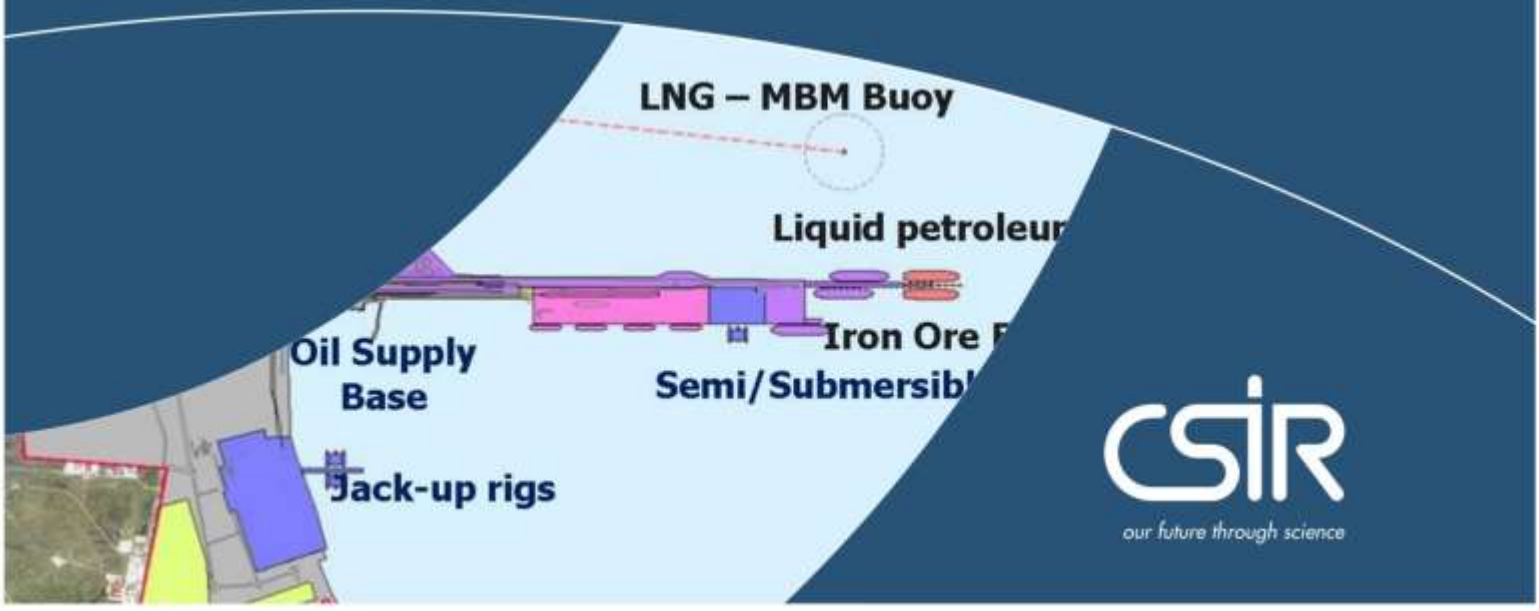
Western Cape Government

BETTER TOGETHER.

Environmental screening study for a proposed LNG terminal at Saldanha and associated pipeline infrastructures to Atlantis and Cape Town, Western Cape, South Africa.

Chapter 7: Conclusions and Recommendations



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CHAPTER 7. CONCLUSIONS AND RECOMMENDATIONS

This chapter contains the main conclusions with regards to environmental sensitivity and recommended management actions to avoid or mitigate the negative impacts (or to enhance the positive benefits), including possible alternatives that should be investigated. The conclusion chapter concentrates on potential no go areas, and very high and high environmental sensitive areas.

7.1. LNG RECEIVING TERMINAL

The gas receiving terminal is the gateway for LNG to downstream markets. This study evaluates two LNG receiving terminal options and their respective transmission and distribution gas pipeline networks to the downstream markets namely;

- a permanent land-based LNG receiving terminal, with a jetty in the Port of Saldanha Bay; and
- a submerged LNG receiving terminal (FSRU) within the Port of Saldanha or offshore along the west coast.

7.1.1. Land-based receiving terminal and jetty

In the event of a land-based terminal, it is proposed to construct a jetty for offloading the LNG to the storage tanks at the terminal. The potential location(s) for the proposed land-based terminal have been informed by a series of constraints (i.e. biophysical, planning, safety, technical constraints) but also by the restrictions set on viable locations for the proposed jetty.

The sensitivity analysis of the Saldanha Bay area ranges from potentially no-go areas to medium sensitivity areas, with the majority of the environment being highly sensitive (Figure 7.1).

7.1.1.1 Potential no-go areas

The targeted areas for the location of a proposed LNG receiving terminal is restricted to an area within approximately 4 km from the coast due to technical constraints (i.e. the cryogenic pipeline from the LNG vessel to the storage facility is required to be located on trestles and is to be less than 4 km in length).

From a planning perspective, TNPA confirmed that the area to the west of the iron ore jetty has been earmarked for logistic and maintenance activities for the offshore industry and that an LNG discharge facility could not be accommodated in Small Bay due to the presence of mariculture rafts and lay up areas for diamond mining vessels. In addition, the environmental sensitivity of the Big Bay coastal belt to the south of the Port of Saldanha is also regarded as a potential no-go area by the Saldanha Municipality as it is *not* earmarked for industrial development. Should development be allowed in the Big Bay coastal belt, it would set a precedent, thereby unlocking the area for further development. The Greater Saldanha Bay Area EMF (2014) designates the vast majority of the Big Bay coastal belt as a Zone 1 (Keep Assets Intact) area. The municipality therefore plans to maintain this area as a natural

high conservation value buffer between the industrial area at the ore terminal and the recreation/residential areas south of Lynch Point.

Other potential no-go areas include the SAS Saldanha Contractual Nature Reserve, which is situated on National Defence Force land to the northwest of Saldanha Bay. Although National Protected areas are considered throughout this study as being of very high environmental sensitivity, the SAS Nature Reserve has been identified as a potential no-go area following information obtained from discussions held at the Western Cape LNG workshop (see Appendix 3). It has been established that the SAS Nature Reserve will be fenced off and that negotiations regarding leasing National Defence Force land may impose a constraint for a land-based LNG facility. This area is therefore considered as a no-go constraint.

The Langebaan lagoon Ramsar site and Malgas, Jutten and Marcus Islands which are components of the West Coast National Park, are also considered as potential no-go areas.

From a safety perspective, the risk assessment revealed that the failure of the high pressure (HP) pumps at the terminal would dominate the extent of the risk contours. The distance of the risk isopleth of $1x10^{-4}$ fatalities per person per year was calculated to be 180 m from the point of release. This value represents risk that is unacceptable for the public and must remain within the site boundary. A 15 ha site as proposed may be adequate providing the site is adequately designed.

