- ***Toxic Release***

Pipeline Distance (km)	Maximum Inventory (m^3)	Down Wind Distance to 1% Fatality (m)
5	12723	2800
1	2544	1834

- ***Flash Fire***

Pipeline Distance (km)	Maximum Inventory (m^3)	Down Wind Distance to ½ LFL (m)
5	12723	1200
1	2544	661

While the distances to the endpoint from toxic releases are relatively large, these are subject to the engineering designs and mitigation. The suitability of the designs and proposed layout will be evaluated during the EIA phase of the project.

4.2.6 Visual

The visual sensitivity analysis has as its primary purpose the identification and delineation of ideal (preferred), acceptable or sensitive areas within the study area for the construction and operation of the CCGT in the Amersfoort area. The visual analysis focused on constraints (in the form of areas with high observer incidence) and opportunities in terms of areas with existing visual disturbance.

Based on this rationale the following areas were identified as having a preferred rating from a visual assessment point of view:

- The existing Majuba coal fired power station and its related infrastructure and activities.
- The decommissioned mining area approximately 8 km east of the power station.

These areas represent industrial style developments that already constitute a vertical disturbance within the landscape. A 2 km preferred buffer zone surrounding these two areas ensures the concentration of visual impacts as apposed to scattering developments throughout this region.

Sensitive areas within the study area include areas of high observer incidence where potentially negative viewer perceptions may lead to a high visual impact.

- Areas within a 2 km buffer zone from the town of Amersfoort.
- Areas within a 2 km buffer zone from Vlakplaats and Daggakraal.

Other sensitive areas represent corridors within which a high observer frequency can be expected. This zone is delineated with a 500 m buffer around the following major roads within the study area:

- The N11 national road.
- The R23 arterial road.
- Other major secondary roads.

Additional areas identified as sensitive for the development of a CCGT power plant are elevated topographical units in the region. These are predominantly situated towards the south of the study area in the form of ridges, crests and low mountains. The placement of the CCGT on these topographical features will unnecessarily elevate and expose the development to a larger geographical area.

Areas that do not (as an initial evaluation) possess any of the above constraints or opportunities are placed within the **acceptable category from a regional perspective**.

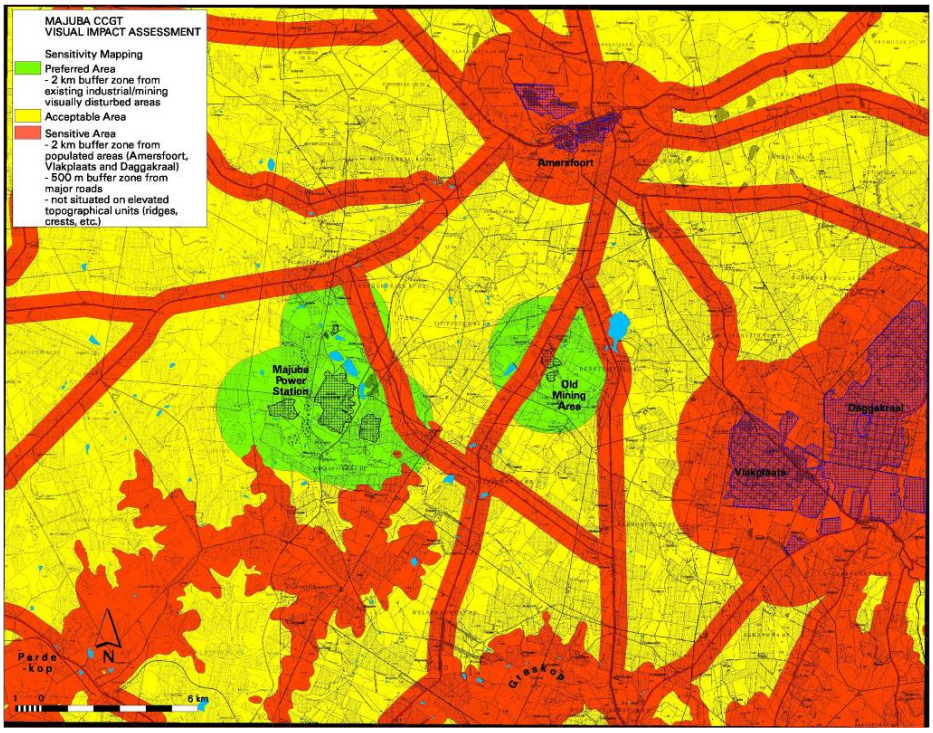

Figure 4.7 **S**ensitivity map showing areas that are acceptable, less acceptable and sensitive in terms of visual impacts.

