PART 3.4

Visual, Aesthetic and Scenic Resources






CONTENTS

PART 3. SCIENTIFIC ASSESSMENT OF AQUACULTURE DEVELOPMENT ZONES

Section 3.4 Visual, Aesthetic and Scenic Resources

Fish farming is increasingly being seen as a source of food for growing populations, and at the same time taking pressure off wild stocks of fish, allowing these to recover. Historically fish and shellfish have been cultivated around the world in natural ponds, lakes and estuaries to provide a reliable source of food. In countries like South Africa, which has poverty and food security issues, aquaculture development could provide a valuable source of protein locally and a commodity for export. However, large parts of South Africa's coastline are exposed, with only a few sheltered bays or lagoons, while there are few perennial rivers or natural lakes inland. This could mean that aquaculture would compete in some cases with other land uses, such as residential, resort or tourism development, which depend on scenic landscapes, both on the coast and inland. Therefore, as the impetus for aquaculture development grows, controls need to be put in place to resolve potential visual conflicts and protect scenic resources.

Aquaculture development activities, along with related infrastructure, if developed on a large scale, could potentially have an industrial connotation, affecting important scenic resources. Pristine or protected landscapes are particularly vulnerable, while previously disturbed areas may be less sensitive. Aquaculture development could, in addition, detract from the amenity value of recreation or resort areas, and affect property values in some cases, which together with national parks, game farms and other visitor destinations, have important economic value in the form of tourism for the country. The siting of aquaculture developments therefore has implications for not only the scenic resource base (the receiving environment), but also for communities and the tourism industry (the receptors).

The purpose of this strategic level visual assessment was to identify scenic resources at the regional scale, as well as potential sensitive receptors that could be affected, and to recommend measures to avoid, mitigate or offset possible adverse effects.

3.4.1 Environmental Attributes

The term 'visual' broadly includes visual, aesthetic, scenic, and amenity values, which contribute to an area's overall 'sense of place', and which encompass both natural and cultural landscapes. In addition, visual issues are concerned with the integrity of natural landscapes (ecological health) on the one hand and the social well-being or 'quality of life' (human health) on the other.

From the above it can be seen that visual assessments by their nature encompass both tangible and more abstract qualities of the landscape, resulting in a degree of subjectivity. This regional-scale strategic visual study focuses on the spatial distribution of scenic resources and sensitive receptors. The assessment is a scoping-level study, focused primarily on interpreting existing information, using a range of scenic mapping criteria, and the knowledge of the authors.

At this regional scale, landforms such as mountain ridges, escarpments, koppies, prominent rock outcrops and large water bodies, play a large role in the mapping of scenic resources. Vegetational differences and land uses tend to only become meaningful at the local scale and have therefore not been considered in the current visual sensitivity mapping.

At the local or project scale a more detailed Visual Impact Assessment (VIA) may be required involving, amongst others, viewshed analyses and visual modeling in the form of photomontages to indicate anticipated changes to the local setting. This process requires viewpoints and view corridors to be identified, along with potential visual receptors, including both local residents and visitors (Falconer *et al*., 2013[1]).

No standardised approach to scenic resource mapping exists for the country as a whole at present, or for rating the significance of these. In the assessment of scenic value, aspects such as landscape complexity, topographical variety and geo-diversity of the landscape have been considered. Protected landscapes, such as those in National Parks or nature reserves, as well as heritage sites, where these are known, tend to increase visual sensitivity. Landscape integrity, or intactness, as opposed to disturbed or degraded landscapes, are another consideration at the local project scale, usually as part of a VIA.

In determining 'visual sensitivity' for aquaculture development, the authors adopted a similar approach to that used in other strategic environmental assessments (Lawson and Oberholzer, 2014[2]; Oberholzer *et al*., 2016[3]). This allowed a common database and sensitivity analysis to be used covering similar geographical areas, providing consistency in assessing competing land uses.

3.4.2 Sensitivity Mapping

Aspects that play a role in visual assessments can be divided into scenic resources such as topographic features, water features and cultural landscapes, and sensitive receptors including National Parks, Ramsar sites, Nature Reserves, Biosphere Reserves, private reserves, resorts, human settlements, scenic routes, arterial roads, passenger rail lines and heritage sites. Heritage sites, although they can add to visual sensitivity, have not been included in the sensitivity analysis as these are discussed in Section 3.3 of this SEA Report.

The key scenic resources and visually sensitive receptors within the 17 strategic focus areas have been categorised according to Very High, High, Moderate (Medium) and Low visual sensitivity. Visual buffers have been included for each of the scenic resources and sensitive receptors. The buffers represent nominal distances for regional scale mapping and could be amended with more detailed information, such as viewshed mapping, at the local scale. The buffers are not intended to be exclusion zones or prescriptive setbacks, but merely serve as a broad indicator.

[1] Falconer, L., Hunter, D.C., Telfer, T.C. and Ross L.G. 2013. Visual, Seascape and Landscape Analysis to Support Coastal Aquaculture Site Selection. Land Use Policy 34, Elsevier.

[2] Lawson, Q. and Oberholzer, B. 2014. Appendix A2: Landscape Scoping Assessment Report. In Strategic Environmental Assessment Report for Wind and Solar Photovoltaic Energy in South Africa. CSIR. 2014.

[3] Oberholzer, B., Lawson, Q., Klapwijk, M., Young, G., Anderson, M. and Orton, J. 2016. Visual, Aesthetic and Scenic Resources. In Scholes, R. et al (eds.) 2016. Shale Gas Development in the Central Karoo: A Scientific Assessment of the Opportunities and Risks. CSIR.

Table 3.4-1: Visual sensitivity criteria for marine and freshwater aquaculture

Scenic Resources	Very high visual sensitivity	High visual sensitivity	Moderate visual sensitivity	Low visual sensitivity
Topographic features	[1]Landscapes of national scenic value	Landscapes of [2]national / [1]regional scenic value	Landscapes of [2]regional /[1]local scenic value	[2]Landscapes of local scenic value
Water features	[1]Features of national scenic value	Features of [2]national / [1]regional scenic value	Features of [2]regional / [1]local scenic value	[2]Features of local scenic value
Coastal zone	[1]Prominent coastal features	[2]Prominent coastal features / [1]500 m coastal zone	[2]500 m coastal zone / [1]1 km coastal zone	[2]1 km coastal zone
Cultural landscapes	[1]Cultural landscapes of national significance	Cultural landscapes of [2]national / [1]regional significance	Cultural landscapes of [2]regional / [1]local significance	[2]Cultural landscapes of local significance
Protected Landscapes / Sensitive Receptors				
World Heritage Sites / National Parks / Ramsar sites	[1+2]Protected World Heritage Site or Park area	[1]within 1.5 km [2]Protected Park area	[1]within 3 km [2]within 1.5 km	[2]within 3 km
Nature Reserves / Biosphere Reserve	[1]Protected Reserve area	[1]within 1 km [2]Protected Reserve area	[1]within 2 km [2]within 1 km	[2]within 2 km
Private reserves and game farms	[1]Protected private reserve area	[1]within 500 m [2]Protected private reserve area	[1]within 1 km [2]within 500 m	[2]within 1 km
Small settlements / rural villages	[1]Residential / resort settlement	[1]within 500 m [2]Residential / resort settlement	[1]within 1 km [2]within 500 m	[2]within 1 km
Large settlements / towns	[1]Residential / resort settlement	[1]within 1 km [2]Residential / resort settlement	[1]within 2 km [2]within 1 km	[2]within 2 km
Scenic routes	[1]within 500 m	[1]within 1 km [2]within 500 m	[1]within 2 km [2]within 1 km	[2]within 2 km
Arterial routes	-	[1]within 500 m	[1]within 1 km [2]within 500 m	[2]within 1 km
Passenger rail	-	-	[1]within 1 km	[2]within 1 km

*[1]Visual sensitivity criteria for **large scale** marine aquaculture*
*[2]Visual sensitivity criteria for **small to moderate scale** marine and freshwater aquaculture*

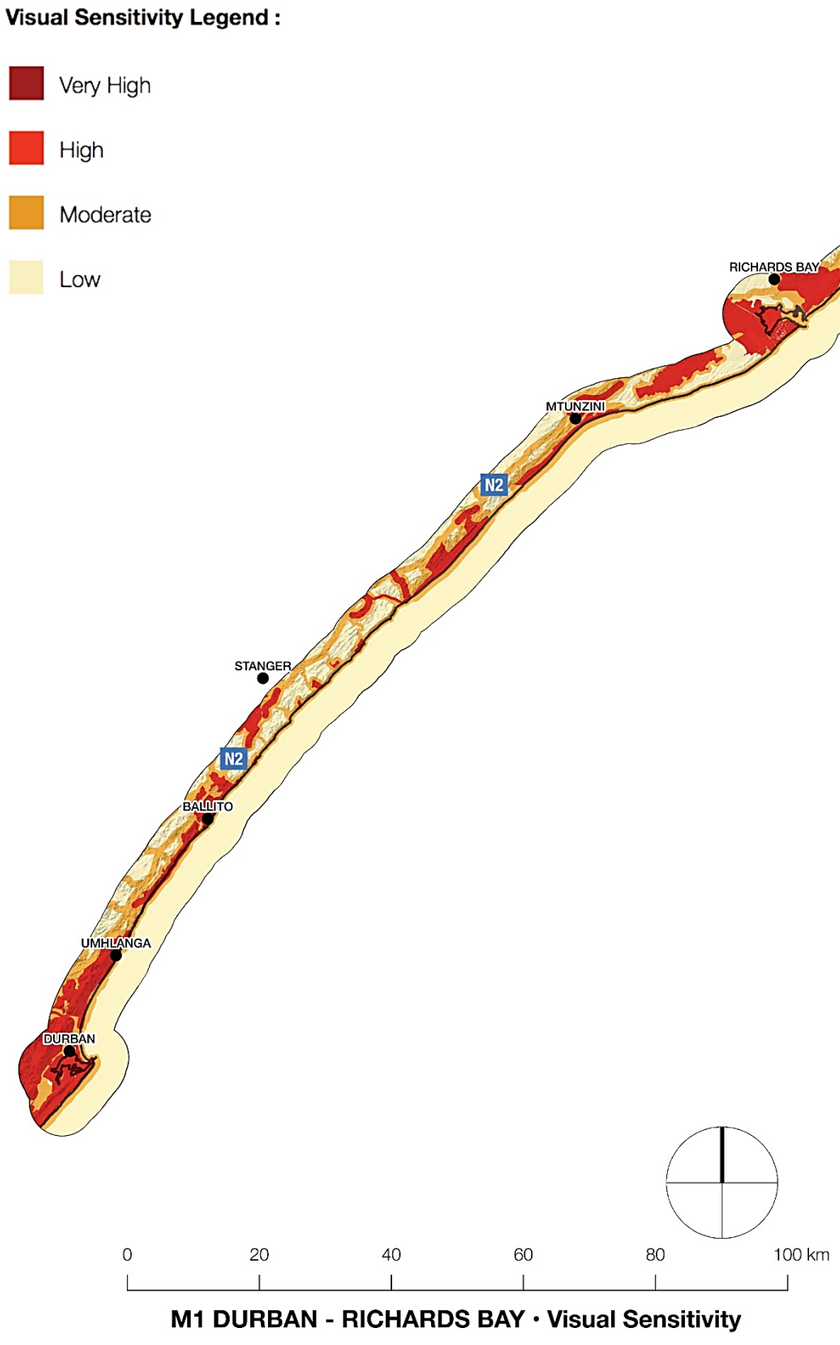


Figure 3.4-1: Durban – Richards Bay Marine Study Area visual sensitivity to small and moderate scale aquaculture

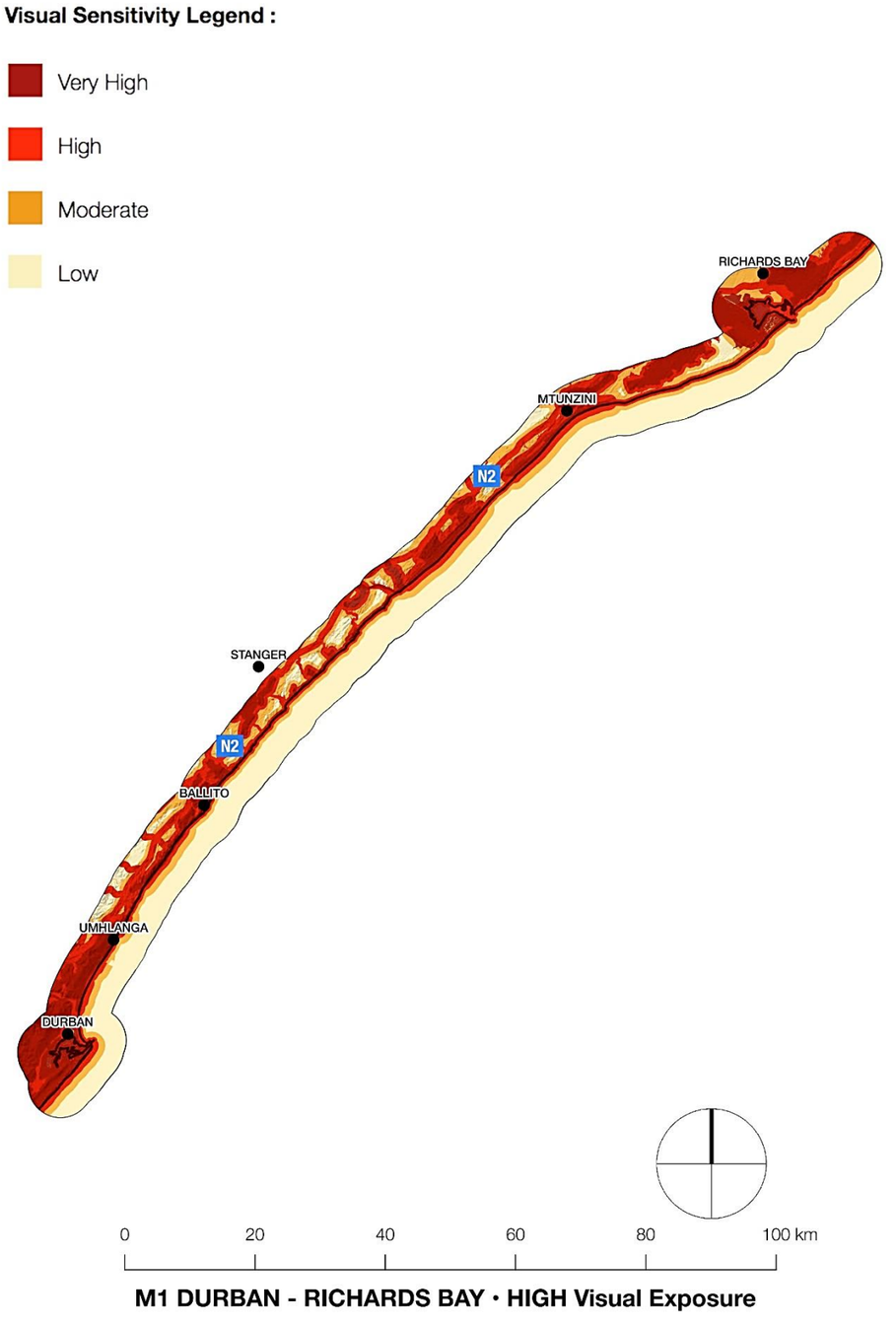


Figure 3.4-2: Durban – Richards Bay Marine Study Area visual sensitivity to large scale aquaculture

