PART 3.3

Archaeology, Palaeontology and Cultural Heritage

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PART 3. SCIENTIFIC ASSESSMENT OF AQUACULTURE DEVELOPMENT ZONES

Section 3.3 Archaeology, Palaeontology and Cultural Heritage

South African heritage, as defined in Sections 2 and 3 of the NHRA[1], forms an integral part of our identity as South Africans. Also, the South African archaeological and palaeontological record is one of the richest and most scientifically valuable on earth. Heritage is a non-renewable and irreplaceable resource, and, as such, the loss of any evidence for the human past is an irretrievable loss, the extent of which, though in some way linked to the sphere and degree of significance of that resource, is nonetheless variable and hard to quantify. Therefore, mitigation in the form of complete or partial preservation of the resource *in situ* to partial or complete preservation of the resource in record only – through excavation, photographing, describing and recording – is always preferable to destruction without mitigation. Therefore, beyond a mere legal requirement to identify, preserve and conserve this heritage, it is a moral and ethical obligation.

3.3.1 Environmental Attributes

Any development poses a possible risk to heritage resources that may exist there, particularly in rural areas that have not been subject to intensive, recent human activity. Areas suitable for aquaculture, particularly, are likely to contain archaeological, historical and further cultural heritage resources. This is due to the fact that the very feature that is central to inland fish farming, namely access to freshwater, has been a deciding factor in the preferential exploitation and settlement of the landscape throughout time. Similarly, the successful farming of marine resources depends on areas where wild marine populations thrive, and these too would have been preferentially sought out by all people throughout time as food sources. As such, one can expect palaeo-anthroplogical and archaeological heritage resources to occur both at coastal and inland sites earmarked for aquaculture. More recently, in historic times, coastal areas with abundant fish and shellfish have been settled by fishing communities, while inland areas with abundant freshwater were often preferentially settled for farming, meaning that historic towns, farms and associated structures can be expected as well.

Shipwrecks, many of which relate to the earliest European navigation round the Cape and settlement there, is another characteristic heritage resource in coastal areas. These sites have international significance as markers of global trade systems and imperial expansion, as well as the development of local maritime trade. All shipwrecks are part of the national estate and are recognised as Grade I resources, in terms of Section 7 of the NHRA, and are protected and managed by SAHRA. Wrecks include numerous types of vessels, located at varying depths and distances off shore, and in varying states of preservation.

The final aspect of significant heritage that could be affected by aquaculture developments comprises the layered cultural landscape that reflects the tapestry of interplay between people and the landscape through time. The effect of people on their landscape, and the restrictions and possibilities the landscape exerts on people results in a unique combination of tangible and intangible characteristics that give each location its particular visual heritage character and sense of place. New, potentially visually intrusive developments in such landscapes can cause irrevocable shifts and rifts in this sense of place that has developed gradually, through more appropriate landscape interventions, through time.

3.3.1.1 Heritage Resources

Heritage can broadly be considered the tangible places and objects of cultural significance that have been passed down from previous generations, as well as the intangible cultural practices and traditions that shape daily life. The heritage character of an area is delineated by the interplay of materials, forms, location, spatial configurations, uses and cultural associations or meanings attributed to that area, which contribute to its heritage value and that must be retained to preserve that value. A variety of heritage resources contribute to the heritage character of each of the 17 marine and freshwater study areas. Each category of heritage resource was subjected to largely similar assessment processes to derive the heritage character of each study area. These processes consisted of consulting SAHRIS to identify the known, graded and declared heritage sites and resources, as well as mapped sites derived from surveys, for each resource type across the country. These data were supplemented by consultation of heritage reports captured into SAHRIS as well as academic reports and the specialist knowledge of the specialist authors. Additional information was obtained from the international shipwreck database, the 1:1 000 000 geological maps for palaeontology and the SAHRIS Palaeo-sensitivity map. This information provided an idea of the categories and distribution of heritage resources in each study area to determine the known heritage character of each study area and flag the known sites that will need to be avoided and/or buffered.

3.3.1.2 Gradings

Section 7(1) of the NHRA provides for heritage resources to be assigned Grades I, II or III, while Section 7(2) provides for sub-categories of Grade II and III. Grading of sites is not only necessary for heritage management as it informs the conservation of generally protected sites but also a legal requirement for the formal protection of sites. The grading of heritage sites which form part of the National Estate is done according to Section 7 of the NHRA as follows:

- Grade I: Heritage resources with qualities so exceptional that they are of special national significance;
- Grade II: Heritage resources which, although forming part of the national estate, can be considered to have special qualities which make it significant within the context of a province or a region;
- Grade III (a-c): Other heritage resources worthy of conservation.

Sites with little or no heritage value are deemed NCW (Not Conservation-Worthy). Although this categorization of sites is not currently recognised by SAHRA, it is useful in a strategic level assessment.

3.3.2 Sensitivity Mapping

The heritage sensitivity maps for the 17 study areas represent elements relating to known heritage resources including physical sites (places), as well as palaeontological significance as determined by fossil sensitivity. These two layers (heritage sites and palaeo-sensitivity layers) were combined to create a composite heritage sensitivity map for each study area indicating a Very High, High, Medium and Low sensitivity based on the sensitivity criteria assigned (Figure 3.3-1 to 3.3-17).

The known heritage resources located within each study area include (i) Archaeological sites such as archaeological, battlefield, geological, meteorological, palaeontological and underwater sites; (ii) Built environment including structures, monuments and memorials; (iii) Burial grounds and graves including living heritage or sacred sites, and natural sites and places; and (iv) Cultural heritage including conservation areas and cultural landscapes. The palaeontological sensitivity reflects the relative likelihood of the underlying geological layers containing fossil remains. The key palaeontological sites identified in each study area have been mapped separately in order to flag their locations where possible at this scale. Where these key sites represent likely outcrops of certain formations for which the location cannot be derived at this strategic scale of assessment, these have been noted but not mapped.

[1] The National Heritage Resources Act, 1999 (Act No. 25 of 1999)

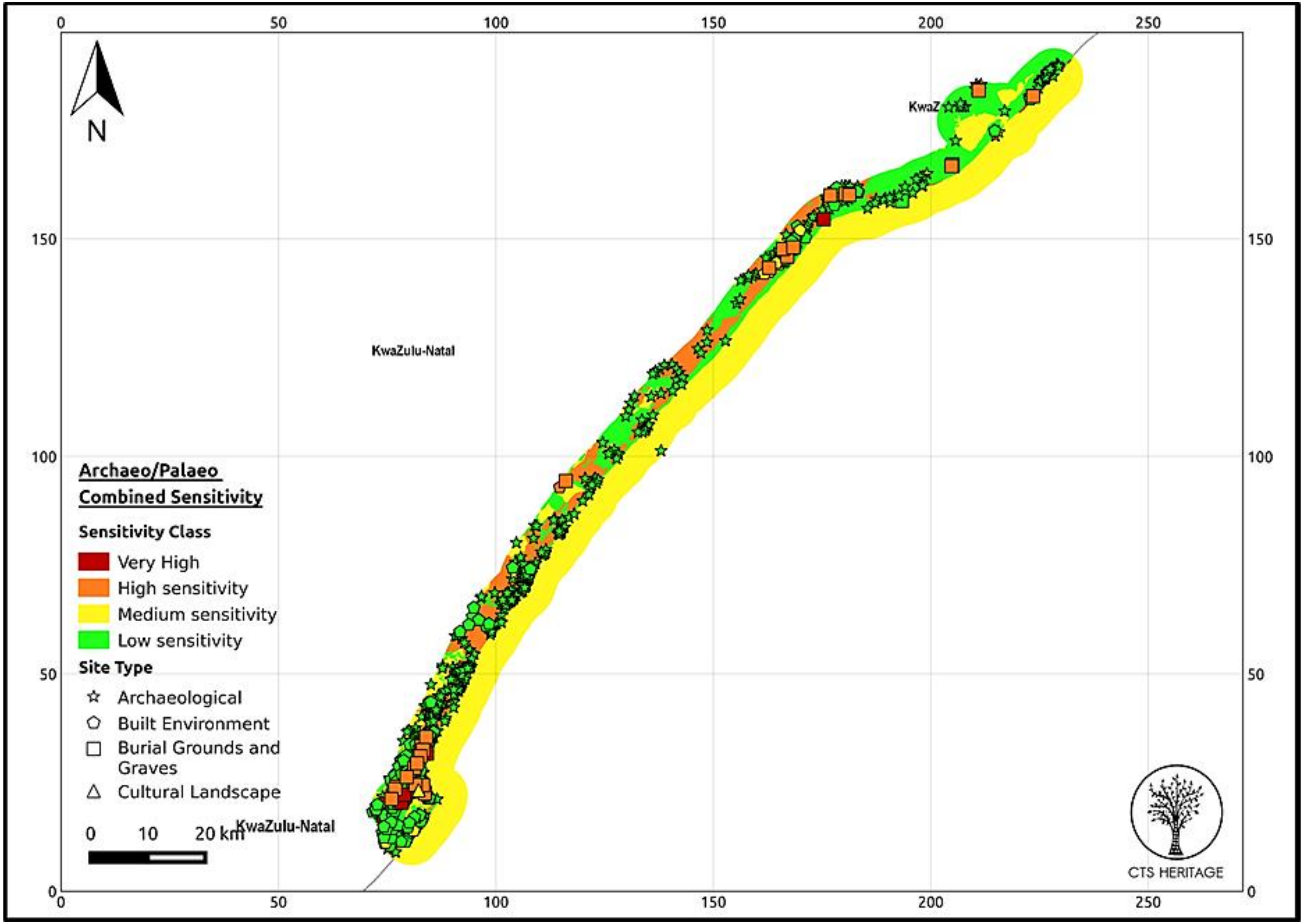

Figure 3.3-1: Durban – Richards Bay Marine Study Area combined heritage sensitivities map.

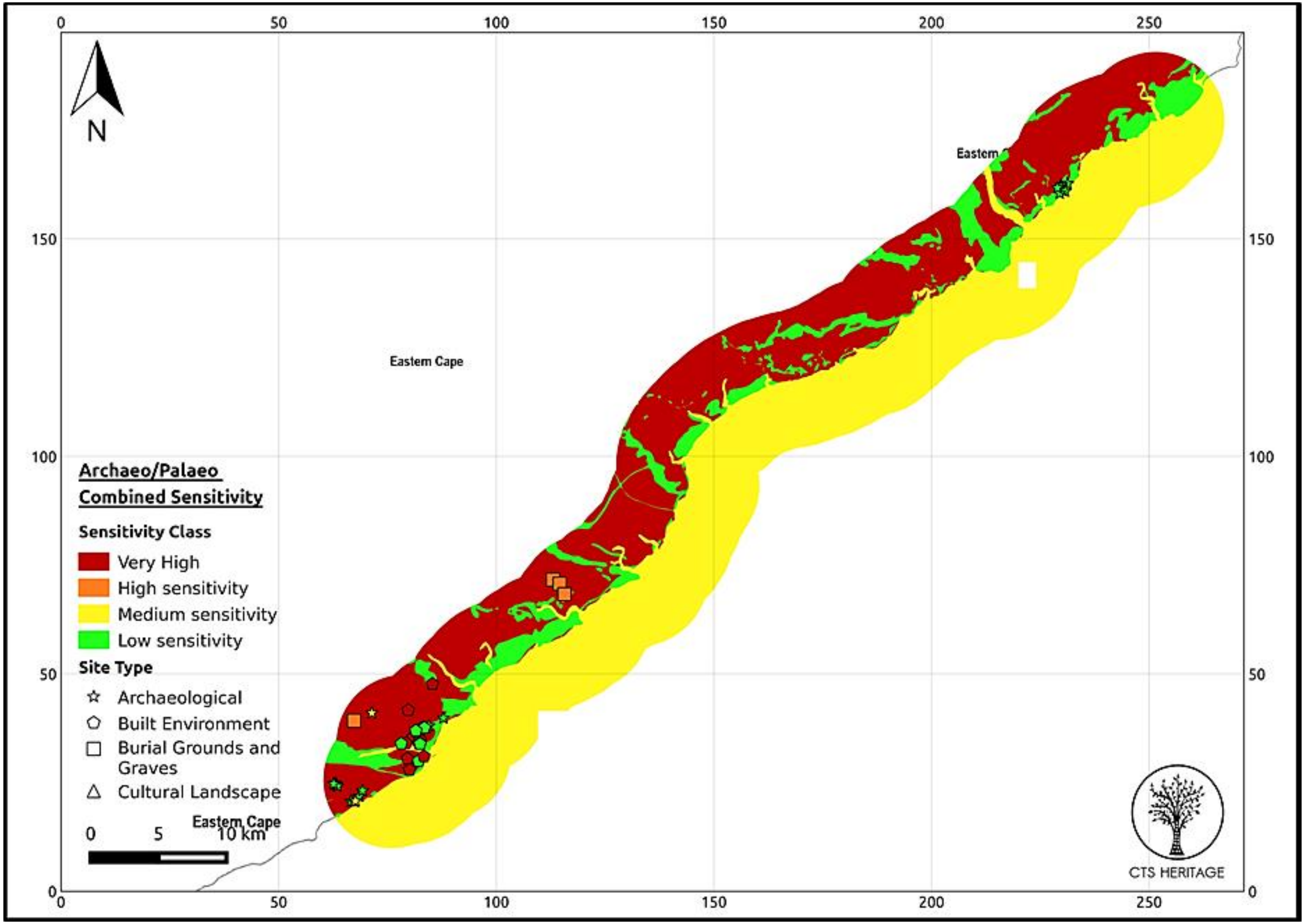

Figure 3.3-2: East London – Kei Marine Study Area combined heritage sensitivities map.

