

**Environmental Impact Assessment for the
proposed Banna Ba Pifhu Wind Energy Project
near Humansdorp, Eastern Cape:
Final Environmental Impact Assessment Report**

Chapter 4:

Approach to the EIA



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CHAPTER 4. APPROACH TO THE EIA

This chapter presents the approach to the impact assessment phase of the EIA process, including public participation. For information on the approach to Scoping, including the relevant legislation, key principles and guidelines that provide the context for this EIA process, refer to the Final Scoping Report (CSIR, 2011).

4.1 PURPOSE AND COMPONENTS OF EIA PHASE

The purpose of the EIA phase is to:

- Address issues that have been raised through the Scoping Process;
- Assess alternatives to the proposed activity in a comparative manner;
- Assess all identified impacts and determine the significance of each impact; and to
- Formulate mitigation measures.

The EIA phase consists of three parallel and overlapping processes:

- Central assessment process involving the authorities where inputs are integrated and presented in documents that are submitted for approval by authorities (Section 4.5);
- Public participation process whereby findings of the EIA phase are communicated and discussed with I&APs and responses are documented (Section 4.3); and
- Specialist studies that provide additional information required to address the issues raised in the Scoping phase (Sections 4.6 and 4.7).

4.2 OVERVIEW OF APPROACH TO PREPARING THE EIA REPORT AND EMPR

The results of the specialist studies and other relevant project information have been summarized and integrated into the Draft and Final EIA Reports. The Draft EIA Report was released for a 45-day I&AP and authority review period, as outlined in Section 4.3. All I&APs on the project database were notified in writing of the release of the Draft EIA for review. During this review period a public meeting was held on 8 May 2012. The purpose of this meeting was to provide an overview of the outcome and recommendations from the specialist studies, as well as provide opportunity for comment. Comments raised through written correspondence (emails, comments, forms) and at the public meeting were captured in a Comments and Responses Trail which is included in Appendix F of the Final EIA Report. Comments raised were responded to by the CSIR EIA team and/or the applicant (Appendix F). These responses indicate how the issue has been dealt with in the EIA process. Should the comment received fall beyond the scope of this EIA, clear reasoning was provided. All comments received were attached as appendix E to the Final EIA Report.

The Final EIA Report includes a draft Environmental Management Programme (EMPR), which was prepared in compliance with the relevant regulations. This EMPR is based broadly on the

environmental management philosophy presented in the ISO 14001 standard, which embodies an approach of continual improvement. Actions in the EMPR were drawn primarily from the management actions in the specialist studies for the construction and operational phases of the project. If the project components are decommissioned or re-developed, this will need to be done in accordance with the relevant environmental standards and clean-up/remediation requirements applicable at the time.

An overview of the approach to the EIA process is provided in Figure 4.1.

4.3 PUBLIC PARTICIPATION PROCESS

The key steps in the public participation process for the EIA phase are described below. This approach has been accepted by DEA through their approval of the PSEIA (letter from DEA dated 22 February 2012, see Appendix B). For background on the public participation during the Scoping Phase, refer to Chapter 4 of the Final Scoping Report.

All I&APs on the project database were notified in writing, via letter 3 dated 9 November 2011, of the submission of the Final Scoping Report and the 21 day comment period. A copy of this correspondence is attached as Appendix D of this report. No comments were received from I&APs during the 21 day comment period on the Final Scoping Report.

Task 1: Review of Draft EIA Report and EMPR

The first stage in the process entailed the release of the Draft EIA Report for a 45-day public and authority review period which extended from the 25 April 2012 to 8 June 2012. The comment period was extended to accommodate public holidays, which fell over the review period. Relevant organs of state and I&APs were informed in writing, via Letter 4 to I&APs (see Appendix D), of the review process in the following manner:

- **Advertisements** – In order to notify I&APs of the comment period and invite them to attend a public meeting, which was held during the 45 day review period, two newspaper advertisements were placed, one in a newspaper with a local distribution and one in a newspaper with a Provincial Distribution. A copy of the newspaper advertisements placed is included as Appendix H of this report:
 - Local Newspaper, Our Times, 25 April 2012
 - Provincial Newspaper, The Herald, 25 April 2012
- **Letter 4 to I&APs** – All I&APs on the project database (including authorities), were notified of the 45 day comment period, which extended from the 25 April 2012 to 8 June 2012, via Letter 4. Included with Letter 4 to I&APs was a comment form and an executive summary of the Draft EIA Report, as well as notification of the public meeting, which was held during the review of the Draft EIA. A copy of the correspondence sent to I&APs is included as Appendix D of this report;
- **Public Meeting** - All I&APs on the project database were invited to attend a public meeting which was held at the Humansdorp Country Club, on the 8 May 2012. The purpose of the meeting was to present the key findings of the Draft EIA report and provide the opportunity for comments to be submitted on the report. Present at the

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meeting were representatives of the EIA team and project proponent. The meeting was attended by nine I&APs. A copy of the notes from the meeting is included in Appendix I of this report and the registration form from the meeting is included as Appendix J. The comments made by I&APs at the meeting have been included in the Comments and Responses Trail which is attached as Appendix F of this report;

- **Focus Group Meeting(s) with I&APs** – no focus group meetings were requested to be held by I&APs, however telephonic consultations were held and the issues raised telephonically have been captured in the Comment and Responses Trail in Appendix F and a transcription of the discussion is included in Appendix E of this report; and
- A site visit was conducted by two officials from the Department of Agriculture (Ms Annette Stoltz and Mr David Kleyn) and a representative from the client, i.e. Mr Cassie Lotter on 6 September 2012. Issues raised by key authorities through written correspondence received have been captured in the Comment and Responses Trail in Appendix F and a copy of the comment is included in Appendix E of this report

The Draft EIA Report and EMPR was made available and distributed through the following mechanisms to ensure access to information on the project and to communicate the outcome of the specialist studies:

- Copies of the report were placed at the Jeffrey's Bay and Humansdorp Municipal Libraries;
- Relevant organs of state and key I&APs were provided with a hard copy and/or CD version of the report;
- Report was placed on the project website: www.publicprocess.co.za

The project database is regularly updated as and when information is sent to or received from I&APs. At the conclusion of the Scoping Process the project database included 59 registered I&APs. Subsequent to the submission of the Final Scoping Report, comments have been received from I&APs. The database was amended and at the time of the release of the Draft EIA it included 64 registered I&APs. The database has again been amended to include participation by I&APs during the review of the Draft EIA and the database for the Final EIA report includes 75 registered I&APs. A copy of the project database is included as Appendix C of this report, which indicates interaction with I&APs (comments received, participation in meetings, correspondence sent to I&APs).

Task 2: Comments and Responses Trail

A key component of the EIA process is documenting and responding to the comments received from I&APs and the authorities. Subsequent to the submission of the Final Scoping Report to DEA and prior to the release of the Draft EIA, comments were received from I&APs. These comments are captured in the Comments and Responses Trail in Appendix F of this report. Copies of the comments received are included in Appendix E. Letter 3 to I&APs regarding notification of submission of the Final Scoping Report is included in Appendix D.

During the Review of the Draft EIA Report and EMPR, comments received have been documented, as indicated below. The comments received are included in the Comments and

Responses Trail in Appendix F, copies of the comments received are included in Appendix E and notes from the public meeting held are included in Appendix I:

- Written and email comments (e.g. letters and completed comment forms);
- Comments made at public meetings;
- One on one meetings with key authorities and/or I&APs; and
- Telephonic consultations.