5. CONCLUSIONS

5.1. Biophysical

5.1.1. Hydrogeology

Preliminary groundwater data indicates limited groundwater resources within the study area which may require protection due to limited water availability. Areas of low average borehole yields and deeper groundwater levels are recognised as more suitable areas for the CCGT development from a groundwater perspective.

Pre-screening indicates areas where groundwater is vulnerable due to the shallow groundwater levels. These average water levels are, however, not indicative of the entire farm or area, as indicated on Figure 4.1, therefore it still may be possible to consider the sensitive (hydrogeological perspective) areas using more site-specific information. Areas within the sensitive farms could still possibly be considered.

5.1.2. Hydrology

There are many areas ideal for development within the target area for the CCGT plant. However, there are also large areas that are hydrologically sensitive, due to steep slopes and the areas proximity to rivers and water bodies. These areas should be avoided if possible as they will result in problems such as management difficulty, the necessity for a water use license and the diversion of streams.

5.1.3. Biodiversity

It is evident from Section 4.3 that extensive areas are present that are regarded less sensitive in terms of expected impacts resulting from the proposed development. It should be noted that some of these areas do occur in close proximity to areas that are labeled as sensitive. The inclusion of buffer zones is therefore recommended.

5.2. Social Impacts

5.2.1. Air Quality

The preliminary assessment results indicate that the most suitable citing for construction of the CCGT and consequently the gas pipeline would be biased towards the southerly areas surrounding the Majuba Power Station and areas where no significant cumulative air quality impacts would occur. The location of the residential units for the workers should be located north or south of the CCGT site.

5.2.2. Noise

The noise climate (ambient noise condition) in the Amersfoort area is quiet and is representative of a rural (farming) noise district (SANS 10103). There is therefore a high potential for noise impact with the introduction of a new facility such as the CCGT power plant. The new facility could be introduced to almost any sector of the area surrounding the UCG plant. Since the Majuba power station is already the centre of a noise degraded area there are advantages to locating the new facility reasonably close to the existing power station. However, in order to minimise cumulative noise effects, the new facility should not be located within a radius of 3 km for the existing power station.

5.2.3. Social

Considering demographic processes, geographical processes, economic processes, socio-cultural processes, and institutional processes ideal sites are the old mine, as well as available pieces of land on the UCG and Majuba power station sites that do not pose a safety risk. In the selection of other potential sites, houses should be avoided and the input from the visual, air quality, noise and risk specialist studies should be considered in selecting sites in order to reduce potential significant social impacts.

5.2.4. Heritage

Heritage sites are fixed features in the environment, occurring within specific spatial confines. Any impact upon them is permanent and non-reversible. Those resources that cannot be avoided and that are directly impacted by the development can be excavated/recorded and a management plan can be developed for future action. Those sites that are not impacted on can be written into the management plan, whence they can be avoided or cared for in the future.

5.2.5. Risk

The study found that the endpoints from an accidental release could extend as far as 2800 m for the 1% fatality scenario based on a 5 km pipeline. The distance could be reduced to 1200 m with a 1 km pipeline. Further reductions in endpoints can be made with engineering inputs.

This screening study did not find a fatal flaw regarding any site nor did it find a preferential site. The layout and engineering designs will determine the acceptability of the project on any particular site and will be evaluated during the EIA phase and Major Hazardous Installation risk assessment (if applicable).

5.2.6. Visual

The proposed CCGT in the Amersfoort area has the potential to negatively impact on the rural character and visual quality of this area. The visual impact can be contained within existing areas of industrial development. This will ensure that industrial developments are not scattered throughout the region with the consequence of compounding the visual impact. The repeated siting of industrial developments should ideally be avoided when selecting a suitable site for the placement of the CCGT. This site selection process should also be cognisant of additional ancillary infrastructure associated with the CCGT (i.e. pipelines, HV yard, gas cleaning plant etc.)

5.3. Sensitivity Indexes

Each of the sensitivity maps from each specialist discipline was then overlaid in order to calculate a total sensitivity of the study area. The sensitivity index indicates the least sensitive areas (green – yellow areas) for the CCGT power plant and highlights the sensitive areas (red to maroon areas) that should be avoided. The sensitivity analysis is based on the individual specialist input, where:

- Sensitive areas were awarded a value of **-1**
- Acceptable areas were awarded a value of **0**
- Ideal areas were awarded a value of **+1**.