TNPA is also recommending a 1 km exclusion safety zone around the load out berth during offloading operations. The LNG carrier should therefore be at least 1km away from the LPG SBM presently under construction.

7.1.1.2 Very high environmental sensitivity areas

A loss of containment of LNG at the ship, resulting in a vapour cloud explosion, could impact up to 537 m downwind of the release. The basic failure frequency for accidents used to calculate the risk contours has to be determined based upon the specific route section and shipping traffic, which are currently unknown. These will be best obtained from a marine risk assessment. Therefore, at this stage of the screening study, a 600 m wide area along the shoreline is considered as being highly sensitive in terms of safety issues related to the LNG carrier.

A number of remaining patches of endangered Saldanha Granite Strandveld and Saldanha Flats Strandveld coinciding with Critical Biodiversity Areas are present in the vicinity of the Port of Saldanha and are regarded as very highly sensitive areas, in particular, in the eastern portion of the Port which is earmarked for oil and gas activities.

National Parks such as the West Coast National Park and Marine Protected Areas (e.g. around Jutten Island) and the two wetland clusters located to the north and the west of the Port of Saldanha also fall into the very high environmental sensitivity class.

If the underlying granite requires to be blasted extensively for the construction of a jetty, this will give rise to both a financial/technical impact and an environmental impact on marine ecology, particularly

African Penguins, other diving seabirds such as the Cape Gannet and cormorants. The potential impact on the Endangered African Penguin, the most endangered of all the world's penguin species, is of particular concern. The sensitivity of the above seabirds to blasting is therefore assessed to be very high.

7.1.1.3 High environmental sensitivity areas

The highly sensitive areas in the Saldanha Bay study area comprise aquatic CBAs and the remaining extents of endangered vegetation (that do not coincide with terrestrial CBAs).

The sensitivity of whales to blasting, should the latter be required for the construction of a jetty, is also assessed to be high. Big Bay is also assessed to be of high sensitivity in terms of maritime archaeological resources (shipwreck material) given the lack of available data.

The Saldanha Bay area is also anticipated to be moderately to highly sensitive to visual impacts due to the disruption of the visual integrity of the dune belt and the construction of an LNG receiving terminal.

7.1.2. Floating Storage and Regasification Unit (FSRU)

7.1.2.1 FSRU within the Port of Saldanha

The constraints for the location of the FSRU within the Port of Saldanha are similar to these for the location of the jetty, i.e. Small Bay cannot accommodate an LNG offloading facility. Similarly, it is recommended to position the FSRU within Big Bay, at least 1km away from the LPG SBM currently under construction.

It is understood that a minimum depth of 15 m is necessary for the FSRU to operate and that dredging will be limited to the turret position where a minimum depth of 30 m is required. Issues related to dredging are similar to the ones described in Section 7.1.1. The CSIR is currently assessing the marine environmental conditions for LNG shipment and transfer operations for two FSRU positions within Big Bay - one location in the northern section of Big Bay and one near Salamander Point (CSIRa&b, 2014).

7.1.2.2 FSRU along the West Coast

Two main areas have been assessed for the location of a FSRU along the West Coast – (i) between Robben Island and Dassen Island; and (ii) in the eastern sector of St Helena Bay, between Baboon point and the Berg River mouth.

The main environmental impacts of an FSRU operation located along the coast will occur during construction rather than during routine operation of the facility. The impact of laying the pipeline between the FSRU and the shore will be limited to a direct impact on the benthic organisms directly in its path. The sensitivity of these organisms to trenching operations is regarded as low. In addition, care will have to be taken to ensure that the whales do not become entangled during mooring

operations. Once the LNG carrier and FSRU vessels are connected and are free to "weather vane" they should not present a hazard to whales. No additional environmental key issues related to the location of the FSRU have been identified.

The risk assessment concluded that for an FSRU outside of Port Authority jurisdiction, the risks from collisions and ship-to-ship transfers extend 1 250 m from the release point. To this end, an exclusion zone of 1 250 m width from the shore has been set along the West Coast (Figures 7.2 and 7.4). In addition, the Sea-Shore Regulations (No 522, April 1977) have positioned a 2 km exclusion zone seawards from the coast around the Koeberg Nuclear Power Station, within which any activity (vessels, sailing, swimming etc.) is prohibited.

CSIR is also assessing the marine environmental conditions for the LNG ship and transfer operations along the West Coast (CSIRa & b, 2014).

7.1.3. Conclusions

Four potential locations for the LNG importation facility have been identified:

- A land-based facility in Saldanha Bay with a jetty on the eastern/southern side of the iron ore terminal.
- An FSRU in Saldanha Bay north-east of Salamander Point or further north within Big Bay. Note: if suitable land can be obtained from the SANDF, this option could be converted to a land-based receiving facility for LNG.
- An FSRU located between Robben and Dassen Islands.
- An FSRU located approximately mid-way along the eastern shore of St Helena Bay between Baboon Point and the Berg River mouth.

The sensitivity analysis revealed that the only acceptable area for the location of the proposed land based LNG facility terminal is an area to the east of the iron ore jetty, extending from the coast towards the 4 km restriction zone inland (Figure 7.1, Section A) and an area at Salamander Point should negotiation with the Defence Force be successful (Figure 7.1, Section B).

Should there be the technically feasible option of building an LNG jetty to the south, and roughly parallel to the iron ore jetty, it may be necessary to route the cryogenic pipeline across the northern end of the Big Bay coastal buffer zone i.e. the feasibility of the entire LNG import operation depends on being able to do so (Figure 7.1, Section C). While any alteration of this buffer zone is not to be undertaken lightly the present planning status of the zone does not guarantee its long-term security and thus an offset agreement may provide a mutually acceptable option both in terms of conservation of the buffer zone and the viability of the LNG project. An option for consideration could be for the LNG developer to purchase the Big Bay coastal buffer zone and transfers it to the West Coast National Park in return for the ability to route the cryogenic pipeline across the portion closest to the TNPA property immediately south of the ore-berth.

The dredging associated with the jetty could have an impact on longshore sediment transport and associated coastal erosion such as is currently occurring at the eastern side of the entrance to Langebaan Lagoon. Similarly, any attempt to protect the LNG discharge terminal with a breakwater could affect the wave regime in the bay and consequently the sediment dynamic processes. This could lead to erosion and/or accretion problems between the ore berth and the entrance to Langebaan Lagoon. This issue will need to be further investigated once the configuration of the LNG jetty has been confirmed.

