SOCIAL IMPACT ASSESSMENT REPORT

FOR

BOULDERS WIND FARM

WESTERN CAPE PROVINCE

NOVEMBER 2018

Prepared for

EOH COASTAL AND ENVIRONMENTAL SERVICES

By

Tony Barbour and Schalk van der Merwe

Tony Barbour

ENVIRONMENTAL CONSULTING AND RESEARCH

10 Firs Avenue, Claremont, 7708, South Africa
(Tel) 27-21-797 1361 - (Fax) 27-21-797 1361- (Cell) 082 600 8266
(E-Mail) tbarbour@telkomsa.net

EXECUTIVE SUMMARY

INTRODUCTION AND LOCATION

Tony Barbour was appointed by Savannah Environmental to undertake a specialist Social Impact Assessment (SIA) as part of the Environmental Impact Assessment (EIA) process for the establishment of a proposed Boulders Wind Farm (WF) and associated infrastructure in an area to the north of Vredenburg in the Western Cape Province between the town and the coast. In October 2018 Vredenburg Wind Farm (Pty) Ltd appointed EOH Coastal and Environmental Services to finalise the EIA process. This report contains the findings of the Social Impact Assessment (SIA) Report undertaken as part of the EIA process.

LAYOUT ALTERNATIVES

Two layout alternatives have been assessed, namely Alternative 1 and Alterative 2.

Alternative 1
Alternative 1 consists of forty five (45) wind turbines, of which thirteen (13) are located to the west of the Vredenburg-Stompneus Bay Road. Seven (7) of the thirteen (13) wind turbines located to the west of the road are located to the north of Kasteelberg. The remaining five (6) are located to the south of Kasteelberg.

Alternative 2
Based on the findings of the Visual Impact Assessment (Logis, October 2018), Heritage Impact Assessment (Smuts, October 2018) and the SIA (Barbour and van der Merwe, October 2018), the total number of wind turbines located to the west of the Vredenburg-Stompneus Bay Road was reduced from thirteen (13) to eight (8). In addition, all seven (7) wind turbines located in the area to north of the Kasteelberg were relocated. The total number of wind turbines remains as forty five (45).

APPROACH TO THE STUDY

The approach to the SIA study is based on the Western Cape Department of Environmental Affairs and Development Planning Guidelines for Social Impact Assessment (February 2007). These guidelines are based on international best practice. The key activities in the SIA process embodied in the guidelines include:

- Collection and review of baseline socio-economic data;
- A review of the issues identified during the Scoping Process;
- Review of relevant planning and policy frameworks for the area;
- Site specific information collected during site visits to the area and interviews with key stakeholders[1];
- Review of information from similar projects;
- Identification of social issues associated with the proposed project.
- A review of selected specialist studies undertaken as part of the EIA, specifically the Visual Impact Assessment (VIA), Heritage Impact Assessment (HIA) and assessment of the impact of the proposed wind farm on property values and tourism;

[1] This includes data collected during interviews undertaken in 2016 as part of the previous EIA process

- A review of relevant literature on social and economic impacts associated with wind farm;
- The experience of the authors with other wind energy projects in South Africa.

SUMMARY OF KEY FINDINGS

The key social issues are associated with:

- Compatibility with relevant policy and planning context ("planning fit");
- Social issues associated with the construction phase;
- Social issues associated with the operation phase;
- Social issues associated with "no development" alternative;
- Social issues associated with cumulative impacts.

FIT WITH POLICY AND PLANNING

The findings of the review indicated that renewable energy is strongly supported at a national, provincial and local level. The development of and investment in renewable energy is supported by the National Development Plan (NDP), New Growth Path Framework and National Infrastructure Plan, which all make reference to renewable energy. The development of renewable energy is also strongly supported by the National Integrated Energy Plan (2016) and Draft Integrated Resource Plan (August 2018). At a provincial level the development of renewable energy is supported by the Western Cape Provincial Strategic Plan, Western Cape Provincial Spatial Development Framework (SDF), West Coast District Municipality Integrated Development Plan (IDP) and SDF and the Saldanha Bay Municipality IDP and SDF.

However, while these documents all support the development of renewable energy in principle, some also provide guidance on the location of renewable energy facilities[2]. Of specific relevance the West Coast District Municipality SDF notes that wind farms should be located where they will cause least visual impact taking into consideration the viability of the project and located where their visual and environmental impact will be the lowest. The Saldanha Bay SDF and IDP refer to the principles contained in the 2006 DEA&DP Regional Methodology document, specifically that large, commercial WEF developments should be excluded from areas with high aesthetic landscape value.

In conclusion, based on the review of key planning documents that pertain to the study area it is clear that the development of renewable energy (including wind farms) in the West Coast District and Saldanha Bay Local Municipality is strongly supported. However, there is a need to ensure that the siting of renewable energy facilities (including wind farms) are appropriately located and do not impact on the areas scenic assets and tourism potential. These issues will need to be considered by the relevant authorities when considering the application.

CONSTRUCTION PHASE

Alternative 1 and 2 both consist of forty five (45) wind turbines. As such there will be no difference in the nature and significance of the construction related impacts between Alternative 1 and 2. The summary of findings presented below therefore applies to both Alternative 1 and 2.

[2] A detailed review of key policy and planning documents is provided in Section 4.2.

The key social issues associated with the construction phase include:

Potential positive impacts

- Creation of employment and business opportunities, and the opportunity for skills development and on-site training;

Employment

813 direct full-time equivalent person-years will be created during the construction of the proposed Boulder Wind Farm. Based on other WF projects approximately 55% will be taken up by low skilled workers, 30% by semi-skilled workers and 15% by skilled workers. The majority of the low skilled and a proportion of the semi-skilled employment opportunities are likely to accrue to Historically Disadvantaged (HD) members from the local WCDM and SBLM community. The levels of unemployment in the SBLM are high, specifically on the St Helena Bay area. The creation of potential employment opportunities, even temporary employment, will represent a significant, if localised, social benefit. In addition to the direct jobs created, the project will also create employment opportunities through backward linkages. It is estimated that an additional 1 049 full-time equivalent person-years will be created through the multiplier effects. Overall, the project is expected to create a total of 1 861 full-time equivalent person-years, which equates to about 931 jobs created and maintained for two years (Urban Econ, June 2018).

The potential benefits for local communities is confirmed by the findings of the Overview of the Independent Power Producers Procurement Programme (IPPPP) undertaken by the Department of Energy, National Treasury and DBSA (30 June 2017). The study found that employment opportunities created during the construction phase of the projects implemented to date had created 40% more job years[3] for South African citizens than anticipated. The study also found that significantly more people from local communities were employed during construction than was initially planned.

The number of low skilled and semi-skilled positions taken up by members from the local community will depend on the effective implementation of these enhancement measures by the proponent in consultation with the WCDM and SBLM. In this regard the local Councillor (Mrs Scholtz) indicated that the local Paternoster and St Helena Bay communities did not benefit significantly from the employment opportunities associated with the construction of West Coast One WF. Mrs Scholtz indicated that these communities should be earmarked for preferential employment and skills training.

Capital investment and business opportunities

The Boulders Wind Farm will require an investment of ~ R1.5 billion, of which 33% or R494 million will be spent in South Africa (Urban Econ, June 2018). Construction will last for just about two years. During this period, the procurement of goods and services will create a direct, as well as a multiplier effect on the economic activities in the local economy of the SBLM, as well as the provincial economy of the Western Cape, and possibly the national economy. The expenditure of R 494 million on procurement of construction-related services, materials, equipment, machinery and other items is expected to generate an additional R573 million through multiplier effects. The project will therefore result in an increase in domestic production in the region of R1.06 billion over the two-year construction period (Urban Econ, June 2018).

[3] The equivalent of a full time employment opportunity for one person for one year

The Green Jobs study (IDC, DBSA, and TIPS, 2011) found that South Africa is in a position to leverage upon some of its existing manufacturing capacities in order to produce components and parts for various sections of wind turbines, especially those industries involved in the production of steel and metal products, as well as the boat building and electrical industries. These types of industries are all located in the Saldanha Bay Municipality and the broader West Coast DM. A Market Intelligence Report on Renewable Energy (Greencape, 2014) indicates that a Green Development Hub is being established in Atlantis. In this regard Gestamp has established a wind turbine manufacturing operation in Atlantis. The proposed WF will therefore create opportunities for engineering and construction companies in Vredenburg and Saldahna Bay. Opportunities will also be created for companies based Cape Town and Atlantis.

The wage bill for the construction phase will be in the region of R 200 million (Urban Econ, June 2018). Given that the construction workers will be based in local towns in the area, specifically Paternoster, St Helena Bay and Vredenburg, a percentage of the wage bill will be spent in the local economy over the 18-24 month construction phase. This will create opportunities for local businesses in local towns in the area. The sector of the local economy that is most likely to benefit from the proposed development is the local service industry. The potential opportunities for the local service sector are linked to accommodation, catering, cleaning, transport and security, etc. associated with the construction workers on the site. The local tourism industry in the area, including restaurants and accommodation facilities, will also benefit.

The implementation of the proposed enhancement measures would also enable the establishment of the proposed WF to support co-operation between the public and private sectors which would support local economic development in the WCDM and SBLM.

Training and skills development

The construction phase has the potential to create training and skills development opportunities that would benefit local community members, specifically HDIs from Paternoster and St Helena Bay. Representatives from the SBLM and the local communities recommended that the developer implement a training and skills development programme prior to the commencement of the construction phase so as to ensure that local employment opportunities are maximised. The interviewees also indicated that the skills development and training programme should focus on community members from Paternoster and the St Helena Bay area.

Potential negative impacts

- Impacts associated with the presence of construction workers on site and in the area;
- Influx of job seekers to the area;
- Increased safety risk to farmers, risk of stock theft and damage to farm infrastructure associated with presence of construction workers on the site;
- Increased risk of grass fires;
- Impact of heavy vehicles, including damage to roads, safety and dust;
- Impact on farming activities.

The findings of the SIA indicate that the significance of all the potential negative impacts with mitigation were **Low Negative**. The potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are

implemented. Given that the majority of the low and semi-skilled construction workers can be sourced from the local area the potential risk posed by construction workers on local family structures and social networks is regarded as low for the community as a whole. Table 1 summarises the significance of the impacts associated with the construction phase. The significance ratings apply to Alternative 1 and 2.

Table 1: Summary of impacts associated with construction phase

Impact	**Significance No Mitigation/ Enhancement**	**Significance With Mitigation/ Enhancement**
Creation of employment and business opportunities	Medium (+)	Medium (+)
Presence of construction workers and potential impacts on family structures and social networks	Medium (-)	Low (-)
Influx of job seekers	Low (-)	Low (-)
Increased risks to livestock and farming infrastructure associated with the construction related activities and presence of construction workers on the site	Medium (-)	Low (-)
Increased fire risk	Medium (-)	Low (-)
Impact of heavy vehicles and construction activities	Medium (-)	Low (-)
Impact on farming activities	Medium (-)	Low (-)

OPERATION PHASE

Both alternatives consist of forty five (45) wind turbines. As such the potential positive impacts associated with Alternative 1 and 2 are the same. Based on the findings of the Visual Impact Assessment (Logis, November 2018) and the Heritage Impact Assessment (Smuts, November 2018) the potential visual impacts on the areas sense of place and the cultural landscape will differ. This is reflected in the assessment below.

The key social issues affecting the operation phase include:

Potential positive impacts

- The establishment of renewable energy infrastructure.
- Creation of employment and business opportunities. The operation phase will also create opportunities for skills development and training;
- Generate income of affected landowners;
- Socio-economic benefits for local communities.

Development of renewable energy infrastructure

The establishment of renewable energy infrastructure, such as the proposed Boulders WF, should be viewed, firstly within the context of the South Africa's current reliance on coal powered energy to meet the majority of its energy needs, and secondly, within the context of the success of the REIPPPP.

The Green Jobs study (2011) notes that South Africa has one of the most carbon-intensive economies in the world, thus making the greening of the electricity mix a national imperative. The Greenpeace Report (Powering the future: Renewable Energy

Roll-out in South Africa, 2013), notes that within a broader context of climate change, coal energy does not only have environmental impacts, it also has socio-economic impacts. Acid mine drainage from abandoned mines in South Africa impacts on water quality and poses the biggest threat to the country's limited water resources. Huge volumes of water are also required to wash coal and cool operating power stations.

The Green Jobs study (2011) identifies a number of advantages associated with wind power as a source of renewable energy, including zero carbon dioxide (CO_2) emissions during generation and low lifecycle emissions. Greenhouse gases (GHG) associated with the construction phase are offset within a very short period of time compared with the project's lifespan. Wind power therefore provides an ideal means for reaching emission reduction targets in a relatively easy manner. In addition, and of specific relevance to South Africa, wind as energy source is not dependent on water (as compared to the massive water requirements of conventional power stations), has a limited footprint and therefore does not impact on large tracts of land, poses limited pollution and health risks, specifically when compared to coal and nuclear energy plants.

In terms of investment, the REIPPPP has attracted R48.8 billion in foreign investment and financing in the seven bid windows (BW1 – BW4, 1S2 and IS2). This is more than double the inward FDI attracted into South Africa during 2015 (R22.6 billion). In terms of local equity shareholding, 48% (R31.5 billion) of the total equity shareholding (R66.7 billion) was held by South African's across BW1 to BW4, 1S2 and IS2. As far as Broad Based Black Economic Empowerment is concerned, Black South Africans own, on average, 31% of projects that have reached financial close. The combined (construction and operations) procurement value for BW1 to BW4, 1S2 and IS2 is projected as R147.6 billion, of which R47.4 billion has been spent to date. In terms of employment, a total of 32 532 job years[4] have been created for South African citizens, of which 29 046 were in construction and 3 486 in operations.

The establishment of renewable energy facilities, such as the Boulders WF, therefore not only address the environmental issues associated with climate change and consumption of scarce water resources, but also creates significant socio-economic opportunities and benefits, specifically for historically disadvantaged, rural communities.

Creation of employment and business opportunities

The project will employ in the region of 17 people, the majority of who will be technicians (Urban Econ, June 2018). Given that the average household size in the SBLM 3.5, it could be argued that a total of 60 people will benefit from the project as a result of the direct employment created by the Boulders Wind Farm. In addition, another 33 full-time equivalent jobs could be created through the multiplier effect primarily within agriculture, trade, business services, and community services sectors. The annual wage bill for the operation phase would be ~ R 3.5 million (Urban Econ, 2018). With effective training and skills development the majority of employment opportunities associated with the operation phase is likely to benefit HDIs from the local of the community.

[4] The equivalent of a full time employment opportunity for one person for one year

Procurement during the operation phase will also create opportunities for the local economy and businesses. In this regard the overview of the IPPPP (2017) notes that the procurement spend over the 20 year operation phase for BW1 to BW4, 1S2 and IS2 will be in the region of R 75 billion. The Green Jobs study (2011) also found that energy generation is expected to become an increasingly important contributor to green job creation over time, as projects are constructed or commissioned. The study notes that largest gains are likely to be associated with operations and maintenance (O&M) activities. In this regard, operations and maintenance employment linked to renewable energy generation plants will also be substantial in the longer term.

The establishment of WFs, such as the proposed WF, also support the development of a green energy manufacturing sector in South Africa. Manufacturing segments with high employment potential in the long term would include suppliers of components for wind farms, such as Gestamp in Atlantis. The Green Jobs study (2011) found that South Africa is in a position to leverage upon some of its existing manufacturing capacities in order to produce components and parts for various sections of wind turbines, especially those industries involved in the production of steel and metal products, as well as the boat building and electrical industries. Local manufacturing capacity can be promoted through engagement with established global manufacturers. The study does however note that critical mass would have to be developed in order to obtain economies of scale. The establishment of WFs, such as the proposed WF, would therefore contribute to achieving this critical mass.

The study also found that there was also significant potential for local involvement in the wind sector. Local companies can also exploit market opportunities in other African countries with higher wind power potential. This would create additional opportunities for improving economies of scale and enhancing the local industry's chances to succeed.

Generate income for affected landowners

The income earned by the farmers whose land the wind turbines are located on will reduce the risks to their livelihoods posed by droughts and fluctuating market prices for their outputs and inputs, such as fuel, feed etc. The additional income from the WF would therefore improve economic security of farming operations, which in turn would improve job security of farm workers and benefit the local economy.

Socio-economic benefits for local communities

An important focus of the REIPPPP is to ensure that the build programme secures sustainable value for the country and enables local communities to benefit directly from the investments attracted into the area. In this regard IPPs are required to contribute a percentage of projected revenues accrued over the 20 year project operational life toward socio-economic development (SED) initiatives. These contributions are linked to Community Trusts and accrue over the 20 year project operation life and are used to invest in housing and infrastructure as well as healthcare, education and skills development.

The establishment of a community benefit structure (typically, a Community Trust) also creates an opportunity to support local economic development in the area. The requirement for the project to allocate funds to socio-economic contributions (through structures such as Community Trusts) provides an opportunity to advance local community projects, which is guaranteed for a 20 year period (project lifespan). The revenue from the proposed WEF can be used to support a number of social and economic initiatives in the area, including but not limited to:

- Creation of jobs;
- Education;
- Support for and provision of basic services;
- School feeding schemes;
- Training and skills development; and
- Support for SMME's.

The minimum compliance threshold for SED contributions is 1% of revenue with 1.5% the targeted level over the 20 year project operational life. The current portfolio of projects has committed on average 2.2%, which is 125% higher than the minimum threshold level. The 57 projects that are currently operational have contributed R407.7 million to SED. The province with the highest SED contribution has been the Northern Cape, followed by the Eastern and Western Cape respectively (IPPP Overview, 2016).

The 2017 IPPP Overview notes that to date (across 7 bid windows) a total contribution of R20.6 billion has been committed to SED initiatives. Assuming an even, annual revenue spread, the average contribution per year would be R 1.03 billion. Of the total commitment, R16.5 billion is specifically allocated for local communities where the IPPs operate. The benefits linked to SED initiatives are therefore significant. The Green Jobs study (2011), found that the case for wind power is enhanced by the positive effect on rural or regional development. Wind farms located in rural areas create an opportunity to benefit the local and regional economy through the creation of jobs and tax revenues. In this regard the towns of Paternoster and St Helena Bay can be regarded in the same category of small rural towns.

The long term duration of the contributions from the WEF also enables local municipalities and communities to undertake long term planning for the area. Experience has, however, shown that Community Trusts can be mismanaged. This issue will need to be addressed in order to maximise the potential benefits associated with the establishment of a Community Trust or other community benefit structure (entity). The REIPPP programme does however have stringent audit requirements in place to try and prevent the mismanagement of trusts.

The findings of the SIA indicate that the social spend associated with the West Coast One WF has created a number of benefits for local communities in the SBLM, specifically communities and households in the low-middle income suburb of Louwville in Vredenburg. Aurora Power which operates West Coast One has teamed up with ELRU (Early Learning Resource Unit), Soul City and Valued Citizens to support Early Childhood Education (ECD) programmes and secondary and primary schools in the SBLM as part of it socio-economic development (SED) contribution. The SED contribution associated with the West Coast One WF has benefitted a significant number of community members living in the SBLM, specifically HD school children and their families. A well-managed SED programme associated with the proposed Boulders WF would have similar benefits and would add to the benefits already associated with the West Coast One WF.

Potential negative impacts

- The visual impacts and associated impact on sense of place;
- Impact on property values; and
- Potential impact on tourism.

Visual impacts and impact on sense of place
The findings of the SIA indicate that a number of stakeholders, specifically residents in Britannica Heights, have raised concerns regarding the visual impacts associated with the proposed Boulders WF. Some residents from Paternoster have also raised concerns regarding visual impacts. However, the perception of what constitutes a high negative impact is subjective and differs from person to person. In this regard a number of interviewees indicated that they did not regard the wind turbines associated with the existing West Coast One WF as having a negative impact on the landscape and the areas sense of place. Likewise they also indicated that they did not believe that the wind turbines associated with proposed Boulders WF would result in a negative visual impact.

The findings of the Visual Impact Assessment (Logis, October 2018) indicate that the cumulative visual impact of the West Coast 1 WEF and the Boulders WF is expected to be of high negative significance. In this regard the findings of the VIA indicate that the construction of all the proposed wind turbines in their proposed locations may pose a critical risk to the visual quality and landscape of the Paternoster *plateau*. If no mitigation is undertaken (i.e. if the identified wind turbines cannot be relocated or removed) the cumulative visual impact may have as an effect the potential loss of the Paternoster *plateau* as a scenic resource. If mitigation is considered the potential cumulative impact may be within acceptable limits. This would include, as a ***minimum requirement***, the removal or relocation of the wind turbines west of the Vredenburg to Stompneus Bay Road and an investigation into the potential overall reduction in the wind turbine size, in order to match the dimensions of the West Coast 1 wind turbines.

The findings of the HIA (Smuts, October 2018) also indicated that the impact of Alternative 1 on the rural cultural landscape would be **High Negative**. The preferred alternative for the HIA also recommends the removal or relocation of the wind turbines west of the Vredenburg to Stompneus Bay Road to address this impact. With mitigation the impact is regarded as **Moderate Negative**.

Comment on Alternative 2
The VIA recommends that all thirteen (13) wind turbines west of the Vredenburg to Stompneus Bay Road should be removed or relocated as a minimum requirement to mitigate the visual and cumulative impact. This recommendation is also in line with the preferred alternative recommended by the HIA. While all seven (7) located in the area to the north of Kasteelberg have been relocated or removed, an additional two have been added to the area to the south of Kasteelberg. Therefore, while an attempt has been made to address the visual impact on the areas sense of place, the minimum requirement set by the VIA has not been met. The requirements for the HIAs preferred option have also not been met. Therefore, based on the findings of the VIA and the HIA, Alternative 2 does not fully mitigate the impacts on the areas visual quality, sense of place and cultural landscape.

However, the SIA also found that a number of interviewees did not identify visual impacts as a key concern. These interviewees had no preference between Alternative 1 and 2.

Impact on property values
The potential impact of the proposed Boulders WF on property values was raised as a key concern, specifically by residents of Britannica Heights and Paternoster. A

literature review was undertaken as part of the SIA. In addition, an assessment of the potential impact on property values was included in the study undertaken by Urban Econ as part of the EIA (Property Values, Tourism and Economic Issues Assessment Report, Urban Econ, June 2018). The potential impact on property values was also assessed by a study undertaken by the Appraisal Corporation (July 2018).

The findings of the literature review indicate that the most comprehensive study appears to the study by Gibbons (2014), which found that "averaging over wind farms of all sizes" the price reduction was around 5-6% within 2km, falling to less than 2% between 2 and 4km, and less than 1% by 14km which is at the limit of likely visibility. The properties that stand to be most affected are those located in Britannica Heights and to a lesser degree Paternoster. Based on the information from the Visual Impact Assessment (VIA)(Logis, October 2018), the closest turbines are located 4.1km and 5.4km from Britannica Heights and Paternoster respectively. Based on the findings of the Gibbons study the potential impact on residential property values in Paternoster would be less than 2%. In addition, the value of the properties in Paternoster is largely linked to the village's coastal location and its traditional, west coast architecture. The demand for properties and their market value have continued to increase despite the establishment of the West Coast One WF. The proposed Boulders WF is therefore unlikely to impact on the property values in Paternoster. This is also confirmed by the findings of the studies undertaken by Urban Econ and Appraisal Corporation. The findings of the study undertaken by the Appraisal Corporation found the proposed Boulders Wind Farm Project, will not impact negatively on the market values of properties in the area.

In terms of potential impact on agricultural properties, the findings of the Urbis (2016) study indicate that "wind farms may not significantly impact rural properties used for agricultural purposes". This finding was also supported by the Appraisal Corporation study.

However, while the findings of the literature review indicate that the impact on property values is less than 2% for distances of between 2 and 4km, is it recognised that property values in Britannica Heights are linked to the views towards the south. These views have been impacted by the existing wind turbines associated with the West Coast One WF, which are located in the region of 8-9 km from Britannica Heights. Given that the wind turbines will be located closer to Britannica Heights, the establishment of the proposed Boulders WF will increase the visual impact on the properties in Britannica Heights. This may influence potential buyers, which, in turn, may impact on property values. The magnitude of this potential impact cannot however be quantified based on the available information. However, the study undertaken by the Appraisal Corporation indicated that the proposed Boulders WF is unlikely to impact on property values in the area, including Britannica Heights.

While the findings of the literature review and the studies undertaken by Urban Econ and the Appraisal Corporation indicate that the proposed Boulders WF (Alternative 1 and 2) is unlikely to impact on property values, Alternative 2 would be the preferred option given the reduced impact of views from Britannica Heights towards Kasteelberg and Paternoster.

Impact on tourism

Based on the findings of the literature review there is limited evidence to suggest that the proposed Boulders WF would impact on impact on the areas tourism industry, specifically Paternoster. The findings also indicate that wind farms do not

impact on tourist routes. In this regard the findings of research by Professor Atchison (April, 2012) for the Scottish Government found that the "findings from both primary and secondary research relating to the actual and potential tourism impact of wind farms indicate that there will be neither an overall decline in the number of tourists visiting an area nor any overall financial loss in tourism-related earnings as a result of a wind farm development".

The findings of the Urban Econ (June 2018) support the findings of the literature review, namely that the proposed Boulders WF is unlikely to have a measurable impact on tourism in the area.

While the findings of the literature review and the Urban Econ study indicate that the potential impact on tourism of Alternative 1 and 2 is likely to be low, Alternative 2 is the preferred option given the reduced impact on Kasteelberg and views towards the coast from the Vredenburg-Stompneus Bay Road.

Table 2 summarises the significance of the impacts associated with the operation phase. The significance ratings apply to Alternative 1 and 2.

Table 2: Summary of impacts associated with operation phase

Impact	**Significance No Mitigation/ Enhancement**	**Significance With Mitigation/ Enhancement**
Promotion of renewable energy projects	High (-)	High (+)
Creation of employment and business opportunities	Medium (+)	Medium (+)
Generate additional income for landowners	Medium (+)	Medium (+)
Establishment of Community Trust	Medium (+)	High (+)
Visual impact and impact on sense of place (based on VIA and HIA)	High (-)	Moderate-High (-)[5]
Visual impact and impact on sense of place (interviewees that were not concerned about visual impacts)	Low (-)	Low (-)
Impact on property values	Low (-)	Low (-)
Impact on tourism	Low (- and +)	Low (- and +)

CUMULATIVE IMPACTS

Cumulative impact on sense of place

Based on the available information there is only one WF located with a 30 km radius of the proposed Boulders WF, namely the adjacent West Coast One WF (Figure 4.1). The potential for cumulative impacts associated with combined visibility (whether two or more wind energy facilities will be visible from one location) and sequential visibility (e.g. the effect of seeing two or more wind energy facilities along a single journey, e.g. road or walking trail) within the 30km radius is therefore high. However, as indicated above, the findings of the review on tourism found that wind farms do not impact on tourist routes.

[5] The full mitigation measures recommended by the VIA and HIA (preferred option) which require the removal of all wind turbines to the west of the Vredenburg-Stompneus Bay Road have not been fully implemented in terms of Alternative 2. The significance rating therefore remains **Moderate-High Negative.**

The potential cumulative impact formed a key focus of the VIA (Logis, 2018). The findings of the VIA indicate that the construction of all the proposed wind turbines in their proposed locations may pose a critical risk to the visual quality and landscape of the Paternoster *plateau*. If no mitigation is undertaken (i.e. if the identified wind turbines cannot be relocated or removed) the cumulative visual impact may have as an effect the potential loss of the Paternoster *plateau* as a scenic resource. However, the VIA indicates that with effective mitigation the potential cumulative impact may be within acceptable limits. The recommended mitigation, ***as a minimum requirement***, is the removal or relocation of the wind turbines west of the Vredenburg to Stompneus Bay Road and an investigation into the potential overall reduction in the wind turbine size, in order to match the dimensions of the West Coast 1 wind turbines.

The findings of the HIA also indicate that the cumulative impacts of the proposed WEF and associated infrastructure on the rural cultural landscape, in context of the authorised West Coast 1 WEF, are **high** given the current layout. As in the case of the VIA, the preferred alternative for the HIA also recommends that all turbines west of the Vredenburg-Stompneus Bay Road be relocated or removed. The less preferable alternative recommendation is that all turbines north of Kasteelberg be relocated or removed, but that the turbines south of the Kasteelberg remain. With mitigation the impact is regarded as **Moderate Negative**.

Comment on Alternative 2

The VIA recommends that all thirteen (13) wind turbines west of the Vredenburg to Stompneus Bay Road should be removed or relocated as a minimum requirement to mitigate the visual and cumulative impact. This recommendation is also in line with the preferred alternative recommended by the HIA. While all seven (7) located in the area to the north of Kasteelberg have been relocated or removed, an additional two have been added to the area to the south of Kasteelberg. Therefore, based on the findings of the VIA and the HIA, Alternative 2 does not fully mitigate the impacts on the areas visual quality, sense of place and cultural landscape.

However, the SIA also found that a number of interviewees did not identify visual impacts as a key concern. These interviewees had no preference between Alternative 1 and 2.

Cumulative impact on services

The establishment of the proposed Boulders WF and the other renewable energy facilities in the WCDM and SBLM may place pressure on local services, specifically medical, education and accommodation. This pressure will be associated with the potential influx of workers to the area associated with the construction and operation phases of renewable energy projects proposed in the area, including the proposed WEF. The potential impact on local services can be mitigated by employing local community members. With effective mitigation the impact is rated as **Low Negative.**

In addition, as indicated below, this impact should also be viewed within the context of the potential positive cumulative impacts for the local economy associated with the establishment of renewable energy as an economic driver in the area. These benefits will create opportunities for investment in the SBLM, including the opportunity to up-grade and expand existing services. In this regard the establishment of a renewable energy will create an opportunity for economic development in the area.

Cumulative impact on local economies
In addition to the potential negative impacts, the establishment of the proposed WF and other renewable energy projects in the area also has the potential to create a number of socio-economic opportunities for the WCDM and SBLM, which, in turn, will result in a positive social benefit. The positive cumulative impacts include creation of employment, skills development and training opportunities, creation of downstream business opportunities. The SED contributions associated with each project will also create significant socio-economic benefits, especially Historically Disadvantaged (HD) community members from Paternoster and St Helena Bay. This benefit is rated as **High Positive** with enhancement.

POTENTIAL HEALTH IMPACTS

The findings of a literature review undertaken by the Australian Health and Medical Research Council published in July 2010 indicate that there is no evidence of wind farms posing a threat to human health. The research also found that wind energy is associated with fewer health effects than other forms of traditional energy generation and in fact will have positive health benefits (WHO, 2004). Based on these findings it is assumed that the significance of the potential health risks posed by the proposed WF is of **Low Negative** significance.

NO-DEVELOPMENT OPTION

The No-Development option would reduce South Africa's potential to supplement its current energy needs with clean, renewable energy. While the No-Development Option would result in a continuation of the current status quo it would represent a lost opportunity in terms of the socio-economic benefits associated with construction and operational phase. The SED initiatives that would benefit the local communities in Paternoster and St Helena Bay would also be forgone. Given the current socio-economic conditions in Paternoster and St Helena Bay this would represent a significant negative social cost.

However, at a provincial and national level, it should be noted that the proposed WF development is not unique. In this regard, a number of other renewable energy developments are currently proposed in the Western Cape and other parts of South Africa. Foregoing the proposed establishment of the Boulders WF would therefore not necessarily compromise the development of renewable energy facilities in the Western Cape Province and or South Africa. However, the socio-economic benefits for the local communities of Paternoster and St Helena Bay would be forfeited. In terms of site specific impacts, the no-development option would also result in a loss of income for the affected landowners, which would also represent a lost opportunity. In terms of current farming operations, the no-development option would have no impact on current activities.

DECOMMISSIONING PHASE

In the case of decommissioning ~17 permanent jobs associated with the decommissioning phase would be lost. The potential impacts associated with the decommissioning phase can however be effectively managed with the implementation of a retrenchment and downscaling programme. With mitigation, the impacts will be **Low Negative.**

COMMENT ON DIFFERENT VIEWS ON THE WIND FARM

The findings of the SIA indicate that there is both opposition to and support for the proposed Boulders WF. The opposition to the proposed WF is largely linked to the visual impact associated with the wind turbines and the associated impact that this will have on the areas sense of place, property values and tourism. Concerns have also been raised regarding the potential impact on birds. The concerns relating to impact on property values are largely linked to residents of Britannica Heights.

Support for the proposed WF is associated with the potential employment and socio-economic opportunities associated with the project, including the potential opportunities associated local shareholding and SED contributions during the operation phase. The majority of the community members that support the proposed development are HDIs that were born in the area and who have a long a long standing association with the area. The support of the proposed WF is however conditional on a commitment from the developers make provision for community shareholding, the creation of meaningful employment opportunities for local community members during both the construction and operation phases, and the implementation of an effective socio-economic development (SED) programme. Local community representatives have also indicated that the focus should be on the benefitting the communities of Paternoster and the St Helena Bay area.

CONCLUSION AND RECOMMENDATIONS

Conclusion

The findings of the SIA indicate that the development of the proposed Boulders WF will create employment and business opportunities for locals during both the construction and operation phases of the project. The establishment of a Community Trust will also benefit the local community. The proposed development also represents an investment in clean, renewable energy infrastructure, which, given the negative environmental and socio-economic impacts associated a coal based energy economy and the challenges created by climate change, represents a significant positive social benefit for society as a whole. The findings of the SIA also indicate that the Renewable Energy Independent Power Producers Procurement Programme (REIPPPP) has resulted in significant socio-economic benefits, both at a national level and at a local, community level. These benefits are linked to foreign Direct Investment, local employment and procurement and investment in local community initiatives. The establishment of the proposed Boulders WF will therefore create positive socio-economic benefits for the area and the local community, specifically the local community in Paternoster and the St Helena Bay area, the majority of who are HDIs.

The key concerns identified during the SIA relate to the visual impacts associated with the wind turbines, and the potential impact on the areas sense of place, property values and tourism. A number of local residents also indicated that they did not regard the wind farm as having a negative visual impact. Visual impacts and the impact on sense of place were confirmed by the findings of the VIA (Logis 2018) and HIA (Smuts 2018).

The findings of the VIA and HIA also indicated that with effective mitigation the potential visual impacts may be within acceptable limits. The recommended mitigation involves the removal or relocation of wind turbines west of the Vredenburg to Stompneus Bay Road. Alternative 2 represents a response to the findings of the

VIA and HIA. In terms of Alternative 2 the seven (7) wind turbines located to north of Kasteelberg and to the west of the Vredenburg-Stompneus Bay Road have been relocated. Five have been relocated to the east of the road, while two (2) wind turbines have been added to the area to the south of Kasteelburg. Therefore, while an attempt has been made to address the visual impact on the areas sense of place, the minimum requirement set by the VIA and the preferred option of the HIA, namely the removal of all wind turbines to the west of the Vredenburg-Stompneus Bay Road has not been fully met.

Based on the findings of the literature review undertaken as part of the SIA and the findings of the Urban Econ (June 2018) and Appraisal Corporation (July 2018) studies the potential impact on residential property values in Paternoster is likely to be negligible. However, while the findings of the literature review indicate that the impact on property values is less than 2% for distances of between 2 and 4km, is it recognised that property values in Britannica Heights are linked to the views towards the south. These views will be further impacted by the wind turbines associated with the proposed Boulders WF. The magnitude of this potential impact cannot be quantified based on the available information. However, the study undertaken by the Appraisal Corporation indicated that the proposed Boulders WF is unlikely to impact on property values in the area, including Britannica Heights.

In terms of the potential impact on tourism, there is limited evidence in the literature to suggest that the proposed Boulders WF will impact on the areas tourism industry. This finding was supported by the Urban Econ study (June 2018). The findings of the literature also indicate that wind farms do not impact on tourist routes.

In conclusion, the impact on the areas sense of place is an issue that the relevant authorities will need to consider when assessing the application. As indicated above, while the development of renewable energy (including wind farms) in the West Coast District and Saldanha Bay Local Municipality is strongly supported, the key policy and planning documents highlight the need to ensure that renewable energy facilities are appropriately located and do not impact on the areas scenic assets and tourism potential. In this regard the HIA indicates that the wider area has been proposed as a Grade II cultural landscape.

Based on the findings of the VIA and HIA the visual impacts and impact on the areas cultural landscape can be addressed by the removal and or relocation of all wind turbines located to the west of the Vredenburg to Stompneus Bay Road. These measures are also considered acceptable to address the social impacts associated with visual impacts on the areas sense of place and cultural landscape. As indicted above, an attempt has been made to address the visual impact by removing seven (7) turbines located in the area to the north of Kasteelburg and west of the Vredenburg to Stompneus Bay Road. However, the minimum requirement set by the VIA that all wind turbines located to the west of the Vredenburg to Stompneus Bay Road has not been fully met. While the removal of all wind turbines located to the west of the Vredenburg to Stompneus Bay Road may impact on the financial viability of the proposed Boulders WF, the findings of the VIA and the HIA and the potential impact on the areas sense of place cannot be ignored.

Recommendations

Based on the findings of the SIA the following recommendations are made:

- Alternative 1 is not supported;

- Given the potential visual impacts and impact on sense of place, the preferred option supported by the SIA is the removal of all thirteen (13) wind turbines located to the west of the Vredenburg-Stompneus Bay Road;
- However, it is recognised that the preferred SIA option may impact on the financial viability of the proposed WF, which in turn may result in the loss of the socio-economic benefits associated with the proposed development for local communities in Paternoster and St Helena Bay;
- The SIA therefore also supports the first (but less preferable alternative) identified by the HIA of relocating all seven (7) turbines north of Kasteelberg. This corresponds to Alternative 2. In this regard the potential site specific negative impacts associated with the proposed Boulders WF should also be considered within the context of the broader socio-economic benefits of the REIPPPP;
- The developer should make provision for community shareholding in the project;
- The developer should commit to the creation of meaningful employment opportunities for local community members during both the construction and operation phases;
- The developer should commit to creating meaningful business opportunities for local SMME companies based in the SBLM;
- The developer should implement a skills development and training programme prior to the commencement of the construction phase; and
- The developer should implement of an effective socio-economic development (SED) programme.

The focus of the community enhancement measures listed above should be towards the communities of Paternoster and the greater St Helena Bay area.

CONTENTS OF THE SPECIALIST REPORT – CHECKLIST

Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6	**Section of Report**
(a) details of the specialist who prepared the report; and the expertise of that specialist to compile a specialist report including a *curriculum vitae*;	Section 1.5, p6, Annexure C, p166
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Section 1.6, p6, Annexure D, p167
(c) an indication of the scope of, and the purpose for which, the report was prepared;	Section 1.1, p1, Section 1.2, p2
(cA) an indication of the quality and age of base data used for the specialist report;	Section 1.2, p2, Section 3, p72
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 4, p92
(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Interviews undertaken in 2016 and 2018 (Annexure A)
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 1.2, p2, Annexure B, p164
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section 4, p92, Section 5, p138
(g) an identification of any areas to be avoided, including buffers;	The establishment of wind turbines located to the west of the Vredenburg-Stompneus Bay Road should be reconsidered[6].
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Refer to VIA
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 1.4, p5
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment, or activities;	Section 4, p92, Section 5, p147
(k) any mitigation measures for inclusion in the EMPr;	Section 4, p92
(l) any conditions for inclusion in the environmental authorisation;	Section 4, p92, Section 5, p147
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	N/A
(n) a reasoned opinion— i. as to whether the proposed activity, activities or portions thereof should be authorised; iA. Regarding the acceptability of the proposed activity or activities; and ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr or Environmental Authorization, and where applicable, the closure plan;	Section 5.4, p158
(o) a description of any consultation process that was undertaken	Annexure A, p161,

[6] The potential impact on the financial viability of the project should also be taken into account

during the course of preparing the specialist report	lists key stakeholders interviewed
(p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Annexure A, p161, lists key stakeholders interviewed
(q) any other information requested by the competent authority	N/A
Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	

ACRONYMS

DEA&DP	Department of Environmental Affairs and Development Planning (Western Cape)
DEA	Department of Environmental Affairs (National)
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
IDP	Integrated Development Plan
IPP	Independent Power Producer
kV	Kilovolts
LED	Local Economic Development
LM	Local Municipality
Mtoe	Million tonnes of oil equivalent
MW	Megawatt
PGWC	Provincial Government Western Cape
SBLM	Saldanha Bay Local Municipality
SDF	Spatial Development Framework
SIA	Social Impact Assessment
WCDM	West Coast District Municipality
WF	Wind Energy Facility

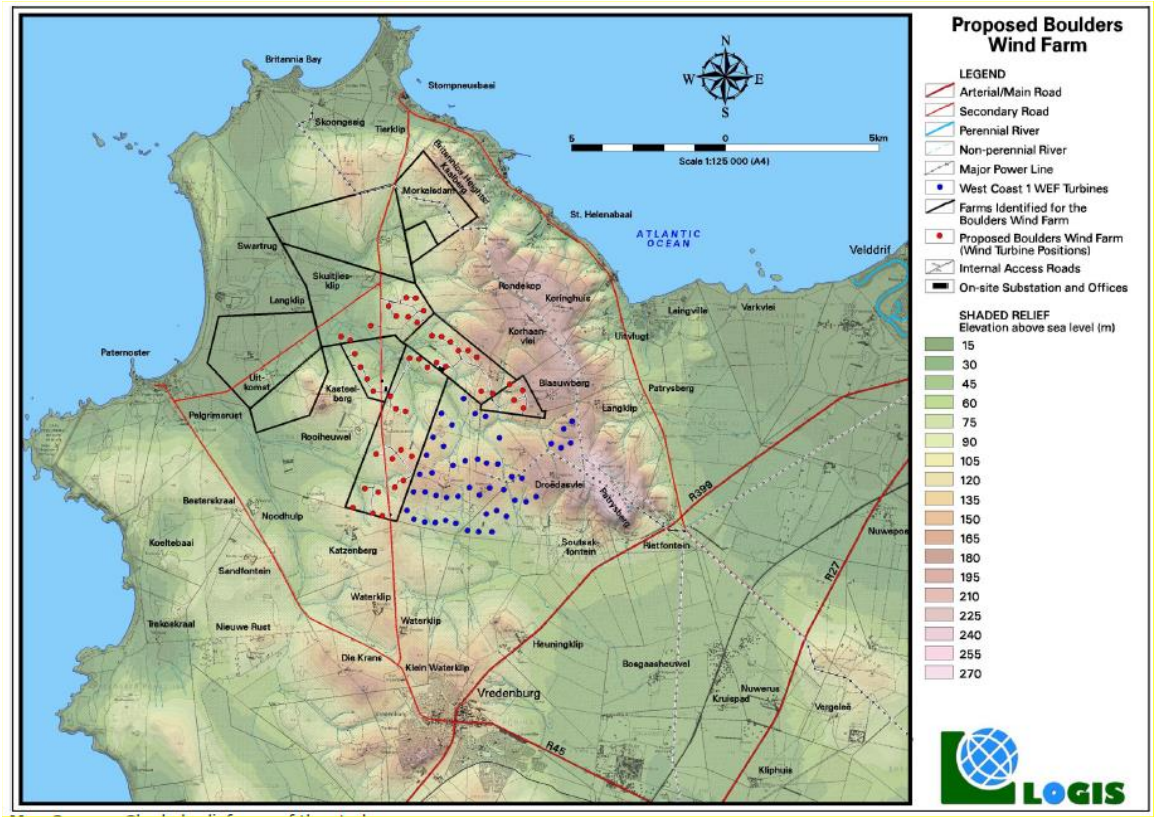
TABLE OF CONTENTS

SECTION 1: INTRODUCTION

1.1 INTRODUCTION

Tony Barbour was appointed by Savannah Environmental to undertake a specialist Social Impact Assessment (SIA) as part of the Environmental Impact Assessment (EIA) process for the establishment of a proposed Boulders Wind Farm (WF) and associated infrastructure in an area to the north of Vredenburg in the Western Cape Province between the town and the coast (Figure 1.1).

In October 2018 Vredenburg Wind Farm (Pty) Ltd appointed EOH Coastal and Environmental Services to finalise the EIA process. This report contains the findings of the Social Impact Assessment (SIA) Report undertaken as part of the EIA process.



(Source: Visual Impact Assessment, Logis, 2018)

Figure 1.1: Location of proposed Boulders WF (Alternative 1)

1.2 APPROACH TO STUDY

The terms of reference for the SIA include:

- A description of the environment that may be affected by the activity and the manner in which the environment may be affected by the proposed development;
- A description and assessment of the potential social issues and impacts associated with the proposed development and the associated alternatives;
- Identification of enhancement and mitigation measures aimed at maximizing opportunities and avoiding and or reducing negative impacts.

The approach to the SIA study is based on the Western Cape Department of Environmental Affairs and Development Planning Guidelines for Social Impact Assessment (DEADP, 2007). The key activities undertaken as part of the SIA process as embodied in the guidelines included:

- Describing and obtaining an understanding of the proposed intervention (type, scale, and location), the settlements, and communities likely to be affected by the proposed project;
- Collecting baseline data on the current social and economic environment;
- Identifying the key potential social issues associated with the proposed project;
- Site visit and semi-structured interviews with key stakeholders and affected individuals and communities;
- Assessing and documenting the significance of social impacts associated with the proposed intervention;
- Identification of enhancement and mitigation measures aimed at maximizing opportunities and avoiding and or reducing negative impacts; and
- Consideration of other renewable energy projects within a 30km radius from the proposed site that may pose cumulative impacts.

The identification of potential social issues associated with the proposed WF is based on observations during the project site visit, interviews with local stakeholders[7], review of relevant documentation and experience with similar projects and the general area. Annexure A contains a list of stakeholders interviewed and the secondary information reviewed. Annexure B outlines the assessment methodology used to assign significance ratings during the assessment phase.

One of the key challenges facing SIA does not necessarily involve the physical disruption of human populations, but understanding the meanings, perceptions and/or social significance of these changes. In order to understand the role of a social assessment in the EIA process one needs to define what social impacts are. This issue is complicated by the way in which different people from different cultural, ethnic, religious, gender, and educational backgrounds etc., view the world. This is referred to as the "social construct of reality". The social construct of reality informs people's worldview and the way in which they react to changes. However, in many instances these constructs are frequently treated as perceptions or emotions, to be distinguished from "reality."

[7] Interviews were undertaken in 2016 as part of the previous EIA process and 2018 as part of the current EIA process

The social construct of reality is a characteristic of all social groups, including the agencies that attempt to implement changes, as well as the communities that are affected (Guidelines and Principles for Social Impact Assessment, 1994). The tendency of development agencies and proponents to dismiss the concerns of others as being merely imagined and perceived is therefore a key issue that needs to be addressed by social impact assessments.