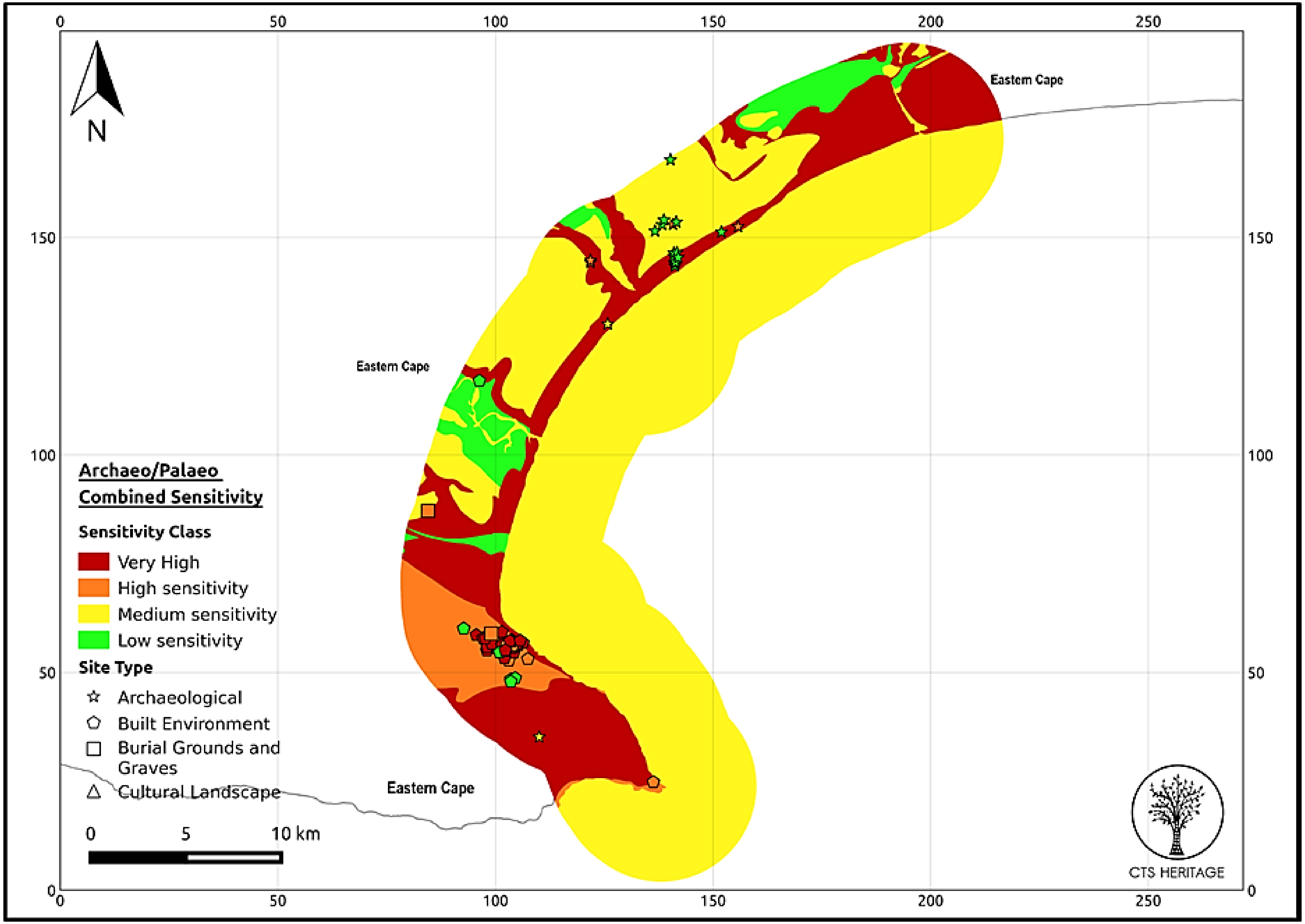

Figure 3.3-3: Port Elizabeth Marine Study Area combined heritage sensitivities map.

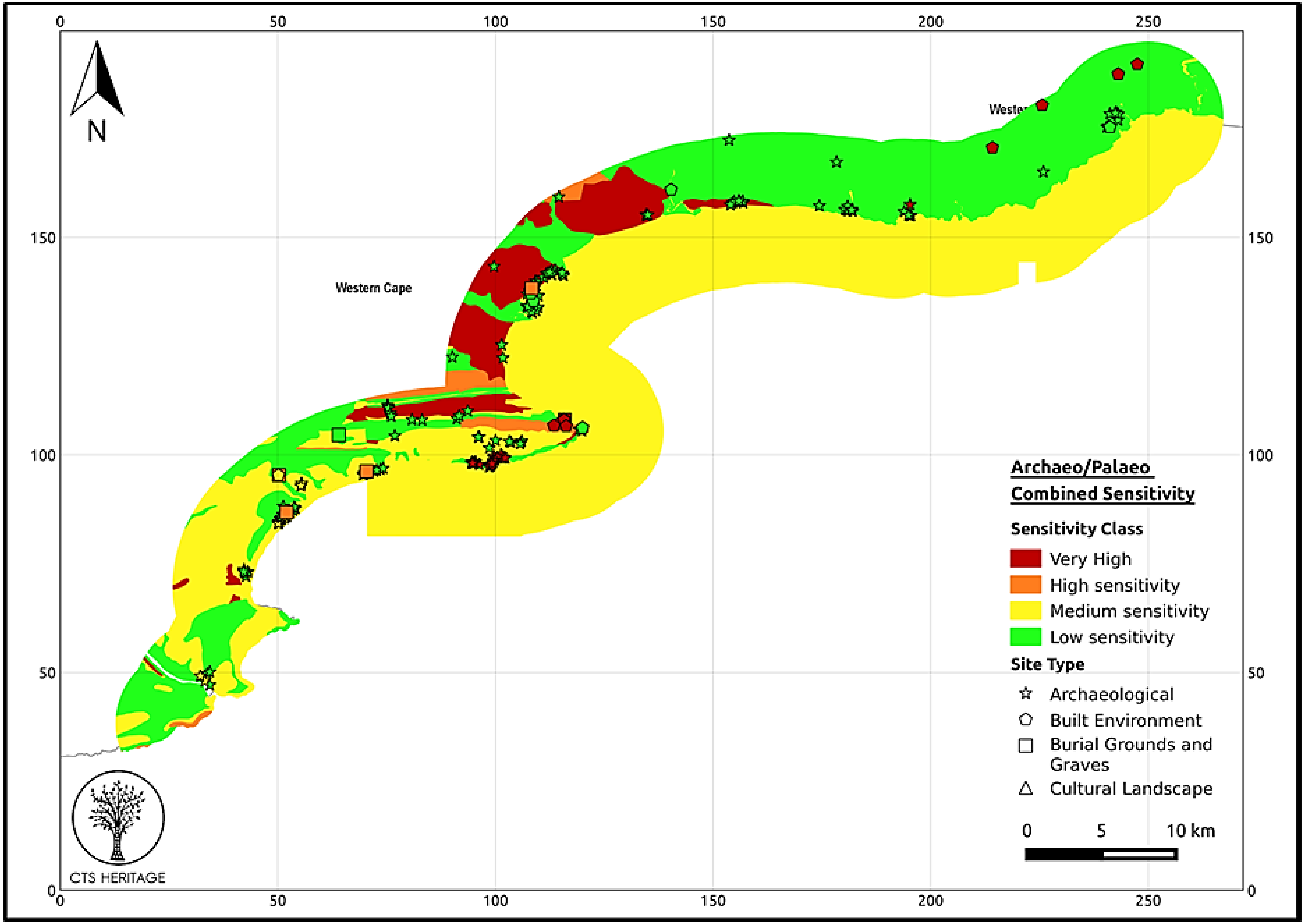

Figure 3.3-4: Gouritz – George Marine Study Area combined heritage sensitivities map.

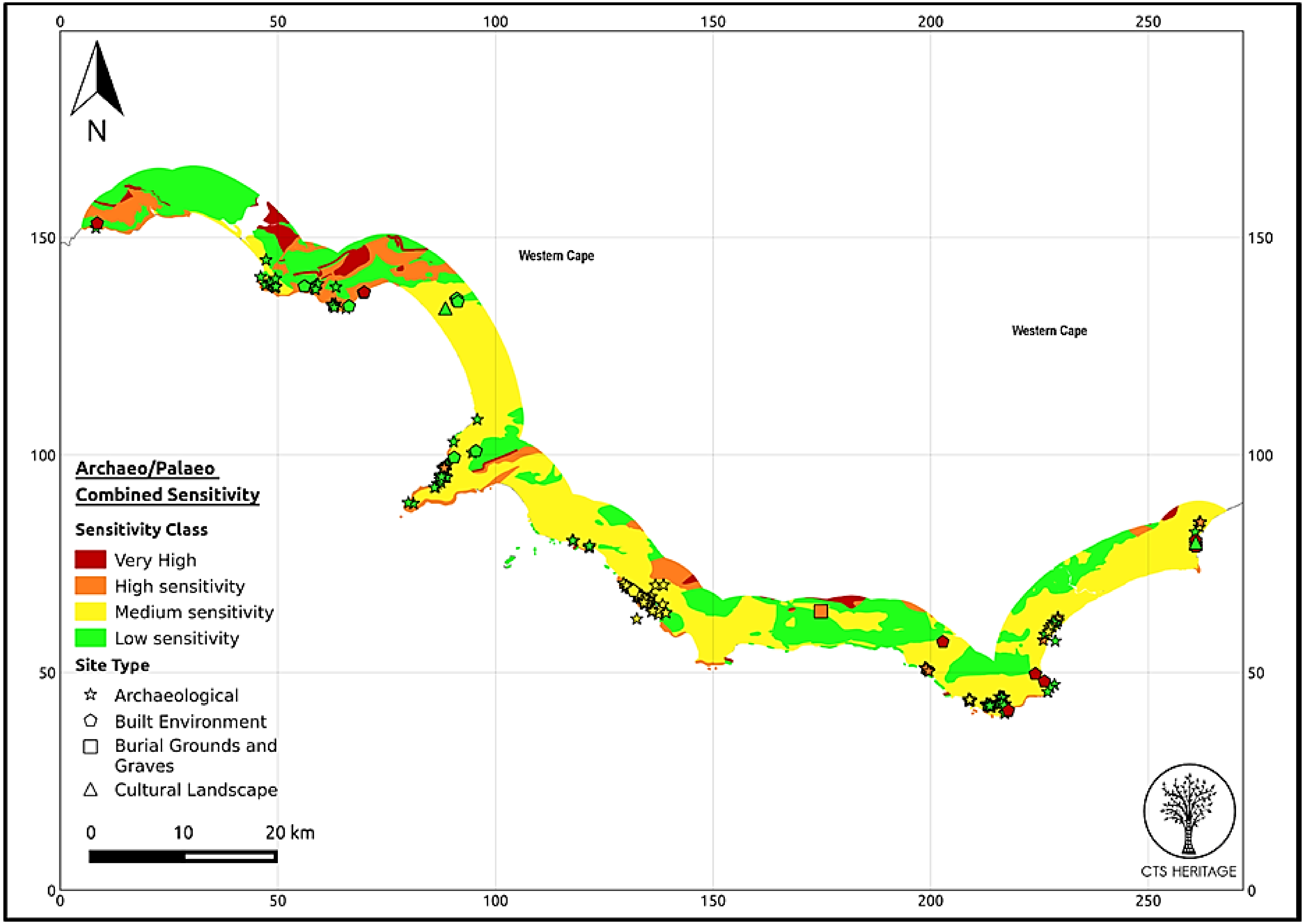

Figure 3.3-5: Hermanus – Arniston Marine Study Area combined heritage sensitivities map.

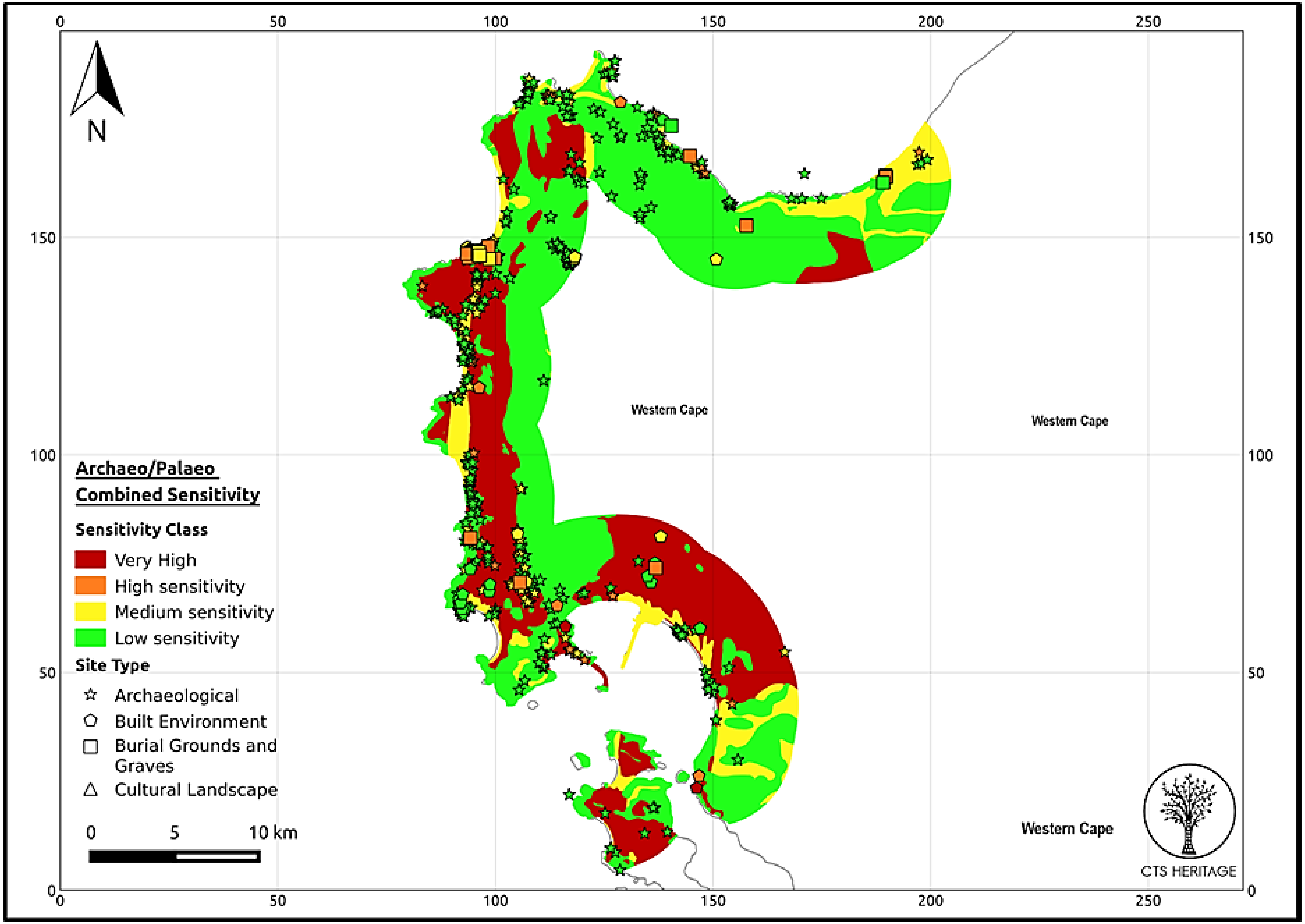

Figure 3.3-6: Velddrif – Saldanha Marine Study Area combined heritage sensitivities map.