Should extensive (capital) dredging be required the impact of the changed sea floor topography on wave refraction and diffraction patterns must also be investigated to ensure that the erosion conditions at the eastern side of the northern end of Langebaan Lagoon are not exacerbated. The shoreline in this area has been protected at considerable expense

Metocean studies to evaluate the suitability of these locations for the respective LNG importation method are currently being undertaken by the CSIR (CSIR a&b, 2014). Following this, the revised list of candidate sites in terms of metocean suitability should enable the screening process to focus only on the remaining sites although it is possible that all four sites prove to be suitable from a metocean perspective.

The next stage of screening would result of bathymetric and geophysical surveys of the potential sites. Extensive areas of sub-bottom rock (granite) requiring intensive (and expensive) blasting operations at any of the four sites would eliminate it on technical/cost considerations besides any environmental issues.

7.1.4. Recommendations

The following recommendations to mitigate significant impacts that could potentially be associated with the proposed LNG receiving terminals are:

- The risk assessment has recommended a marine risk assessment to be undertaken on request of the Harbour Master or in the event that the FSRU would be stationed within 1.5 km of the shore, shipping lane or any other shipping or port activity.
- It is recommended to undertake a remote sensing (e.g. side scan sonar and sub-bottom profiling) survey prior to blasting and /or dredging to determine the presence of any potential shipwreck material.
- In the event of blasting, it is recommended to:
    - use ripple blasting and blast at mid-day, during the non-breeding season, which would significantly reduce the mortalities of seabirds, particularly African penguins.
    - patrol the area for penguins before blasting (if they are present the blast must be cancelled/postponed until they are at least 1 000 m away from the site).
    - Avoid blasting within a minimum of 1 000 m from whales
    - Undertake a helicopter overflight of the 1 000 m exclusion zone immediately before any blasting takes place.

  - Prohibit any deliberate approach within 300 m of whales.
- The recommended management actions include the implementation of good visual international practices.
- Further investigate potential issues such as erosion and/or accretion problems between the ore berth and the entrance to Langebaan Lagoon in the event that a Jetty is constructed and dredging undertaken.
- Should extensive (capital) dredging be required the impact of the changed sea floor topography on wave refraction and diffraction patterns must also be investigated to ensure that the erosion conditions at the eastern side of the northern end of Langebaan Lagoon are not exacerbated.

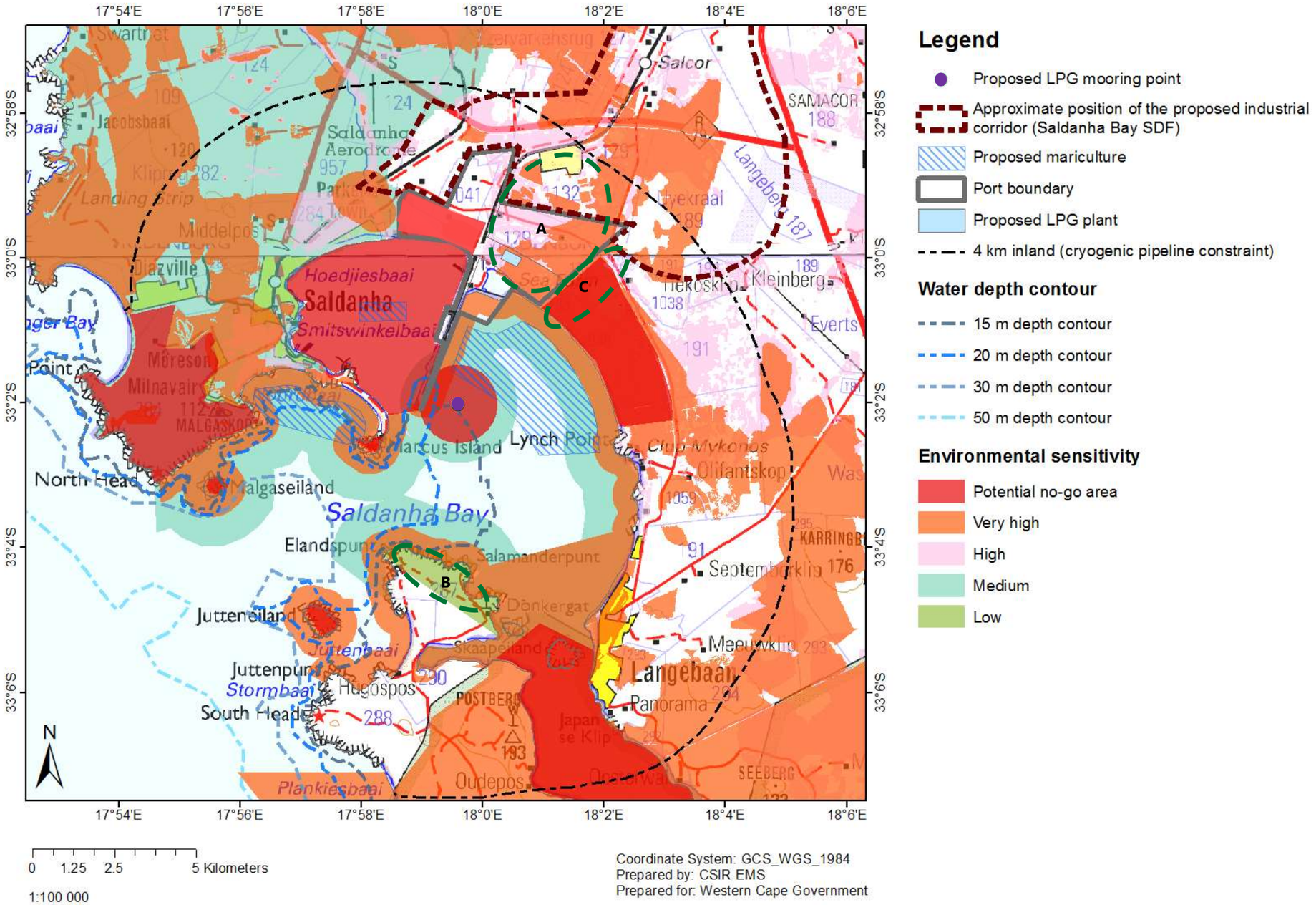

Figure 7.1 Environmental Sensitivity mapping for the location of a proposed land-based terminal.

7.2. PROPOSED GAS PIPELINE

The assessment of the environmental sensitivity of the proposed pipeline route was undertaken using a variety of criteria outlined in Chapter 3 Approach and Methodology, some of which constituted a fatal flaw and others defined a very high or highly sensitive environment. Figures 7.2 to 7.5 depict the results of the evaluation process, limited to fatal flaw and high/very high sensitivity areas. These figures give the Western Cape government an indication of areas to avoid and/or minimise the destruction thereof and the anticipated key issues.