In this regard, the findings of this SIA indicate that while certain stakeholders are opposed to the establishment of the Boulders WF, others either support the development and or do not have an objection to the establishment of a WF on the proposed site.

1.3 PROJECT DESCRIPTION

A WF consists of multiple wind turbines which are used to capture the kinetic energy of the wind and generate electricity. This captured kinetic energy is used to drive a generator located within the wind turbine and the energy is subsequently converted into electrical energy. A typical wind turbine consists of four primary components (Figure 1.2):

- The **foundation unit** upon which the turbine is anchored to the ground;
- The **tower** which is a hollow structure allowing access to the nacelle. The height of the tower is a key factor in determining the amount of electricity a turbine can generate. The tower houses the transformer which converts the electricity to the correct voltage for transmission into the grid;
- The **nacelle** (generator/turbine housing). The nacelle houses the gearbox and generator as well as a wind sensor to identify wind direction. The nacelle turns automatically ensuring the blades always face into the wind to maximise the amount of electricity generated; and
- The **rotor** which is comprised of three rotor blades. The rotor blades use the latest advances in aeronautical engineering materials science to maximise efficiency. The greater the number of turns of the rotor the more electricity is produced.

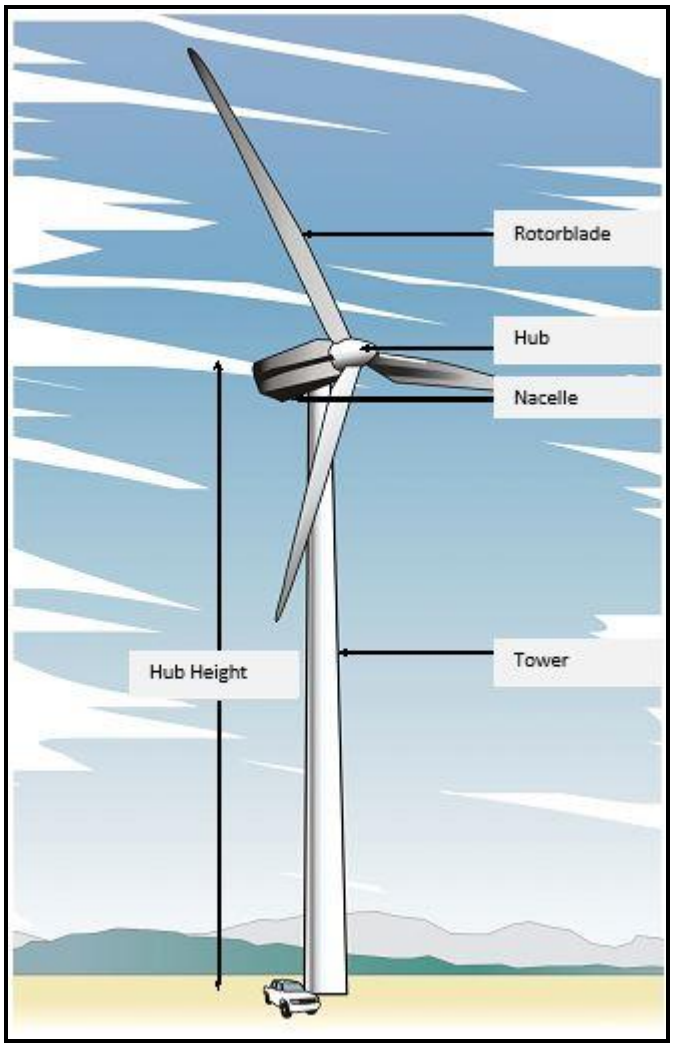


Figure 1.2: Typical example of wind turbine structure and components

The amount of energy a turbine can harness is dependent on the wind velocity and the length of the rotor blades. Wind turbines start generating power at wind speeds of between 10 - 15 km/hour, with speeds between 45 - 60 km/hour required for full power operation. In a situation where wind speeds are excessive, the turbine automatically shuts down to prevent damage. A turbine is designed to operate continuously, unattended and with low maintenance for more than 20 years or more. Once operating, a WF can be monitored and controlled remotely, with a mobile team used for maintenance when required.

As indicated above, the number of turbines proposed is up to 45 wind turbines with a combined maximum output of approximately 140MW (i.e. contracted capacity). The proposed location of the wind turbines are illustrated in Figure 1.2. The total area under consideration is approximately 5084ha. The number and placement of turbines will be informed by the findings of the EIA. The energy will be fed into the Eskom grid. The project is therefore an Independent Power Producer (IPP) project. The proposed WF is located on the following properties:

- Boebezaks Kraal 2/40;

- Boebezaks Kraal 3/40;
- Boebezaks Kraal 5/40;
- Frans Vlei 2/46;
- Schuitjes Klip 3/22;
- Davids Fontyn 9/18;
- Schuitjes Klip 1/22;
- Het Schuytje 1/21;
- Davids Fontyn 7/18;
- Uitkomst RE/6/23.

The associated Infrastructure includes:

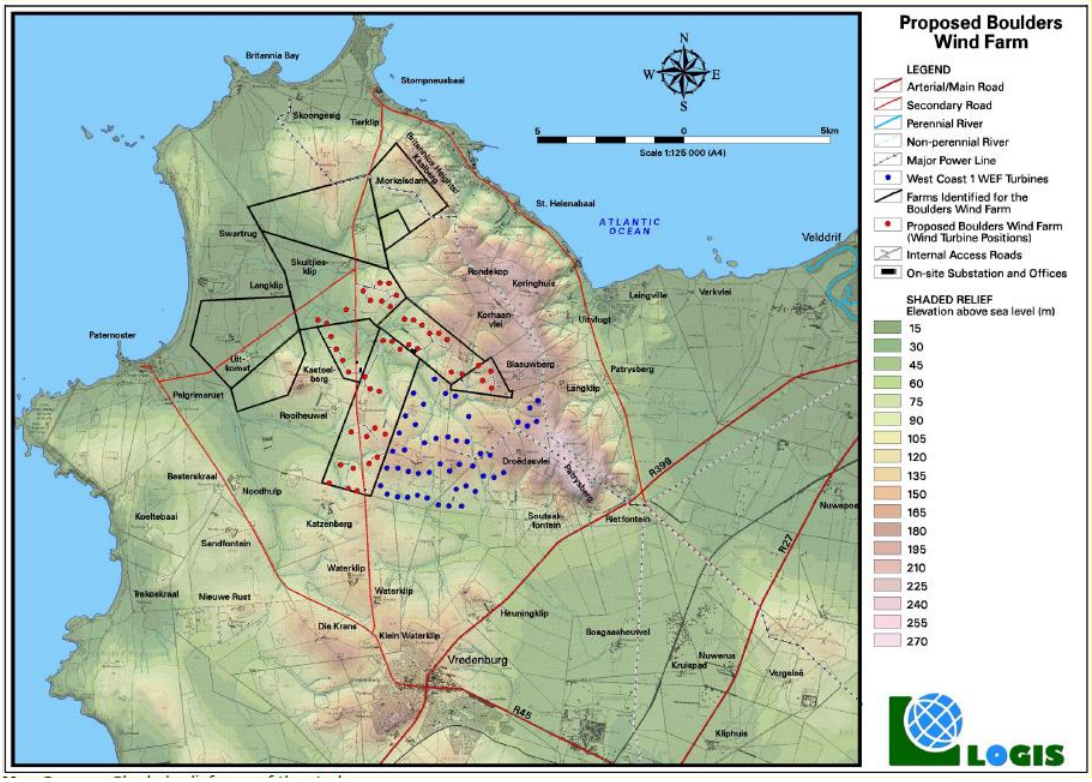
- A substation to facilitate connection to the grid including control and storage of buildings;
- Internal access roads;
- Underground electrical cabling (not more capacity than 33 kilovolts or kV) to connect each turbine to a main (nodal point) substation on site;
- Temporary storage and crane hardstanding areas
- Control buildings and workshops for maintenance purposes;
- Four laydown area for storage of equipment and material.

1.4 LAYOUT ALTERNATIVES

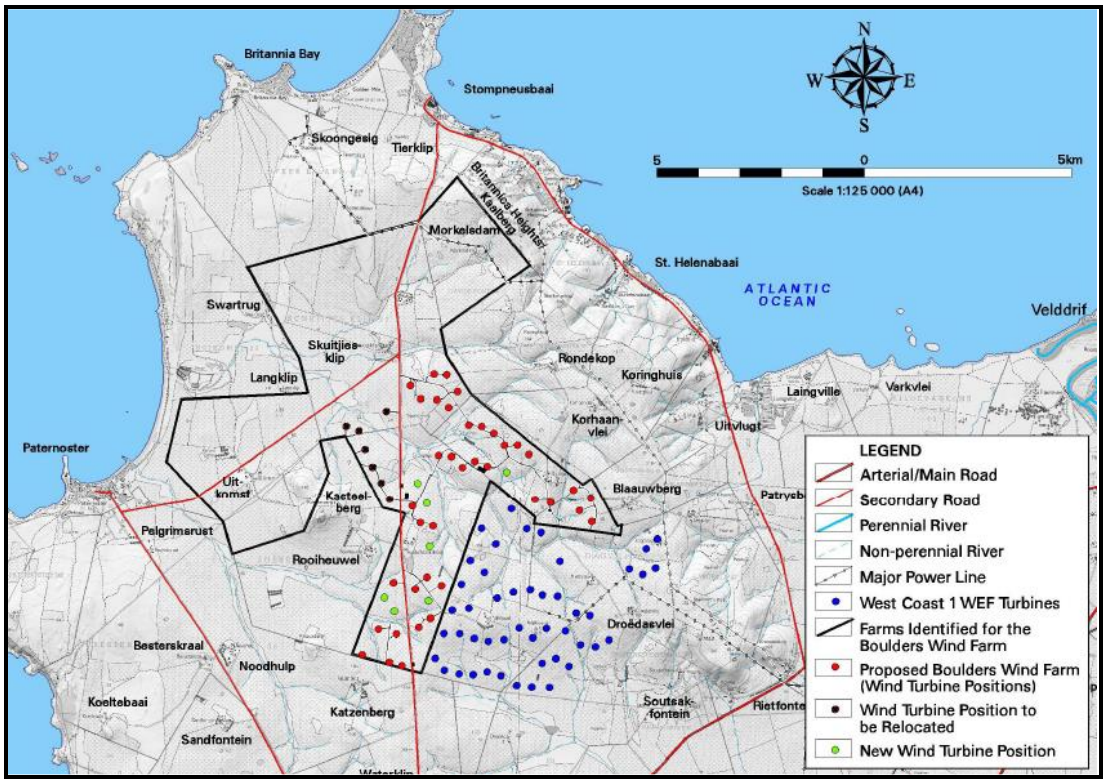
Two layout alternatives have been assessed, namely Alternative 1 and Alterative 2.

Alternative 1
Alternative 1 consists of forty five (45) wind turbines, of which thirteen (13) are located to the west of the Vredenburg-Stompneus Bay Road. Seven (7) of the thirteen (13) wind turbines located to the west of the road are located to the north of Kasteelberg (Figure 1.3).

Alternative 2
Based on the findings of the Visual Impact Assessment (Logis, October 2018), Heritage Impact Assessment (Smuts, October 2018) and the SIA (Barbour and van der Merwe, October 2018), the total number of wind turbines located to the west of the Vredenburg-Stompneus Bay Road was reduced from thirteen (13) to eight (8). In addition, all of the seven (7) wind turbines located in the area to north of the Kasteelberg were removed (Figure 1.4). The total number of wind turbines remains as forty five (45).



(Source: Visual Impact Assessment, Logis, 2018)
Figure 1.3: Boulders WF Alternative 1



(Source: Visual Impact Assessment, Logis, 2018)
Figure 1.4: Boulders WF Alternative 2

1.5 ASSUMPTIONS AND LIMITATIONS

1.5.1 Assumptions

Technical suitability
It is assumed that the development site represents a technically suitable site for the establishment of a wind energy facility.

Strategic importance of the project
The strategic importance of promoting wind energy is supported by the national and provincial energy policies. However, this does not mean that site related issues can be ignored or overlooked.

Fit with planning and policy requirements
Legislation and policies reflect societal norms and values. The legislative and policy context therefore plays an important role in identifying and assessing the potential social impacts associated with a proposed development. In this regard a key component of the SIA process is to assess the proposed development in terms of its fit with key planning and policy documents. As such, if the findings of the study indicate that the proposed development in its current format does not conform to the spatial principles and guidelines contained in the relevant legislation and planning documents, and there are no significant or unique opportunities created by the development, the development cannot be supported. However, the study recognises the strategic importance of wind energy and the technical, spatial and land use constraints required for wind energy facilities.

Interviews
Interviews were undertaken with affected stakeholders in 2016 as part of the previous EIA process. Given that the proposed Boulders WF is located on the same site as the previous WF the issues identified during these interviews are likely to be similar. This is confirmed by the key issues and concerns listed in the Comments and Response Report (Savannah, February 2018). The identification of social issues and concerns has also been informed by follow up interviews undertaken in 2018 as part of the current SIA process.

1.5.2 Limitations

Demographic data
The information contained in some key policy and land use planning documents, such as Integrated Development Plans etc., may not contain data from the 2011 Census. However, where required this data has been updated with the relevant 2011 Census data.

1.6 SPECIALIST DETAILS

Tony Barbour, the lead author of this report, is an independent specialist with 25 years' experience in the field of environmental management. In terms of SIA experience Tony Barbour has undertaken in the region of 240 SIAs and is the author of the Guidelines for Social Impact Assessments for EIA's adopted by the Department

of Environmental Affairs and Development Planning (DEA&DP) in the Western Cape in 2007. Annexure C contains a copy of Tony Barbour's CV.

Schalk van der Merwe, the co-author of this report, has an MPhil in Environmental Management from the University of Cape Town and has worked closely with Tony Barbour on a number of SIAs over the last ten years.

1.7 DECLARATION OF INDEPENDENCE

This confirms that Tony Barbour and Schalk van der Merwe, the specialist consultants responsible for undertaking the study and preparing the SIA Report, are independent and do not have any vested or financial interests in the proposed WF being either approved or rejected. Annexure D contains a signed declaration of independence.

1.8 REPORT STRUCTURE

The report is divided into five sections, namely:

- Section 1: Introduction;
- Section 2: Policy and planning context;
- Section 3: Overview of study area;
- Section 4: Identification and assessment of key issues;
- Section 5: Summary of key findings.

SECTION 2: POLICY AND PLANNING CONTEXT

2.1 INTRODUCTION

Legislation and policy embody and reflect key societal norms, values and developmental goals. The legislative and policy context therefore plays an important role in identifying, assessing and evaluating the significance of potential social impacts associated with any given proposed development. An assessment of the "policy and planning fit[8]" of the proposed development therefore constitutes a key aspect of the Social Impact Assessment (SIA). In this regard, assessment of "planning fit" conforms to international best practice for conducting SIAs. Furthermore, it also constitutes a key reporting requirement in terms of the applicable Western Cape Department of Environmental Affairs and Development Planning's *Guidelines for Social Impact Assessment* (2007).

For the purposes of meeting the objectives of the SIA the following national, provincial and local level policy and planning documents were reviewed, namely:

National

- National Energy Act (2008);
- White Paper on the Energy Policy of the Republic of South Africa (December 1998);
- White Paper on Renewable Energy (November 2003);
- National Integrated Energy Plan (IEP) (2016);
- Draft Integrated Resource Plan (August 2018);
- The National Development Plan (2011);
- New Growth Path Framework (2010);
- National Infrastructure Plan (2012).

Provincial and local

- White Paper on Sustainable Energy for the Western Cape Province (2010);
- The Western Cape Provincial Strategic Plan 2014-2019 (2014);
- The Western Cape Land Use Planning Act, 2014;
- The Western Cape Provincial Spatial Development Framework (2014 Revision);
- The Western Cape Climate Change Response Strategy (2014);
- The Western Cape Infrastructure Framework (2013);
- The Western Cape Green Economy Strategy Framework (2013);
- The One Cape 2040 Strategy (2012);
- The Western Cape Amended Zoning Scheme Regulations for Commercial Renewable Energy Facilities (2011);
- The Western Cape Draft Strategic Plan (2010);

[8] "Planning fit" can simply be described as the extent to which any relevant development satisfies the core criteria of appropriateness, need, and desirability, as defined or circumscribed by the relevant applicable legislation and policy documents at a given time.

- The Strategic Initiative to Introduce Commercial Land Based Wind Energy Development to the Western Cape – Towards a Regional Methodology (2006);
- The Guidelines for the Management of Development on Mountains, Hills and Ridges in the Western Cape (2002);
- West Coast District Municipality Integrated Development Plan (2017-2021);
- West Coast District Municipality Spatial Development Framework (2014);
- Saldanha Bay Municipality Spatial Development Framework (2011);
- Draft Saldanha Bay Municipality Spatial Development Framework (2017);
- Saldanha Bay Municipality Integrated Development Plan (2017-2022).
- Saldanha Bay Municipality Local Economic Development Plan (2005);
- Saldanha Bay Municipality Mid Term Strategic Local Economic Development Strategy (2013);

Section 2 also provides a review of the Renewable Energy Programme in South Africa and a summary of some of the key social issues associated with wind farms based on international experience. A summary of international studies on the potential impacts on property values and tourism is also provided.

2.2 NATIONAL POLICY ENVIRONMENT

2.1.1 National Energy Act (Act No 34 of 2008)

The National Energy Act was promulgated in 2008 (Act No 34 of 2008). One of the objectives of the Act was to promote diversity of supply of energy and its sources. In this regard, the preamble makes direct reference to renewable resources, including wind:

"To ensure that diverse energy resources are available, in sustainable quantities, and at affordable prices, to the South African economy, in support of economic growth and poverty alleviation, taking into account environmental management requirements (…); to provide for (…) increased generation and consumption of renewable energies…"(Preamble).

2.1.2 White Paper on the Energy Policy of the Republic of South Africa

Investment in renewable energy initiatives, such as the proposed WF, is supported by the White Paper on Energy Policy for South Africa (December 1998). In this regard the document notes:

"Government policy is based on an understanding that renewables are energy sources in their own right, are not limited to small-scale and remote applications, and have significant medium and long-term commercial potential".

"Renewable resources generally operate from an unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future".

The support for renewable energy policy is guided by a rationale that South Africa has a very attractive range of renewable resources, particularly solar and ***wind*** and that renewable applications are in fact the least cost energy service in many cases; more so when social and environmental costs are taken into account.

Government policy on renewable energy is therefore concerned with meeting the following challenges:

- Ensuring that economically feasible technologies and applications are implemented;
- Ensuring that an equitable level of national resources is invested in renewable technologies, given their potential and compared to investments in other energy supply options; and,
- Addressing constraints on the development of the renewable industry.

The White Paper also acknowledges that South Africa has neglected the development and implementation of renewable energy applications, despite the fact that the country's renewable energy resource base is extensive and many appropriate applications exist.

The White Paper also notes that renewable energy applications have specific characteristics that need to be considered. Advantages include:

- Minimal environmental impacts in operation in comparison with traditional supply technologies; and
- Generally lower running costs, and high labour intensities.

Disadvantages include:

- Higher capital costs in some cases;
- Lower energy densities; and
- Lower levels of availability, depending on specific conditions, especially with sun and wind based systems.

2.1.3 White Paper on Renewable Energy

The White Paper on Renewable Energy (November, 2003) (further referred to as the White Paper) supplements the *White Paper on Energy Policy*, which recognises that the medium and long-term potential of renewable energy is significant. This Paper sets out Government's vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in South Africa.

The White Paper notes that while South Africa is well endowed with renewable energy resources that have the potential to become sustainable alternatives to fossil fuels, these have thus far remained largely untapped. As signatory to the Kyoto Protocol[9], Government is determined to make good on the country's commitment to reducing greenhouse gas emissions. To this purpose, Government has committed itself to the development of a framework in which a national renewable energy framework can be established and operate.

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[9] The Kyoto Protocol is a protocol to the United Nations Framework Convention on Climate Change (UNFCCC), aimed at fighting global warming. The UNFCCC is an international environmental treaty with the goal of achieving "stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system". The Protocol was initially adopted on 11 December 1997 in Kyoto, Japan and entered into force on 16 February 2005. As of November 2009, 187 states have signed and ratified the protocol (Wikipedia)

South Africa is also a signatory of the Copenhagen Accord, a document that delegates at the 15th session of the Conference of Parties (COP 15) to the United Nations Framework Convention on Climate Change agreed to "take note of" the final plenary on 18 December 2009. The accord endorses the continuation of the Kyoto Protocol and confirms that climate change is one of the greatest challenges facing the world. In terms of the accord South Africa committed itself to a reduction target of 34% compared to business as usual. In this regard the IRP 2010 aims to allocate 43% of new energy generation facilities in South Africa to renewables.

Apart from the reduction of greenhouse gas emissions, the promotion of renewable energy sources is aimed at ensuring energy security through the diversification of supply (in this regard, also refer to the objectives of the National Energy Act).

Government's long-term goal is the establishment of a renewable energy industry producing modern energy carriers that will offer in future years a sustainable, fully non-subsidised alternative to fossil fuels.

2.1.4 Integrated Energy Plan (2016)

The development of a National Integrated Energy Plan (IEP) was envisaged in the White Paper on the Energy Policy of the Republic of South Africa of 1998 and, in terms of the National Energy Act, 2008 (Act No. 34 of 2008), the Minister of Energy is mandated to develop and, on an annual basis, review and publish the IEP in the Government Gazette. The purpose of the IEP is to provide a roadmap of the future energy landscape for South Africa which guides future energy infrastructure investments and policy development.

The IEP notes that South Africa needs to grow its energy supply to support economic expansion and in so doing, alleviate supply bottlenecks and supply-demand deficits. In addition, it is essential that all citizens are provided with clean and modern forms of energy at an affordable price. As part of the Integrated Energy Planning process, eight key objectives were identified, namely:

- Objective 1: Ensure security of supply;
- Objective 2: Minimise the cost of energy;
- Objective 3: Promote the creation of jobs and localisation;
- Objective 4: Minimise negative environmental impacts from the energy sector;
- Objective 5: Promote the conservation of water;
- Objective 6: Diversify supply sources and primary sources of energy;
- Objective 7: Promote energy efficiency in the economy; and
- Objective 8: Increase access to modern energy.

The IEP provides an assessment of current energy consumption trends within different sectors of the economy (i.e. agriculture, commerce, industry, residential and transport) and uses this information to identify future energy requirements, based on different scenarios. The scenarios are informed by different assumptions on economic development and the structure of the economy and also take into account the impact of key policies such as environmental policies, energy efficiency policies, transport policies and industrial policies, amongst others.

Based on this information the IEP then determines the optimal mix of energy sources and technologies to meet those energy needs in the most cost-effective manner for each of the scenarios. The associated environmental impacts, socio-economic benefits and macroeconomic impacts are also analysed. The IEP is therefore focused on determining the long-term energy pathway for South Africa, taking into account a multitude of factors which are embedded in the eight objectives.

As part of the analysis four key scenarios were developed, namely the Base Case, Environmental Awareness, Resource Constrained and Green Shoots scenarios:

- The Base Case Scenario assumes that existing policies are implemented and will continue to shape the energy sector landscape going forward. It assumes moderate economic growth in the medium to long term;
- The Environmental Awareness Scenario is characterised by more stringent emission limits and a more environmentally aware society, where a higher cost is placed on externalities caused by the supply of energy;
- The Resource Constrained Scenario in which global energy commodity prices (i.e. coal, crude oil and natural gas) are high due to limited supply;
- The Green Shoots Scenario describes an economy in which the targets for high economic growth and structural changes to the economy, as set out in the National Development Plan (NDP), are met.

The IEP notes that South Africa should continue to pursue a diversified energy mix which reduces reliance on a single or a few primary energy sources. In terms of renewable energy the document refers to wind and solar energy. The document does however appear to support solar over wind noting that solar PV and CSP with storage present excellent opportunities to diversify the electricity mix, to produce distributed generation and to provide off-grid electricity. Solar technologies also present the greatest potential for job creation and localisation. Incentive programmes and special focused programmes to promote further development in the technology, as well as solar roll-out programmes, should be pursued.

In terms of existing electricity generation capacity the IEP indicates that existing capacity starts to decline notably from 2025, with significant plant retirement occurring in 2031, 2041 and 2048. By 2050 only 20% of the current electricity generation capacity remains. As a result large investments are required in the electricity sector in order to maintain an adequate supply in support of economic growth.

By 2020, various import options become available and some new coal capacity is added along with new wind, solar and gas capacity. The mix of generation capacity technologies by 2050 is considerably more diverse than the current energy mix, across all scenarios. The main differentiating factors between the scenarios are the level of demand, constraints on emission limits and the carbon dioxide externality costs.

In all scenarios the energy mix for electricity generation becomes more diverse over the period to 2050, with coal reducing its share from about 85% in 2015 to 15–20% in 2050 (depending on the scenario). Solar, wind, nuclear, gas and electricity imports increase their share. The Environmental Awareness and Green Shoots scenarios take on higher levels of renewable energy.

An assessment of each scenario against the eight objectives with reference to renewable energy notes while all scenarios seek to ensure that costs are minimised within the constraints and parameters of each scenario, the Base Case Scenario presents the least cost followed by the Environmental Awareness, Resource Constrained and Green Shoots scenarios respectively when total energy system costs are considered.

In term of promoting job creation and localisation potential the Base Case Scenario presents the greatest job creation potential, followed by the Resource Constrained, Environmental Awareness and Green Shoots scenarios respectively. In all scenarios, approximately 85% of total jobs are localisable. For electricity generation, most jobs result from solar technologies followed by nuclear and wind, with natural gas and coal making a smaller contribution.

The Environmental Awareness Scenario, due to its stringent emission constraints, shows the lowest level of total emissions over the planning horizon. This is followed by the Green Shoots, Resource Constrained and Base Case scenarios. These trends are similar when emissions are considered cumulatively and individually by type

The IEP notes that a diversified energy mix with a reduced reliance on a single or a few primary energy sources should be pursued. In terms of renewable energy wind and solar are identified as the key options.

Wind

Wind energy should continue to play a role in the generation of electricity. Allocations to ensure the development of wind energy projects aligned with the IRP2010 should continue to be pursued.

Solar

- Solar should play a much more significant role in the electricity generation mix than it has done historically, and constitutes the greatest share of primary energy (in terms of total installed capacity) by 2050. The contribution of solar in the energy mix comprises both CSP and solar PV.
- Investments should be made to upgrade the grid in order to accommodate increasing solar and other renewable energy contributions.

With reference to the Renewable Energy Independent Power Producer (REIPP) Procurement Programme, the IEP notes:

- The REIPP Procurement Programme should be extended and new capacity should be allocated through additional bidding windows in order ensure the ongoing deployment of renewable energy technologies,;
- Experience and insights gained from the current procurement process should be used to streamline and simplify the process;
- The implementation of REIPP projects in subsequent cycles of the programme should be aligned with the spatial priorities of provincial and local government structures in the regions that are selected for implementation, in line with the Spatial Development Frameworks. This will ensure that there is long-term, sustainable infrastructure investment in the areas where REIPP projects are located. Such infrastructure includes bulk infrastructure and associated social infrastructure (e.g. education and health systems). This alignment will further assist in supporting the sustainable development objectives of provincial and local government by benefiting local communities.

The IEP indicates that Renewable Energy Development Zones (REDZs) have been identified and describe geographical areas:

- In which clusters (several projects) of wind and solar PV development will have the lowest negative impact on the environment while yielding the highest possible social and economic benefit to the country;
- That are widely agreed to have strategic importance for wind and solar PV development;
- Where the environmental and other authorisation processes have been aligned and streamlined based on scoping level pre-assessments and clear development requirements; and
- Where proactive and socialised investment can be made to provide time-efficient infrastructure access.

2.1.5 Integrated Resource Plan-Draft (2018)

The NDP envisages that, by 2030, South Africa will have an energy sector that provides reliable and efficient energy service at competitive rates, is socially equitable through expanded access to energy at affordable tariffs and that is environmentally sustainable through reduced pollution. In formulating this vision for the energy sector, the NDP took as point of departure

The Integrated Resource Plan (IRP) 2010–2030, promulgated in March 2011, represents an electricity infrastructure development plan for South Africa based on least-cost supply and demand balance taking into account security of supply and the environment (minimize negative emissions and water usage. Since the promulgated IRP 2010–2030 in 2011 a total 6 422MW under the Renewable Energy Independent Power Producers Programme (REIPPP) has been procured, with 3 272MW operational and made available to the grid.

At the time of promulgation, it was envisaged that the IRP would be a "living plan" to be revised by the Department of Energy (DoE) frequently. Since the promulgation of the IRP in March 2011 a number of assumptions have changed, including electricity demand projection, Eskom's existing plant performance, as well as new technology costs. The 2018 IRP notes that the Gross Domestic Product (GDP) for the period 2010–2016 was significantly lower than the GDP projections assumed in the promulgated IRP 2010–2030. The expected electricity demand as forecasted in the promulgated IRP 2010–2030 did therefore not materialise and the forecast was updated accordingly to reflect this.

In so doing the 2018 IRP assess the electricity demand for the period 2017-2050. Three demand scenarios were assessed, namely an upper, median and lower forecast based on varying GDP growth rates. The median scenario also took into account the assumed change in the structure of the economy where energy-intensive industries make way for less intensive industries. The lower scenario took into account lower economic growth linked to possible downgrading decisions by rating agencies.

The 2018 IRP also took into account the externality costs associated with Green House Gas (GHG) emissions, specifically the negative externalities-related air pollution caused by pollutants such as nitrogen oxide (NOx), sulphur oxide (SOx),

particulate matter (PM) and mercury (Hg). These externality costs reflect the cost to society because of the activities of a third party resulting in social, health, environmental, degradation or other costs.

The scenarios were analysed in three timeframes, namely 2017–2030, 2031–2040 and 2041–2050. The period 2021–2030 is termed a "medium-to-high" period of certainty, with new capacity requirements driven by the decommissioning of old Eskom power plants and marginal demand growth. While demand and technology costs are likely to change, the decommissioning of old plants will definitely result in the requirements for additional capacity.
The period 2031–2040 is termed an "indicative period", as the uncertainty regarding the assumptions begins to increase. The output for this period is relevant to the investment decisions of the 2021–2030 period because it provides information needed to understand various future energy mix paths and how they may be impacted by the decisions made today. The period 2041–2050 is even more uncertain than the period before 2040.

Based on the results of the scenario analyses, the following findings are relevant to the RE sector:

- Committed REIPPP (including the 27 signed projects) and Eskom capacity rollout ending with the last unit of Kusile in 2022 will provide more than sufficient capacity to cover the projected demand and decommissioning of plants up to around 2025;
- The installed capacity and energy mix for scenarios tested for the period up to 2030 does not differ materially. This is driven mainly by the decommissioning of about 12GW of Eskom coal plants;
- Imposing annual build limits on RE will not affect the total cumulative installed capacity and the energy mix for the period up to 2030;
- Imposing carbon budget as a strategy for GHG emission reduction or maintaining the PPD approach used in 2010 will not alter the energy mix by 2030;
- The projected unit cost of electricity by 2030 is similar for all scenarios, except for market-linked gas prices where market-linked increases in gas prices were assumed rather than inflation-based increases[10].
- The scenario without RE annual build limits provides the least-cost option by 2030.

For the period post 2030, the findings indicate:

- The decommissioning of coal plants (total 28GW by 2040 and 35GW by 2050), together with emission constraints imposed, imply coal will contribute less than 30% of the energy supplied by 2040 and less than 20% by 2050.
- Imposing annual build limits on RE will restrict the cumulative renewable installed capacity and the energy mix for this period;

[10] Representatives from the RE sector have indicated that this finding does not reflect the latest reductions in production costs associated with renewable energy technologies

- Adopting no annual build limits on renewables or imposing a more stringent GHG emission reduction strategy implies that no new coal power plants will be built in the future unless affordable cleaner forms of coal to power are available.
- Of key relevance, the assessment found that the scenario without RE annual build limits provides the least-cost option by 2050.

The following conclusions are drawn from the results of the analyses:

- Ministerial Determinations for capacity beyond Bid Window 4 (27 signed projects) issued under the promulgated IRP 2010–2030 must be reviewed and revised in line with the projected system requirements (updated plan);
- The scenario without RE annual build limits provides the least-cost electricity path to 2050;
- Without a policy intervention, all technologies included in the promulgated IRP 2010–2030 where prices have not come down like in the case of PV and wind, cease to be deployed because the least-cost option only contains PV, wind and gas.

The IRP 2018 Report concludes that cased on the findings of the scenarios analysis, the scenario of RE without annual build limits provides the least-cost path up to 2050. The document also notes that a detailed analysis of the appropriate level of penetration of RE in the South African national grid is required in order to better understand the technical risks and mitigations required to ensure security of supply is maintained during the transition to a low-carbon future.

Based on the findings of the study the final proposed plan is a that of a least-cost plan with the retention of annual build limits (1000MW for PV and 1600MW for wind) for the period up to 2030. This provides for smooth roll out of RE, which will help sustain the industry. Table 2.1 outlines the new additional RE capacity envisaged in terms of the 2018 IRP for the period up to 2030. The figure for wind energy is 11 447, making it the largest contributor to renewable energy in South Africa.

Table 2.1: Proposed Updated Plan for the Period Ending 2030

	Coal	Nuclear	Hydro	Storage (Pumped Storage)	PV	Wind	CSP	Gas / Diesel	Other (CoGen, Biomass, Landfill)	Embedded Generation
2018	39 126	1 860	2 196	2 912	1 474	1 980	300	3 830	499	Unknown
2019	2 155					244	300			200
2020	1 433				114	300				200
2021	1 433				300	818				200
2022	711				400					200
2023	500									200
2024	500									200
2025					670	200				200
2026					1 000	1 500		2 250		200
2027					1 000	1 600		1 200		200
2028					1 000	1 600		1 800		200
2029					1 000	1 600		2 850		200
2030			2 500		1 000	1 600				200
TOTAL INSTALLED	33 847	1 860	4 696	2 912	7 958	11 442	600	11 930	499	2600
Installed Capacity Mix (%)	44.6	2.5	6.2	3.8	10.5	15.1	0.9	15.7	0.7	

Installed Capacity
Committed / Already Contracted Capacity
New Additional Capacity (IRP Update)
Embedded Generation Capacity (Generation for own use allocation)

(Source: IRP Draft 2018)

2.1.6 National Development Plan

The National Development Plan (NDP) contains a plan aimed at eliminating poverty and reducing inequality by 2030. The NDP identifies 9 key challenges and associated remedial plans. Managing the transition towards a low carbon national economy is identified as one of the 9 key national challenges. Expansion and acceleration of commercial renewable energy is identified as a key intervention strategy.

Infrastructure investment is a key priority of the National Development Plan (NDP). The National Development Plan (NDP) identifies the need for South Africa to invest in a strong network of economic infrastructure designed to support the country's medium-and long-term economic and social objectives. Energy infrastructure is a critical component that underpins economic activity and growth across the country, and it needs to be robust and extensive enough to meet industrial, commercial and household needs.

The NDP requires the development of 10 000MW additional electricity capacity to be established by 2019 against the 2010 baseline of 44 000 MW.

The Integrated Resource Plan (IRP) 2010 developed the preferred energy mix with which to meet the electricity needs over a 20 year planning horizon to 2030. In line with the national commitment to transition to a low carbon economy, 17 800 MW of the 2030 IRP target are expected to be from renewable energy sources, with 5 000 MW to be operational by 2019 and a further 2000 MW (i.e. combined 7000 MW) operational by 2020. The Independent Power Producers Procurement Programme's (IPPPP) primary mandate is to secure electrical energy from the private sector for renewable and non-renewable energy sources. With regard to renewables, the programme is designed to reduce the country's reliance on fossil fuels, stimulate an indigenous renewable energy industry and contribute to socio-economic development and environmentally sustainable growth. The IPPPP has been designed not only to procure energy, but has also been structured to contribute to the broader national development objectives of job creation, social up-liftment and broadening of economic ownership.

2.1.7 The New Growth Path Framework

The aim of the New Economic Growth Path Framework is to enhance growth, employment creation and equity. Central to the New Growth Path is a massive investment in infrastructure as a critical driver of jobs across the economy. In this regard the framework identifies investments in five key areas namely: ***energy***, transport, communication, water and housing.

The New Growth Path also identifies five other priority areas as part of the programme, through a series of partnerships between the State and the private sector. The Green Economy as one of the five priority areas to create jobs, including expansions in construction and the production of technologies for solar, wind and biofuels. In this regard clean manufacturing and environmental services are projected to create 300 000 jobs over the next decade.

2.1.8 National Infrastructure Plan

The aim of the National Infrastructure Plan (2012) is to transform the economic landscape while simultaneously creating significant numbers of new jobs and strengthen the delivery of basic services.

As part of the Plan 18 strategic integrated projects (SIPs) have been identified, including three energy SIPs, namely:

- SIP 8: Green energy in support of the South African economy;
- SIP 9: Electricity generation to support socio-economic development;
- SIP 10: Electricity transmission and distribution for all.

2.3 PROVINCIAL POLICY AND PLANNING ENVIRONMENT

2.3.1 White Paper on Sustainable Energy for the Western Cape

The White Paper on Sustainable Energy (2010) compliments the Climate Change Strategy and Action Plan, specifically by *inter alia* setting targets for renewable energy generation. The White Paper is currently in Final Draft form. Once approved by Provincial cabinet, it will constitute the formal Western Cape's policy document on

which the Western Cape Sustainable Energy Facilitation Bill will be based. The purpose of the White Paper and the envisaged Bill is to create an enabling policy environment in the Western Cape in order to promote and facilitate energy generation from renewable sources, as well as efficient energy use technologies and initiatives. This objective forms an integrated part of the Province's overarching energy policy objectives, namely:

- To ensure medium-term energy security, sufficient in order to support economic growth;
- To reduce energy poverty;
- To increase the efficient use of energy;
- To limit the greenhouse emissions footprint (associated with the use of fossil fuels);
- To decrease reliance on finite fossil fuel resources and associated unpredictable commodity markets.

The White Paper forms part of the Provincial Government of the Western Cape's (PGWC) strategy aimed at removing a number of barriers (e.g. energy pricing, legal, institutional, low levels of investment confidence, insufficient knowledge) currently frustrating the province's energy goals by preventing the adoption and commercialization of clean energy (including electricity generation from renewable sources such as wind and solar) technologies and initiatives. The White Paper notes that, with regard to sources of renewable energy, wind and solar both represent commercially viable options in the province. The document proposes that special focus should be given to these renewable subsectors and specific associated technologies in order to achieve critical mass of installation, and therefore drive down establishment costs and ensure permanent employment opportunities.

The context, vision, identified goals and targets of the White Paper are briefly discussed below:

Context

The White Paper is rooted in an integrated set of high-level provincial policy documents, and in particular, the Western Cape Provincial Growth and Development Strategy (PGDS)[11] of 2007 and the Sustainable Development Implementation Plan (SDIP)[12]. These policy documents provide the overarching framework for the White Paper. Information contained in the internal Sustainable Energy Strategy (SES) document which was prepared in 2007, largely informed the drafting of the White Paper.

Vision

The vision underpinning the White Paper, the so-called "2014 Sustainable Energy Vision for the Western Cape" is the following:

[11] The main purpose of the PGDS is to provide a strategic framework for accelerated and shared economic growth in the Western Cape. The PGDS builds on the 12 iKapa strategies which were developed by the relevant PGWC line departments, including the Provincial Spatial Development Framework (PSDF), the Sustainable Development Implementation Plan (SDIP) and the Climate Change Response Strategy (CCRS).

[12] This plan includes programmes to encourage biodiversity, effective open-space management and the better management of settlements by ensuring the sustainability of services in respect of water, waste, energy and land. The SES and White Paper both effectively form part of SDIP.

The Western Cape has a secure supply of quality, reliable, clean and safe energy, which delivers social, economic and environmental benefits to the Province's citizens, while also addressing the climate change challenges facing the region and the eradication of energy poverty (White Paper, 15).

Goals

Six goals have been identified in order to realise to this vision. These goals are grouped under economic, environmental and social sustainability categories. These goals are listed below, and each briefly discussed:

- Goal 1: alleviate energy poverty (Social sustainability): This goal is aimed at addressing energy related under-development amongst the province's poor.
- Goal 2: Improve the health of the nation (Social sustainability): The goal is aimed at reducing health and safety risks associated with the use of fuels such as coal, paraffin and wood, as well as the generation of electricity from fossil fuels. In this regard it is noted that the use of renewable sources to generate electricity does not emit harmful substances such as smoke, or oxides of sulphur nitrogen into the atmosphere. The document notes that improving the health of the nation includes improving the health of the individual through improved indoor climate as well as the outdoor climate.
- Goal 3: Reduce harmful emissions (Environmental sustainability): The White Paper notes that improved energy efficiency and increased use of renewable energy are cost effective methods to reduce Greenhouse Gas emissions, thereby combating Climate Change. Addressing Climate Change opens the door to utilising additional finance mechanisms to reduce CO_2 emissions.
- Goal 4: Reduce negative footprints in our environment (Environmental sustainability): The White Paper notes that the use of fossil fuels has a documented negative impact on the regional and local environment. The negative impacts include, but are not limited to individual health, ground water pollution and air pollution. Any reduction in the use of fossil fuels through switching to clean(er) energy sources and more efficient energy uses is therefore desirable.
- Goal 5: Enhance energy security (Economic sustainability): The massive South African black-outs that started first in the Western Cape in early 2006 alerted the Province to its energy vulnerability. It is essential that the Western Cape increases its resilience against external energy supply disruptions and the massive price fluctuations caused by national or international decisions with regard to energy commodities (coal, oil):
- Goal 6: Improve economic competitiveness (Economic sustainability): It has been demonstrated internationally that one of the ways to improve economic competitiveness is by improving industrial and commercial energy efficiency. Support of industrial best practice energy management as a tool to stay competitive and improve the economy is important.

Targets

The PGWC agreed to targets for electricity from renewable sources and for energy efficiency to be achieved by 2014. The purpose of the White Paper is to quantify the relevant targets, and further to provide an incremental implementation plan until 2014. In this regard, four targets have been identified. Of these, two are of direct relevance to the proposed WF:

- Target for electricity generated from renewable sources: *15% of the electricity consumed in the Western Cape will come from renewable energy sources in*

2014, measured against the 2006 provincial electricity consumption (White Paper, p21)

In this regard, the White Paper notes that in order to reach this target, it will be necessary for the PGWC to ensure that the environment to establish and generate renewable energy is such that a minimum of 15% of the electricity can be produced, and must be consumed, from renewable sources.

- Target for reducing carbon emissions: *The carbon emissions are reduced by 10% by 2014 measured against the 2000 emission levels* (p. 23).

In this regard, the White Paper notes that achieving this target largely depends on achieving the renewables target.

2.3.2 Western Cape Climate Change Response Strategy

The Western Cape Climate Change Response Strategy (WCCCRS) was adopted in February 2014. It is an update of the 2008 Western Cape Climate Change Response Strategy and Action Plan. The key difference with the 2008 Strategy is a greater emphasis on mitigation, including strategically suitable renewable energy development.

The 2014 WCCCRS was updated in accordance with the National Climate Change Response Policy (2013). It is strongly aligned with the overarching provincial objectives contained in the Western Cape Draft Strategic Plan 2009-2014 (2010), and the WCP 'Green is Smart' Strategy (2013). In line with the National Climate Change Response Policy, the Strategy takes a two-pronged approach to addressing climate change:

- **Mitigation:** Contribute to national and global efforts to significantly reduce Green House Gas (GHG) emissions and build a sustainable low carbon economy, which simultaneously addresses the need for economic growth, job creation and improving socio-economic conditions;
- **Adaptation:** Reduce climate vulnerability and develop the adaptive capacity of the Western Cape's economy, its people, its ecosystems and its critical infrastructure in a manner that simultaneously addresses the province's socio-economic and environmental goals (WCCCRS, 2014: 21).

The Strategy will be executed through an implementation framework which will include an institutional framework for both internal and external stakeholders, with a strong emphasis on partnerships. The framework still has to be prepared. A monitoring and evaluation system is further envisaged in order to track the transition to a low carbon and climate resilient WCP. Policy aspects dealing with mitigation are of specific relevance to renewable energy generation.

Energy and emissions baseline

Based on comprehensive 2009 data for all WCP energy use sectors, the following key findings pertain to the overall WCP energy use and emissions:

- Electricity is the key fuel used in the WCP, accounting for 25% of total consumption;

- Approximately 95% of base load electricity is generated from low-grade coal and the remainder by nuclear. The vast bulk of WCP electricity is generated in the north of the country;
- In terms of emissions by sector, electricity is responsible for 55% of the total WCP emissions. According to the Strategy, this supports the case for a shift towards renewables and clean energy types;
- Transport (55%) was the greatest energy user, followed by industry (33%). Although domestic consumption accounted for only 8%, it accounted for 18% of emissions, again underscoring the emission-intensive nature of electricity generation.

Mitigation potential

According to the Strategy, the main opportunities for mitigation include energy efficiency, demand-side management, and moving towards a less-emission intensive energy mix. In the short to medium term, four areas with mitigation potential are identified, including promoting renewable energy in the form of both small-scale embedded generation as well as large scale renewable energy facilities. Together with other mitigation interventions, renewable energy generation is anticipated to result in the following socio-economic benefits:

- Reducing fuel costs to households and business;
- Improving the competitiveness of businesses;
- Job creation opportunities with the development of new economic sectors;
- Local business development;
- Improved air quality (with positive health impacts);
- Reducing the negative impact of large carbon footprints, particularly for export products; and
- Reducing stress on energy needs of the province and thereby increasing energy security.

Renewable energy as strategic focus area

Initial implementation of the Strategy will focus on select focus areas aligned with the National Climate Change Response Policy Flagship Programmes and the Western Cape Green Economy Strategy Framework. These focus areas will be reviewed every five years – i.e. the next revision is due in 2019. The renewable energy area is identified as one of nine focus areas. The Strategy document notes that renewable energy is a key area of focus for the Western Cape, and forms a fundamental component of the drive towards the Western Cape becoming the green economy hub for Africa.

The role of the provincial government is identified as 'supporting the development of the renewable energy industry through promoting the placement of renewable energy facilities in strategic areas of the Western Cape as well as through supporting renewable energy industries'.

The document further notes that waste-to-energy opportunities are being investigated in order to facilitate large-scale rollout. Current investigation includes understanding the most appropriate technologies for waste-to-energy projects as well as developing decision support tools for municipalities to implement waste-to-energy programmes.