The comments received have been compiled into an updated Comments and Responses Trail for inclusion in the Final EIA Report. The Comments and Responses trail indicates the nature of the comment, when and who raised the comment. The comments received have been considered by the EIA team and appropriate responses provided by the relevant member of the team and/or specialist. The response provided indicates how the comment received has been considered in the Final EIA Report, in the project design or EMPR for the project.

Task 3: Compilation of Final EIA Report for submission to Authorities

The Final EIA Report, including the Comments and Responses Trail and EMP, will be submitted to the authorities for decision making. Letter 5 will be sent to all I&APs on the project database notifying them of the submission of the final report. The Final EIA Report will be distributed as follows:

- Copies of the report will be placed at the Jeffrey's Bay and Humansdorp Municipal Libraries;
- Relevant organs of state and key I&APs will be provided with a hard copy and/or CD version of the report; and
- Report to be placed on the project website www.publicprocess.co.za.

The EIA is currently at this stage in the process.



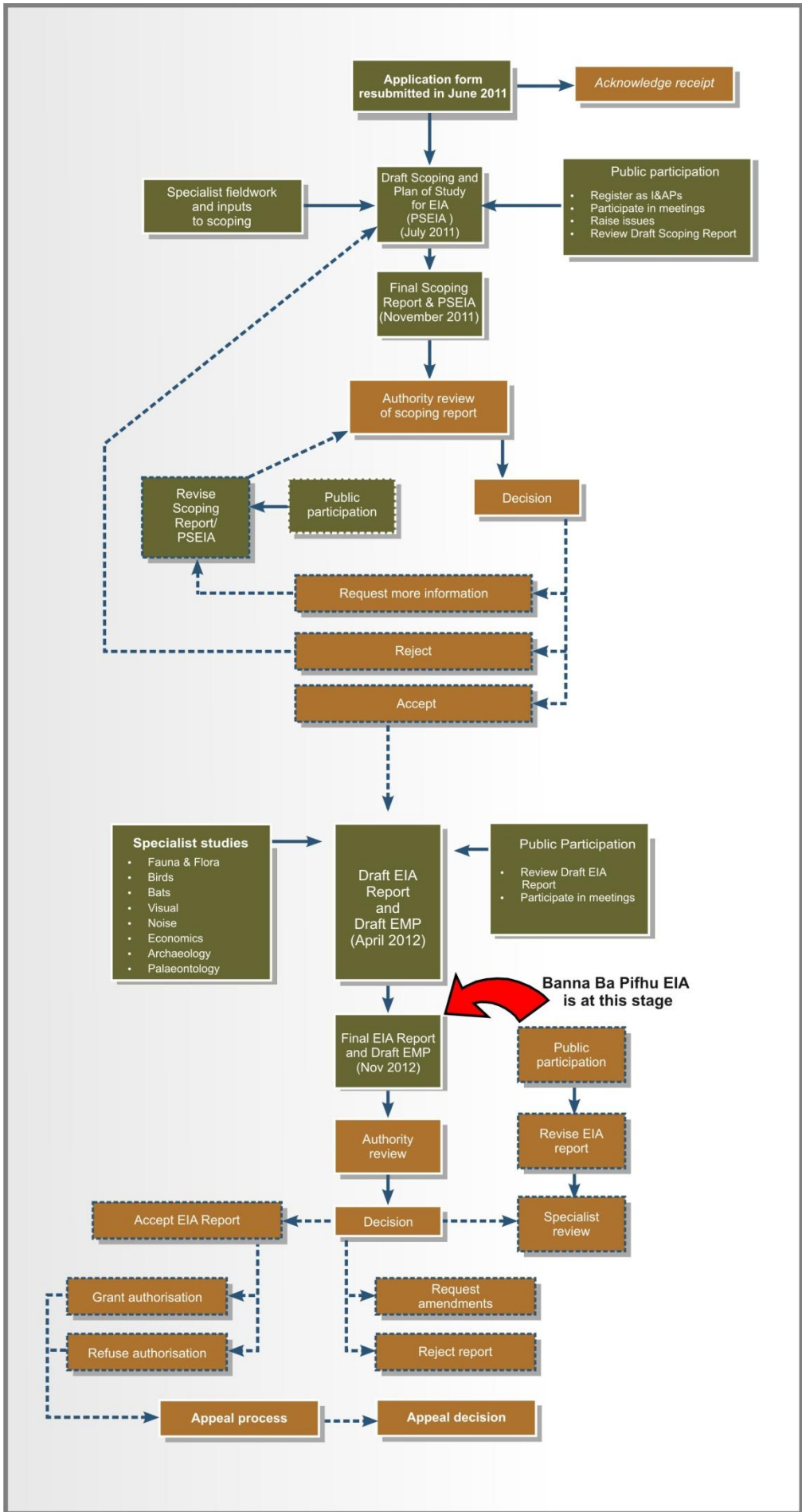


Figure 4.1: EIA process for the Banna Ba Pifhu project

Task 4: Environmental Authorisation and Appeal Period

All I&APs on the project database will be notified of the outcome of the decision making process and the Appeal period. The following process will be followed for the distribution of the Environmental Decision and notification of the appeal period:

- Copies of the Environmental Decision will be placed at the Jeffrey's Bay and Humansdorp Municipal Libraries;
- Letter 6 to be sent to all I&APs (including organs of state), with notification on the availability of the Environmental Decision and information on the Appeal Period;
- Environmental Decision to be placed on the project website; and
- Advertisements to be placed in two local newspaper advertising the environmental decision.

All I&APs on the project database will be notified of the outcome of the appeal period, this notification will be included in Letter 7 to I&APs.

4.4 AUTHORITY CONSULTATION DURING THE EIA PHASE

Authority consultation is integrated into the public consultation process, with additional one-on-one meetings held with the lead authorities where necessary. The authority consultation process for the EIA Process is outlined in Table 4.1 below.

Table 4.1. Authority consultation schedule for the EIA phase

Stage in EIA Phase	Form of Consultation (including provisional dates)
During Scoping phase	Ad hoc communications with DEA to discuss the outcome of the Scoping process.
During preparation of draft EIA Report and Draft EMP	Ad hoc communications with DEA to discuss the outcome of the Scoping process, preparation of the draft EIA and draft EMP and other legislative issues that may arise.
Public Review of draft EIA report and draft EMP; and attend public meeting	Review of draft reports: Authorities, together with other stakeholders, had the opportunity to review the Draft EIA and EMP reports during the 45- day review period; and to attend the public meeting. The public meeting was held on 8 May 2012.
During the EIA process	Site visit: A site visit was conducted with officials from the Department of Agriculture (Ms Annette Stoltz and Mr David Kleyn) and a representative from the client, i.e. Mr Cassie Lotter on 6 September 2012.
During Final EIA report phase	Decision on final reports: Meetings with dedicated departments, if requested by DEA, with jurisdiction over particular aspects of the project (e.g. Local Authority) and potentially including relevant specialists.

4.5 APPROACH TO SPECIALIST STUDIES AND IMPACT ASSESSMENT

This section outlines the assessment methodology and legal context for specialist studies.

4.5.1 Generic Terms of Reference for the assessment of impacts

The identification of potential impacts should include impacts that may occur during the construction and operational phases of the activity. The assessment of impacts is to include direct, indirect as well as cumulative impacts.

In order to identify potential impacts (both positive and negative) it is important that the nature of the proposed activity is well understood so that the impacts associated with the activity can be understood. The process of identification and assessment of impacts will include:

- Determine the current environmental conditions in sufficient detail so that there is a baseline against which impacts can be identified and measured;
- Determine future changes to the environment that will occur if the activity does not proceed; and
- An understanding of the activity in sufficient detail to understand its consequences; and
- The identification of significant impacts which are likely to occur if the activity is undertaken.