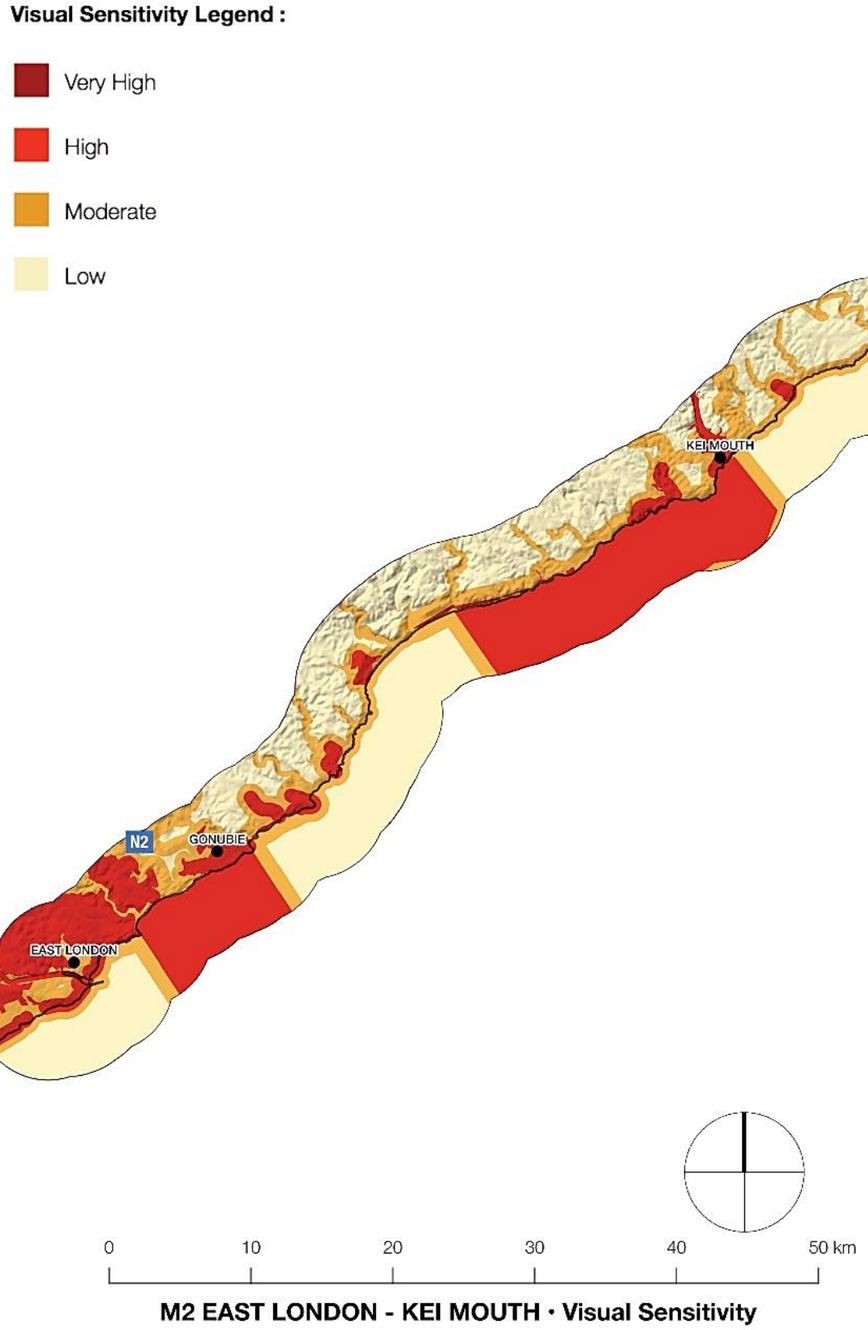


Figure 3.4-3: East London – Kei Mouth Marine Study Area visual sensitivity to small and moderate scale aquaculture

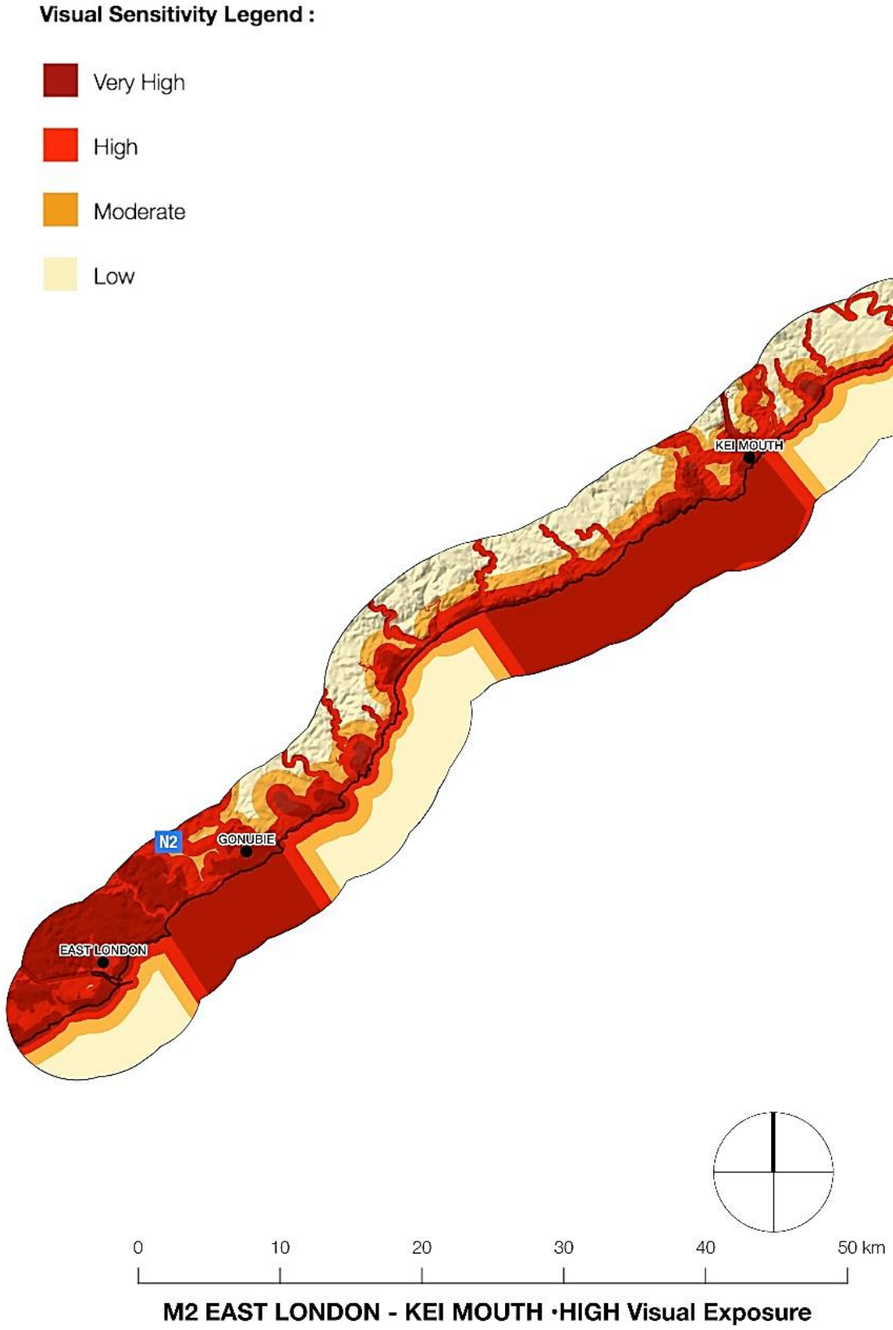


Figure 3.4-4: East London – Kei Mouth Marine Study Area visual sensitivity to large scale aquaculture

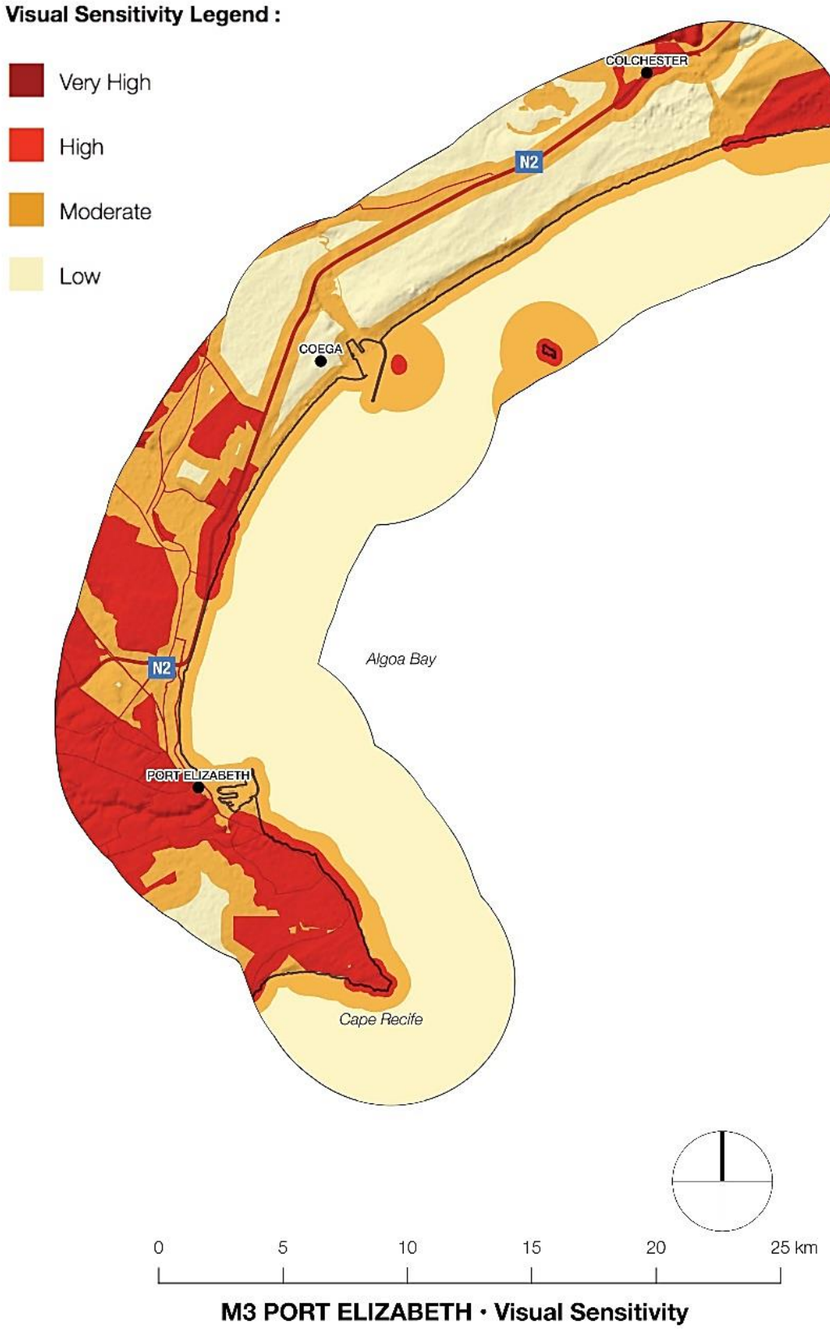


Figure 3.4-6: Port Elizabeth Marine Study Area visual sensitivity to small and moderate scale aquaculture