Priority areas identified for renewable energy development

- Development of the Renewable Energy economy in the WCP, in terms of both the appropriate placement of renewable energy as well as manufacturing opportunities;
- Development of waste-to-energy opportunities for both municipal and private sector (commercial and industrial) waste systems;
- Development of opportunities around small-scale renewable energy embedded generation activities.

2.3.3 Provincial Strategic Plan 2014-2019 (2014)

The Western Cape Provincial Strategic Plan (WCPSP) builds upon the 2009-2014 Draft Provincial Strategic Plan. The vision statement for the 2014-2019 Plan is 'a highly skilled, innovation-driven, resource-efficient, connected, high-opportunity society for all'. The five strategic goals identified for the 2014-2019 period are:

- Creating opportunities for growth and jobs;
- Improving education outcomes and opportunities for youth development;
- Increasing wellness and safety, and tackling social ills;
- Enabling a resilient, sustainable, quality and inclusive living environment; and
- Embedding good governance and integrated service delivery through partnerships and spatial alignment.

Five sets of performance indicators are identified to evaluate the implementation of strategies aimed at meeting these goals. In addition, the Plan identifies a number of 'game changers' which would help tackling provincial development issues, and result in palpable 'real' change. It envisages that action plans would be prepared by 2015/2016 for each of these identified 'game changers'. The 'game changers' are clustered around three priority areas. Key aspects of the Plan pertaining to renewable energy are discussed below.

Strategic Goal 1: Energy security as a 'game changer'

Economic growth/ job creation (Strategic Goal 1) is one of the 3 priority development areas. Achieving Energy security is identified as one of two 'game changers' for fostering this. In this regard, the Plan notes that inadequate electricity supplies over the next five years and beyond threaten to be a significant impediment to growth. A number of strategic priorities are identified to address the issue, including the development of a WCP green economy. The Plan notes that PGWC has prioritised the development of a green economy, with the further aim of establishing it as the green economy hub of Africa.

The Plan further notes that the WCP has already established itself as the national renewable energy hub. In that regard, it is home to developers which have developed more than 60% of the 64 successful projects in the first three rounds of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), as well as a wide array of firms that provide key support services for the industry (engineering and environmental consultancies, legal advisors, etc.). The WCP has also seen the majority of local manufacturing investments. Three of the 4 PV manufacturers that have been successful in supplying to the REIPPPP projects are located in Cape Town, whilst 2014 also saw major global players opening manufacturing facilities for inverters and wind turbine towers.

Future energy security priorities include scaling up renewable energy generation in the province, including embedded generation such as rooftop solar PV, and the importation of liquid natural gas as an alternative power source to support further rollout of renewable energy and low carbon fuel switching (WCPSP, 2014: p.21).

Strategic Goal 4: Reducing greenhouse emissions and improving air quality
The Plan notes that PGWC is committed to improving the resilience, sustainability, quality and inclusivity of the urban and rural settlements. The Plan further notes that while some resource conservation and management improvements have been made, the WCP resource base remains under severe pressure.

Water, energy, pollution and waste, transport and resource-use inefficiencies are leading to extensive environmental degradation, poor air quality, loss of biodiversity and agricultural resources, which result in a deterioration of social and economic conditions. These challenges are further exacerbated by population growth and climate change impacts. It is anticipated that climate change will worsen air quality, as its effects will slow air circulation around the world, resulting in an increase in the frequency and severity of disasters (e.g. fires, floods, and coastal erosion) (WCPSP, 2014: p. 35).

Strategic outcomes pursued under Goal 4 include the enhanced management and maintenance of the ecological and agricultural resource-base; sustainable and integrated urban and rural settlements; and an improved climate change response.

Four outcomes are prioritised, including reduced greenhouse gas emissions and improved air quality. In this regard, the Plan notes that, as air quality and climate change are integrally linked, activities such as reducing fossil fuel burning will address both these priorities (WCPSP, 2014: p. 36). The Plan does not discuss reduced fossil fuel burning or renewable energy in any further detail.

With regard to interventions to air quality management, the Plan refers to the Western Cape Air Quality Management Plan (WCAQMP). The WCAQMP (2010) and associated working groups focus on key interventions relating to governance and integrated management of air quality, climate change, town and regional planning and transport planning. The WCAQMP does not address renewable energy generation.

2.3.4 Western Cape Land Use Planning Act

In line with the Spatial Planning and Land Use Management Act, (Act 16 of 2013), the Western Cape Land Use Planning Act 2014 (LUPA) was adopted by PGWC in April 2014. Chapter III (which deals with spatial planning matters) sets out the minimum requirements for drafting a Provincial Spatial Development Framework (PSDF) for the WCP.

Of specific relevance, Section 4 requires a PSDF to (3) 'contain at least (*c*) provincial priorities, objectives and strategies, dealing in particular with (*iiii*) adaptation to climate change, mitigation of the impact of climate change, renewable energy production and energy conservation'. This requirement would apply to all future revisions of the PSDF. As such, it indicates PGWC's commitment to renewable energy production in order to respond to climate change.

2.3.5 Western Cape Provincial Spatial Development Framework

The 2014 Revision of the Western Cape PSDF replaces the 2009 PSDF. The 2014 PSDF was approved by MEC Bredell (Local Government, Environmental Affairs and Development Planning) in April 2014. In his Preface to the 2014 PSDF the MEC indicated that the 2014 PSDF carries the buy-in of all the Provincial departments to inform and guide their sector planning/spatial development strategies, and is therefore 'owned' by all Heads of Department (PSDF, p.2).

While it builds on and continues to incorporate the key principles and spatial policies of the 2009 PSDF, the new PSDF replaces the 2009 one as policy framework. A number of reasons necessitated this replacement. These include the fact that the 2009 PSDF was drafted in a climate of economic buoyancy before the global recession had hit home. The 2009 PSDF also had to be updated in line with new policy such as the One Cape 2040 vision, LUPA, and the National Development Plan (NDP), as well as the results of the 2011 Census. Finally, the 2014 PSDF reflects PGWC's new transversal (cutting across departments) approach to government, while providing greater clarity with regard to the planning responsibilities of the three spheres of government.

Overarching guiding principles
The new PSDF is based on a set of 5 guiding principles, namely:

- Spatial justice;
- Sustainability and resilience;
- Spatial efficiency;
- Accessibility, and
- Quality and livability.

Under Sustainability and resilience, the PSDF notes that land development should be spatially compact, resource-frugal, compatible with cultural and scenic landscapes, and should not involve the conversion of high potential agricultural land or compromise ecosystems (p. 22). The 2004 Growth Potential Study was also revised in 2013 as part of the PSDF process[13].

Key spatial challenges are outlined in Chapter 2 of the PSDF. Energy security and climate change response are identified as key high-level future risk factors. The PSDF notes that the WCP is subject to global environmental risks such as climate change, depletion of material resources, anticipated changes to the global carbon regulatory environment, and food and water insecurity. The challenge would be to open up opportunities for inclusive economic growth, and decouple economic growth from resource consumptive activities (i.e. the development of a 'greener' economy, as outlined in the 2013 WCP Green is Smart strategy – see further below).

In this regard, the 2014 PSDF is in response to a number of associated escalating risks, including understanding the spatial implications of known risks (e.g. climate change and its economic impact and sea level rise, flooding and wind damage associated with extreme climatic events); and energy insecurity, high levels of

[13] eadp-westerncape.kznsshf.gov.za/sites/default/files/news/files/2013-10-15/2013-growth-potential-study-of-towns-report_0.pdf. The 2014 PSDF is informed by three additional studies, also available at the above link.

carbon emissions, and the economic impacts of the introduction of a carbon tax (p. 27).

The WCP Spatial agenda

The spatial agenda for the WCP is set out in Chapter 2.6. This agenda is anticipated to deliver on the objectives of greater inclusivity, and growth and environmental resilience. The agenda may be summarised as three linked sub-agendas, all addressed in the PSDF:

- (1) Growing the WCP economy in partnership with the private sector, non-governmental and community based organisations;
- (2) Using infrastructure investment as a primary lever to bring about the required urban and rural spatial transitions, including transitioning to sustainable technologies, as set out in the 2013 Western Cape Infrastructure Framework (WCIF), while also maintaining existing infrastructure;
- (3.) Improving oversight of the sustainable use of the Western Cape's spatial assets. This sub-agendum is of specific relevance to climate change response and renewable energy. Its key objective is safeguarding the biodiversity networks, ecosystem services, agricultural resources, soils and water, as well as the WCP's unique cultural, scenic and coastal resources on which the tourism economy depends. In addition, it seeks to understand the spatial implications of known risks (e.g. climate change) and to introduce risk mitigation and/or adaptation measures.

Chapter 3.1 deals with the sustainable use of the WCP's assets. These are identified as Biodiversity and Ecosystem services; Water resources; Soils and Mineral resources; Resource consumption and disposal; and Landscape and scenic assets. Policies are outlined for each of these themed assets. The last two themed assets are of specific relevance with regard to renewable energy.

Resource consumption and disposal

Key challenges facing the WCP are identified as matters pertaining to waste disposal, air quality, energy, and climate change.

Energy

With regard to energy use, the PSDF notes that the Cape Metro and West Coast regions are the WCP's main energy users. It further notes that the WCP's electricity is primarily drawn from the national grid, which is dominated by coal-based power stations, and that the WCP currently has a small emergent renewable energy sector in the form of wind and solar generation facilities located in its more rural, sparsely populated areas. The PSDF also reiterates PGWC's commitment to shifting the economy towards gas[14] as transitional fuel (see WCIP below). Most of the energy discussion in the PSDF is dominated by aspects pertaining to natural gas.

With regard to renewable energy, the following policy provisions are of relevance:

[14] The PSDF at present envisages mainly from offshore West Coast gas fields via a terminal at Saldanha. The PSDF refers to the potential exploitation of own shale reserves, but also to the environmental sensitivity involved.

- Policy R.4.6: *Pursue energy diversification and energy efficiency in order for the Western Cape to transition to a low carbon, sustainable energy future, and delink economic growth from energy use*;
- R.4.7: *Support emergent Independent Power Producers (IPPs) and sustainable energy producers (wind, solar, biomass and waste conversion initiatives) in suitable rural locations (as per recommendations of the Strategic Environmental Assessments for wind energy (DEA&DP) and renewable energy (DEA)*[15] .

Unlike the 2009 PSDF, the new PSDF does not provide any spatial provisions with regard to REF or transmission line infrastructure. Instead, such determination is envisaged in terms of the WCP WF SEA, the DEA REF SEA, municipal SDFs, etc. In this regard the two policy directives contained in the 2009 PSDF that had a direct relevance for WFs are not contained in the 2014 revision, namely:

HR26 (…) transmission lines (…) should be aligned along existing and proposed transport corridors rather than along point to point cross-country routes. (Mandatory directive)

HR27 Wind farms should be located where they will cause the least visual impact, taking into consideration the viability of the project. (Guiding directive)

Climate change

Water scarcity is identified as probably the key risk associated with climate change. Essentially the same primary response objectives outlined in the 2014 Western Cape Climate Change Response Strategy (WCCCRS – see 4 below) are identified in the PSDF. These are energy efficiency, demand management and renewable energy.

Policy provisions are made with regard to climate change adaptation and mitigation. Concerning renewable energy, the following is of relevance:

- R.4.16: *Encourage and support renewable energy generation at scale*.

Landscape and scenic assets

A specialist study was undertaken into the Province's cultural and scenic landscapes. This study[16] was one of the informants of the 2014 PSDF. It established that the WCP's cultural and scenic landscapes are significant assets underpinning the tourism economy, but that these resources are being incrementally eroded and fragmented. According to the study agriculture is being reduced to 'islands', visual cluttering of the landscape by non-agricultural development is prevalent, and rural authenticity, character and scenic value are being eroded. The mountain ranges belonging to the Cape Fold Belt together with the coastline are identified as the most significant in scenic terms, and noted to underpin the WCP's tourism economy.

A number of scenic landscapes of high significance are under threat, mainly from low density urban sprawl, and require strategies to ensure their long-term protection. These include landscapes under pressure for large scale infrastructural developments

[15] See notes under Regional Methodology Review below.

[16] DEA&DP Winter and Oberholzer (2013). *Heritage and Scenic Resources: Inventory and Policy Framework for the Western Cape. - A Study prepared for the Western Cape Provincial Spatial Development Framework*. Draft 5. See footnote 1 above.

such as ***wind farms***, solar energy facilities, transmission lines and shale gas development in the Central Karoo. With regard to renewable energy, the following policy provisions are of relevance:

- R.5.6: *Priority focus areas proposed for conservation or protection include -*

  - *Rural landscapes of scenic and cultural significance situated on major urban edges and under increasing development pressure, e.g. Cape Winelands;*
  - *Undeveloped coastal landscapes under major development pressure;*
  - *Landscapes under pressure for large scale infrastructural developments such as **wind farms**, solar energy facilities, transmission lines and fracking, e.g. Central Karoo; and*
  - *Vulnerable historic mountain passes and 'poorts'* .

Renewable energy within the Spatial Economy
Chapter 3.2 deals with opportunities in the WCP spatial economy, including with regard to regional infrastructure development. Essentially the same objectives are identified as in the WCIF, including the promotion of a renewable energy sector . General project-based (EIA and specialist assessment) provisions are made for evaluating the suitability of sites proposed for bulk infrastructure (Policy E.1) .

2.3.6 Western Cape Infrastructure Framework

The Western Cape Infrastructure Framework (WCIF) (2013) was developed by the WCP Provincial Department of Transport and Public Works in terms of the Provincial Government's mandate to coordinate provincial planning under Schedule 5A of the Constitution. The objective of the WCIF is to align the planning, delivery and management of infrastructure to the strategic agenda and vision for the Province, as outlined in the 2009-2014 Draft Provincial Strategic Plan. The One Cape 2040 and 2013 Green is Smart strategy were other key informants.

The document notes that given the *status quo* of infrastructure in the province, and the changing and uncertain world facing the Western Cape over the 2-3 decades a new approach to infrastructure is needed. Namely one that satisfies current needs and backlogs, maintains the existing infrastructure, and plans proactively for a desired future outcome. The 2040 vision requires a number of transitions to shift the way in which infrastructure is provided and the type of infrastructure provided in the WCP.

The WCIF addresses new infrastructure development under five major 'systems' (themes), and outlines priorities for each. Energy is one of the 'systems' identified. The document notes that a provincial demand increase of 3% per year is anticipated for the period 2012-2040. Key priorities are in matching energy generation/ sourcing with the demand needed for WCP economic growth. Additionally, the energy focus should be on lowering the provincial carbon footprint, with an emphasis on renewable and locally generated energy.

Energy infrastructure transition
Three key transitions are identified for the WCP Energy 'system' infrastructure, namely:

- Shifting transport patterns to reduce reliance on liquid fuels;

- Promoting natural gas as a transition fuel by introducing gas processing and transport infrastructure; and
- Promoting the development of renewable energy plants in the province and associated manufacturing capacity.

2.3.7 Western Cape Green Economy Strategy Framework

The Western Cape Green Economy Strategy (2013) – 'Green is Smart' - is a framework for shifting the Western Cape economy from its current carbon intensive and resource-wasteful path within a context of high levels of poverty to one which is smarter, greener, more competitive and more equitable and inclusive. The Strategy is closely aligned with provincial development goals and the 2014 WCCCRS.

The strategy notes that two of the WCP's key economic sectors - both of national importance - agriculture and tourism, are vulnerable to climate change. At the same time, these challenges hold significant potential for opportunities linked to attracting investment, economic development, employment creation, and more resilient infrastructure and patterns of consumption. These opportunities are partly linked to the WCP's existing leadership in some fields of green technology, including knowledge services. The core objective of the Strategy is to position the WCP as the lowest carbon footprint province in South Africa, and a leading green economy hub on the African continent.

Drivers, Enablers and Priorities

The Strategy framework is made up of 5 drivers of the green economy which are market focused and principally private sector driven, and supported by 5 enablers which are either public sector driven, or the product of a collaborative effort.

The five drivers are: smart mobility, smart living and working, smart ecosystems, smart agri-processing and smart enterprise. The relevant cross-cutting enablers are: finance, rules and regulations, knowledge management, capabilities, and infrastructure.

The framework also identifies priorities that would position the WCP as a pioneer and early adopter of green economic activity. These priorities have been identified in terms of the WCP being firstly, a front-runner or pioneer and secondly, an early adopter of innovations and technologies which already exist, but are not widely adopted in South Africa. Some priorities are considered game-changers, and are singled out as 'high level priorities for green growth'.

Three such 'high level priorities for green growth' are identified, two of which are of relevance here:

- Natural Gas and Renewables: Off-shore natural gas, potential gas base-load power plants and renewable energy IPP programme, together with a greenfield gas infrastructure, will be the game-changer for the Western Cape to be the lowest carbon province in South Africa, and achieve significant manufacturing investment;
- Green Jobs: A green growth path without job growth is unsustainable. There must be early pursuit of priorities with a high rate of job growth potential – notably rehabilitation of natural assets, responsible tourism and the waste sector.

Renewable energy servicing hub

'Under the section dealing with drivers, renewable energy is discussed under 'Smart Enterprise'. The WCP's objective in terms of this driver is to establish the WCP as a globally recognised centre of green living, working, creativity, business and investment, and thereby attract investment, business and employment opportunities. Based on existing comparative advantages, three key opportunities are identified, one of which is of relevance here, namely to establish the WCP as Africa's new energy servicing hub.

In this regard, the Strategy document notes that WCP is well placed to be the most important research and servicing hub for the renewable and natural gas energy sectors in South Africa and on the African continent.

In support of this claim, it notes that the Darling Wind Energy Facility (WF) was the first operational WF in the country, and that a number of further WFs and SEFs have been approved for the province under REIPPPP. Estimated investment of REIPPPP projects in the Western Cape in the first two rounds is just under R8 billion (wind and solar). WCP professional service firms play a leading advisory role in REIPPPP projects across the country.

The WCP is further home to the country's first photovoltaic manufacturers, Tenesol/ SunPower and SolaireDirect. On the back of REIPPPP, AEG and jointly, Enertronica and Gefran have also established manufacturing facilities in the Cape, with growing interest from other companies. South Africa's first dedicated renewable training centre is being established in the Western Cape at the Cape Peninsula University of Technology (CPUT). The aim of the centre is to prepare a skilled labour pool for the new emerging renewable energies: wind, solar and biogas. The first phase will combine theoretical and practical training for wind turbine service technicians and for solar farms. In the long run, the centre will also become a development and research facility for renewable energy.

The Strategy also notes that there are important initial opportunities in the construction of new energy infrastructure. However, the real long-term benefits lie in the servicing of operational infrastructure. In this regard, it is estimated that the annual servicing and maintenance costs of WFs for instance amount to approximately 10% of the initial capital investment.

Public and market sector procurement are identified as some of the key enablers. The creation of a streamlined regulatory system – the reduction of 'red tape' – is identified as a key prerequisite for creating an enabling environment.

A leader in renewable energy research, manufacturing and servicing

Under the section dealing with enablers necessary to unlock development potential, renewable energy is discussed under "Smart Infrastructure". The Strategy document notes that existing infrastructure systems, particularly those relating to energy and transport, are carbon intensive, with high costs to the environment. Opportunities for the WCP are linked to tapping into infrastructural development funding by leveraging existing advantages.

With regard to the energy sector, the Strategy proposes that the WCP becomes an early adopter of natural gas processing and transport infrastructure, and become the hub of solar manufacture and servicing. Natural gas is identified as the key potential 'game changer' of the WCP economy, and presents the best way to transition the

economy to a more fully-integrated renewables sector as major part of the WCP fuel mix in the long term. In this regard, the relative ease with which gas-fired stations could be activated makes them an ideal supplement to less predictable wind and solar sources.

CSP manufacturing and servicing centre[17]

Surprisingly, WF and Solar PV manufacture and servicing receive no specific mention, while Concentrated Solar (CSP) does. The Strategy document justly notes that while the Northern Cape Province is the best suited for CSP facilities, the WCP has strong existing research capabilities in CSP at the University of Stellenbosch (US), and the WCP's existing manufacturing sector already has the capacity to manufacture many CSP components.

Potential opportunities of commercialisation of CSP technology for local (RSA, Africa) conditions based on US research could be substantial. This subsector is identified as an important area of collaboration between the two provinces to realise the potential benefits. The key action at this stage to initiate a WCP manufacturing and servicing centre is to lobby for support for a pilot of South African designed CSP technologies, adapted to SA conditions.

2.3.8 One Cape 2040 Strategy

The One Cape 2040 (2012) vision was developed by the Western Cape Government, the City of Cape Town (CoCT) and the Western Cape Economic Development Partnership. It was adopted as policy by CoCT Council in 2012. It is aimed at stimulating a transition towards a more inclusive and resilient WCP economy. It seeks to set a common direction to guide planning and action and to promote a common commitment and accountability to sustained long-term progress.

The 2040 Strategy does not replace any existing statutory plans. Rather, it is intended as a basic reference point and guide for all stakeholders planning for long-term economic resilience and inclusive growth.

Six key transitions are identified to define the necessary infrastructure-related shifts in the WCP. One of these 6 key transitions is an Ecological transition ('Green Cape') from an unsustainable, carbon-intensive resource use economy, to a sustainable, low carbon-footprint one. The development of renewable energy projects and natural gas are expected to significantly decrease the WCP's carbon footprint.

2.3.9 Western Cape Amended Zoning Scheme Regulations for Commercial Renewable Energy Facilities

Amendments to the Western Cape Land Use Ordinance (1985) (LUPO) were promulgated in 2011 in order to guide the development of commercial renewable energy generation facilities (REFs), mainly wind and solar[18]. The Zoning Scheme amendments are specifically intended to provide guidance with regard to land use compatibility, and applicable development restrictions and conditions, including provision for mandatory rehabilitation post construction and final decommissioning

[17] The revised IRP excludes CSP as an option.

[18] Province of the Western Cape (2011). *Provincial Gazette 6894, Friday 29 July 2011;* PN 189/2011 (pp. 1381-6).

("abandonment" in terms of the Provincial Notice[19]). The ambit of the Regulations include all REFs as well as associated ("appurtenant") infra/ structure(s) operated for commercial gain, irrespective of whether such feed into the electricity grid or not. The section below provides an overview of key points of relevance to the proposed WF.

Zoning status

- In terms of zoning status, "renewable energy structures" are designated as a consent use in the zone Agriculture I.

Land use restrictions

- Restrictions with regard to height are mainly applicable to wind energy facilities (WFs), but associated on-site buildings for all REFs are limited to a maximum of 8,5 m (ground to highest point of roof);
- Restrictions with regard to setback are only applicable to WFs.

Establishment of a Rehabilitation Fund

- Prior to authorisation, the applicant ("owner") must make financial provision for the rehabilitation or management of negative environmental impacts, as well as for negative impacts associated with decommissioning or abandonment of the facility. Such provision should be in the form of a fund to be administrated by the Municipality, and should be to the satisfaction of the competent authority (i.e. Department of Energy).

Land clearing/ erosion management

- Land clearing should be limited to areas considered essential for the construction, operation and decommissioning of a REF;
- All land cleared during construction which does not form part of the REF structural footprint, must be rehabilitated in accordance with an approved rehabilitation plan;
- Soil erosion must be avoided at all costs, and any high risk areas should be rehabilitated.

Visual impact management

- Visual and environmental impacts must be taken into account, to the satisfaction of the competent authority;
- Associated structures (i.e. substations, storage facilities, control buildings, etc.) must be screened from view by indigenous vegetation, and/or located underground, or be joined and clustered to avoid adverse visual impacts. In addition, appurtenant structures must be architecturally compatible with the receiving environment;
- Lighting should be restricted to safety and operational purposes, must be appropriately screened from adjacent land units, and should also be in accordance with applicable Civil Aviation Authority requirements.

Operational management and maintenance

- REFs may not cause or give rise to any noise or pollution, deemed to be a nuisance in terms of applicable Environmental Impact Assessment (EIA) regulations or Municipal by-laws;

[19] "A Renewable energy structure shall be considered *abandoned* when the structure fails to continuously operate for more than one year".

- The REF owner/ operator is responsible for maintaining the REF in a good condition, including with regard to painting, structural repairs, on-going rehabilitation measures (e.g. erosion), as well as the upkeep of safety and security measures.

Decommissioning management

- An REF which has reached the end of its lifespan or that has been abandoned must be removed. The owner (operator) is responsible for the removal of such structures in whole, no longer than 150 days after the date of discontinued operation, and the land must be rehabilitated to the condition it was in prior to construction of the facility;
- Decommissioning activities must include the removal of all REF structures, associated structures, as well as transmission lines; the disposal of solid and hazardous waste according to applicable waste disposal regulations; and the stabilisation and re-vegetation of the site. In order to minimise disruptive impacts on vegetation, soils, etc., the competent authority may grant approval not to remove any underground foundations or landscaping.

In conclusion, it should be noted that the relevant provisions are mandatory (compliance requirements), and would therefore have to be implemented by the proponent.

2.3.10 Western Cape Draft Strategic Plan

The 11 Strategic Objectives embodied in the Western Cape Draft Strategic Plan 2009-2014 (2010) ("Building an Open Opportunity Society for All") embody the key overarching strategic objectives identified by Provincial Government for its term in office from 2009-2014. Although the Draft Plan has been replaced by the WCPSP 2014-2019, it remains of relevance. In this regard, the objectives identified and work groups established in terms of it were some of the key informants of the 2014 WCCCRS. The 2013 WCIP is also explicitly based on the Draft Plan. Of the 11 Outcomes, the following are applicable to REF projects:

- Creating opportunities for growth and jobs (1);
- Developing integrated and sustainable human settlements (6);
- Mainstreaming sustainability and optimising resource use and efficiency (7);
- Reducing and alleviating poverty (9).

According to the plan to achieve the outcomes pertaining to "Mainstreaming sustainability and optimising resource use and efficiency", key measures include:

- The promotion of energy efficiency in households, commerce, industry and all provincial offices, hospitals and schools; a green building programme and a green low-cost housing programme to increase the chances of the poor against climate change impacts.
- Development of a wind energy sector and energy production from alternative sources as well as net metering supported by a small-scale feed-in tariff to encourage small-scale renewable energy production.

Proposed socio-economic interventions are underpinned by the Administration's beliefs that "economic growth constitutes the foundation of all successful development; that growth is driven primarily by private sector business operating in a market environment; and that the role of the state is (a) to create and maintain an

enabling environment for business and (b) to provide demand-led, private sector-driven support for growth sectors, industries and businesses" (WC Department of the Premier; 2010: 8).

2.3.11 Strategic Initiative to Introduce Commercial Land Based Wind Energy Development to the Western Cape – Towards a Regional Methodology

The document developed in 2006 remains the most recent DEA&DP publication with regard to the locational/ siting aspects of WFs. The document focuses specifically on the siting of wind energy facilities. Some of the key findings and recommendations that have a potential bearing on the study are briefly summarised below. However, it should be noted that the document does not have Guideline or Policy status.

Cumulative Impact Issues
The experience in Europe is that the very high cumulative impact of wind farms has resulted due to a policy of permitting small (wind) energy schemes in relatively close proximity to each other (only 2.5 km in Denmark). As a result the document recommends that:

- Large installations should be located extremely far apart (30 – 50km), and;
- Smaller installations should be encouraged in urban / brownfield areas.

Recommended Disturbed Landscape Focus
In addition to proposing that smaller facilities should be focused in urban/ brownfield areas, the proposed methodology further recommends focusing on existing disturbed rural landscapes, and in particular, those rural landscapes that have already been "vertically compromised" by the location, for example, of transmission lines, railway lines, and all phone towers.

Protecting Rural Landscape Values (put after "Urban Emphasis")
The document notes that in Europe in the past, a great degree of emphasis was given to quantifying views from residential locations. This policy emphasis has effectively led to commercial-scale renewable energy developments having been pushed into more "remote" rural locations. The study notes that in the South African context this policy would effectively "penalising" rural areas, and compromising wilderness and touristic visual values. As indicated above the area has been impacted upon by existing power and railway lines.

Site Specific Aesthetic Considerations
The document lists the following site-specific recommendations for turbines:

- Stick to linear, non-organic layouts;
- Placement in straight rows is preferred;
- Maintain consistency in height;
- Consistency of type across an entire facility is recommended.

In terms of REF spatial policy development the following initiatives also have a bearing on the proposed WF:

- DEA / CSIR have undertaken a Strategic Environmental Assessment (SEA) aimed at identifying strategic geographical areas best suited for the effective and efficient roll-out of large scale wind and solar PV energy projects, referred to as Renewable Energy Development Zones (REDZs). Through a process of positive

and negative mapping as well as wide stakeholder consultation, eight focus areas have been identified as potentially being of national strategic importance for wind and solar PV development;

- According to DEA&DP's website, a WCP SEA for the placement of WFs is currently being undertaken. The project, headed by Paul Hardcastle, is listed as 'under development', and no documents are available yet. The project context is unclear, but it is likely linked to the national REF SEA[20].

2.3.12 Guideline for the Development on Mountains, Hills and Ridges in the Western Cape

The aim of the Guideline (2002) is to provide a decision-making framework with regard to developments which include listed activities in terms of National Environmental Management Act Regulations, and which are proposed in an environment which is characterised by mountains, hills and ridges.

The Guideline notes that mountains, hills and ridges are subject to a range of development pressures. A guiding framework is therefore needed to control development in these areas. Key reasons listed are:

- Provide catchment areas for valuable water resources;
- Often characterised by unique and sensitive ecosystems;
- Have aesthetic / scenic value; and
- Provide "wilderness" experience opportunities.

The Guideline defines a mountain, hill or ridge as "*a physical feature that is elevated above the surrounding landscape*".

The Guideline is divided into 2 sections. The second section deals with key decision-making criteria which need to be taken into account when adjudicating the suitability of developments in such areas. Key criteria which are of specific relevance to the proposed WF include:

- Development on the crest of a mountain, hill or ridge should be strongly discouraged;
- Preserve landform features through ensuring that the siting of facilities is related to environmental resilience and visual screening capabilities of the landscape;
- Adopt the precautionary principle to decision making;
- The criteria used to assess developments in these areas include, amongst others, density of the development, aesthetics, location, value in terms of "sense of place", character of adjacent land use, character of the general area, and cumulative impacts which may arise from other existing and planned developments in the area.

The proposed WF site is located in a landscape characterised by rolling hills in an agricultural setting. However, it should be noted that the Guidelines were developed in 2002 and do not take into account the locational requirements of WFs.

[20] eadp.westerncape.gov.za/wc-sustainable-energy-projects-db/wc-strategic-environmental-assessment-placement-wind-energy (accessed 18-04-15).

2.4 DISTRICT AND LOCAL LEVEL POLICY AND PLANNING

2.4.1 West Coast District Municipality Integrated Development Plan

The vision for the WCDM as set out in the WCDM Integrated Development Plan (IDP) (2017-2021) is "a quality destination of choice through an open opportunity to society". The Mission is "to ensure outstanding service delivery on the West Coast by pursuing the following objectives".

The IDP lists a number of Strategic Objectives that are relevant to the proposed development. These include:

- Ensuring environmental integrity for the West Coast;
- Pursuing economic growth and facilitation of jobs opportunities;
- Promoting social wellbeing of the community.

Strategic Objective 1: Ensuring Environmental Integrity for the West Coast
The IDP notes that the environmental integrity of the larger West Coast District is largely transformed from a natural environment to commercial farming practises. However, despite this the area is located within an area that has a high biodiversity value. The IDP also notes the potential risks posed by climate change and the need to develop and implement a climate change strategy.

Strategic Objective 2: Pursuing economic growth and the facilitation of job opportunities
The IDP highlights the importance to developing private public partnerships to support and facilitate economic development in the WCDM. Tourism is listed as a key development sector for regional and local economic development.

Strategic Objective 3: Promoting social wellbeing of the community
The section lists the key economic and social challenges and opportunities facing the area. The challenges that are relevant to the proposed development include:

- Unemployment and dependency on government grants;
- Limited employment opportunities for the youth;
- Social impact of in-migration due to current and future industrial development;

The opportunities include:

- District tourism industry and its contribution to economic development and alleviation of poverty;
- The promotion of the West Coast as a renewable energy investment destination.

The IDP includes a Climate Change Strategy. In this regard the IDP notes that the West Coast area will become a very dry area with less rainfall and less water. Of relevance to the proposed WF, the IDP Notes that the approach to addressing the challenges includes reducing greenhouse gas emissions from energy by switching to renewable energy.

2.4.2 West Coast District Municipality Spatial Development Framework

The vision of the West Coast District IDP (2012-2016) is to provide "A quality destination of choice through an open opportunity society". The spatial vision

contained in WCSDF (2014) is "to Promote Sustainable Development, prioritise development in highest growth potential areas, encourage and facilitate development along the key corridors within the West Coast District".

The SDF lists three goals that underpin the West Coast District Spatial Strategy and Vision, namely:

- Goal 1: Enhance the capacity and quality of infrastructure in the areas with the highest economic growth potential, while ensuring continued provision of sustainable basic services to all residents in the District;
- Goal 2: To facilitate and create an enabling environment for employment, economic growth and tourism development, while promoting access to public amenities such as education and health facilities;
- Goal 3: Enhance and protect the key biodiversity and agricultural assets in the district and plan to minimise the human footprint on nature, while also mitigating the potential impact of nature (climate change) on the residents of the district.

The above-mentioned Goals 1, 2 and 3 are focused on the three themes identified in the Provincial Spatial Plan (2012) respectively, namely: built environment, socio-economic development and biophysical environment.

The SDF notes that the strategic locality of the WCDM within the Western Cape Province has a number of spatial planning related implications that are of relevance to the proposed development, namely:

- Existing spatial planning and policies, on a national and provincial level, identified the development potential of the West Coast District and such policies and strategies should guide planning decisions;
- The strategic location of the Saldanha Bay harbour in the district and its potential to be a key catalyst for development and economic growth in the district;
- The study area includes sensitive biodiversity areas that require conservation and responsible planning.

The SDF lists three spatial planning themes, namely:

- Theme 1: The built environment;
- Theme 2: Socio-economic environment;
- Theme 3: Biophysical environment.

Themes 2 and 3 are of specific relevance to the proposed development.

Theme 2: Socio-economic environment

The overarching goal of theme two is to facilitate and create an enabling environment for employment, economic growth and tourism development, while promoting access to public amenities such as education and health facilities.

Manufacturing and agriculture showed contraction during the economic slowdown (recession) period and are two 2 key sectors requiring revitalisation to ensure sustainable employment opportunities and economic growth in the study area. In terms of employment, agriculture was the key employment generating sector, contributing to almost 25% of employment in the West Coast District. This highlights the key role and importance of the agricultural sector.

The following policies contained in the SDF are relevant:

- *HR1* Promote infrastructure development in locations with medium, high and very high economic growth potential;
- *HR2* Invest in key economic sectors to facilitate development and employment opportunities.

A sectoral analysis and assessment of the West Coast District Economy identified the key sectors for future growth. Of relevance to the study, renewable energy is identified as a key sector. The SDF notes that "wind and solar projects can become a key sector in the study area" and that the manufacture and distribution of renewable energy components, such as wind turbines, can further promote this sector. With regard to manufacturing, although the sector has contracted since 2008 there is potential to grow, especially in the context of the Saldanha Bay IDZ, which will enhance industrial development in the area and will create more employment opportunities.

With specific reference to renewable energy the SDF states that the wind resources in the West Coast District are substantial and comparably high in relation to the rest of the country. The region also leads the country in terms of implementation experience with regards to the establishment of a number of wind farms in the WCDM. In addition the Saldanha Harbour has sufficient infrastructure and capacity to facilitate imported wind turbines into the West Coast District.

The SDF also notes that a number of solar energy projects have been established and/or are being investigated in the area. However, the SDF does indicate that the extent of land requirements, and the environmental impact and loss of potentially arable land does need to be taken into consideration with solar PV projects. Figure 2.2 illustrates the location of renewable energy projects in the WCDM.

The other key sectors listed that are of relevance to the study are agriculture and tourism. The SDF notes that the WCDM has a number of established agricultural production areas, such as the Swartland, Sandveld, Olifantsriver Valley citrus and wine district and the rooibos tea production area. Although reliant on natural and weather conditions, this sector has the potential to contribute more substantially to the economy, through higher productivity, advanced and environmentally sensitive methods, etc.

Tourism is also identified as a key economic sector. The strength of the tourism sector is linked to its proximity to the City of Cape Town. The area is therefore easily accessible as a breakaway destination over weekends. The tourism attractions in the area that are of relevance to the study include the small coastal towns, such as Paternoster, Jacobsbaai and Velddrift.

Of relevance to the study the area's tourism attractions are linked to natural features, scenic qualities and coastal villages. Agriculture linked and cultural tourism is also identified as a key growth sector, and area linked to towns and villages like Riebeeck Kasteel and Riebeeck West, Goedverwacht, Wupperthal and Ebenhaeser.

The following policies contained in the SDF are relevant:

- *HR3* District tourism assets should be promoted and strengthened;
- *HR4* Key tourism corridors/routes should be promoted.

Theme 3: Bio-physical environment

The overarching goal outlined in the SDF is to promote conservation of Critical Biodiversity Areas by strategically implementing sustainable agricultural activities and urban development where the impact on biodiversity will be the lowest, while also mitigating the potential impact of nature (climate change) on the residents of the district.

The SDF notes that the WCDM is located within in an area that contains a wide range of conservation worthy areas, species of fauna and flora and key biodiversity areas and ecosystems. It is therefore important to ensure that these natural assets be recognised and addressed when spatial planning is considered. The key challenges identified include loss and degrading of sensitive biodiversity areas and conflict between conservation, agriculture and development needs.

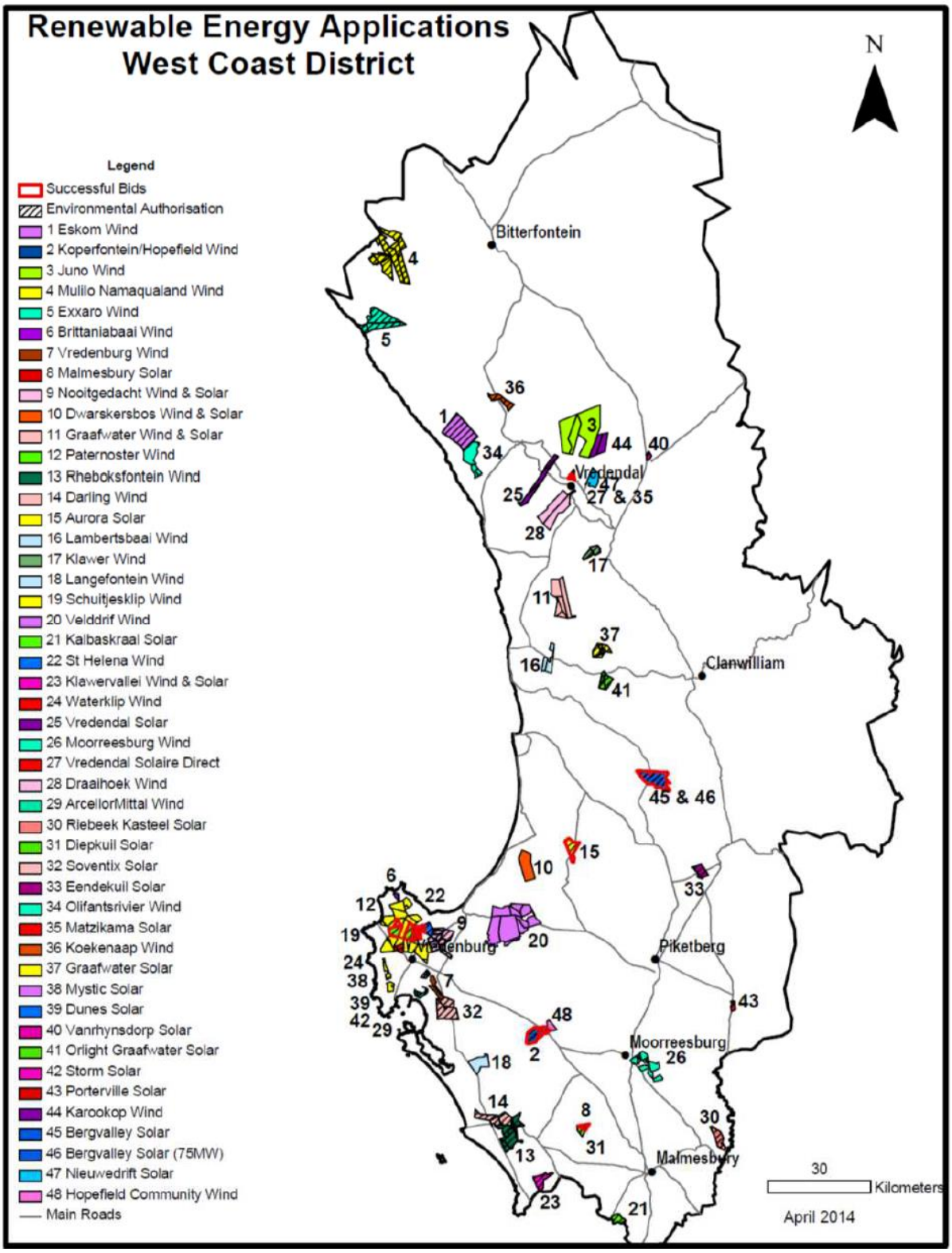

Figure 2.3: Location of potential renewable energy applications in the West Coast District Municipality Area (2014)

The approach adopted to planning is informed by the Bioregional Planning Approach, which identifies a number of spatial planning categories. The proposed renewable energy development is located in an area defined as an Intensive Agricultural Area. These are rural landscapes, largely transformed by agricultural activities that could contain some remaining remnants of threatened ecosystems, but primarily contains no/very little natural vegetation. The SDF provides a list of permissible land uses, including; expansion of agricultural activities, tourism, agricultural industry, recreational facilities and mining and mineral extraction, subject to environmental, biodiversity and botanical assessments. While renewable energy is not specifically listed, it would be compatible land use in an Intensive Agricultural Area.

The SDF also highlights the potential risks posed by climate change. In this regard the Western Cape and South Africa as a whole, has been identified as potentially relatively sensitive to the impacts of climate change. The risks include increased mean annual temperatures and extended dry periods between rainfall events. Of specific relevance to the proposed development eight mitigation focus areas, including Renewable Energy, are identified to address the challenges associated with climate change. The establishment of renewable energy in the WCDM in suitable locations is therefore supported.

The proposed development of renewable energy facilities is also aligned with and supports a number of provincial and district strategic objectives. These include the creation of opportunities for growth and jobs and reduce poverty, and mainstreaming sustainability and optimising resource-use efficiency.

The following policies contained in the SDF are relevant:

- *HR1* Support and promote sustainable economic development;
- *HR2* Invest in key economic sectors for development and employment Opportunities;
- *BE16* Renewable energy sources (wind, solar, etc.) should be established to support and enhance the electricity capacity in the West Coast District.

However, the proposed development of renewable energy facilities must also take into account other key objectives, specifically those relating to tourism

- *HR3* District tourism assets should be promoted and strengthened;
- *HR4* Key tourism corridors/routes should be promoted;
- *BP9* Low density, low impact tourism development could be considered in rural areas, subject to proper assessment in terms of environmental impact, heritage and visual impact.

In this regard the SDF notes:

- *HR 27*: Wind farms should be located where they will cause the least visual impact taking into consideration the viability of the project;
- *BE 17:* Wind farms and solar farms should be located where their visual and environmental impact will be the lowest.

In terms of biodiversity the SDF makes reference to two biosphere initiatives, namely the Cape West Coast Biosphere Reserve (CWCBR) and the Greater Cederberg Biodiversity Corridor (GCBC). The Cape West Coast Biosphere Reserve (CWCBR) is

an initiative by Cape Nature, established in 2000 in association with the CWCBR to facilitate sustainable development along the West Coast, through stewardship contracts/agreements with private land owners. The CWCBR stretches from Diepriver in the Cape Metropolitan Area northwards along the coastline and coastal plain towards the Bergriver north of Saldanha and Vredenburg.

The GCBC is described as a landscape conservation initiative implemented by CapeNature, which spans across two district municipalities. The bulk of the GCBC occurs within the Bergrivier, Cederberg and Matzikama local municipalities of the West Coast District Municipality, and covers an area of approximately 1.8 million hectares.

2.4.3 Saldanha Bay Integrated Development Plan

The SBLM Integrated Development Plan (2017-2022), notes that the vision of the SBLM is "to enable a future of prosperity for all through effective objectives promoting service excellence". The mission statement linked to the vision provides the framework or context within which the Council's strategies are formulated and notes that the SBLM is a caring institution that excels through:

- Accelerated economic growth for community prosperity;
- Establishment of high quality and sustainable services;
- Commitment to responsive and transparent governance;
- The creation of a safe and healthy environment;
- Long term financial sustainability.

The IDP lists a number of strategic objectives to give effect to the vision and mission for the municipality. The following are relevant to the proposed development:

- To diversify the economic base of the municipality through industrialization, de-regulation, investment facilitation, tourism development whilst at the same time nurturing traditional economic sectors;
- To develop socially integrated, safe and healthy communities;
- To maintain and expand basic infrastructure for economic development and growth;
- To be an innovative municipality through technology, best practices and caring culture.

The IDP notes that the Saldanha Bay area plays an important role in the broader strategic framework of the South African Government as driven by the National Development Plan and National Growth Plan. In this regard Saldanha Bay was identified as a presidential priority development region in 2011 by the National Planning Commission. The National Development Plan 2012 (NDP) identifies the Greater Saldanha region as a special intervention area, attributed to the natural deep water harbour and industrial development prospects that warrant its designation as a national growth management zone.

The Saldanha Bay Industrial Development Zone (IDZ) was officially launched on 31 October 2013 and serves as an important mechanism to achieve the government's aim of sustainable economic development and job creation in the localized economy, diversification and transformation of the historically under-developed and under-

supported industrial maritime and energy sectors; and broadening of the regional and national economic base through industrialisation.

Of key relevance to the proposed WF the IDP notes that the area forms part of Strategic Integrated Project (SIP) 8 which forms part of the government's National Infrastructure Plan of 2012. SIP 8 involves supporting green energy initiatives on a national scale through a diverse range of clean energy option.

The Saldanha Bay area is also identified in OneCape2040 as one of two provincial 'regional' motors of economic significance. The Western Cape Growth and Development Strategy of 2006 also identified Vredenburg and Saldanha as 'Leader towns' and towns with high growth potential where fixed infrastructure investment should be focused. The Socio-economic Profile of Saldanha Bay Municipality issued by the Western Cape Government Provincial Treasury in 2015 indicates that the Saldanha Bay economy is amongst the fastest in the province. The study also found that Saldanha Bay was the fastest growing municipality in the district. The West Coast District Municipality's SDF (2014) also identifies Saldanha Bay as a Major Regional Growth Centre and one three key development areas within the district (WCDM, 2014).