The following methodology is to be applied to the predication and assessment of impacts. Potential impacts should be rated in terms of the direct, indirect and cumulative:

- **Direct impacts** are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.
- **Indirect impacts** of an activity are indirect or induced changes that may occur as a result of the activity. These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.
- **Cumulative impacts** are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities. Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.
- **Spatial extent** – The size of the area that will be affected by the impact:
 - Site specific
 - Local (<2 km from site)
 - Regional (within 30 km of site)
 - National.

- **Intensity** –The anticipated severity of the impact:
 - High (severe alteration of natural systems, patterns or processes)
 - Medium (notable alteration of natural systems, patterns or processes)
 - Low (negligible alteration of natural systems, patterns or processes).
- **Duration** –The timeframe during which the impact will be experienced:
 - Temporary (less than 1 year)
 - Short term (1 to 6 years)
 - Medium term (6 to 15 years)
 - Long term (the impact will cease after the operational life of the activity)
 - Permanent (mitigation will not occur in such a way or in such a time span that the impact can be considered transient).

Using the criteria above, the impacts will further be assessed in terms of the following:

- **Probability** –The probability of the impact occurring:
 - Improbable (little or no chance of occurring)
 - Probable (<50% chance of occurring)
 - Highly probable (50 – 90% chance of occurring)
 - Definite (>90% chance of occurring).
- **Significance** – Will the impact cause a notable alteration of the environment?
 - Low to very low (the impact may result in minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making)
 - Medium (the impact will result in moderate alteration of the environment and can be reduced or avoided by implementing the appropriate mitigation measures, and will only have an influence on the decision-making if not mitigated)
 - High (the impacts will result in major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making).
- **Status** - Whether the impact on the overall environment will be:
 - positive - environment overall will benefit from the impact
 - negative - environment overall will be adversely affected by the impact
 - neutral - environment overall not be affected.
- **Confidence** – The degree of confidence in predictions based on available information and specialist knowledge:
 - Low
 - Medium
 - High.
- Management Actions and Monitoring of the Impacts (EMPR)
- Where negative impacts are identified, mitigatory measures will be identified to avoid or reduce negative impacts. Where no mitigatory measures are possible this will be stated
- Where positive impacts are identified, augmentation measures will be identified to potentially enhance positive impacts

- Quantifiable standards for measuring and monitoring mitigatory measures and enhancements will be set. This will include a programme for monitoring and reviewing the recommendations to ensure their ongoing effectiveness.

The impacts will be further assessed in terms of the following:

The **reversibility of impacts** and the degree to which the impact can cause **irreplaceable loss of resources** as indicated below as indicated in subregulation 31 (2) (l) (v) and (vii) of the NEMA 2010 EIA Regulations.

ASSESSMENT OF THE REVERSIBILITY OF IMPACT

Assessment term	Explanation of how to use this term
High reversibility of impacts	This is the <u>most</u> favourable assessment for the environment. For example, the nuisance factor caused by noise impacts from wind turbines can be considered to be highly reversible at the end of the project life, when
Moderate reversibility of impacts	
Low reversibility of impacts	
Impacts are non- reversible	This is the least favourable assessment for the environment. The impact is permanent. For example, the loss of a paleontological resource on the site caused by turbine foundations could be non-reversible.

ASSESSMENT OF THE DEGREE TO WHICH THE IMPACT CAUSES IRREPLACEABLE LOSS OF RESOURCES

Assessment term	Explanation of how to use this term
High irreplaceability of resources	This is the <u>least</u> favourable assessment for the environment. For example, if the project will destroy unique wetland systems, these may be irreplaceable.
Moderate irreplaceability of resources	
Low irreplaceability of resources	
Resources are replaceable	This is the most favourable assessment for the environment.

The Table below is to be used by specialists for the rating of impacts.

Table 4.2: Table for rating of impacts

Direct Impacts							
Mitigation	Spatial Extent	Intensity	Duration	Probability	Significance & Status		Confidence
					Without Mitigation	With Mitigation	
e.g. Impact on Flora from increased risk of alien invasion in disturbed areas							
Alien invasive monitoring to be implemented as per EMP	Site	Medium	Long term	High	Medium	Low	Medium

The proposed impacts will be further assessed in terms of reversibility and the degree to which the impact can cause irreplaceable loss of resources as explained above.

Other aspects to be taken into consideration in the assessment of impact significance are:

- Impacts will be evaluated for the construction and operation phases of the development. The assessment of impacts for the decommissioning phase will be brief, as there is limited understanding at this stage of what this might entail. The relevant rehabilitation guidelines and legal requirements applicable at the time will need to be applied;
- The impact evaluation will, where possible, take into consideration the cumulative effects associated with this and other facilities/projects which are either developed or in the process of being developed in the local area; and
- The impact assessment will attempt to quantify the magnitude of potential impacts (direct and cumulative effects) and outline the rationale used. Where appropriate, national standards are to be used as a measure of the level of impact.

4.6 SPECIFIC ISSUES TO BE ADDRESSED IN SPECIALIST STUDIES

Based on an evaluation of issues to date, the following Specialist Studies are proposed as part of the EIA phase:

Table 4.3: Specialist studies

Specialist Studies		
Jamie Pote	Private Consultant	Ecology (Flora and Fauna)
Chris van Rooyen	Chris van Rooyen Consultants	Birds
Stephanie Dippenaar	Private Consultant	Bats (Draft EIA Report)
Kate MacEwan	Natural Scientific Services	Bats (Final EIA Report)
Henry Holland	Mapthis	Visual impacts
Brett Williams	SafeTech	Noise
Dr Hugo van Zyl	Independent Economic Researchers	Economics
Dr Johan Binneman	Albany Museum	Archaeology
Dr John Almond	Natura Viva	Palaeontology
Dr Brian Colloty	Scherman Colloty & Associates	Aquatic (Wetland) specialist
Johann Lanz	Private Consultant	Soil and Agricultural potential
Public Participation Process		
Sandy Wren	Public Process Consultants	Public Participation Process

The Terms of Reference (ToR) for the specialist studies essentially consisted of the generic assessment requirements and the specific issues identified for each study. These issues have been identified through the baseline studies, I&AP and authority consultation during the scoping phase, as well as input from the proposed specialists based on their experience. As part of the review of the Draft Scoping Report, specialists were requested to propose any additional issues for inclusion in the specialist studies. Additional issues, identified through public and authority consultation during Scoping, as well as specialist inputs, were included in the final Terms of Reference for specialists.

4.6.1 *Fauna and Flora*

The ecological specialist study included the following:

- Describe the vegetation in the study area.
- Determine species composition of each vegetation type, and the presence of potential protected species.
- Describe the current state of the vegetation on site.
- Describe the conservation status and value of the vegetation.
- Describe transformations and invasive alien plant species.
- Provide a vegetation sensitivity map of the sites.

- Include Faunal Assessment (Mammal; amphibian and reptile).
- Identify and assess potential impacts on fauna and flora, outline mitigatory measures and outline additional management guidelines.
- Assess the significance of the impacts on fauna and flora.
- Indicate potential no go areas; and
- Identify management actions to avoid or reduce negative impacts on fauna and flora for inclusion in the EMPR.

4.6.2 Birds

The bird specialist study included the following:

- A desktop review of available information that can support and inform the specialist study i.e. potential impacts on birds.
- Establish which species may occur in the area, their relevant conservation status and which ones would be potentially most at risk.
- Identification of issues and potential impacts related to birds, which are to be considered in combination with any additional relevant issues that may be raised through the public consultation process.
- Assessment of the potential, as well as potential cumulative impacts on birds, both positive and negative, associated with the proposed project for the construction, operation and decommissioning phases.
- Compilation of a bird sensitivity map or identification of buffer zones and no-go areas to inform the turbine layout.
- Identification of management actions to avoid or reduce negative impacts; and to enhance positive benefits of the project on avifauna; and
- In addition to the specialist study, a pre-construction bird monitoring programme is being undertaken. The results and recommendations of this monitoring programme should be included in the specialist bird reports and EMPR.