From a vegetation perspective, the proposed pipeline will have two major impacts: the inevitable change in the vegetation structure and composition after rehabilitation of areas where vegetation was removed during construction activities; and the exclusion of deeper-rooted flora may permanently alter the structure of the plant communities and their suitability as habitat for fauna.

The proposed pipeline route passes through a number of threatened vegetation types and terrestrial Critical Biodiversity Areas. Where the particular vegetation is considered threatened, especially in the Critically Endangered (CR) and Endangered (EN) classes, remnants in a natural or near-natural state should be avoided as far as possible. This also applies to CBAs as disturbances should be avoided wherever possible and the hindrances to the ability of plants and animals to disperse or move through these areas should be minimised. Each portion that is traversed will have to be justified and the cumulative impacts will be considered important in proposing possible alternative routes.

Sections of the route affecting agricultural land, i.e. crossing intensively irrigated lands and grazing land, could lead to broader socio-economic impacts on the smallholder farmers and mechanisms for compensating these farmers would have to be negotiated and agreed upon.

River crossings are unavoidable when considering a cross-country pipeline. Rivers rarely represent a constraint for the routing of a pipeline, unless these are associated with extensive wetlands or riverine forest belts. Several sensitive aquatic features identified as National Freshwater Ecosystems Priority Areas (FEPAs) - FEPA Rivers, FEPA Wetlands, Upstream Management Areas, FEPA Phase 2 Rivers and Fish Sanctuaries - may be affected by the proposed pipeline.

Generally, with the correct design and construction of the crossing of aquatic features (where these cannot be avoided) and appropriate restoration measures, the resultant potential impacts are anticipated to be acceptable.

7.2.1. Gas transmission pipeline from Saldanha to Cape Town via Atlantis

The environmental sensitivity along and in the vicinity of the proposed transmission pipeline between Saldanha Bay and Cape Town ranges from medium to potentially no-go areas, with the overall environmental sensitivity of the area anticipated to be high to very high (Figure 7.2).

The main concern along the proposed transmission line is the CBAs identified by the City of Cape Town BioNet. The CCT BioNet irreplaceable areas are distributed from the north of Atlantis to Cape Town. Due to their irreplaceable nature, these areas are regarded ***as potential no go areas*** and two alternative routes have been proposed:

- Option A is to follow Road 315 towards Malmesbury following existing road servitudes via the N7 to link to Ankerlig.
- Option B is to follow the railway servitude between Road 315 and the N7 and then continue along the road servitude to Ankerlig.

Both alternative route options may traverse Atlantis Sand Fynbos (CR) remnants with *very high* environmental sensitivity, which should ideally be avoided. Option A is preferable from a terrestrial ecology perspective, as Option B may traverse the Pela- and Riverlands Nature Reserves, as well as the Burgherspost Wine Estate and Cloof CapeNature Stewardship site. If the pipeline cannot be re-routed via Road 315 and the N7 to Ankerlig, it is proposed that the pipeline follows the R27 and road 307 servitudes along the boundary of the local authority protected area of Witzand to Ankerlig.

The proposed transmission pipeline is also planned to follow the existing crude oil servitude running from SFF to Milnerton, across the West Coast National Park to the east of the Langebaan Lagoon. This area is anticipated to have a ***very high environmental sensitivity*** due to it being formally protected. It is also visually highly sensitive and an important tourist area. In addition, the West Coast Fossil Park has high palaeontological and tourism value. An alternative routing would be for the pipeline to follow the R27 servitude to Saldanha Bay instead of crossing the West Coast National Park where there is an area of Saldanha Flats Strandveld (EN).

The proposed pipeline corridor crosses a number of ***very high and high sensitivity areas*** comprising critically endangered vegetation (such as Swartland Granite Renosterveld) mainly in the Atlantis and Cape Town areas, and endangered vegetation (predominantly Saldanha Flats Strandveld and Atlantis Sand Fynbos), including CBAs in the northern section of the corridor up to Yzerfontein.

From Saldanha to Atlantis, the pipeline crosses a number of aquatic features, including River FEPAs, Phase 2 FEPAs, FEPA wetlands and rivers that are classified as threatened ecosystems. In this section of the pipeline, the crossing across the Dwars River is regarded as a ***high sensitivity area*** because of the presence of FEPA wetlands in close proximity to the river. Should the correct design and construction of the crossing and appropriate restoration measures be implemented, the environmental impacts associated with this section of the proposed pipeline would be acceptable

From a safety perspective, the 5 km Precautionary Action Zone (PAZ) around Koeberg Nature Reserve is regarded as a ***very high sensitivity*** area and the 16 km Urgent Protective Action Planning Zone around the power station is considered to have ***high sensitivity***. Taking into consideration the proposed technical specifications of the pipeline, the $1x10^{-6}$ and the $1x10^{-5}$ risk contours for the Saldanha Bay corridor consisting of a 120 bar (508 mm) pipeline, extends approximately 290 m and 165 m from that section of the pipeline respectively. As the risk of $1x10^{-6}$ fatalities per person per year for the transmission would extend some distance from the release, the transmission pipelines **would be classified as a Major Hazard Installation.** In accordance with Section 9 of the Major Hazard Installation regulations, land restrictions would apply as to the separation distance between the transmission pipelines and certain types of land development, particularly areas occupied by humans for part or all of the day.

The area between the coast and the R27 road from Bakkies se Bank to Koeberg Nuclear Station is alo regarded a ***high sensitivity*** area when considering heritage resources.