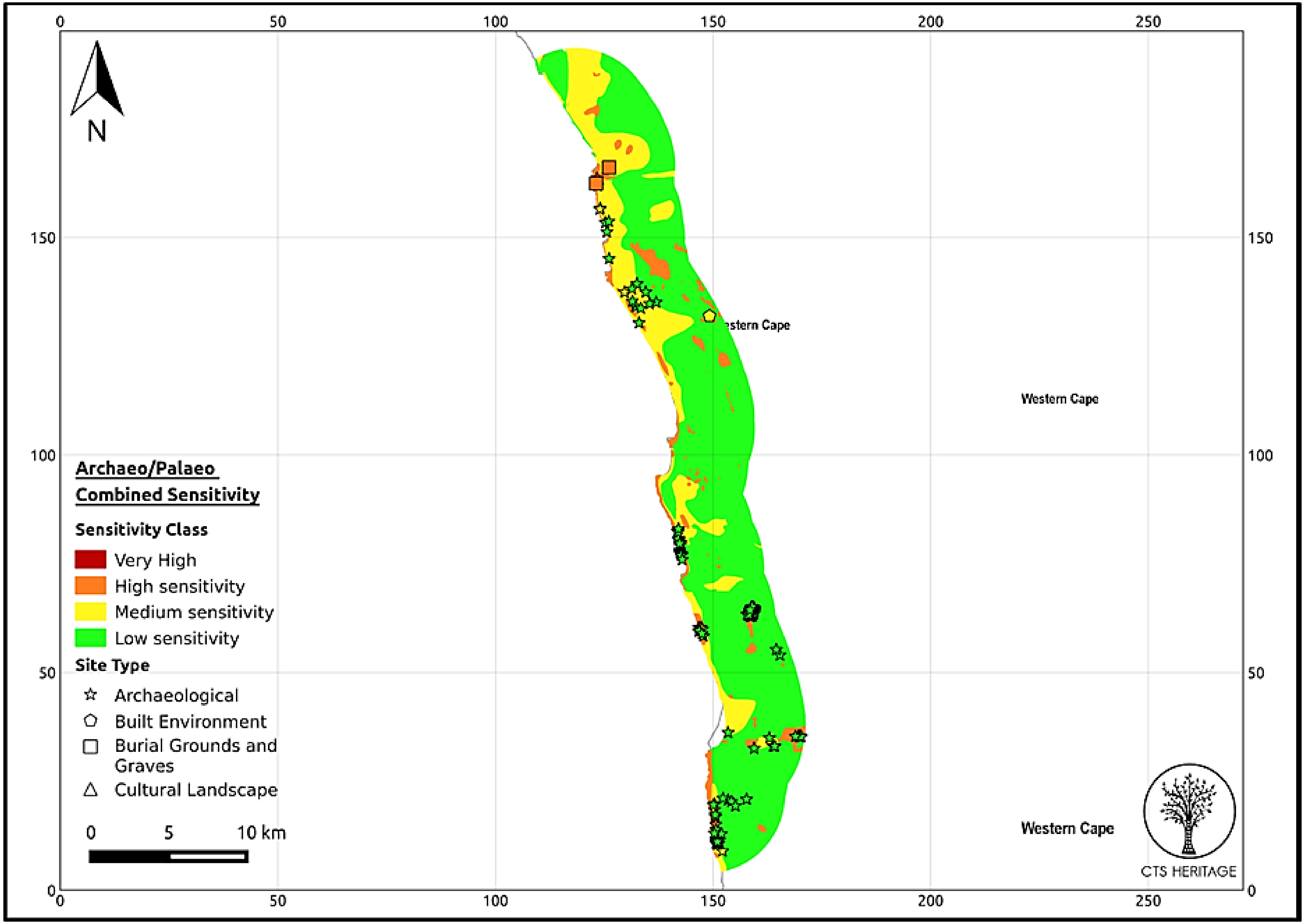

Figure 3.3-7: Strandfontein – Lamberts Bay Marine Study Area combined heritage sensitivities map.

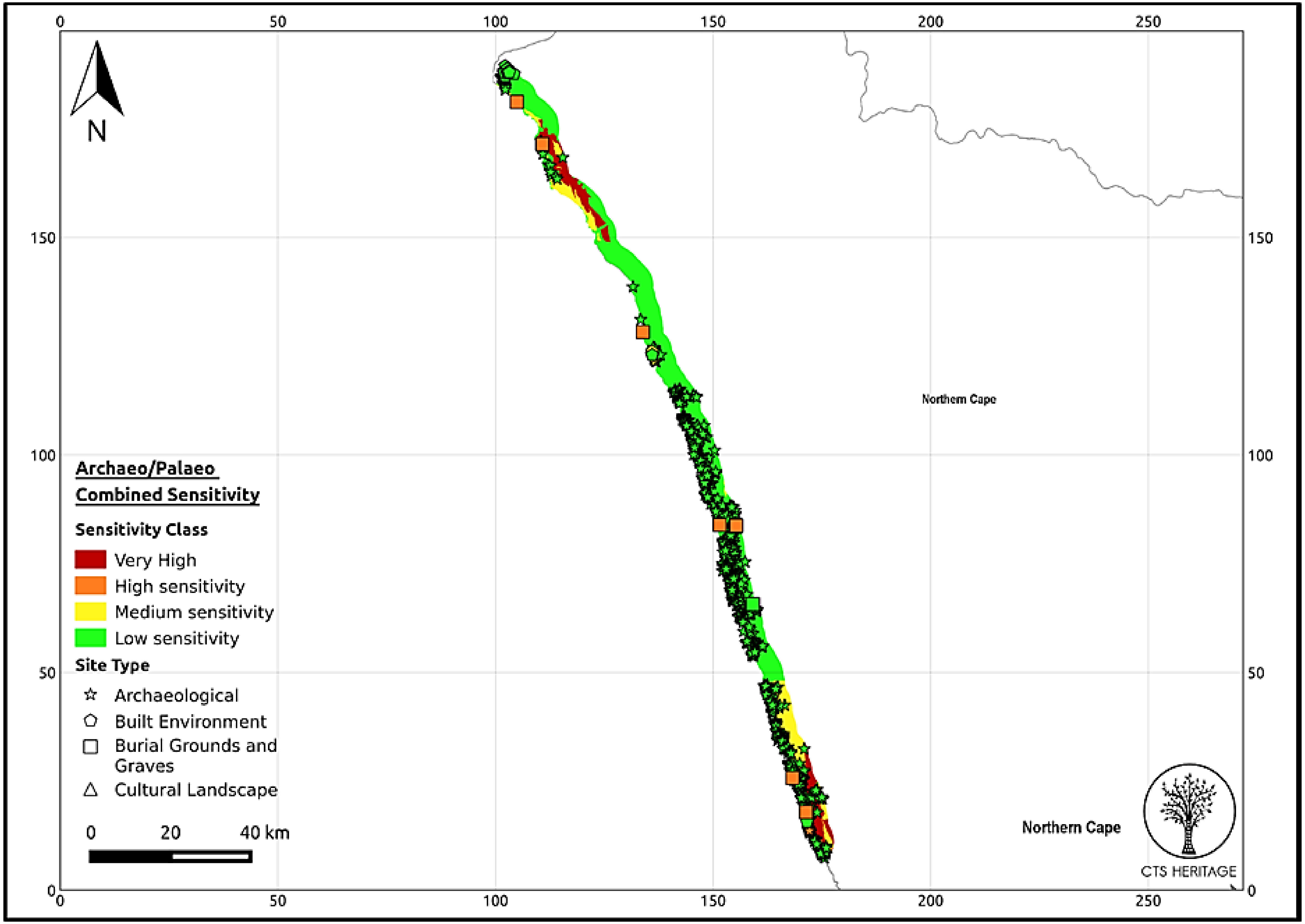

Figure 3.3-8: Orange River – Hondeklip Bay Marine Study Area combined heritage sensitivities map.

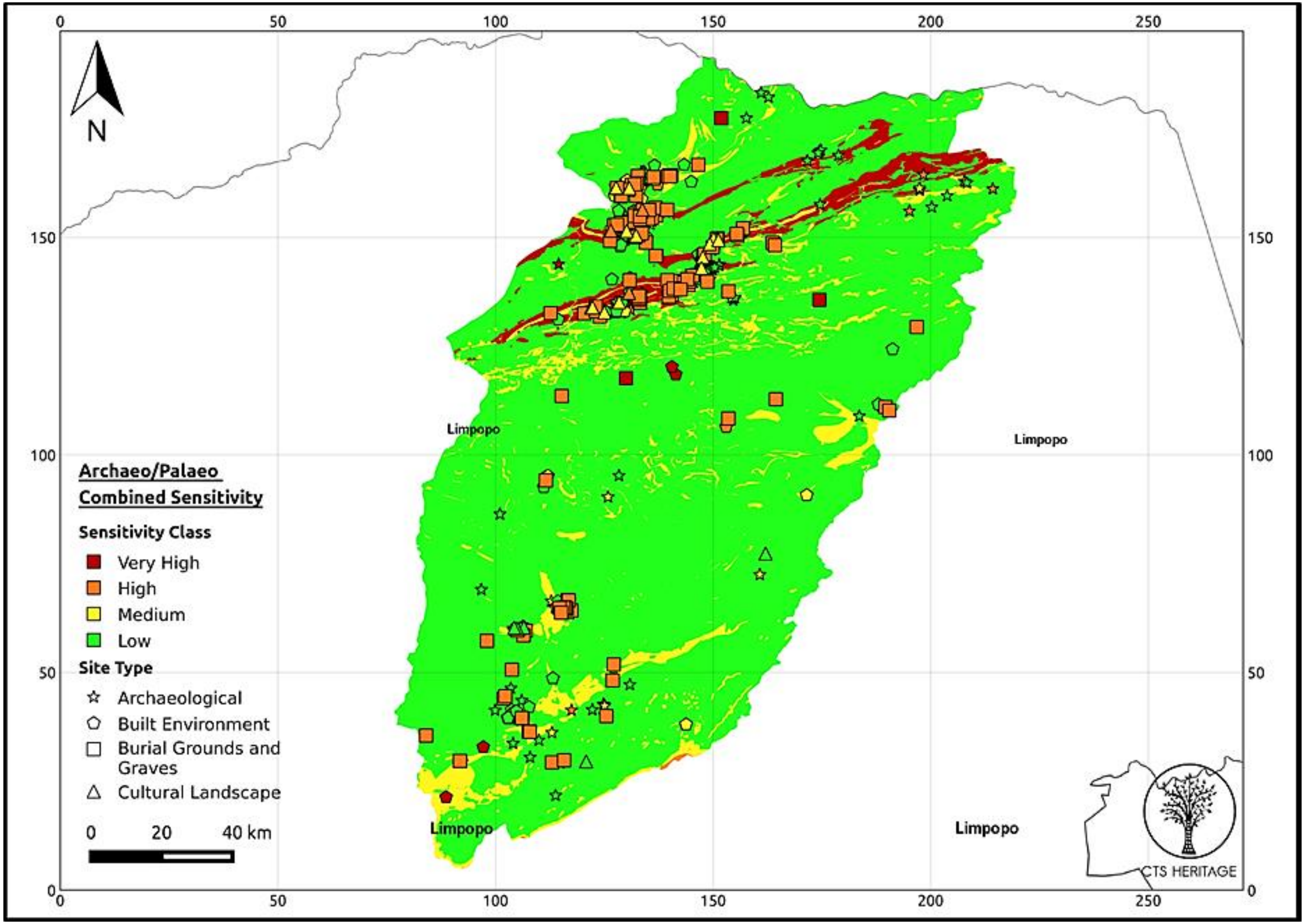

Figure 3.3-9: Limpopo Freshwater Study Area combined heritage sensitivities map.

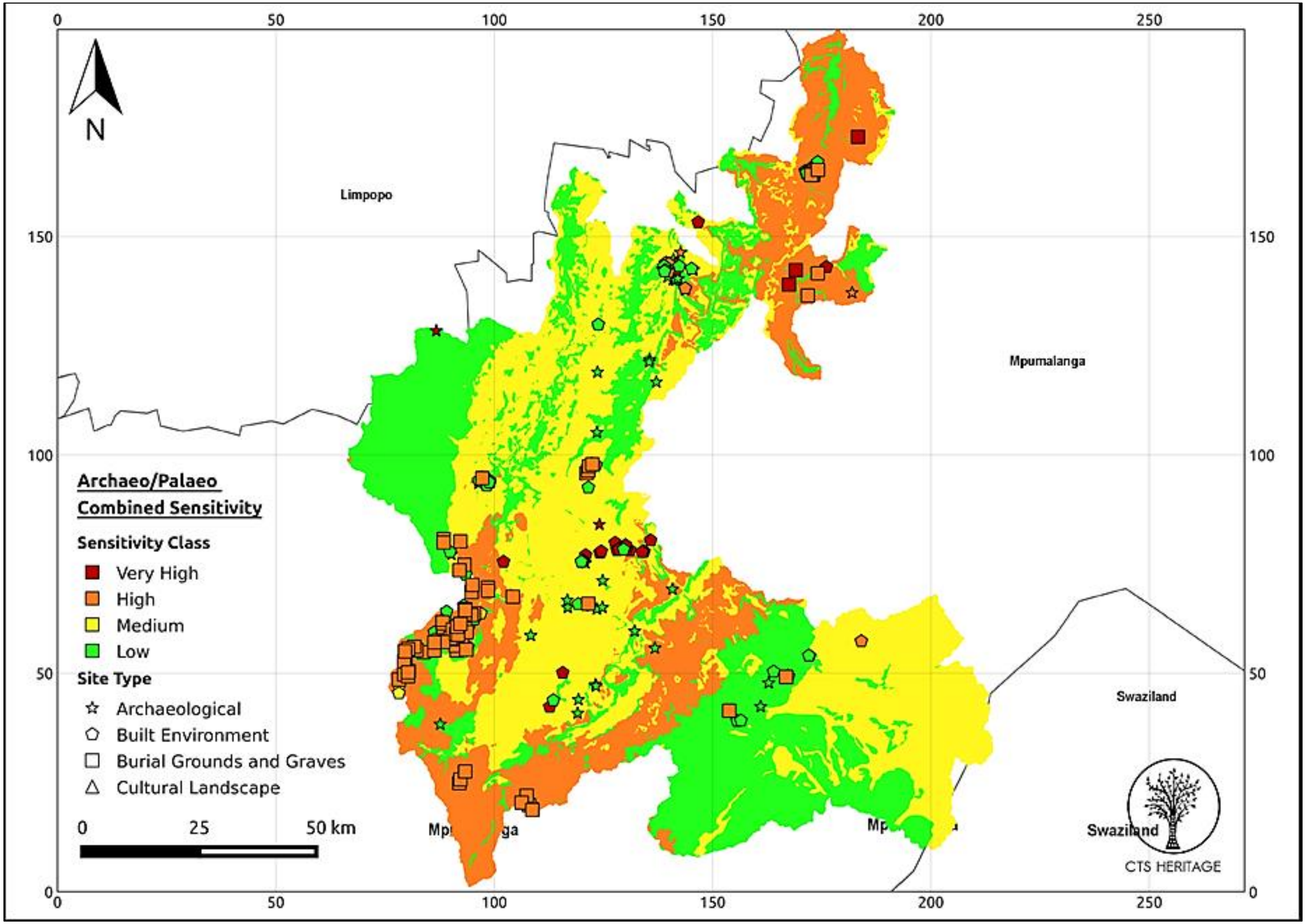

Figure 3.3-10: Mpumalanga Freshwater Study Area combined heritage sensitivities map.