4.6.3 Bats

The bat specialist study included the following:

- Identify and assess the potential impacts of the wind project on bats and bat mortality.
- Establish which species may occur in the area and their relevant conservation status.
- Conduct field work to assess bat species presence at the proposed site, the presence of any large bat roosts or maternity colonies, and areas of foraging activity.
- Identify potential management plans to reduce the impact of the wind farm on the local bat community.
- Compilation of a bat sensitivity map or identification of buffer zones and no-go areas to inform the turbine layout; and
- In addition to the specialist study, a pre-construction bat monitoring programme is being undertaken. The results and recommendations of this monitoring programme should be included in the specialist bat reports and the EMPR. It should be noted that the bat monitoring programme was undertaken by Natural Scientific Services. The monitoring data obtained to date was included and used to inform the Final EIA Report. At the start of the

EIA process the bat study was undertaken by Ms Stephanie Dippenaar (Private Consultant) and was included in the Draft EIA Report.

4.6.4 Visual

The visual specialist study included the following:

- Conduct a site visit to identify potential visual sensitive receptors.
- Identify and assess the potential visual impacts of the wind project on landscape character and sense of place, including a viewshed analysis and taking into consideration factors such as visual sensitivity and visual absorption capacity. This should be done in combination with any additional relevant issues that may be raised through the public consultation process.
- Identify possible cumulative impacts related to the visual aspects for the proposed project.
- Assess the potential impact/impacts (including flicker effects), both positive and negative, associated with the proposed project for the construction, operation and decommissioning phases; and
- Identify management actions to avoid or reduce negative visual impacts for inclusion in the EMPR.

4.6.5 Noise

The noise specialist study included the following:

- Conduct a site visit to identify potential noise sensitive receptors.
- Identify issues and potential impacts, as well as possible cumulative impacts, related to the noise aspects for the proposed project.
- The measurement of the existing ambient noise (day and night time).
- A noise study/modelling of the future potential impact/s during construction and operation of the proposed project, taking into consideration sensitive receptors.
- Identify and assess the potential impacts associated with the proposed project for the construction, operation and decommissioning phases; and
- Identify management actions to avoid or reduce negative noise impacts for inclusion in the EMPR.

4.6.6 Economic

The Economic specialist study included the following:

- Describe the existing socio-economic characteristics/context of the local area and broader region.
- Identify and assess potential socio-economic impacts (e.g. job creation, skills development and training, community investment programmes, promotion of secondary industries etc) at local as well as wider scales as relevant. These are expected to include the following:

- Broad level review of the need and financial viability/risks associated with the project.
- Degree of fit with local, regional and national economic development visions and plans including renewable energy planning.
- Impacts on overall economic development potential in the area including impacts on commercial enterprises nearby the site (incl. agriculture, small businesses, tourism establishments and others).
- Impacts associated with project expenditure on direct and indirect employment and household incomes. These impacts should be investigated through an examination of how the project and the spending injection associated with it may impact on the local, regional and national economy.
- Impacts associated with environmental impacts that have economic implications. This should focus on positive impacts associated with renewable energy use as well as potential negative impacts on neighbouring land owners should they be relevant.
- Recommend mitigation measures to both minimise the negative socio-economic effects, and to maximise the positive socio-economic effects of the proposed development, both during construction and operations.
- Address any additional issues raised through the public participation process, and
- Propose and implement additional ToR, if required, based on professional expertise, experience and compliance with the relevant specialist study guidelines and best practice.

4.6.7 Heritage (Archaeology, Palaeontology, historical and cultural aspects)

- Identify and assess potential impact on archaeology (e.g. stone age artefacts)
- Identify and assess potential impact of excavations on palaeontology (e.g. fossils).
- Identify and assess potential impacts on the built environment or places of historical and cultural significance (e.g. national monuments and grave sites).
- Identify management actions to avoid or reduce negative impacts on heritage for inclusion in the EMPR.

4.6.8 Wetland and Aquatic Impact Assessment

- A desktop biodiversity assessment of the study area. This would cover the development footprint in relation to available ecological information related to wetland and riverine ecosystems functioning within the region.
- A map demarcating the relevant local drainage area of the respective wetland/s, i.e. the wetland, its respective catchment and other wetland areas within a 500 m radius of the study area. This will demonstrate, from a holistic point of view the connectivity between the site and the surrounding regions, i.e. the zone of influence.
- Maps depicting demarcated wetland areas delineated to a scale of 1:10 000, following the methodology described by the Department of Water Affairs, together with a classification of delineated wetland areas. A detailed methodology is supplied in the Annexure.
- The determination of the ecological state of any wetland and riparian area, estimating their biodiversity, conservation and ecosystem importance. This will be based on the latest Present Ecological State / Ecological Importance & Sensitivity (PES/EIS)

methodology being developed by DWA and SC&A for the Eastern Cape Province. Note that this determination will not include avifaunal, herpetological or invertebrate studies; however possible habitat for species of special concern would be commented on.

- Recommend buffer zones and No-go areas around any delineated wetland areas based on the relevant legislation (e.g. Eastern Cape Biodiversity Conservation Plan guidelines) or best practice judgement for those systems that are found to have ecological value, and should be retained.
- Assess the potential impacts, based on a supplied methodology.
- Provide mitigations regarding project related impacts, including engineering services that could negatively affect demarcated wetland areas.
- Supply the client with geo-referenced GIS shape files of the wetland / riverine areas.

4.6.9 Soil and Agricultural potential

- Provision of a site plan
- Mapping of soil forms and identification of the following soil characteristics
 - soil depth
 - soil colour
 - clay content
 - limiting factors
- Indication of the slope of the site.
- Identification of land use, developments and access routes on and surrounding the site.
- Assessment of the status of the land including erosion, vegetation and degradation.
- Identification of possible land use options for the site.
- An assessment of the potential impact of the development on agriculture and identification of possible mitigation measures to reduce potential impacts.
- Rehabilitation plan to rehabilitate the roads after construction.

4.7 SUPPORTING TECHNICAL STUDIES

Aviation

WKN Windcurrent obtained approval from the South African Civil Aviation Authority for the proposed Banna Ba Pifhu project (see letter in Appendix G).

Shadow flicker study

A shadow flicker study was conducted by WKN Windcurrent and the impacts were assessed by the visual specialist, Mr Henry Holland.

4.8 APPROACH TO THE ASSESSMENT OF ALTERNATIVES

Subregulations 31 (2) (g) and (i) of the NEMA 2010 Regulations require that the EIA Report includes a description and comparative assessment of all alternatives identified during the environmental impact assessment process. Alternatives are different means of meeting the general purpose and need of a proposed activity. This may include the assessment of site

alternatives, activity alternatives, process or technology alternatives, temporal alternatives and/or the no-go alternative.

The EIA Regulations indicate that alternatives that are considered in an assessment process be reasonable and feasible. I&APs must also be provided with an opportunity of providing inputs into the process of formulating alternatives. The assessment of alternatives should, as a minimum, include the following:

- The consideration of the no-go alternative as a baseline scenario;
- A comparison of the selected alternatives; and
- Providing reasons for the elimination of an alternative.

An overview of the alternatives is provided below, together with updated information that incorporates the revised layout alternatives and findings from the specialist studies.