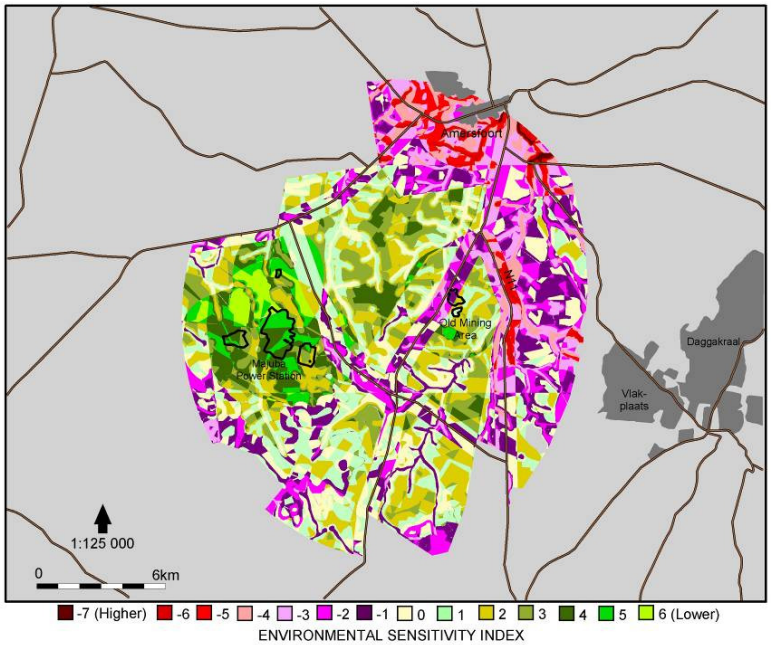

Figure 5.1 **E**nvironmental sensitivity index

Figure 5.1 is the result of the merging of the seven specialist inputs and is expressed as an index indicating higher or lower environmental sensitivity. An area with the most sensitive value (-7), for instance, indicates areas that where awarded -1 by all the specialists. The value of 6, at the other end of the index, represents the most ideal areas.

5.4. Sensitivity Zoning

Figure 5.2 is a simplification of the index into three zones representing the negative (sensitive - red), zero (acceptable - yellow) and positive (ideal - green) zones. It must be borne in mind that a zero area could be the result of a -1 and +1 canceling each other out. The negative may be a critical factor and therefore Figure 5.3 has been generated to illustrate Ideal/Preferred areas for development. This map (Figure 5.3) is based on the environmental sensitivity areas but excludes all areas that received a negative rating by any specialist. It may be that not all the specialists consider their negatives to be critical, in which case that area may removed from the exclusion zone. The result of Figure 5.3, however, is a risk-averse approach, where all the negatives are considered to carry the same weight.

