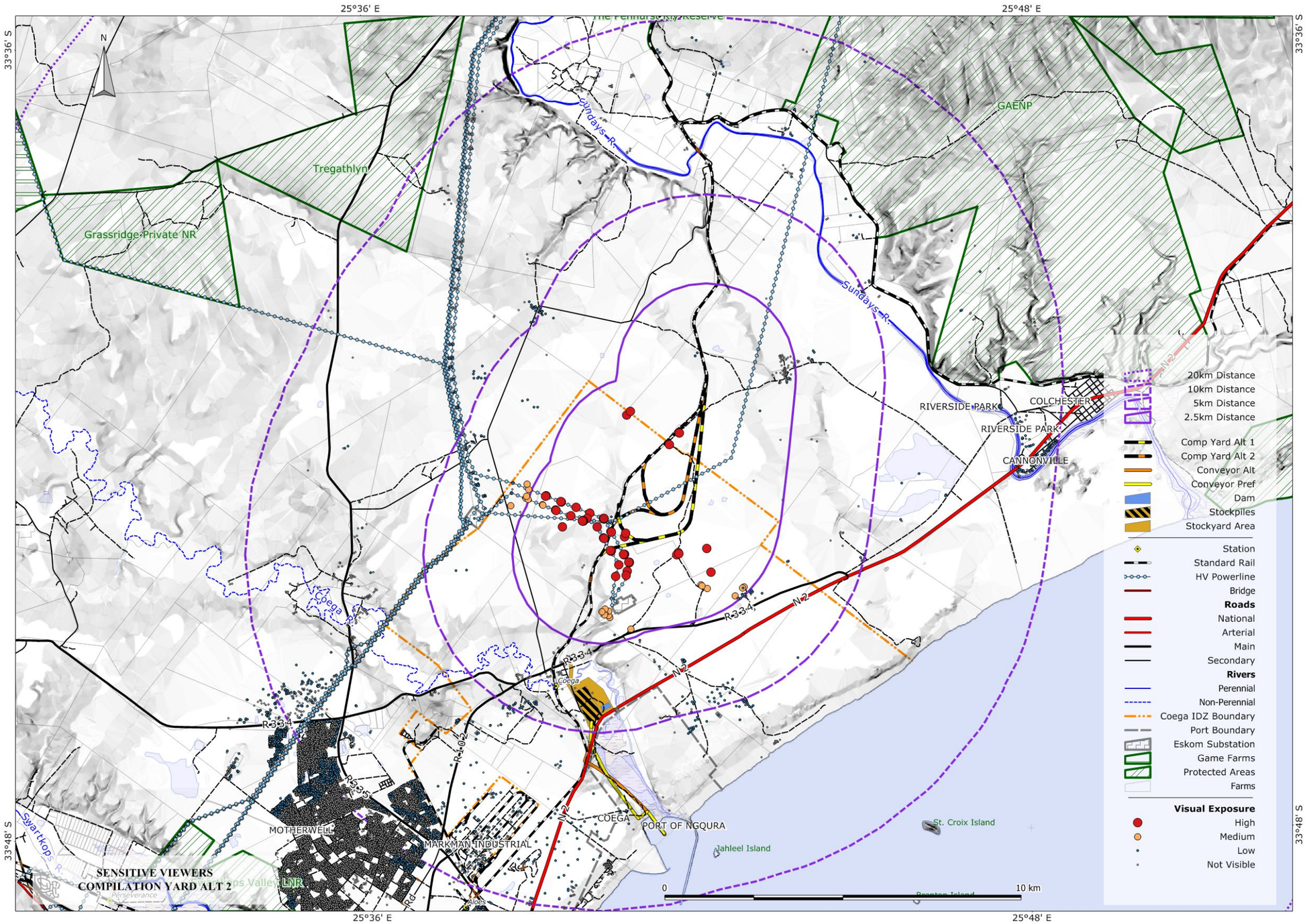
Map 13-27 Visual exposure for sensitive viewers. Stockyard and alternative conveyor route.