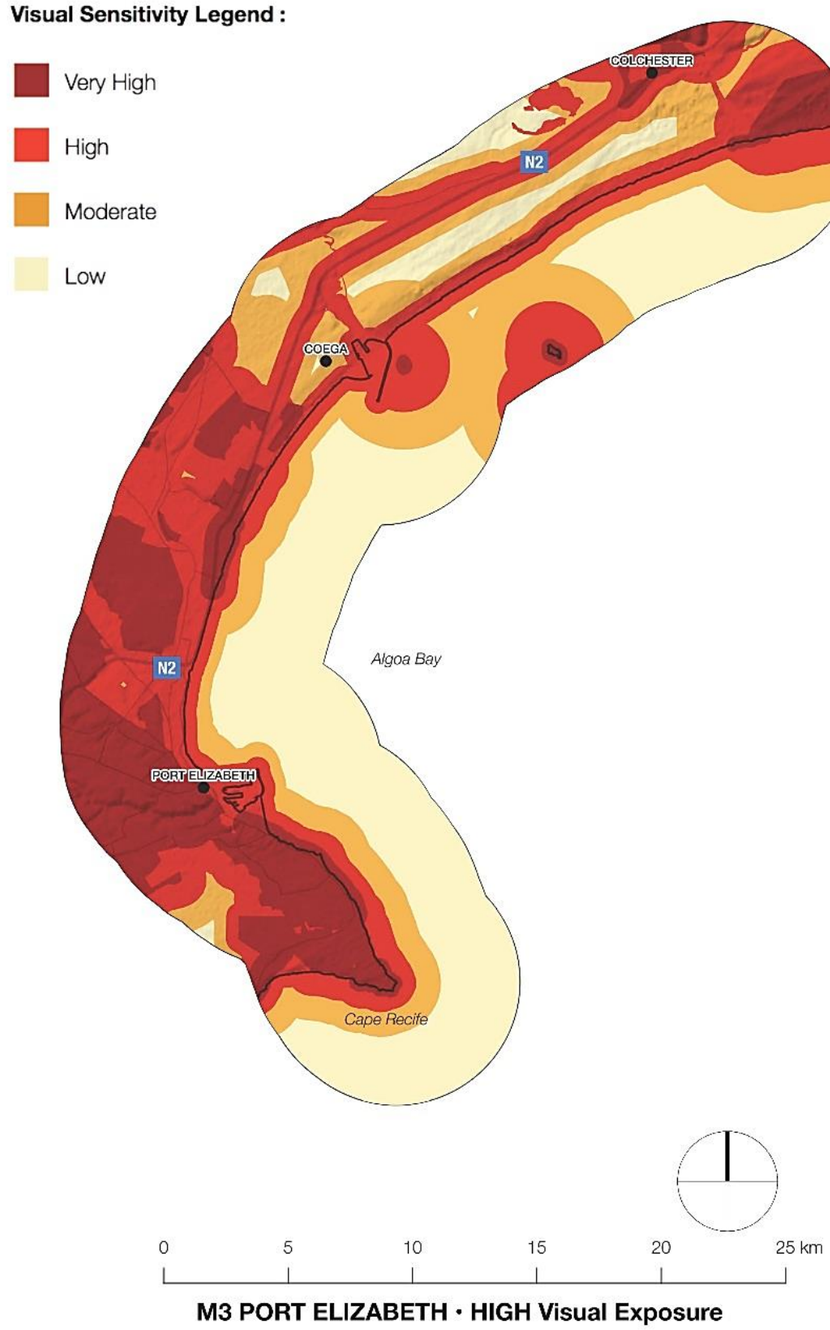


Figure 3.4-5: Port Elizabeth Marine Study Area visual sensitivity to large scale aquaculture

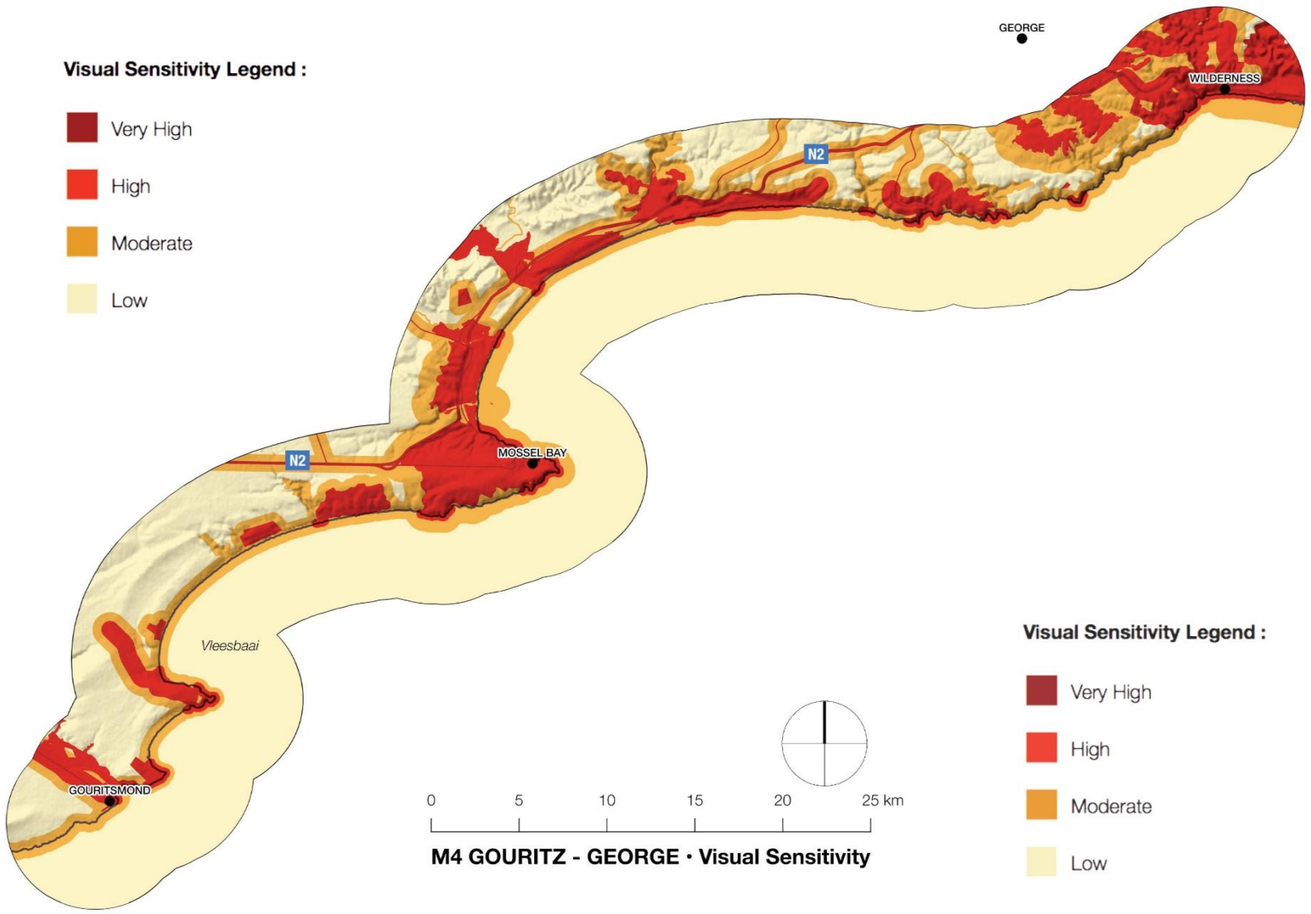


Figure 3.4-7: Gouritz – George Marine Study Area visual sensitivity to small and moderate scale aquaculture

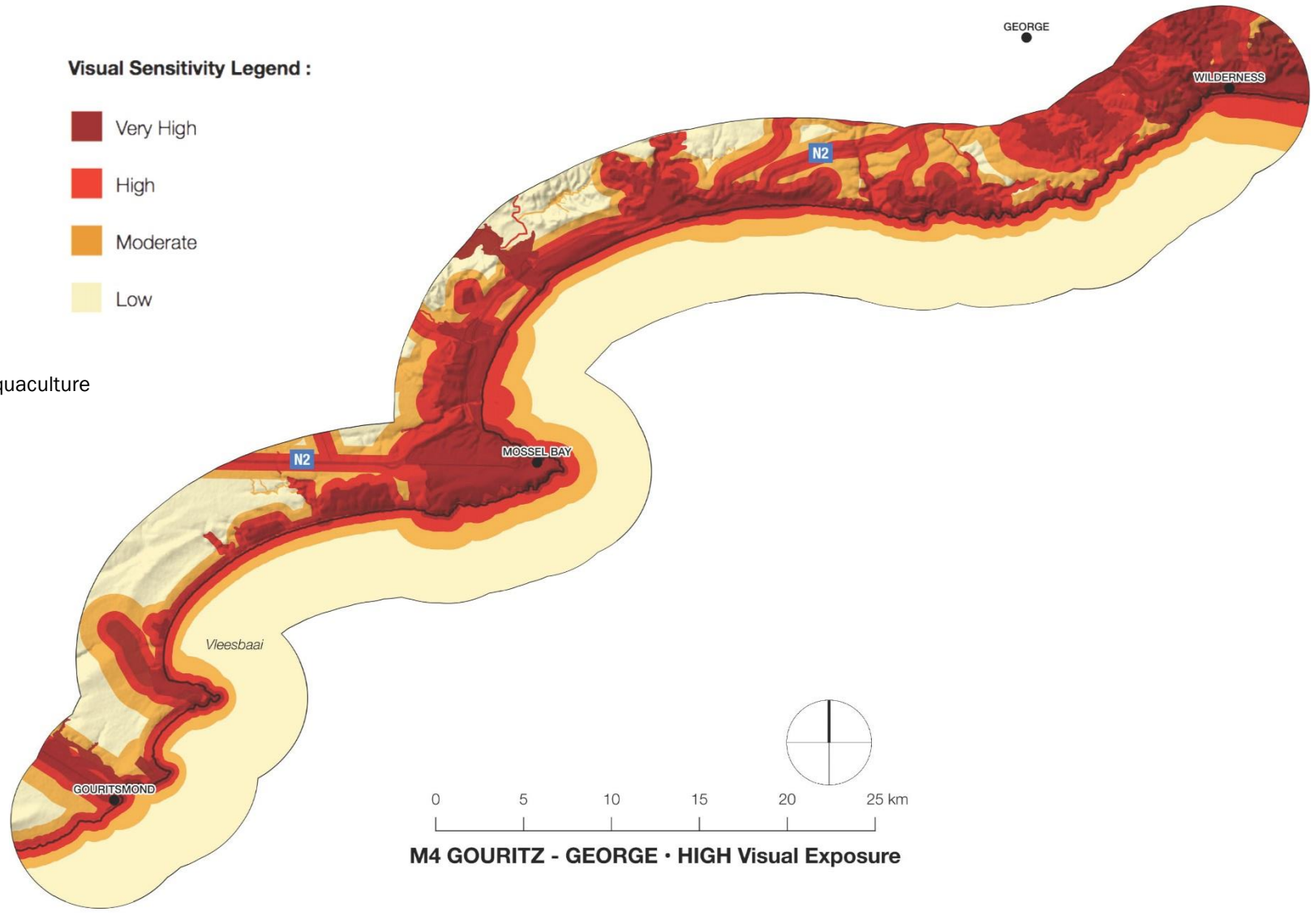


Figure 3.4-8: Gouritz – George Marine Study Area visual sensitivity to large scale aquaculture

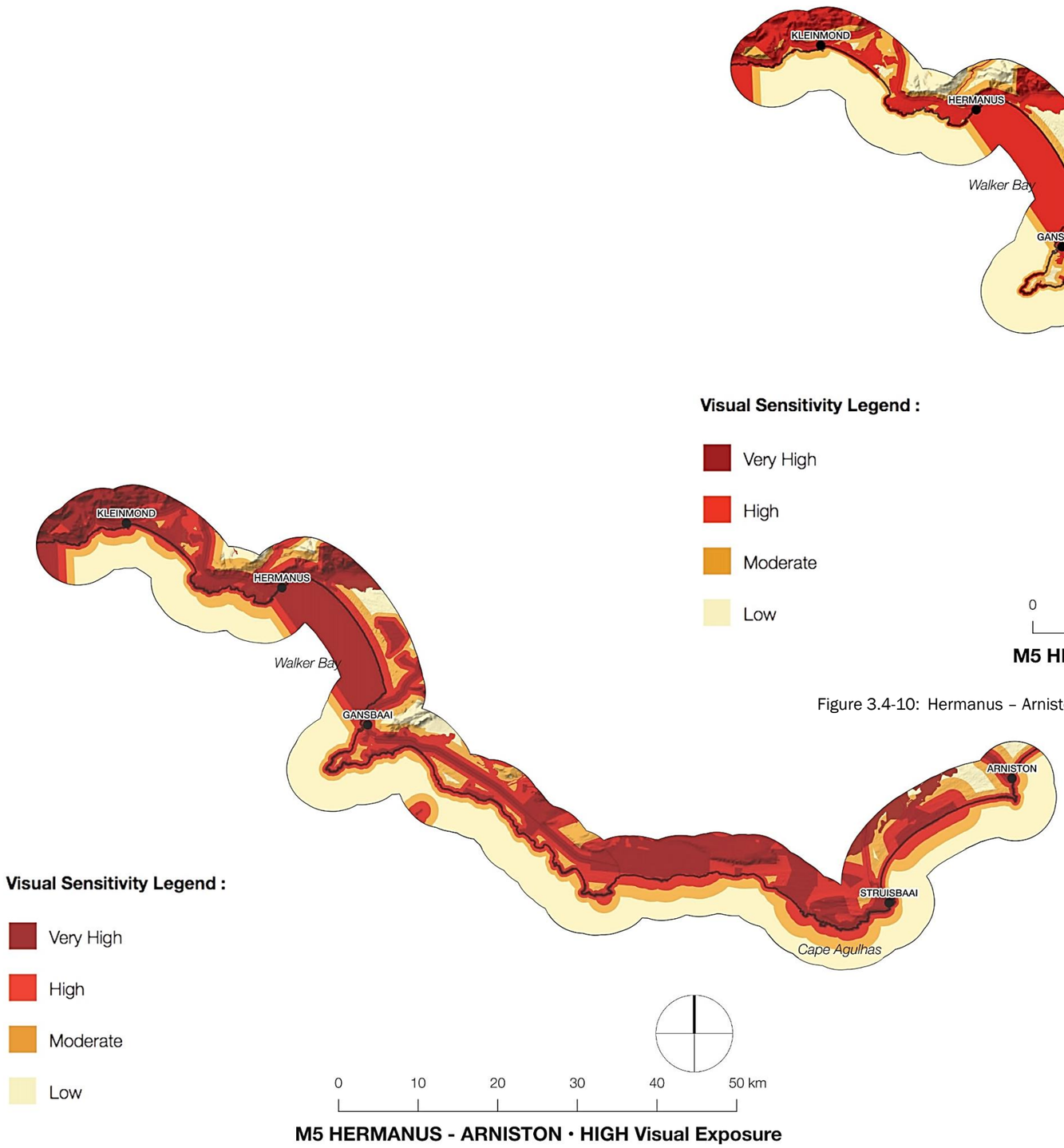


Figure 3.4-9: Hermanus – Arniston Marine Study Area visual sensitivity to large scale aquaculture