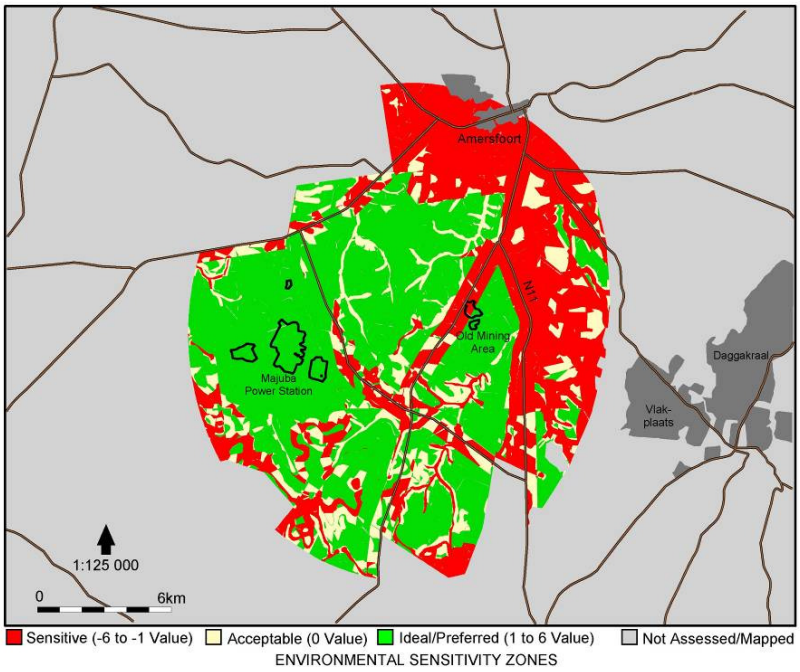

Figure 5.2 Environmental Sensitivity Zones

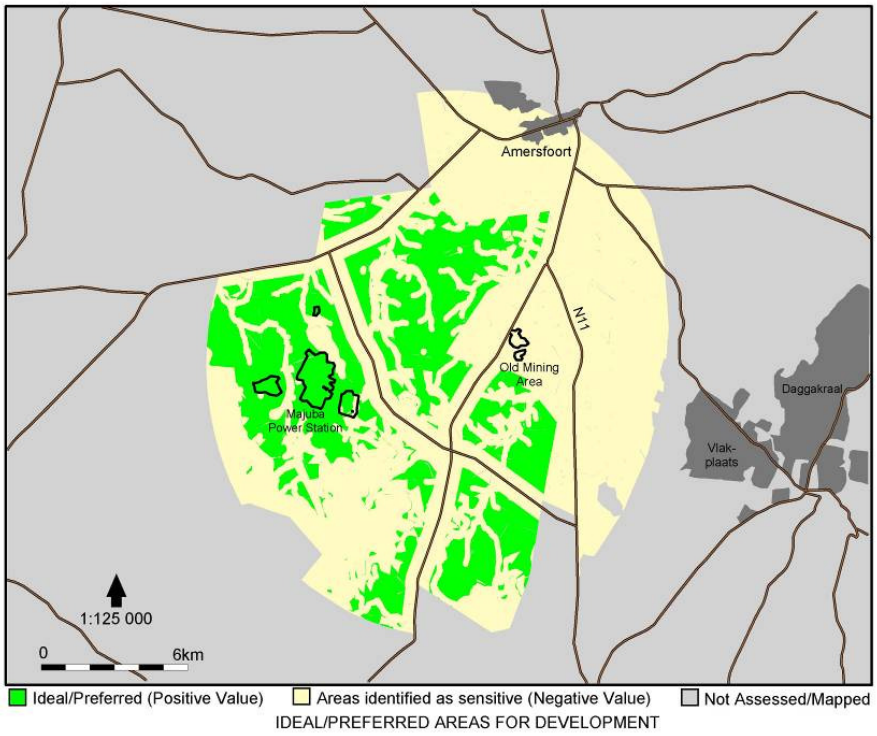

Figure 5.3 Ideal/preferred areas for development

5.5. Conclusions

The sensitivity analysis was undertaken to identify potential ideal/preferred areas within the study area, where a CCGT plant could be constructed with the least environmental impact.

By utilising the Figures 5.1 – 5.3 the broader farms were identified where potential alternative sites can be located and therefore assessed within the Environmental Scoping Study. These farms include:

- Roodekopjes 67 HS
- Bergvliet 65 HS
- Werda 116 HS
- Rietpoort 83 HS
- Welgedacht 82 HS
- Palmietspruit 68 HS
- Strydkraal 53 HS
- Witkoppies 81 HS

Figure 5.4 shows the areas in which potential alternative sites can be located.