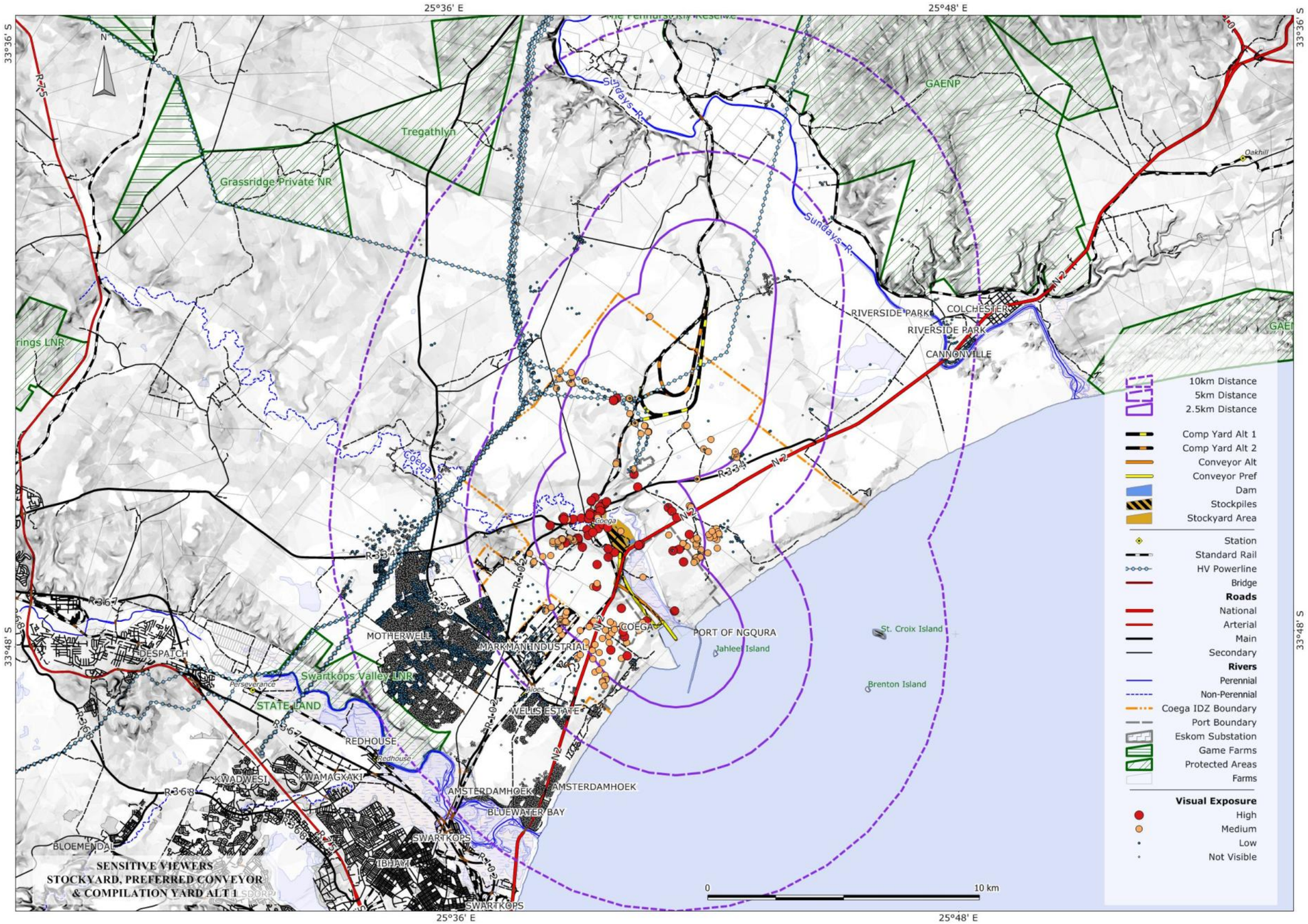
Map 13-28 Visual exposure for sensitive viewers: Compilation yard Alternative 1.