The IDP notes that the "Electrical Network Development Plan for the Saldanha Bay Municipal Area of Supply" dated 25 April 2014 is the current master plan in use and is to be used as guideline for expansion of the electrical networks in the SBLM. The IDP notes that number of documents need to be read in conjunction with this Network Development Plan. The following are of relevance to the proposed WF:

- Local Government Energy Efficiency and Renewable Energy Strategy - November 2014 – SALGA Document;
- Western Cape Climate Change Mitigation Scenarios exercise for the Energy Sector – March 2015 – WCG Environmental Affairs and Development Planning Document;
- Western Cape Climate Change Response Strategy –March 2016 - WCG Environmental Affairs and Development Planning Document

Climate Change

Section 6.2.5.3 of the SBLM IDP addresses the issue of Climate Change. The section notes climate change impacts are already evident in the Western Cape and are negatively impacting and undermining economic and social development. In terms of the SBLM the potential risks identified include rising sea levels and the impact of changing rainfall patterns and extreme weather events. The IDP notes that the municipality is critically linked with its natural resources, particularly marine and agricultural, both of which will face increasing threats from climate change.

Of relevance the proposed WF project the section notes that the Saldanha Bay municipal area has a number of opportunities in terms of low carbon development and that small and large renewable energy must be considered as part of the future planning for the region.

Spatial considerations
The SBLM IDP refers to the SDF approved in 2011. The 2011 SDF promotes an overall spatial management concept where significant predicted growth in the towns of Vredenburg and Saldanha and the Saldanha Port are focused inward along corridors in order to lead to the establishment of a consolidated, major growth centre. Of relevance to the proposed development the 2011 SDF notes that areas of limited predicted growth such as Paternoster, Hopefield and Jacobsbaai are advocated for retention of their status quo, with protection of their natural and historical heritage.

However, the IDP notes significant legislative changes have occurred in the planning regime with the promulgation of the National Spatial Planning and Land Use Management Act, No 16 of 2013 (SPLUMA) and the Western Cape Land Use Planning Act, no 3 of 2014 (LUPA) and the Saldanha Bay Municipality Land Use Planning By-law. This new legislation gives the legal directive for the compilation of a SDF and has made provision for very specific measures according to which SDF's should be drafted and also for greater clarity on the aspects they should address. The IDP indicates that the compilation of a new SDF is expected to be finalised during the course of 2017/2018. As indicated below the Draft SDF was published for comment in September 2017.

2.4.4 Saldanha Bay Municipality Municipal SDF (2011)[21]

The SBLM SDF (2011) notes that the existing landscape of the Saldanha Bay Municipal Area reflects the dynamic nature of the interaction between human and natural elements that have over time combined to create the unique landscape of the area. The combination of these elements and their spatial context creates a number of 'districts' or areas with specific attributes and a distinct character. An awareness and sensitivity to these elements within their spatial, local and broader context is essential to protect and enhance the various districts / area's '**sense of place**'. In this regard, it is therefore critical that the overarching spatial management framework is sensitive to the contextual variances within the municipal area.

The following aspects covered in the SBMSDF are of relevance to the proposed WF development.

Planning Principles
Section 10.3 outlines the planning principles that provide the point of departure for translating the Municipality's Vision into practice. The SDF notes that the principles form the fundamental basis for reasoning and action. The adherence to the broad principles will ensure that the environmental quality, social and economic performance of Saldanha Bay Municipality is improved.

The following principles are relevant to the proposed development:

- Ecological integrity: The diversity, health and productivity of ecosystems should be maintained and environmental and sustainable land use practises promoted.
- Risk aversion and precaution: Land use management efforts and the assessment of development applications should adopt a risk averse and precautionary approach under conditions of uncertainty.

[21] A revised Draft SDF was published in September 2017 (see below). Until this draft is approved the existing SDF remains in place.

- Duty of care: All people and organisations should act with duty of care to conserve and avoid negative impacts on biodiversity, and use biological resources in a sustainable manner, equitably and efficiently.

Strategic Goals and Objectives

Section 10.4 outlines the SDFs Goals and Objectives based upon the Vision and Principles that underpin the SDF. The following are relevant to the proposed development:

- Goal: To develop and maintain a strong local economic base, through the promotion of non-consumptive tourism, industrial development and the role of agriculture in the municipal area's economy. One of the key objectives linked to this goal is to promote the development of tourism infrastructure that conforms to place-specific architectural, environmental and aesthetic requirements;
- Goal: To protect and conserve the heritage resources of the area. The key objectives linked to this goal is to promote the conservation and inclusion of important heritage resources into a municipal area's tourism strategy and improve and develop tourism related facilities;
- Goal: To ensure that on-going development pressure and its spatial implications are managed in a sustainable manner that protects the unique character of the existing cultural landscape and the place-specific character and form of the existing settlement pattern. The key objectives linked to this goal include to retain and strengthen the unique identity of the municipal area and its districts, and to conserve and improve the visual quality of the landscape and the scenic route experience of the primary movement corridors. In this regard the road to Paternoster is identified as an important tourism route.

Tourism as key economic growth sector

The document notes that manufacturing and tourism have emerged as the key sectors with regard to economic growth in the Saldanha Bay Local Municipality (SBLM) area. With regard to tourism, the economies of scenic coastal towns, such as Paternoster, Langebaan and St Helena Bay, are already heavily reliant on tourism inflows. The sector was anticipated to grow 50% by 2010. Proximity to Cape Town ensures year-round tourist-inflows, and consequently year-round economic activity.

The key tourist attractions include annual wildflower displays and the scenic beauty of the coastal settlements. The environmental setting plays a key role in both regards, and protection of the landscape and scenic amenity are identified as pivotal to the region's tourism development strategy and management plan. Marketing focus should be on promoting the SBLM as preferred eco-tourism destination in the West Coast region. Focus should be on the protection and development of the region's natural assets, especially in Paternoster, Langebaan and St Helena Bay.

The importance of establishing a network of scenic roads is highlighted, and the document further notes that scenic routes, especially where these are accessible from country roads, have potential economic advantages for rural communities otherwise cut off from economic opportunities.

Renewable energy generation

The document notes the region's potential for accommodating renewable energy projects, but further notes that the siting of these projects are important from a spatial land use viewpoint in as far as large tracts of land are typically required to

accommodate them. Furthermore, with regard to WFs, the turbines are typically visible over long distances.

In terms of siting principles, the document reiterates the principles contained in the 2006 DEA&DP Regional Methodology document (see: Section 4.3.3. above). The key principles reiterated include:

- Excluding commercial WF developments from areas with high aesthetic landscape value;
- Encouraging commercial WFs in areas where they are well located in terms of visual impact, technical and safety criteria and landscape, environmental and planning criteria;
- Encouraging commercial WFs in areas where visual disturbance to the landscape has already occurred (e.g. power transmission lines);
- Focusing on the development of large concentrated wind farms rather than small dispersed locations where the distance between large wind farms is at least 30km, and ideally exceeding 50km.

The SDF does not provide any spatial guidance with regard to the appropriate siting of WFs in the SBLM area.

Paternoster

Section 14.6 provides specific spatial proposals for Paternoster. The section notes that within the municipal context, Paternoster, a historical west coast fishing village fulfils the function of a tourist destination. The local economy of Paternoster town was historically driven by the pelagic fishing and crayfishing industries. However, as with all the towns on the West Coast, fishing resources have largely collapsed. However, this has been largely offset by the increase in growth in tourism. In this regard, the historical west coast architecture and settings of the original fishing village of Paternoster have, together with its unique natural (coastal) setting, resulted in the town becoming an important local and regional tourism resource.

In terms of detailed proposals for the town, the SDF lists a number that are relevant to the proposed development including:

- Paternoster's dependence on the fishing and tourism sectors of the economy and the need to strengthen this;
- The unique historical character and small fishing village atmosphere, which are the most important elements of the tourism sector, require protection;
- Seasonal wild flowers and whale watching opportunities should be used to support the role of the town as an eco-tourism destination;

The SDF also identifies a set of local spatial development principles aimed at promoting the town, including:

- Conservation of the areas heritage assets;
- Tourism development based on the ecological and heritage value of the town and the region;

Activities that should be restricted include:

- Insensitive developments which are architecturally out of scale or not of an appropriate design or materials;

Activities that should be maintained, enhanced and conserved include:

- The unique "small village" character of Paternoster;
- The architectural heritage.

2.4.5 Saldanha Bay Municipality SDF (2017)

The Draft Spatial Development Framework-Draft Conceptual Development Framework (CDF) prepared by CNdV Africa (Pty) Ltd, was published for comment in September 2017. Key sections of the framework that are relevant to the proposed WF are summarised below.

A SWOT analysis was undertaken as part of the development of the SDF. The findings of the analysis that are relevant to the proposed WF are listed below.

Internal strength's

- Tourism – coastal settlements;
- Attractive coastline;
- Coastal settlements' scenic settings; Langebaan, Jacobsbaai, Paternoster, St Helena Bay

Opportunities (external)

- West Coast international floral attraction;
- City of Cape Town day tripper and weekend getaway demand;
- Gauteng and other provinces "semigration"

Weaknesses (internal)

- Low rainfall;
- Water supply dependent on Berg water system

Threats (external)

- Eskom reluctance to commit major energy infrastructure upgrades unless significant commitment from investors;
- Declining fish resources and instability in fishing industry

There is no reference to the establishment of renewable energy facilities, including wind farms, as a potential threat to the area, and specifically as a potential threat to tourism, in the SWOT analysis.

With specific reference to wind farms, the CDF notes that two windfarms are operating, one north of Vredenburg and one east of Hopefield. The CDF also states that these wind farms form the core of two much bigger areas currently under application for further wind farms. The CDF therefore acknowledges the potential for future development of wind farms in the SBLM, and specifically in close proximity to the existing facilities. The location of the existing wind farms is illustrated in Figure 6.1.5 in the CDF report. See Figure 2.4 below.

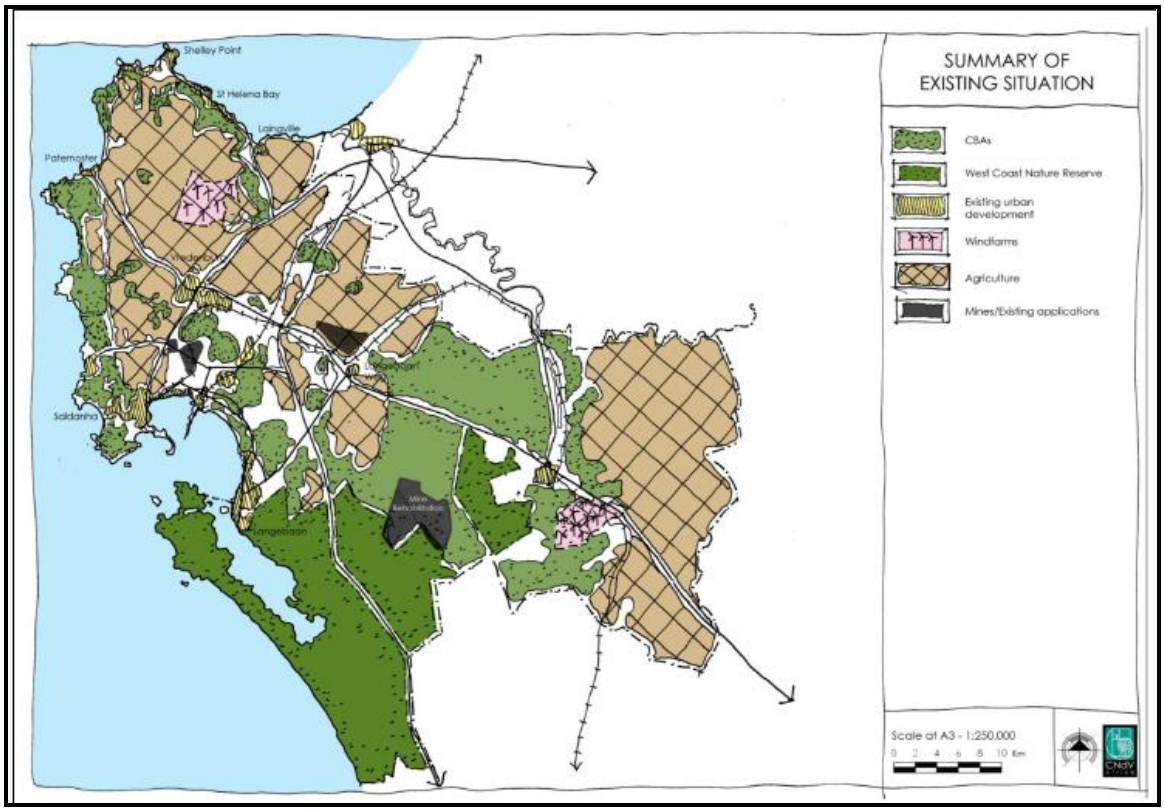

Figure 2.4: Summary of existing land use situation in SBLM

Section 6.1.4 of the CDF, Existing and Future Hazards and Impacts, identifies existing and future hazards and impacts that the municipality needs to manage in its SDF so as to ensure its economic, job creation and environmental sustainability. Of relevance to the proposed WF is the *visual attractiveness of coastal wildernesses*. The CDF notes that a balance must be established between extent of wind farms and maintaining wilderness appeal and attractions for coastal settlements, residents and visitors. Figure 6.1.6 in the Draft CDF illustrate that the current and future potential hazards and impacts and illustrates the location of wind farms in the proposed study area (Figure 2.5 below).

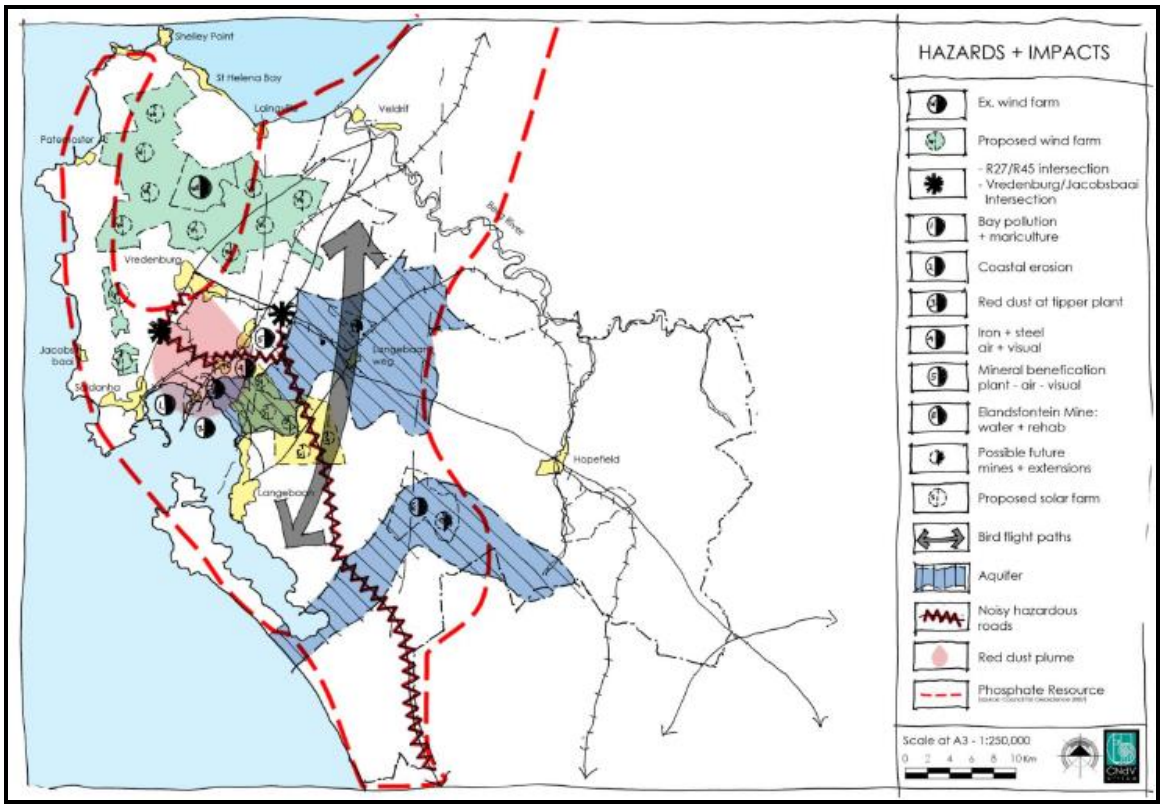

Figure 2.5: Location of current and future hazards and impacts

Based on the findings of the study the Draft CDF report outlines potential conceptual spatial ideas for the SBLM. Of relevance to the proposed WF the report refers to the need to consolidate the coastal wilderness areas and promote tourism and job creation. With regard to coastal wilderness areas and tourism the Draft DCF report recommends creating a continuous wilderness and biodiversity conservation fringe along the coast from Saldana Bay town to Veldrif and building on the current private coastal nature reserves broken only by environmentally friendly coastal developments. In terms of job creation the Draft CDF reports highlights the importance of promoting high-tech economic development and taking advantage of global demand opportunities. Figure 6.1.7 in the CDF report reflects the spatial aspects of the conceptual ideas contained in the CDF (Figure 2.6 below). The area in which the proposed WF is located is identified as agriculture priority areas. In terms of the map the proposed WF is not located in the coastal wilderness / park areas that are proposed.

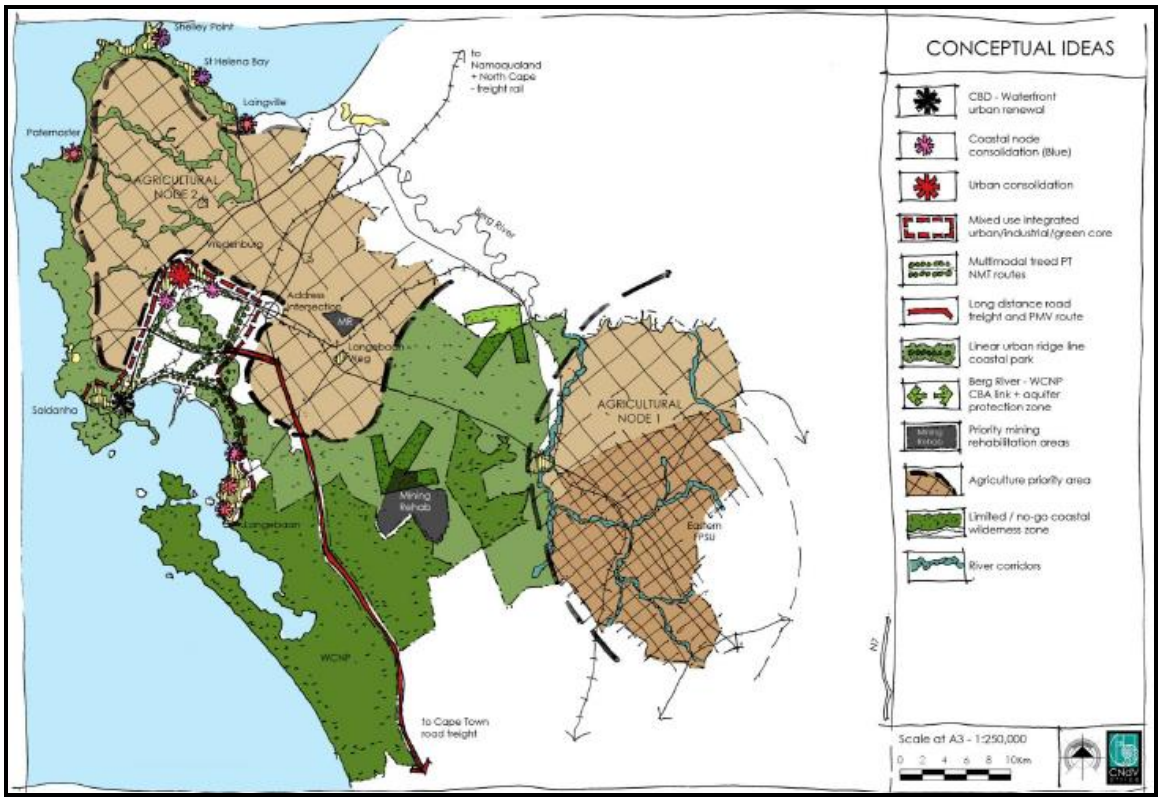

Figure 2.6: Conceptual land uses for the SBLM

The CDF discusses each of the settlements in the SBLM. Paternoster and St Helena Bay are of relevance to the proposed WF.

Paternoster

The CDF notes that historically, Paternoster was established to provide sea access for a small fishing community. However, in the town has become a sought after tourist destination. Almost all the buildings in the settlement have made a sincere effort to respect West Coast vernacular architecture leading to a coherent urban character, which has contributed to its attraction as a holiday and tourism destination. The CDF identifies potential challenges and opportunities. A public meeting was held on the 7th of June 2017 to confirm the public's concerns, issues and vision for Paternoster. One of the key challenges identified was the decline in the local fishing industry. The development of the tourism sector was identified as a key opportunity. Based in the information contained in the Draft CDF document the presence of wind farms was not identified as a challenge or issue of concern at the meeting.

St Helena Bay

The section on St Helena Bay also comments on the importance of tourism to the area, and of relevance notes that wind farms are proposed to the south the area and that care must be taken to ensure that the visual impact does not detract from St Helen Bay's tourism appeal. Says wind turbines footing should be at maximum of 40 AMSL. Based in information contained in Figure 2.8 it would appear that the wind turbines associated with the Boulders WF are located at a maximum of 40 AMSL. This should however be confirmed by the Visual Impact Assessment (VIA).

A public meeting was held on the 6th of June 2017 to confirm the public's concerns, issues and vision for St Helena Bay. Based in the information contained in the Draft CDF document the presence of wind farms was not identified as a challenge or issue of concern at the meeting.

Figure 6.6.2 in the CDF report indicates the boundary of wind farms (pink dotted line) (Figure 2.7 below). Figure 6.6.3 in the CDF report presents the spatial proposals for the St Helena Bay area. The lime green dotted line illustrates the proposed limit of wind turbines footing at maximum of 40 AMSL (Figure 2.8 below).

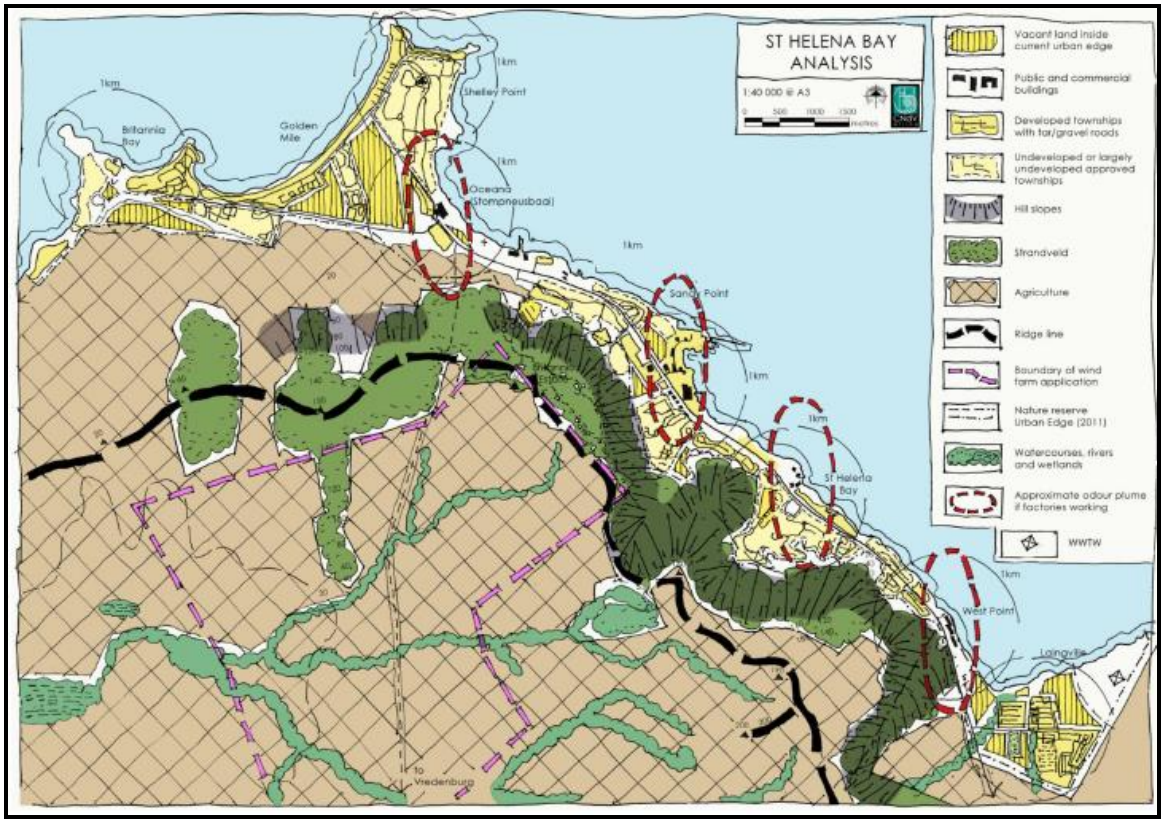

Figure 2.7: Spatial analysis of St Helena Bay area

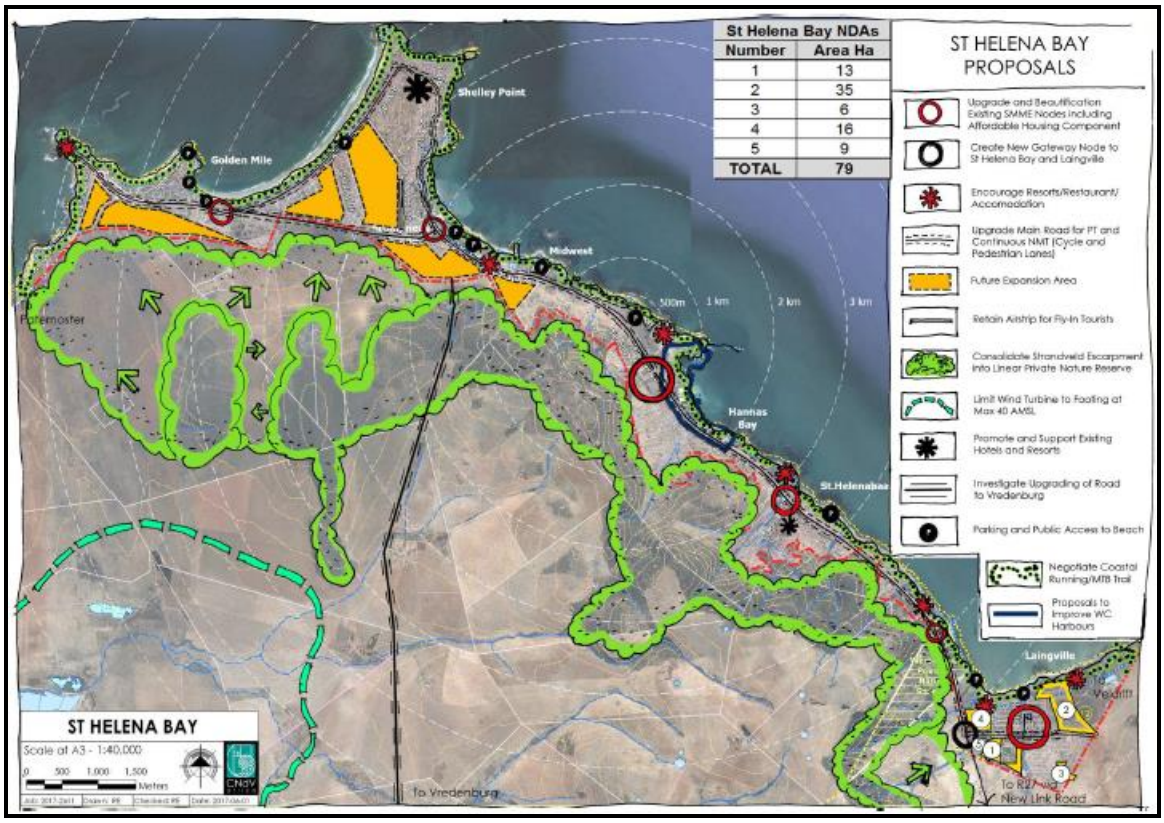

Figure 2.8: Spatial proposals for St Helena Bay area

2.4.6 Saldanha Bay Municipality Local Economic Development (LED) Strategy (2005)

This LED Strategy document was prepared for the Saldanha Bay LM in 2005 by Urban Econ. The following summary is taken from the Executive Summary of the document:

"The purpose of this study was to investigate the options and opportunities available to the local Municipality, so as to broaden the local economic base of the area in order to address the creation of employment opportunities and the resultant spin-off effects throughout the local economy. The Saldanha Bay Municipality (SBM) is faced with a development problem in that the Municipal area jurisdiction is characterised by a mix of urban and rural economies, ranging from relatively strong economic performances to relatively isolated rural settlements with high levels of poverty".

The following key developmental issues of relevance to the WF development proposal were identified:

- "From a regional development perspective, the economy is characterised by a few strong sectors, due to the concentration of leading activities such as agricultural production and manufacturing activities, services and utilities. These are significant sources of employment as well as activities with strong forward and backward linkages, although not all of these are realised locally".

- "Spatially it is evident that the area is characterised by a number of towns, villages and settlements, which places a strain on cost-effective infrastructure and service provision. The economic implications are, amongst others, high levels of unemployment, low levels of disposable income, widespread poverty, etc".
- "The labour force can generally be interpreted as inadequate for sustainable economic development in terms of skills levels, etc. A skills scoping is therefore needed to understand the availability of skills, training needs and requirements from employers".
- "Agriculture and fishing as an important economic production sector and source of employment, commercially as well as a source of subsistence income, needs to be evaluated as a priority sector".
- "The area has specific tourism development potential. Specific examples include the coastal villages, the Langebaan wetlands area and National Park, Nature Reserve, wild flowers and other attractions. These opportunities are not fully exploited and need to be unlocked and appropriately focused on niche markets for full benefit for local communities".

LED is an important tool for the alleviation of poverty and the development of sustainable local economies in that it can:

- Create jobs and new employment opportunities;
- Increase income levels and enable people to pay for services;
- Broaden the tax and revenue base of the local authority;
- Enable the Local Authority to provide more and better services and facilities;
- Enable the Local Authority to concentrate on human resource potential;
- Enable the Local Authority to concentrate on opportunities for development;
- Enable the Local Authority to promote linkages between developed and under-developed areas;
- Enable the Local Authority to build new institutions for sustainable economic development".

Of particular relevance to the WF development proposal, the LED document explicitly discusses the development of renewable energy resources as a viable environmentally sustainable economic sector within the Saldanha Bay LM area (Chapter 7: Economic Development Framework). The following extract is of particular relevance to the study:

"Renewable energy is of high priority in South Africa. In the Saldanha Bay Municipal area, most winds occur during May to September, and November to February. Strong winds of over 20km/h are common in this area (…). This illustrates that the Saldanha Bay Municipal area could be the ideal place to implement wind energy (renewable energy), due to the constant occurrence of wind through the year. A feasibility study should be done in order to take this concept further. The Saldanha Bay Municipality is already involved in various activities, regarding renewable energy, and is also part of the Provincial Task Team that is looking into this issue".

2.4.7 Saldanha Bay Municipality Medium Term Economic Development Strategy (2013)

The Medium Term Economic Development Strategy developed by Stone Soup Development (Pty) Ltd in 2013 notes that Saldanha has the potential and is well positioned for exponential growth and development. This growth can be expected

from four "sunrise" and labour intensive sectors - Oil and Gas, Tourism, Steel Fabrication and Aquaculture. The document notes that Saldanha Bay's importance as a development node comes from its natural and locational comparative advantages and that provide the platform around which four globally competitive and job rich sectors can be built and held in the long term. The most significant of these natural advantages are:

- Best deep water harbour on the African Continent; and;
- Close proximity to Cape Town.

The existing steel manufacturing capability of the area also provides a distinct advantage to developing a potential metal fabrication sector. Additionally the more generic, but nonetheless significant factors driving the development agenda were identified as the efficient stable municipality, existing infrastructure and the availability of labour. At the same time there are significant concern regarding the availability of necessary skills to meet current industry needs let alone the demands for the future.

Tourism is already well established and relatively mature although, it still does have growth potential. Aquaculture is also an established sector that has considerable growth potential. Of relevance to the proposed development there is no reference to renewable energy in the Medium Term Strategy.

2.5 OVERVIEW OF RENEWABLE ENERGY SECTOR IN SOUTH AFRICA

The section below provides an overview of the potential benefits associated with the renewable energy sector in South Africa. Given that South Africa supports the development of renewable energy at national level, the intention is not to provide a critical review of renewable energy. The focus is therefore on the contribution of renewable energy, specifically in terms of supporting economic development.

The following documents were reviewed:

- Independent Power Producers Procurement Programme (IPPPP): An Overview (30 June 2017), Department of Energy, National Treasury and DBSA;
- Green Jobs Study (2011), IDC, DBSA Ltd and TIPS;
- Powering the Future: Renewable Energy Roll-out in South Africa (2013), Greenpeace South Africa;
- WWF SA, Renewable Energy Vision 2030, South Africa, 2014
- Jacqueline M. Borel-Saladin, Ivan N. Turok, (2013). The impact of the green economy on jobs in South Africa,), South African Journal of Science, *Volume 109 |Number 9/10, September/October 2013;*
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2.5.1 Independent Power Producers Procurement Programme (IPPPP): An Overview

The document presents an overview of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) undertaken by the Department of

Energy, National Treasury and the Development Bank of South Africa in June 2017. By the end of June 2017, the REIPPPP had made the following significant impacts:

Energy supply

In terms of renewable energy 6 422 MW[22] of electricity had been procured from 112 RE Independent Power Producers (IPPs) in seven bid rounds to date. Of this 3 162 MW of electricity generation capacity from 57 IPP projects has been connected to the national grid. To date 16 991 GWh of energy has been generated by renewable energy sources procured under the REIPPPP since the first project became operational (making a 15% contribution to morning and evening system peak periods).

Investment

The document notes that the REIPPPP has attracted significant investment in the development of the REIPPs into the country. The total investment (total project costs), including interest during construction, of projects under construction and projects in the process of closure is R201.8 billion (this includes total debt and equity of R200.4 billion, as well as early revenue and VAT facility of R1.4 billion).

The REIPPPP has attracted R48.8 billion in foreign investment and financing in the seven bid windows (BW1 – BW4, 1S2 and 1S2). This is more than double the inward FDI attracted into South Africa during 2015 (R22.6 billion).

South African citizen shareholding

In terms of local equity shareholding, 48% (R31.5 billion) of the total equity shareholding (R66.7 billion) was held by South African's across BW1 to BW4, BW1S2 and 1S2. This equates to substantially more than the 40% requirement. Foreign equity amounts to R35.8 billion and contributes 52% of total equity.

The REIPPPP also contributes to Broad Based Black Economic Empowerment and the creation of black industrialists. In this regard Black South Africans own, on average, 31% of projects that have reached financial close, which is slightly above the 30% target.

The REIPPPP has also ensured that black people in local communities have ownership in the IPP projects that operate in or nearby their vicinities. On average, black local communities own 11% of projects that have reached financial close. This is well above the 5% target. In addition, an average of 18% shareholding by black people in engineering, procurement and construction (EPC) contractors has been attained in projects that have reached financial close under the REIPPPP. This is slightly below the 20% target. The shareholding by black people in operating companies of IPPs has averaged 20% (against a targeted 20%) for the 57 projects in operation (i.e. in BW 1, 2 and 3). The target for shareholding by black people in top management has been set at 40%, with an average 61% achieved to date. The target has therefore been significantly exceeded.

Community shareholding and community trusts

The regulations require a minimum ownership of 2.5% by local communities in IPP projects as a procurement condition. This is to ensure that a substantial portion of the investments has been structured and secured as local community equity. An individual community's dividends earned will depend on the terms of each transaction corresponding with the relevant equity share. To date all shareholding for

[22] 6323 MW from 92 largescale RE + 99MW from 20 small scale REIPPs.

local communities have been structured through the establishment of community trusts. For projects in BW1 to BW4, 1S2 and 2S2, qualifying communities will receive R29.3 billion net income over the life of the projects (20 years). The report notes that the bulk of the money will however only start flowing into the communities from 2028 due to repayment obligations in the preceding years (repayment obligations are mostly to development funding institutions). However, despite the delay this represents a significant injection of capital into mainly rural areas of South Africa.

Income to all shareholders only commences with operation of the facility. With only 57 IPPS currently operational over a short period of time the revenue generated has been limited to R 36.3 billion.

Procurement spend

The total projected procurement spend for BW1 to BW4, 1S2 and 2S2 during the construction phase was R75 billion, more than the projected operations procurement spend over the 20 years operational life (R72 billion). The combined (construction and operations) procurement value is projected as R147.6 billion of which R50.1 billion has been spent to date. For construction, of the R46.4 billion already spent to date, R36.6 billion is from the 57 projects which have already been completed. These 57 projects had planned to spend R33.6 billion. The actual procurement construction costs have therefore exceeded the planned costs by 9% for completed projects.

The majority of the procurement spend to date has been for construction purposes. Of the R46.6 billion spent on procurement during construction, R41.1 billion has reportedly been procured from BBBEE suppliers, achieving 89% of total procured. Actual BBBEE spend during construction for BW1 and BW2 alone was R25.5 billion. The R 41.1 billion spent on BBBEE during construction already exceeded the R34.8 billion that had originally been anticipated by IPPs.

Local Content[23]

The report notes that the REIPPP programme represents the country's most comprehensive strategy to date in achieving the transition to a greener economy. Local content minimum thresholds and targets were set higher for each subsequent bid window. The report notes that for a programme of this magnitude, with construction procurement spend alone estimated at R75 billion, the result is a substantial stimulus for establishing local manufacturing capacity. Actual local content spend reported for IPPs that have started construction amounts to R38.1 billion against a corresponding project value (as realised to date) of R75.8 billion. This means 50% of the project value has been locally procured, exceeding the 45% commitment from IPPs and the thresholds for BW1 – BW4 (255-45%).

The report also notes that the strategy has prompted several technology and component manufacturers to establish local manufacturing facilities. The report also notes that this will improve with greater certainty relating to subsequent bid windows and further determinations will continue to build on these successes.

For the 57 projects that have reached COD, local content spend has been R 29 billion, which represents 97% of planned local spend of R 29.9 billion.

[23] Local content is expressed as a % of the total project value and not procurement or total project costs.

Preferential procurement
The share of procurement that is sourced from Broad Based Black Economic Empowered (BBBEE) suppliers, Qualifying Small Enterprises (QSE), Exempted Micro Enterprises (EME) and women owned vendors are tracked against commitments and targeted percentages. The IA target requirement for BBBEE is 60% of total procurement spend. However, the actual share of procurement spend by IPPs from BBBEE suppliers for construction and operations combined is currently reported as 88%, which is significantly higher than the target of 60%, but also the 73% that had been committed by IPPs. BBBEE, as a share of procurement spend for projects in construction, is also reported as 89% with operations slightly lower at 78%. However, these figures have not been verified and the report notes that they are reported with caution.

Total procurement spend by IPPs from QSE and EMEs has amounted to R16.4 billion (construction and operations) to date, which exceeds commitments by 24% and is 33% of total procurement spend to date (while the required target is 10%). QSE and EME's procurement spend for construction is achieving 34% of total procurement to date and operations is less at 22%, however this is still well above the 10% target. QSE and EME share of construction procurement spend totals R15.5 billion, which is almost 3 times the targeted spend for construction of R5.0 billion during this procurement phase. However, procurement from women owned vendors is lagging, with only 3%f or construction and 5% for operations achieved to date against a target of 5%.

Nonetheless, the fact that the REIPPPP has raised employment opportunities for black South African citizens and local communities beyond planned targets, indicates the importance of the programme to employment equity and the drive towards more equal societies.

Leveraging employment opportunities
To date, a total of 32 532 job years[24] have been created for South African citizens, of which 29 046 job years were in construction, 40% higher than the planned 20 689, and 3 486 in operations. These job years should rise further past the planned target as more projects enter the construction phase. By the end of June 2017, 57 projects had successfully completed construction and moved into operation. The projects had planned to deliver 14 639 job years during the construction phase, but had achieved 23 987. This was 64% more than planned.

The report notes that employment thresholds and targets were consistently exceeded across the entire portfolio. The average share of South African citizens of total South Africa based employees for BW1 – BW3.5 was 89% during construction (against a target of 80%), while it was 96% during operations for BW1 – BW3 (against a target of 80%). The report notes that the construction phase offers a high number of opportunities over shorter durations, while the operations phase requires fewer people, but over an extended operating period.

In terms of benefits for local communities, significantly more people from local communities were employed during construction than was initially planned. The expectation for local community participation was 6 772 job years. To date 16 376

[24] The equivalent of a full time employment opportunity for one person for one year

job years have been realised (i.e. 142% greater than initially planned), with 16 projects, which have reached financial close, still to reach COD. The number of black SA citizens employed during construction also exceeded the planned numbers by 83%.

Black South African citizens, youths and rural or local communities have been the major beneficiaries during the construction phases, as they respectively represent 80%, 41% and 52% of total job opportunities created by IPPs to date. However, woman and disabled people could still be significantly empowered as they represent a mere 8% and 0.5% of total jobs created to date, respectively. Nonetheless, the fact that the REIPPPP has raised employment opportunities for black South African citizens and local communities beyond planned targets, indicates the importance of the programme to employment equity and the drive towards more equal societies.

The share of black citizens employed during construction (80%) and the early stages of operations (82%) has significantly exceeded the 50% target and the 30% minimum threshold. Likewise, the share of skilled black citizens (as a percentage of skilled employees) for both construction (67%) and operations (77%) has also exceeded the 30% target and is at least 3.5 times more than the minimum threshold of 18%. The share of local community members as a share of SA-based employees was 50% and 67% for construction and operations respectively – at least 4 times more than the minimum threshold of 12% and more than 2.5 times more than the target of 20%.

Socio-economic development (SED) contributions

An important focus of the REIPPPP is to ensure that the build programme secures sustainable value for the country and enables local communities to benefit directly from the investments attracted into the area. In this regard IPPs are required to contribute a percentage of projected revenues accrued over the 20 year project operational life toward SED initiatives. These contributions accrue over the 20 year project operation life and are used to invest in housing and infrastructure as well as healthcare, education and skills development. The minimum compliance threshold for SED contributions is 1% of the revenue with 1.5% the targeted level over the 20 year project operational life. For the current portfolio of projects the average commitment level is 2.2%, which is 125% higher than the minimum threshold level. Therefore, based on current projects average commitment level is 2.2% or 125% more than the minimum compliance threshold. To date (across seven bid windows) a total contribution of R20.6 billion has been committed to SED initiatives. Assuming an even, annual revenue spread, the average contribution per year would be R1.03 billion. Of the total commitment, R16.5 billion is specifically allocated for local communities where the IPPs operate. With every new IPP on the grid, revenues and the respective SED contributions will increase.

To date, with the limited number of operational IPPs (57), the SED contribution amounts to R 403.7 million. The province with the highest SED contribution has been the Northern Cape Province, followed by the Eastern Cape and Western Cape. However, the report does note that SED contributions are concentrated in the communities in the immediate vicinity of the IPPs. As such there is a lack of equity considerations across geographical areas, i.e. some communities benefit more than others.

Enterprise development contributions
The target for IPPs to spend on enterprise development is 0.6% of revenues over the 20 year project operational life. However, for the current portfolio, IPPs have committed an average of 0.7% or 11% more than the target. Enterprise development contributions committed for BW1 to BW4, 1S2 and 2S2 amount to R6.4 billion. Assuming an equal distribution of revenue over the 20 year project operational life, enterprise development contributions would be R320 million per annum. Of the total commitment, R4.9 billion is specifically committed directly within the local communities where the IPPs operate, contributing significantly to local enterprise development. Up until the end of June 2017 a total of R 129.8 had been contributed to enterprise development by the 57 operating IPPs.

2.5.2 Green Jobs Study

The study notes that South Africa has one of the most carbon-intensive economies in the world, therefore making the greening of the electricity mix a national imperative. Within this context the study notes that the green economy could be an extremely important trigger and lever for enhancing a country's growth potential and redirecting its development trajectory in the 21st century. The attractiveness of wind and solar technologies is not only supported by local conditions, but also by the relatively mature stage of their technological development.

The aim of the Green Jobs study was to provide information on the net direct job creation anticipated to emerge in the formal economy across a wide range of technologies/activities that may be classified as green or contributing to the greening of the economy. The study looked at the employment potential for a number of green sectors, including power generation, over three consecutive timeframes, namely, the short term (2011 – 12), medium term (2013 – 17) and long term (2018 – 25). The analysis attempts to estimate the employment potential associated with: building, construction and installation activities; operations and maintenance services; as well as the possible localisation spin-offs for the manufacturing sector as the domestic production of equipment, parts and components benefits from preferential local procurement.

It is also worth noting that the study only considered direct jobs in the formal economy. Multiplier effects were not taken into account. As a result the analysis only captures a portion of the potential employment impact of a greening economy. International studies have indicated that there are considerable backward and forward linkages through various value chains of production, as well as of indirect and induced employment effects. The employment figures can therefore be regarded as conservative.

The analysis reveals the potential of an unfolding green economy to lead to the creation of approximately 98 000 new direct jobs, on average, in the short term, almost 255 000 in the medium term and around 462 000 employment opportunities in the formal economy in the long term. The number of jobs linked to the power generation was estimated to be ~ 12 500 in the short term, 57 500 in the medium term and 130 000 in the long term. Power generation jobs therefore account for 28% of the employment opportunities created in the long term. However, the report notes that the contribution made by a progressively expanding green energy generation segment increases from 14% of the total in the short term, or just over 13 500 jobs, to more than 28% in the long term (166 400) (Table 2.1).

The study also found that energy generation is expected to become an increasingly important contributor to green job creation over time, as projects are constructed or commissioned.

The international wind power industry employed almost half a million workers worldwide in 2009 – a figure that is expected to grow to over a million in five years from now, according to forecasts by the Global Wind Energy Council.