4.8.1 Location Alternatives

During the pre-feasibility for the project, WKN Windcurrent reviewed a range of potential sites in the Kouga Region. These sites were evaluated based on a range of criteria such as:

- Local wind climate, using data from local weather stations in the area;
- Local power line network, including existing grid availability, stability and capacity, local power utilisation, future developments and planned power line upgrades;
- Road access for construction and operational maintenance and the topography of the site;
- Existing wind farm development proposals;
- Engagement with landowners; and
- The visibility of the project with regard to local habitation and tourism.

Based on the above review, WKN Windcurrent selected the Banna Ba Pifhu site located near Humansdorp (subject of this EIA) as its preferred option. Following site selection WKN Windcurrent moved forward towards a feasibility study. An environmental screening study for the Banna Ba Pifhu site was undertaken by the CSIR in November 2009. Based on this preliminary screening, and information available from the authorities at the time that was relevant to the siting of wind energy projects, it was concluded that there were no fatal flaws identified from an environmental perspective that would necessitate termination of the project at this stage, provided that the exclusion criteria are reviewed in more detail as part of the forthcoming planning in the EIA phase.

4.8.2 No-go alternative

This alternative is included in the EIA as a benchmark against which to assess the impacts (positive and negative) of the proposed Banna Ba Pifhu Wind Energy Project. The main negative implications of the no-go option are a lack of generation of additional power by the wind farm for supply to the national grid and lack of investment associated with the project (including both direct investment as well as associated investments such as via the Local Economic Development Plan specified in the REIPPP process).

Selecting the no-go alternative will prevent the risk of bird and bat mortalities as no turbines would be erected. Furthermore, potential negative impacts on vegetation, fauna and the visual character of the area, aquatic systems, agricultural and heritage resources would also be avoided by the no-go alternative. Potential positive impacts on the socio-economic environment will not be realised.

4.8.3 Land use alternative

At present the proposed site is zoned for Agriculture, and is mainly used for extensive cattle grazing. WKN Windcurrent intends to diversify the use of renewable energy resources by erecting both a solar and a wind energy facility on the same farm. In addition to the application for a proposed wind farm, WKN Windcurrent also submitted an application to DEA for the erection of a 4.5 MW photovoltaic (PV) solar PV project on portion 15 of farm 689 and portion 1 of farm 868 (DEA reference number: 12/12/20/2236). These properties are included in the study area for the proposed Banna Ba Pifhu wind farm. The closest turbine will be located 389 m from the PV facility (Figure 2.4 in Chapter 2). The PV project requires a Basic Assessment in terms of the 2010 EIA Regulations. The Final Basic Assessment Report has been submitted to DEA for decision-making in December 2011 (CSIR Ref No: Stel General: 9291). A decision from DEA is currently pending.

4.8.4 Technology alternatives as part of the development

The only feasible technological alternative to the horizontal axis wind turbine (HAWT) is the vertical axis wind turbine (VAWT). With the VAWT system, the turbine rotor shaft is mounted vertically as opposed to the horizontal mount of the HAWT (Figure 4.2). Such a configuration affords the VAWT various advantages, most notably; easy access to the turbine gearbox and relative quiet operation. WKN Windcurrent, however, did not consider VAWT to be a reasonable alternative technology due to the unproven nature of these turbines at a commercial or Megawatt scale as well as its reduced efficiency (due to its relative low height and subsequent lower wind speeds at ground level) compared to that of HAWT (REFOCUS, 2003). Further the HAWT have proven worldwide that it has installed capacity of more than hundred GW.

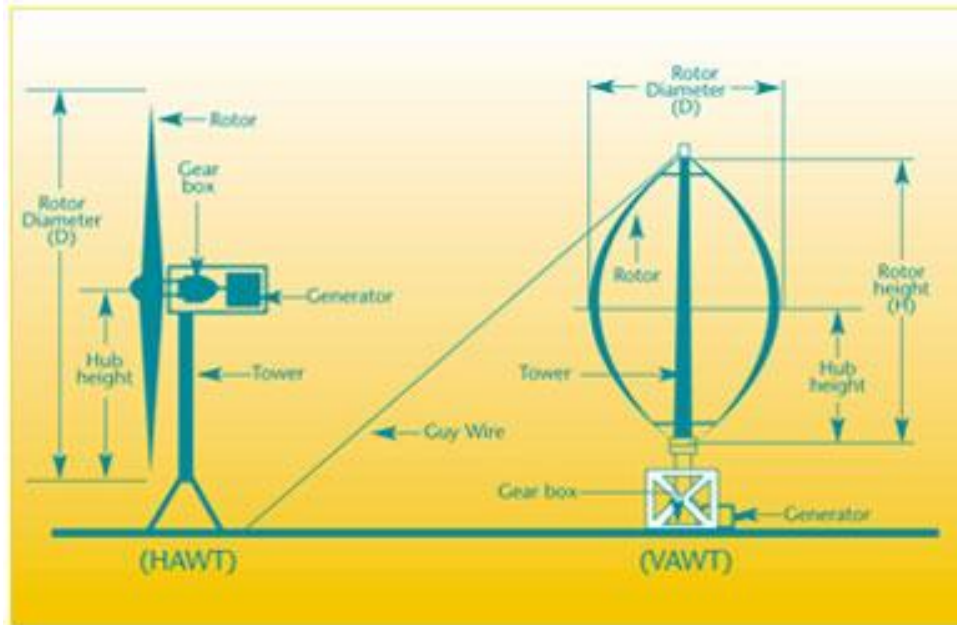


Figure 4.2: Comparison between HAWT and VAWT systems (not to scale)

4.8.5 Activity Alternatives as part of the development

The fundamental goal of the WKN Windcurrent project is the economically viable generation of renewable energy (RE) on a commercial scale. Theoretically, RE alternatives which could potentially achieve the same power generation targets include solar power generation (concentrated solar power and photovoltaic), hydro-electricity and biomass-based energy generation. Wind energy was selected as the energy source of choice due to the very favourable wind regime of the Kouga area, compared to the relatively poor solar, hydro and biomass resources in the study area (refer to Figures 4.3 to 4.6).