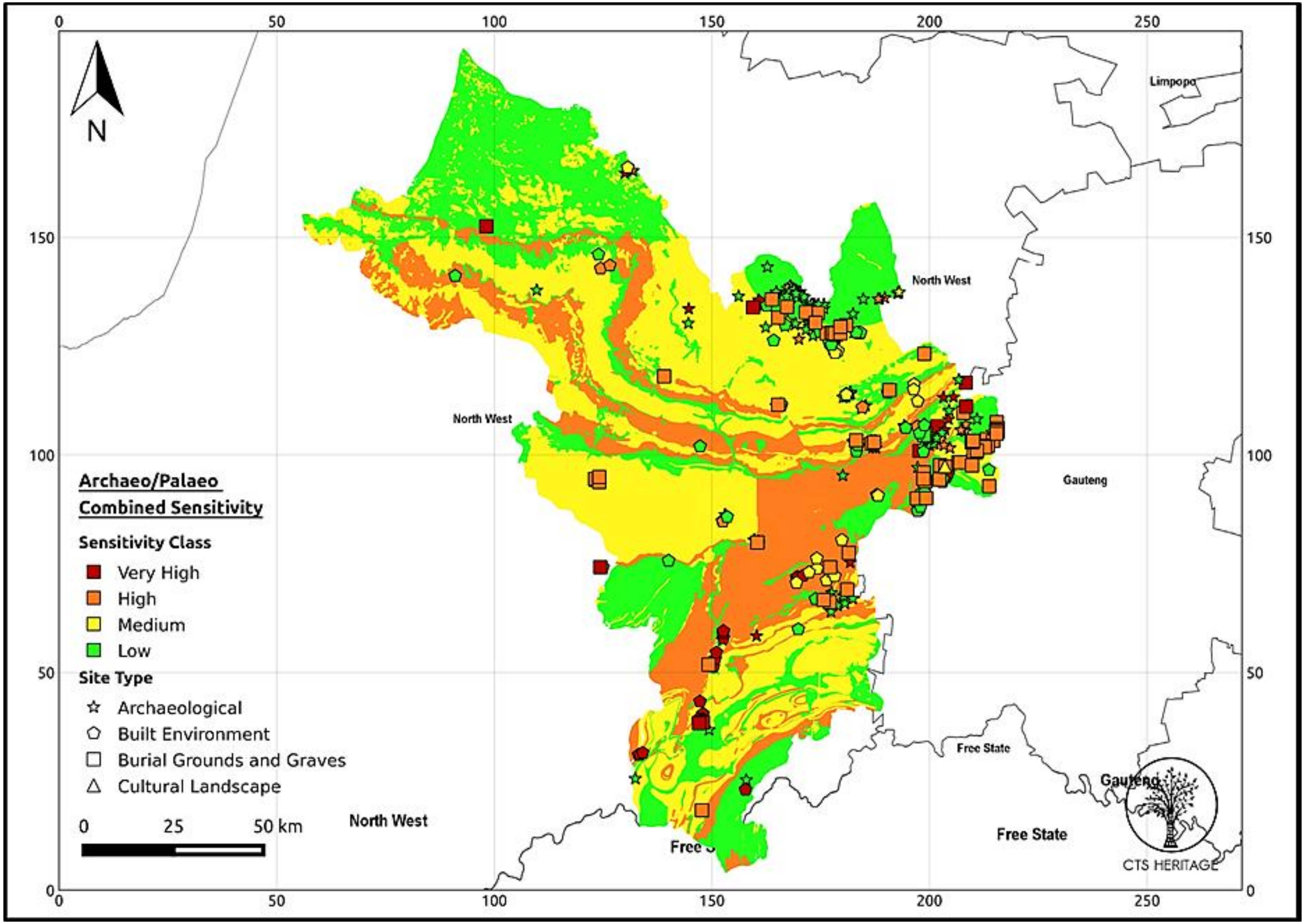

Figure 3.3-11: Gauteng – North West Freshwater Study Area combined heritage sensitivities map.

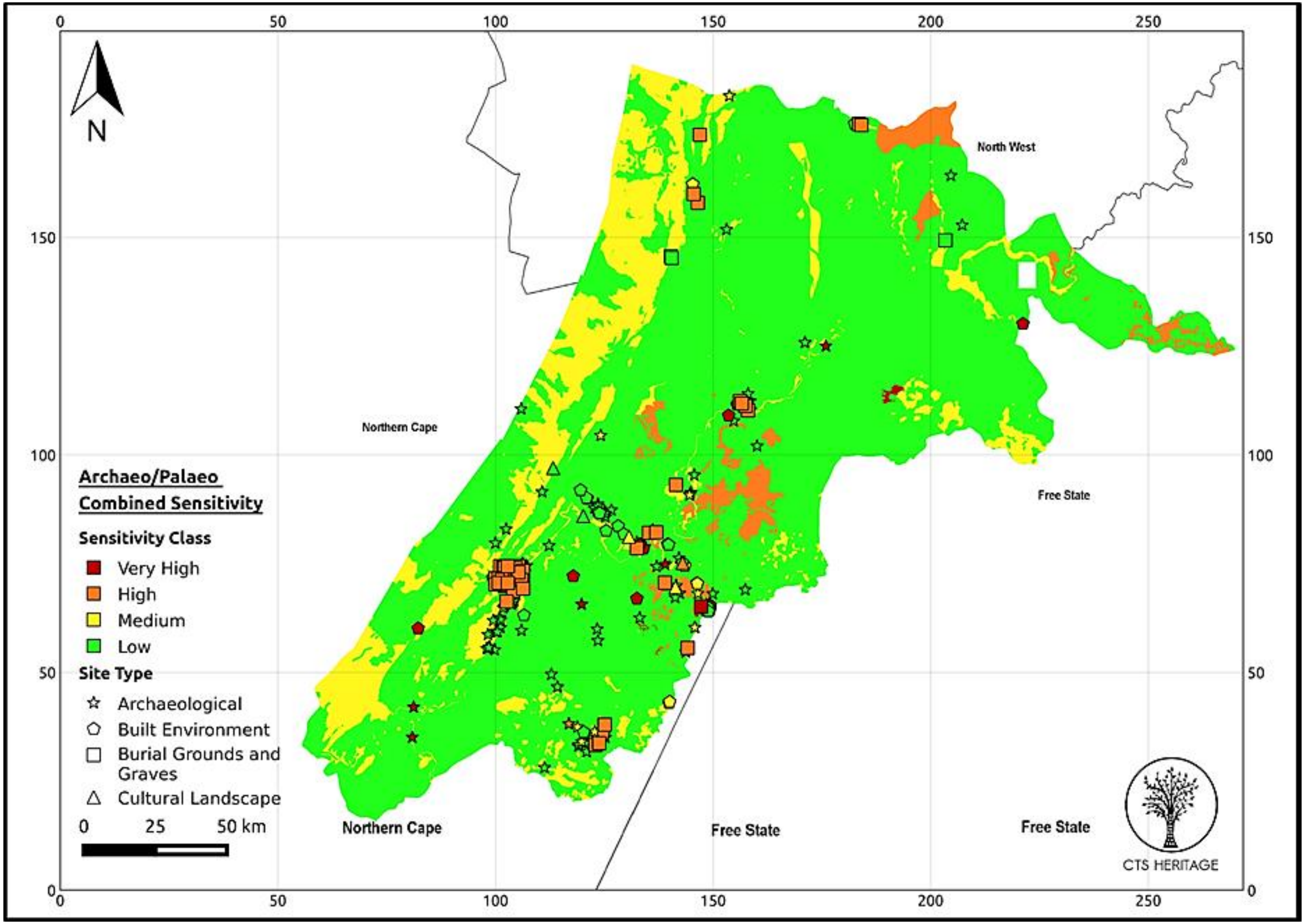

Figure 3.3-12: Vaalharts Freshwater Study Area combined heritage sensitivities map.

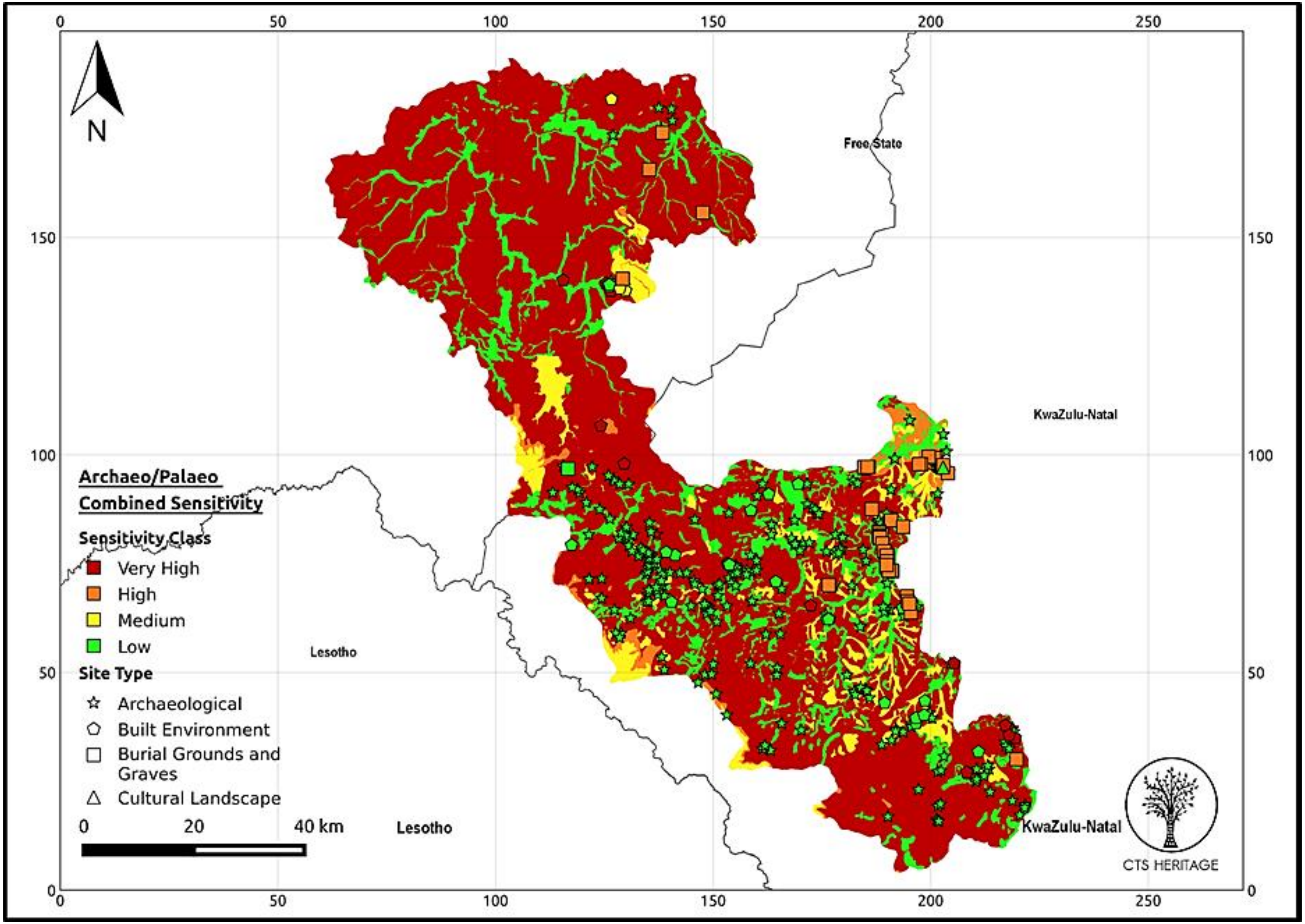

Figure 3.3-13: Free State – KwaZulu-Natal Highlands Freshwater Study Area combined heritage sensitivities map.

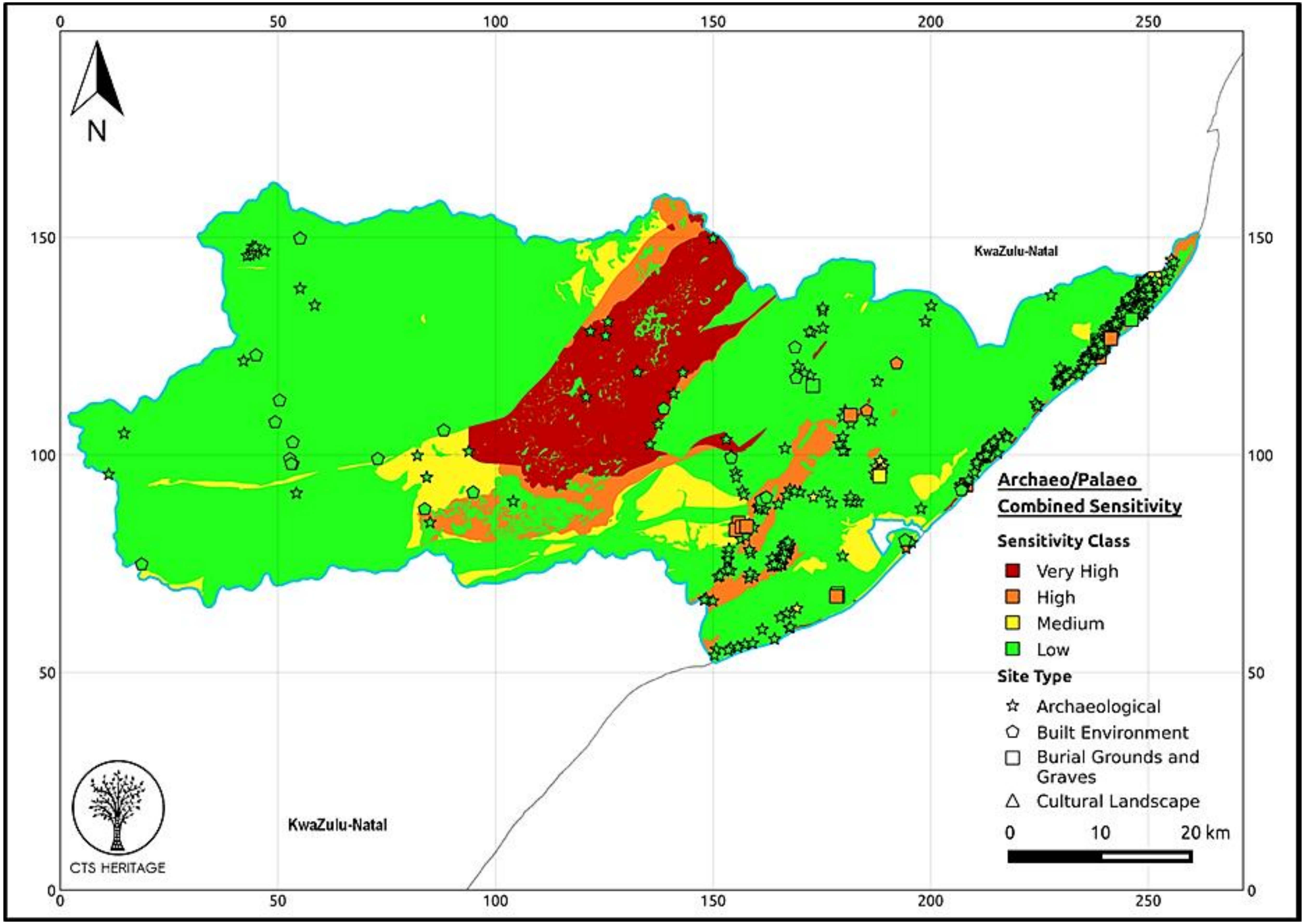

Figure 3.3-14: Richards Bay Freshwater Study Area combined heritage sensitivities map.