Table 2.1: Net direct employment potential estimated for the four broad types of activity and their respective segments in the long term, and an indication of the roll-out over the three timeframes

Broad green economy category		Segment	Technology/product	Total net direct employment potential in the long-term	Net direct manufacturing employment potential in the long-term	Total net direct employment potential (ST, MT, LT)	Net direct manufacturing employment potential (ST, MT, LT)
ENERGY GENERATION	Renewable (non-fuel) electricity	Wind power	Onshore wind power	5 156	2 105	VL, L, M	L, M, H
			Offshore wind power				
		Solar power	Concentrated solar power	3 014	608	N, VL, M	N, VL, M
			Photovoltaic power	13 541	8 463	M, H, H	H, VH, VH
		Marine power	Marine power	197	0	N, N, VL	N, N, N
		Hydro power	Large hydro power	272	111	VL, VL, VL	VL, M, VL
			Micro-/small-hydro power	100	0	VL, VL, VL	N, N, N
	Fuel-based renewable electricity	Waste-to-energy	Landfills	1 178	180	VL, VL, L	VL, VL, L
			Biomass combustion	37 270	154	VL, H, VH	VL, VL, L
			Anaerobic digestion	1 429	591	VL, VL, L	VL, L, M
			Pyrolysis/Gasification	4 348	2 663	VL, L, M	VL, H, H
			Co-generation	10 789	1 050	L, M, H	M, H, H
	Liquid fuel	Bio-fuels	Bio-ethanol	52 729	6 641	M, H, VH	L, H, VH
			Bio-diesel				
ENERGY GENERATION SUB-TOTAL				**130 023**	**22 566**		
ENERGY & RESOURCE EFFICIENCY		Green buildings	Insulation, lighting, windows	7 340	838	L, M, M	L, M, M
			Solar water heaters	17 621	1 225	L, H, H	L, M, H
			Rain water harvesting	1 275	181	VL, VL, L	VL, VL, L
		Transportation	Bus Rapid Transport	41 641	350	VH, VH, VH	H, M, L
		Industrial	Energy efficient motors	-566	4	VL, VL, VL	VL, VL, VL
			Mechanical insulation	666	89	VL, VL, VL	VL, VL, VL
ENERGY & RESOURCE EFFICIENCY SUB-TOTAL				**67 977**	**2 686**		
EMMISIONS AND POLLUTION MITIGATION		Pollution control	Air pollution control	900	166	N, VL, VL	N, L, L
			Electrical vehicles	11 428	10 642	VL, L, H	N, H, VH
			Clean stoves	2 783	973	VL, VL, L	VL, L, M
			Acid mine water treatment	361	0	VL, VL, VL	N, N, N
		Carbon Capture and Storage		251	0	N, VL, VL	N, N, N
		Recycling		15 918	9 016	M, H, H	H, VH, VH
EMMISIONS AND POLLUTION MITIGATION SUB-TOTAL				**31 641**	**20 797**		
NATURAL RESOURCE MANAGEMENT		Biodiversity conservation & eco-system restoration		121 553	0	H, VH, VH	N, N, N
		Soil & land management		111 373	0	VH, VH, VH	N, N, N
NATURAL RESOURCE MANAGEMENT SUB-TOTAL				**232 926**	**0**		
TOTAL				**462 567**	**46 049**		

Notes:

- VH = very high (total employment potential > 20 000 direct jobs; manufacturing employment potential > 3 000 direct jobs);
- H = high (total employment potential > 8 000 but < 20 000; manufacturing employment potential > 1 000 but < 3 000);
- M = medium (total employment potential > 3 000 but < 8 000; manufacturing employment potential > 500 but < 1 000);
- L = low (total employment potential > 1 000 but < 3 000; manufacturing employment potential > 150 but < 500);
- VL = very low (total employment potential > 0 but < 1 000; manufacturing employment potential > 0 but < 150);
- N = negligible/none (total employment potential = 0; manufacturing employment potential = 0).

Of relevance the study also notes that the largest gains are likely to be associated with operations and maintenance (O&M) activities, particularly those involved in the various natural resource management initiatives. In this regard, operations and maintenance employment linked to renewable energy generation plants will also be substantial in the longer term. The employment growth momentum related to building, construction and installation activities peaks in the medium term, largely propelled by mass transportation infrastructure, stabilising thereafter as green building methods become progressively entrenched.

In addition, as projects related to a greening economy are progressively commissioned, the potential for local manufacturing also become increasingly viable. Employment gains in manufacturing are also expected to be relatively more stable than construction activities, since the sector should continue exhibiting growth potential as new and replacement components are produced, as additional markets are penetrated and as new green technologies are introduced. Manufacturing segments with high employment potential in the long term would include suppliers of components for wind farms. The study does note that a shortage of skills in certain professional fields pertinent to wind power generation presents a challenge that must be overcome.

The study also found that South Africa is in a position to leverage upon some of its existing manufacturing capacities in order to produce components and parts for various sections of wind turbines, especially those industries involved in the production of steel and metal products, as well as the boat building and electrical industries. Local manufacturing capacity can be promoted through engagement with established global manufacturers. The study does however note that critical mass would have to be developed in order to obtain economies of scale.

The study found that there was also significant potential for local involvement in the wind sector (Table 2.2). Local companies can also exploit market opportunities in other African countries with higher wind power potential. This would create additional opportunities for improving economies of scale and enhancing the local industry's chances to succeed.

Table 2.2: Potential contribution capacity of local industries

Industry	Product/services	Share in turbine cost[30]	Local capacity
Manufacturing:	**Production of:**		
Structural steel, cast iron, metal and cement products	Towers, frames, hubs	34%	High
Boat-, airplane-, glass fibre composites	Rotor blades, nacelle, other plastic and fibre glass products	26%	High
High-technology parts and machinery	Gearbox parts, shafts, bearings	18%	Low
Electrical and electronic equipment	Generators, transformers and other electrical components	15%	Medium
Metal products	Pitch, yaw and break systems, and other parts	7%	Medium
Construction and civil engineering	**Foundation laying, tower erection, housing**	-	High
Electricity distribution	**Grid connection**	-	High
Electricity generation	**Operations and maintenance**	-	High
Logistics	**Transportation of very large components**	-	Medium

The study also identifies a number of advantages associated with wind power as a source of renewable energy with a large 'technical' generation potential. In this regard wind energy does not emit carbon dioxide (CO_2) in generating electricity and is associated with exceptionally low lifecycle emissions. The construction period for a wind farm is much shorter than that of conventional power stations, while an income stream may in certain instances be provided to local communities through employment and land rental. The study also notes that the greenhouse gases (GHG) associated with the construction phase are offset within a very short period of time compared with the project's lifespan. Wind power therefore provides an ideal means for reaching emission reduction targets in a relatively easy manner. In addition, and of specific relevance to South Africa, wind as an energy source is not dependent on water (as compared to the massive water requirements of conventional power stations), has a limited footprint and therefore does not impact on large tracts of land, poses limited pollution and health risks, specifically when compared to coal and nuclear energy plants.

Of relevance, the study also notes that the case for wind power is enhanced by the positive effect on rural or regional development. Wind farms located in rural areas create an opportunity to benefit the local and regional economy through the creation of jobs and tax revenues. In Denmark, one of the world's most advanced countries with respect to wind power generation, a significant portion of wind turbines are owned by local communities. A major drawback for wind energy is that, due to the natural variation in wind power on a daily and/or seasonal basis, back-up base-load generation capacity is imperative to provide stability to the energy supply. Furthermore, as with other renewable energy sources, wind power has relied on incentive measures throughout the world for its development, although its relative competitiveness has been improving continuously.

2.5.3 Powering the Future: Renewable Energy Roll-out in South Africa

The study notes that South Africa has higher CO_2 emissions per GDPppp (2002 figures) from energy and cement production than China or the USA (Letete, T et al). Energy accounts for 83% of the total GHG emissions (excluding land use, land use change and forestry) with fuel combustion in the energy industry accounting for 65% of the energy emissions of South Africa (DEA, 2011).

Within a broader context of climate change, coal energy does not only have environmental impacts, it also has socio-economic impacts. Acid mine drainage from abandoned mines in South Africa impacts on water quality and poses the biggest threat to the country's limited water resources. Huge volumes of water are also required to wash coal and cool operating power stations. Eskom uses an estimated 10 000 litres of water per second due to its dependency on coal (Greenpeace, 2012).

The report notes that the concerns relating to whether South Africa can afford renewable energy arise out of the perception that renewable energy (RE) is expensive while fossil and nuclear technologies are cheap. The premise also ignores life cycle costing of the technologies which is favourable to renewable technologies where the sources of fuel are free or cheap.

In terms of costs, onshore wind energy costs are expected to drop by 12% since 2011 due to lower cost equipment and gains in output efficiency. The report refers to Bloomberg New Energy Finance, which noted that the average wind farm could reach grid parity by 2016. In Australia, unsubsidised renewable energy is now cheaper than electricity from new-build coal- and gas-fired power stations. A BNEF study indicated that electricity can be supplied from a new wind farm at a cost of R747.32/MWh (AUS$80), compared to R1 335.82/MWh (AUS$143) from a new coal plant or R1 083.06 /MWh (AUS$116) from a new base-load gas plant, including the cost of emissions under the Australian government's carbon pricing scheme. Based on this the chief executive of Bloomberg New Energy Finance, Michael Liebreich, noted that "The fact that wind power is now cheaper than coal and gas in a country with some of the world's best fossil fuel resources showing that clean energy is a game changer which promises to turn the economics of power systems on its head," (Paton, 2013).

Within the South African context, a presentation by the South African Wind Energy Association (SAWEA) at the NERSA hearings in February 2013 indicated that in the second round of (REIPPPP) the bidding price for wind was 89c/kWh. The estimates for nominal new Eskom coal power range from NERSA's 97c/kWh to Standard Bank's estimate that Kusile will cost R1.38/kWh in 2019. In addition to being more expensive, coal-fired power stations have fewer job creation possibilities than RE, carry future expenses due to climate change impacts, and have health expense issues due to pollution.

The Greenpeace study notes that it is not only local manufacturers and rural farmers that benefit from RE, but large scale renewable utilities as well. The report notes that the Lake Turkana Wind Power Project (LTWP), which has a capacity of 310MW and consists of 365 turbines of 850kW, is the largest wind farm in Sub-Saharan Africa. The project is equivalent to 20% of the current installed capacity in Kenya and is the largest single private investment in Kenya's history (LTWP, 2012). At the proposed 9.9 US cents per kWh it will be the cheapest electricity in Kenya (Kernan, 2012). Wind energy therefore creates significant opportunities for investment and

the production of affordable energy without the significant environmental and socio-economic impacts associated with coal and nuclear energy options.

2.5.4 WWF SA, Renewable Energy Vision 2030

In its vision the WWF motivated for a more ambitious plan, suggesting that the IRP should provide for an 11-19% share of electricity capacity by 2030, depending on the country's growth rate over the next fifteen years. The vision is to increase renewable energy at the expense of new coal-fired and nuclear capacity. The report notes that in addition to the obvious environmental benefits of this scenario, it will enable South Africa to add flexibility to energy supply capacity on an on-demand basis.

The report notes that Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) introduced in 2011, has by all accounts been very successful in quickly and efficiently delivering clean energy to the grid. Increasingly competitive bidding rounds have led to substantial price reductions. In this regard the study indicates that in three years, wind and solar PV have reached pricing parity with supply from new coal-fired power stations from a levelised cost of electricity (LCOE) perspective.

In bidding window 3 of August 2013, the average tariffs bid for wind and solar PV were R0,66/kWh and R0.88/kWh respectively, well below the recent estimates of R1.05/kWh for supply from the coal-fired Medupi and Kusile power stations (Papapetrou 2014). In 2013, the average levelised cost of electricity supplied to the grid was R0.82/kWh (Donnelly 2014), so wind-generated power has already achieved pricing parity with the grid.

The report also notes that the REIPPPP has several contracting rounds for new renewables supply. A robust procurement process, extension of a 20-year sovereign guarantee on the power purchase agreement (PPA) and, especially, ideal solar power conditions, have driven the investment case for RE in South Africa. In this regard South Africa has been identified as one of the worlds' leading clean energy investment destinations (Figure 2.9).

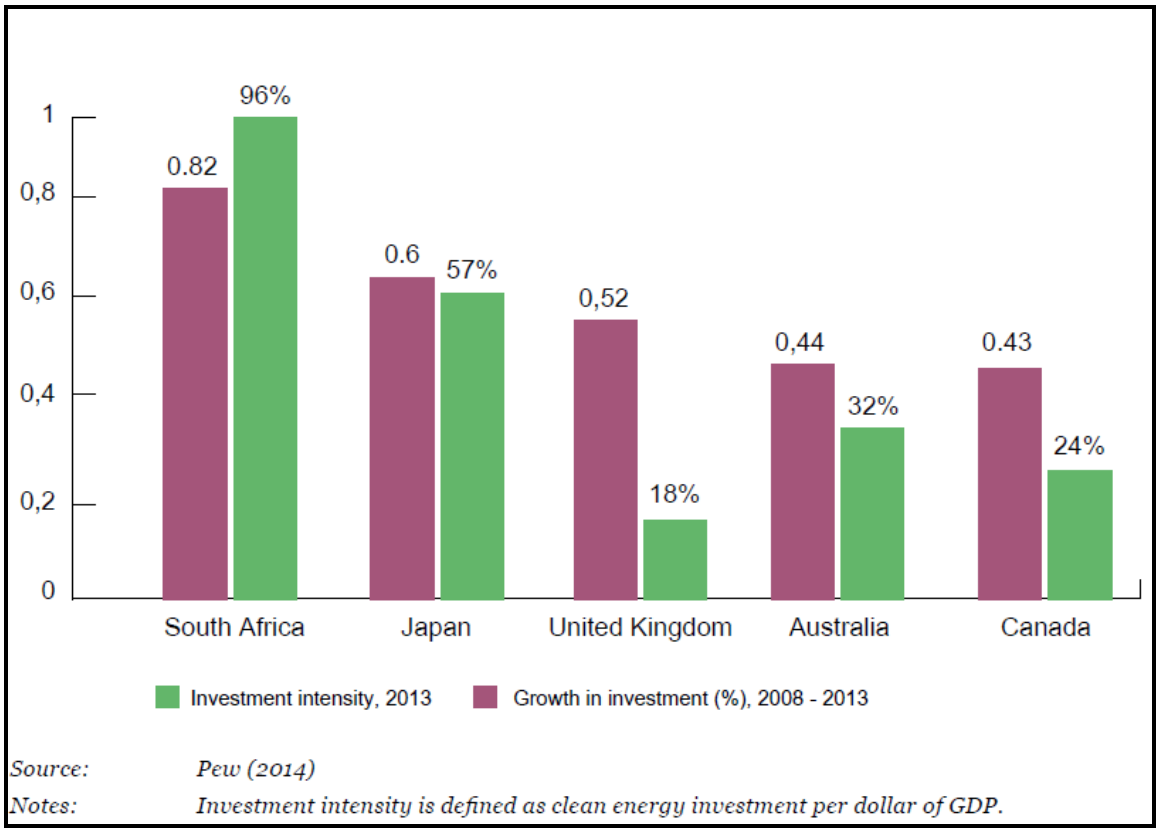

Figure 2.9: South Africa leads as a clean energy investment destination

The study also found that there were a number of opportunities to further reduce the cost of wind energy, specifically cost reductions for turbines. Towers, constructed mostly from steel, comprise 25% of the cost of wind turbines. The increasing distribution of manufacturers, greater competition and the use of more lightweight materials support cost reductions. In addition, since towers can, and are manufactured locally, they will be less sensitive to the weakening Rand. The study estimates a potential cost reduction of 15-20% by 2030. Rotor blades comprise 20% of the cost of wind turbines. On-going improvements in reducing weight through the use of carbon fibre and other lightweight materials will support a reduction of 10-20% by 2020. Gearbox costs and the costs of other components may be reduced by 10-15% by 2020, owing to manufacturing efficiencies.

With regard to local economic development, the REIPPPP sets out various local economic development requirements with stipulated minimum threshold and aspirational targeted levels, which each bidder must comply with. Based on the Broad-Based Black Economic Empowerment Codes, this requirement comprises the following components which make up a scorecard:

- Ownership by black people and local communities;
- Job creation;
- Local content;
- Management control;
- Preferential procurement;
- Enterprise development; and

- Socio-economic development.

The final award is based on a combined evaluation in which price determines 70% of the ranking and performance on the local economic development scorecard the remaining 30%. This gives non-price criteria a much heavier weighting than they would normally enjoy under Government's preferential procurement policy.

Job creation, local content and preferential procurement accounted for the bulk of possible points on the scorecard in REIPPPP Round 3. Consequently, a requirement to source goods and services locally is considered to be the central driver of project costs associated with local economic development. In terms of local content, the definition of local content is quite broad, being the value of sales less the costs associated with imports. However, through successive bidding rounds, the definition has become subject to more detailed definition, with an expanding list of exclusions and increased targeting in terms of key components identified by the Department of Trade and Industry for local manufacturing. This has benefitted local manufacturers and suppliers.

The WWF study considers a low and high growth renewable energy scenario. The capital requirements for the low growth scenario are estimated at R474 billion over the period 2014-2030 (2014 Rand value), rising to R1.084 trillion in the high-growth scenario, in which 35 GW of capacity is built. Each annual round of purchasing 2 200 MW of RE capacity would cost approximately R77 billion in 2014 Rand value terms. In relative economic terms, this equates to 2% of the GDP per annum or approximately one quarter of Government's planned annual investment in infrastructure over the medium term. In the low economic growth scenario, which is arguably the more realistic one, the average annual new liability over the period is approximately R40 billion.

The study also points out that infrastructure spend is more beneficial than other government expenditure due to the infrastructure multiplier effect. This refers to the beneficial impact of infrastructure on economic growth in both the short term, resulting from expansion in aggregate demand, as well as in the longer term (six to eight years) due to enhanced productive capacity in the economy. A recent USA study on highway expenditure revealed the infrastructure multiplier to be a factor of two on average, and greater during economic downturns (Leduc & Wilson 2013). This means that one dollar spent on infrastructure raises GDP by two dollars. If the same were to hold true, as similar analysis suggests it would (Kumo 2012, Ngandu et al 2010), this indicates that the construction of renewable energy plants could be a valuable economic growth driver at a time when fears of recession abound.

The report concludes that the WWF is optimistic that South Africa can achieve a much more promising clean energy future than current plans allow for. With an excellent solar resource and several very good wind-producing pockets, the country is an ideal candidate for a renewable energy revolution.

The report indicates that the levelised cost of producing renewable energy already competes favourably with the three main alternatives, namely coal, gas and nuclear. In addition, renewable energy would contribute to a more climate-resilient future and insulate South Africa from dependence on expensive and unreliable fuel sources priced in dollars. Critical from a planning perspective, the report notes that renewable energy can also provide added flexibly on an 'as needed' basis, as electricity demand grows. This is vital in a highly uncertain environment.

2.5.5 The impact of the green economy on jobs in South Africa

The paper notes that greening the economy is particularly important in South Africa for two basic reasons: (1) the exceptional level of unemployment that the country is experiencing and (2) the high carbon impact of the economy.

In terms of employment, the paper refers to the IDC *Green Jobs R*eport (2011). In summary, the short-term (next 2 years) estimate of total net employment potential is 98 000 jobs, and the long-term (next 8 years) employment potential is 462 567 jobs. 16 Natural resource management is predicted to lead to the greatest number of these at 232 926 long-term jobs. Green energy generation is estimated to produce 130 023 long-term jobs, with energy and resource efficiency measures adding another 67 977 long-term jobs.

The paper notes that the Green Jobs Report was prepared by 17 primary researchers from three prominent organisations, namely the IDC, the Development Bank of South Africa, and Trade and Industrial Policy Strategies. Many role players from other organisations were also consulted, including the World Wide Fund for Nature, the Green Building Council, the Economic Development Department and private companies involved in green industries.

Despite questions surrounding the employment estimates contained in the Green Jobs Report, green economic activity does appear to generate more local jobs than fossil-fuel-based industries. Some of the estimates also indicate the potential for significant employment. The paper concludes that the figures represent a promising starting point that warrants further research and policy involvement in greening the economy in South Africa.

2.5.6 The potential for local community benefits from wind farms in South Africa

In her thesis, Tait notes that the distributed nature of renewable energy generation can induce a more geographically dispersed pattern of development. As a result RE sites can be highly suited to rural locations with otherwise poor potential to attract local inward investment therefore enabling to target particularly vulnerable areas.

In her conclusion, Tait notes that the thesis has found positive evidence for the establishment of community benefit schemes in the wind sector in South Africa. The BBBEE requirements for developers as set out in the DoE's IPPPP for renewables is the primary driver for such schemes. The procurement programme, in keeping with the objective of maximising the economic development potential from this new sector, includes a specific focus on local communities in which wind farms are located.

The procurement programme, typical of all Government tendering processes, includes a BBBEE scorecard on which wind projects are evaluated. However the renewables scorecard appears to play an important part in a renewed focus on the broad-based Aspects of the legislation, as enforced by a recent national review of the BBBEE Act. In this regard the renewables scorecard includes specifications for local communities in respect of broad-based ownership schemes, socio-‐economic development and enterprise development contributions. This approach to legislating social responsibilities of business in all sectors definitely has a South African flavour,

borne out of the political history of the country and the imperatives for social transformation laid out in the constitution.

While Tait notes that it is still early days for the development of this sector and one cannot determine the impact that such benefit schemes may have, it is clear though that targeted development expenditure will be directed to multiple rural communities and there seems to be a strong potential to deliver socio-economic benefits.

2.5.7 Market Intelligence Report: Renewable Energy

A study undertaken by Greencape in 2014 found that the bidding programme is placing increasing pressure on developers to include locally manufactured 'key components'. In the wind sector the key components that are being focussed on are wind turbine blades and towers. In this regard two tower manufacturers had at the time begun the establish facilities in South Africa, DCD in Coega, and Gestamp in Atlantis. LM wind power has also announced that they have developed business cases for two regions in South Africa. In the PV industry the focus has been on panels, inverters, mounting structures, cables and trackers. There is already considerable manufacturing set up in the Western Cape to support the PV industry, including SunPower, Jinko, SolarDirect, ZnShine (pending) (Modules) and AEG, SMA, Gefran, and MLT-Drives (Inverters). The report notes that these manufacturers could supply a significant portion of the South African market. The increasing local content requirements are leading to increasing interest in setting up manufacturing in the country, specifically in the Western Cape.

The study also notes that the Western Cape is home to the bulk of the renewable energy industry in South Africa. The majority of 'successful' developers are in Cape Town. The majority of professional services, the majority of EPC companies, and the majority of manufactures are based in the province. The Western Cape has also launched a broader Green Economy strategy, which focuses on enshrining the green economy principles in a transversal strategic framework. As part of the strategy the City of Cape Town has made a large area of industrial land available for the manufacturing of renewable energy components. This opportunity is perfect for manufacturers who are interested in green field sites. The DTi in collaboration with GreenCape will be establishing a special economic zone (SEZ) in Atlantis focussed on Green technology manufacturing (Atlantis Green Economic Hub). The zone will offer significant incentives for investment, including proposed 15% company tax rate.

2.6 INTERNATIONAL EXPERIENCE WITH WIND FARMS

Three documents were reviewed, namely:

- National Wind Farm Development Guidelines produced by the Environment Protection and Heritage Council (EPHC) of Australia (Draft, July, 2010). The guidelines highlight the potential social and biophysical impacts associated with WFs. Given the similarities between South Africa and Australia, such as large, unobstructed landscapes and climates, these guidelines are regarded as relevant to the South Africa situation;
- Research on wind energy development in Scotland undertaken by Warren and Birnie in 2009 (Warren, Charles R. and Birnie, Richard V.(2009) 'Re-powering Scotland: Wind Farms and the 'Energy or Environment?' Debate'). The Scottish experience is also regarded as relevant to the South Africa context for a number

of reasons. Firstly, installed wind power capacity has expanded rapidly in Scotland over the past decade. Before 1995 no wind farms existed. By late 2008, there were 59 operational onshore wind farms, 65 consented to or under construction and a further 103 in the planning process (BWEA, 2008). South Africa faces a similar situation, with a rush of applicants seeking approval for WFs. Secondly, the impact on the landscape, specifically the Scottish Highlands, was one of the key concerns raised in Scotland. The impact on undeveloped, natural landscapes is also likely to become an issue of growing concern in South Africa;

- Review of the potential health impacts associated with wind farms undertaken by the Australian Health and Medical Research Council (July, 2010).

It should be noted that the section is not specific to the site but merely a review of international literature.

Health related impacts

The potential health impacts typically associated with WFs include, noise, dust shadow flicker and electromagnetic radiation. The findings of a literature review undertaken by the Australian Health and Medical Research Council published in July 2010 indicate that there is no evidence of wind farms posing a threat to human health. The research also found that wind energy is associated with fewer health effects than other forms of traditional energy generation, and may therefore in fact result in the minimisation of adverse health impacts for the population as a whole (WHO, 2004).

The overall conclusion of the review undertaken by the Australian Health and Medical Research Council (July, 2010) is that, based on current evidence, wind turbines do not pose a threat to health if planning guidelines are followed.

Landscape impacts

The guidelines also note that landscapes change over time, both naturally and through human intervention. In addition, landscape values, being subjective, change not only with time, but also from person to person. As a result there are a wide variety of opinions of what is valued and what is not. The perceptions by which we value landscapes are influenced by a range of factors such as visual, cultural, spiritual, environmental, and based on memories or different aesthetics (National Wind Farm Development Guidelines, DRAFT - July 2010).

The guidelines note that cumulative impacts need to be considered in relation to dynamic as well as static viewpoints. The experience of driving along a tourist road, for example, needs to be considered as a dynamic sequence of views and visual impacts, not just as the cumulative impact of several developments on one location. The viewer may only see one wind farm at a time, but if each successive stretch of the road is dominated by views of a wind farm, then that can be argued to be a cumulative visual impact (National Wind Farm Development Guidelines, DRAFT - July 2010).

Cumulative impacts may be visual and aesthetic, but they can also occur in relation to non-visual values in the landscape. Non-visual values include sounds/noise, associations, memories, knowledge and experiences or other cultural or natural values. As an example, the Guidelines indicate that locating four wind farms in a valley previously best known for its historic wineries might change the balance of perception about the valley's associational character, irrespective of whether all four

wind farms were sited in a single view shed (National Wind Farm Development Guidelines, DRAFT - July 2010).

In the Scottish case, the primary argument employed to oppose wind farms related to the impact on valued landscapes. As in the South African case, the visual impacts are exacerbated by the fact that the locations with the greatest wind resources are often precisely those exposed upland areas which are most valued for their scenic qualities, and which are often ecologically sensitive. The establishment of wind farms together with the associated service roads and infrastructure, transforms landscapes which are perceived to be natural into 'landscapes of power' (Pasqualetti et al., 2002, p. 3).

2.7 IMPACT OF WIND FARMS ON TOURISM

A review of international literature in the impact of wind farms was undertaken as part of the SIA. Three articles were reviewed, namely[25]:

- Atchison, (April, 2012). Tourism Impact of Wind Farms: Submitted to Renewables Inquiry Scottish Government. University of Edinburgh
- Glasgow Caledonian University (2008). The economic impacts of wind farms on Scottish tourism. A report prepared for the Scottish Government
- Regeneris Consulting (2014). Study into the Potential Economic Impact of Wind Farms and Associated Grid Infrastructure on the Welsh Tourism Sector

The most comprehensive appears to be a review undertaken by Professor Cara Aitchison from the University of Edinburgh in 2012 which formed part Renewable Energy Inquiry by Scottish Government. The research by Aitchison found that previous research from other areas of the UK has demonstrated that wind farms are very unlikely to have any adverse impact on tourist numbers (volume), tourist expenditure (value) or tourism experience (satisfaction) (Glasgow Caledonian University, 2008; University of the West of England, 2004). In addition, to date, there is no evidence to demonstrate that any wind farm development in the UK or overseas has resulted in any adverse impact on tourism. In conclusion, the findings from both primary and secondary research relating to the actual and potential tourism impact of wind farms indicate that there will be neither an overall decline in the number of tourists visiting an area nor any overall financial loss in tourism-related earnings as a result of a wind farm development. The study by the Glasgow Caledonian University (2008) found that only a negligible fraction of tourists will change their decision whether to return to Scotland as a whole because they have seen a wind farm during their visit.

The study also found that 51.0% of respondents indicated that they thought wind farms could be tourist attractions. In this regard the visitor centre at the Whitelee Wind Farm in east Ayrshire Scotland run by ScottishPower Renewables has become one of the most popular 'eco-attractions' in Scotland, receiving 200 000 visitors since it opened in 2009.

[25] Annexure E contains a more detailed review of the documents

2.8 IMPACT ON WIND FARMS ON PROPERTY VALUES

The literature review undertaken as part of the SIA does not constitute a property evaluation study and merely seeks to comment on the potential impact of wind farms on property values based on the findings of studies undertaken overseas[26]. The literature reviewed was based on an attempt by the authors of the SIA to identify what appear to be "scientifically" based studies that have been undertaken by reputable institutions. In this regard it is apparent that there are a number of articles available on the internet relating to the impact of wind farms on property values that lack scientific vigour. The literature review also sought to identify research undertaken since 2010. The literature review does not represent an exhaustive review.

In total five articles were identified and reviewed namely:

- Stephen Gibbons (April, 2014): Gone with the wind: Valuing the Visual Impacts of Wind turbines through house prices. London School of Economics and Political Sciences & Spatial Economics Research Centre, SERC Discussion Paper 159;
- Review of the Impact of Wind Farms on Property Values, Urbis Pty Ltd (2016): Commissioned by the Office of Environment and Heritage, NSW, Australia;
- Yasin Sunak and Reinhard Madlener (May 2012): The Impact of Wind Farms on Property Values: A Geographically Weighted Hedonic Pricing. School of Business and Economics / E.ON Energy Research Center, RWTH Aachen University. Model Working Paper No. 3/2012;
- Martin D. Heintzelman and Carrie M. Tuttle (March 3, 2011): Values in the Wind: A Hedonic Analysis of Wind Power Facilities. Economics and Financial Studies School of Business, Clarkson University;
- Ben Hoen, Jason P. Brown, Thomas Jackson, Ryan Wiser, Mark Thayer and Peter Cappers (August 2013): A Spatial Hedonic Analysis of the Effects of Wind Energy Facilities on Surrounding Property Values in the United States. Ernest Orlando Lawrence Berkeley National Laboratory.

Three of the articles indicate that wind farms have the potential to impact on property values, while two indicate that the impacts are negligible and or non-existent.

In terms of the proposed project the most relevant study is the Urbis study (2016). The authors of the study found that appropriately located wind farms within rural areas, removed from higher density residential areas, are unlikely to have a measurable negative impact on surrounding land values.

[26] Annexure F contains a more detailed review of the documents

SECTION 3: OVERVIEW OF THE STUDY AREA

3.1 INTRODUCTION

Section 3 provides an overview of the study area with regard to:

- The administrative context;
- The socio-economic context of the study area.

3.2 ADMINISTRATIVE CONTEXT

The proposed WF is located within the Saldanha Bay LM (WC014), a Category-B Municipality[27], which is one of five LM that make up the West Coast District Municipality (WCDM) (DC1), a Category-C municipality, within the Western Cape Province. The SBLM is bordered in the west by the Atlantic Ocean, in the south by the West Coast National Park (which forms part of the West Coast District Management Area), in the north by the Bergrivier LM (WCDM), and the east by the Swartland LM (WCDM).

The administrative seat of the SBLM is Vredenburg. The most significant settlements in the SBLM are Vredenburg, Saldanha, Langebaan, St Helena Bay and Hopefield. Saldanha Harbour, the largest harbour on the west coast of the African continent and is of regional and national importance. A number of large manufacturing plants (e.g. Saldanha Steel) are located in the Saldana area. The bulk of the SBLM's population is concentrated in urban areas, mainly Vredenburg and Saldanha. Other, smaller settlements include Paternoster, Jacobsbaai, Langebaan and St Helena Bay (Figure 3.1).

[27] A category-B municipality is defined as a municipality that shares executive and legislative authority in its area with a category- C municipality within whose area it falls

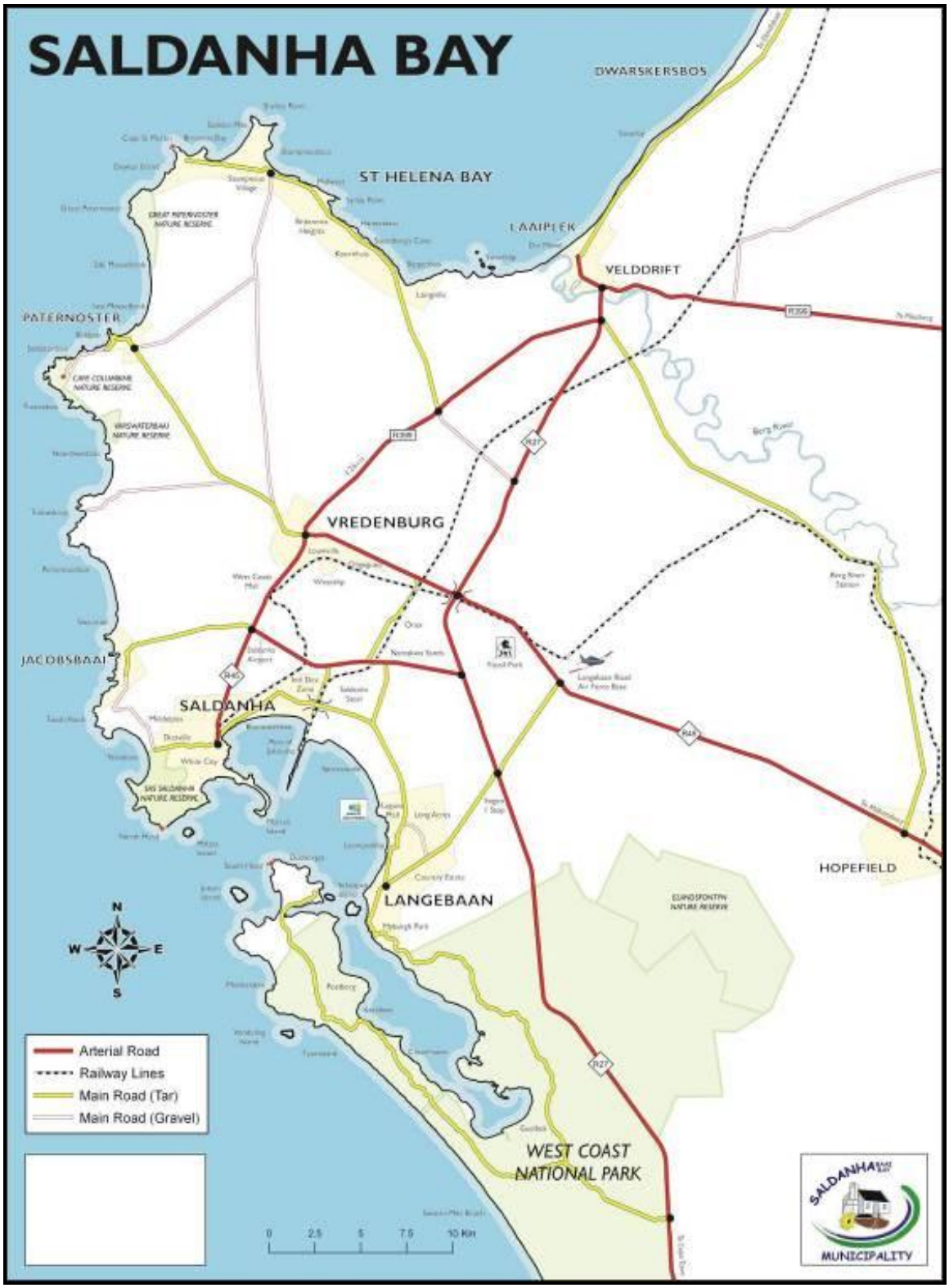

Figure 3.1: Major settlements and roads within the Saldanha Bay LM (*Source: Saldanha Bay Tourism)*

3.3 SOCIO-ECONOMIC OVERVIEW OF THE STUDY AREA

3.3.1 Introduction

The largest towns in the Saldanha Bay Municipality are Saldanha and Vredenburg located approximately 20 and 35 km south of Britannica Bay/ St Helena Bay respectively (Figure 3.1). Saldanha serves as an important fishing and industrial port, while Vredenburg serves as the business and administrative centre of the Saldanha Bay LM. Vredenburg is located approximately 130 km north of Cape Town. Both Saldanha and Vredenburg are easily accessible from the R27 coastal road, which links Cape Town in the south with Velddrif (Bergrivier LM) in the north.

In terms of natural assets the Saldanha Bay municipal area boasts a broad range of natural assets that contribute to the area's attraction as a tourist destination. These assets include the Langebaan Lagoon, a Ramsar site and popular recreational areas, as well as the major portion of the West Coast National Park, the Cape Columbine Nature Reserve (Paternoster) and the West Coast Fossil Park (Langebaanweg). Other major tourism attractions include the region's famed wild flower displays (late August to mid-October), as well as whale, dolphin and bird watching opportunities. The coastline is also extensively used for recreational uses such as angling, crayfishing and various water sports. The areas tourism potential is enhanced by its proximity to Cape Town and other large towns in the Boland (Stellenbosch, Paarl, Wellington).

Commercial fishing and fish processing have played an important historic role within the local economies of coastal towns such as Saldanha and St Helena Bay. However, a decline in fish stock and other factors has, over the past two to three decades, resulted in a shift towards tourism. As part of this change a large number of holiday and retirement homes have been established in the area, specifically in towns such as Langebaan, Paternoster, Jakobsbaai, and the Britannica Bay/ St Helena Bay area. As a result the traditional fishing village sense of place associated with these small, coastal towns has largely been lost.

The population of Saldanha Bay Municipality was 99 193 in 2011 or 25 % of the West Coast District population (391 766 in 2011). Of the local municipalities in the district, Saldanha Bay (25%) and Swartland (29%) had the largest populations in 2011 (Census 2011).

Between 2001 and 2011 the population of the Saldanha Bay LM increased from 70 261 to 99 193, at an average annual growth rate of 2.6%. The population is expected to grow at an annual average rate of 3.45% a year. The population growth can be attributed largely to the development of the Port of Saldanha and the associated industrial zone. The Saldanha Bay Municipality's population is predominantly Coloured (55.80%) followed by Black African (24.5%) and Whites (18%). In 2006 Black Africans made up 16% of the population. There has therefore been an in-migration of Black African's to the area in search of employment. The majority of the population, over 90%, is urbanised. This is the highest proportion of all the municipalities in the district.

In terms of age, 25.3% of the Saldanha Bay Municipality's population is below the age of 15, 69.5% fall within the economically active age group of 15-64, and the

remaining 5.2% are older than 65. The dependency ratio[28] decreased from 48.8 in 2001 to 44 in 2011, which is lower than the provincial average of 45 in 2011. This represents a socio-economic improvement.

Based on information from the West Coast Socio-Economic Profile (2006), Agriculture, Forestry and Fishing was the biggest employer in Saldanha in 2001, contributing 23.6% to employment while its contribution to the GDPR was only 11.9%. The Manufacturing Sector contributed 17.8% to total local employment, followed by CSP services (14.4%) and the Wholesale and Retail Trade; Catering and Accommodation (13.3%). The major employers in the fishing industry include companies such as Sea Harvest, which employs approximately 2 400 employees, Oceana, Southern Seas and West Point Processors (565 employees). In terms of the metals and mineral-processing companies (Manufacturing Sector), Saldanha Steel (Mittal SA) accounts for 790 permanent jobs, Namakwa Sands 950 and Duferco 325.

3.3.2 Saldanha Bay economy

The SBLM contributed R5.86 billion (30.56 %) of the WCDM total R19.16 billion GDPR in 2015. GDP growth averaged 2.95 % per annum over the period 2005–2015, which was below the District average of 3.42 %. In terms of employment, the SBLM employed 28 % of the West Coast District's labour force in in 2015. The SBLM notes that while Saldanha Bay experienced job losses prior to and during the recession, these jobs have been recovered and approximately 5720 (net) additional jobs have been created since 2005, with the majority been created post-2010.

The majority of the workforce in Saldanha Bay falls within the semi-skilled (32.50%) and low-skilled sector (32.14%). The semi-skilled sector experienced a contraction in employment over the long term (-0.1 % per annum over the period 2005 –2015), while low-skilled employment remained fairly stagnant over the long term and skilled employment, which makes up 13.35 % of the municipality's workforce, grew at a moderate rate of 1.9 % per annum since 2005. The informal sector, which employs 22 % of the municipality's workforce, experienced robust growth of 7.8 % per annum over the past decade.

The key sectors in the local economy consist of the primary and secondary sector.

Primary sector

Agriculture, forestry and fishing make up the primary sector of the SBLM economy, and contributed R887.21 million (15.15 %) to the Municipality's GDP in 2015. The sector has displayed steady growth of 2.85 % for the period 2005 – 2015, with a significant improvement of 4.49 % per annum over the period 2010 – 2015). The sector also employed 31.77% of the area's workforce. The labour force in the primary sector is characterised by a relatively large proportion of unskilled labour (43.32%). The semi-skilled sector employs 32.59 % of the industry's workforce and has grown at a rate of 4.4 % per annum since 2010. The skilled sector employs the smallest proportion of the municipality's workforce (5.20 %). This segment has shown robust growth post-recession (4.7 %). Despite the economic recovery since

[28] The dependency ratio is calculated as the number of 0 to 14-year olds, plus the number of 65-year olds and older, divided by the number of people in the 15 to 64-year old age cohort. This is to give a rough indication of dependency but it should be noted that it is not linked to the labour force or income earners (including those of pensionable age who have access to social or private pensions or other income).

2010 employment in agriculture, forestry and fishing sectors has stagnated over the long term (2005 – 2015). As a result the jobs lost for the period 2005–2010 have not yet been recovered.

Secondary sector

The key sectors in the secondary sector are the manufacturing, construction, commercial services, and government and community, social and personal services sectors. These are briefly discussed below.

Manufacturing

The manufacturing contributed R1.305 billion (22.3%) towards the Municipality's GDP in 2015, making it the second largest sector in the Saldanha Bay region. The sector has experienced moderate growth of 1.25 % per annum on average over the period 2010 – 2015, and fared slightly better over the long term with growth averaging 1.49 % per annum since 2005. The manufacturing sector employed 10.65 % of the area's workforce (making it the 4th largest employer in Saldanha Bay). The majority of workers employed in the manufacturing sector are classified as semi-skilled (39.6%) and low-skilled (31.8 %). Only 11.8 % of those employed in the manufacturing sector are categorised as skilled workers. The informal sector makes up 16.8 % of the industry's workforce and experienced robust long term growth as employment grew by 7.2 % per annum over the period 2005 – 2015.

Construction

The construction sector contributed R 239.3 million (4.08%) of the municipality's GDP in 2015. Despite the relatively small size of the sector, construction has been the fastest growing industry since 2005, with growth averaging 5.94 % per annum. The sector employed only 4.96 % of the area's workforce in 2015. Employment in the municipality's construction sector has however grown by 2.4 % per annum since 2005. The majority (42.4%) of the workers employed in the construction industry operate within the informal sector. Low-skilled employment makes up 17.5 % and semi-skilled employment makes up 33.1 % of the workforce in the construction industry. Employment within both these sectors has contracted over the past decade (with employment contracting the fastest in the latter half of the decade). This is linked to the global financial crisis of 2008. Skilled employment makes up only 7.1 % of the construction industry's workforce.

Commercial services

Commercial services sector encompass wholesale and retail trade, catering and accommodation, transport, storage and communication and finance, insurance, real estate and business services industries. This sector is the largest sector in the SBLM economy, contributing R2.404 billion (41.0 %) towards the GDP in 2015. The industry also grew at a faster rate than the overall municipality over the period 2005 – 2015, namely 3.59 % compared to the municipal average of 2.95%. The sector is also the largest employer in the local economy (32.1%). In addition, employment has shown consistent growth throughout the past decade recording a 3.4% growth rate per annum on average. It is also worth noting that 35.2% of the industry's workforce falls within the semi-skilled category, 18.6 % are low-skilled and 15.5% are skilled. The SBLM IDP notes that informal employment within the Commercial services industry makes up 30.6% of the industries workforce and has experienced robust growth of 10.8 per cent per annum since 2005. The informal sector is responsible for the majority of the new jobs created in the industry.

The commercial services sector includes tourism. The Saldanha Bay region's key tourist assets include the Saldanha Bay Harbour and the region's pristine coastline. Coastal settlements such as Langebaan, Saldanha, Jacobsbaai, Paternoster and St Helena Bay are the key anchoring destinations in the region. Major tourist attractions include the region's renowned flower displays (late August to mid-October), as well as whale, dolphin and bird watching opportunities. The coastline is also extensively used for recreational uses such as angling, cray-fishing and various water sports. The role of the tourism sector has been enhanced by the region's proximity to Cape Town and other large towns in the Boland region (Stellenbosch, Paarl and Wellington). In this regard the BLM SDF (2011) and Draft SDF (2017), both highlight the importance of the tourism sector.

The Paternoster tourism sector pitches itself at the high-end of the market, promoting the village as the "Franschhoek of the West Coast". The settlement's sense of place as picturesque and quaint traditional West Coast fishing village offering a relaxed holiday in a natural setting constitutes the main attraction. Tourist flows to Paternoster tend to be seasonal, with vistor numbers declining in the winter months. The Paternoster Village Tourism Association currently has 54 members and facilities include a range of accommodation facilities (estimated total of 800 beds) and 8 restaurants. In addition to formalized accommodation facilities, a significant proportion of local residents supplement their income by renting out their properties to visitors. This source of income enables many residents to live in the settlement on a permanent basis.

At present no designated scenic drives or formalised tourism routes exist in the study area. Tourist flows appear to enter and leave the Vredenburg Peninsula either via the MR 240 (for Paternoster), or via the MR 533 (for the St Helena Bay/ Stompneusbaai area). No circular route has been established, and cross-traffic between the MR 240 and MR 533 appears to be limited at present. However, the 2011 SBLM SDF does recommend the establishment of a scenic drive network for the area.

Government and community and social and personal services

The general government and community, social and personal services contributed R943.63 million (16.1%) of the municipality's GDPR in 2015, making it the third largest contributor to the SBLM's GDP. The sector experienced GDPR growth of 3.61 % over the period 2005 – 2015. Despite only being the third largest sector, it employs 20.27% of the area's workforce, making it the second largest employer. Employment growth over the period 2005 – 2015 averaged 3.4 % per annum. However, employment growth slowed to 2.8% per annum over the post-recession period of 2010 – 2015. The majority of the workers fall within the low-skilled category (39.9%), whilst 23.9% are semi-skilled and 24.9 % are classified as skilled.

3.3.3 Future economic development

The SBLM LED Mid Term Strategy (2013) notes that Saldanha Bay has long term potential and is well positioned for exponential growth and development. This growth is linked to Oil and Gas, Manufacturing, Aquaculture and Tourism. The Strategy indicates that these sectors can impact on the Saldanha Bay economy to grow at a rate that can create or sustain jobs and quality of life of all residents, with immediate outcomes and outputs as indicated in the strategy map.