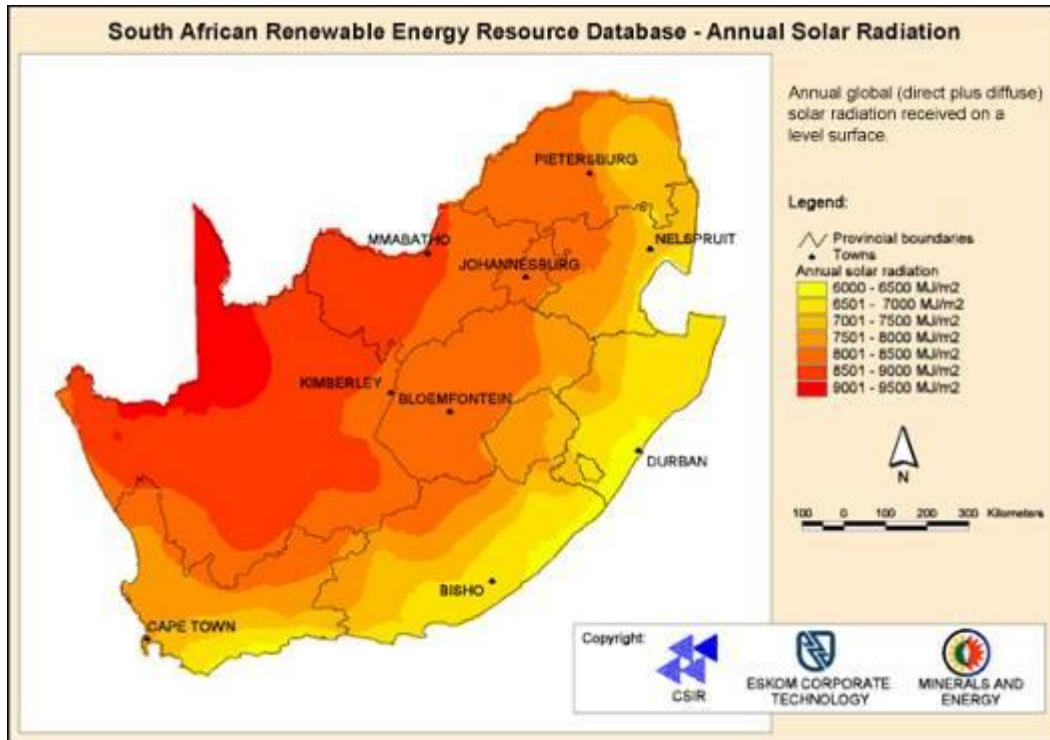


Figure 4.3: South African annual solar radiation in MJ/m⁴

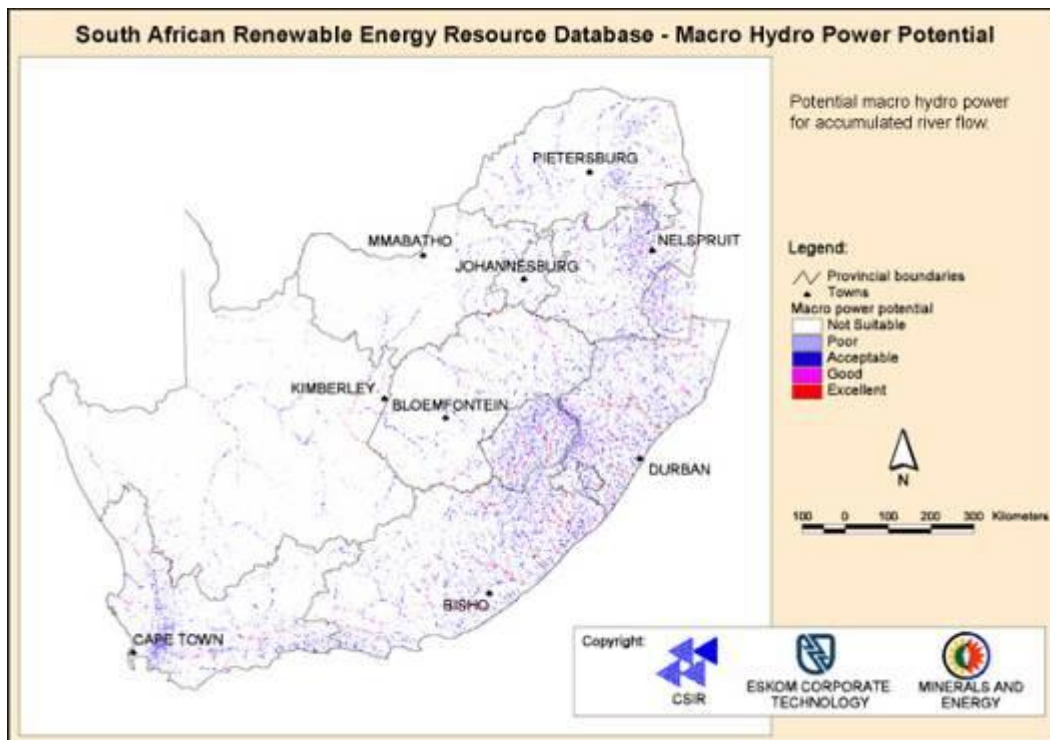


Figure 4.4: South African macro hydro power potential

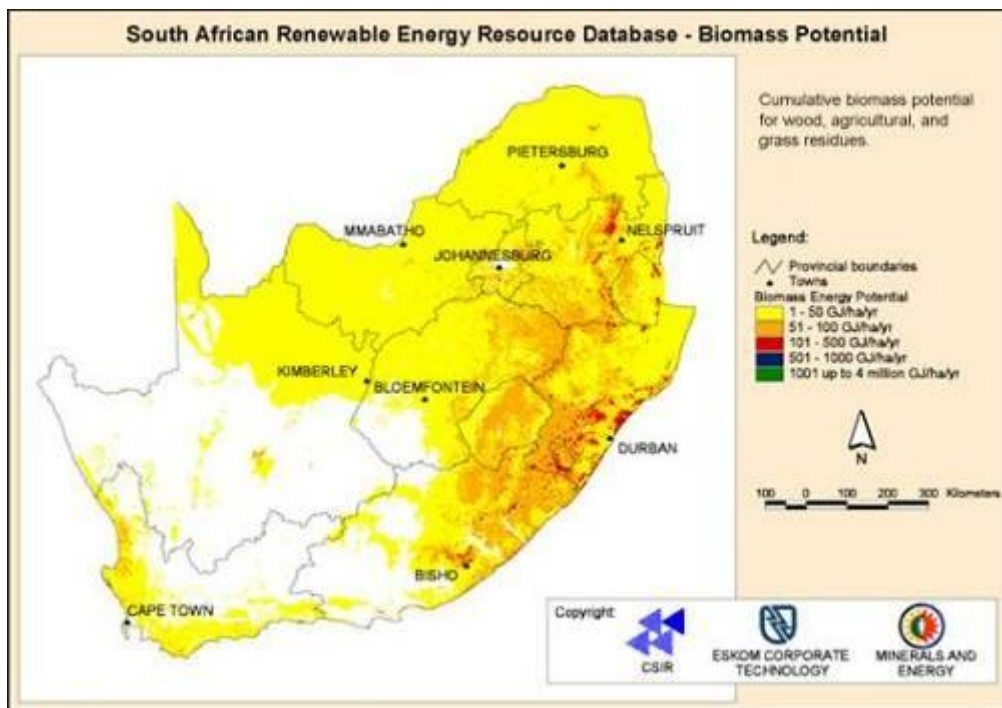


Figure 4.5: South African biomass potential

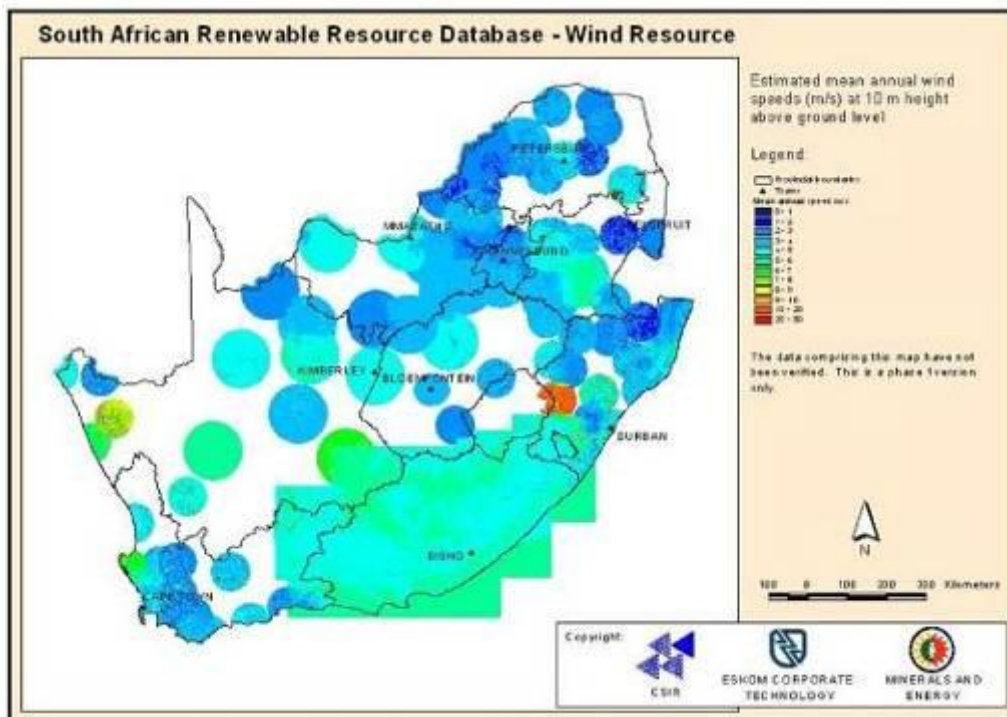


Figure 4.6: South African wind resource with the study area receiving between 4-5m & 5-6m/second mean annual wind speeds

4.8.6 Project scale and grid connection alternatives

Preferred Alternative: 30.6 MW

At the start of the EIA process, this project was planned with a maximum generation capacity of 50 MW and a maximum of 28 wind turbines. WKN Windcurrent has subsequently decided to decrease the total capacity from 50 MW to **30.6 MW** (approx. 9 to 17 turbines). The actual number of turbines will be dependent on the capacity of the turbines selected in the range between 1.8 and 3.2 MW.