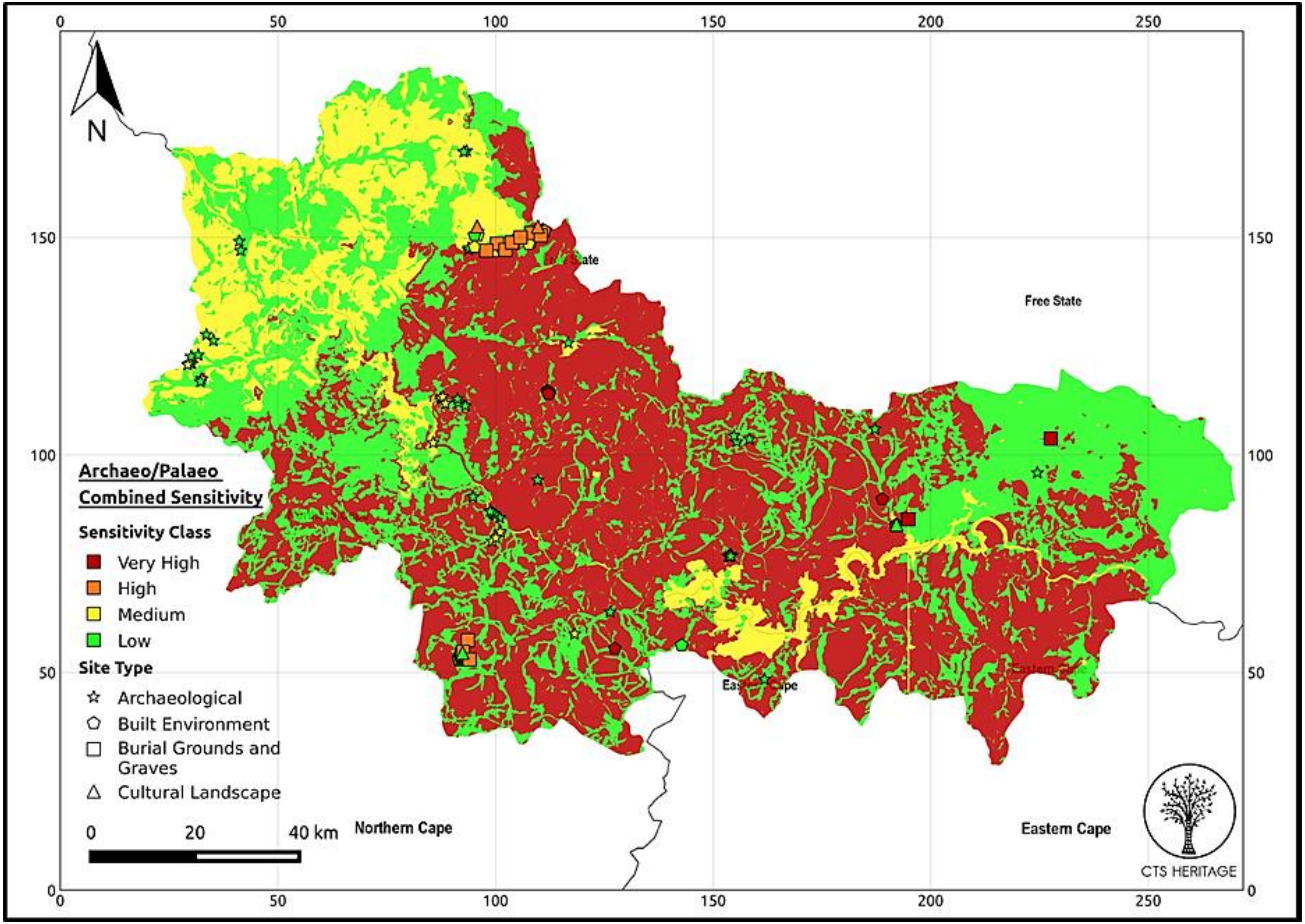

Figure 3.3-15: Vanderkloof – Gariep Freshwater Study Area combined heritage sensitivities map.

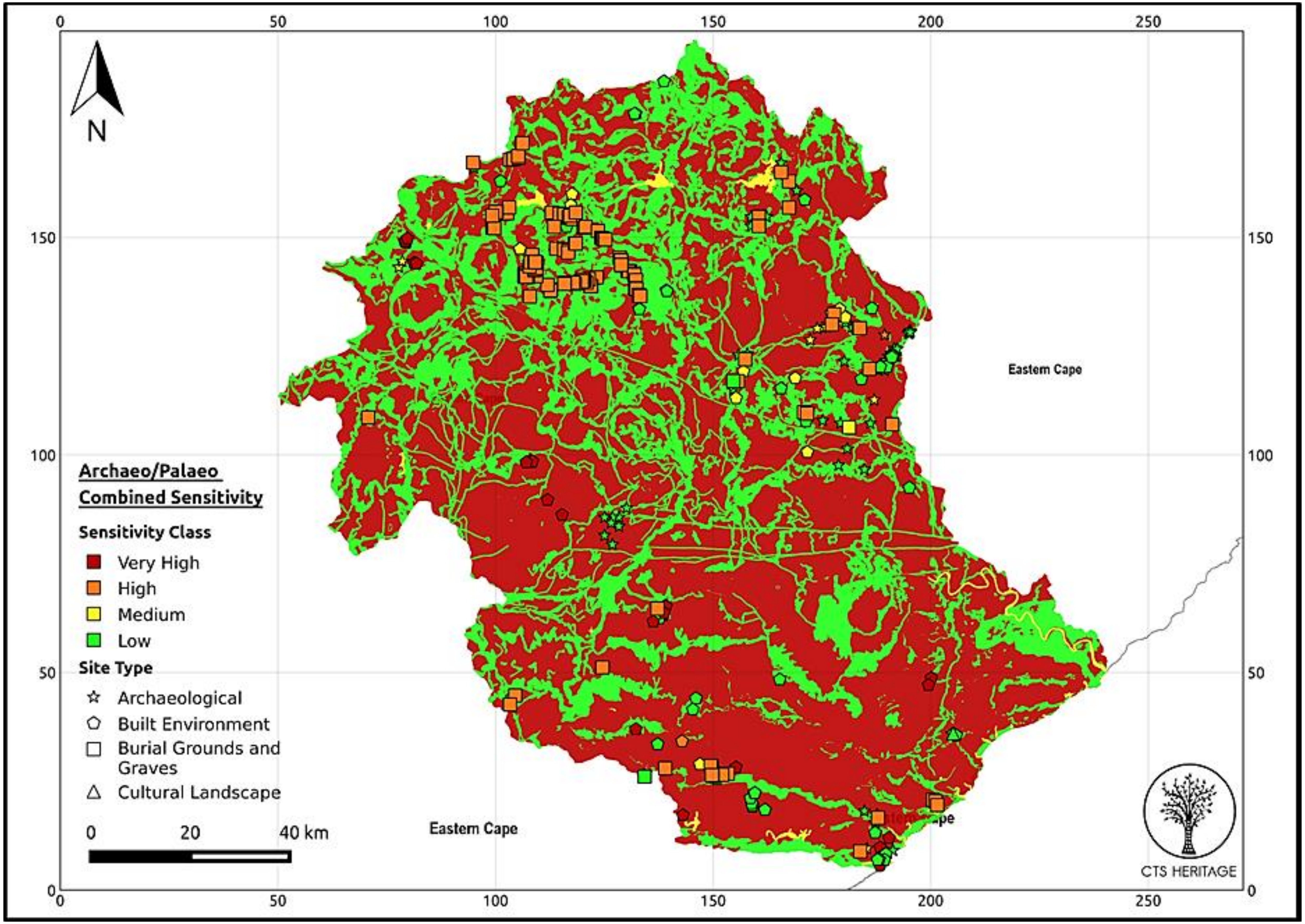

Figure 3.3-16: Eastern Cape Freshwater Study Area combined heritage sensitivities map.

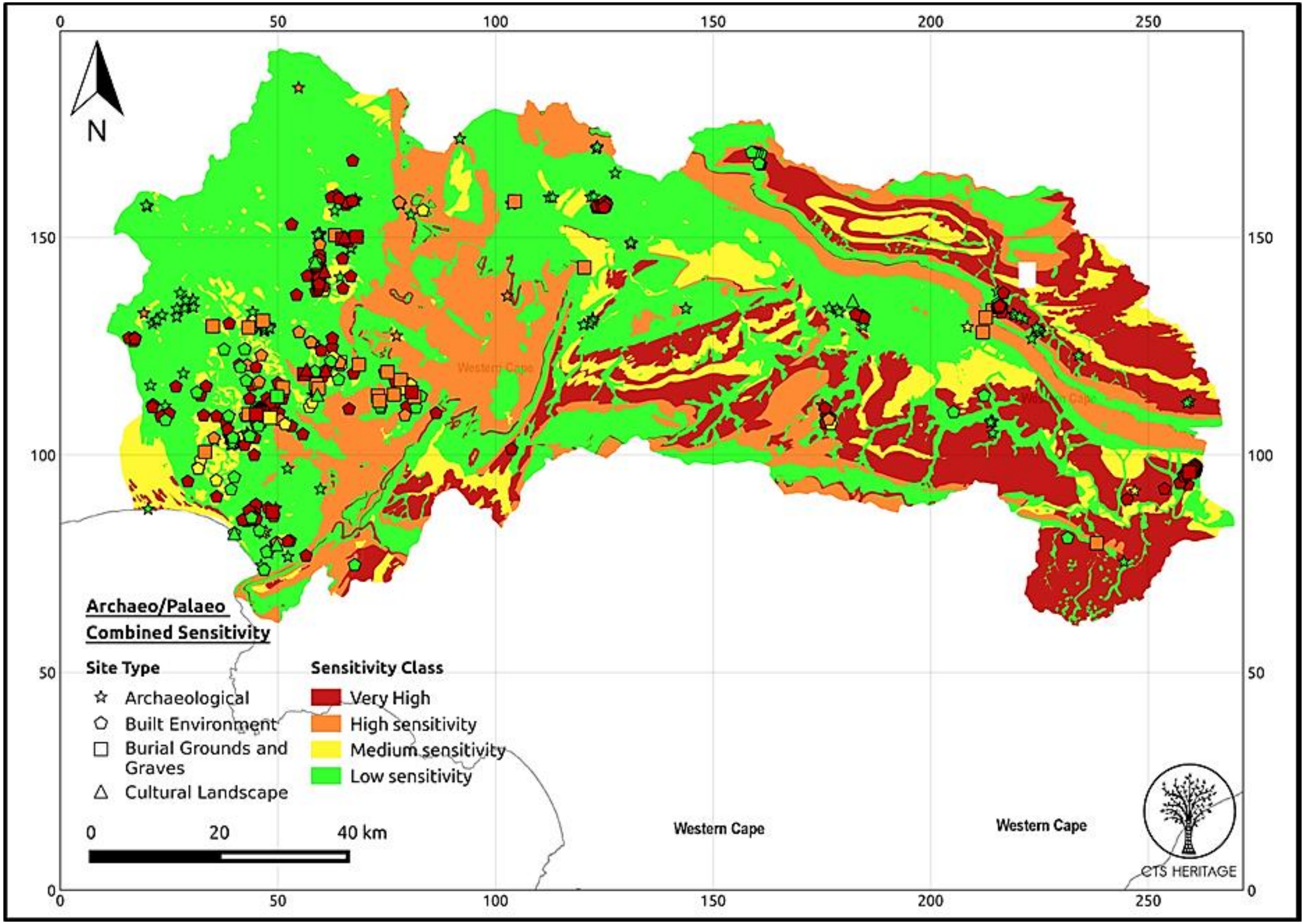

Figure 3.3-17: Western Cape Freshwater Study Area combined heritage sensitivities map.

3.3.3 Key Potential Impacts

The greatest threat to all types of heritage resources is the damage or destruction of sites and resources during the construction phase of aquaculture infrastructure. Due to the ubiquity of heritage resources throughout the study areas, and the preferential siting of aquaculture facilities near fresh water and/or coastlines, it is almost impossible for construction of these facilities to avoid all heritage resources. In terms of the scope and strategic level of assessment of this SEA, determining impacts was a multi-faceted exercise. Each type of development will have a different impact on each resource, with the impacts varying in scale and extent within each of the study areas. Mitigation, similarly, will be variable at each site, for each intervention. This fact notwithstanding, it is still possible to identify impacts that will be common to all aquaculture facilities, regardless of their type, location in South Africa or siting in the landscape.

Key potential impacts to resources of an archaeological, palaeontological and/or cultural heritage nature include the following:

- Construction and upgrade of access roads;
- Clearing of vegetation on site;
- Excavation for construction of aquaculture facilities and associated infrastructure;
- Trenching for pipelines;
- Disturbance of shorelines (e.g. intertidal fish traps, shell middens and shipwrecks) for construction of aquaculture infrastructure such as pump houses and water intake/outlet systems;
- Disturbance of submerged marine archaeological resources (e.g. shipwrecks) due to installation of offshore infrastructure such as concrete mooring blocks;
- Intentional vandalism (e.g. graffiti and other damage to rock art) or theft of artefacts and fossil material due to increased movement of people on site;
- Damage to or destruction of heritage buildings, archaeological built features or historical bridges due to increased vehicular traffic on site;
- Disturbance due to operational activities (e.g. light and noise pollution to cultural landscapes); and
- Damage to or destruction of heritage resources due to site closure and rehabilitation.

3.3.3.1 Cumulative Impacts

Cumulative impacts, considered to be the combined or incremental effect arising from changes caused by a development in conjunction with other previous, current or future activities, cannot be sufficiently determined at the level of assessment in this SEA. As such, site-specific assessments would be required to obtain required information on the location, density and particular nature of proposed aquaculture development in relation to other existing and proposed activities, whether of a similar or different nature. In order to reduce cumulative impacts, it will be necessary to ensure integrated planning at the regional scale to minimise competing land use and excessive cumulative developmental impacts to heritage resources, however tangible or intangible.

Examples of cumulative impacts associated with marine cage culture development to cultural heritage include:

- Physical, chemical and/or biological impacts on terrestrial and submerged sites of archaeological interest or potential;
- Increased visual intrusion;
- Increased noise and disturbance;
- Changes in original land- and seascapes and settings; and
- Loss of amenity.

3.3.4 Risk Assessment[2]

3.3.4.1 Marine Aquaculture

The main risks of marine aquaculture to heritage resources are driven by the **establishment of physical infrastructure** and **human activity on site** (Figure 3.3-18 – 3.3-23). These risks and impacts presents and manifests the same as other physical infrastructure developments.