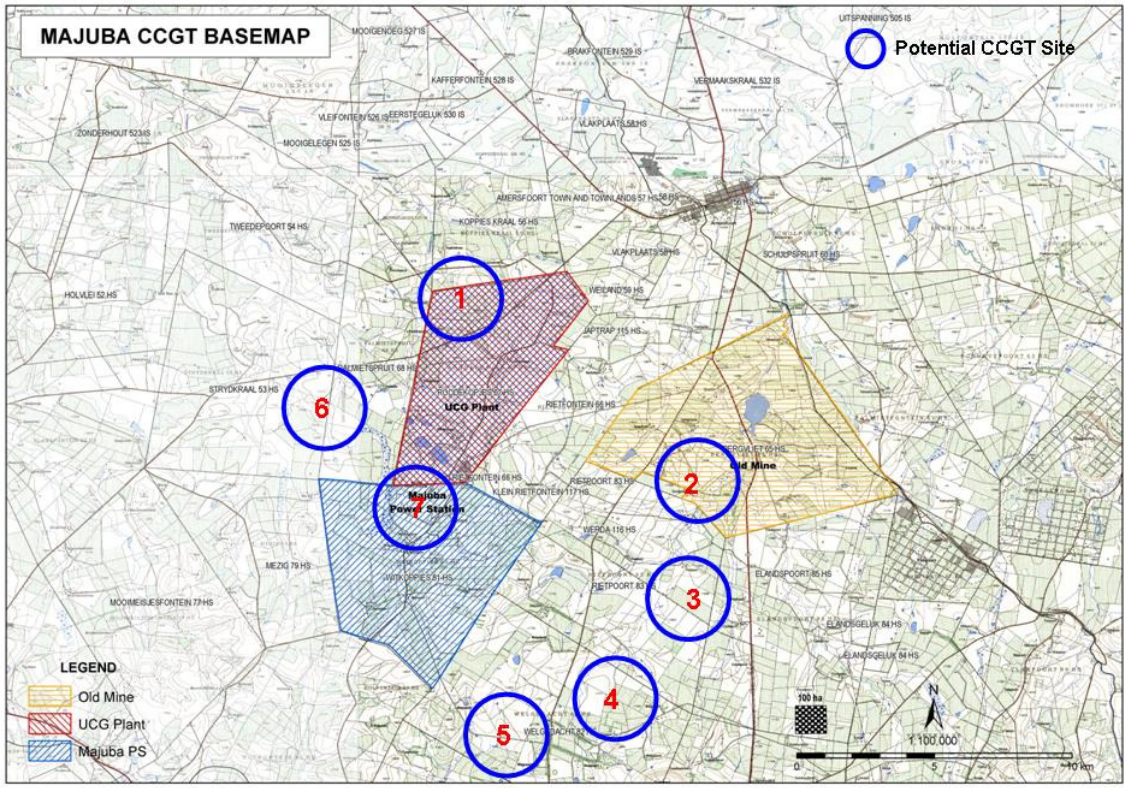

Figure 5.4: Proposed alternative sites

6. ASSESSMENT OF SITES IN THE INITIAL SCOPING STUDY

By utilising the Figures 5.1 – 5.4 in the previous section (Section 5) the following sites within the broader area / farms were identified (with the aid of a site visit):

SITE	FARM	PORTION
1	Roodekopjes 67 HS	Portions 3 and 4
2A	Bergvliet 65 HS Rietpoort 83 HS Werda 116 HS	Portion 7 Portion 4
2B	Rietpoort 83 HS Werda 116 HS	Portions 3 and 4
3	Rietpoort 83 HS	Portions 3 and 4
4	Rietpoort 83 HS Welgedacht 82 HS	Portion 1 Portions 2, 6 and 7
5	Welgedacht 82 HS	Portions 4, 5 and 8
6	Palmietspruit 68 HS Strydkraal 53 HS Roodekopjes 67 HS	Portions 1, 3 and 7 Portion 6 Portion 1
7A	Witkoppies 81 HS	Portions 1, 2, 6, 10 and 11
7B	Witkoppies 81 HS	Portions 1, 5 and 6
7C	Witkoppies 81 HS	Portions 4, 5, 8, 9, 12, 13 and 14

These potential sites (refer to Figure 6.1) were deemed **environmentally feasible** and were therefore nominated for assessment in the initial Environmental Scoping Study by the Environmental Specialist Team