The establishment of the Saldanha Bay IDZ (SBIDZ) located within the Saldanha Bay Municipality represents a key component of the development of the local and regional economy. An IDZ is a purpose built, industrial estate linked to an international air or sea port, which might contain one or multiple Customs Controlled Areas tailored for manufacturing and storage of goods to boost beneficiation, investment, economic growth and, most importantly, the development of skills and employment in these regions. IDZs are intended to promote the competitiveness of the manufacturing sector and to encourage beneficiation of locally available resources. The key objectives of the IDZ programme include the following:

- Attract foreign direct investment;
- Attract advanced foreign production and technology methods in order to gain experience in global manufacturing and production networks;
- Develop linkages between domestic and zone-based industries; and
- Provide world-class industrial infrastructure.

The IDZ extends from the Port area in the south up to Regional Route 45 (R45) to the north, and includes land both east and west of the Sishen-Saldanha rail line which runs through the central part of the area in a north-south direction. It is the area around the present industrial area, i.e. around ArcelorMittal South Africa (Saldanha Works), Duferco Steel Processing (Pty) Ltd (Duferco), Tronox (Sands Smelter) and other industries.

3.3.4 Growth and Development Potential

A study (Centre for Geographical Research, 2004) of the growth potential of the towns in the Western Cape was commissioned by the Department of Environmental Affairs and Development Planning (Western Cape) to provide the Department with a better understanding of the developmental potential and challenges of the Western Cape. The Study was undertaken within the context of the strategic requirements as pointed out in the National Spatial Development Perspective. The findings of the Study played a crucial role in informing the drafting of the PSDF.

The Study investigated 131 towns in the province with regard to assessing their development potential for infrastructural investment, as well as assessing their human need with a view to social investment in their people. The study also investigated and diagnosed rural-urban development issues faced by the province, and made recommendations towards improving the *status quo*.

Two investment types, 'Town/Infrastructural investment' and 'Social/People investment', were used as points of departure in order to identify the appropriate investment type best suited to stimulate economic growth and social investment for each of the relevant urban communities/ towns:

- High Need/Low Development: *Social investment required*;
- Low Need/High Development: *Town investment required*;
- High Need/High Development: *Social and Town investment required*;
- Low Need/Low Development: *Minimal investment required*.

The assigning of development potentials to specific towns included quantitative (survey of existing infrastructure, retail and services providers, etc) and qualitative aspects (based on the self-perception of its inhabitants). The following five qualitative categories were defined:

- ***"Very Low"*** and ***"****Low" growth potential*:
  Towns with a proven track record of growth, but wishing to retain their present character and therefore rejecting major development; *or* towns with limited economic and human resources, devoid of the potential to stimulate the urban economy.
- *"Medium" growth potential*:
  Consistent and moderate growth prevails in these towns and certain sectors of the economy show signs of growth, or have the potential for it;
- *"High"* and *"Very High" growth potential*:
  Towns displaying sustainable growth combined with an established and proven track record to operate as 'regional leaders'. Potential to grow at a sustainable and powerful rate in line with the capacity of their resources and to operate as service providers to a relatively extensive hinterland. The difference between 'High' and 'Very High' status only lies in the diversity and intensity of the town dynamics (Centre for Geoscience Research, 2004,)

The Study appears to have subsumed the Britannica Bay/ Golden Mile and Stompneusbaai areas under St Helena Bay. Based on the Study, St Helena Bay was identified as a town with *a low-low development potential* and *low need*. In the study it is identified as a town that qualifies for infrastructural investment.

Part of the study also investigated "the dominant *economic base* and *place identity"* of each town to better understand and appreciate the various settlements' development potential. In this regard, St Helena Bay's economic base was identified as ""Fishing/ Residential". The town's "place identity" was identified as "Fish pantry of the Western Cape".

The neighboring towns of Saldanha and Vredenburg were identified as towns with high and very high development potential. Saldanha's potential was linked to its strong Transportation/Communication role as an important harbour and railway node. Vredenburg's rating is linked to its strong position regarding Institutional and Commercial Services, as well as its Market Potential and Regional Vitality. The report notes that Vredenburg demonstrates a well-balanced and diversified development structure, with only Natural Resources not being well endowed.

3.4 DEMOGRAPHIC OVERVIEW OF STUDY AREA

As indicated in Table 3.1., the population of the West Coast District Municipality (WCDM) increased by from 282 672 in 2001 to 391 766 in 2011, which represents a significant increase of ~ 38.5%. The population of the Saldanha Bay Local Municipality (SBLM) increased from 70 261 in 2001 to 99 193 in 2011, an increase of 42.0 % over the same period. This represents an average annual increase of ~ 3.26 % and 3.45 % for the WCDM and SBLM respectively. The increase in the population in both the WCDM and SBLM was largely linked to an increase in the economically active 15-65 year age group. The increase in the economically active 15-65 age group in also reflected in the decrease in the dependency ratios in both the WCDM and SBLM (see below). It also reflects an influx of job-seekers to the area. As expected, the number of households in both the WCDM and SBLM increased between 2001 and 2011. The size of the households in both areas decreased marginally, from 3.5 to 3.4 in the WCDM and 3.7 to 3.2 in the SBLM.

The 2016 Community Survey indicates that the population of the SBLM increased to 111 173 in 2016 from 99 193 in 2011. The forecasts of the Western Cape Department of Social Development, is that this total will gradually increase across the 5-year planning cycle and is expected to reach 122 265 by 2023. This equates to an approximate 9.8 % growth off the 2017 base estimate (SBLM IDP, 2017-2022).

The majority of the population is in the SBLM was Coloured (55.89%), followed by Black Africans (24.5%) and Whites (18.0%)(Census, 2011). The dominant language within the Municipality is Afrikaans (~70.8%), followed by isiXhosa (~16.0%) and English (~6.5%)(Census 2011).

At a local level the population of Paternoster was 1972 in 2011. Of this total the majority were Coloured (72%), followed by Black African's (16%) and Whites (12%). The main language was Afrikaans (83%), followed by isiXhosa (9%) and English (6%). The population of St Helena Bay area was 11 528 in 2011. Of this total the majority were Coloured (75%), followed by Black African's (30%) and Whites (10%). The main language was Afrikaans (69%), followed by isiXhosa (26%) and English (3.5%). The majority of the population of Paternoster and St Helena Bay are therefore Historically Disadvantaged Individuals (HDIs).

Table 3.1: Overview of key demographic indicators for the WCDM and SBLM

	WCDM		SBLM	
ASPECT	**2001**	**2011**	**2001**	**2011**
Population	282 672	391 766	70 261	99 193
% Population <15 years	28.7	25.5	28.9	25.3
% Population 15-64	66.1	68.5	67.2	69.5
% Population 65+	5.2	6.0	3.9	5.2
Households	73 449	106 781	18 663	28 835
Household size (average)	3.5	3.4	3.7	3.2
Formal Dwellings %	90.5 %	87.9 %	84.6 %	81.7 %
Dependency ratio per 100 (15-64)	51.4	45.9	48.8	44.0
Unemployment rate (official) - % of economically active population	13.8 %	14.6 %	21.5 %	23.4 %
Youth unemployment rate (official) - % of economically active population 15-34	18.1 %	19.9 %	26.8 %	30.4 %
No schooling - % of population 20+	9.5 %	5.4 %	5.1 %	2.4 %
Higher Education - % of population 20+	7.0 %	8.1 %	7.7 %	9.3 %
Matric - % of population 20+	19.1 %	23.7 %	22.2 %	28.4 %

Source: Compiled from StatsSA Census 2011 Municipal Fact Sheet

The dependency ratio in both the WCDM and SBLM decreased from 51.4 to 45.9 and 48.8 to 44.0 respectively. The age dependency ratio is the ratio of dependents, people younger than 15 or older than 64, to the working age population, those ages being 15-64. The increase represents a positive socio-economic improvement, and reflects a decreasing number of people dependent on the economically active 15-64 age group. This decrease is linked to the increase in the percentage of economically active people in both the WCDM and SBLM. The dependency ratio in the SBLM is

lower than the provincial ratio of 45.0, while the ratios of the WCDM and the SBLM are both lower than the national figure of 52.7.

The Western Cape Department of Social Development reflected in the 2016 Socio-Economic Profile indicates that there is an increasing dependency ratio of 44.0, 46.3 and 46.9 for the respective years of 2011, 2017 and 2023. As higher dependency ratios imply greater strain on the working age to support their economic dependents (children and aged), this increase will have far reaching social, economic and labour market implications.

In terms of percentage of formal dwellings, the number of formal dwellings in the WCDM decreased from 90.5% in 2001 to 87.9 3% in 2011. In the SBLM the number of formal dwellings also decreased from 84.6% to 81.7% for the same period. This is likely to reflect the influx of job seekers to the area from areas such as the Eastern Cape Province.

Employment

The official unemployment rate in both the WCDM and SBLM also increased for the ten year period between 2001 and 2011. In the WCDM the rate increased from 13.8% to 14.6%. In the SBLM the rate increased from 21.5% to 23.4%. Youth unemployment in both the WCDM and SBLM also increased over the same period. However, the unemployment and youth unemployment rates in the WCDM are lower than the provincial figures of 21.6% and 29.0% respectively. The figures for the SBLM are however higher. This is likely to be due to influx of job seekers to the SBLM and their inability to find employment. In addition, job losses are likely to be associated with the decline in the role of the fishing sector and the subsequent loss of employment opportunities in this sector.

Household income

Based on the data from the 2011 Census, 14 % of the households in the SBLM have no formal income, 2% earn up to R 4 800, 4% earn between R 4 801 and R 9 600 per annum, 11% between R 9 601 and R 19 600 per annum and 17% between R 19 600 and R 38 200 per annum (Census 2011). The poverty income datum for households is linked to the number of household members (Western Cape Provincial Treasury, 2012a - "Definitions"). According to this yardstick, the average poor South African household (5.1 people) requires R1 6371/ month just to subsist, and R3 162/ month to meet the most basic of food and other needs. The City of Cape Town uses a figure of R3500.00 per month. Based on this measure 48% of the households in the SBLMs in 2011 live close to or below the poverty line. The low income levels are a major concern given that an increasing number of individuals and households are likely to be dependent on social grants. The low income levels also result in reduced spending in the local economy and less tax and rates revenue for the district and local municipality.

Based in the 2016 Community Survey data, 14.1 % of the population of the SBLM have no formal income, 2.3% earn up to R 4 800, 3.9% earn between R 4 801 and R 9 600 per annum, 10.9% between R 9 601 and R 19 600 per annum and 17.4% between R 19 600 and R 38 200 per annum. The total percentage of households that live close to or below the poverty line increase marginally from 48% in 20111 to 48.6% in 2016. The number of indigent households also increased between 2014 and 2015, which implies an increased burden on municipal resources (SBLM IDP, 2017-2022).

Education
The education levels in both the WCDM and SBLM improved between 2001 and 2011, with the percentage of the population over 20 years of age with no schooling in the WCDM decreasing from 9.5 1% to 5.4%. For the SBLM the decrease was from 5.1% to 2.4%. The percentage of the population over the age of 20 with matric also increased in both the WCDM and SBLM, from 19.1% to 23.7% in the WCDM and 22.2% to 28.4% in the SBLM. The matric pass level in the WCDM is however lower than the provincial average of 28.1%.

3.5 MUNICIPAL SERVICE LEVELS

As indicated in Table 3.2, the provision of and access to municipal services as measured in terms of flush toilets, weekly refuse removal, piped water and electricity, increased in both the WCDM and SBLM for the period 2001 to 2011. As indicated in Table 3.2 there have been significant improvements in the number of households with access to piped water inside their dwellings in both the WCDM and SBLM. These improvements also contribute significantly to the overall improvement in the quality of life of the residents of the WCDM and SBLM.

Table 3.2: Overview of access to basic services in the WCDM and SBLM

	WCDM		SBLM	
	2001	2011	2001	2011
% households with access to flush toilet	80.8	85.6	90.5	92.5
% households with weekly municipal refuse removal	69.4	76.5	96.2	96.6
% households with piped water inside dwelling	69.1	78.7	67.2	80.2
% households which uses electricity for lighting	88.1	94.4	91.5	97.8

Source: Compiled from StatsSA Census 2011 Municipal Fact Sheet

3.6 OVERVIEW OF SITE AND SURROUNDING LAND USES

The boundaries of the properties associated with the proposed Boulders WF site are located ~6 km to the north of the town of Vredenburg, 1.1 km west of the coastal settlement of Paternoster, and 2.5 km south of St Helena Bay. The existing West Coast One (WC01) 47 turbine WF is located adjacent to the south and east of the proposed WF. Primary access to the study area is from Vredenburg via the Paternoster tarred road and the Stompneusbaai gravel road.

The Paternoster Road (R399) is tarred and links Vredenburg to the coastal town of Paternoster. The road provides primary access to Paternoster as well as the Cape Columbine Nature Reserve (CCNR) located to the west of the town. Wind turbines associated with the existing West Coast One WF are visible along various stretches of the road (Photograph 3.1). The civil aviation lights are also visible at night.

Photograph 3.1: Wind turbines associated with West Coast One WF located to the north of Paternoster Road (R399)

The Stompneusbaai gravel road intersects the Paternoster Road north west of Vredenburg. From this point the road runs northwards, where it intersects with the St Helena Bay coast road outside Stompneusbaai. The road runs to the east (inland) of Kasteelberg and provides the most direct link between Vredenburg, Stompneusbaai and the St Helena Bay coast road. The road passes through undulating farming landscape, made up of wheat fields and grazing land on both sides.

The topography of the area consists of low undulating hills, interspersed by granite outcrops. Kasteelberg is the most significant topographical feature and its nearest point is located 1.9 km west of the Stompneusbaai Road (Photograph 3.2). Kasteelberg is considered one of the richest pre-colonial archaeological Khoi-Khoi sites in South Africa and is currently proposed as a Provincial Heritage Site (PHS). Kasteelberg also forms a key component of the area's sense of place. The site is located on private land not accessible to the public.

Photograph 3.2: Stompneusbaai Road looking south with Kasteelberg on the right

Existing turbines associated with West Coast One WF are visible along various stretches of the Stompneusbaai gravel road (Photograph 3.3). The flashing, red civil aviation lights located at the top of the wind turbine hubs are also clearly visible at night. The wind turbines associated with the West Coast One are all located to the east of the Stompneusbaai gravel road, the nearest being 550 m from the road.

Photograph 3.3: Wind turbines associated with West Coast One WF viewed from Stompneusbaai Road.

The St Helena Bay Road is a tarred road which links the R399 (Velddrif-Vredenburg) road to the coastal settlements which comprise the suburbs of St Helena Bay and the Shelly Point development. As indicated above, the range of hills inland from the road shields the coastal settlements and the road from the existing West Coast One and proposed Boulders WF. The Britannica Heights residential area is located on the northern slopes of these hills and along the top of the ridge. The Skuitjiesklip gravel road provides a link between the Paternoster and Stompneusbaai Roads. Skuitjiesklip and Uitkoms Farms are accessed off the road. The road, together with a portion of the Stompneusbaai Road, provides a link between Paternoster and St Helena Bay, therefore forming part of a circular route. The Koppiesveld Road is aligned between the Stompneusbaai Road and the R399 (Velddrif Road). The road provides access to the West Coast One WF site as well as a number of farms located in the area between the coastal range of hills and the Stompneusbaai Road. These include Soldatepos, Skuitjies and Fransvlei. The southern portion of the road was used during the construction of the West Coast One WF.

St Helena Bay

St Helena Bay comprises the stretch of coastal settlements extending along the coast from Laingville in the south to Duyker Eiland in the north. This stretch includes the settlements of St Helena Bay, Sandy Point, Britannica Heights, Stompneusbaai, Shelley Point, Golden Mile, Britannica Bay and Cape St Martin. With the exception of the houses located along the top of Britannica Heights, all of the areas are screened from the existing West Coast One and proposed Boulders WF by the natural topography (Photograph 3.4). All of the suburbs are primarily accessed off the St Helena Bay coastal road. The population of St Helena Bay area was 11 528 in 2011. Of this total the majority were Coloured (75%), followed by Black African's (30%)

and Whites (10%). The main language was Afrikaans (69%), followed by isiXhosa (26%) and English (3.5%). The majority of the population in the St Helena Bay area is therefore Historically Disadvantaged Individuals (HDIs).

Photograph 3.4: Sandy Point and St Helena Bay viewed from Vasco da Gama Drive in Britannica Heights.

Britannica Heights

Britannica Heights consists of 126 residential erven located on the north facing slopes and crest of the range of coastal hills to the west of the St Helena Bay coastline. The development was approved in 1993, shortly before independence in 1994, and sold out in the same year. The first houses were established ~ 20 years ago. There are currently around 40 developed erven, with many developed since 2012 (Photograph 3.5). The majority of owners reside permanently on their properties. A few also accommodate guest accommodation facilities, such as the Country Cabin on Columbine Crescent.

Britannica Heights is regarded as one of the prime suburbs of St Helena Bay. Although it is not located on the coast it is has excellent views. The properties located on the northern slopes over look St Helena Bay, while the properties located on Vasco da Gama Drive and Columbine Street, which are located along the crest of the ridge, provide views looking north over St Helena Bay and south towards Cape Columbine, Kasteelberg and Paternoster. It is worth noting that the development pre-dates the 2002 Guideline on Development on Mountains and Ridges which subsequently put a stop to such developments.

Photograph 3.5: House in Britannica Heights at the intersection of Vasco da Gama Dr and Columbine Crescent with existing West Coast One WF wind turbines in the background

The wind turbines associated with the West Coast One WF are visible from Vasco da Gama Drive and Columbine Crescent (Photograph 3.6). Property owners along these roads indicated that the flashing red civil aviation lights associated with the West Coast One WF have had the most significant impact on the areas sense of place.

Photograph 3.6: View south from residence at 7 Vasco da Gama Drive with existing turbines and proposed development area in middle distance and Kasteelberg in far distance

Paternoster

Paternoster is small settlement located along the west coast approximately 15 km north of Vredenburg. The population of Paternoster was 1 972 in 2011. Of this total the majority were Coloured (72%), followed by Black African's (16%) and Whites (12%). The main language was Afrikaans (83%), followed by isiXhosa (9%) and English (6%). The majority of the population in Paternoster is therefore made up of Historically Disadvantaged Individuals (HDIs). The settlement originated around fishing and cray-fishing and associated processing activities. The collapse of local fish and crayfish stocks over the past 10-20 years has however seen the closure of local processing plants and significant reduction in the role played by the local fishing sector. This has had a significant impact on the local fishing community which is predominately made up of members from the Coloured community. Today Paternoster and its economy are closely linked to tourism and lifestyle residential land uses. Unlike the majority of South African settlements there is a high degree of spatial integration between low and high income groups.

Much the town's transformation dates to after 2000. New suburbs and properties were developed for lifestyle residential and tourism uses. The town's coastal setting, the existing "sleepy West Coast fisherman's village" with its modest fisherman's cottages, unspoilt beaches and the scenic landscape associated with the surrounding Vredenburg Peninsula and Koppiesveld form the key attractions for visitors and property owners to Paternoster and the surrounds (Photograph 3.7). The town's sense of place can be described as that of a relatively undisturbed West Coast fishing village located adjacent to and within a west coast wheat farming area. The area also attracts visitors to the annual spring flower displays. However, this should not detract from the socio-economic challenges faced by the HD residents of Paternoster

who were previously involved in the fishing sector and have lived in the town for a number of generations.

Photograph 3.7: Paternoster coastal village

In addition, Paternoster is located within a two hour drive of Cape Town and the Boland. This makes it a convenient destination for locals, overseas tourists and second home owners. It also makes it an ideal destination for day-trippers. According to the Saldanha Bay Tourism Office, the Saldanha Bay Municipal Area is currently responsible for 41% of the measured tourism activity in the West Coast District Municipality. The two key tourist attractions are the Langebaan Lagoon and Paternoster. Key attractions associated with Paternoster include the picturesque village itself, spring flower displays (dependent on rainfall), the Cape Columbine Nature Reserve and Tietiesbaai, seasonal sightings of whales and dolphins, and the coastline (van der Merwe, pers. comm). Many visitors also take a circular route along the peninsula, namely from Vredenburg to Paternoster via the Paternoster Road, then to Stompneusbaai via the Skuitjiesklip Road and the northern portion of the Stompneusbaai Road, and then along the coast to the Velddrif Road via the St Helena Bay Road (or the other way around). This route is popular with spring flower visitor flows and with day trippers. As indicated above, the existing West Coast One WF is visible from sections of the Paternoster Road and Skuitjiesklip Road. All development in Paternoster is subject to approval by the local aesthetic committee. As a result, the settlement has largely managed to retain its character as a traditional west coast fishing village (Photograph 3.8). The nearest existing turbines associated with the West Coast One WF are located ~ 7.6 km inland from Paternoster (Pilgrimsrust smallholdings). While most of the town fronts towards the sea (and therefore away from the existing turbines and the proposed Boulders WF), the aviation lights associated with existing turbines are visible at night from Pilgrimsrust, the entrance to Paternoster as well as along the coast. Photograph 3.9 illustrates the turbines from the intersection between the R399 and the gravel road

that links Paternoster with the Stompneus Bay Road, with Kasteelberg located on the left of the photograph.

Photograph 3.8: View of houses in Paternoster looking north

Photograph 3.9: View looking inland from Paternoster with Kasteelberg flanked by wind turbines associated with West Coast One to the south

The visual quality of the area to the south of the Kasteelberg has been impacted by the turbines associated with the West Coast One WF (Photograph 3.10).

Photograph 3.10: View looking inland from the beach at Paternoster with Kasteelberg flanked by wind turbines associated with West Coast One to the south

Adjacent rural area

Properties in the rural area around the proposed WF site are traditionally used for mixed farming activities. The majority of the inland properties in the Koppiesveld are used primarily for farming purposes, while coastal properties tend to be associated with tourism, conservation and residential development (e.g. Groot Paternoster Private Nature Reserve). The farms in the Koppiesveld are located in closer proximity to the Boulders WF than the coastal ones. Many of them are directly or indirectly accessed off the Stompneusbaai gravel road which traverses the WF site. Few, if any of the farming properties appear to offer tourism accommodation or other facilities at present. The existing West Coast One WF is visible from the majority of the adjacent rural areas.

SECTION 4: ASSESSMENT OF KEY SOCIAL ISSUES

4.1 INTRODUCTION

Section 4 provides an assessment of the key social issues identified during the study. The identification of key issues was based on:

- Review of project related information;
- Interviews with key interested and affected parties[29];
- Findings of relevant specialist studies undertaken as part of the EIA[30];
- Experience/ familiarity of the authors with the area and local conditions;
- Experience with similar projects.

The assessment section is divided into the following sections:

- Assessment of compatibility with relevant policy and planning context ("planning fit";
- Assessment of social issues associated with the construction phase;
- Assessment of social issues associated with the operation phase;
- Assessment of social issues associated with the decommissioning phase.
- Assessment of the "no development" alternative;
- Assessment of cumulative impacts.

The findings of the SIA also indicate that while there is opposition to the establishment of the Boulders WF from members of the community that live in the area, there is also support for the development of the WF from other members of the community that live in the area.

4.2 ASSESSMENT OF POLICY AND PLANNING FIT

The findings of the review indicate that renewable energy is strongly supported at a national, provincial and local level. The development of and investment in renewable energy is supported by the National Development Plan (NDP), New Growth Path Framework and National Infrastructure Plan, which all make reference to renewable energy. The development of renewable energy is also strongly supported by the National Integrated Energy Plan (2016) and Draft Integrated Resource Plan (August 2018). At a provincial level the development of renewable energy is supported by the Western Cape Provincial Strategic Plan, Western Cape Provincial Spatial Development Framework (SDF), West Coast District Municipality Integrated Development Plan (IDP) and SDF and the Saldanha Bay Municipality IDP and SDF.

[29] This includes interviews undertaken in 2016 as part of the previous EIA process and interviews undertaken in 2018 as part of the current EIA process

[30] Relevant specialist studies include Urban Econ study on impact on property values and tourism (2018), Appraisal Corporation Assessment of Impact on Property Values (2018), Visual Impact Assessment (VIA, 2018) and Heritage Impact Assessment (HIA, 2018).

The section below provides a summary of relevant provincial and local policies and planning documents that support renewable energy.

White Paper on Sustainable Energy for the Western Cape
The vision underpinning the White Paper is "t*he Western Cape has a secure supply of quality, reliable, clean and safe energy, which delivers social, economic and environmental benefits to the Province's citizens, while also addressing the climate change challenges facing the region and the eradication of energy poverty* (White Paper, p15).

Western Cape Climate Change Response Strategy
The Strategy document notes that renewable energy is a key area of focus for the Western Cape, and forms a fundamental component of the drive towards the Western Cape becoming the green economy hub for Africa. The role of provincial government is identified as 'supporting the development of the renewable energy industry through promoting the placement of renewable energy facilities in strategic areas of the Western Cape as well as through supporting renewable energy industries'.

Provincial Strategic Plan 2014-2019
The Plan notes that PGWC has prioritised the development of a green economy, with the further aim of establishing it as the green economic hub of Africa. In terms of key goals, under Strategic Goal 1, energy security is identified as a game changer, and notes that future energy security priorities include scaling up renewable energy generation in the province.

Western Cape Provincial Spatial Development Framework
The SDF lists a number of policies that support renewable energy, including, Policy R.4.6: *Pursue energy diversification and energy efficiency in order for the Western Cape to transition to a low carbon, sustainable energy future, and delink economic growth from energy use,* and Policy R.4.7: *Support emergent Independent Power Producers (IPPs) and sustainable energy producers (wind, solar, biomass and waste conversion initiatives) in suitable rural locations (as per recommendations of the Strategic Environmental Assessments for wind energy (DEA&DP) and renewable energy (DEA)*[31] (p.52)).

The SDF also notes that cultural and scenic landscapes in provinces are significant assets that underpin the tourism economy. The SDF also notes that a number of scenic landscapes of high significance are under threat from a number of developments, including large scale infrastructural developments such as ***wind farms.*** With regard to the development of renewable energy projects the SDF lists a number of policy provisions that are relevant to the proposed Boulders WF, namely, R.5.6: *Priority focus areas proposed for conservation or protection include landscapes under pressure for large scale infrastructural developments such as* ***wind farms****, solar energy facilities, transmission lines and fracking, e.g. Central Karoo*.

Western Cape Green Economy Strategy Framework
The core objective of the Strategy is to position the WCP as a leading green economy hub on the African continent. The document also notes that the WCP is well placed to be the most important research and servicing hub for the renewable energy sector in South Africa and the African continent. The Strategy also notes that there are

[31] See notes under Regional Methodology Review below.

important initial opportunities in the construction of new energy infrastructure. However, the real long-term benefits lie in the servicing of operational infrastructure. In this regard, it is estimated that the annual servicing and maintenance costs of WFs for instance amount to approximately 10% of the initial capital investment.

Western Cape Draft Strategic Plan

The plan identifies the importance to the wind sector in mainstreaming sustainability and optimising resource use and efficiency.

West Coast District Municipality Integrated Development Plan

The promotion of the West Coast as a renewable energy investment destination is identified as an opportunity in the West Coast DM. Under Strategic Objective 2: Pursuing economic growth and the facilitation of job opportunities, the IDP also highlights the importance to developing private public partnerships to support and facilitate economic development in the WCDM. Strategic Objective 3: Promoting social wellbeing of the community; identifies the key economic and social challenges and opportunities facing the area, including unemployment and dependency on government grants, and limited employment opportunities for the youth. Tourism is also listed as a key development sector for regional and local economic development.

West Coast District Municipality Spatial Development Framework

The proposed development of renewable energy facilities is aligned with and supports a number of the strategic objectives listed in the WCSDF. These include the creation of opportunities for growth and jobs and reduce poverty, and mainstreaming sustainability and optimising resource-use efficiency. In this regard the SDF notes that renewable energy (wind, solar, etc.) should be established to support and enhance the electricity capacity in the West Coast District (BE16). The SDF also highlights the potential risks posed by climate change. Of specific relevance to the proposed development are the eight mitigation focus areas, including Renewable Energy, which is identified to address the challenges associated with climate change. The establishment of renewable energy in the WCDM in suitable locations is therefore supported.

While the SDF supports the development of renewable energy, it also notes that wind farms should be located where they will cause least visual impact taking into consideration the viability of the project (HR 27) and located where their visual and environmental impact will be the lowest (BE 17). The development of renewable energy projects must also take into account potential impact on tourism, specifically impact on tourist corridors and routes (HR4). The SDF also notes that the area's tourism attractions are linked to natural features, scenic qualities and coastal villages. The small coastal towns, including Paternoster are identified as key tourism destinations.

Saldanha Bay Municipality Municipal SDF[32]

The SDF document identifies the region's potential for accommodating renewable energy projects. In terms of siting principles, the document refers to the principles contained in the 2006 DEA&DP Regional Methodology document (see: Section 4.3.3. above). The key principles include, excluding commercial WF developments from areas with high aesthetic landscape value and encouraging development of WFs in in areas where visual disturbance to the landscape has already occurred (e.g. power

[32] A Draft SDF was published in September 2017. Until this Draft is finalised the existing 2011 SDF remains in place

transmission lines). The SDF does not provide any spatial guidance with regard to the appropriate siting of WFs in the SBLM area itself. Of relevance to the proposed development are the siting principles contained in the 2006 DEA&DP Regional Methodology document (see: Section 4.3.3. above), which note that the focus should be on the development of large concentrated wind farms rather than small dispersed locations.

Saldanha Bay Municipality Local Economic Development (LED) Strategy
The LED strategy explicitly discusses the development of renewable energy resources as a viable environmentally sustainable economic sector within the Saldanha Bay LM area.

Conclusion
In conclusion, based on the review of key planning documents that pertain to the study area, it is clear that the development of renewable energy (including wind farms) in the West Coast District and Saldanha Bay Local Municipality is strongly supported. However, the documents also highlight the need to ensure that the siting of renewable energy facilities (including wind farms) does not impact on the area's tourism potential and scenic assets.

4.3 CONSTRUCTION PHASE IMPACTS

As indicated in Section 1.4, two alternative layouts have been identified, namely Alternative 1 and Alternative 2. Given that both alternatives consist of forty five (45) wind turbines there will be no difference in the nature and significance of the construction related impacts between Alternative 1 and 2. The significance ratings therefore apply to both Alternative 1 and 2.

The key social issues associated with the construction phase include:

Potential positive impacts
- Creation of employment and business opportunities, and the opportunity for skills development and on-site training.

Potential negative impacts
- Impacts associated with the presence of construction workers on site and in the area;
- Influx of job seekers to the area;
- Increased safety risk to farmers, risk of stock theft and damage to farm infrastructure associated with presence of construction workers on the site;
- Increased risk of grass fires;
- Impact of heavy vehicles, including damage to roads, safety and dust;
- Impact on farming activities.

4.3.1 Creation of local employment, business and training opportunities

Employment
The Urban Econ study (2018) indicates that 813 direct full-time equivalent person-years will be created during the construction of the proposed Boulder Wind Farm, 54% of which will be jobs involved in the production and erection of the concrete-based wind towers. The Urban Econ study does not provide a breakdown of skills levels, but based on other WF projects approximately 55% of the employment

opportunities are typically available to low skilled workers (construction labourers, security staff etc.), 30% to semi-skilled workers (drivers, equipment operators etc.) and 15% to skilled personnel (engineers, land surveyors, project managers etc.).

The Urban Econ study also notes that in addition to the direct jobs created, the project will also create employment opportunities through backward linkages. It is estimated that an additional 1 049 full-time equivalent person-years will be created through the multiplier effects, some of which will be localised in the nearby towns of Paternoster, Vredenburg and St Helena Bay. Overall, the project is expected to create a total of 1 861 full-time equivalent person-years, which equates to about 931 jobs created and maintained for two years.

Members from the local community in the area are likely to be in a position to qualify for the majority of the low skilled and a proportion of the semi-skilled employment opportunities. The majority of these employment opportunities are also likely to accrue to Historically Disadvantaged (HD) members from the local WCDM and SBLM community. The levels of unemployment in the SBLM are high, specifically on the St Helena Bay area. The creation of potential employment opportunities, even temporary employment, will represent a significant, if localised, social benefit.

Based on the comments from a number of stakeholders, including the SBLM IDP Manager (Mr du Plessis), Ward 11 Councillor (Mrs Scholtz), Ward 11 Council Representative (Mr Cloete) and WCDM Municipal Manager (Mr Joubert), there were limited benefits for the towns of Paternoster and St Helena Bay associated with the West Coast One WF. The majority of benefits accrued to the town of Vredenburg. It was therefore recommended that the focus in terms of identifying local of employment opportunities should be on Paternoster and the St Helena Bay area.

The potential benefits for local communities is confirmed by the findings of the Overview of the Independent Power Producers Procurement Programme (IPPPP) undertaken by the Department of Energy, National Treasury and DBSA (30 June 2017). The study found that employment opportunities created during the construction phase of the projects implemented to date had created 40% job years[33] more for South African citizens than anticipated. The construction phase associated with the 57 projects developed to date achieved 64% more job years than planned. The study also found that significantly more people from local communities were employed during construction than was initially planned. In this regard the expectation for local community participation was 6 772 job years. To date 16 376 job years have been realised (i.e. 142% greater than initially planned). Black South African citizens, youths and rural or local communities have been the major beneficiaries during the construction phases, as they respectively represent 80%, 41% and 52% of total job opportunities created by IPPs to date.

The study also found that the share of black citizens employed during construction (80%) had significantly exceeding the 50% target. Likewise, the share of skilled black citizens (as a percentage of skilled employees) for both construction (67%) and operations (77%) has also exceeding the 30% target and is at least 3.5 times more than the minimum threshold of 18%. The study also found that the share of local community members as a share of SA-based employees was 50% and 67% for construction and operations respectively – at least 4 times more than the minimum threshold of 12% and more than 2.5 times more than the target of 20%.

[33] The equivalent of a full time employment opportunity for one person for one year

Given the proximity of the site to Saldahna Bay and Vredenburg there is likely to be a pool of suitably qualified local community members that could be employed during the construction phase. Where feasible the implementation of a training and skills development programme prior to the commencement of construction would also increase the potential to employ local community members. The number of low skilled and semi-skilled positions taken up by members from the local community will depend on the effective implementation of these enhancement measures by the proponent in consultation with the WCDM and SBLM. In this regard the local Councillor (Mrs Scholtz) indicated that the local Paternoster and St Helena Bay communities did not benefit significantly from the employment opportunities associated with the construction of West Coast One. Mrs Scholtz indicated that these communities should be earmarked for preferential employment and skills training (Scholtz, pers. comm).

Capital investment and business opportunities

The findings of the Urban Econ Economic Assessment (Urban Econ, June 2108) note that the Boulders Wind Farm will require an investment to the tune of R1 520 million, of which 33% or R494 million will be spent in South Africa. The construction will last for just about two years. During that period, the procurement of goods and services for the construction of the wind farm will create a direct, as well as a multiplier effect on the economic activities in the local economy of the Saldanha Bay municipality, as well as the provincial economy of the Western Cape, and possibly the national economy. The extent to which each of these economies will benefit will depend on the location of businesses that will be contracted and sub-contracted to provide the related services and goods. It is estimated that a spending of R494 million on procurement of construction-related services, materials, equipment, machinery, and other items required for the development of the proposed Boulder Wind Farm will generate an additional R573 million through multiplier effects. The project will therefore lead to the increase in domestic production in the region of R1 066 million over the two-year construction period. The increase in production will lead to the growth of the GDP. It is estimated that the province's GDP will expand by R342 million, which equates to about R171 million per annum for two years in a row.

The Green Jobs study (IDC, DBSA, and TIPS, 2011) found that South Africa is in a position to leverage upon some of its existing manufacturing capacities in order to produce components and parts for various sections of wind turbines, especially those industries involved in the production of steel and metal products, as well as the boat building and electrical industries. These types of industries are all located in the Saldanha Bay Municipality and the broader West Coast DM. A Market Intelligence Report on Renewable Energy (Greencape, 2014) indicates that a Green Development Hub is being established in Atlantis. In this regard Gestamp has established a wind turbine manufacturing operation in Atlantis.

The proposed WF will therefore create opportunities for engineering and construction companies in Vredenburg and Saldahna Bay. Opportunities will also be created for companies based Cape Town and Atlantis. Implementing the enhancement measures listed below can enhance these opportunities.

The wage bill for the construction phase will be in the region of R 200 million (Urban Econ, 2018). Given that the construction workers will be based in local towns in the area, specifically Paternoster, St Helena Bay and Vredenburg, a percentage of the wage bill will be spent in the local economy over the 18-24 month construction

phase. This will create opportunities for local businesses in local towns in the area. The sector of the local economy that is most likely to benefit from the proposed development is the local service industry. This is confirmed by the experience with the other renewable projects. The potential opportunities for the local service sector are linked to accommodation, catering, cleaning, transport and security, etc. associated with the construction workers on the site. The findings of the Urban Econ study indicate that the hospitality sector in Paternoster benefitted from the construction of the West Coast One WF.

The local tourism industry in the area, including restaurants and accommodation facilities, will also benefit. In this regard, non-local semi-skilled and skilled workers are likely to frequent local tourism destinations in the area over weekends. Families of workers may also take the opportunity to visit the area over weekends. The hospitality industry in the area will also benefit from the provision of accommodation and meals for professionals (engineers, quantity surveyors, project managers, product representatives etc.) and other (non-construction) personnel involved on the project. Experience from other renewable energy projects indicates that the potential opportunities are not limited to on-site construction workers but also to consultants and product representatives associated with the project. The benefits to the local economy will be confined to the construction period (18-24 months).

The implementation of the proposed enhancement measures would also enable the establishment of the proposed WF to support co-operation between the public and private sectors which would support local economic development in the WCDM and SBLM.

Training and skills development

The construction phase has the potential to create training and skills development opportunities that would benefit local community members, specifically HDIs from Paternoster and St Helena Bay. In this regard a number of stakeholders interviewed, including the IDP Manager (Mr du Plessis), Ward 11 councillor (Mrs Scholtz) and Ward 11 representative from St Helena Bay (Mr Cloete) indicated that this was lacking from the West Coast One project and represented a missed opportunity. It was recommended that the developer should implement a training and skills development skills prior to the commencement of the construction phase so as to ensure that local employment opportunities are maximised. The interviewees also indicated that the skills development and training programme should focus on community members from Paternoster and the St Helena Bay area.

Table 4.1: Impact assessment of employment and business creation opportunities during the construction phase (Alternative 1 and 2)

Nature: Creation of employment and business opportunities during the construction phase.		
	Without Mitigation	**With Enhancement**
Extent	Local – Regional (3)	Local – Regional (4)
Duration	Short term (2)	Short term (2)
Magnitude	Moderate (6)	High (8)
Probability	Highly probable (4)	Highly probable (4)
Significance	Medium (44)	Medium (56)
Status	Positive	Positive
Reversibility	N/A	N/A
Irreplaceable loss of resources?	N/A	N/A
Can impact be enhanced?	Yes	
Enhancement: See below		
Residual impacts: Improved pool of skills and experience in the local area.		

Assessment of No Go option
There is no impact, as the current status quo will be maintained. The potential employment and economic benefits associated with the construction of the proposed WF would however be forgone.

Recommended enhancement measures
In order to enhance local employment and business opportunities associated with the construction phase the following measures should be implemented.

Employment
- Where reasonable and practical the proponent should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. The focus should be on creating employment opportunities for community members from Paternoster and the St Helena Bay area. Due to the low skills levels in the area, the majority of skilled posts are likely to be filled by people from outside the area;
- Where feasible, every effort should be made to employ local contactors that are compliant with Broad Based Black Economic Empowerment (BBBEE) criteria;
- Before the construction phase commences the proponent should meet with representatives from the local community in Paternoster and St Helena Bay and the SBLM to establish the existence of a skills database for the area. If such as database exists it should be made available to the contractors appointed for the construction phase;
- The local authorities, relevant community representatives and local farmers should be informed of the final decision regarding the project and the potential job opportunities for locals and the employment procedures that the proponent intends following for the construction phase of the project.
- A training and skills development programme for suitably qualified local community members should be initiated prior to the initiation of the construction

phase. As indicated above, the focus should be on community members from Paternoster and the St Helena Bay area;
- The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.

Business
- The proponent should liaise with the WCDM and SBLM and local small businesses with regards the establishment of a database of local companies, specifically BBBEE companies, which qualify as potential service providers (e.g. construction companies, catering companies, waste collection companies, security companies etc.) prior to the commencement of the tender process for construction contractors. These companies should be notified of the tender process and invited to bid for project-related work;
- Where possible, the proponent should assist local BBBEE companies to complete and submit the required tender forms and associated information;
- The WCDM and SBLM, in conjunction with the local business sector and representatives from the local hospitality industry, should identify strategies aimed at maximising the potential benefits associated with the project.

Note that while preference to local employees and companies is recommended, it is recognised that a competitive tender process may not guarantee the employment of local labour for the construction phase.

4.3.2 Impact of construction workers on local communities

Experience has shown that the presence of construction workers can pose a potential risk to family structures and social networks. These risks however tend to be more pronounced in isolated rural areas. While the presence of construction workers does not in itself constitute a social impact, the manner in which construction workers conduct themselves can impact on local communities. The most significant negative impact is associated with the disruption of existing family structures and social networks. The risks are linked to:

- An increase in alcohol and drug use;
- An increase in crime levels;
- The loss of girlfriends and/or wives to construction workers;
- An increase in teenage and unwanted pregnancies;
- An increase in prostitution;
- An increase in sexually transmitted diseases (STDs), including HIV.

Employing members from the local community to fill the majority of low and semi-skilled job categories will reduce the risk and mitigate the potential impact on the local communities. If these opportunities are taken up by local residents the potential impact on the local family and social network will be low as these workers come from local community. As indicated in the Overview of the Independent Power Producers Procurement Programme (IPPPP) (June 2017), in terms benefits for local communities, significantly more people from local communities were employed during construction than was initially planned. The expectation for local community participation was 6 772 job years. To date 16 376 job years have been realised (i.e. 142% greater than initially planned). The likelihood of local community members being employed during the construction phase is therefore high. Employing local residents to will also reduce the need to provide accommodation for construction workers in Paternoster, St Helena Bay and Vredenburg.

In addition, while a risk does exist, the area has experienced a significant influx of job-seekers over the last 10-15 years. This is linked to the development of the area, including the establishment of the Industrial Development Zone (IDZ) in Saldanha.

The majority of non-local skilled personnel are likely to be accommodated in Paternoster and St Helena Bay. This would benefit the local hospitality sector. As indicated in the Urban Econ Study (June, 2018), a number of establishments in Paternoster benefitted from accommodating construction staff during the construction of West Coast One. The presence of these workers over a period of 18-24 months is unlikely to have a significant impact on local family networks and structures in the area.

In terms of potential threat to the families of local farm workers in the vicinity of the site, the risk is likely to be low. This is due to the relatively low number of permanent workers residing on local farms in the area. In addition, none of the local farmers interviewed indicated that the construction of the West Coast One WF had impacted on local workers in the area. The risks can also be effectively mitigated by ensuring that the movement of construction workers on and off the site is carefully controlled and managed. However, given the nature of construction projects it is not possible to totally avoid these potential impacts at an individual or family level.

While the risks associated with construction workers at a community level will be low, at an individual and family level they may be significant, especially in the case of contracting a sexually transmitted disease or an unplanned pregnancy. However, it will not be possible to avoid this. This potential risk should also be viewed within the context of the socio-economic benefits associated with the creation of employment opportunities for locals.

Based on the findings of the SIA the presence of construction workers during the construction of the West Coast One WF did not pose risk to local communities.

Table 4.2: Assessment of impact of the presence of construction workers in the area on local communities (Alternative 1 and 2)

Nature: Potential impacts on family structures and social networks associated with the presence of construction workers		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (1)
Duration	Short term for community as a whole (2)	Short term for community as a whole (2)
Magnitude	Low for the community as a whole (4)	Low for community as a whole (4)
Probability	Probable (3)	Probable (3)
Significance	Low for the community as a whole (24)	Low for the community as a whole (21)
Status	Negative	Negative
Reversibility	No in case of HIV and AIDS	No in case of HIV and AIDS
Irreplaceable loss of resources?	Yes, if people contract HIV/AIDS. Human capital plays a critical role in communities that rely on farming for their livelihoods	
Can impact be mitigated?	Yes, to some degree. However, the risk cannot be eliminated	
Mitigation: See below		
Residual impacts: Residual impacts would include costs to local individuals and families associated with having to raised children from unplanned pregnancies, costs associated with living with STD, specifically HIV/AIDs, and costs associated with becoming dependent on drugs and or alcohol		

Assessment of No Go option
There is no impact as the current status quo would be maintained.

Recommended mitigation measures
The potential risks associated with construction workers can be effectively mitigated. The detailed mitigation measures should be outlined in the Environmental Management Plan (EMP) for the Construction Phase. Aspects that should be covered include.

- Where possible the proponent should make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically for semi and low-skilled job categories. As indicated above, the focus should be on employment community members from Paternoster and the St Helena Bay area;
- The proponent should consider the need for establishing a Monitoring Forum (MF) in order to monitor the construction phase and the implementation of the recommended mitigation measures. The MF should be established before the construction phase commences, and should include key stakeholders, including representatives from the WCDM and SBLM, farmers and the contractor(s). The MF should also be briefed on the potential risks to the local community and farm workers associated with construction workers;

- The proponent and the contractor(s) should, in consultation with representatives from the MF, develop a code of conduct for the construction phase. The code should identify which types of behaviour and activities are not acceptable. Construction workers in breach of the code should be dismissed. All dismissals must comply with the South African labour legislation;
- The proponent and contractor (s) should implement an HIV/AIDS awareness programme for all construction workers at the outset of the construction phase;
- The contractor should provide transport to and from the site on a daily basis for low and semi-skilled construction workers. This will enable the contractor to effectively manage and monitor the movement of construction workers on and off the site;
- Where necessary, the contractors should make the necessary arrangements to enable low and semi-skilled workers from outside the area to return home over weekends and/ or on a regular basis. This would reduce the risk posed to local family structures and social networks;
- It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.

4.3.3 Influx of job seekers

Large construction projects tend to attract people to the area in the hope that they will secure a job, even if it is a temporary job. These job seekers can in turn become "economically stranded" in the area or decide to stay on irrespective of finding a job or not. As in the case of construction workers employed on the project, the actual presence of job seekers in the area does not in itself constitute a social impact. However, the manner in which they conduct themselves can impact on the local community.