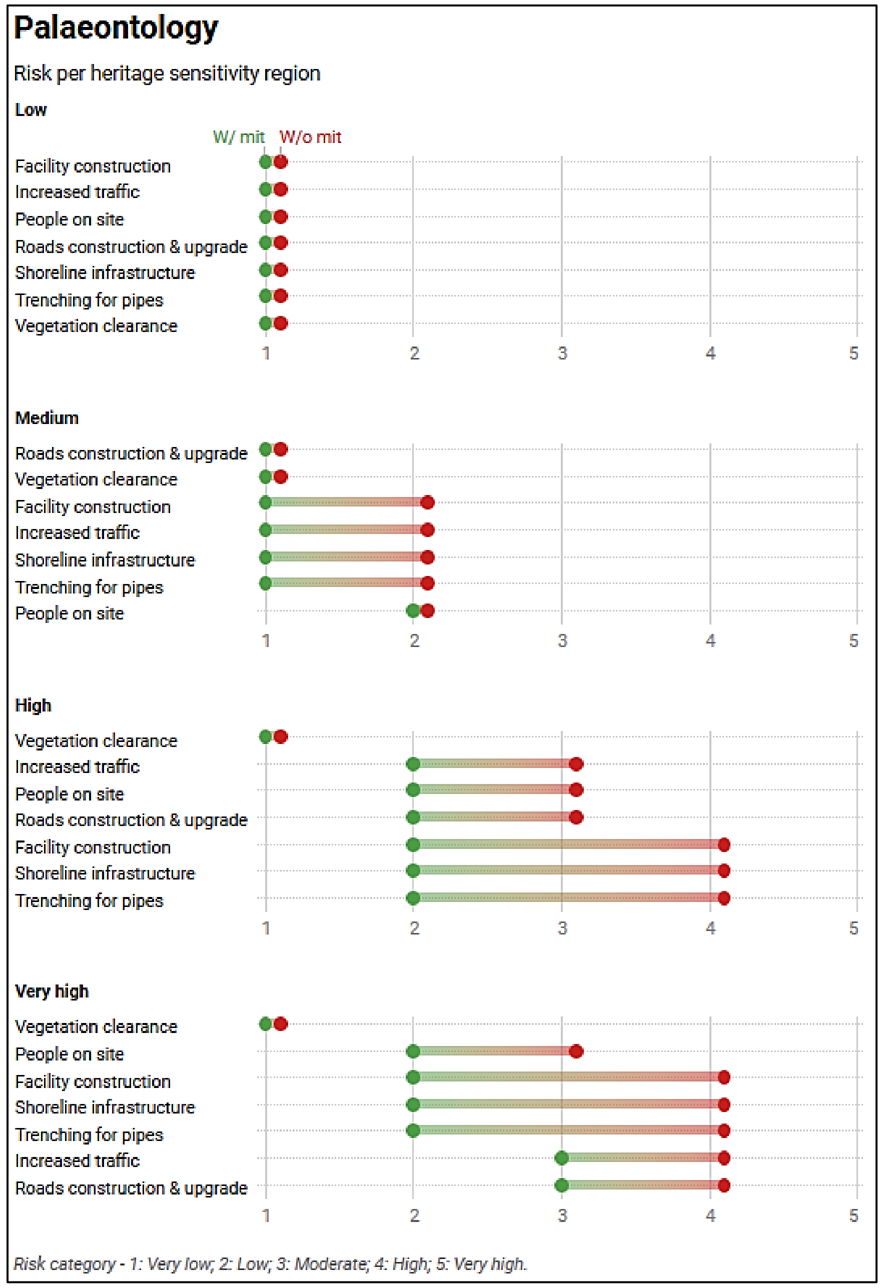

Figure 3.3-18: Summary of risks posed by mariculture infrastructure and activities to Palaeontological resources. Risks are presented per heritage sensitivity region, without mitigation ("W/o mit") and with best practice management and mitigation ("W/ mit").

Risks to heritage resources are generally effectively mitigated, managed or avoided, as can be seen in the very low to moderate residual risk across all heritage resource types and sensitivity classifications (Figure 3.3-18 – 3.3-23).

A unique consideration relevant to mariculture and heritage resources are potential impacts to **shipwrecks** by sea-based infrastructure or water intakes / outfalls (Figure 3.3-19).

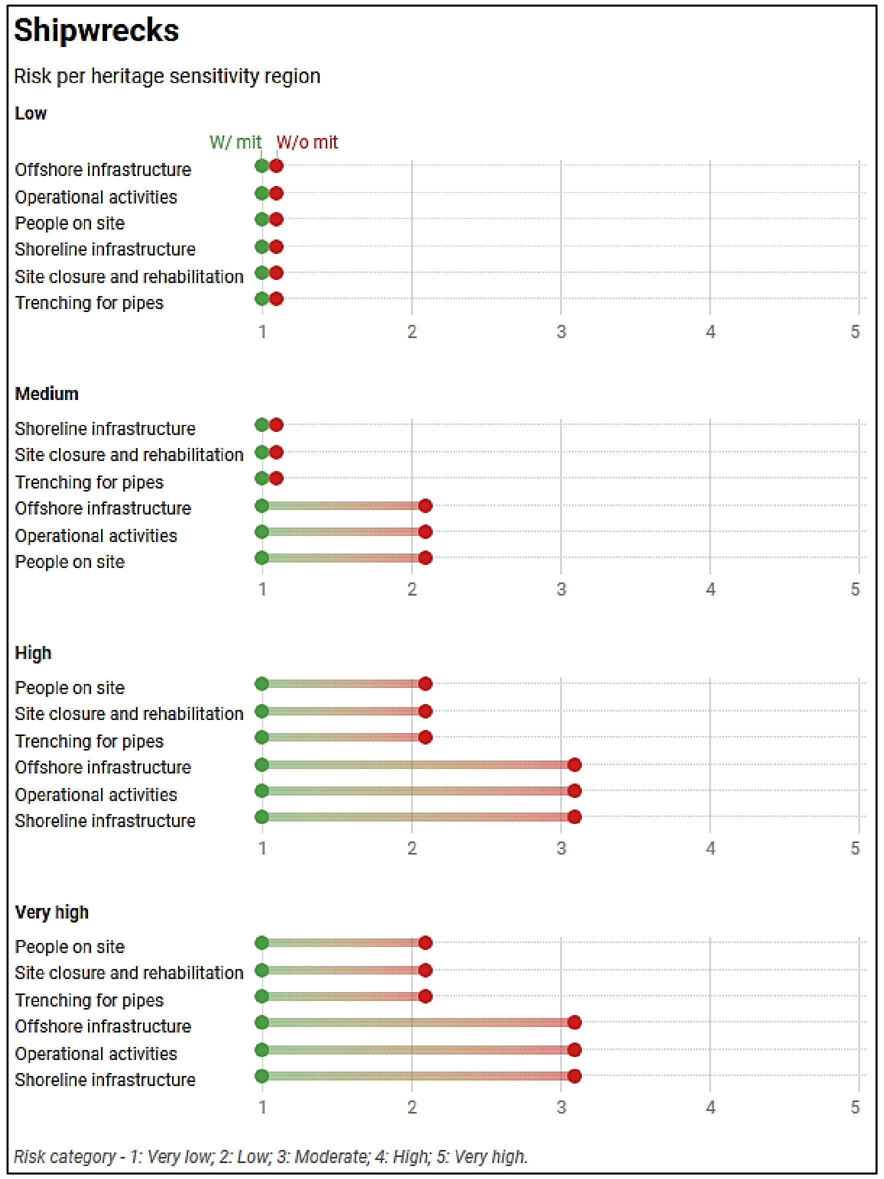

Figure 3.3-19: Summary of risks posed by marine aquaculture infrastructure and activities to shipwrecks. Risks are presented per heritage sensitivity region, without mitigation ("W/o mit") and with best practice management and mitigation ("W/ mit").

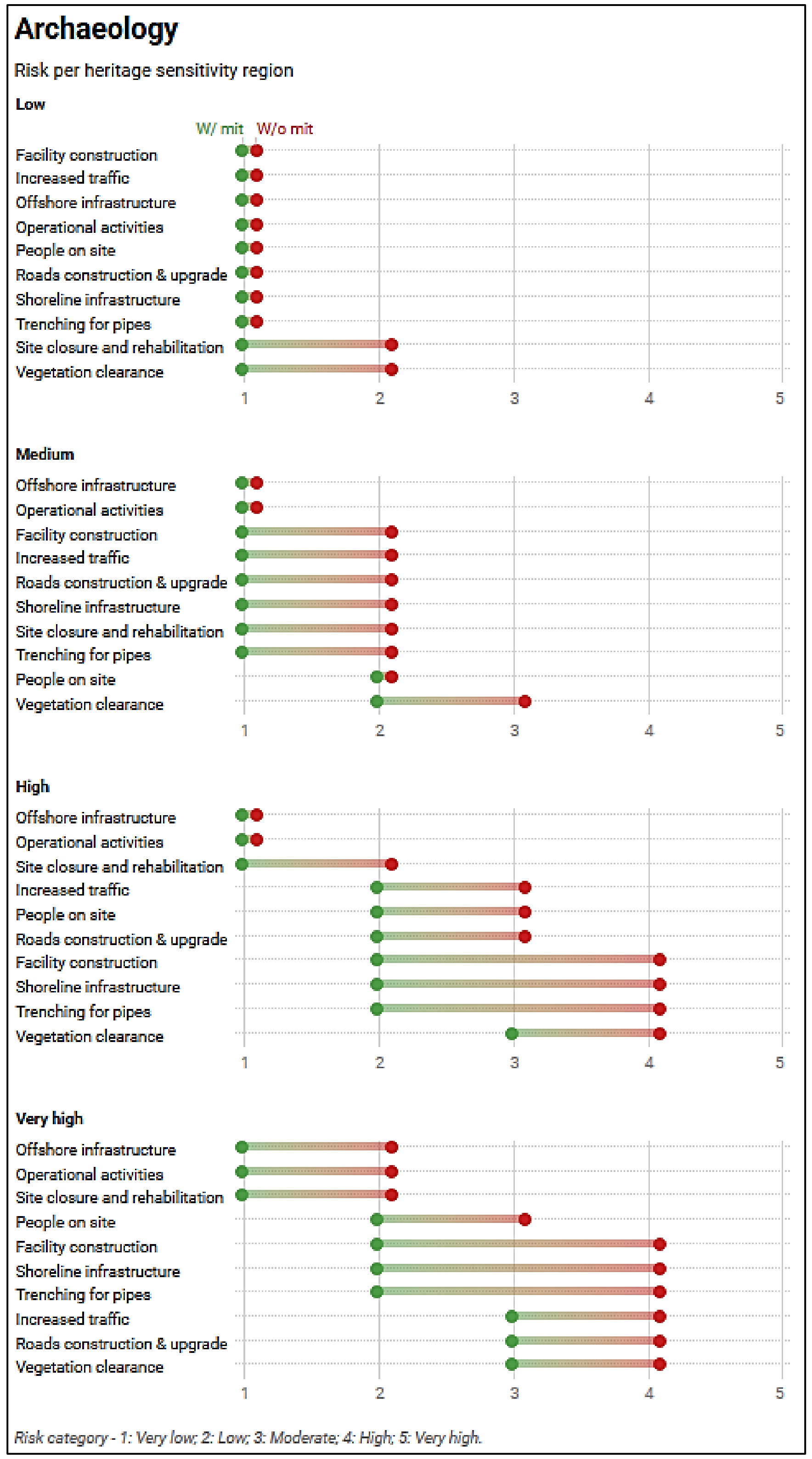

Figure 3.3-20: Summary of risks posed by marine aquaculture infrastructure and activities to archaeological resources. Risks are presented per heritage sensitivity region, without mitigation ("W/o mit") and with best practice management and mitigation ("W/ mit").

[2] 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.

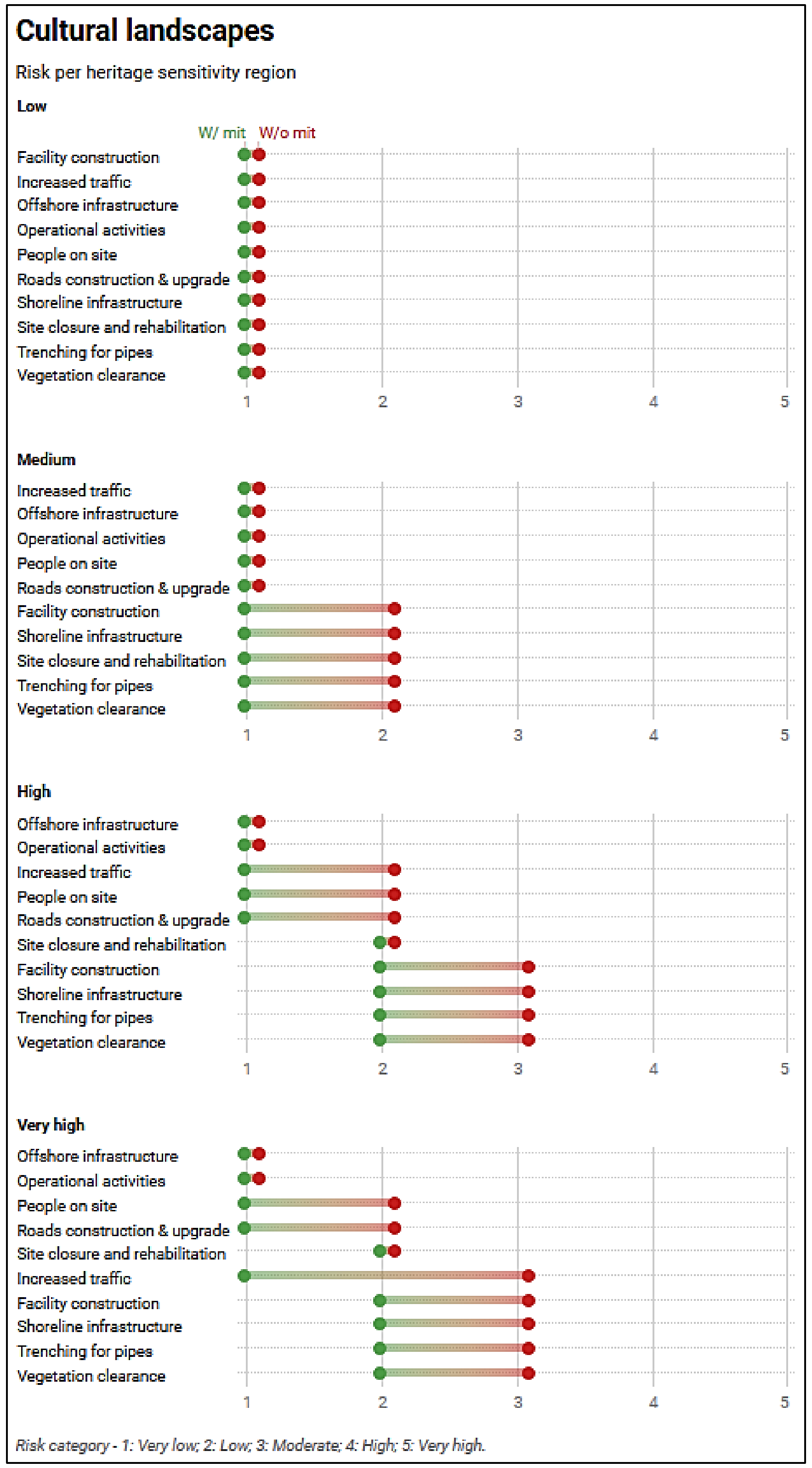

Figure 3.3-21: Summary of risks posed by marine aquaculture infrastructure and activities to cultural landscapes. Risks are presented per heritage sensitivity region, without mitigation ("W/o mit") and with best practice management and mitigation ("W/ mit").