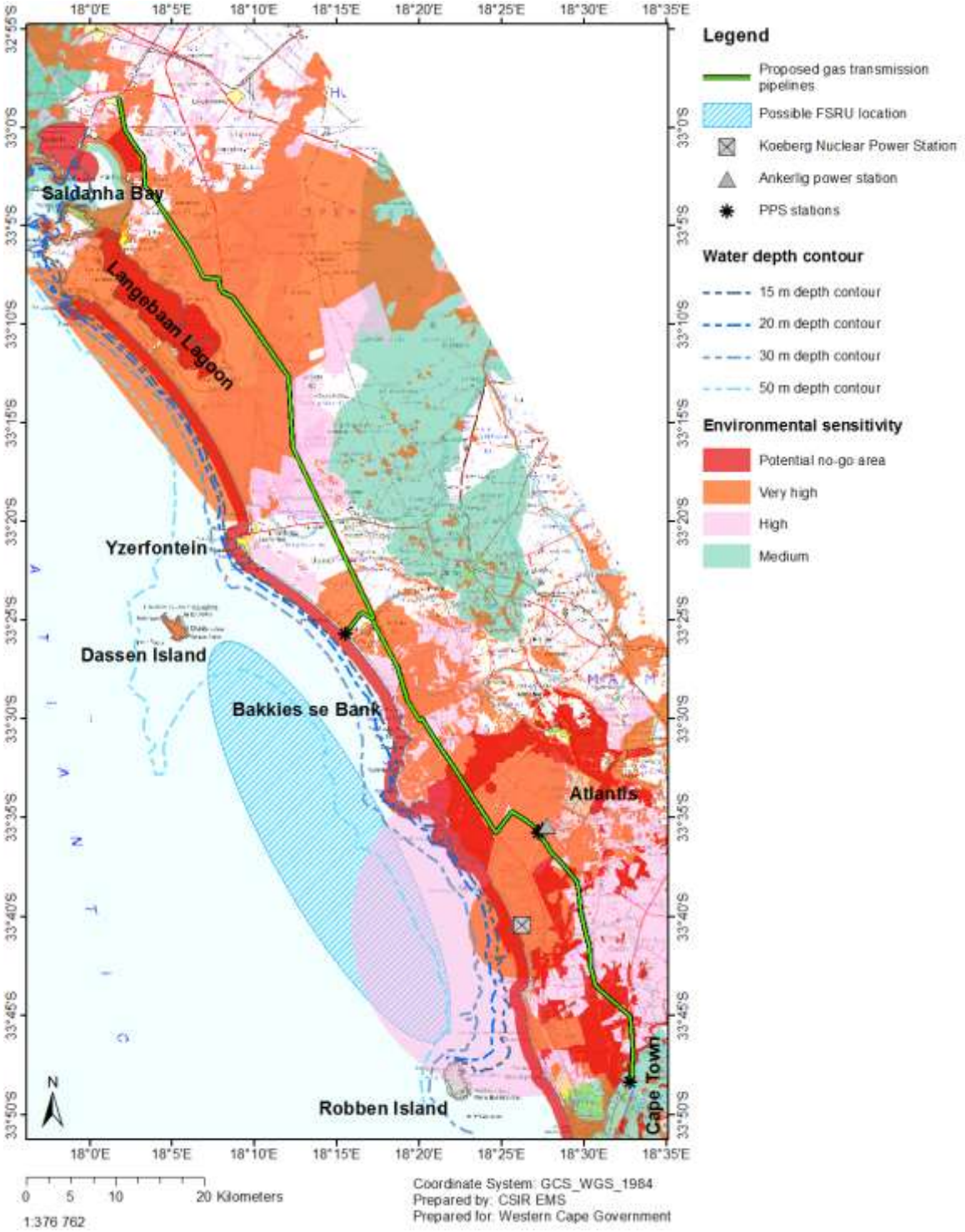

Figure 7.2 Sensitivity analysis of the proposed transmission pipeline between Saldanha Bay and Cape Town

7.2.2. Transmission pipeline route to Paarl/Wellington and Stellenbosch

The gas transmission pipeline between Cape Town and Paarl/Wellington will predominantly follow the N1 and between Cape Town and Stellenbosch the route will follow the Polkadraai/Adam Tas Road (R310). The areas that may be affected by the proposed gas transmission pipelines to Stellenbosch, Paarl and Wellington, is anticipated to have an overall sensitivity rating of ***medium*** (Figure 7.3). The area has been extensively transformed to viticultural and horticultural land-uses.

The main areas of concern are the CBAs identified by the City of Cape Town BioNet as irreplaceable areas which are ***potential no-go areas***. These areas mainly coincide with small, fragmented remaining patches of Swartland Renosterveld.

Remaining patches of critically endangered vegetation are embedded in a matrix of vineyards distributed along the proposed transmission line, mostly from Cape Town to Paarl, and are regarded as ***very high*** environmental sensitive areas. The Stellenbosch and Drakenstein Municipal areas also contain some CBAs that correspond with the small remaining patches of threatened vegetation.

The Joostenberg Private Nature Reserve (Informal Protected Area) is located to the west of Paarl. The gas pipeline runs south of the reserve and is not planned to cross it. Note that the reserve is regarded as a ***very high*** sensitive area.

There are a number of wetlands present within this area, however given that the proposed gas pipeline is planned to follow existing servitudes, the overall environmental sensitivity of the pipeline route is regarded as ***low***. There are no other sensitive aquatic features present within this area.