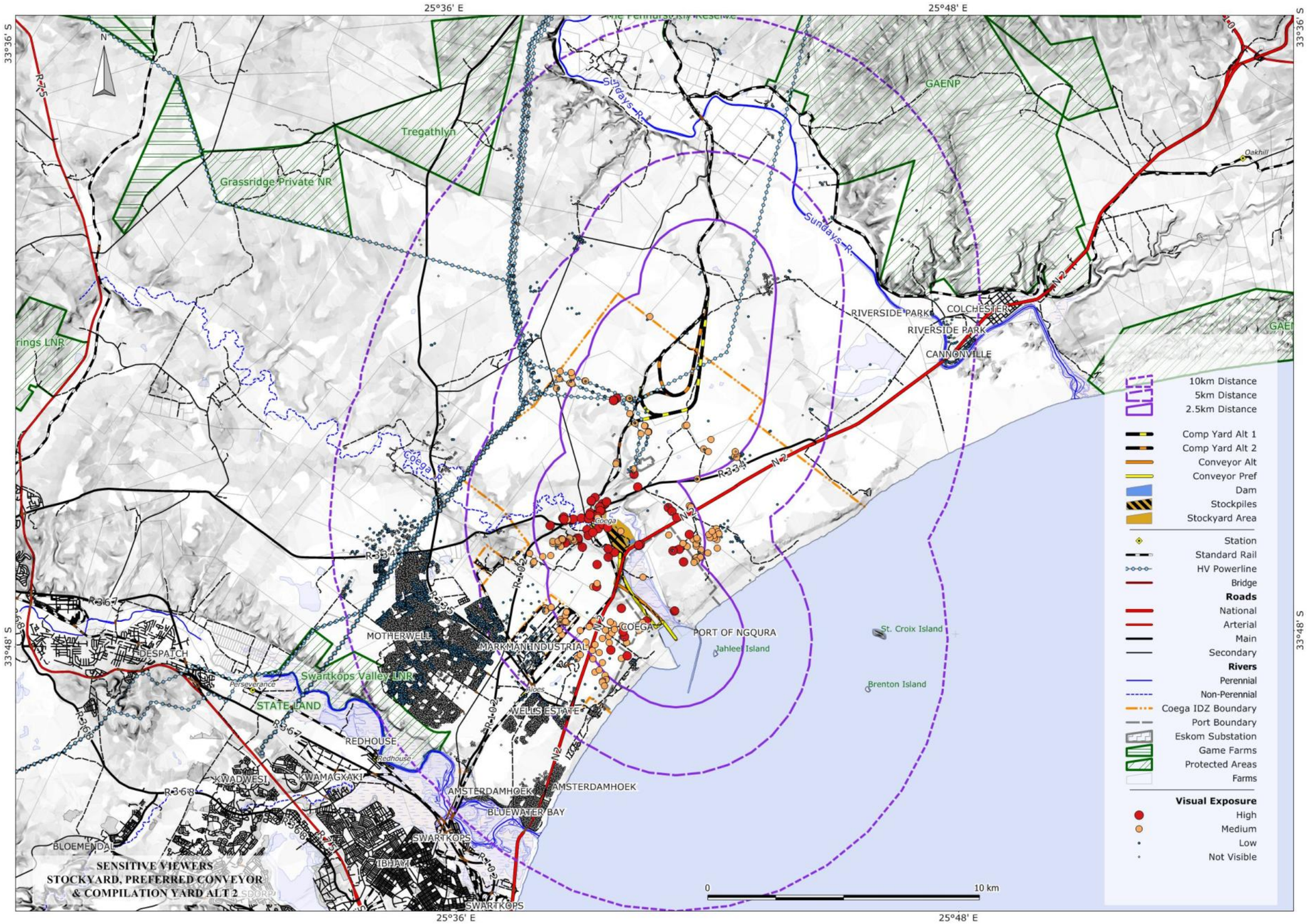
Map 13-29 Visual exposure for sensitive viewers: Compilation yard Alternative 2.