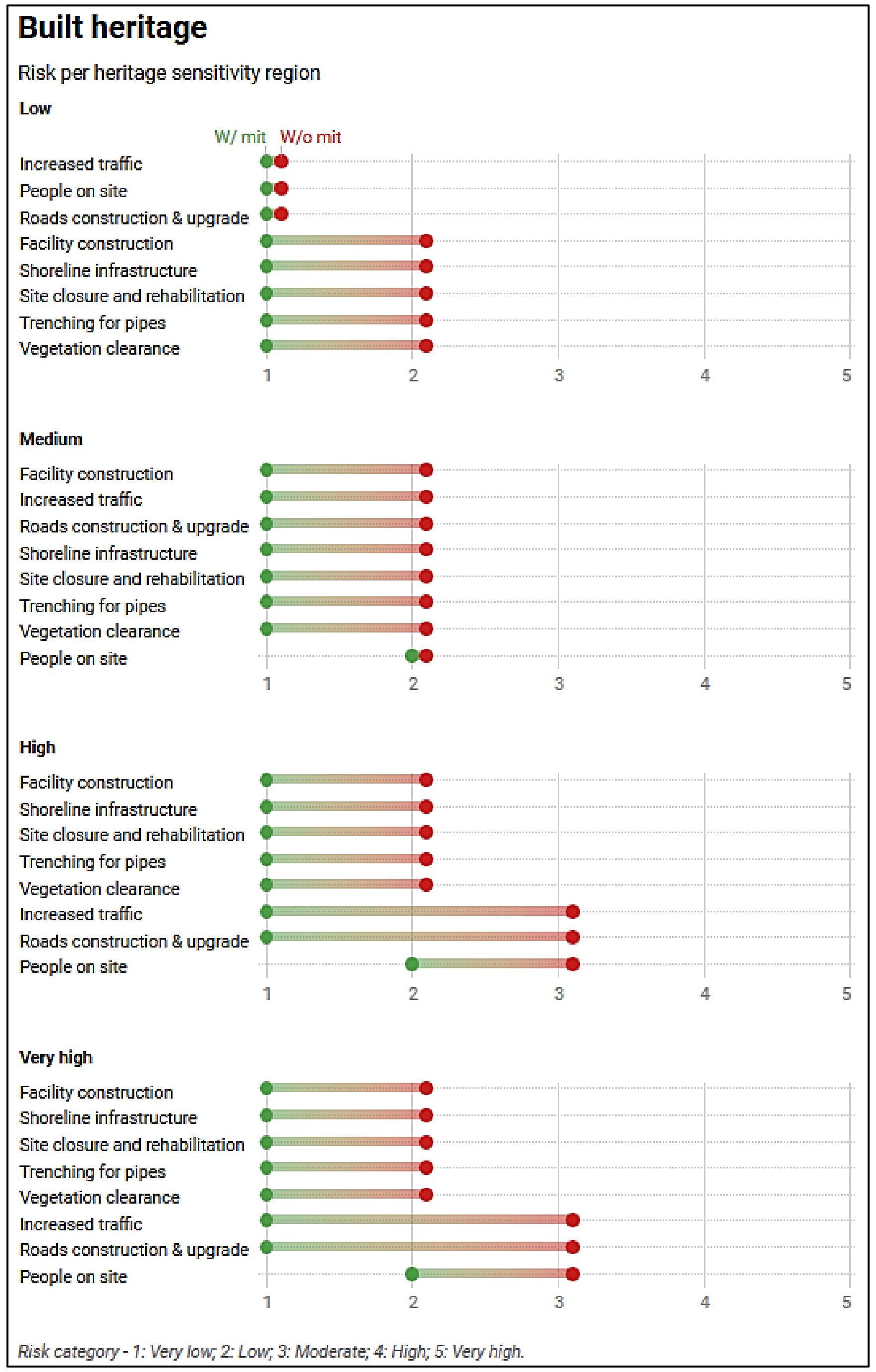

Figure 3.3-22: Summary of risks posed by marine aquaculture infrastructure and activities to built heritage. Risks are presented per heritage sensitivity region, without mitigation ("W/o mit") and with best practice management and mitigation ("W/ mit").

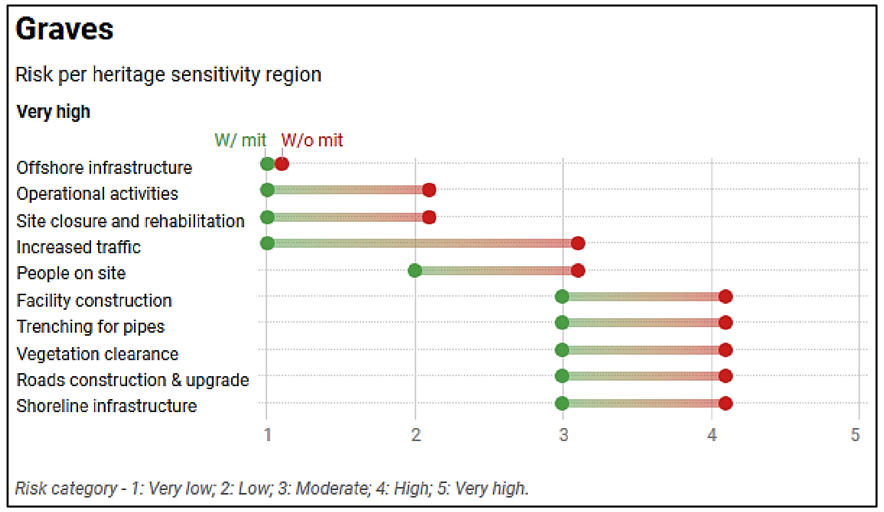

Figure 3.3-23: Summary of risks posed by marine aquaculture infrastructure and activities to grave. Risks are presented per heritage sensitivity region, without mitigation ("W/o mit") and with best practice management and mitigation ("W/ mit").

3.3.4.2 Freshwater Aquaculture

The main risks of freshwater aquaculture to heritage resources are driven by the **establishment of physical infrastructure** and **human activity on site** (Figure 3.3-24 – 3.3-28). These risks and impacts presents and manifests the same as other physical infrastructure developments.

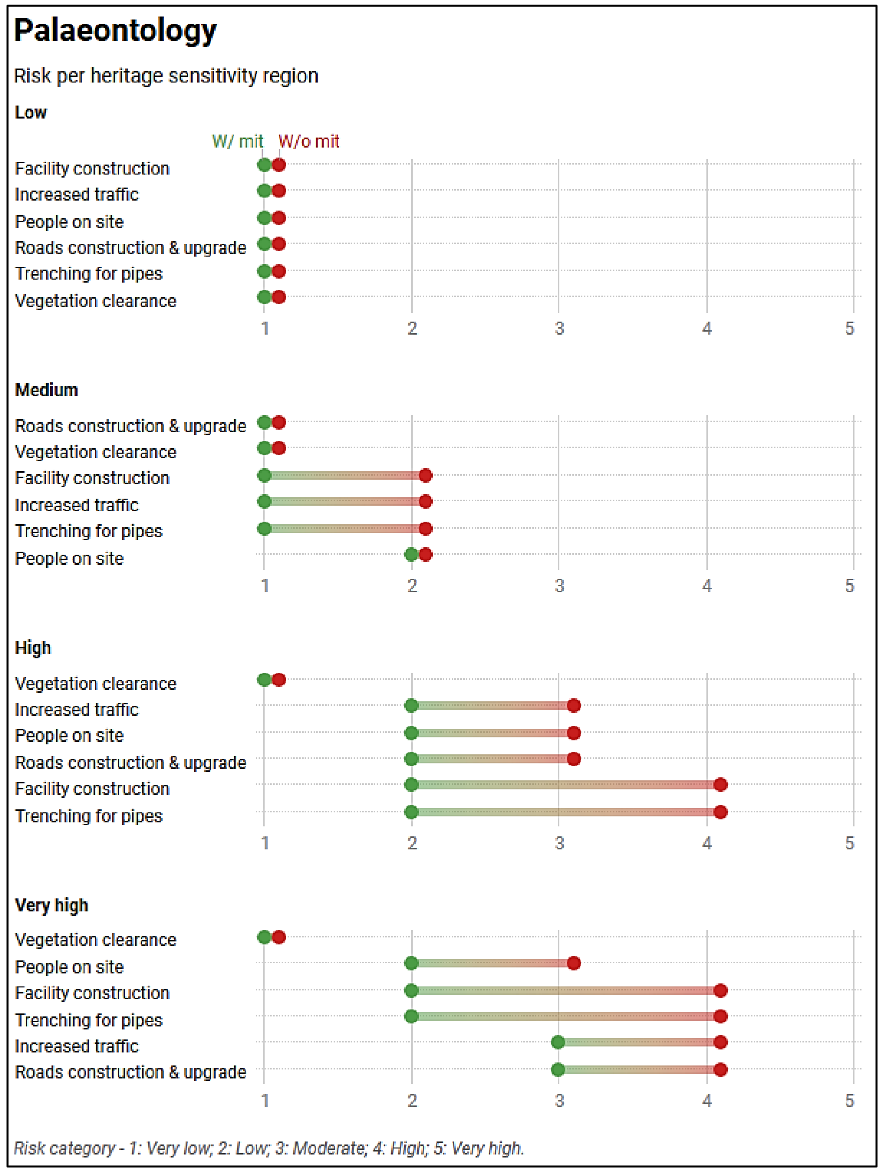

Figure 3.3-24: Summary of risks posed by freshwater aquaculture infrastructure and activities to Palaeontological resources. Risks are presented per heritage sensitivity region, without mitigation ("W/o mit") and with best practice management and mitigation ("W/ mit").

Risks to heritage resources are generally effectively mitigated, managed or avoided, as can be seen in the very low to moderate residual risk across all heritage resource types and sensitivity classifications (Figure 3.3-24 – 3.3-28).

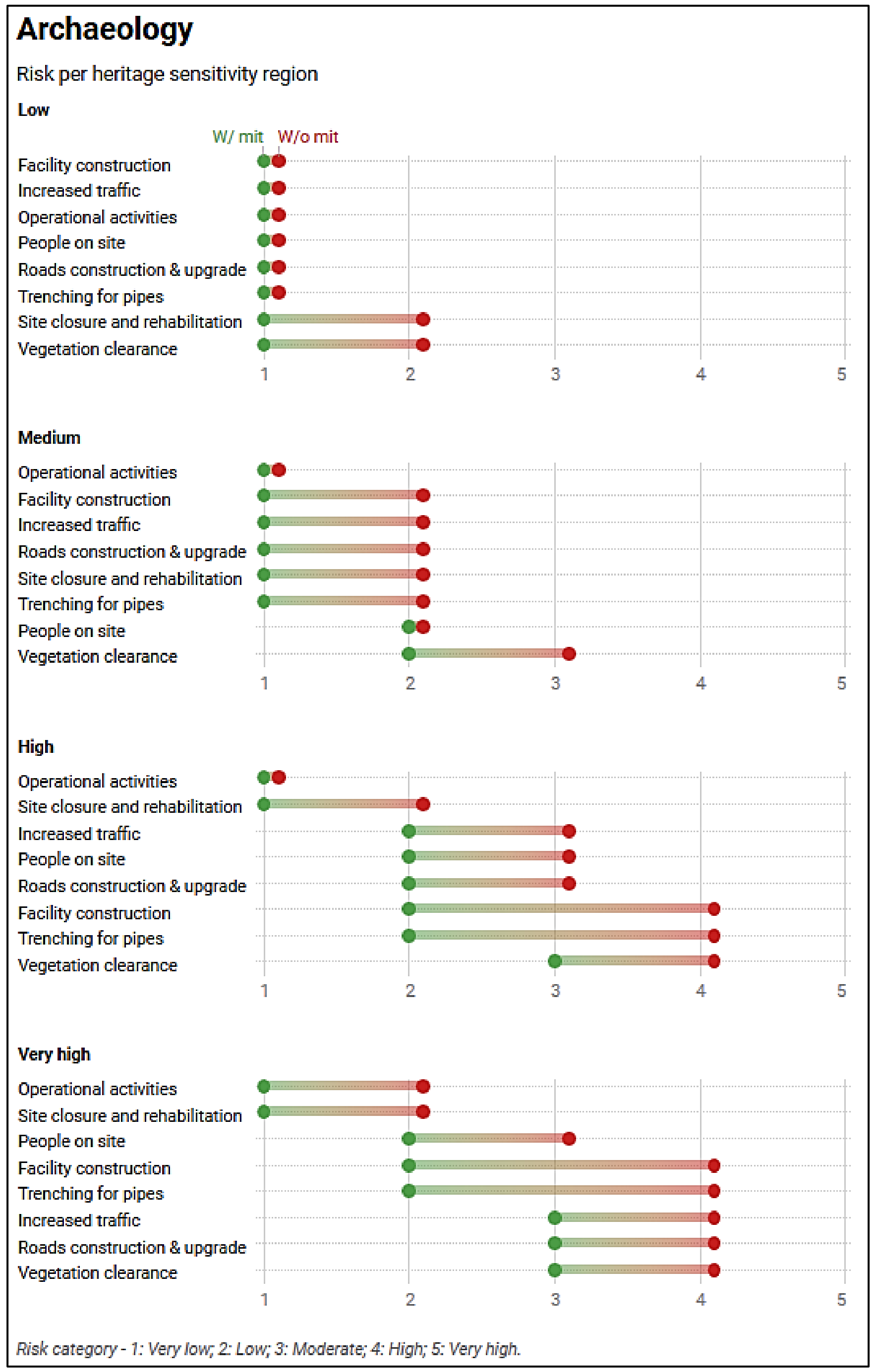

Figure 3.3-25: Summary of risks posed by freshwater aquaculture infrastructure and activities to archaeological resources. Risks are presented per heritage sensitivity region, without mitigation ("W/o mit") and with best practice management and mitigation ("W/ mit").

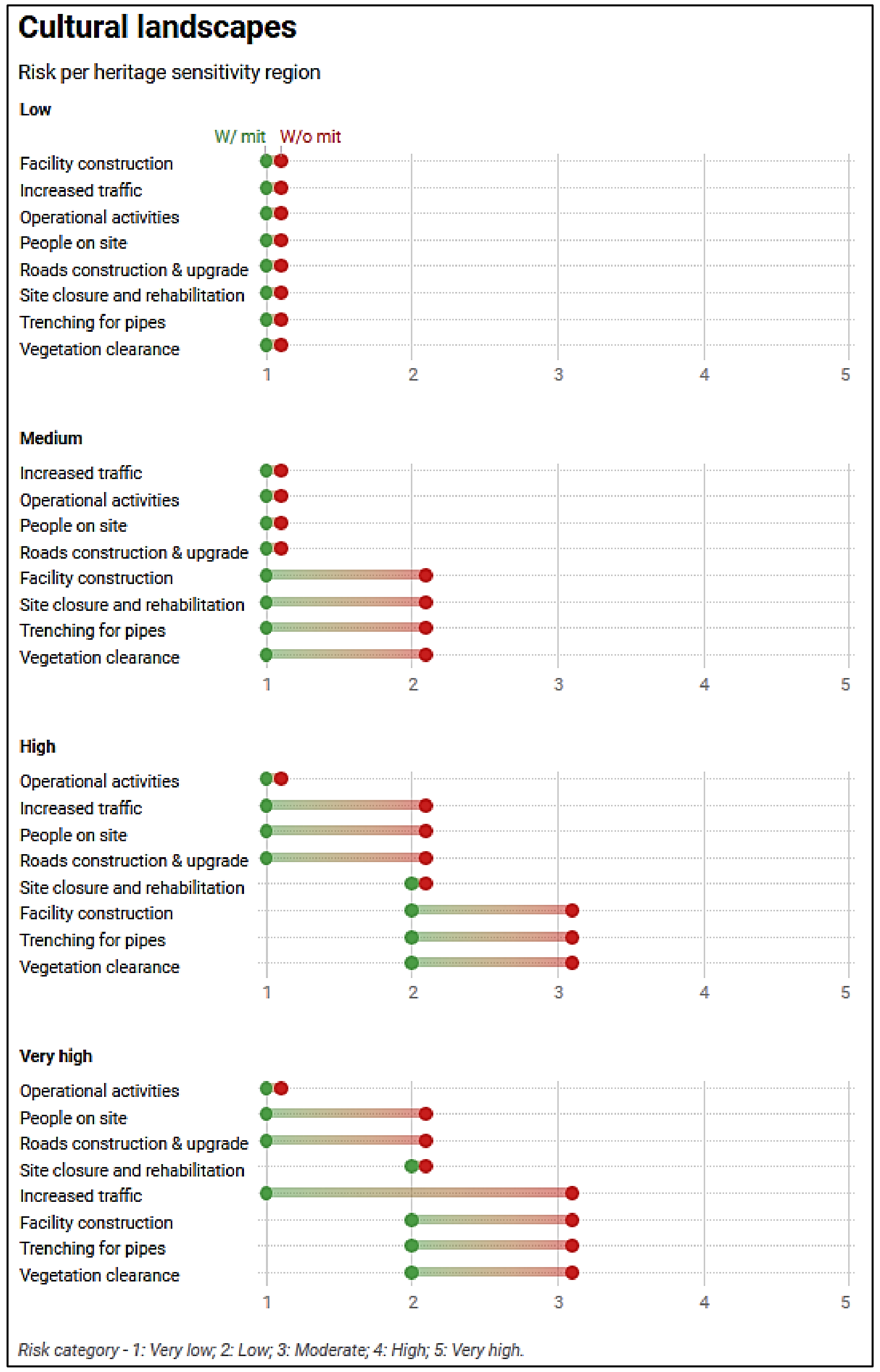

Figure 3.3-26: Summary of risks posed by freshwater aquaculture infrastructure and activities to cultural landscapes. Risks are presented per heritage sensitivity region, without mitigation ("W/o mit") and with best practice management and mitigation ("W/ mit").