Since the release of the Draft EIA Report in April 2012, Eskom has conveyed to WKN Windcurrent that the existing 66 kV Melkhout / St. Francis overhead powerline can only receive an additional connection of up to approximately 30 MW from this project. WKN Windcurrent has thus decided to decrease the total capacity from 50 MW to 30.6 MW in order to utilize the on-site grid connection. The wind turbines will be connected to each other and to the substation using medium voltage cables which will, in most cases, be buried approximately 1 m below ground, except where a technical assessment of the proposed design suggests that above ground lines are appropriate. A new substation will be built on site to connect to the distribution or transmission system (maximum footprint of 100 m by 100 m). It is proposed to connect the 30.6 MW wind farm substation to the existing 66 kV Melkhout / St. Francis overhead powerline, which passes through the site. The connection from the new substation to the Eskom grid line would be via an overhead line supported on intermediate poles.

Alternative 1: 50 MW

As explained in the section above, the maximum capacity at the start of the EIA process was **50 MW**. At that stage of the EIA process, it was proposed to connect the wind farm either to the existing 66 kV Melkhout / St. Francis overhead powerline, which passes through the site, or to build a new 132 kV overhead powerline which would connect the wind farm to the Melkhout substation, located approximately 7 km north of the site. This 50 MW option is now the second choice for WKN Windcurrent and is referred to in this report as "**Alternative 1**".

4.8.7 Turbine size and number of turbines alternatives as part of the development

Different scales of turbines and different turbine technology providers were considered by WKN Windcurrent. When considering alternative suppliers, key factors were availability of turbines on the international market, suitable to the South African wind climate, and service levels and experience in South Africa.

Preferred Alternative: 30.6 MW

WKN Windcurrent proposes to establish approximately 9 to 17 wind turbines, depending on the capacity of the turbines to be used (i.e. 1.8 MW or 3.2 MW). The total installed capacity will be a maximum of 30.6 MW. The proponent is considering a multitude of turbine suppliers. The preferred supplier and turbine capacity will be chosen later in the EIA process.

Alternative 1: 50 MW

WKN Windcurrent proposes to establish a maximum of 28 wind turbines, depending on the capacity of the turbines to be used (i.e. 1.8 MW or 3.2 MW). The total installed capacity will be a maximum of 50 MW.

Three potential alternative turbine sizes for the proposed 50 MW Banna Ba Pifhu wind energy project are provided below:

- (2 MW) –comprising 25 turbines (and 3 potential additional turbines);
- (2.5 MW) comprising 20 turbines (and 3 potential additional turbines); and
- (3 MW) – comprising 17 turbines (and 2 potential additional turbines).

These alternative turbine locations will be used should individual turbine locations of the current proposed locations not be favourable from an environmental perspective.

4.8.8 Turbine layout alternatives as part of the development

The specialists have assessed both alternative layouts-first the layout comprising 50 MW (**Alternative 1**) and then the **preferred alternative** layout comprising **30.6 MW** later in the EIA process. The specialists assessed the alternative layouts based on various factors such as the proximity to dwellings, proximity to roads, access to roads, proximity to undisturbed natural areas, wetlands or water courses, the ecological (fauna and flora) sensitivity of the proposed area as well as the sensitivity of the area from a birds, bats, noise, visual heritage, socio-economic and agricultural perspective. The turbine layout was also informed by the wind regime (climate).

The specialists made recommendations to the two alternative layouts to reduce environmental impacts. These recommendations include *inter alia* the relocation of some turbines to avoid irrigated land and the increase of buffer zones between some of the turbines and the wetland areas. The recommendations from the specialists were taken into account by the project proponent and incorporated into the layout.

The current preferred alternative layout of 30.6 MW is based on the Vestas V100 1.8 MW turbine (Figure 4.7). It comprises 17 turbines and represents all the different proposed turbine types ranging from 1.8 MW to 3.2 MW; 9 to 17 turbines). The layout for alternative 1 of 50 MW is based on the Vestas V90 2MW turbine and comprises 25 turbines with three optional turbine positions (Figure 4.8).

The current preferred layout was reviewed by the specialists and they are satisfied that their requirements are met. They concluded that the potential environmental impact of the preferred wind farm alternative of 30.6 MW is less compared to alternative 1 comprising a wind farm of 50 MW as the scale of the project has been significantly reduced.

4.9 SCHEDULE FOR THE EIA

The proposed schedule for the EIA, based on the legislated EIA process, is presented in Table 4.3. It should be noted that this schedule might be revised during the EIA process, depending on factors such as the time required for decisions from authorities.