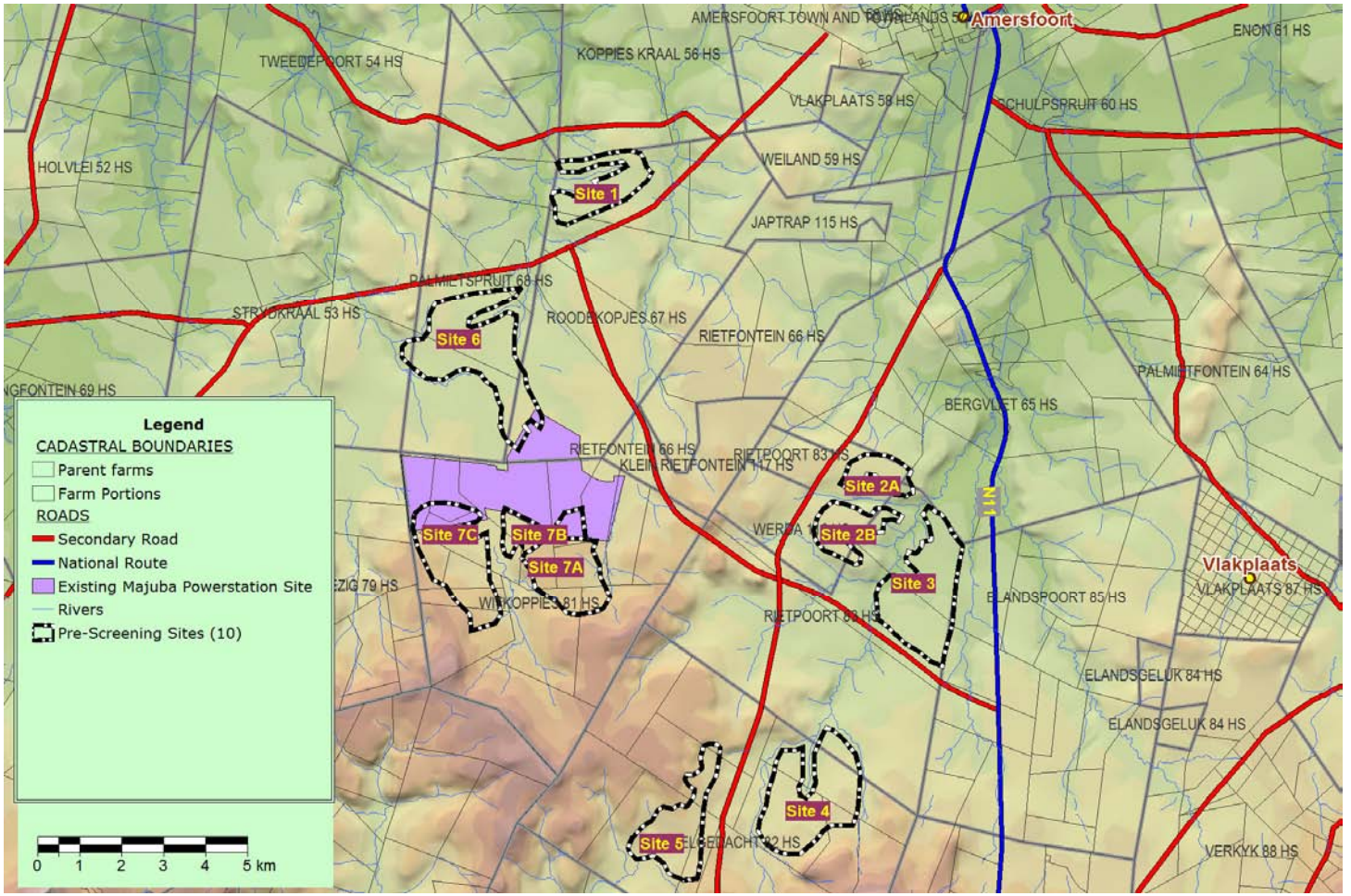

Figure 6.1 Alternative environmentally feasible sites identified in the Screening Study for the development of the CCGT power plant

After early workshops and discussions with the Project Technical Team, Site 1; 3; 4 and 5 listed above were eliminated as they occur in the area earmarked for the future expansion of UCG operations. The following six (6) sites were then proposed for further assessment during the initial Scoping Study (refer to Figure 6.2):

ORIGINAL SITE NUMBER - SCREENING	NEW SITE NUMBER – INITIAL SCOPING	FARM	PORTION
6	**1**	Palmietspruit 68 HS Strydkraal 53 HS Roodekopjes 67 HS	Portions 1, 3 and 7 Portion 6 Portion 1
2A	**2A**	Bergvliet 65 HS Rietpoort 83 HS Werda 116 HS	Portion 7 Portion 4
2B	**2B**	Rietpoort 83 HS Werda 116 HS	Portions 3 and 4
7A	**3A**	Witkoppies 81 HS	Portions 1, 2, 6, 10 and 11
7B	**3B**	Witkoppies 81 HS	Portions 1, 5 and 6
7C	**3C**	Witkoppies 81 HS	Portions 4, 5, 8, 9, 12, 13 and 14