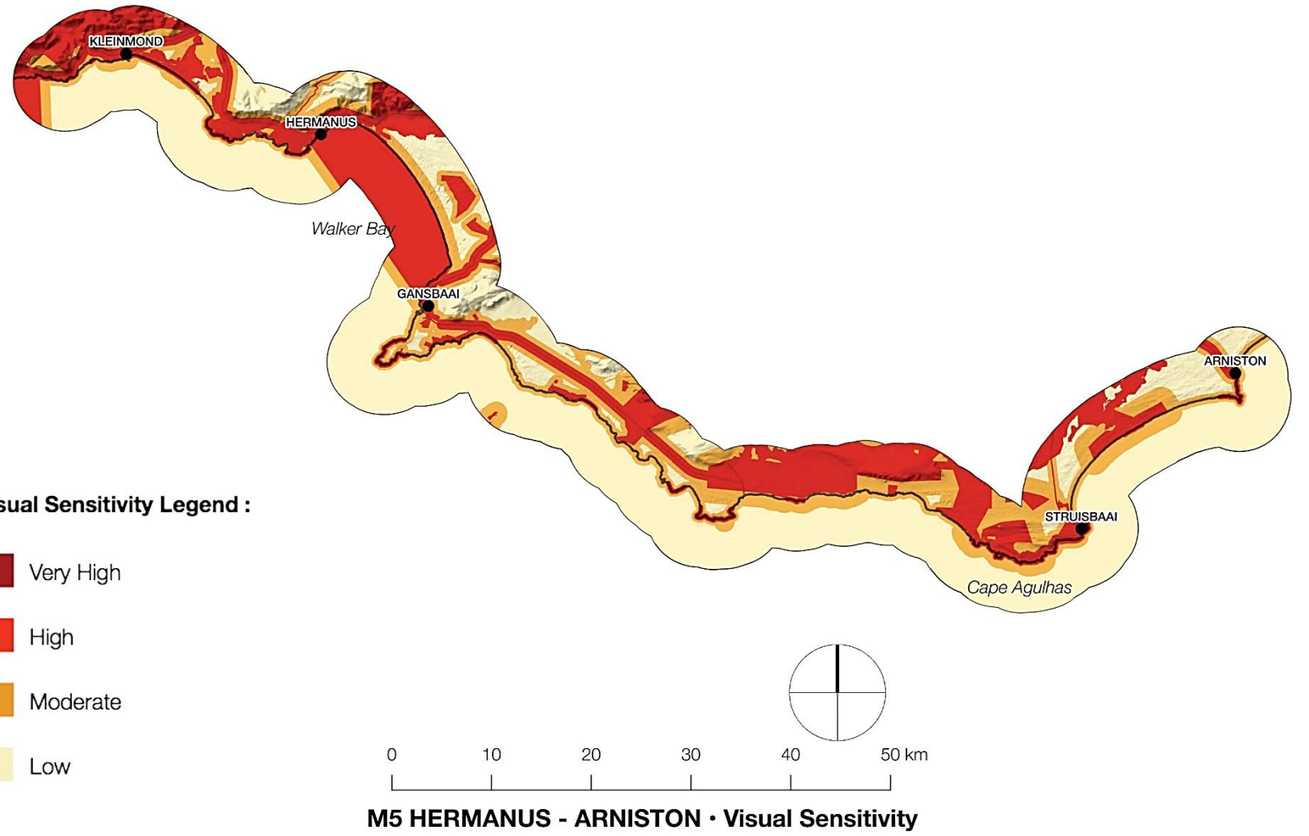


Figure 3.4-10: Hermanus – Arniston Marine Study Area visual sensitivity to small and moderate scale aquaculture

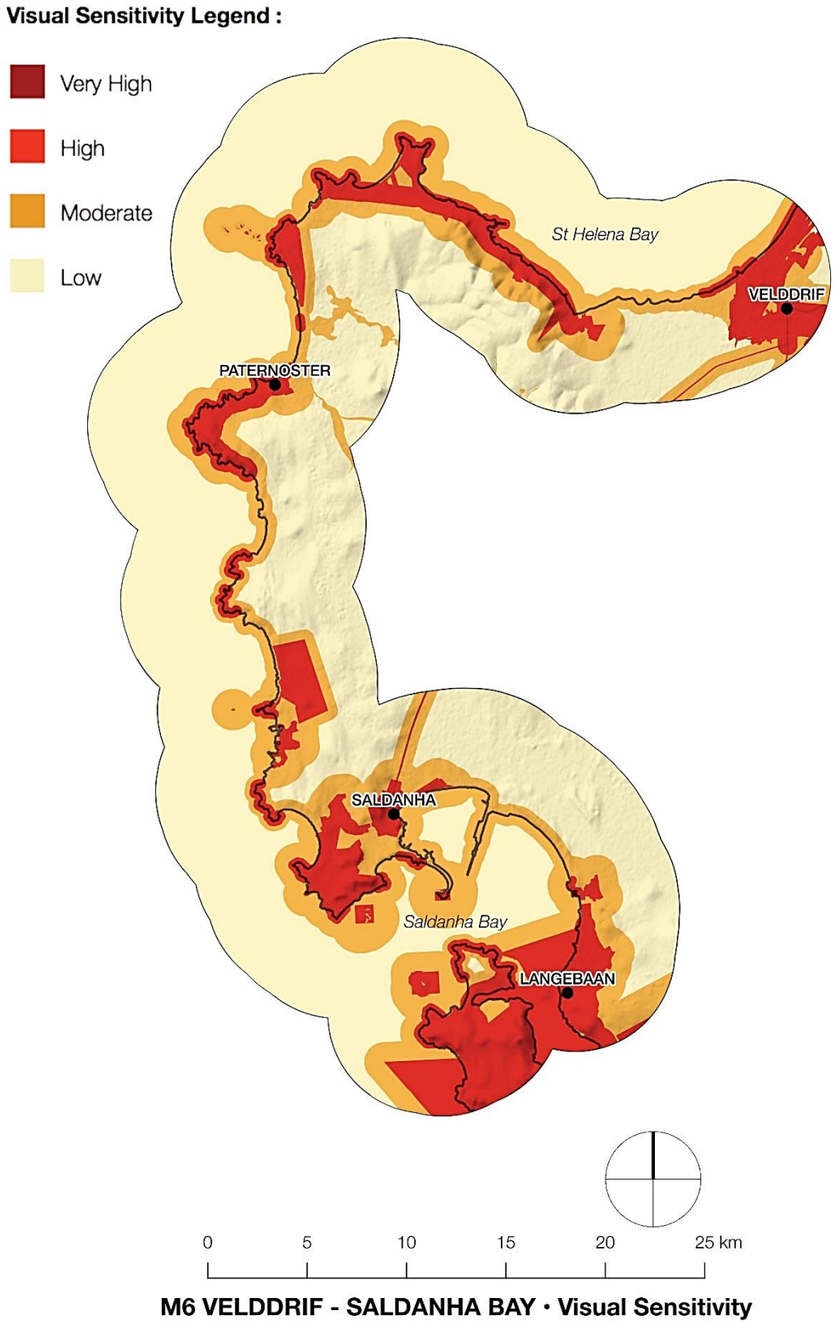


Figure 3.4-12: Velddrif – Saldanha Bay Marine Study Area visual sensitivity to small and moderate scale aquaculture

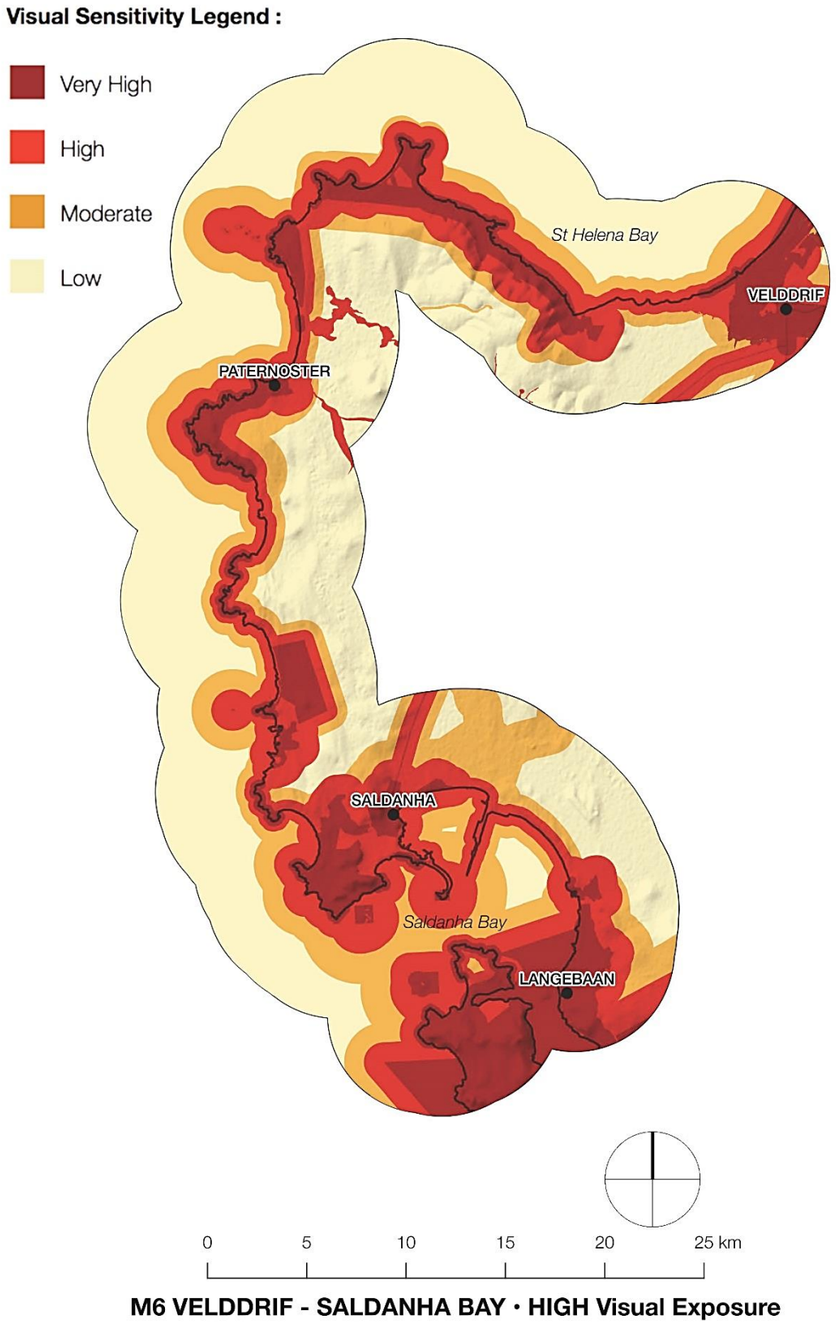


Figure 3.4-11: Velddrif – Saldanha Bay Marine Study Area visual sensitivity to large scale aquaculture

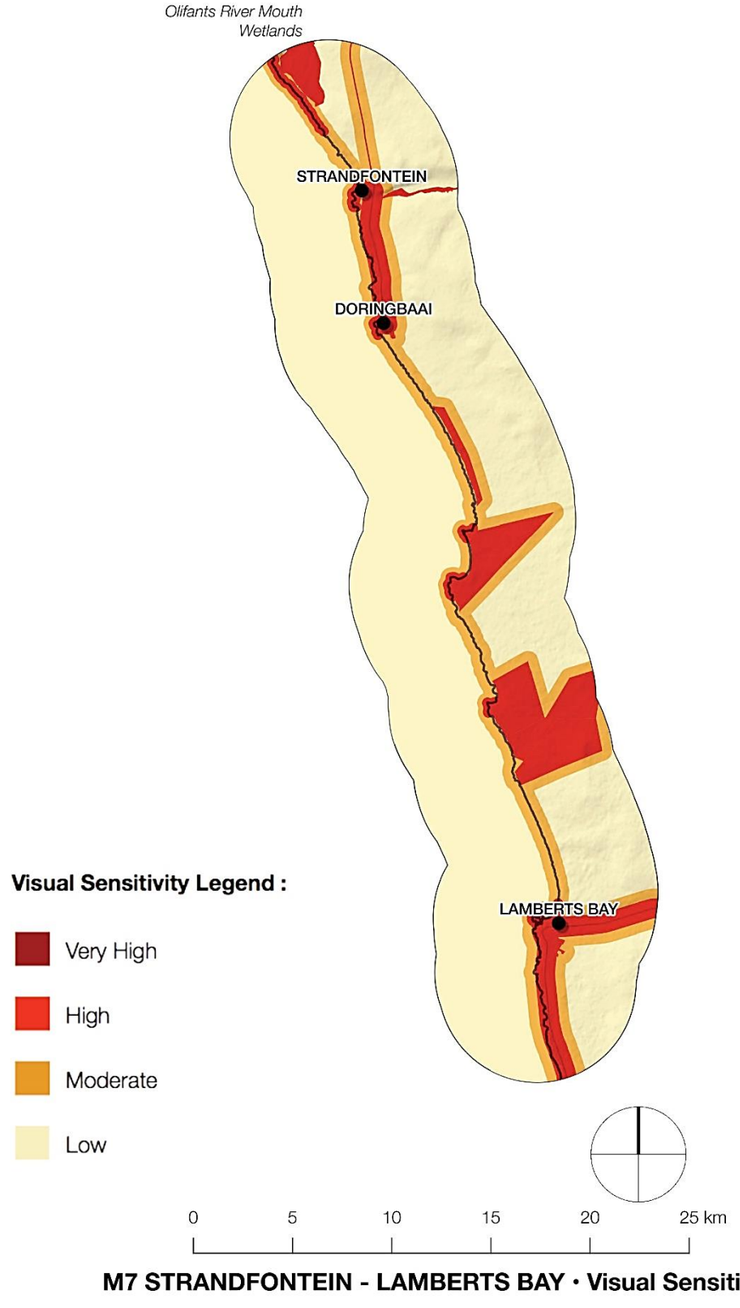


Figure 3.4-13: Strandfontein – Lamberts Bay Marine Study Area visual sensitivity to small and moderate scale aquaculture