These issues are similar to the concerns associated with the presence of construction workers and are discussed in Section 4.4.2. However, in some instances the potential impact on the community may be greater given that they are unlikely to have accommodation and may decide to stay on in the area. In addition, they will not have a reliable source of income. The risk of crime associated with the influx of job seekers may therefore be greater.

However, the potential for economically motivated in-migration and subsequent labour stranding in the area linked to the proposed project is likely to be low. As indicated above, the area has experienced a significant influx of job-seekers and over the last 10-15 years linked to the development of the area, including the establishment of the Industrial Development Zone (IDZ) in Saldanha. The establishment of a 140 MW WF is not sufficiently large to result in an additional influx of job-seekers to the area. The risks associated with significant number of job seekers staying on in the area is therefore likely to be low.

Based on the findings of the SIA the construction of the West Coast One WF did not result in an influx of job seekers to the area.

Table 4.3: Assessment of impact of job seekers on local communities associated with the construction phase (Alternative 1 and 2)

Nature: Potential impacts on family structures, social networks and community services associated with the influx of job seekers		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (1)
Duration	Permanent (5) (For job seekers that stay on the town)	Permanent (5) (For job seekers that stay on the town)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	Low (27)	Low (24)
Status	Negative	Negative
Reversibility	No in case of HIV and AIDS	No in case of HIV and AIDS
Irreplaceable loss of resources?	Yes, if people contract HIV/AIDS. Human capital plays a critical role in communities that rely on farming for their livelihoods	
Can impact be mitigated?	Yes, to some degree. However, the risk cannot be eliminated	
Mitigation: See below		
Residual impacts: Impacts on family and community relations that may, in some cases, persist for a long period of time. Also in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent impacts on the affected individuals and/or their families and the community.		

Assessment of No Go option
There is no impact as the current status quo would be maintained.

Recommended mitigation measures
It is not possible to prevent job seekers from coming to the area in search of a job. However, as indicated above, the potential influx of job seekers to the area as a result of the proposed WF is likely to be low. In addition:

- The proponent should implement a "locals first" policy, specifically with regard to unskilled and low skilled opportunities. The focus should be in communities in Paternoster and St Helena Bay;
- The proponent should implement a training and skills development programme for local community members. The focus should be in communities in Paternoster and St Helena Bay.

4.3.4 Risk to safety, livestock, farm infrastructure and farming operations

The presence on and movement of construction workers on and off the site may pose a potential safety threat to local farmers and farm workers in the vicinity of the site. In addition, farm infrastructure, such as fences and gates, may be damaged and stock losses may also result from gates being left open and/or fences being damaged or stock theft linked either directly or indirectly to the presence of farm workers on the site. The local farmers in the area interviewed indicated that the presence of construction workers on the site increased the exposure of their farming operations and livestock to the outside world, which, in turn, increased the potential risk of stock theft and crime. In this regard stock theft is a problem on farms adjacent to public roads in the study area, specifically the Paternoster, Stompneusbaai and Skuitjiesklip roads. Farms accessed off the Koppiesveld Road are less at risk due to being more secluded.

The local farmers interviewed did, however, indicate that the potential risks (safety, livestock and farm infrastructure) can be effectively mitigated by careful planning and managing the movement of construction on the site workers during the construction phase. At the same time, the properties associated with the proposed Boulders WF would benefit from the security associated with the development this (Danie Kotze, pers comm). This would also have the potential to be benefit adjacent properties. Local farmers also indicated that based on experience during the construction phase of the West Coast WF it was not possible to undertake normal farming operations on the development area. Stock control and cropping activities were essentially impossible during this period and it is better to withdrawn these areas from cultivation during the construction phase (Heydenrych – pers. comm). This issue will need to be addressed by the proponent in their discussions with the landowners associated with the Boulders WF.

Table 4.4: Assessment of risk to safety, livestock, infrastructure and farming operations (Alternative 1 and 2)

Nature: Potential risk to safety of farmers and farm workers, livestock, damage to farm infrastructure and farming operations associated with the construction related activities and presence of workers on the site		
	Without Mitigation	**With Mitigation**
Extent	Local (3)	Local (2)
Duration	Short term (2)	Short term (2)
Magnitude	Medium (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Medium (33)	Low (24)
Status	Negative	Negative
Reversibility	Yes, compensation paid for stock losses and damage to farm infrastructure etc.	Yes, compensation paid for stock losses and damage to farm infrastructure etc.
Irreplaceable loss of resources?	No	No
Can impact be	Yes	Yes

mitigated?		
Mitigation: See below		
Residual impacts: None**,** provided losses are compensated for.		

Assessment of No-Go option
There is no impact as it maintains the current status quo.

Recommended mitigation measures
Key mitigation measures include:

- The proponent should enter into an agreement with the local farmers in the area whereby damages to farm property etc. during the construction phase that can be linked to construction activities will be compensated for. The agreement should be signed before the construction phase commences;
- Contractors appointed by the proponent should provide daily transport for workers to and from the site. This would reduce the potential risk of trespassing on the remainder of the farm and adjacent properties;
- The proponent should consider the option of establishing a MF (see above) that includes local farmers and develop a Code of Conduct for construction workers. This committee should be established prior to commencement of the construction phase. The Code of Conduct should be signed by the proponent and the contractors before the contractors move onto site;
- The proponent should hold contractors liable for compensating farmers in full for any stock losses and/or damage to farm infrastructure that can be linked to construction workers. This should be contained in the Code of Conduct to be signed between the proponent, the contractors and neighbouring landowners. The agreement should also cover loses and costs associated with fires caused by construction workers or construction related activities (see below);
- The Environmental Management Programme (EMPr) should outline procedures for managing and storing waste on site, specifically plastic waste that poses a threat to livestock if ingested;
- Contractors appointed by the proponent must ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent farms.
- Contractors appointed by the proponent must ensure that construction workers who are found guilty of trespassing, stealing livestock and/or damaging farm infrastructure are dismissed and charged. This should be contained in the Code of Conduct. All dismissals must be in accordance with South African labour legislation;
- The housing of construction workers on the site should be limited to security personnel.

4.3.5 Increased fire risk

The presence of construction workers and construction-related activities on the site poses an increased fire risk, which could, in turn, pose a threat to crops, livestock, and farmsteads in the area. In the process, farm infrastructure may also be damaged or destroyed and human lives threatened. Grass fires would pose a threat to wheat crops, which in turn, would have a significant impact on the livelihoods of local farmers should their crops and or livestock be affected. The potential fire risk of grass fires is highest towards the end of the winter months (October-November)

when the wheat crops have ripened and are ready for harvesting. This period also coincides with dry, windy conditions in the area.

Table 4.5: Assessment of impact of increased risk of fires (Alternative 1 and 2)

Nature: Potential loss of livestock, crops and houses, damage to farm infrastructure and threat to human life associated with increased incidence of fires		
	Without Mitigation	**With Mitigation**
Extent	Local (4)	Local (2)
Duration	Short term (2)	Short term (2)
Magnitude	High due to reliance on agriculture for maintaining livelihoods (8)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Medium (42)	Low (24)
Status	Negative	Negative
Reversibility	Yes, compensation paid for crop and stock losses etc.	Yes, compensation paid for crop and stock losses etc.
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	
Mitigation: See below		
Residual impacts: No, provided losses are compensated for.		

Assessment of No-Go option
There is no impact as it maintains the current status quo.

Recommended mitigation measures
The mitigation measures include:

- The proponent should enter into an agreement with local farmers in the area whereby losses associated with fires that can be proven to be due to construction activities for the WF will be compensated for. The agreement should be signed before the construction phase commences;
- Contractor should ensure that open fires on the site for cooking or heating are not allowed except in designated areas;
- No smoking should be permitted on site, except in designated areas;
- Contractor should ensure that construction related activities that pose a potential fire risk, such as welding, are properly managed and are confined to areas where the risk of fires has been reduced. Measures to reduce the risk of fires include avoiding working in high wind conditions when the risk of fires is greater. In this regard special care should be taken during the high risk dry, windy summer months;
- Contractor to provide adequate fire-fighting equipment on-site;
- Contractor to provide fire-fighting training to selected construction staff;

- No construction staff, with the exception of security staff, to be accommodated on site over night;
- As per the conditions of the Code of Conduct, in the event of a fire proven to be caused by construction workers and or construction activities, the appointed contractors must compensate farmers for any damage caused to their farms. The contractor should also compensate the fire-fighting costs borne by farmers and local authorities.

4.3.6 Impacts associated with the movement of construction vehicles

The movement of heavy construction vehicles during the construction phase has the potential to damage local farm roads and create dust and safety impacts for other road users in the area and also impact on farming activities. The project components are likely to be transported to the site via the N7, R45 and or R27, all of which are important commercial and tourist routes. At a local, site specific level, access to the site is likely to be via the Paternoster Road (MR 240), Stompneus Bay Road and Koppiesveld Road. The latter two roads are gravel roads. The Koppiesveld Road provides access to the West Coast One WF site as well as a number of farms located in the area between the coastal range of hills and the Stompneusbaai Road. These include Soldatepos, Skuitjies and Fransvlei. The southern portion of the road was used during the construction of the West Coast One WF. The damage to gravel roads by heavy equipment can result in a number of potential negative impacts, including increased wear on vehicles owned by local farmers, impact on ease of access (e.g. time delays, detours), as well as access to local towns (services, retail, socializing).

While traffic volumes along these roads are low during the week they increase over weekends due to visitors to the area. The transport of components of the WF to the site therefore has the potential to impact on other road users travelling along these roads. Measures will need to be taken to ensure that the potential impact on motorist using these roads is minimised. The potential impacts on tourists and locals can be effectively mitigated by restricting construction traffic movements to weekdays, and, where possible, limiting activities during the flower season months of August and September.

Table 4.6: **Assessment of the impacts associated with the movement of construction vehicles (Alternative 1 and 2)**

Nature: Potential safety, dust etc. and damage to road surfaces associated with movement of construction related traffic to and from the site		
	Without Mitigation	**With Mitigation**
Extent	Local (3)	Local (1)
Duration	Short Term (2)	Short Term (2)
Magnitude	Medium (6)	Minor (2)
Probability	Highly Probable (4)	Probable (3)
Significance	Medium (44)	Low (15)
Status	Negative	Negative
Reversibility	Yes	
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	
Mitigation: See below		
Residual impacts: If damage to roads is not repaired then this will affect the farming activities in the area and result in higher maintenance costs for vehicles of local farmers and other road users. The costs will be borne by road users who were no responsible for the damage.		

Assessment of No-Go option
There is no impact as it maintains the current status quo.

Recommended mitigation measures
The potential impacts associated with heavy vehicles can be effectively mitigated. The mitigation measures include:

- As far as possible, the transport of components to the site along the N7, R45 and R27 should be planned to avoid weekends and holiday periods, including the spring flower season (August-September);
- Movement of construction traffic should be limited to weekdays. In addition, the movement of heavy vehicles on the local roads, specifically the Paternoster Road (MR240), should not be permitted after 13h00 on Friday afternoons and before 09h00 on Monday mornings as these are times that are likely to impact on weekend visitors to Paternoster who are either travelling to or leaving Paternoster;
- The contractor should inform local farmers and representatives from the Vredenburg and Paternoster Local Authority and Tourism Sector of dates and times when abnormal loads will be undertaken;
- The contractor must ensure that damage caused by construction related traffic to local farm roads is repaired on a regular basis throughout the construction phase. The costs associated with the repair must be borne by the contractor;

- Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis[34], adhering to speed limits and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers;
- All vehicles must be road-worthy and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits;
- The Contractor should ensure that workers are informed that no waste can be thrown out of the windows while being transported to and from the site. Workers who throw waste out windows should be fined;
- The Contractor should be required to collect waste along the road reserve on a weekly basis;
- Waste generated during the construction phase should be transported to the local landfill site[35].
- EMP measures (and penalties) should be implemented to ensure farm gates are closed at all times;
- EMP measures (and penalties) should be implemented to ensure speed limits are adhered to at all times.

4.3.7 Impacts associated with loss of farmland

Activities such as the establishment of access roads, the movement of heavy vehicles, the establishment of lay-down areas and foundations for the wind turbines, as well as the establishment of substations and power lines will potentially damage topsoil and vegetation. The compaction of soils associated with movement of heavy vehicles and other construction related activities does pose a potential threat to the productivity of the affected farms. However, mechanical ploughing and scarifying can mitigate the damage caused by compaction. Minimising the footprint of construction related activities could also mitigate the damage to farmland, and ensuring that disturbed areas are actively rehabilitated upon completion of the construction phase.

However, as indicated above, local farmers also indicated that based on the experience with the West Coast One WEF it was not possible to undertake normal farming operations in the development area during the construction phase. Mr Heydenrych indicated that farming operations were affected during the construction phase (Heydenrych – pers. comm).

[34] Non-Potable water should be used for wetting of roads
[35] The contractor should ensure that the landfill site is licenced.

Table 4.7: **Assessment of impact on farmland due to construction related activities (Alternative 1 and 2)**

Nature: The activities associated with the construction phase, such as establishment of access/haul roads, the movement of heavy vehicles, the establishment of lay-down areas and foundations for the wind turbines, substations and power lines will potentially damage topsoil and vegetation and result in damage to productive soils.		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (1)
Duration	Long term-permanent if disturbed areas are not rehabilitated (5)	Short term if damaged areas are rehabilitated (1)
Magnitude	Low (4)	Minor (2)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	Medium (44)	Low (16)
Status	Negative	Negative
Reversibility	Yes, but long period required	Yes, but long period required
Irreplaceable loss of resources?	No. Affected land can be restored, provided appropriate rehabilitation is implemented.	
Can impact be mitigated?	Yes, provided efficient site rehabilitation is carried out, and the movement of heavy loads on the site are strictly limited to designated on-site roads and construction areas. .	
Mitigation: See below		
Residual impacts: Potential localised deep soil computation resulting from the movement of abnormally heavy equipment and components.		

Assessment of No-Go option

There would be no impact as the current status quo is maintained.

Recommended mitigation measures

With mitigation, the potential impacts on farming activities and livelihoods as a result of damage to and loss of farmland are assessed to be of low significance due to the relatively small portions of arable land likely to be affected. Impacts may be further reduced by the implementation of the following mitigation measures:

- The location of wind turbines, access roads, laydown areas etc. should be informed by the findings of a soil study;
- The developer should consult with affected property owners in order to enable them to factor construction activities into their rotational land use schedules;
- The location of wind turbines, access roads, laydown areas etc. should be discussed with the locally affected landowner in the finalisation process and inputs provided should be implemented in the layout as best as possible;
- The footprint areas for the establishment of individual wind turbines should be clearly demarcated prior to commencement of construction activities. All construction related activities should be confined to the demarcated area and minimised where possible;
- An Environmental Control Officer (ECO) should be appointed to monitor the establishment phase of the construction phase;

- All areas disturbed by construction related activities, such as access roads on the site, construction platforms, workshop area etc., should be rehabilitated at the end of the construction phase. The rehabilitation plan should be informed by input from the soil scientist and discussed with the local farmer;
- The implementation of a rehabilitation programme should be included in the terms of reference for the contractor/s appointed. The specifications for the rehabilitation programme should be drawn up the Environmental Consultants appointed to undertake the EIA;
- The implementation of the Rehabilitation Programme should be monitored by the ECO;
- All workers should receive training/ briefing on the reasons for and importance of not driving in undesignated areas;
- EMP measures (and penalties) should be implemented to strictly limit all vehicle traffic to designated roads and construction areas. Under no circumstances should vehicles be allowed to drive into the veld;
- Disturbance footprints should be reduced to the minimum.
- Compensation should be paid by the developer to farmers that suffer a permanent loss of land due to the establishment of the WF. Compensation should be based on accepted land values for the area.

4.4 OPERATION PHASE IMPACTS

As indicated in Section 1.4, two alternative layouts have been identified, namely Alternative 1 and Alternative 2. Both alternatives consist of forty five (45) wind turbines. As such the potential positive impacts associated with Alternative 1 and 2 will be the same. Based on the findings of the Visual Impact Assessment (Logis, 2018) and the Heritage Impact Assessment (Smuts, 2018) the potential visual impacts on the areas sense of place and the cultural landscape will differ. This is reflected in the assessment below.

The key social issues affecting the operation phase are likely to include:

Potential positive impacts
- The establishment of renewable energy infrastructure and generation of clean, renewable energy;
- Creation of employment and business opportunities. The operation phase will also create opportunities for skills development and training;
- Generation of additional income for farmers;
- Benefits associated with the establishment of a Community Trust.

Potential negative impacts
- The visual impacts and associated impact on sense of place;
- Impact on property values; and
- Potential impact on tourism.

4.4.1 Development of renewable energy infrastructure

The establishment of renewable energy infrastructure, such as the proposed WF, should be viewed, firstly within the context of the South Africa's current reliance on coal powered energy to meet the majority of its energy needs, and secondly, within the context of the success of the REIPPPP.

Impact of a coal powered economy

The Green Jobs study (2011) notes that South Africa has one of the most carbon-intensive economies in the world, thus making the greening of the electricity mix a national imperative. Within this context the study notes that the green economy could be an extremely important trigger and lever for enhancing a country's growth potential and redirecting its development trajectory in the 21st century. The study also identifies a number of advantages associated with wind power as a source of renewable energy with a large 'technical' generation potential. In this regard wind energy does not emit carbon dioxide (CO_2) in generating electricity and is associated with exceptionally low lifecycle emissions. The construction period for a wind farm is much shorter than that of conventional power stations, while an income stream may in certain instances be provided to local communities through employment and land rental. The study also notes that the greenhouse gases (GHG) associated with the construction phase are offset within a very short period of time compared with the project's lifespan. Wind power therefore provides an ideal means for reaching emission reduction targets in a relatively easy manner. In addition, and of specific relevance to South Africa, wind as energy source is not dependent on water (as compared to the massive water requirements of conventional power stations), has a limited footprint and therefore does not impact on large tracts of land, poses limited pollution and health risks, specifically when compared to coal and nuclear energy plants.

The Greenpeace Report (powering the future: Renewable Energy Roll-out in South Africa, 2013), notes that within a broader context of climate change, coal energy does not only have environmental impacts, it also has socio-economic impacts. Acid mine drainage from abandoned mines in South Africa impacts on water quality and poses the biggest threat to the country's limited water resources. Huge volumes of water are also required to wash coal and cool operating power stations. Eskom uses an estimated 10 000 litres of water per second due to its dependency on coal (Greenpeace, 2012).

Benefits associated with REIPPPP

The overview of the IPPPP (2017) indicates that the REIPPPP has attracted R48.8 billion in foreign investment and financing in the seven bid windows (BW1 – BW4, 1S2 and IS2). This is more than double the inward FDI attracted into South Africa during 2015 (R22.6 billion). In terms of local equity shareholding, 48% (R31.5 billion) of the total equity shareholding (R66.7 billion) was held by South African's across BW1 to BW4, 1S2 and 1S2. This equates to substantially more than the 40% requirement. Foreign equity amounts to R 35.8 billion and contributes 52% to total equity. As far as Broad Based Black Economic Empowerment is concerned, Black South Africans own, on average, 31% of projects that have reached financial close, which is slightly above the 30% target.

The total projected procurement spend for during the construction phase was R75 billion, more than the projected operations procurement spend over the 20 years operational life (R72 billion). The combined (construction and operations) procurement value for BW1 to BW4, 1S2 and IS2 is projected as R147.6 billion, of which R50.1 billion has been spent to date. For construction, of the R46.4 billion already spent to date, R36.6 billion is from the 57 projects which have already been completed. These 51 projects had planned to spend R36.6 billion. The actual procurement construction costs have therefore exceeded the planned costs by 9% for completed projects. Of the R46.6 billion spent on procurement during

construction, R41.1 billion has reportedly been procured from BBBEE suppliers, achieving 89% of total procured. Actual BBBEE spend during construction for BW1 and BW2 alone was R25.5 billion. The R41.1 billion spent on BBBEE during construction already exceeded the R34.8 billion that had originally been anticipated by IPPs.

The report notes that for a programme of this magnitude, with construction procurement spend alone estimated at R75 billion, the result is a substantial stimulus for establishing local manufacturing capacity. The report also notes that the strategy has prompted several technology and component manufacturers to establish local manufacturing facilities. The report also notes that this will improve with greater certainty relating to subsequent bid windows and further determinations will continue to build on these successes.

In terms of employment, to date, a total of 32 532 job years[36] have been created for South African citizens, of which 29 046 were in construction and 3 486 in operations. Black South African citizens, youths and rural or local communities have been the major beneficiaries during the construction phases, as they respectively represent 80%, 41% and 52% of total job opportunities created by IPPs to date. These job years should rise further past the planned target as more projects enter the construction phase. The REIPPPP has also ensured that black people in local communities have ownership in the IPP projects that operate in or nearby their vicinities. On average, black local communities own 11% of projects that have reached financial close. This is well above the 5% target.

The WWF (2014) study also notes that the REIPPPP requirement of 30% allocated to the local economic development has ensured that non-price criteria linked to socio-economic upliftment have a much heavier weighting than they would normally enjoy under Government's preferential procurement policy (WWF, 2014).

The establishment of renewable energy facilities, such as the proposed WF, therefore not only address the environmental issues associated with climate change and consumption of scarce water resources, but also creates significant socio-economic opportunities and benefits, specifically for historically disadvantaged, rural communities.

[36] The equivalent of a full time employment opportunity for one person for one year

Table 4.8: Implementation of clean, renewable energy infrastructure (Alternative 1 and 2)

Nature: Development of infrastructure to generate clean, renewable energy		
	Without Enhancement	**With Enhancement**
Extent	Local, Regional and National (4)	Local, Regional and National (5)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	High (8)
Probability	Highly Probable (4)	Definite (5)
Significance	High (64)	High (85)
Status	Positive	Positive
Reversibility	Yes	
Irreplaceable loss of resources?	Yes, impact of climate change on ecosystems	
Can impact be mitigated?	Yes	
Enhancement: See below		
Residual impacts: Overall reduction in CO_2 emission, reduction in water consumption for energy generation to establish an economically viable commercial renewable generation sector in the Western Cape and South Africa.		

Assessment of No-Go option
The No-Development option would represent a lost opportunity for South Africa to supplement its current energy needs with clean, renewable energy.

Recommended mitigation measures
Should the project be approved the proponent should:

- Implement a skills development and training programme aimed at maximizing the number of employment opportunities for local community members. As indicated above, the focus should be in community members from Paternoster and St Helena Bay;
- Maximise opportunities for local content, procurement and community shareholding;
- Establish a visitor centre. As indicated in the literature review, visitor centers in Scotland have attracted large numbers of visitors to wind farms.

4.4.2 Creation of employment and business opportunities and support for local economic development

The Urban Econ Study (June 2018) indicates that the project will employ in the region of 17 people, the majority of who will be technicians. In addition, another 33 full-time equivalent jobs could be created through the multiplier effect primarily within agriculture, trade, business services, and community services sectors. The study also notes that although the jobs created by the project on-site are expected to be new jobs, the job creation of the multiplier effect is likely to result in the maintained of the existing positions rather than creation of new positions. Therefore,

once operational, Boulders Wind Farm will initially create 17 new jobs and support about 50 jobs on an annual basis for the duration of its operational life of 20-25 years.

The annual wage bill for the operation phase would be ~ R 3.5 million (Urban Econ, 2018). With effective mitigation the majority of employment opportunities associated with the operation phase is likely to benefit HDIs from the local of the community. The Urban Econ study also notes that given that the average household size in the SBLM 3.5, it could be argued that a total of 60 people will benefit from the project as a result of the direct employment created by the Boulders Wind Farm.

However, in order to maximise the number of local employment opportunities will require the implementation of a skills development and training programme linked to the operation phase. Such a programme would support the strategic goals of promoting employment and skills development contained in the WCDM and SBLM. As indicated above, the SBLM support development that creates employment and skills development opportunities. The implementation of a skills development and training programme was supported by representatives from the SBLM, WCDM and local community representatives.

At this stage it is unclear where the permanent staff will reside. However, a number of people are likely to live in the coastal settlements in the study area, such as Paternoster. A percentage of permanent employees who are not locally based may purchase houses in one of the areas, while others may decide to rent. Both options would represent a positive economic benefit for the region. In addition, a percentage of the monthly wage bill earned by permanent staff would be spent in the regional and local economy. This will benefit local businesses in the relevant towns. The benefits to the local economy will extend over the anticipated 20-25 year operational lifespan of the project.

The local hospitality industry is also likely to benefit from the operation phase. These benefits are associated with site visits by company staff members and other professionals (engineers, technicians etc.) who are involved in the company and the project but who are not linked to the day-to-day operations.

Procurement during the operation phase will also create opportunities for the local economy and businesses. In this regard the overview of the IPPPP (2016) notes that the procurement spend over the 20 year operation phase for BW1 to BW4 and 1S2 will be in the region of R 70 billion. The Green Jobs study (2011) also found that energy generation is expected to become an increasingly important contributor to green job creation over time, as projects are constructed or commissioned. The study notes that largest gains are likely to be associated with operations and maintenance (O&M) activities. In this regard, operations and maintenance employment linked to renewable energy generation plants will also be substantial in the longer term.

The establishment of WFs, such as the proposed WF, also support the development of a green energy manufacturing sector in South Africa. Manufacturing segments with high employment potential in the long term would include suppliers of components for wind farms, such as Gestamp in Atlantis. The Green Jobs study (2011) found that South Africa is in a position to leverage upon some of its existing manufacturing capacities in order to produce components and parts for various sections of wind turbines, especially those industries involved in the production of

steel and metal products, as well as the boat building and electrical industries. Local manufacturing capacity can be promoted through engagement with established global manufacturers. The study does however note that critical mass would have to be developed in order to obtain economies of scale. The establishment of WFs, such as the proposed WF, would therefore contribute to achieving this critical mass.

The study also found that there was also significant potential for local involvement in the wind sector. Local companies can also exploit market opportunities in other African countries with higher wind power potential. This would create additional opportunities for improving economies of scale and enhancing the local industry's chances to succeed.

Table 4.9: Impact assessment of employment and business creation opportunities (Alternative 1 and 2)

Nature: Creation of employment and business opportunities associated with the operation phase.		
	Without Enhancement	**With Enhancement**
Extent	Local, Regional and National (3)	Local, Regional and National (4)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Moderate (6)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	Medium (44)	Medium (56)
Status	Positive	Positive
Reversibility	N/A	
Irreplaceable loss of resources?	No	
Can impact be enhanced?	Yes	
Enhancement: See below		
Residual impacts: Creation of permanent employment and skills and development opportunities for members from the local community and creation of additional business and economic opportunities		

Assessment of No-Go option
There is no impact as it maintains the current status quo. However, the potential opportunity costs in terms of the loss of employment and skills and development training would be lost.

Recommended enhancement measures
The enhancement measures listed in Section 4.4.1, i.e. to enhance local employment and business opportunities during the construction phase, also apply to the operation phase. In addition:

- The proponent should implement a training and skills development programme for locals during the first 5 years of the operation phase. The aim of the programme should be to maximise the number of South African's and locals

employed during the operation phase of the project. The focus should be on community members from Paternoster and St Helena Bay;

- The proponent, in consultation with the WCDM and SBLM, should investigate the options for the establishment of a Community Development Trust (see below).

4.4.3 Generate income for affected landowners

The proponent has entered into rental agreements with the affected landowners for the use of the land for the establishment of the proposed WEF. In terms of the rental agreement the affected landowner(s) will be paid an annual amount dependent upon the number of wind turbines located on the property. The farms in the areas, like others areas in the Western Cape have been impacted by the drought. The additional income associated with the WF would therefore represent a significant benefit for the affected landowner(s). The additional income would reduce the risks to their livelihoods posed by droughts and fluctuating market prices for their outputs and inputs, such as fuel, feed etc. The additional income from the WF would improve economic security of farming operations, which in turn would improve job security of farm workers and benefit the local economy.

Table 4.10: Assessment of benefits associated with income generated for affected farmer(s) (Alternative 1 and 2)

Nature: The generation of additional income represents a significant benefit for the local affected farmer(s) and reduces the risks to their livelihoods posed by droughts and fluctuating market prices for products and farming inputs, such as feed etc.		
	Without Enhancement	**With Enhancement**
Extent	Local (2)	Local (2)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Moderate (6)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	Medium (44)	Medium (56)
Status	Positive	Positive
Reversibility	N/A	
Irreplaceable loss of resources?	No	
Can impact be enhanced?	Yes	
Enhancement: See below		
Residual impacts: Improve economic security of farming operations, which in turn would improve job security of farm workers and benefit local economy		

Assessment of No-Go option
There is no impact as it maintains the current status quo.

Recommended enhancement measures
The relevant lease agreements between the proponent and the land owners must be put in place and signed off prior to commencement.

4.4.4 Socio-economic benefits for local communities

An important focus of the REIPPPP is to ensure that the build programme secures sustainable value for the country and enables local communities to benefit directly from the investments attracted into the area. In this regard IPPs are required to contribute a percentage of projected revenues accrued over the 20 year project operational life toward socio-economic development (SED) initiatives. These contributions are linked to Community Trusts and accrue over the 20 year project operation life and are used to invest in housing and infrastructure as well as healthcare, education and skills development.

Community Trusts provide an opportunity to generate a steady revenue stream that is guaranteed for a 20 year period. This revenue can be used to fund development initiatives in the area and support the local community. The long term duration of the revenue stream also allows local municipalities and communities to undertake long term planning for the area. The revenue from the proposed WF plant can be used to support a number of social and economic initiatives in the area, including:

- Creation of jobs;
- Education;
- Support for and provision of basic services;
- School feeding schemes;
- Training and skills development;
- Support for SMME's.

The minimum compliance threshold for SED contributions is 1% of revenue with 1.5% the targeted level over the 20 year project operational life. The current portfolio of projects has committed on average 2.2%, which is 125% higher than the minimum threshold level. The 57 projects that are currently operational have contributed R407.7 million to SED. The province with the highest SED contribution has been the Northern Cape, followed by the Eastern and Western Cape respectively (IPPP Overview, 2016).

The 2017 IPPP Overview notes that to date (across 7 bid windows) a total contribution of R20.6 billion has been committed to SED initiatives. Assuming an even, annual revenue spread, the average contribution per year would be R 1.03 billion. Of the total commitment, R16.5 billion is specifically allocated for local communities where the IPPs operate. With every new IPP on the grid, revenues and the respective SED contributions will increase.

The Green Jobs study (2011), found that the case for wind power is enhanced by the positive effect on rural or regional development. Wind farms located in rural areas create an opportunity to benefit the local and regional economy through the creation of jobs and tax revenues. The findings of the thesis by Tait (2012) also note that the distributed nature of renewable energy generation can induce a more geographically dispersed pattern of development. As a result renewable energy sites can be highly suited to rural locations with otherwise poor potential to attract local inward investment thus able to target particularly vulnerable areas. In her conclusion Tait notes that thesis found positive evidence for the establishment of community benefit schemes in the wind sector in South Africa. The BBBEE requirements for developers as set out in the DoE's IPPPP for renewables was the primary driver for such schemes. The procurement programme, in keeping with the objective of maximising

the economic development potential from this new sector, includes a specific focus on local communities in which wind farms are located.

In addition to the benefits for local communities, the establishment of a WF has a limited impact on the current agricultural land uses that underpin the local economic activities in the area and consumes negligible volumes of water during the operation phase.

Based on the findings of the review it is clear that the establishment of Community Trusts associated with renewable energy projects create significant benefits for local rural communities. In this regard the towns of Paternoster and St Helena display similar characteristics to rural towns. The benefits to the local HD communities in the area should also be viewed within the context of the collapse of the fishing industry over the last 10-15 years.

The findings of the SIA also indicate that the social spend associated with the West Coast One WF has created a number of benefits for local communities in the SBLM, specifically communities and households in the low-middle income suburb of Louwville in Vredenburg. Aurora Power which operates West Coast One has teamed up with ELRU (Early Learning Resource Unit) to support Early Childhood Education (ECD) programmes in the area as part of it socio-economic development (SED) contribution. Representatives from ELRU (Mr Mario Classen and Ms Bernie Dawood) indicated that a number of initiatives had been established in Vredenburg, including support for existing ECD centers, establishment of ELRU play centers for children up to the age of 6 and caregiver support system. The caregiver programme provides parents with support on how to raise children and provide a loving, supportive environment for children to grow up.

To date 200 families have been targeted as part of the caregiver programme, which in turn has benefited in the region of 300 children. The ELRU play group programme supports approximately 15 ECD playgroups, which cater for approximately 170 children. The a feeding programme forms part of the ELRU play group programme and is linked to local food garden that is run by Soul City. The food garden also forms part of Aurora's SED contribution. The ECD support programme currently supports 20 existing ECD centers in Louwville, which cater for 1616 children. The support for existing ECD centers includes providing assistance with registration, governance, and the learning environment. The ELRU programme that is supported by Aurora currently employs 25 full time employees.

In addition to funding ELRU as part of its SED contribution, Aurora also funds Valued Citizens, a non-governmental organisation founded in 2001 with the objective of develop citizenship education in public schools. The focus of Valued Citizens has been on primary and secondary schools in the study area. Year 1 of the Valued Citizens Programme included the introduction of the Values in the Lead Programme provided to 16 Public Schools and the implementation of school management team and educators training to schools in area including Diazville, Louwville, Velddrif secondary schools, Karitas and Weskus Special School, Jury Hayes Combined School, Diazville, EJ Malgarte, Langebaan, Masipathisane, Saldanha, St Andrews, St Augustine, St Helena Bay, Steenberg Coves Primary Schools. A total of 330 educators were trained within 2 years. A Responsible Parenting – Parenting Skills Workshop programme was also undertaken in primary schools, with 593 parents reached in 2016. During Year 2 of the programme My Career, My Choice Programme was offered to 350 learners from Diazville, Louwville, Velddrif secondary schools, and

Jury Hayes Combined School, while the iNSPIRE Programme reached 62 Grade 10 Girl learners supported by 2 educators from Diazville, Louwville, Weston and Velddrif secondary schools. A training programme aimed at teachers was also held with 48 educators from 16 public schools. A responsible parenting programme reached 279 parents. During Year 3 of the programme the Bridging for Life Programme reached 174 grade 11 learners out of 200 (boy and girl learners from Weston, Louwville, Velddrif and Vredenburg high schools). The Open Dialogue in School's communities will be offered to 20 learners from G8 to G11 accompanied by 2 educators per high school with the involvement of school community and stakeholders per dialogue. This is scheduled of July – August 2018.

It is therefore evident that the SED contribution associated with the West Coast One WF has benefitted a significant number of community members living in the SBLM, specifically HD school children and their families. This was confirmed by representatives from ELRU and the SBLM. A well-managed SED programme associated with the proposed Boulders WF would have similar benefits and would add to the benefits already associated with the West Coast One WF.

Table 4.11: Assessment of socio-economic benefits for local communities (Alternative 1 and 2)

Nature: SED initiatives funded by revenue generated from the sale of energy. The revenue can be used to fund local community development		
	Without Enhancement	**With Enhancement[37]**
Extent	Local and Regional (2)	Local and Regional (3)
Duration	Long term (4)	Long term (4)
Intensity	Low (4)	Moderate (6)
Likelihood	Probable (3)	Definite (5)
Reversibility	Medium (30)	High (65)
Irreplaceable loss of resources?	Positive	Positive
Significance		
Status	No	
Can impact be enhanced?	Yes	
Enhancement: See below		
Residual impacts: Promotion of social and economic development and improvement in the overall well-being of the community		

Assessment of No-Go option
There is no impact as it maintains the current status quo.

Recommended enhancement measures
In order to maximise the benefits and minimise the potential for corruption and misappropriation of funds the following measures should be implemented:

[37] Enhancement assumes effective management of the community trust

- The focus of the SED initiatives, including the Community Trust, should be on supporting initiatives in Paternoster and the St Helena Bay area;
- The WCDM, SBLM and registered local community organisations with a proven track record should be consulted as to the structure and identification of potential projects to be supported by the SED initiatives. The key departments in the WCDM and SBLM that should be consulted include the Municipal Managers Office, IDP Manager and LED Manager;
- Clear criteria for identifying and funding SED projects and initiatives in the area should be identified. The criteria should be aimed at maximising the benefits for the community as a whole and not individuals within the community;
- Strict financial management controls, including annual audits, should be instituted to manage the funds generated for the Community Trust from the WF.

4.4.5 Impact on sense of place and rural character of the landscape

The potential visual impact on the areas sense of place and rural character was raised as a key concern during the Scoping Phase and a number of key stakeholders interviewed as part of the previous SIA, specifically some residents from Britannica Heights and Paternoster. The visual impacts were also linked to impact on property values. The impact on property values is discussed in more detail in Section 4.4.5. However, a number stakeholders interviewed, including residents from Paternoster and the St Helena Bay area, also indicated that they did not believe that the wind turbines associated with WF's in the area resulted in negative visual impact. In this regard, a number of stakeholders interviewed indicated that they were either indifferent to the presence of wind turbines on the landscape, while others found the wind turbines to be aesthetically appealing. The assessment of significance is informed by the findings of the Visual Impact Assessment (VIA) undertaken during the Assessment Phase (Logis, November 2018) and the Heritage Impact Assessment (Smuts, November 2018).

Visual Impact Assessment

A key aspect considered by the VIA was the cumulative visual impact of the proposed Boulders WF. Section 6.2, Cumulative Visual Assessment, of the VIA indicates that the "cumulative impact of wind farm development on landscape and visual amenity is largely a subjective assessment or value judgement, which is difficult to quantify". In order to address this, the VIA considers this value judgement to some degree, but primarily focusses on the potential cumulative visual impact on specific receptors which is more quantifiable. The receptors assessed were:

- Observers travelling along the Vredenburg to Stompneus Bay road south of the facilities;
- Observers near *Noodhulp*;
- The Paternoster viewpoint;
- The rocky outcrop at the Paternoster beach;
- Observers travelling along the Vredenburg to Stompneus Bay road north of the facilities;
- Residents at Britannica Heights; and
- Observers travelling along the R399 arterial road.

The findings relating to some of the key receptors are summarised below.

Receptor 1: Stompneus Bay Road South: Receptor 1 (observers travelling along Stompneus Bay road south of the facilities) is expected to have a **moderate cumulative visual impact**

Receptor 3: Paternoster Viewpoint: This receptor located west of Paternoster is expected to have a very high increase in the frequency of exposed wind turbines. The cumulative visual impact is expected to be of high significance as the turbines would be spread out across the skyline, east and west of the Kasteelberg hill. The VIA indicates that the only mitigation of this potential cumulative visual impact is the removal or relocation of up to 25 turbines that are completely or partially visible.

Receptor 4: Paternoster Beach: This receptor (Paternoster beach) shares the same characteristics as the previous receptor. It is expected to have a very high cumulative visual impact as 38 new turbines would be visible on the horizon. The VIA indicates that up to 26 turbines would need to be removed or relocated in order to mitigate this impact.

Receptor 5: Stompneus Bay Road North: This receptor (observers travelling south along the Stompneus Bay road) will have the third highest frequency of visual exposure to the Boulders WF and West Coast 1 WEF. A combined 84 turbines may be visible from both facilities. The Boulders wind turbines would also be located in closer proximity to this receptor, aggravating the cumulative visual impact. The road once again acts as a delineation of the 'combined' WEF's boundary, prompting the removal or relocation of the seven turbines located west of this road.

Receptor 6: Britannica Heights: Observers at Britannica Heights will have a similar visual experience of the wind turbines as the previous receptor (receptor 5). It is expected to have a moderate increase in the frequency of visual exposure (up to 91 turbine may be visible), but the turbines will be located in closer proximity to Britannica Heights (within medium distance (5km) of this receptor). The same turbines, as at receptor 5, will need to be removed or relocated in order to successfully mitigate this potential cumulative visual impact.

The findings of the VIA indicate that the overall cumulative visual impact will be of high significance due to the:

- The open landscape context of the Paternoster *plateau* (wide panoramic views valued by residents and visitors alike);
- The activities of the residents and visitors (outdoor recreation related to the tourism industry of the region);
- Sensitivity of the visual receptors to wind farm developments (based on comments, responses and objections); and
- The magnitude of the cumulative change to the landscape (in terms of the scale, nature and frequency of combined or sequential views of the turbine structures).

The VIA notes that in spite of the physical similarities between the visual exposure and the close proximity of the two wind farms, this consolidation into one large wind farm is only applicable in theory in this instance. In visual terms, and more specifically in terms of the cumulative visual impact on the landscape, the Paternoster *plateau* is an area where the receptor sensitivity is a limiting factor to any further wind energy developments.

As a result the author of the VIA notes that that besides the physical scale and extent of the cumulative visual exposure of the two WEFs being a limiting factor (as illustrated earlier), the Paternoster *plateau* may have reached its capacity to accommodate wind energy infrastructure, based largely on (but not restricted to) the concept of 'receptor sensitivity'. The sensitivity of the landscape, including the Paternoster *plateau* and adjacent elevated terrain such as Kasteelberg and the Britannica Heights ridgeline with open vistas and visual receptors which are drawn to the area as a result of the natural features and beauty indicates that relatively low levels of cumulative effect may be considered unacceptable. Based on this the VIA notes that the construction of all the proposed wind turbines in their proposed locations may pose a critical risk to the visual quality and landscape of the Paternoster *plateau*. If no mitigation is undertaken (i.e. if the identified wind turbines cannot be relocated or removed) the cumulative visual impact may have as an effect the potential loss of the Paternoster *plateau* as a scenic resource. If mitigation is considered the potential cumulative impact may be within acceptable limits. This would include, as a minimum requirement, the removal or relocation of the wind turbines west of the Vredenburg to Stompneus Bay road and an investigation into the potential overall reduction in the wind turbine size, in order to match the dimensions of the West Coast 1 wind turbines.

The VIA (November 2018) assesses Alternative 1, which includes seven (7) wind turbines located to the north of the Kasteelberg and west of the Vredenburg to Stompneus Bay road, and Alternative 2, where the seven (7) turbines are relocated. In terms of the comparison three key receptor sites are looked, at, namely Receptor 3 and 4 (views from Paternoster) and Receptor 6 (views from Britannia Heights).The findings are summarised below.

Receptor 3

Approximately 22 wind turbines may be partially visible north (left) of the Kasteelberg hill in the original layout (Alternative 1). This number may be reduced to approximately 17 wind turbines partially visible after the relocation of the seven wind turbine positions (Alternative 2). Two of the relocated wind turbine positions were located behind this hill and do not affect the outcome of the reduction in visible turbines. This translates to a 23% decrease in the number of visible wind turbines north of the hill. The closest wind turbine in the original layout was 6.4km from this vantage point. This distance is increased to 8km after the relocation, 1.6km further away. This is an approximate 20% increase in distance to the closest wind turbine located north of the Kasteelberg hill.

Receptor 4

Approximately 19 wind turbines may be partially visible north (left) of the Kasteelberg hill in the original layout (Alternative 1). This number may be reduced to approximately 14 wind turbines partially visible after the relocation of the seven wind turbine positions (Alternative 2). Two of the relocated wind turbine positions were located behind this hill and do not affect the outcome of the reduction in visible turbines. This translates to a 26% decrease in the number of visible wind turbines north of the hill. The closest wind turbine in the original layout was 5.4km from this vantage point. This distance is increased to 7km after the relocation, 1.6km further away. This is an approximate 23% increase in distance to the closest wind turbine located north of the Kasteelberg hill.

Receptor 6
The closest wind turbine position from this receptor is 4.1km away (located east of the Stompneus Bay road) and will not change with the relocation of the seven wind turbine positions west of this road (i.e. there will be no benefit in terms of increased distance from the wind turbines). The number of wind turbines located in between this vantage point and the Kasteelberg hill will however be reduced from five (Alternative 1) to one (Alternative 2), leaving this view of the hill less obscured by wind turbine structures.

The VIA goes on to state that the overall visual exposure of the Boulders WF will remain virtually the same for both of the wind turbine layouts. There will be a negligible reduction in the area of visual exposure (red areas indicated with green arrows) within the study area, should the seven most northerly wind turbines west of the Stompneus Bay road be removed. This is due to the generous dimensions (120m hub-height and 165m blade tip height) of the wind turbine structures within the generally flat topography of the region.

In conclusion the VIA indicates that the relocation of the seven (7) wind turbine positions north-west of the Stompneus Bay road (Alternative 2) is likely to reduce the potential cumulative visual impact to some extent. The frequency (number of turbines) of visibility to observers at sensitive visual receptor sites, as tested, will be slightly lower and in at least two cases the visibility will be from longer distances.

However, the VIA notes that the relocation of the turbine positions is not expected to influence the overall visual impact of the Boulders WF, due to the fact that the viewshed pattern will largely remain the same, with wind turbines still visible from all of the receptor sites. Despite this the VIA does indicate that the following benefits are expected (even if it may be marginal):

- The overall development footprint of the Boulders WF will be more contained after the relocation of the wind turbine positions;
- In some cases the observer proximity to the turbine structures will be greater (i.e. observations will be from longer distances);
- The frequency of visual exposure of wind turbines will be less from the Paternoster receptor sites.

The visual impact on the Kasteelberg hill (cultural-historical site) and views from the Stompneus Bay road to the Atlantic seaboard west of this road will be mitigated at this northern position where the turbine locations are removed. The visual impact will however still manifest itself at the southern section, where it will most likely be aggravated by the addition of two turbines (west of the road) relocated from the north-western section.

The VIA concludes by indicating that the revised layout (Alternative 2), where the seven wind turbines north-west of the Stompneus Bay road is relocated, is expected to partially reduce the potential cumulative visual impact. This (revised wind turbine layout) should be set as a minimum requirement when considering the application for the construction of the Boulders WF. However, the VIA notes that "The ideal mitigation scenario would however include the removal or relocation of all the wind turbines west of the Vredenburg to Stompneus Bay road and an investigation into the potential overall reduction in the wind turbine size, in order to match the dimensions of the West Coast 1 wind turbines". The VIA also states "if no mitigation is undertaken the potential visual impacts and especially the potential cumulative

visual impacts may exceed acceptable levels within the context of the receiving environment".

The key findings of the assessment of other visual impacts are summarised below.