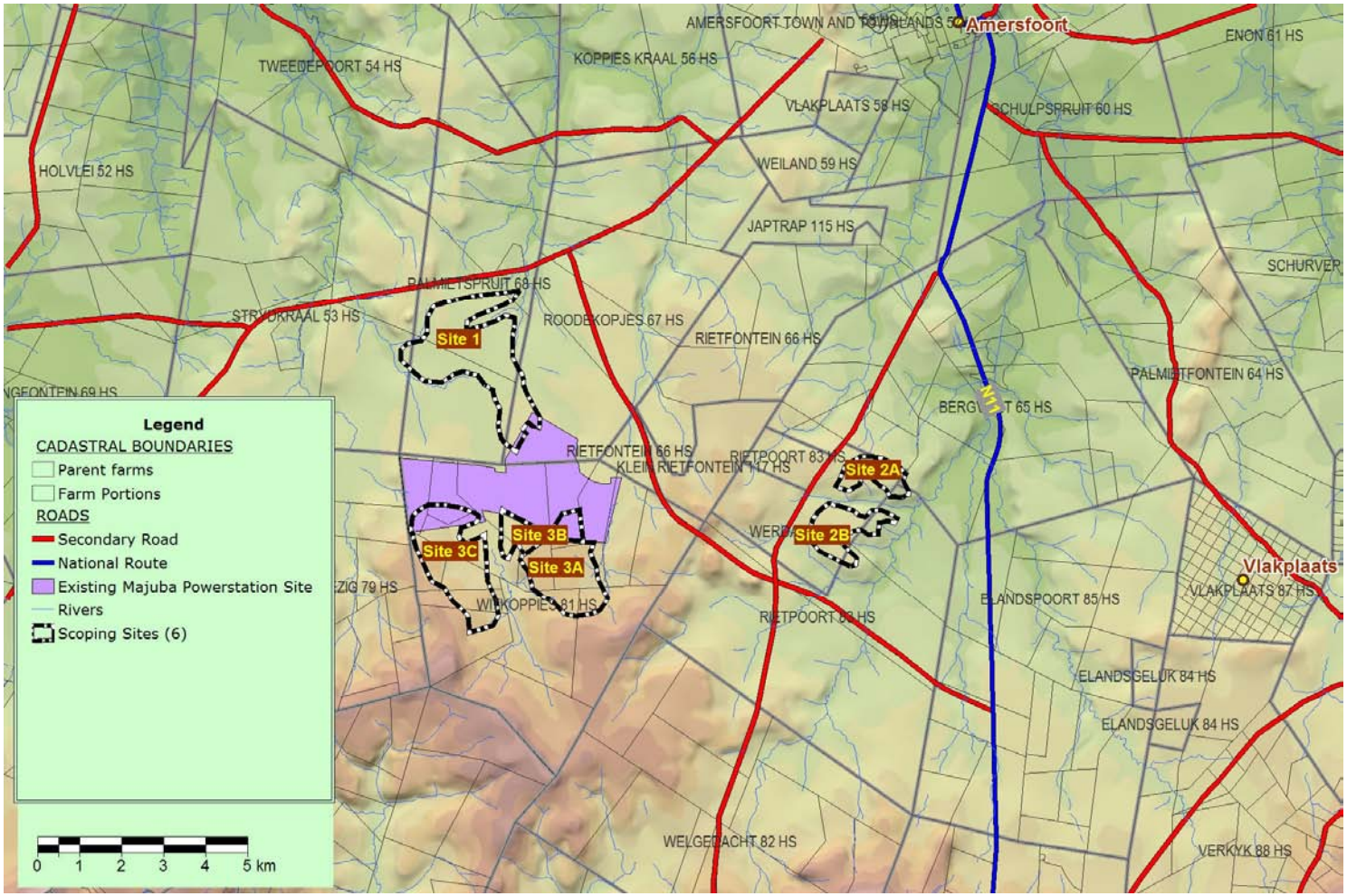

Figure 6.2 Alternative environmentally and technically feasible sites identified for the development of the CCGT power plant

The six sites presented in the table and figure above were further assessed in terms of preference by the Environmental and Technical specialist team in the initial Scoping phase. Sites 1, 3A and 3B were identified as being the most preferred sites for further assessment in the EIA phase of the study.

However, following further workshops and discussions with the Project Technical Team, it became evident that the site identification process required a re-assessment of the sites nominated for further assessment in a revised Scoping Process for the project. The motivation for the re-assessment was that:

The 3 sites that were initially identified were only based on proximity to the UCG operation as a selection criterion. The main objectives of the UCG selection criteria was to locate the new power station as close as possible to the gas field, but off usable coal reserves that can be used in the future. The close proximity was mainly driven by the cost of the gas pipelines - estimated at approximately R20m per km. Sites close to the Majuba power station were preferred by UCG operation as there were already plans to build pipelines to Majuba for co-firing.

Other fatal flaws (for some sites) that were revealed included suitability of the selected sites for the greater Eskom divisions' (Generation, Transmission and Distribution Divisions) processes, as discussed per site below.

Site 1 - The location of the site had two fatal flaws. Firstly, it was located in a position that is in the main wind direction towards Majuba's ACC's. This would have negative thermal impacts on performance of both Majuba power station and the CCGT depending on wind direction. Secondly, it was located in a position where Transmission would not be able to evacuate the power due to major restrictions in constructing new transmission lines.

Sites 3A and 3B - These sites also had two fatal flaws. Firstly, they are downwind of the existing Majuba power station's dry ash dam. Although Majuba power station uses dust suppression measures, there is still a very high dust emission from this dump site during windy conditions, which would create significant problems on the air filtration systems for the CCGT plant. The dust would also create problems during maintenance etc. as it is not ideal to work in dusty environments when opening up turbines. Secondly, **Site 3C** was destined for future expansion of the Majuba power station ash dam, which means that the above mentioned problem would become more significant over time.

Investigations on the coal qualities at the sites earmarked for expansion of the UCG operation revealed that **Site 4 (Figure 6.1 above)** is not suitable for the expansion as the coal is devolatilised. This site therefore became available as a feasible site for location of the CCGT plant.

In light of this, the following potential (environmentally and technically) feasible sites have been identified as suitable to be evaluated during the issues based Scoping Study (refer to Figure 6.3).