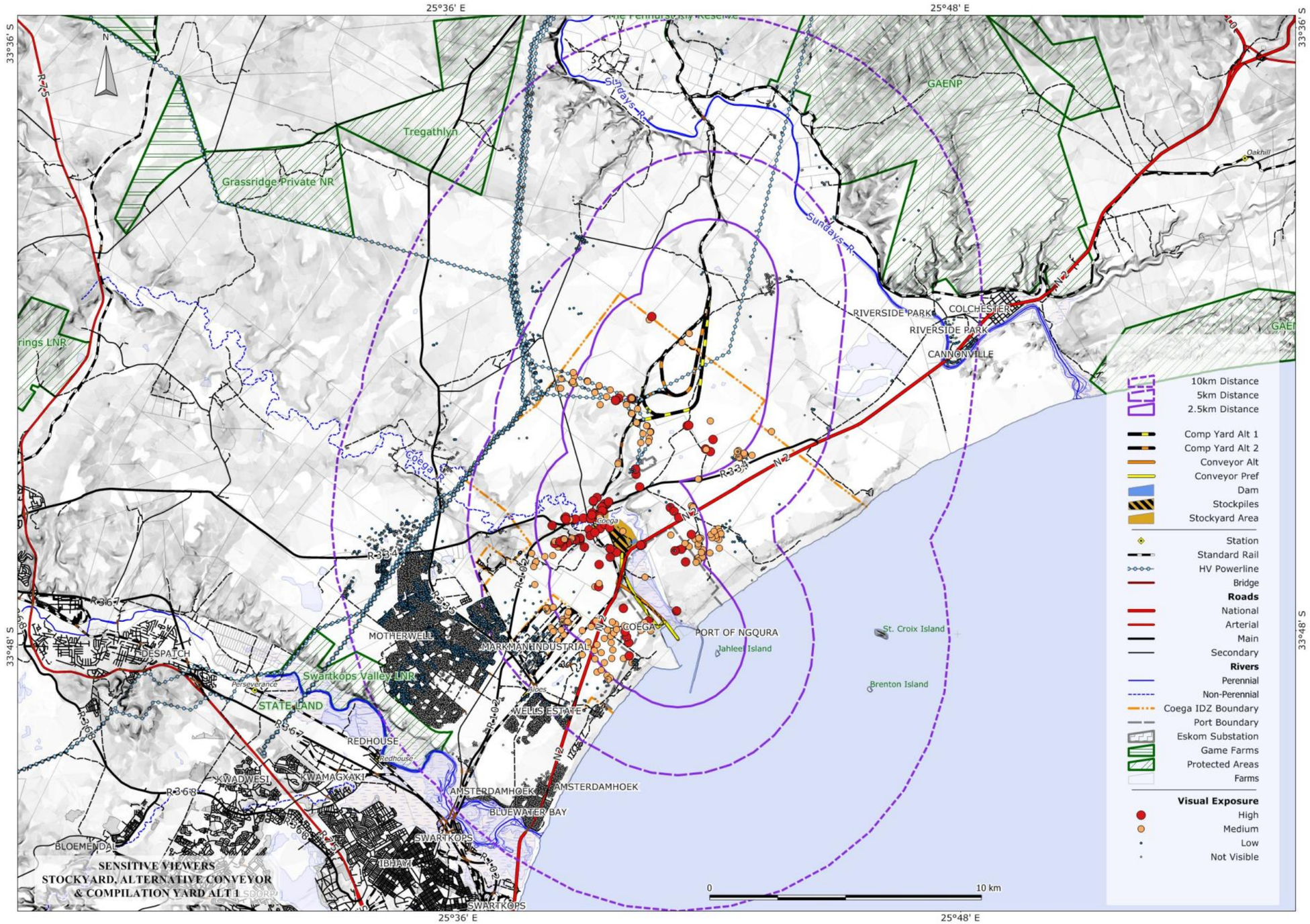
Map 13-30 Visual exposure for sensitive viewers: Proposed development with Stockyard, Preferred Conveyor Route and Compilation Yard Alternative 1.