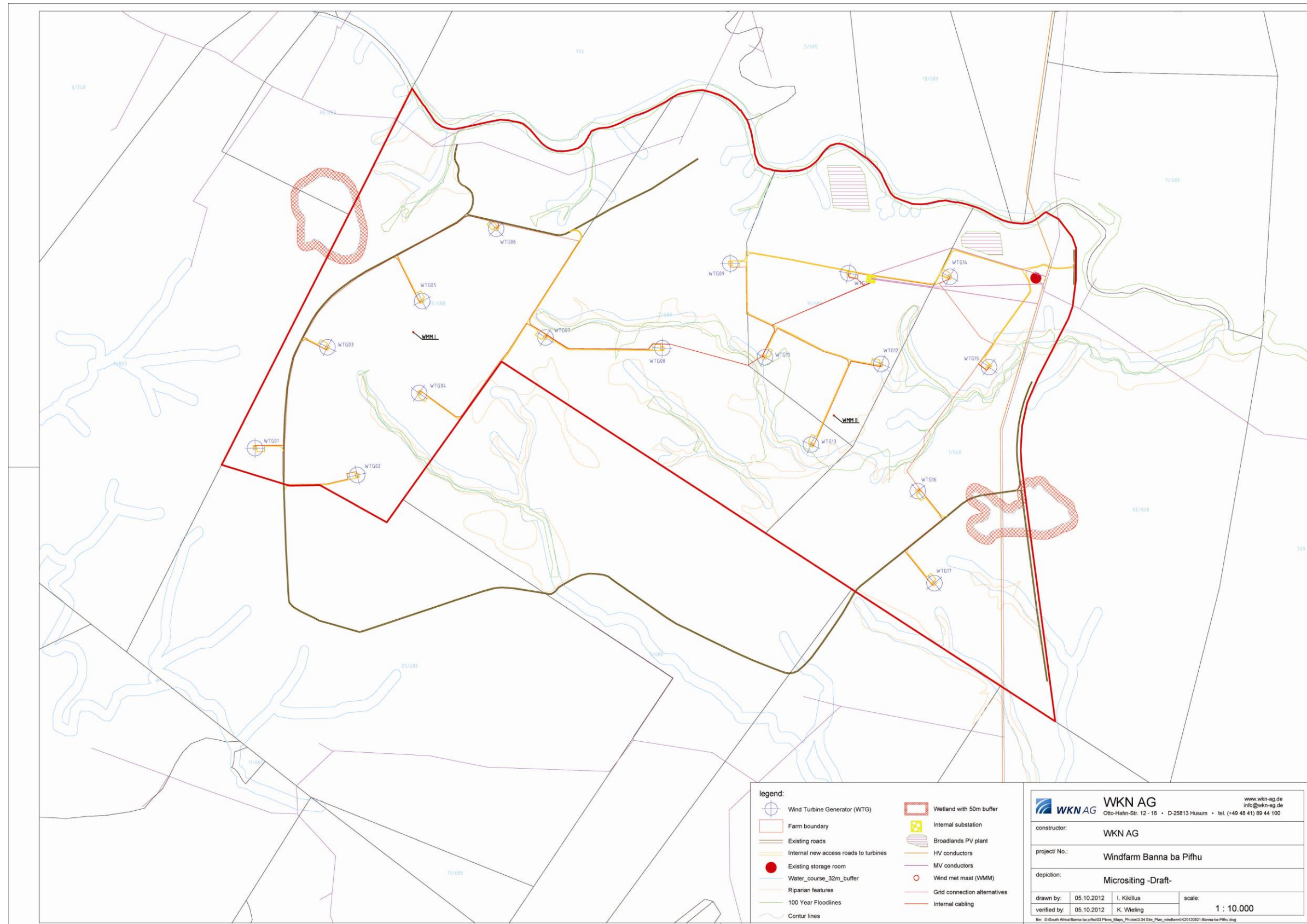


Figure 4.7: Preferred alternative turbine layout of 30.6 MW (maximum of 17 turbines) and supporting infrastructure such as roads relative to features such as riparian areas and the 1:100 year floodline.

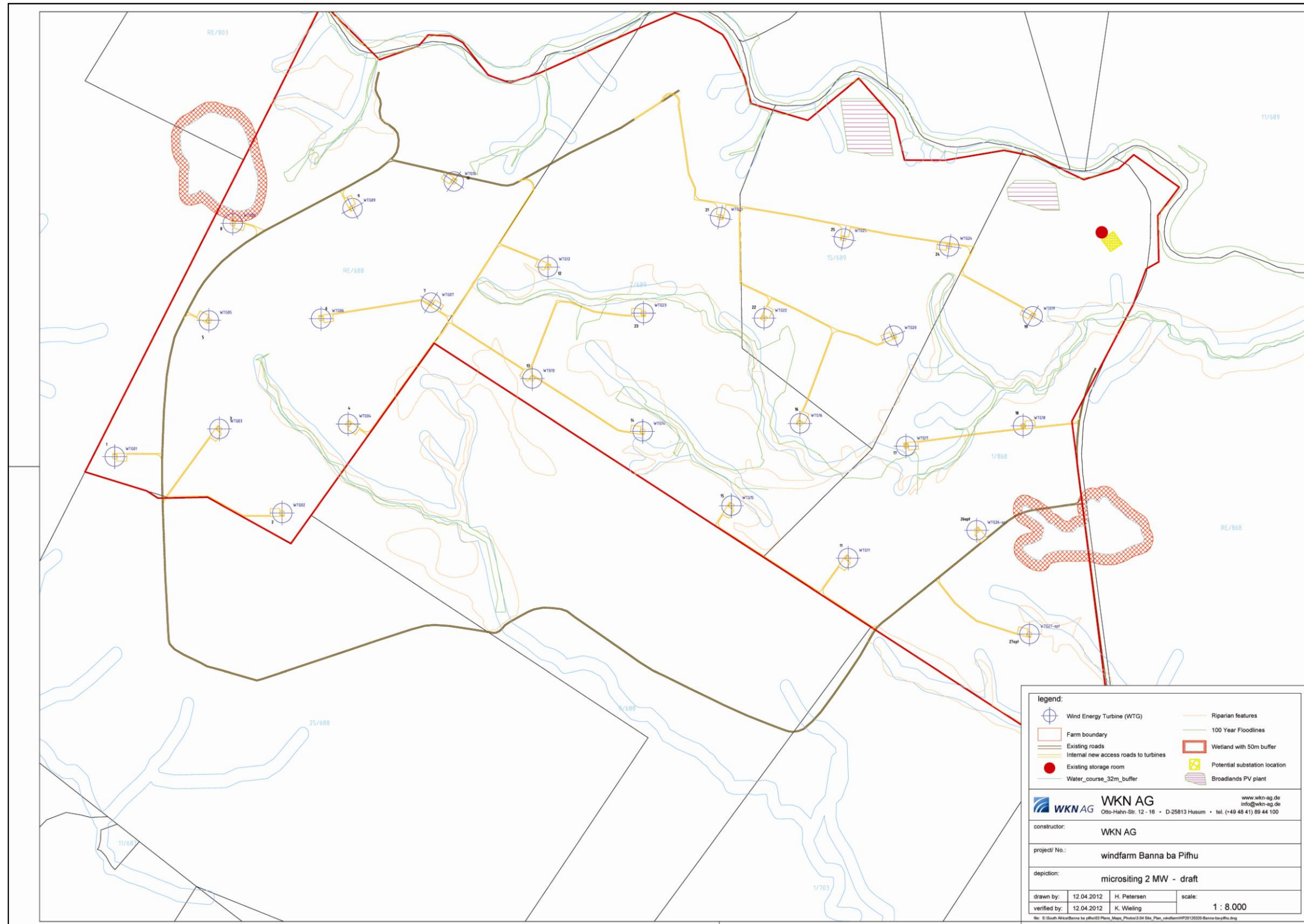


Figure 4.8: Alternative 1 turbine layout of 50 MW (25 turbines plus 3 optional turbines) and supporting infrastructure such as roads relative to features such as riparian areas and the 1:100 year floodline.

Table 4.4: EIA Schedule for the Banna Ba Pifhu Wind Energy Project

TASKS	EIA SCHEDULE (MONTHS)																							
	2011 May	Jun	July	Aug	Sept	Oct	Nov	Dec	2012 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2013 Jan	Feb		
1	Establish I&AP database, prepare BID and announce EIA	█																						
2	I&AP registration & meetings with key stakeholders to source issues	█	█																					
3	Prepare Draft Scoping Report (DSR) and Plan of Study for EIA (PSEIA)		█	█																				
4	Public comments period (40 days) on DSR and stakeholder meetings			█	█																			
5	Submit Final Scoping Report (FSR) and PSEIA to I&APs (21 days) and to authorities for decision (30 days)					█	█																	
6	Communicate authority decision to I&APs and process for next phase					█	█																	
7	Specialist studies (including fieldwork)					█	█	█	█	█	█	█												
8	Prepare Draft EIA Report and EMPR						█	█	█	█	█	█												
9	Public review of Draft EIA Report & EMPR (45 days)											█	█	█	█									
10	Submit Final EIA Report & Draft EMPR to authorities													█	█	█	█	█	█	█	█			
11	Public review of Final EIA Report & EMPR (30 days)																			█	█			
12	Decision by authorities																			█	█	█	█	
13	Appeal process																					█	█	

- Key:
 BID: Background Information Document
 DEA: National Department of Environmental Affairs
 DEIA: Draft EIA report
 DSR: Draft Scoping Report
 FSR: Final Scoping Report
 PSEIA: Plan of Study for EIA
 EMP: Environmental Management Plan