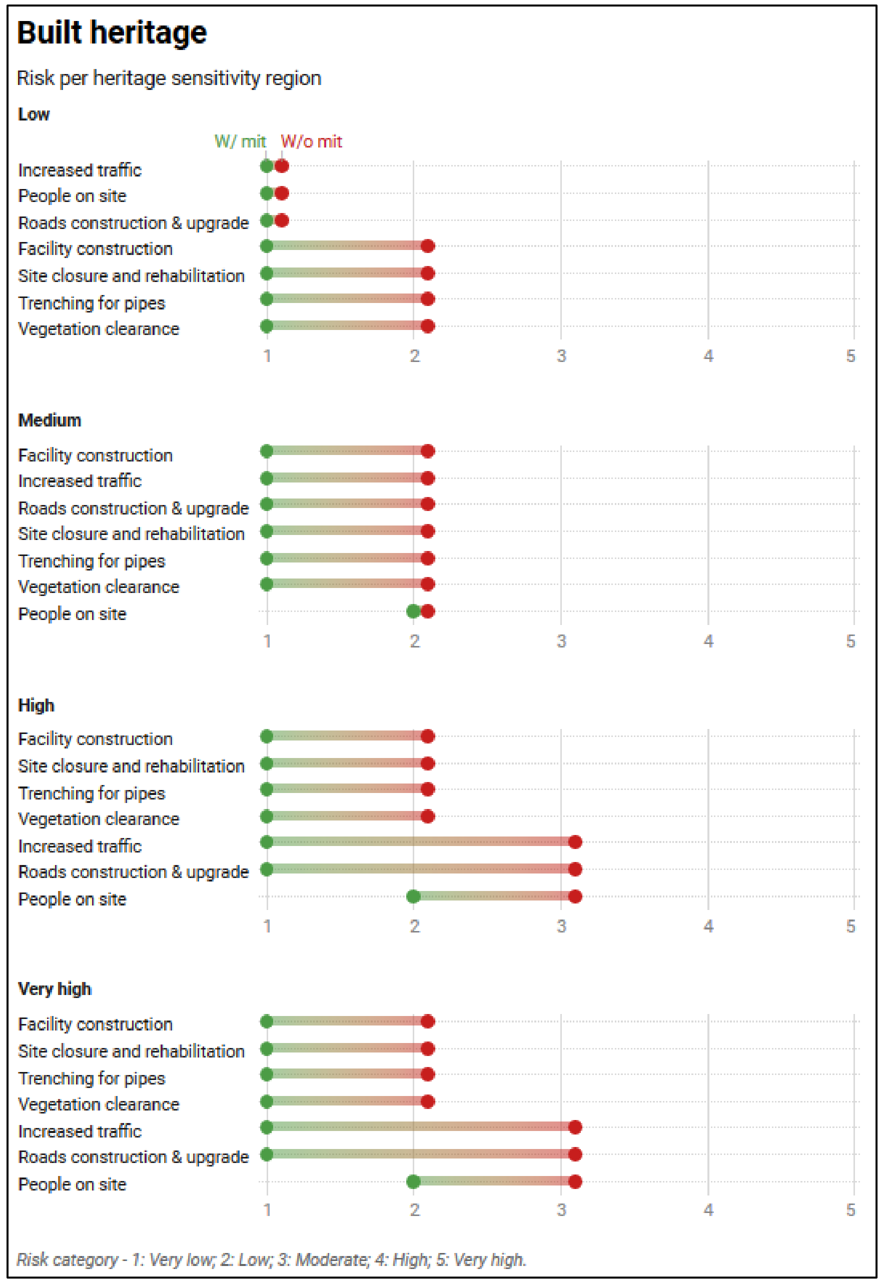

Figure 3.3-27: Summary of risks posed by freshwater aquaculture infrastructure and activities to built heritage. Risks are presented per heritage sensitivity region, without mitigation ("W/o mit") and with best practice management and mitigation ("W/ mit").

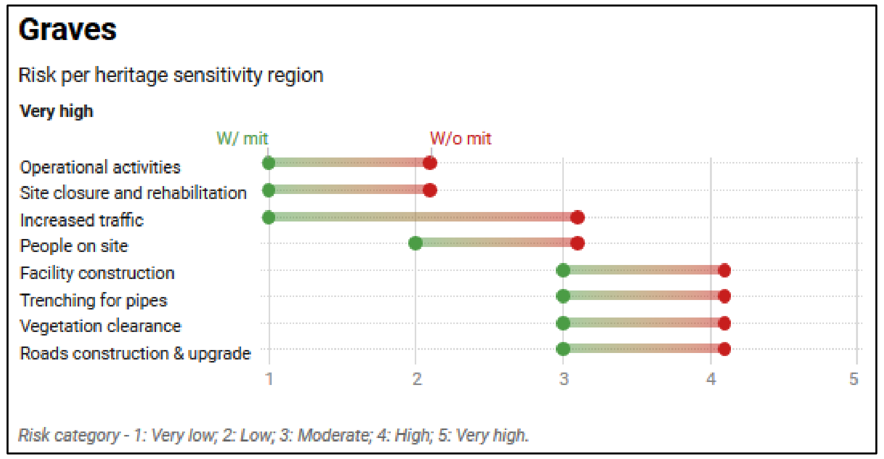

Figure 3.3-28: Summary of risks posed by freshwater aquaculture infrastructure and activities to graves. Risks are presented per heritage sensitivity region, without mitigation ("W/o mit") and with best practice management and mitigation ("W/ mit").

3.3.5 Management Actions, Best Practice Guidelines and Monitoring Requirements

3.3.5.1 Planning phase

All study areas, barring five freshwater study areas, fall within the boundaries of a single province, which reduces the complexity of the heritage application process. For all aquaculture applications in the Northern Cape, North West, Gauteng, Limpopo, Mpumalanga and Free State provinces, as is currently the case, SAHRA will be the commenting authority on archaeological and palaeontological matters, with the provincial heritage resources agency (PHRAs) providing input on matters of built heritage and cultural landscapes. Further to this, SAHRA's maritime unit will be the responsible authority for all near- and offshore mariculture developments.

The first step required in the planning phase of aquaculture development is consultation of the available heritage resource management tools. These tools include inter alia the Palaeontological sensitive geological strata (from SAHRA[3]), and known or formally protected archaeological, grave and built environment sites (from SAHRIS[4]). The SAHRA Maritime Unit maintains a database of known shipwrecks, and this can be released to the public where information is not already listed on SAHRIS or similar resources such as Wrecksite[5]. Appropriate, proactive use of these resources can provide sufficient basis for the Heritage Authorities to determine whether additional heritage impact assessments are necessary in a given area, for instance (i) if the area is highly disturbed, (ii) if sufficient previous work has been conducted in the area to characterize it adequately, or (iii) if it can be shown that no significant heritage resources are likely to occur in the area. Further to this, developments proposed for areas that are already zoned for development, such as industrial development zones (IDZs), will benefit from the heritage pre-screening that such areas have been subjected to, and can expect to have the heritage process pertaining to their application waived, making the selection of these sites preferable.

Due to the high level and broad scope of this study, it is recommended that ground-truthing (i.e. site-specific verification) is conducted before any development proceeds in a Medium to Very High sensitivity area. This more fine grained project-level assessment will be able to flag more accurately whether a heritage impact assessment (HIA) is required for a given development area. Such assessments which consider all potentially sensitive heritage resources within a proposed development area will need to be compiled in terms of Section 38(3) of the NHRA where requested by the relevant heritage authorities. The HIAs will need to focus particularly on those areas flagged in this SEA as underexplored, particularly cultural landscapes and living heritage.

The planning phase should also address issues of possible cumulative impacts caused by the proposed development in relation to existing and planned activities within the area, whether these are new aquaculture developments or other types of agricultural or industrial changes to the landscape.

Archaeological field surveys will necessarily form part of these HIAs as the scoping exercises and the present broad scope of this assessment cannot be expected to identify all resources within heritage sensitive areas. With few exceptions (e.g. mined-out areas in Namaqualand), the locations of shore-based and inland infrastructure will need to be ground-truthed by an archaeologist and/or palaeontologist.

The bio-cultural diversity of many of these study areas is likely to be high and therefore hold significance to the local inhabitants who have lived there for many generations. This diversity in bio-cultural relationships has been internationally recognised as significant and worthy of conservation and would need to be considered and thoroughly researched through public consultation and inclusion in development decisions.

3.3.5.2 Construction phase

The construction phase will pose the greatest risk to heritage resources in the landscape. This threat can be minimized through strict adherence to management actions and mitigation requirements as specified in the Environmental Authorisation (EA) and Environmental Management Programme (EMPr).

Micro-siting should be undertaken to ensure that sensitive heritage resources and the protective buffer zones can be avoided. The anchor points of all marine infrastructure will need to be considered by an underwater archaeologist to determine the likelihood of wrecks being impacted and hence the need for further studies. Visual considerations will need to be taken into account in terms of the disruption of significant cultural landscapes and the proximity of aquaculture facilities to important visually sensitive heritage sites (e.g. historic buildings and rock art sites).

Monitoring, by a suitably experienced archaeologist, should be undertaken where this has been stipulated. Any changes to the EA that result in proposed disturbance of moderate to high sensitivity areas, not previously subject to heritage surveys, must be assessed before development takes place.

3.3.5.3 Operations phase

The recommendations made for the construction phase also apply to the operational phase. In addition to on-going monitoring on site, an environmental control officer (ECO) should be appointed and regularly check whether such heritage resources, which occur within the development footprint and that have been conserved *in situ*, are buffered and that they have not suffered any degradation. Furthermore, a marine archaeologist should be allowed to inspect any near- and offshore facilities where sensitivity has been identified on an annual basis to ensure that submerged heritage resources are not being negatively impacted by underwater infrastructure.

3.3.5.4 Rehabilitation and post closure

Adherence to the terms and conditions of the EA, as well as to management actions and mitigation requirements as specified in the EMPr, are paramount to ensure that no new disturbance is caused to areas not previously assessed. Any new disturbances will need to be assessed by the relevant heritage practitioner prior to any activities taking place at those locations.

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[3] South African Heritage Resources Agency. 2014. SAHRIS Palaeosensitivity Map. Available at: http://www.sahra.org.za/sahris/map/palaeo
[4] South African Heritage Resources Agency. 2017. SAHRIS. Available at: http://www.sahra.org.za/sahris
[5] Wrecksite. 2017. Wrecksite. Available at: http://www.wrecksite.eu/wrecksite.aspx

These monitoring requirements should be considered as guidelines only, and should be subject to review on a case-by-case basis to refine frequency of inspection and other aspects specific to an aquaculture project. Not all monitoring needs necessarily to be undertaken by an archaeologist, and some could be handled by the Environmental Control Officer (ECO), or, in some instances, a specifically designated monitor could receive training in certain aspects of on-site heritage monitoring and management. All monitoring reports will need to be lodged with SAHRA by means of uploading to SAHRIS. The vast majority of open archaeological sites that might be encountered would likely not require in situ conservation, although this is obviously the most desirable option. Archaeological mitigation is likely to be relatively easily accomplished, although in coastal contexts the possibility of extensive and time consuming excavations should be borne in mind.

Table 3.3-1: Best management practices and monitoring requirements for archaeological, palaeontological and cultural heritage resources

Objectives	Methodology	Developmental Stage	Responsibility
Construction and Operational Phases			
Avoid any direct or indirect damage to heritage resources flagged for mitigation prior to development	Ensure that the conditions of any Records of Decision (RoD) issued by the heritage authorities have been complied with	Planning phase	Environmental Control Officer
	Obtain approval from heritage authorities prior to commencement of activities	Planning phase	Environmental Control Officer
Avoid any direct or indirect damage to heritage resources to be protected *in situ*	Establish and observe buffers and no-go areas	Prior to commencement of construction activities on site	Environmental Control Officer /Heritage monitor
	Mark all buffers and no-go areas on development and site plans	Prior to commencement of construction activities on site	Environmental Control Officer /Heritage monitor
	Monitoring to ensure buffers are observed	Weekly during site establishment and construction phase, six-monthly during operational phase	Environmental Control Officer /Heritage monitor
Avoid any direct or indirect damage to heritage resources not identified at EIA Phase	Undertake monitoring of such development activities as might disturb any undetected heritage resources, as recommended in the HIA	Daily or as and when required during operations in High sensitivity areas as recommended in the HIA	Archaeologist
Identification, protection and rescue of buried palaeontological resources	Undertake monitoring of such excavations and similar activities as might disturb any palaeontological resources, as recommended in the HIA	Daily in areas of High sensitivity and/or areas of intense activity	Palaeontologist
		Weekly/bi-weekly as recommended in the HIA for areas of Low and Medium sensitivity and/or impact	Palaeontologist/ Environmental Control Officer with relevant training
Closure and Rehabilitation Phases			
Avoid any direct or indirect damage to heritage resources to be protected *in situ*	Establish and observe buffers and no-go areas	Prior to commencement of rehabilitation activities on site	Environmental Control Officer /Heritage monitor
	Mark all buffers and no-go areas on development and site plans	Prior to commencement of rehabilitation activities on site	Environmental Control Officer /Heritage monitor
	Monitoring to ensure buffers are observed	Weekly during site rehabilitation	Environmental Control Officer /Heritage monitor