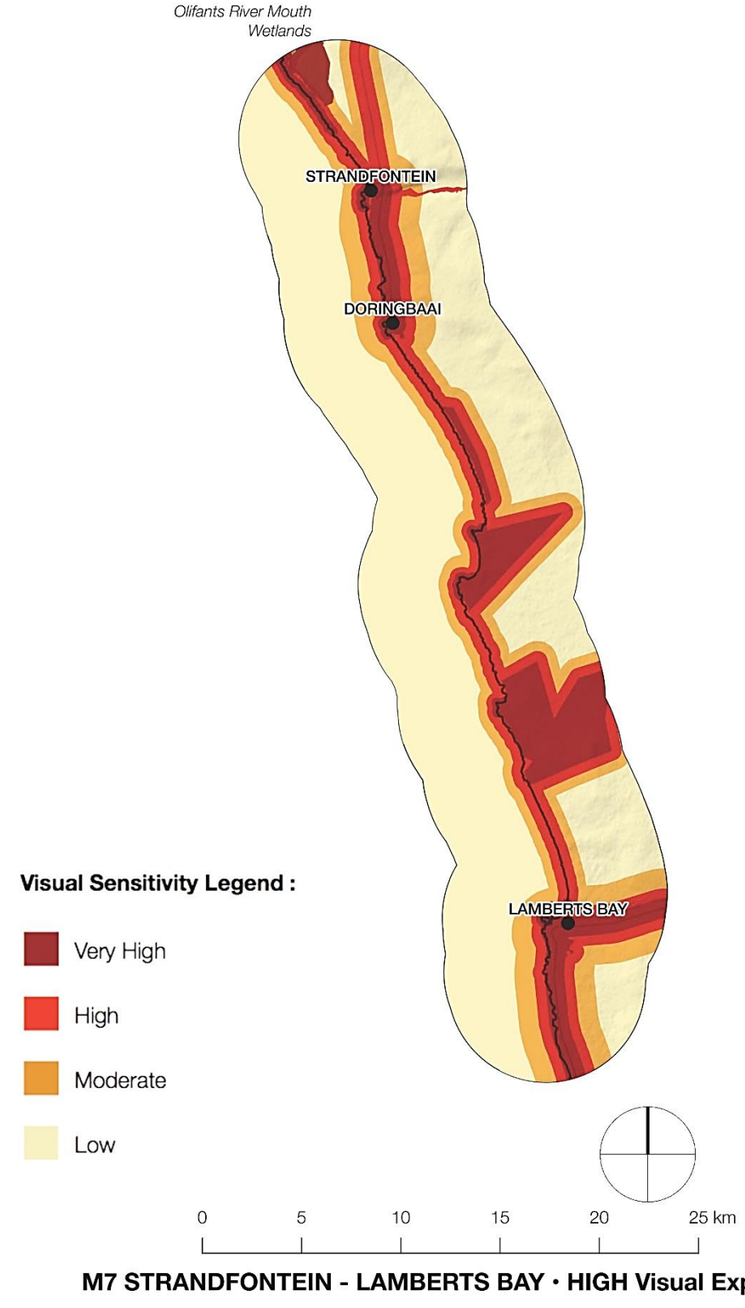


Figure 3.4-14: Strandfontein – Lamberts Bay Marine Study Area visual sensitivity to large scale aquaculture

Figure 3.4-15: Orange – Hondeklip Bay Marine Study Area visual sensitivity to small and moderate scale aquaculture

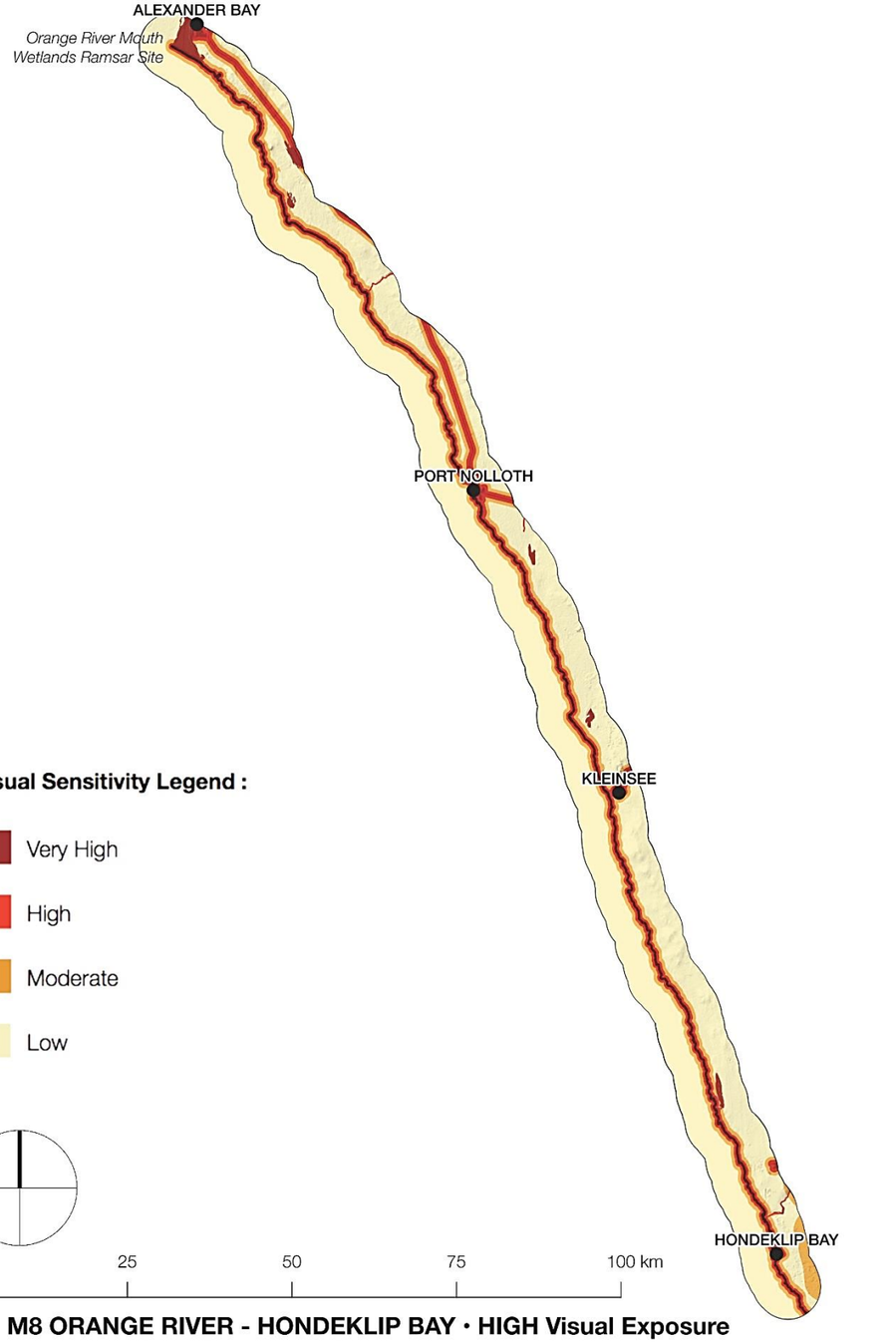
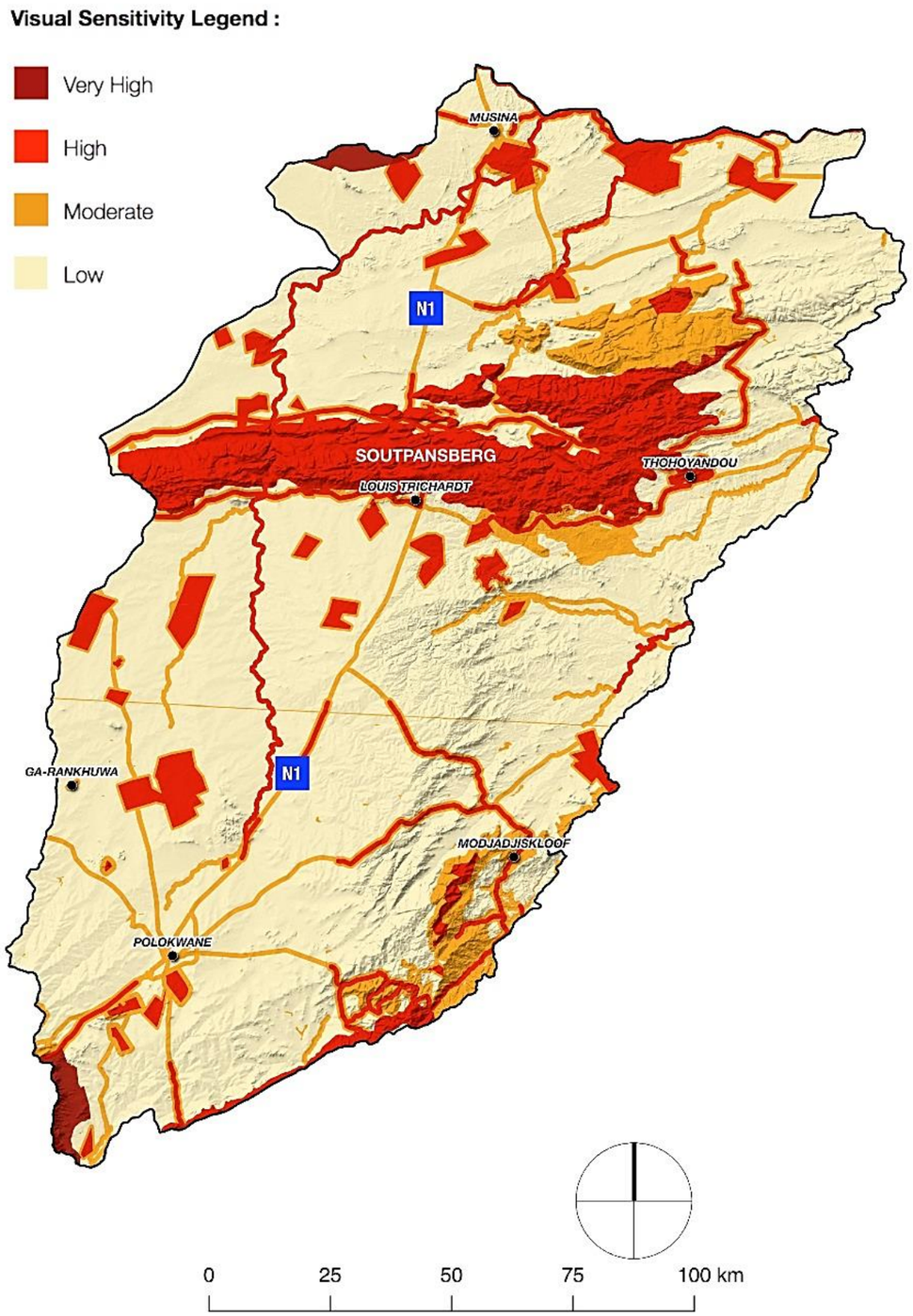
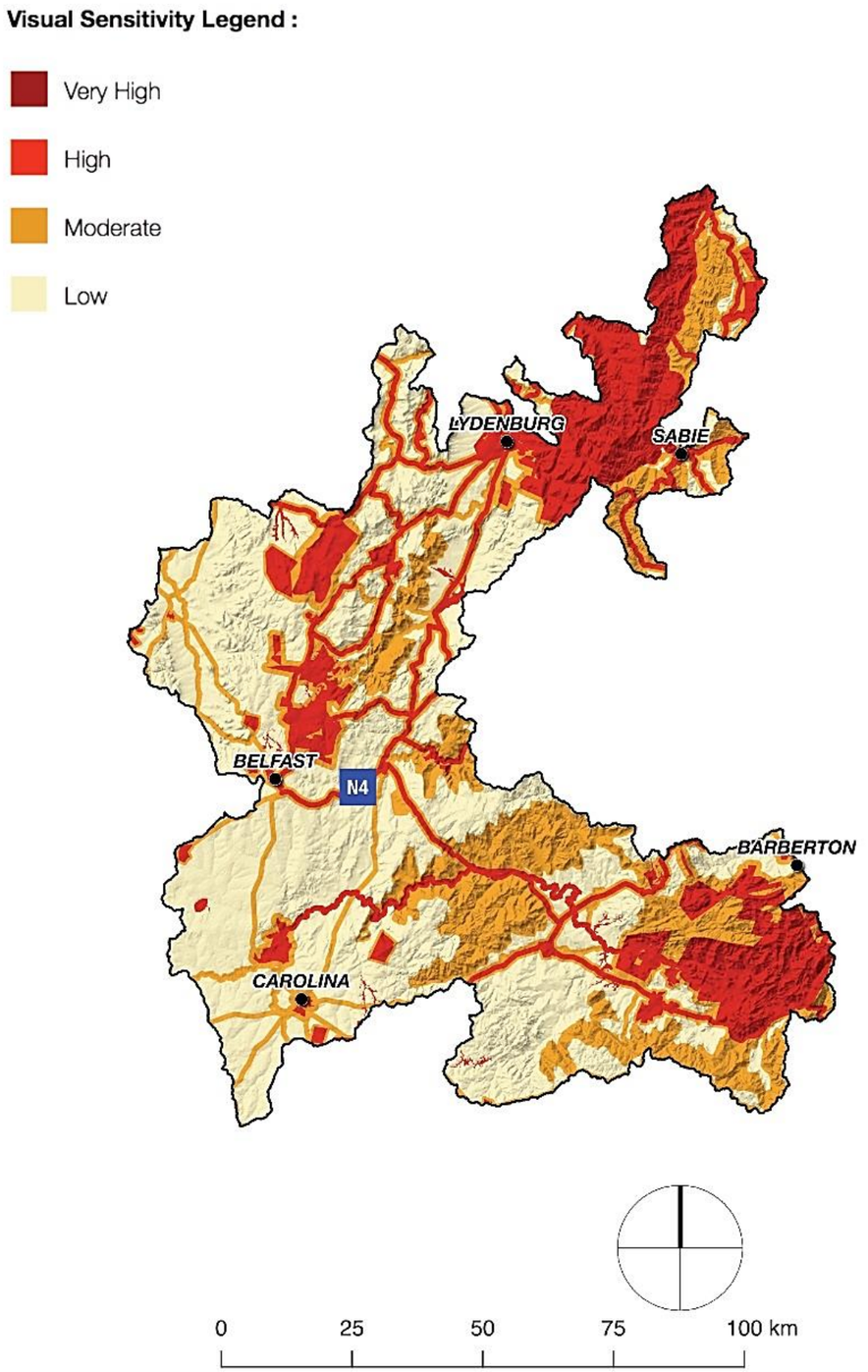