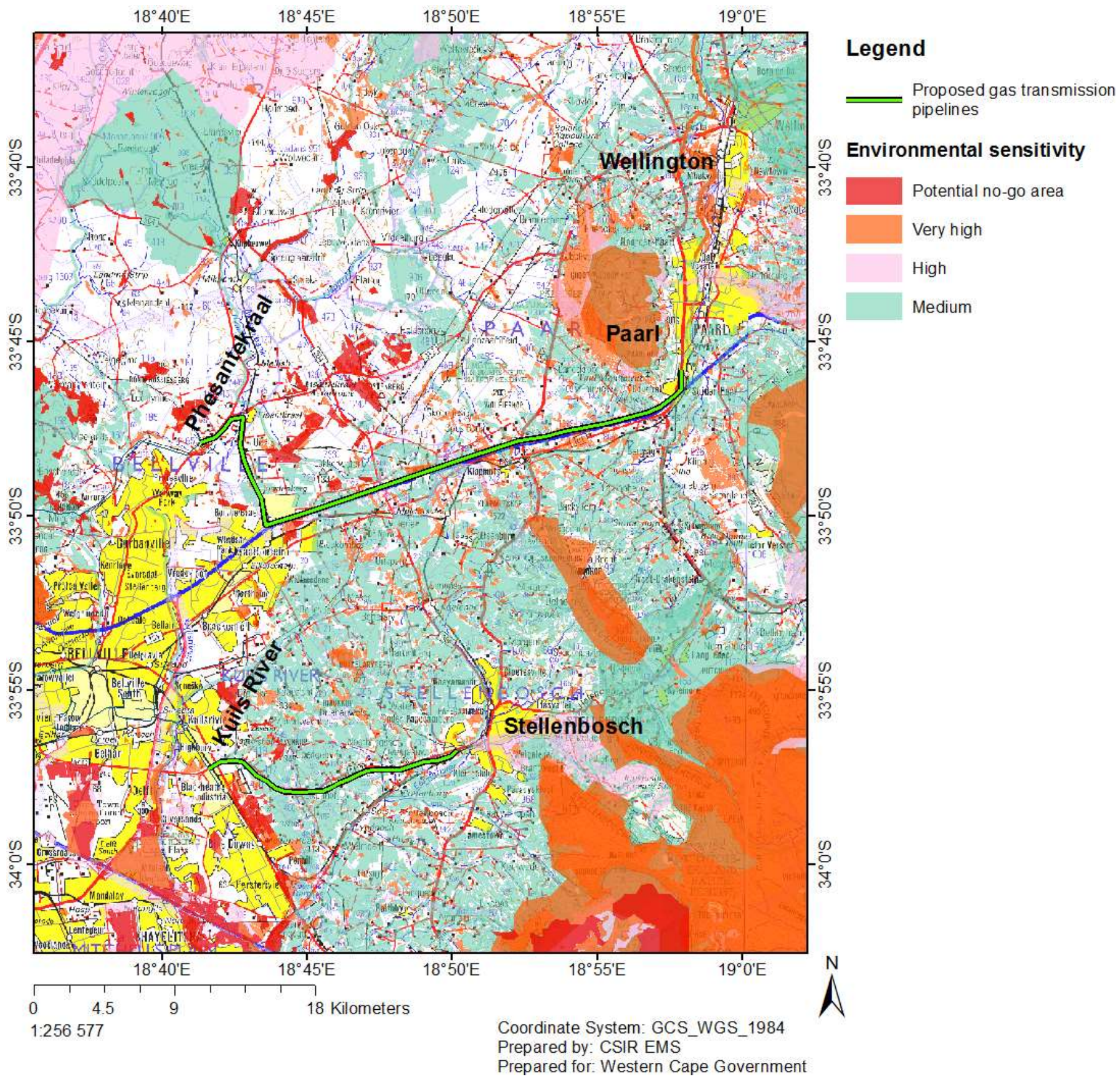

Figure 7.3 Sensitivity analysis of the proposed transmission pipeline between Saldanha Bay and Cape Town

7.2.3. Domestic distribution pipelines: Atlantis, Melkbosstrand, Cape Town, Paarl, Wellington, Stellenbosch and Somerset West

The distribution pipeline(s) in these areas are smaller and lower pressure gas lines. It is anticipated that the gas distribution pipelines supplying Atlantis, Melkbosstrand, Cape Town, Paarl, Wellington, Stellenbosch and Somerset West will not significantly adversely affect sensitive environments, as the pipelines are predominantly proposed to be constructed within urban built-up areas (Figure 7.4). However, it is recommended that further studies establish more detailed risk and safety constraints.

The main areas of concern remain patches of irreplaceable CBA areas throughout Cape Town (City of Cape Town BioNet) which may be affected by the gas distribution pipelines, in particular the section of the pipeline from Atlantis to Melkbosstrand which crosses remnant of Critically Endangered Atlantis Sand Fynbos, also identified as a CBA and ESA (CCT Bionet). These are regarded as ***potential no-go areas***. An alternative route, approaching Melkbosstrand from the south, following existing servitudes should be considered. This alternative route diverges from the main gas transmission pipeline at Melkbosstrand Road (M19) to follow the existing road into Melkbosstrand and will not fragment the large remnant of CR Atlantis Sand Fynbos. This proposed alternative route may however still affect some City of Cape Town BioNet irreplaceable sites (CBAs 1A and B).

A section of the proposed distribution pipeline also traverses a remnant Cape Flats Dune Strandveld (EN) which is a BioNet irreplaceable site and ESA, while remaining patches of critically endangered vegetation are scattered throughout the affected area. The Table Mountain National Park (including a Fish Support Area) is located to the west of the gas distribution network. The commercial Stage 2 pipeline also traverses the Greater Zandvlei Estuary Nature Reserve. The above areas are all regarded as ***very high*** sensitive areas.

The Cape Town Stage 2 domestic distribution pipelines may affect FEPA Rivers and Wetlands (i.e. the Rietvlei Wetland and Milnerton Lagoon). Because of the size of the wetland and various aquatic features present in this area, the environmental sensitivity is considered to be ***high to very high***.

Several FEPA wetlands are present to the south of the proposed distribution pipeline in Somerset West (Stage 2). This area is also a fish support area. The Stellenbosch distribution and commercial pipelines (Stage 2) fall within a River FEPA. These areas are regarded as ***highly sensitive*** areas.

The Paarl commercial and distribution pipelines (Stage 2) will cross the Berg River which is classified as Critically Endangered and as a FEPA wetland. Several Fish Support areas and artificial wetlands are present in the Paarl and Wellington area, that would need to be taken into account during the routing of the pipeline. The environmental sensitivity of the Paarl and Wellington areas is considered to be ***high***.

From a heritage perspective, almost every new excavation in the streets in the Greenpoint area reveals human remains. This area is therefore regarded as a ***high sensitivity*** area.

The 5 km Precautionary Action Zone (PAZ) around Koeberg Nature Reserve is also regarded as a very ***high sensitivity*** area in terms of risk and safety for the distribution of gas to Melkbosstrand.

Based on unmitigated pipeline designs, excluding mitigation such as applying the applicable design factors for lines within occupied areas, all the distribution pipeline network would have surface risks of $1x10^{-6}$ fatalities per person per year (the extend depending on the pipeline diameter) and would be considered as a major hazard installation. The $1x10^{-6}$ risk contour extends approximately 7 m and 112 m from the release point for pipelines with a diameter of 60.3mm and 559mm respectively. The $1x10^{-7}$ risk contour extends approximately 12 m and 140 m from the release point for pipelines with a diameter of 60.3mm and 559mm respectively.

All Cape Town distribution pipelines would require detailed analysis per area to determine acceptability for surrounding developments. However, at this level of study certain areas would be considered problematic. The main pipeline and pipelines in the Epping area consist of large diameter gas pipelines that have risk isopleths extending into residential and business areas. The designers of the pipelines would be required to introduce further mitigation to reach a level of acceptability in this area. A proposed 323 mm pipeline would run to the north of the residential area of Altydgedacht and passing through the suburb of Durbanville. The designer must demonstrate that the risks to the public would be considered acceptable.

The distribution pipeline in the Saldanha Bay area (323 mm) would require more detailed analysis regarding the routing of the pipeline. Additional mitigation may be required for this to routing to be considered acceptable.

In accordance with Section 9 the MHI regulations, no facility within the $3x10^{-7}$ fatalities per person per year isopleths should be approved without first evaluating the impacts on the proposed development or potential land usage. Acceptable developments can be verified in the tables provided in the HSE Land Use Planning Methodology (UK 2011).