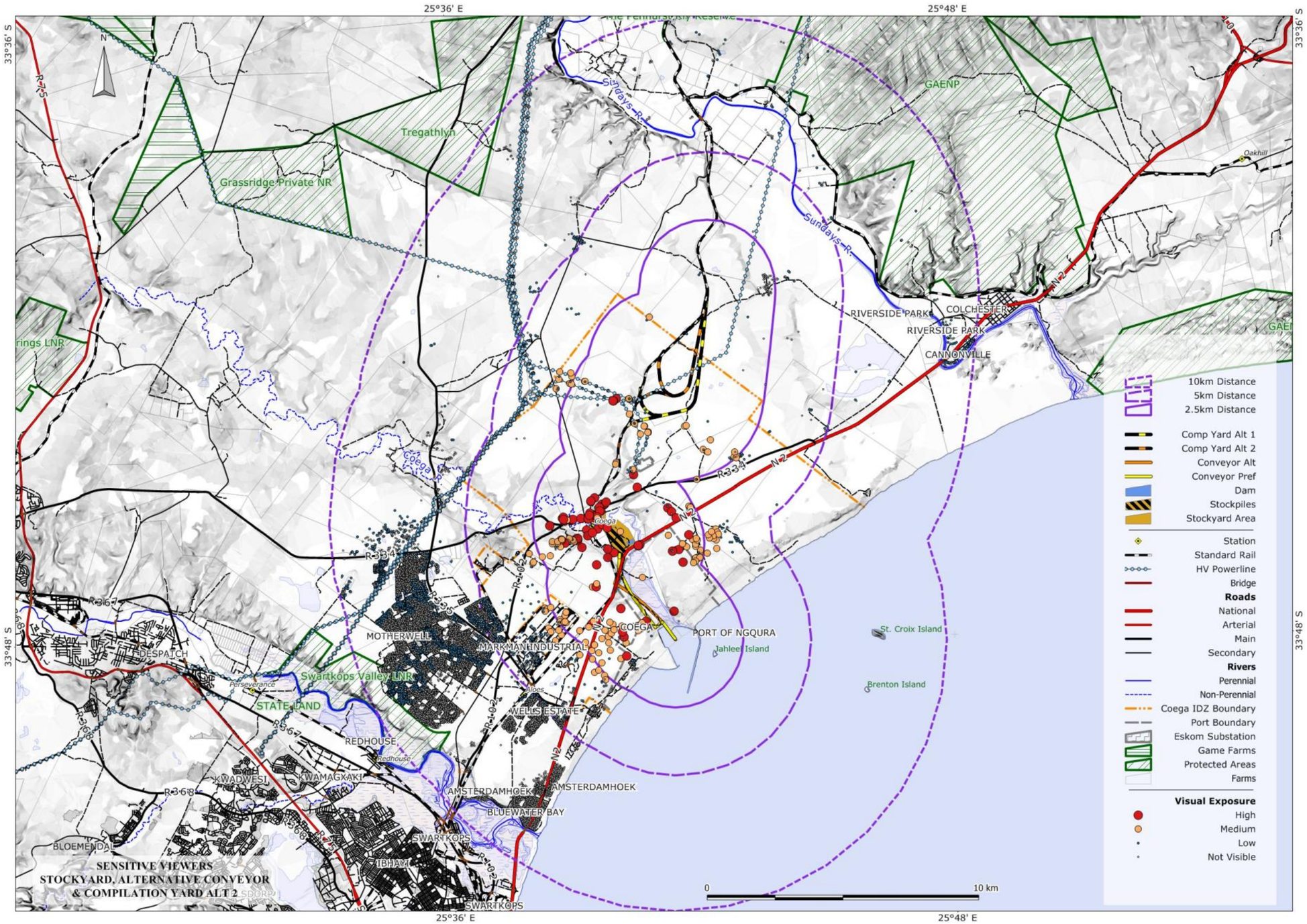
Map 13-31 Visual exposure for sensitive viewers: Proposed development with Stockyard, Preferred Conveyor Route and Compilation Yard Alternative 2.



Map 13-32 Visual exposure for sensitive viewers: Proposed development with Stockyard, Alternative Conveyor Route and Compilation Yard Alternative 1.



Map 13-33 Visual exposure for sensitive viewers: Proposed development with Stockyard, Alternative Conveyor Route and Compilation Yard Alternative 2.



Map 13-34 Sites visited during photographic survey.