Figure 3.4-16: Orange – Hondeklip Bay Marine Study Area visual sensitivity to large scale aquaculture



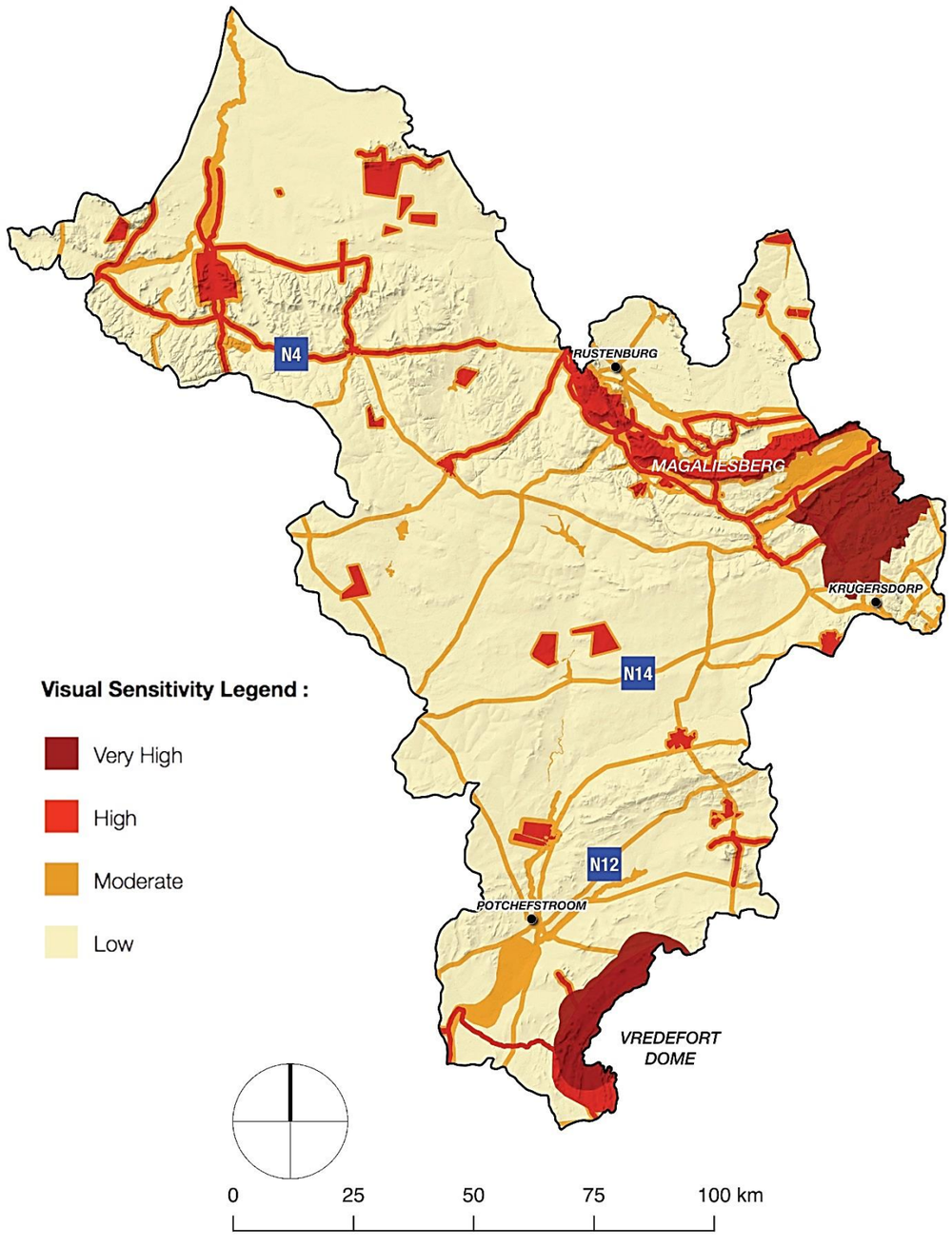
F1 : LIMPOPO • Visual Sensitivity

Figure 3.4-18: Limpopo Freshwater Study Area visual sensitivity



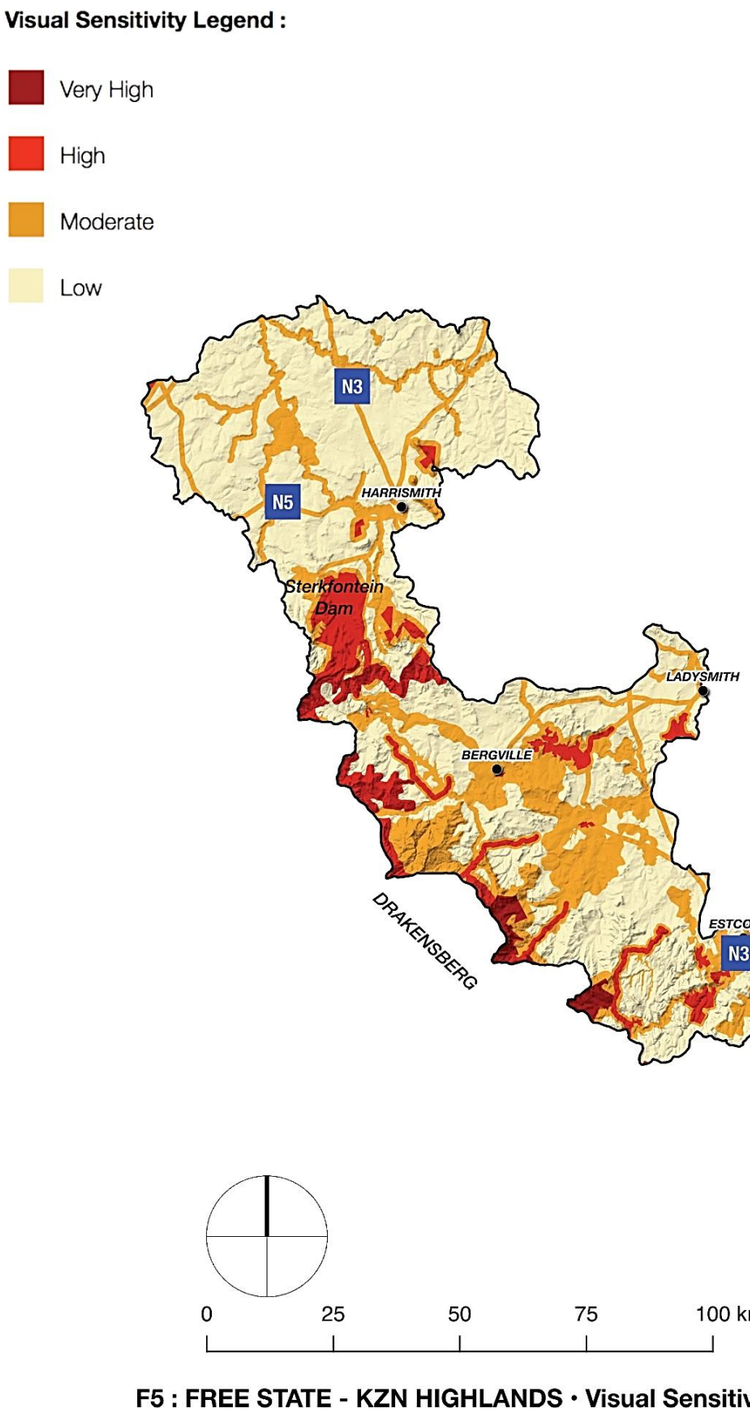
F2 : MPUMALANGA • Visual Sensitivity

Figure 3.4-17: Mpumalanga Freshwater Study Area visual sensitivity



F3 : GAUTENG NORTH-WEST • Visual Sensitivity

Figure 3.4-20: Gauteng – North West Freshwater Study Area visual sensitivity



F5 : FREE STATE - KZN HIGHLANDS • Visual Sensitivity

Figure 3.4-19: Free State – KwaZulu-Natal Highlands Freshwater Study Area visual sensitivity