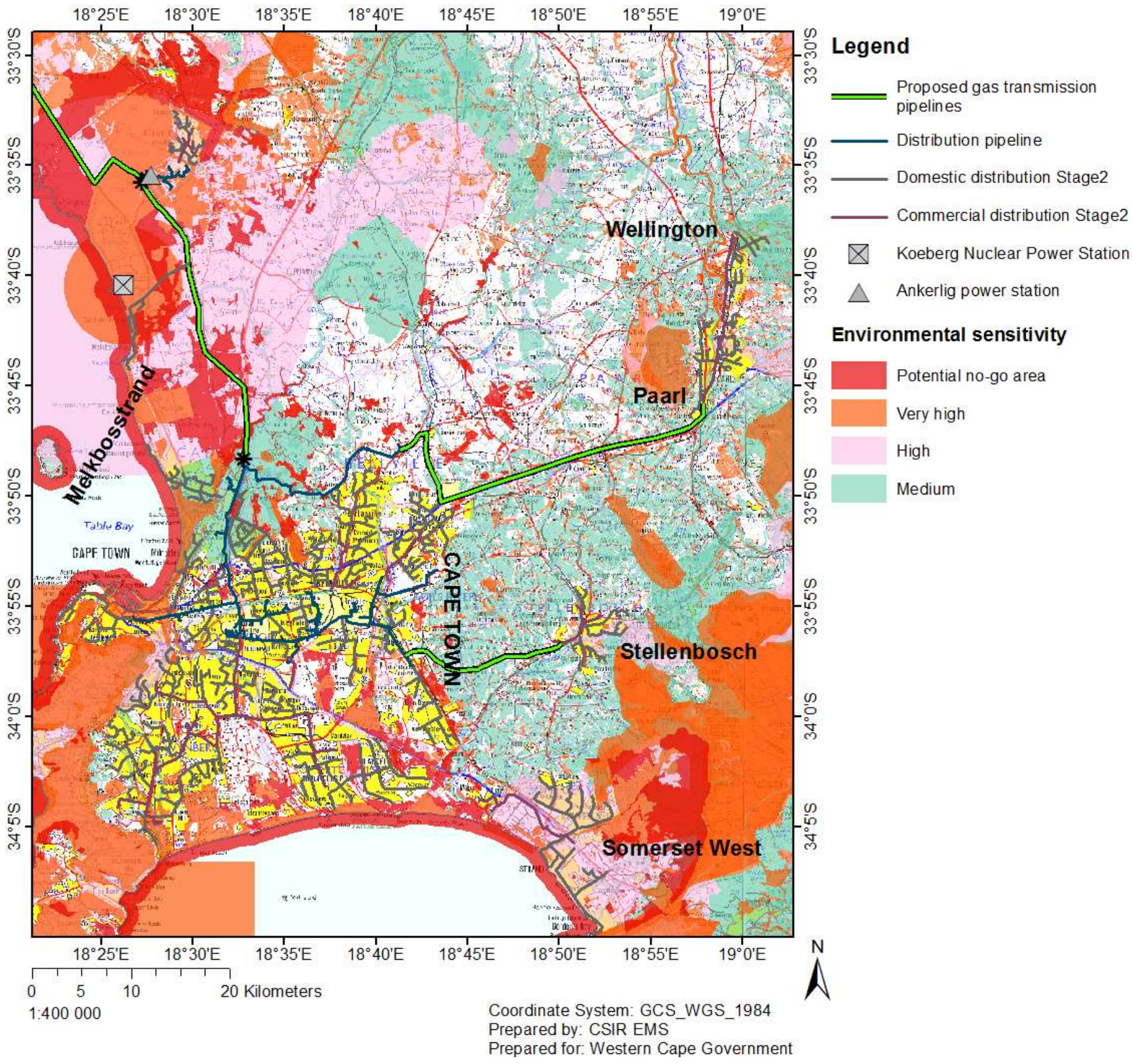

Figure 7.4 Sensitivity analysis of the proposed distribution pipeline network in Cape Town, Paarl/Wellington, Stellenbosch and Somerset West

7.2.4. St. Helena Bay corridor

The environmental sensitivity for the St. Helena Corridor generally ranges from medium to very high (Figure 7.5).

The Berg River estuary and aquatic CBAs coinciding with the Verlorenvlei, Papkuil and Berg rivers are ***very high*** sensitivity areas. Endangered vegetation coinciding with CBAs to the south of the corridor also has ***very high*** environmental sensitivity.

Endangered Leipoldtville Sand Fynbos and NPAES focus areas at the northern end of the corridor are anticipated to have ***high*** environmental sensitivity. From a heritage resources perspective the area around Baboon Point and Langebaanweg is also ***highly*** sensitive.

From a safety perspective a 1.25 km wide area along the coast is regarded as a potential no-go area for a FSRU. The risk ($1x10^{-6}$ fatalities per person) for the pipeline located within the St Helena Bay corridor consisting of a 120 bar (508 mm) pipeline would extend approximately 290 m from the pipeline.