SITE NUMBER	FARM	PORTION
Revised site 2A (which includes the mine)	Bergvliet 65 HS Rietpoort 83 HS Werda 116 HS	Portion 7 Portion 4
2B	Rietpoort 83 HS Werda 116 HS	Portions 3 and 4
4	Rietpoort 83 HS Welgedacht 82 HS	Portion 1 Portions 2, 6 and 7

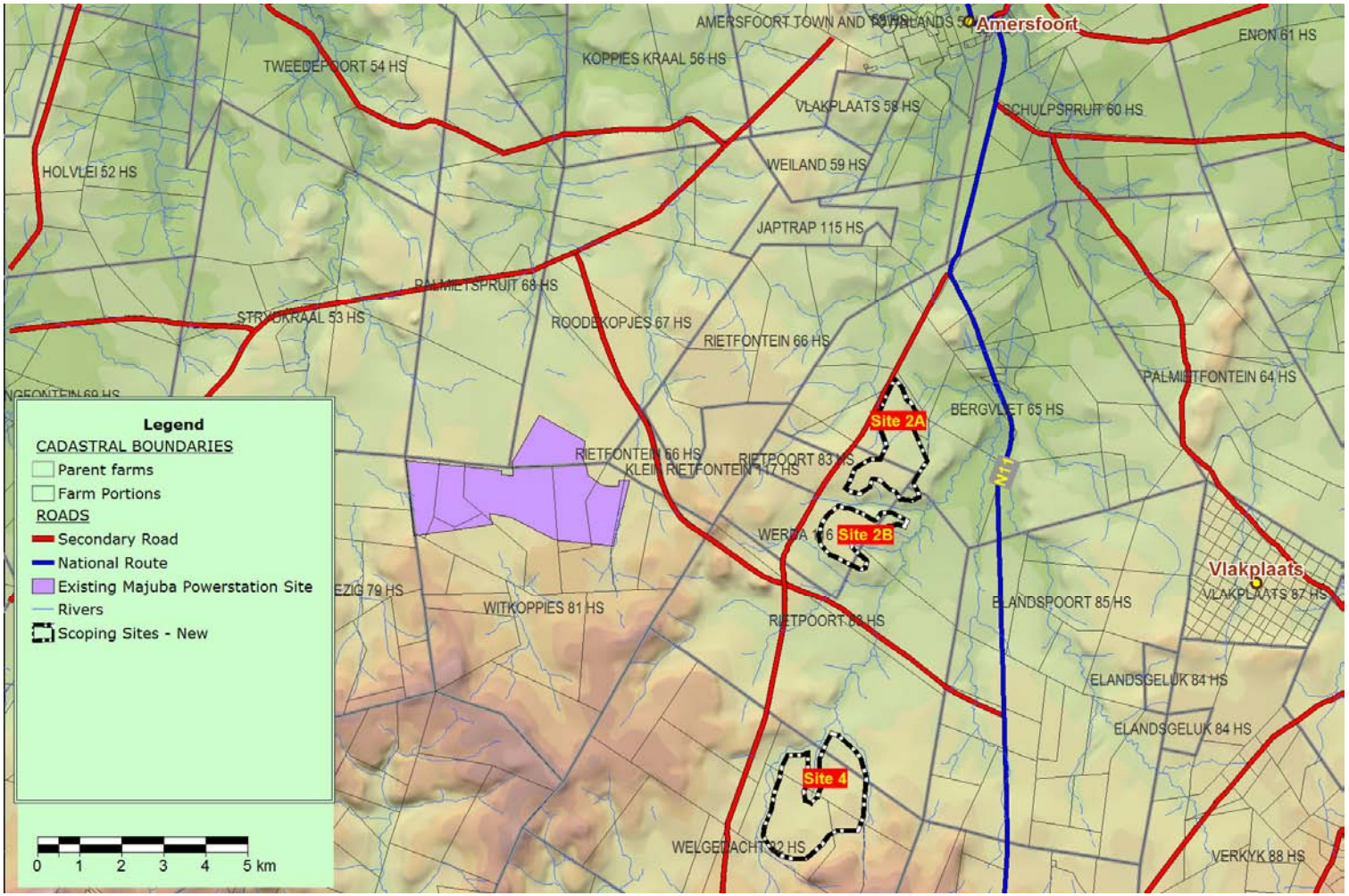

Figure 6.3 Alternative environmentally and technically feasible sites identified for the development of the CCGT power plant

It is evident from the above that a detailed site identification and planning exercise was undertaken during the screening process as well as the initial scoping study in order to identify feasible sites which could accommodate the proposed CCGT plant. The 3 sites identified will be further reported upon in the issues-based Scoping Report.