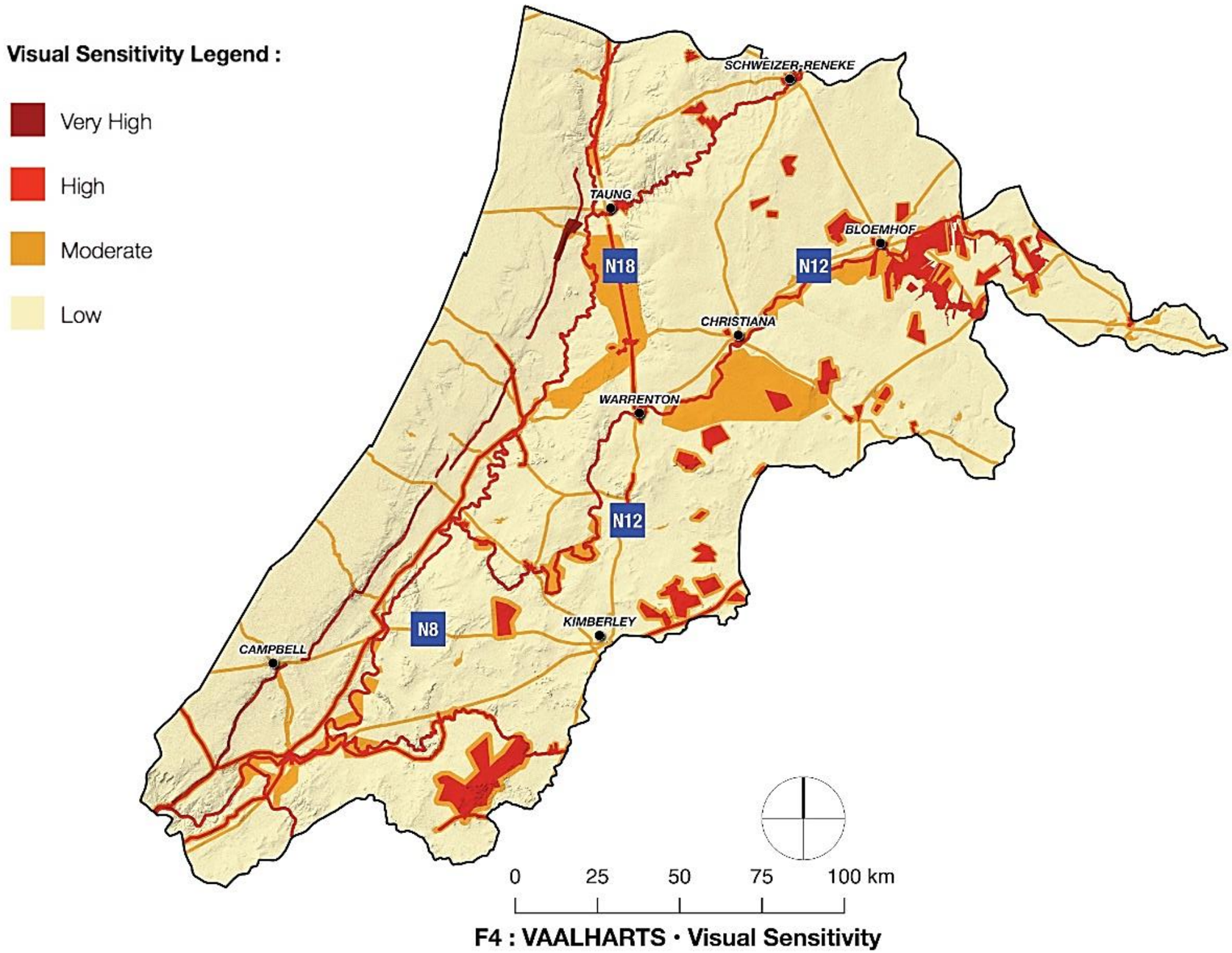


Figure 3.4-21: Vaalharts Freshwater Study Area visual sensitivity

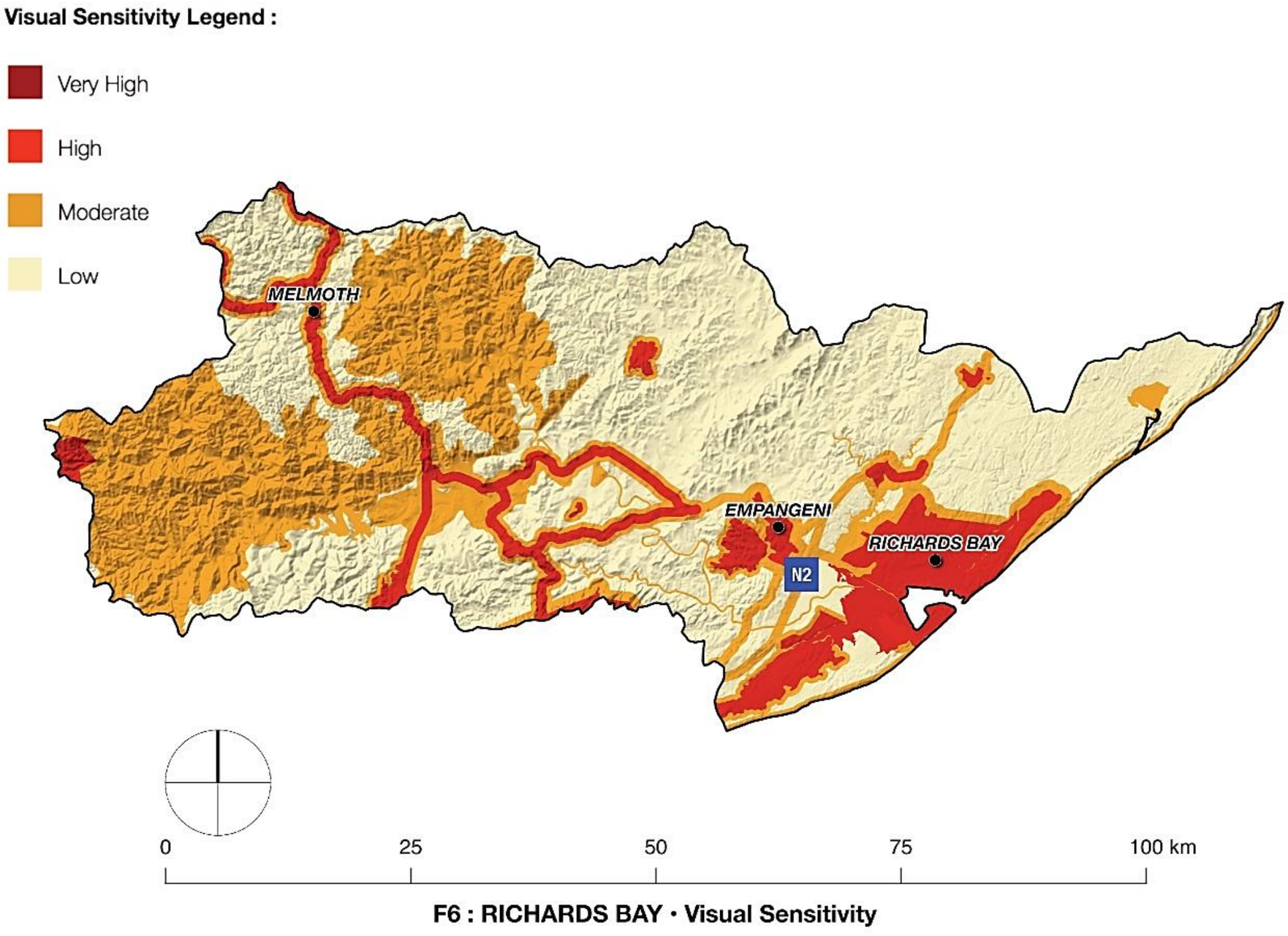


Figure 3.4-22: Richards Bay Freshwater Study Area visual sensitivity

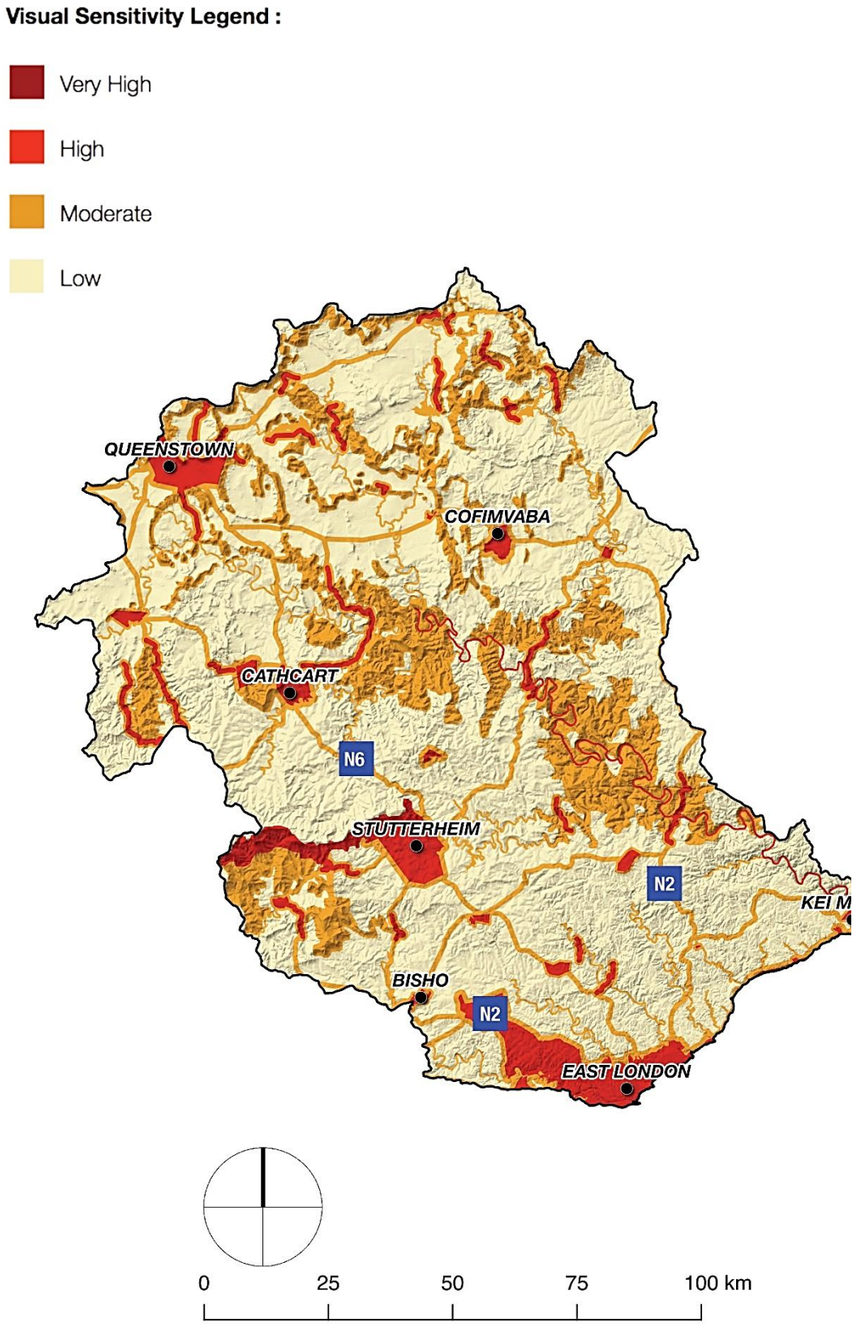


Figure 3.4-23: Eastern Cape Freshwater Study Area visual sensitivity

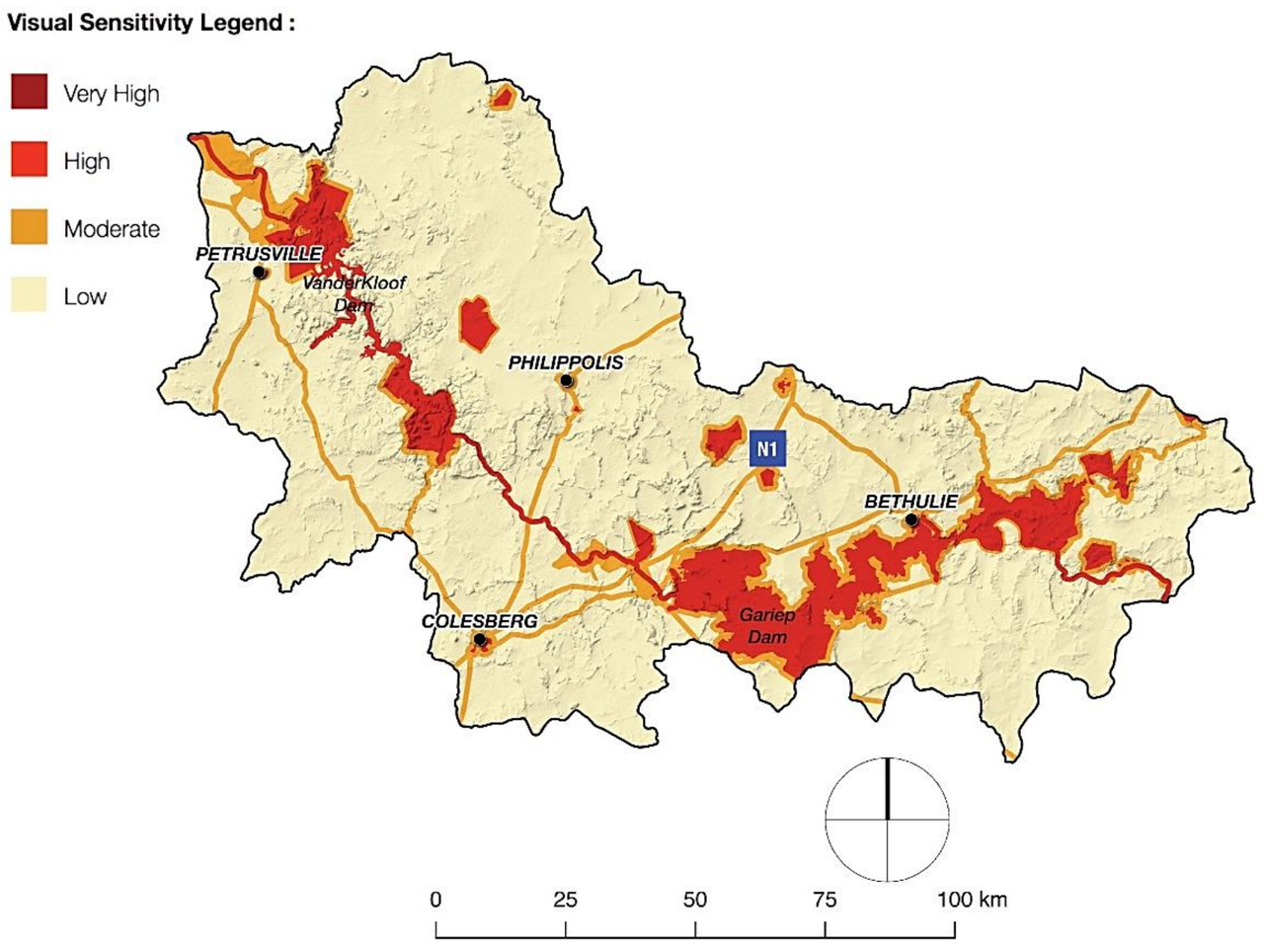


Figure 3.4-24: Vanderkloof – Gariep Freshwater Study Area visual sensitivity

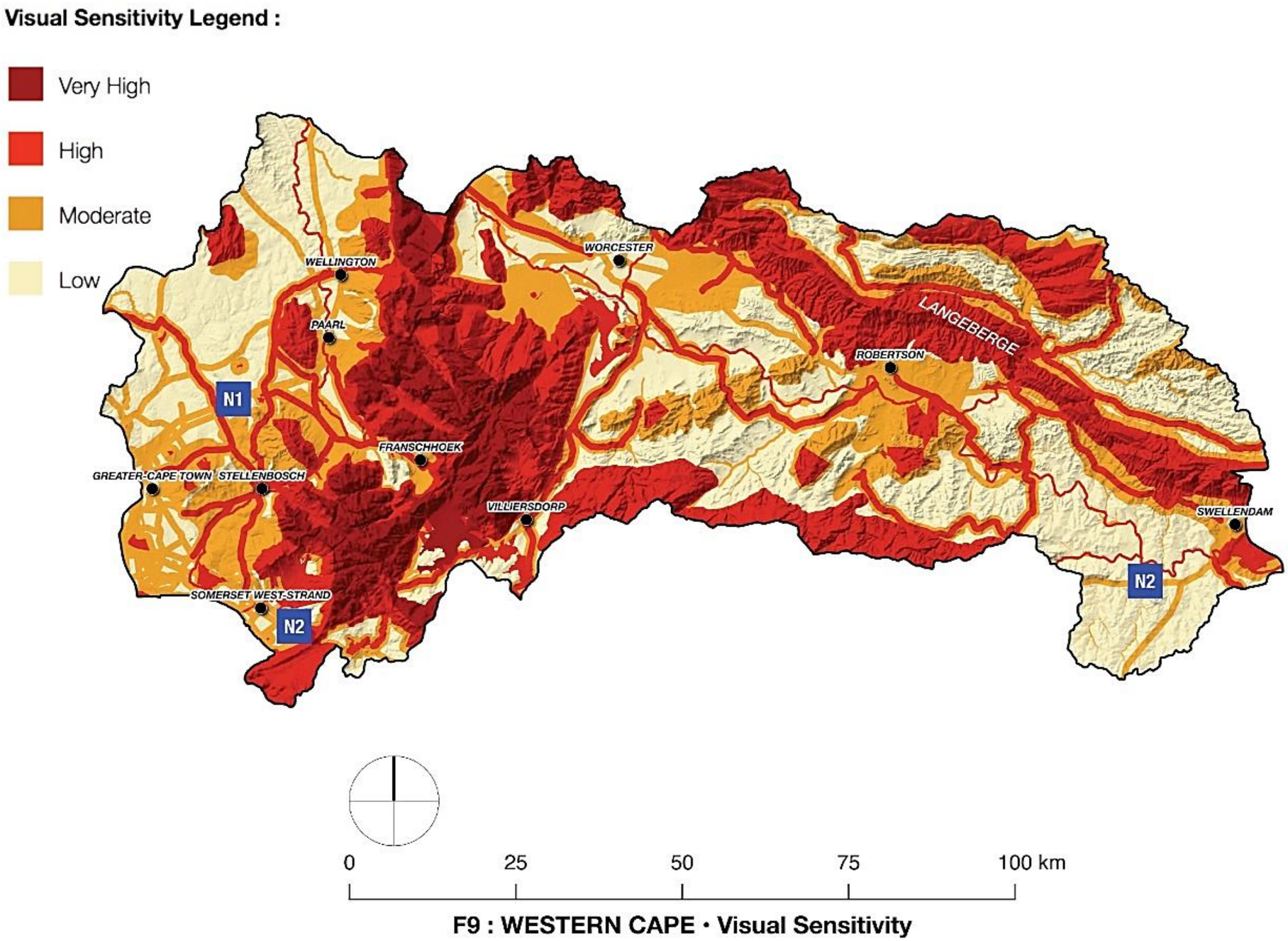


Figure 3.4-25: Western Cape Freshwater Study Area visual sensitivity

3.4.3 Key Potential Impacts

From a visual perspective, the physical scale, or footprint, as well as the height of buildings and infrastructure of land-based aquaculture facilities, as well as extensive water-based facilities, would tend to have the most visual influence and effect on receptors. As a consequence, it is these physical structures that have been prioritized in the visual assessment and in the formulation of mitigation measures. The coastal location of facilities, particularly in natural environments, may compete with other urban and tourism related uses, and could therefore add to potential visual impacts.