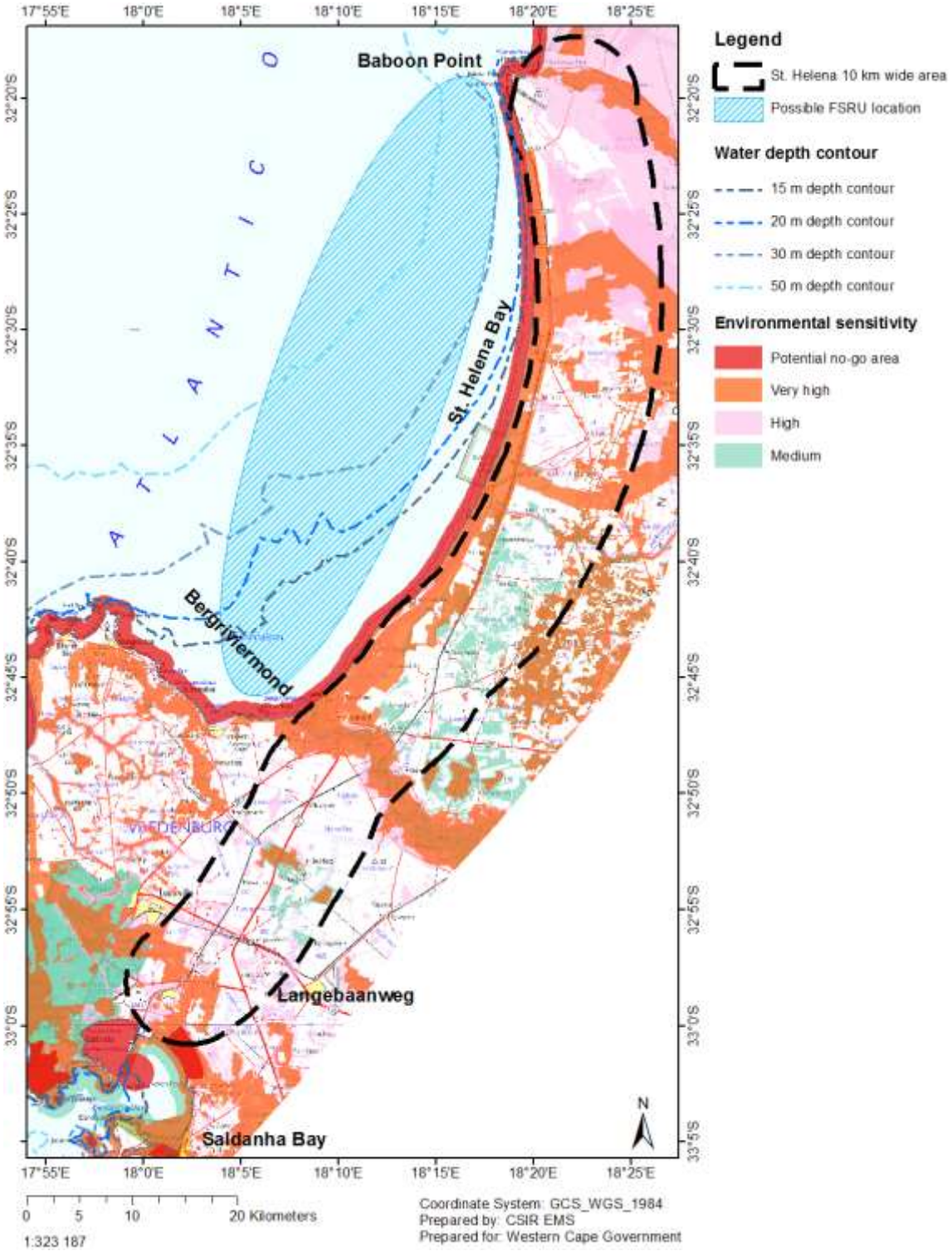

Figure 7.5 Sensitivity analysis of the proposed distribution pipeline within the St Helena Bay corridor

7.2.5. Conclusions

It should be feasible to route both the main high pressure pipeline and the subsidiary low pressure distribution pipelines while keeping the environmental impacts to the minimum possible. Because of the relatively coarse resolution of the available environmental data, extensive ground truthing of the vegetation along the proposed pipelines routes would be required to ensure the avoidance of sensitive areas as far as possible.

From a safety perspective, a literature search did not find any scientific relationship to the minimum distance between adjacent pipelines. Of most importance is the construction and maintenance of such pipelines, bearing in mind that third-party interference resulting in damaged pipelines with injuries and losses is the greatest cause of pipeline failures.

7.2.6. Recommendations

The following management/mitigation actions are recommended:

- It is recommended to appoint suitably qualified specialists to assist in the identification of the final routing of the proposed pipeline and to undertake some ground truth verification and to avoid sensitive terrestrial and aquatic ecology (i.e. remnants, wetlands, rivers, aquatic CBAs and ESAs), and heritage resources that have been identified to be on the proposed route.
- It is recommended that the City of Cape Town Municipality be consulted and that the area should be ground-truthed.
- During the refinement of the pipeline route, it is recommended to avoid wetlands and FEPA aquatic features as far as possible and to set a 100m buffer zone. The best crossing points from a technical and environmental point of view will need to be identified and assessed. Wetland clusters are to be treated as a unit and should not be fragmented.
- It is recommended to limit the construction footprint and to rehabilitate disturbed areas as soon as possible, before the onset of the winter rains to take maximum advantage of the growing season.
- An invasive alien plant control will also need to be developed and implemented.
- Good housekeeping during construction is essential to ensure the minimum of interference with water quality (i.e. limit the amount of suspended sediments as far as practicable).
- For this reason it is suggested that placing pipelines on top of each other should be avoided and that crossover pipelines be designed and installed with caution.
- For new gas transmission pipelines one should consider a separate adjacent lane with sufficient distance between the lanes for safe construction and maintenance of the pipelines. The distance would be specified by the width of the vehicles involved in such activities.
- It is important to note that the maintenance of the pipeline is not limited to construction but also includes inspections. It would be expected that specified vehicles may traverse the length of the transmission pipelines for the observation of leaks or dangers posed to the pipeline. For this reason an adjacent vehicle lane would be required possibly situated between the gas pipeline and other fuel pipelines.

- Any significant heritage resources sites that cannot be avoided and protected during implementation would need to be excavated/sampled by a registered professional under an appropriate permit (if required at the time) from HWC.
- During the construction phase, fieldwork would likely be required to examine trenches, particularly where excavations intersect fresh, unweathered rocks, in order to document the geological sequence and any fossils occurring therein.
- Any unmarked graves that are accidentally discovered during the construction phase would need to be immediately protected in situ, reported to the heritage authorities and then, if required, exhumed by an archaeologist under an appropriate permit. The remains would then be curated in an approved institution or reburied depending on their origin.

Additional generic recommended management actions are presented in Chapter 6, Sections 6.4.1.1 and 6.4.1.2.

7.2.7. Recommended future studies

The following studies should be considered following this screening phase of the proposed project:

- Refinement of the proposed pipeline routing during the preliminary design to avoid where possible and minimise environmental and socio-economic impacts. Given the limited width of the proposed pipeline route (corridor), the risks identified as part of this screening study could be avoided/minimised via detailed botanical (including wetlands) survey.
  A detailed botanical survey at the proposed terminal location and along the proposed gas pipeline is recommended to be undertaken prior to the EIA stage in winter/spring to ensure that species are not dormant (e.g. geophytes) or are flowering. This will permit the various species to be positively identified and will allow the assessment of the actual botanical value of the proposed pipeline route and Saldanha terminal area and to identify any possible disturbed areas that could be utilised for the proposed LNG terminal.
- Metocean and geophysical studies to evaluate the suitability of these locations for the respective LNG importation method.
- Bathymetric study of Big Bay, within the Port of Saldanha to determine the amount of dredging required, if any, also for locating the best position for the heating water discharge pipeline.
- Proactive negotiation process with landowners which should recognise the prevalence of agricultural land for a large section of the proposed pipeline route. This is also necessary to ensure that access to private land will be granted during the operational phase of the project as to facilitate maintenance and repairs.
- Quantitative risk assessment for the proposed terminal and pipeline infrastructure
- Archaeology
  Section 38 of the Heritage Resources Act indicates that any person constructing a powerline or road or similar linear developments exceeding 300m in length is required to notify the responsible heritage resources authority, who will in turn advise whether an impact assessment report is needed before development can take place.

A Phase 1 Archaeological Impact Assessment (AIA) is required as part of the EIA process and includes sampling and dating of archaeological deposits, and realignment of the pipeline route during the detailed design stage in order to avoid known archaeological sites. It is recommended, although not mandatory, to undertake this study prior to the EIA stage.

Western Cape Government

BETTER TOGETHER.

Environmental screening study for a proposed LNG terminal at Saldanha and associated pipeline infrastructures to Atlantis and Cape Town, Western Cape, South Africa.

Chapter 8: References

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