Marine offshore and nearshore cages, longlines, rafts and racks tend to have a lower visual profile (< 1 m above the surface), and are further away from receptors, and therefore may have fewer visual implications, except in pristine or undisturbed areas close to the shoreline. Mitigation of these water-based structures tends to be less feasible, although coastal buffers could be applied.

Freshwater aquaculture infrastructure and processing facilities could have significant visual effects if large in scale and/or located near prime residential or resort areas, while those located in industrial areas are more likely to be visually compatible. Small-scale aquaculture facilities in rural areas would tend to be less visually significant and be easier to mitigate through visual screening measures e.g. trees, hedges, etc.

Strategies for the management of potential visual impacts should be an integral and necessary part of the planning and design of aquaculture development. Strategies can be divided into three possible approaches, being avoidance, mitigation and offsets. The impact mitigation hierarchy approach dictates that impacts should firstly be avoided and if unavoidable appropriate measures should be taken to minimise, reduce and remediate such impacts. Detailed avoidance, mitigation and offset measures would need to be formulated on a project basis taking the nature of the proposed development and site context into account.

3.4.3.1 Freshwater Aquaculture

Possible visual impacts of freshwater aquaculture operations include the following:

- **Overall effect on the character and sense of place of scenic areas**, including potential loss of wilderness or rural character resulting from aquaculture development.
- **Visual intrusion of building infrastructure** on prominent topographical and water features, including the siting of land-based facilities in scenic or pristine areas.
- **Visual intrusion and fragmentation of the natural or rural landscape** caused by high structures and extensive infrastructure.
- **Visual impact on residential, resort and tourism facilities**, as well as heritage sites, particularly where this affects property values or the tourism economy of the region.
- **Increased visual clutter created by power lines, pipelines, water reservoirs and access roads**, particularly in scenic mountain areas or visually sensitive skylines.
- **Disturbance of dark skies at night from operational and security lighting**, as well as from buildings and vehicle headlamps.
- **Noise, dust and litter from construction sites** and heavy trucks or machinery.
- **Loss of landscape views, access and amenity along rivers and dams** used for conservation and recreational purposes.

3.4.3.2 Marine Aquaculture

Possible visual impacts of marine aquaculture operations include the following:

- **Overall effect on the character and sense of place of the local coastal landscape**, including potential loss of wilderness or rural character resulting from land-based harbour, building infrastructure and floating cages or longlines.
- **Visual intrusion of building infrastructure** on prominent coastal features and coastal vegetation, including the siting of both water and land-based facilities in scenic or pristine areas.
- **Visual intrusion and fragmentation of the coastal landscape** caused by high structures and extensive infrastructure.
- **Visual impact on residential, resort and tourism facilities, as well as scenic routes, on or near the coastline**, particularly where this affects property values or the tourism economy of the region.
- **Increased visual clutter created by power lines, pipelines, water reservoirs and access roads**, particularly in scenic coastal areas, seascapes or visually sensitive skylines.
- **Increased disturbance of dark skies at night from operational and security lighting**, as well as from buildings and vehicle headlamps.
- **Noise, dust and litter from construction sites and during operation**, and from heavy trucks or machinery.
- **Loss of coastal views, access and amenity** for conservation and recreational purposes.

3.4.4 Risk Assessment[4]

The risk of marine and freshwater aquaculture facilities resulting in visual intrusion, alteration of landscape character and/or impacts to sensitive visual receptors is dependent on the scale and intensity of the operation (Figure 3.4-26).

Risk of high intensity development in high and very high sensitivity regions may not be mitigatable to acceptable levels, and should be avoided as far as possible.

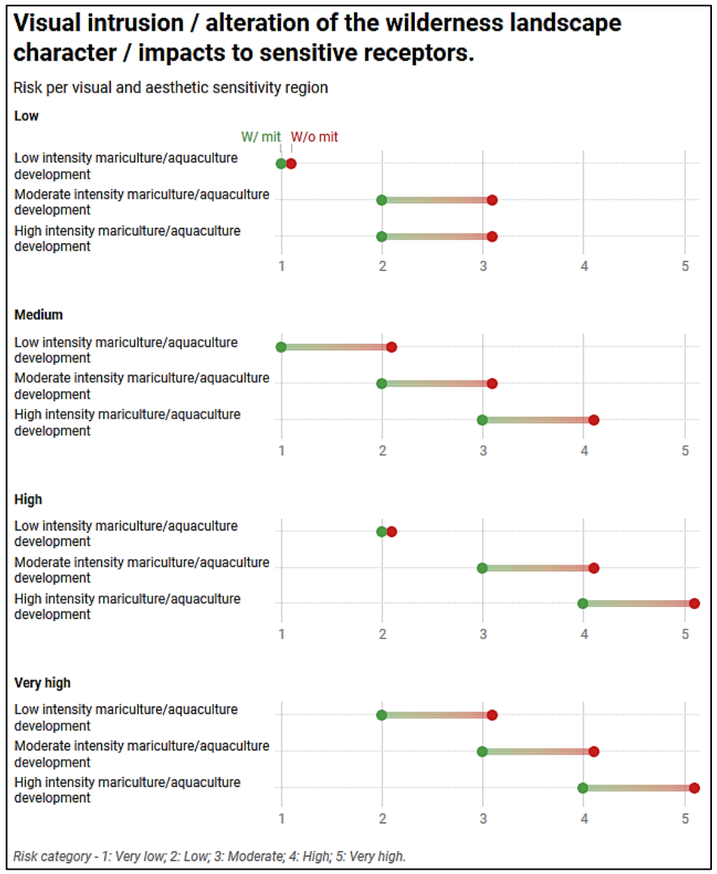


Figure 3.4-26: Summary of the risks of marine and freshwater aquaculture to visual, scenic and aesthetic resources. Risks are presented per heritage sensitivity region, without enhancement ("W/o mit") and with opportunity maximization ("W/ mit").

[4] The green dots indicate risk after mitigation, but does not imply that risk has been mitigated to acceptable levels. The position of the green dot indicates the risk class after mitigation, which may be high, even with mitigation.

3.4.5 Management Actions, Best Practice Guidelines and Monitoring Requirements

Development Stage	Best Practice Guidelines for the Management of Visual Impact associated with aquaculture
Planning / Site selection phase	<u>Location</u>: • Take cognizance of visual sensitivity zones contained in this Visual Specialist Assessment and other regional planning documents for the various districts, including Spatial Development Frameworks (SDFs). • Avoid placement of aquaculture farms in proximity to visually sensitive receptors, such as National Parks, nature reserves, scenic and tourist routes, or areas of classified 'high' or 'very high' visual sensitivity (Appendix A-4). • Observe recommended visual buffers between proposed aquaculture developments and sensitive landscape features or receptors, such as those provided in Appendix A-4. • Preferably locate aquaculture development where industrial development or disturbed sites, such as quarries, already exist, and avoid pristine or scenic landscapes. • Assess the cumulative visual effect of more than one aquaculture farm in the proposed siting of aquaculture facilities, as described in Section 6.1 of Appendix A-4, to avoid industrialisation of natural or rural landscapes. • Conduct detailed site-specific analyses at the planning stage to identify visual constraints, important scenic features and visually sensitive receptors in the area. • Commission a visual assessment, with viewshed analyses, to determine visibility and other potential effects resulting from the proposed siting of the aquaculture farm and related infrastructure in all areas except those of 'low' visual sensitivity (Appendix A-4), unless required otherwise by the relevant authority. • Avoid placement of land-based facilities and other infrastructure, such as powerlines on ridgelines, elevated landforms and steep slopes because of their visual effect on the skyline. Use the mitigating effect of low-lying areas or belts of trees. • Align access roads with the natural contours and avoid steep gradients requiring additional earthworks. Use existing district and farm roads where feasible, and minimise new roads.
Construction / Operational phase	<u>Footprint</u>: • Minimise excessive fragmentation of natural or cultural landscapes as far as possible through grouping or sharing of infrastructure such as powerlines or access roads. • Create a compact layout and group buildings together to minimise the aquaculture farm footprint and consequently the visual effect on landscape character. • Avoid excessive loss of natural veld or agricultural land. Use previously disturbed areas in preference to pristine or agriculturally productive landscapes as far as possible. • Use low-profile cages and low buildings where possible to reduce their visibility from adjacent areas. Large buildings should preferably be broken down into a series of smaller structures. • Avoid unnecessary visual clutter, such as irregular cage sizes and haphazard layouts. Ensure that water-based structures are in scale with the coastline form, dam or lake, and do not visually dominate these features. • Keep access roads as narrow as feasible and minimise cut and fill earthworks. Locate pipelines adjacent to roads to minimise visual disturbance. <u>Visual Screening, Noise and Odour Abatement</u>: • Screen land-based facilities and related infrastructure by means of earth berms and/or planting. Spoil material could be used in the construction of berms. These are also effective if placed at strategic positions near public routes and viewpoints to screen foreground views. • Locate parked vehicles under shaded carports where possible, using natural colours for shade cloth or roof covering, to minimise their visibility in the landscape. Plant shade trees in open parking areas. • Use muted colours with a matt surface for cages / baskets to merge with the surrounding seascape. Avoid reflective materials for both water-based and land-based structures. • Emulate local rural building forms in the design of sheds and other structures. • Avoid exceeding ambient noise levels and limit odours by means of baffles to minimise the effect on receptors and the overall sense of place. <u>Lighting and Signage</u>: • Minimise outdoor lighting to that required for safe operations. Generally avoid high-mast lighting, but where these are required use reflectors to avoid light spillage and 'sky-glow' effects, particularly in natural or rural surroundings. • Use low-level bollard lights and bulkhead lights with downward reflectors in place of high level lighting for parking and footpaths. Use light timers to turn off lights when not needed. • Minimise the amount and intensity of lights used on sea-based structures without affecting safety or navigational requirements. • Limit signage to only that which is absolutely necessary. Fix signage to walls or buildings to minimise visual clutter. • Prohibit billboards or self-illuminated signs because of their visual intrusion. Restrict the size of signs to a maximum of 4 square metres. <u>Maintenance</u>: • Maintain the aquaculture facilities and related infrastructure in a tidy, clean condition. • Control litter and other waste to avoid visual impacts on the surroundings. • Avoid visual scarring of the landscape caused by runoff and erosion by using stormwater management measures.
Rehabilitation and Post Closure phase	• Implement landscape rehabilitation measures during decommissioning. • Remove all above-ground structures, dams, ponds and reservoirs unless these are recycled for new uses. • Grade the affected area to pre-development topographic conditions, unless the area is required for new specific uses. • Scarify compacted areas and re-spread topsoil stored at the time of the initial clearing and re-seed exposed areas. Use stored rocks to simulate rock outcrops of the area. • Vegetation used for the restoration is to match that of the surrounding veld, unless new uses are planned for the site.
Monitoring requirements	Ensure that the visual guidelines listed above form part of the EMPr, and are included in on-going monitoring during the following stages: <u>Pre-construction monitoring</u>: • Create procedures for the review of project plans, including landscape rehabilitation plans as part of the EMPr process to ensure that mitigation measures have been included in the design. • Appoint a suitably qualified landscape architect or restoration ecologist to prepare a phased rehabilitation plan for all stages of the project. Implement these plans by means of the mandatory EMPr. <u>Construction monitoring:</u> • Create procedures for ensuring that the specified visual management actions are carried out on site as part of the EMPr. Appoint an ECO to educate construction workers, monitor the implementation of mitigation measures and report to the EMPr team on a weekly basis. <u>Operational monitoring</u>: • Create procedures for the on-going control of aesthetic aspects of the project including signage, lighting, fencing, litter control etc. to ensure that the management actions are being applied. <u>Decommissioning monitoring</u>: • Create procedures for the removal of structures and stockpiles at the end of the lifespan of the aquaculture farm and related infrastructure, including re-use of the site and recycling of materials, as well as the rehabilitation or redevelopment of the site to a visually acceptable form. Monitoring of the rehabilitation by the EMPr team is required, with signing off by the delegated authority.