- The construction of the Boulders Wind Farm is expected to have a **high negative** visual impact on observers/visitors residing at homesteads within a 5-6km radius of the wind turbine structures. No mitigation of this impact is possible;
- The construction of the Boulders Wind Farm is expected to have a **high negative** visual impact on observers traveling along the roads within a 5-6km radius of the wind turbine structures. No mitigation of this impact is possible;
- The construction of the Boulders Wind Farm could have a **high negative** visual impact on the Kasteelberg hill, the cultural landscape and sense of place related to this cultural/historical feature, and views of the Atlantic seaboard at Paternoster from the Vredenburg-Stompneus Bay road. Mitigation of this impact is possible and entails the relocation of the wind turbines west of this road to the east of the road. The post mitigation visual impact is expected to be of **low negative** significance. The recommendations expressed in the final HIA report should be consulted in order to inform decision-making regarding the potential impact on this cultural-historical feature;
- The construction of the Boulders Wind Farm could have a **moderate-high negative** visual impact on observers traveling along the roads and residents of homesteads within the region (5 - 10km radius of the wind turbine structures). The significance rating of the visual impact is dependent on the observer's potential indifference (**moderate**) or aversion/sensitivity (**high**) to the proposed wind farm development. No mitigation of this impact is possible;
- The significance of shadow flicker is anticipated to be **low** to **negligible;**
- The anticipated lighting impact is likely to be of **moderate-high negative** significance and may be mitigated to **moderate**. The significance rating of the visual impact is dependent on the observer's potential indifference (**moderate**) or aversion/sensitivity (**high**) to the proposed wind farm development;
- The significance of the visual impacts on the sense of place within the region is expected to be of **moderate negative** significance, due to the relatively low viewer incidence within close proximity to the proposed wind farm. No mitigation of this impact is possible (i.e. the structures will be visible regardless).

Based on these findings the VIA notes that "It is clear from the above (when weighing the visual advantages and disadvantages) that it would be difficult to endorse the construction of the Boulders WF from a visual impact perspective. If no mitigation is undertaken the potential visual impacts and especially the potential cumulative visual impacts may exceed acceptable levels within the context of the receiving environment".

However, the VIA goes onto conclude that, "In spite of the above statement this does not imply that the Boulders WF project is fatally flawed. If the Paternoster plateau and/or Kasteelberg cultural/historical landscape had formal environmental or heritage protection status (e.g. if it was a Protected Heritage Site or National/Natural Heritage Site) it would have been considered a fatal flaw from a visual impact (and land use conflict) perspective. This does not, however, exonerate the project proponent and authorities from considering the potentially high levels of visual impact associated with the wind farm project (as proposed), when reviewing the desirability of the proposed development within the receiving environment".

Heritage Impact Assessment

The Heritage Impact Assessment (HIA)(Smuts, November 2018) notes that the roads from Vredenburg to Stompneus Bay and from Paternoster to Stompneus Bay, have historic, scenic and visual qualities (O'Donoghue and Kaplan 2016), particularly in relation to views towards the visually prominent Kasteelberg koppie (Webley et al. 2010). The HIA also indicates that the wider area has been proposed as a Grade II cultural landscape, consisting of scenic rolling hills, agricultural fields and historic farmsteads, layered on top of a Stone Age landscape represented by the numerous archaeological sites found throughout the study area (Sadr et al 1992; O' Donoghue and Kaplan 2016). The heritage resources in the area that are sensitive to visual impacts, include the historic farmsteads, Kasteelberg archaeological site, and the Vredenburg to Stompneus Bay and Paternoster to Stompneus Bay roads, which have scenic qualities.

The HIA indicates that the most important visual impacts to heritage resources will be to the character and sense of place of the region, specifically to the rural cultural landscape and, to a lesser extent, the historic coastal towns. In this regard the Saldanha Bay Municipality Heritage Resource Survey (O' Donoghue and Kaplan 2016) identified the cultural landscape of the study area as being of Grade II cultural significance, and the scenic routes within it as having Grade III significance[38]. Based on this the HIA notes that the impact to the cultural landscape is **high**, and is not possible to mitigate, although clustering of facilities serves to contain the visual impacts in a single area, which can be viewed as preferable to isolated pockets of visual intrusion across the wider landscape

The findings of the HIA indicate that the cumulative impacts of the proposed WEF and associated infrastructure on the rural cultural landscape, in context of the authorised West Coast 1 WEF, are considered **high** given the current layout. The HIA notes that the while the location of the development adjacent to West Coast 1 intends to consolidate turbines in one area, this mitigatory effect is undermined by the location of turbines west of the Vredenburg-Stompneus road. The HIA indicates that given that this road falls within the proposed Grade II cultural landscape (O'Donoghue and Kaplan 2016), it is recommended that it serves as the western boundary of the development and no turbines should be placed west of it to preserve as much of that landscape intact as possible. The HIA notes that this recommendation could render the project unviable, and could prove a fatal flaw. Alternative, less preferred options include the removal of all turbines north of Kasteelberg koppie, retaining only those to the south, and proceeding with the layout unchanged, which preserves all turbines at the expense of the cultural landscape. It is the opinion of this specialist that, provided the recommendations are implemented and incorporated into the EMPr, that Environmental Authorisation for this project should be awarded.

The HIA notes that the impacts to cultural landscapes cannot be mitigated except by removal of turbines from the landscape. However, this would render projects that are necessary and desirable from a socioeconomic standpoint unviable. As such, alternative recommendations are recommended:

[38] While these proposed gradings have been supported by HWC, they have not as yet, been ratified (HIA, 2018).

- The **preferred** recommendation, in order to limit impacts to the cultural landscape, is that all turbines west of the Vredenburg-Stompneus Bay road be relocated or removed;
- The **first**, less preferable alternative recommendation is that all turbines north of Kasteelberg be relocated or removed, but that the turbines south of the koppie remain. This limits the degradation of the landscape to a smaller area, and preserves more of the significant link between Kasteelberg and the coast and can therefore be considered as an acceptable alternative;
- The **second**, least preferable alternative is to accept the project layout as proposed, with the relative buffers around Kasteelberg and the Vredenburg-Stompneus Bay road revised down in accordance with the findings of the Archaeological Impact Assessment.

From a policy perspective, the West Coast SDF notes that wind farms should be located where they will cause least visual impact taking into consideration the viability of the project (HR 27) and located where their visual and environmental impact will be the lowest (BE 17).

Comment on Alternative 2
Based on the findings of the VIA and HIA undertaken in October 2018 the proponent has removed the seven (7) wind turbines located to north of Kasteelbewrg and to the west of the Vredenburg-Stompneus Bay. This is in alignment with the HIA's first (less preferable) alternative, namely that all turbines north of Kasteelberg be relocated or removed, but that the turbines south of the Kasteelberg remain. As indicated above, the HIA notes that this can be considered as an acceptable alternative.

The VIA recommends that all wind turbines west of the Vredenburg to Stompneus Bay Road should be removed or relocated as a minimum requirement to mitigate the visual and cumulative impact. This recommendation is also in line with the preferred alternative recommended by the HIA. This would require the removal or relocation of thirteen (13) wind turbines. Based on the revised layout (Alternative 2), a total of five (5) wind turbines have been effectively removed. While all seven (7) located in the area to the north of Kasteelberg have been relocated or removed, an additional two have been added to the area to the south of Kasteelberg. Therefore, while an attempt has been made to address the visual impact on the areas sense of place, the minimum requirement set by the VIA has not been met. The requirements for the HIAs preferred option have also not been met. Therefore, based on the findings of the VIA and the HIA, Alternative 2 does not fully mitigate the impacts on the areas visual quality, sense of place and cultural landscape.

Table 4.12 provides an assessment of Alternative 1 and Alternative 2. As indicated in Table 4.12 Alternative 1 is regarded as the No Mitigation Option, while Alternative 2, is assessed as the Mitigation Option. However, as indicated in Table 4.12 the full mitigation measures recommended by the VIA and HIA (preferred option) have not been fully implemented in terms of Alternative 2. The significance rating therefore remains **Moderate-High Negative.**

Table 4.12: Assessment of visual impact on sense of place[39]

Nature: Visual impact associated with the proposed WF and the potential impact on the areas rural sense of place and character		
	Without Mitigation (Alternative 1)	**With Mitigation (Alternative 2)**
Extent	Regional (3)	Regional (2)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Moderate (8)
Probability	Highly probable (4)	Highly probable (4)
Significance	High (60)	Moderate-High (56)
Status	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No, facility can be removed.	No, facility can be removed.
Can impact be mitigated?	Yes, if specific turbines are relocated and or removed	Yes, if specific turbines are relocated and or removed
Mitigation: See below		
Residual impacts: None as the visual impact would be removed with the decommissioning of the facility		

Comment on the issue of differences of opinion

As indicated above, while the exposure to visual impacts may be extremely high, the perception of what constitutes a high negative impact is subjective and differs from person to person. In this regard a number of interviewees indicated that they did not regard the wind turbines associated with the existing West Coast One WF as having a negative impact on the landscape and the area's sense of place. Therefore, for example, while the findings of the VIA indicate that the impact on people traveling along the Vredenburg-Stompneus Bay Road and Paternoster-Stompneus Bay Road is regarded as extremely high, some travellers using this road may not regard the presence of wind turbines as an issue. A number of interviewees also indicated that the potential visual impacts associated with the proposed Boulders WE were not an issue of concern. This applies to both Alternative 1 and 2.

Table 4.13 provides an assessment of Alternative 1 and Alternative 2 based on feedback from interviewees who indicated that they did not view WFs as having a negative visual impact on the landscape and the areas sense of place. Based on the findings of the SIA these interviewees had no preference between Alternative 1 and 2. The significance ratings are therefore the same for both Alternative 1 and 2.

[39] The significance ratings are informed by findings of the VIA and HIA.

Table 4.13: Assessment of visual impact on sense of place based comments from interviewees that did not perceive visual impacts to be a key issue

Nature: Visual impact associated with the proposed WF and the potential impact on the areas rural sense of place and character		
	Alternative 1	**Alternative 2**
Extent	Local (1)	Local (1)
Duration	Long term (4)	Long term (4)
Magnitude	Low (2)	Low (2)
Probability	Highly probable (4)	Highly probable (4)
Significance	Low (28)	Low (28)
Status	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No, facility can be removed.	No, facility can be removed.
Can impact be mitigated?	Yes, if specific turbines are relocated and or removed	Yes, if specific turbines are relocated and or removed
Mitigation: See below		
Residual impacts: None as the visual impact would be removed with the decommissioning of the facility		

Assessment of No-Go option
There is no impact as it maintains the current status quo.

Recommended mitigation measures
- The recommendations contained in the VIA and the HIA (preferred alternative) should be implemented, specifically the removal or relocation of all the wind turbines located to the west of the Vredenburg to Stompneus Bay Road.

4.4.6 Potential impact on property values

The potential impact of the proposed Boulders WF on property values was raised as a key concern, specifically by residents of Britannica Heights and Paternoster. A literature review was undertaken as part of the SIA. It should be noted that the review does not constitute a property evaluation study and merely seeks to comment on the potential impact of wind farms on property values based on the findings of studies undertaken overseas.

In addition, an assessment of the potential impact on property values was included in the study undertaken by Urban Econ as part of the EIA (Property Values, Tourism and Economic Issues Assessment Report, Urban Econ, June 2018). A separate assessment of the potential impact on property values was also undertaken by the Appraisal Corporation (July 2018).

The key findings of the literature review and Urban Econ and Appraisal Corporation studies are summarised below.

Literature review

In total five articles were identified and reviewed namely:

- Stephen Gibbons (April, 2014): Gone with the wind: Valuing the Visual Impacts of Wind turbines through house prices. London School of Economics and Political Sciences & Spatial Economics Research Centre, SERC Discussion Paper 159;
- Review of the Impact of Wind Farms on Property Values, Urbis Pty Ltd (2016): Commissioned by the Office of Environment and Heritage, NSW, Australia;
- Yasin Sunak and Reinhard Madlener (May 2012): The Impact of Wind Farms on Property Values: A Geographically Weighted Hedonic Pricing. School of Business and Economics / E.ON Energy Research Center, RWTH Aachen University. Model Working Paper No. 3/2012;
- Martin D. Heintzelman and Carrie M. Tuttle (March 3, 2011): Values in the Wind: A Hedonic Analysis of Wind Power Facilities. Economics and Financial Studies School of Business, Clarkson University;
- Ben Hoen, Jason P. Brown, Thomas Jackson, Ryan Wiser, Mark Thayer and Peter Cappers (August 2013): A Spatial Hedonic Analysis of the Effects of Wind Energy Facilities on Surrounding Property Values in the United States. Ernest Orlando Lawrence Berkeley National Laboratory.

The literature reviewed was based on an attempt by the authors of the SIA to identify what appear to be "academically and or scientifically" based studies that have been undertaken by reputable institutions post 2010. However, the literature review does not represent an exhaustive review. The key findings of the literature review are summarised below.

Stephen Gibbons (April, 2014)
The overall findings of the study indicate that wind farms reduce house prices in postcodes (suburbs) where the turbines are visible, and reduce prices relative to postcodes close to wind farms where the wind farms are not visible. The overall finding is that "averaging over wind farms of all sizes, this price reduction is around 5-6% within 2km, falling to less than 2% between 2 and 4km, and less than 1% by 14km which is at the limit of likely visibility". The study notes that small wind farms have no impact beyond 4km, whereas the largest wind farms (20+ turbines) reduce prices by 12% within 2km, and reduce prices by small amounts right out to 14km (by around 1.5%).

Martin D. Heintzelman and Carrie M. Tuttle (March, 2011)
The findings of the study indicate that nearby wind facilities significantly reduce property values. In this regard, based on the repeat sales model, the construction of turbines within 0.5 miles (0.8 km) of the property resulted in a 10.87%-17.77% decline in sales price depending on the initial distance to the nearest turbine and the particular specification. At a distance of 1 mile (1.6km) (about 20% of the sample), the decline in value was between 7.73% and 14.87%. The study notes that from a policy perspective, these results indicate that there is a need to compensate local homeowners/communities for allowing wind development within their borders.

The paper concludes that the results of the study appear to indicate that proximity to wind turbines does have a negative and significant impact on property values.

Importantly, the best and most consistent measure of these effects appears to be the simple, continuous, proximity measure, the (inverse distance) to the nearest turbine.

Ben Hoen, et al (August 2013)

The study was based on data from more than 50 000 home sales among 27 counties in nine states of the USA. The homes were located within 10 miles of 67 different wind facilities, and 1 198 sales were within 1 mile (1.6 km) (331 of which were within a half mile (0.8km)) of a turbine. The findings of the study indicated that across all model specifications, there was no statistical evidence that home prices near wind turbines were affected in either the post-construction or post-announcement/pre-construction periods. Therefore, if effects do exist, either the average impacts are relatively small (within the margin of error in the models) and/or sporadic (impacting only a small subset of homes). In addition, the sample size and analytical methods enabled the study to bracket the size of effects that would be detected, if those effects were present at all.

Based on the results, the study found that it is *highly unlikely* that the actual average effect for homes that sold in the sample areas within 1 mile of an existing turbine is larger than +/-4.9%. In other words, the average value of these homes could be as much as 4.9% higher than it would have been without the presence of wind turbines, as much as 4.9% lower, the same (i.e., zero effect), or anywhere in between. Similarly, it is highly unlikely that the average actual effect for homes sold in the sample area within a half mile of an existing turbine is larger than +/-9.0%. In other words, the average value of these homes could be as much as 9% higher than it would have been without the presence of wind turbines, as much as 9% lower, the same (i.e., zero effect), or anywhere in between. The study notes that, regardless of these potential maximum effects, the core results of the study consistently show no sizable statistically significant impact of wind turbines on nearby property values.

Urbis Pty Ltd (2016)

Based on the outcome of the study the authors were of the opinion that wind farms may not significantly impact rural properties used for agricultural purposes. However, the study found that there is limited available sales data to make a conclusive finding relating to value impacts on residential or lifestyle properties located close to wind farm turbines, noting that wind farms in New South Wales (Australia) (NSW) have been constructed in predominantly rural areas. In conclusion, the authors of the Urbis study found:

- Appropriately located wind farms within rural areas, removed from higher density residential areas, are unlikely to have a measurable negative impact on surrounding land values;
- There is limited available sales data to make a conclusive finding relating to value impacts on residential or lifestyle properties located close to wind farm turbines, noting that wind farms in NSW have been constructed in predominantly rural areas.

Urban Econ study

The Urban Econ study notes that location has long been recognised as the paramount variable in real estate. Therefore, development of neighbouring land can be controversial and often cause nearby landowners scepticism (Jason Carter, 2011). The four stigmas associated specifically with wind farm developments are (Jason Carter, 2011):

- Nuisance stigma: sounds or shadow flicker from nearby wind turbines;
- Proximity stigma: turbines make the area appear more developed;
- Scenic vista stigma: an undesirable view (negative visual impact);
- Wind farm anticipation stigma: the uncertainty surrounding where turbines will be located and the effects the wind farm will have on area residents when development is initially proposed

Impact of West Coast One Wind Farm on property values

The Urban Econ study includes an assessment of trends in average property values over a period of eight years in Vredenburg, Paternoster and Saint Helena Bay. The study also looked at the potential impact of wind farms on property values in St Francis Bay, a well-known tourism destination located in the Eastern Cape, where several 140MW wind farms are currently operational. The aim of the study was to gain an insight into the overall trends with respect to property prices in the primary zone of influence, specifically the potential impact of West Coast One WF which was developed in 2013-15. The eight year period therefore covers the period during which news about the wind farm development in the area started to circulate (i.e. pre-construction or pre-2013), the construction period (i.e. 2013-2015), and once the construction was completed (post-2015).

The study notes that the following factors should be noted when looking at the trends in property prices in the primary zone of influence:

- The property market experienced a significant drop in 2008/9.
- The recovery of the property market comprising of primary residences was different to that of holiday homes and holiday towns.
- Holiday homes and towns took considerably longer to recover post the financial crisis showing a negative trend in 2010, 2011, and the first half of 2012.
- Although property prices in holiday towns were on the rise from 2013 onwards, the increase in this market showed a dip in 2015.

The Urban Econ study notes that "all real estate agents interviewed asserted that wind farm developments have not had a notable effect on the demand and value of surrounding properties". They indicated that prospective buyers had mostly been indifferent to the presence of wind farms. One real estate agent from Saint Helena Bay stated that one property buyer complained that they would not have purchased the property had they known about the development of the West Coast One Wind Farm. This is the only opposing case that was presented.

Potential impact of Boulders Wind Farm on property prices

The review of the property trends suggests that depending on the nature of the property (holiday home or prime residence) and the type of property (sectional title, freehold, or vacant land), they all follow different demand and pricing patterns. In time of unfavourable economic conditions, households tend to prioritise primary property ownership over holiday home ownership, which leads to a slump in demand and subsequent decline in property prices for holiday homes. As the economy starts to recover, the demand for holiday homes starts to pick up leading to increases in respective property prices. The former trend was clearly observed during 2010-2012, preceded by the financial crisis of 2008/9; while the latter trend was noted post 2013.

Based on the review of historical property price trends in relation to the development stages of the analysed wind farms (West Coast One in the study area, and Kouga Wind Farm near St Francis Bay), the Urban Econ study found that there is was no clear linkage between property price dynamics and the development of wind farms. This finding was also confirmed by real estate agents, representing nine property agencies, interviewed during the study. The estate agents interviewed indicated that wind farm developments (West Coast One Wind Farm and Kouga Wind Farm) did not affect demand and or prices of property in the Paternoster and St Francis Bay areas.

In conclusion, the Urban Econ study found that a number of factors contribute to the value and price of property and a single component such as a wind farm development cannot be assessed in isolation. Property investors and buyers have differing preferences and perceptions. While some buyers may be dissuaded to locate near a wind farm development, it is evident in both case studies that there are buyers who are indifferent while a few are attracted by wind farm developments.

The Urban Econ study concludes that "it can be stated with good confidence that wind farm developments in the coastal holiday home towns in South Africa do not appear to have a negative direct impact on property prices. The fact that the analysis of the impact of wind farm developments on tourism also showed no positive correlation between wind farm developments and tourism visitations further affirms that statement". As indicated above, the Urban Econ study also found that based on interviews with tourism product owners the West Coast One WF had no negative impact on the number of tourist visitors to Paternoster and that tourists were generally neutral or positive to the wind farm development. This implies that Paternoster continued to be viewed as a favourable holiday destination by tourists and is highly unlikely to be viewed differently by holiday home property owners.

Based on these findings the Urban Econ study rated the potential impact of wind farms on property values as Low Negative. This would support the general findings of the literature review.

Comment on findings of the literature review and Urban Econ study

Based on the findings of the literature review the most comprehensive study appears to the study by Gibbons (2014), which found that "averaging over wind farms of all sizes" the price reduction was around 5-6% within 2km, falling to less than 2% between 2 and 4km, and less than 1% by 14km which is at the limit of likely visibility. The properties that stand to be most affected are those located in Britannica Heights and to a lesser degree Paternoster. Based on the information from the Visual Impact Assessment (VIA)(Logis, June 2018), the closest turbines are located 4.1km and 5.4km from Britannica Heights and Paternoster respectively. The proposed Boulders WF is therefore unlikely to impact on the property values in Paternoster. This is also confirmed by the findings of the Urban Econ study.

However, while the findings of the literature review indicate that the impact on property values is less than 2% for distances of between 2 and 4km, is it recognised that property values in Britannica Heights are linked to the views towards the south. These views have been impacted by the existing wind turbines associated with the West Coast One WF, which are located in the region of 8-9 km from Britannica Heights. Given that the wind turbines will be located closer to Britannica Heights (closest will be ~4km), the establishment of the proposed Boulders WF will increase the visual impact on the properties in Britannica Heights. This may influence potential buyers, which, in turn, may impact on property values. The magnitude of

this potential impact cannot however be quantified based on the available information. However, as indicated below, the study undertaken by the Appraisal Corporation indicated that the proposed Boulders WF is unlikely to impact on property values in the area, including Britannica Heights.

Appraisal Corporation study

The study was undertaken by Mr JF du Toit (professional valuer and chartered surveyor) to assess if the proposed Boulders Wind Farm Project may have a possible value impact on adjacent property values. The study included a review of the findings of the Urban Econ Report (2018) and Visual Impact Assessment (VIA) Report. A brief literature review of 25 research papers on the impact of wind farms on property values was also undertaken. The findings of the study indicate that, based on property transactions, no price decrease could be determined in any of the nearby towns, as a result of the existing West Coast One or proposed Boulders WF. The study notes that the absence of any price impact on property values by the existing and proposed wind farm could be due to a number of reasons, including:

- The closest wind turbine to any township is ±3.4km, with most of these townships 4km or further away;
- Most of the towns are coastal holiday destination where sea views and location are the primary value drivers, not the inland high lying area where the wind farms are located;
- Research literature proposes that the impact of wind turbines of properties is negligible, and only where such turbines are located closer than 1.6km could it have a small impact.

The study also found that both the West Coast One as well as Boulders WF had no impact on farm values in the area.

Based on the findings the author notes that "the evidence researched and reviewed leaves me with no conviction that the proposed Boulders Wind Farm will impact negatively on surrounding property values, in respect of both township and agricultural properties". The author concludes that "the proposed Boulders Wind Farm Project, will not impact negatively on the market values of properties in the area".

While the findings of the literature review and the studies undertaken by Urban Econ and the Appraisal Corporation indicate that the proposed Boulders WF (Alternative 1 and 2) is unlikely to impact on property values, Alternative 2 would be the preferred option given the reduced impact of views from Britannica Heights towards Kasteelberg and Paternoster.

Table 4.14: Assessment of potential impact on property values (Alternative 1 and 2)

Nature: Potential impact on general property values in the area due to visual impact associated with the proposed WF.		
	Without Mitigation	**With Mitigation**
Extent	Local (3)	Local (2)
Duration	Long term (4)	Long term (4)
Magnitude	Low (2)	Low (2)
Probability	Probable (3)	Probable (3)
Significance	Low (27)	Low (24)
Status	Negative	Negative
Reversibility	Partially reversible	
Irreplaceable loss of resources?	No	No, facility can be removed.
Can impact be mitigated?		
Mitigation: See below		
Residual impacts: None as the visual impact would be removed with the decommissioning of the facility		

Assessment of No-Go option
There is no impact as it maintains the current status quo.

Recommended mitigation measures

- The recommendations contained in the VIA and the HIA (preferred alternative) should be implemented, specifically the removal or relocation of all the wind turbines located to the west of the Vredenburg to Stompneus Bay Road.

4.4.7 Potential impact on tourism

The potential impact of the proposed WF was raised as a concern by tourism-related operations in Paternoster, as well as Saldanha Bay Tourism and the WCDM planner interviewed as part of the previous SIA. A number of interviewees also indicated that Paternoster was in many ways unique, while there were numerous other potential WF sites not only in the Western Cape but also other parts of South Africa. In this regard the potential benefits associated with the establishment of the proposed WEF should not take precedence over the potential impact on a unique resource. In addition, the local employment opportunities associated with the operation phase (~20) are significantly outweighed by local jobs associated with the local tourism industry (Enskin, Lubitz, Ron, Slabig, van der Merwe – pers. comm).

According to the Saldanha Bay Tourism Office, the Saldanha Bay Municipal Area is currently responsible for 41% of all measured tourism activity in the West Coast District Municipality. The two anchoring attractions are Langebaan Lagoon and Paternoster. Key attractions associated with Paternoster are the picturesque village,

spring flower displays (dependent on rainfall), Cape Columbine Nature Reserve and Tietiesbaai, seasonal sightings of whales and dolphins, and the coastline (van der Merwe, pers. comm). Many visitors prefer to take a circular route along the peninsula, namely from Vredenburg to Paternoster via the Paternoster Road, then to Stompneusbaai via the Skuitjiesklip Road and northern portion of the Stompneusbaai Road, and then south along the coast to the Velddrif road via the St Helena Bay Road (or other way around). This route is particularly popular with spring flower visitor flows and with day trippers.

Based on the findings of the SIA it is clear that the tourism sector is a key economic sector in Paternoster and surrounds. The coastal settlements in the SBLM, such as Langebaan, Saldanha, Jacobsbaai, Paternoster and St Helena Bay, represent the key anchoring destinations in the region. Paternosters sense of place as picturesque and quaint traditional West Coast fishing village offering a relaxed holiday in a natural setting constitutes the main attraction. The proximity of the area to Cape Town also makes it an ideal destination for weekend getaways and day trips. Paternoster is also a popular wedding venue.

In order to comment on the potential impact of wind farms on tourism a review of international literature was undertaken as part of the SIA. In addition, an assessment of the potential impact on tourism was included in the study undertaken by Urban Econ as part of the EIA (Property Values, Tourism and Economic Issues Assessment Report, Urban Econ, June 2018).

The key findings of both the literature review and the Urban Econ study are summarised below.

Literature review
Three articles were reviewed, namely:

- Atchison, (April, 2012). Tourism Impact of Wind Farms: Submitted to Renewables Inquiry Scottish Government. University of Edinburgh
- Glasgow Caledonian University (2008). The economic impacts of wind farms on Scottish tourism. A report prepared for the Scottish Government
- Regeneris Consulting (2014). Study into the Potential Economic Impact of Wind Farms and Associated Grid Infrastructure on the Welsh Tourism Sector

The research by Aitchison (2012) found that that previous research from other areas of the UK has demonstrated that wind farms are very unlikely to have any adverse impact on tourist numbers (volume), tourist expenditure (value) or tourism experience (satisfaction). In addition, the study found that to date there was no evidence to demonstrate that any wind farm development in the UK or overseas has resulted in any adverse impact on tourism. In conclusion, the findings from both primary and secondary research relating to the actual and potential tourism impact of wind farms indicate that there will be neither an overall decline in the number of tourists visiting an area nor any overall financial loss in tourism-related earnings as a result of a wind farm development.

In addition, all of the studies that have sought to predict impact have demonstrated that any negative impact of wind farms on tourism will be more than outweighed by the increase in tourists that are attracted by wind farms, by the increase in employment brought about by the development of wind farms and/or by the continuing growth of tourism. The study by the Glasgow Caledonian University

(2008) found that only a negligible fraction of tourists will change their decision whether to return to Scotland as a whole because they have seen a wind farm during their visit. The study also found that 51.0% of respondents indicated that they thought wind farms could be tourist attractions. In this regard the visitor centre at the Whitelee Wind Farm in east Ayrshire Scotland run by ScottishPower Renewables has become one of the most popular 'eco-attractions' in Scotland, receiving 200 000 visitors since it opened in 2009.

The study by Regeneris Consulting (2014) found that there was no evidence that wind farms would deter tourists from travelling along designated visitor or tourists routes. The study indicated that small minorities of visitors would be encouraged, whilst others would be discouraged. Overall, however, there was no evidence to suggest that there would be any significant change in visitor numbers using these routes to reach destination elsewhere.

The study also found that in more sensitive locations the potential negative effect on visitor numbers may still be low overall, but in some circumstances could be moderate. The greatest concern exists amongst areas and businesses closest to wind farms and appealing to visitor markets most sensitive to changes in landscape quality.

Based on the findings of the literature review there is limited evidence to suggest that the proposed WF would impact on the area's tourism industry, specifically Paternoster. The findings also indicate that wind farms do not impact on tourist routes. However, as indicated above, the establishment of wind turbines to the west of the Vredenburg-Stompneus Bay Road will impact on views towards the coast and Kasteelburg and is likely to impact on the areas sense of place. This may impact negatively on the experience of some visitors travelling along this road.

From a policy perspective, the West Coast SDF notes that the development of renewable energy projects must also take into account potential impact on tourism, specifically impact on tourist corridors and routes (HR4). In this regard, as indicated above, the SDF notes that wind farms should be located where they will cause least visual impact taking into consideration the viability of the project (HR 27) and located where their visual and environmental impact will be the lowest (BE 17).

Urban Econ study

The Urban Econ study notes that as per the 2016 visitor trends, the majority of the visitors to Paternoster were domestic visitors (66%), of which most (52%) came from within the Western Cape, while 24% were from Gauteng. The international market was made up of mostly Germans (46%) and tourists from the United Kingdom (21%). Tourists stay mainly in self-catering accommodation and guesthouses. For St Helena Bay, domestic visitors made up 94% of the total number of visitors to the area, the majority of which were from Western Cape followed by Gauteng. International tourists were predominantly from Germany and Namibia.

The Urban Econ study noted that all of the tourism product owners interviewed indicated that existing West Coast One WF had not had an impact on their operations and tourism in the area at large. In addition, none of the owners indicated that they had received any complaints about the wind farm from visitors. While some tourism operators indicated that the establishment of the wind farm was a 'visual shock' in terms of the landscape, it was no longer regarded as obtrusive and now felt that it blended into the environment and is not obtrusive. A number of tourism operators

also indicated that they had benefitted from the development of the wind farm by providing accommodation for West Coast One Wind Farm employees for a notable duration (11 weeks). In terms of the proposed Boulders WF, the main concern raised was that the project should not obstruct views of the beach. In conclusion, the Urban Econ study notes the proposed development of the Boulders Wind Farm is more likely to have a positive impact on tourism in the area than a negative effect. The positive impact will however be temporary and will be limited to the duration of construction activities.

The findings of the Urban Econ study therefore support the findings of the literature review, namely that the proposed Boulders WF is unlikely to have a measurable negative impact on tourism in the area.

While the findings of the literature review and the Urban Econ study indicate that the potential impact on tourism of Alternative 1 and 2 is likely to be low, Alternative 2 is the preferred option given the reduced impact on Kasteelberg and views towards the coast from the Vredenburg-Stompneus Bay Road.

Table 4.15: Impact on tourism (Alternative 1 and 2)[40]

Nature: Potential impact of the wind energy facility on local tourism		
	Without Mitigation	**With Mitigation**
Extent	Local (3)	Local (2)
Duration	Long term (4)	Long term (4)
Magnitude	Low (2)	Low (2)
Probability	Probable (3)	Probable (3)
Significance	Low (27) (Applies to both – and +)	Low (24) (Applies to both – and +)
Status	Negative (Potential to distract from the tourist experience of the area) Positive (Potential to attract people to the area)	Negative (Potential to distract from the tourist experience of the area) Positive (Potential to attract people to the area)
Reversibility	Yes	
Irreplaceable loss of resources?	No	
Can impact be enhanced?	Yes	
Enhancement: See below		
Residual impacts: Potential benefit for tourism in the SBLM (+). Potential for reduced number of tourist visits to the area, which in turn would impact on local tourism sector (-)		

Assessment of No-Go option
There is no impact as it maintains the current status quo.

[40] The significance rating is based on the findings of the literature review and the Urban Econ study (June 2018).

Recommended mitigation/ enhancement measures

- The recommendations contained in the VIA and the HIA should be implemented, specifically the removal or relocation of the wind turbines west of the Vredenburg to Stompneus Bay Road.
- The proponent should consider the establishment of a visitor center should the WF be approved.

4.5 ASSESSMENT OF DECOMMISSIONING PHASE

Typically, the major social impacts associated with the decommissioning phase are linked to the loss of jobs and associated income. This has implications for the households who are directly affected, the communities within which they live, and the relevant local authorities. However, in the case of the proposed facility the decommissioning phase is likely to involve the disassembly and replacement of the existing components with more modern technology. This is likely to take place in the 20 - 25 years post commissioning. The decommissioning phase is therefore likely to create additional, construction type jobs, as opposed to the jobs losses typically associated with decommissioning. The number of people employed during the operation phase will be in the region of 17. Given the relatively low number of people employed during the operation phase the decommissioning of the facility is unlikely to have a significant negative social impact on the local community. The potential impacts associated with the decommissioning phase can also be effectively managed with the implementation of a retrenchment and downscaling programme.

The decommissioning phase will also create employment opportunities. This will represent a positive impact. These jobs will, however, be limited and of a temporary nature. The significance will be low.

Table 4.16: Impacts associated with decommissioning (Alternative 1 and 2)

Nature: Social impacts associated with the decommissioning phase are linked to the loss of jobs and associated income		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (1)
Duration	Short term depending on how long affected staff take to find alternative employment (2)	Short term (2)
Magnitude	Low (2)	Low (2)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	Low (24) (Applies to both – and +)	Low (20) (Applies to both – and +)
Status	Negative	Positive
Reversibility	Yes	
Irreplaceable loss of resources?	N/A	
Can impact be mitigated?	Yes	

Mitigation: See below
Cumulative impacts: Contribution of current high levels of unemployment in the area and associated social impacts
Residual impacts: See cumulative impacts

Assessment of No-Go option
There is no impact as it maintains the current status quo.

Recommended mitigation measures
The following mitigation measures are recommended:

- The proponent should ensure that retrenchment packages are provided for all staff retrenched when the WEF is decommissioned.
- All structures and infrastructure associated with the proposed facility should be dismantled and transported off-site on decommissioning;
- The proponent should investigate the option of establishing an Environmental Rehabilitation Trust Fund to cover the costs of decommissioning and rehabilitation of areas disturbed by wind turbine footprints. The Trust Fund should be funded by a percentage of the revenue generated from the sale of energy to the national grid over the 20 year operational life of the facility. The rationale for the establishment of a Rehabilitation Trust Fund is linked to the experiences with the mining sector in South Africa and failure of many mining companies to allocate sufficient funds during the operation phase to cover the costs of rehabilitation and closure. Alternatively, the funds from the sale of the WEF as scrap metal should be allocated to the rehabilitation of the site.

4.6 CUMULATIVE IMPACT ON SENSE OF PLACE

The Australian Wind Farm Development Guidelines (Draft, July 2010) indicate that the cumulative impact of multiple wind farm facilities is likely to become an increasingly important issue for wind farm developments in Australia. The key concerns in terms of cumulative impacts are largely linked to visual impacts and the impact on rural, undeveloped landscapes.

The Scottish Natural Heritage (2005) describes a range of potential cumulative landscape impacts associated with wind farms on landscapes. The relevant issues raised by the Scottish Natural Heritage Report include:

- Combined visibility (whether two or more wind farms will be visible from one location).
- Sequential visibility (e.g. the effect of seeing two or more wind farms along a single journey, e.g. road or walking trail).
- The visual compatibility of different wind farms in the same vicinity.
- Perceived or actual change in land use across a character type or region.
- Loss of a characteristic element (e.g. viewing type or feature) across a character type caused by developments across that character type.

The guidelines also note that cumulative impacts need to be considered in relation to dynamic as well as static viewpoints. The experience of driving along a tourist road, for example, needs to be considered as a dynamic sequence of views and visual impacts, not just as the cumulative impact of several developments on one location.

The viewer may only see one wind farm at a time, but if each successive stretch of the road is dominated by views of a wind farm, then that can be argued to be a cumulative visual impact (National Wind Farm Development Guidelines, DRAFT - July 2010).

Research on wind farms undertaken by Warren and Birnie (2009) also highlights the visual and cumulative impacts on landscape character. The paper notes that given that aesthetic perceptions are a key determinant of people's attitudes, and that these perceptions are subjective, deeply felt and diametrically contrasting, it is not hard to understand why the arguments become so heated. Because landscapes are often an important part of people's sense of place, identity and heritage, perceived threats to familiar vistas have been fiercely resisted for centuries. The paper also identifies two factors that are important in shaping people's perceptions of wind farms' landscape impacts. The first of these is the cumulative impact of increasing numbers of wind farms (Campbell, 2008). The research found that if people regard a region as having 'enough' wind farms already, then they may oppose new proposals. The second factor is the cultural context. This relates to people's perception and relationship with the landscape. In the South African context, the majority of South Africans have a strong connection with and affinity for the large, undisturbed open spaces that are characteristic of the South African landscape.

Based on the available information there is only one WF located with a 30 km radius of the proposed Boulders WF, namely the adjacent West Coast One WF (Figure 4.1). The potential for cumulative impacts associated with combined visibility (whether two or more wind energy facilities will be visible from one location) and sequential visibility (e.g. the effect of seeing two or more wind energy facilities along a single journey, e.g. road or walking trail) within the 30km radius is therefore high. However, given that the West Coast One and proposed Boulders WF are located adjacent to each other it is likely that they would be viewed as a single WF as opposed to two separate WFs. The Hopefield WF is located ~ 50 km to the east of the Boulders site, while the Darling WF is located ~ 60 km to the south and therefore fall outside the 30 km radius

The assessment of the potential cumulative impact is informed by the VIA (Logis, 2018) and the HIA (Smuts, 2018).The key findings are summarized below.

Visual Impact Assessment

As indicated above, the potential cumulative impact formed a key focus of the VIA (Logis, November 2018). The findings of the VIA indicate that the overall cumulative visual impact will be of high significance due to the:

- The open landscape context of the Paternoster *plateau* (wide panoramic views valued by residents and visitors alike);
- The activities of the residents and visitors (outdoor recreation related to the tourism industry of the region);
- Sensitivity of the visual receptors to wind farm developments (based on comments, responses and objections); and
- The magnitude of the cumulative change to the landscape (in terms of the scale, nature and frequency of combined or sequential views of the turbine structures).

The findings of the VIA indicate that the cumulative visual impact of the proposed Boulders WF and the West Coast 1 WEF is that the construction of all the proposed

wind turbines in their proposed locations may pose a critical risk to the visual quality and landscape of the Paternoster *plateau*. If no mitigation is undertaken (i.e. if the identified wind turbines cannot be relocated or removed) the cumulative visual impact may have as an effect the potential loss of the Paternoster *plateau* as a scenic resource. However, the VIA indicates that with effective mitigation the potential cumulative impact may be within acceptable limits. The recommended mitigation, as a minimum requirement, is the removal or relocation of the wind turbines west of the Vredenburg to Stompneus Bay road and an investigation into the potential overall reduction in the wind turbine size, in order to match the dimensions of the West Coast 1 wind turbines.

Heritage Impact Assessment

As indicated above, the findings of the HIA indicate that the cumulative impacts of the proposed WEF and associated infrastructure on the rural cultural landscape, in context of the authorised West Coast 1 WEF, are **high** given the current layout. As in the case of the VIA, the HIA also recommends that all turbines west of the Vredenburg-Stompneus Bay road be relocated or removed. This is the preferred recommendation. The less preferable alternative recommendation is that all turbines north of Kasteelberg be relocated or removed, but that the turbines south of the Kasteelberg remain.

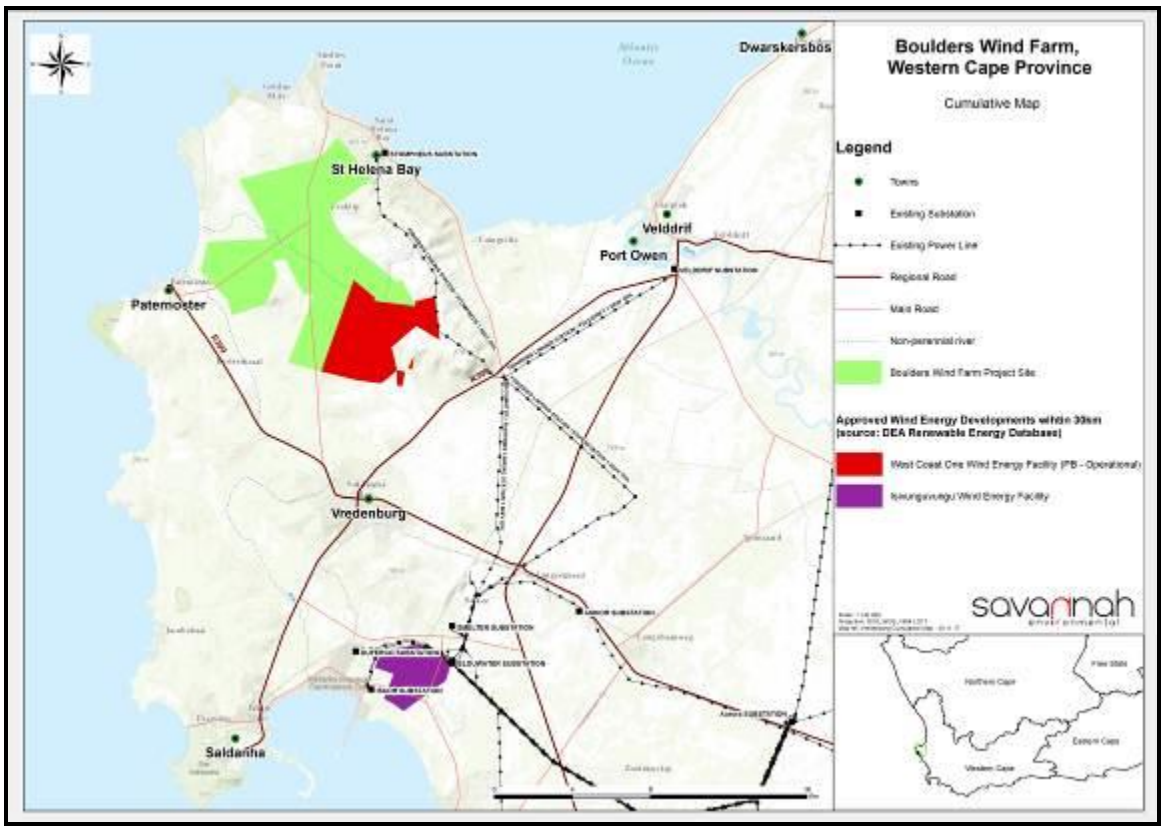

Figure 4.1: Location of renewable energy facilities in the study area

Comment on Alternative 2
Based on the findings of the VIA and HIA the proponent has removed the seven (7) wind turbines located to north of Kasteelbewrg and to the west of the Vredenburg-Stompneus Bay. This is in alignment with the HIA's first alternative, namely that all turbines north of Kasteelberg be relocated or removed, but that the turbines south of the Kasteelberg remain. As indicated above, the HIA notes that this can be considered as an acceptable alternative.

The VIA recommends that all wind turbines west of the Vredenburg to Stompneus Bay Road should be removed or relocated as a minimum requirement to mitigate the visual and cumulative impact. This recommendation is also in line with the preferred alternative recommended by the HIA. This would require the removal or relocation of thirteen (13) wind turbines. Based on the revised layout (Alternative 2), a total of five (5) wind turbines have been effectively removed. While all seven (7) located in the area to the north of Kasteelberg have been relocated or removed, an additional two have been added to the area to the south of Kasteelberg. Therefore, while an attempt has been made to address the visual impact on the areas sense of place, the minimum requirement set by the VIA has not been met. The requirements for the HIAs preferred option have also not been met. Therefore, based on the findings of the VIA and the HIA, Alternative 2 does not fully mitigate the cumulative impacts on the areas visual quality, sense of place and cultural landscape.

Table 4.17 provides an assessment of Alternative 1 and Alternative 2. As indicated in Table 4.17 Alternative 1 is regarded as the No Mitigation Option, while Alternative 2 is assessed as the Mitigation Option. However, as indicated in Table 4.17 the full mitigation measures recommended by the VIA and HIA (preferred option) have not been fully implemented in terms of Alternative 2. The significance rating therefore remains **High Negative.**

Table 4.17: Cumulative impacts on sense of place and the landscape[41]

Nature: Cumulative visual impact associated with the proposed WF and the potential impact on the areas rural sense of place and character		
	Without Mitigation (Alternative 1)	**With Mitigation (Alternative 2)**
Extent	Regional (3)	Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Moderate (8)
Probability	Highly probable (4)	Highly probable (4)
Significance	High (60)	High (60)
Status	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No, facility can be removed.	No, facility can be removed.
Can impact be mitigated?	Yes, if specific turbines are relocated and or removed	Yes, if specific turbines are relocated and or removed
Mitigation: See below		
Residual impacts: None as the visual impact would be removed with the decommissioning of the facility		

Comment on the issue of differences of opinion

As indicated above, the perception of what constitutes a minor or significant visual impact is subjective and differs from person to person. The perception of what constitutes a significant cumulative impact is therefore likely to vary. Table 4.18 provides an assessment of Alternative 1 and Alternative 2 based on feedback from interviewees who indicated that they did not view WFs as having a negative cumulative impact on the landscape and the areas sense of place. Based on the findings of the SIA these interviewees had no preference between Alternative 1 and 2. The significance ratings are therefore the same for both Alternative 1 and 2.

[41] The significance ratings are informed by findings of the VIA and HIA.

Table 4.18: Cumulative impacts on sense of place and the landscape based comments from interviewees that did not perceive visual impacts to be a key issue

Nature: Cumulative visual impact associated with the proposed WF and the potential impact on the areas rural sense of place and character		
	Alternative 1	**Alternative 2**
Extent	Local (1)	Local (1)
Duration	Long term (4)	Long term (4)
Magnitude	Low (2)	Low (2)
Probability	Highly probable (4)	Highly probable (4)
Significance	Low (28)	Low (28)
Status	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No, facility can be removed.	No, facility can be removed.
Can impact be mitigated?	Yes, if specific turbines are relocated and or removed	Yes, if specific turbines are relocated and or removed
Mitigation: See below		
Residual impacts: None as the visual impact would be removed with the decommissioning of the facility		

Assessment of No-Go option
There is no impact as it maintains the current status quo.

Recommended mitigation measures
- The recommendations contained in the VIA and the HIA (preferred alternative) should be implemented, specifically the removal or relocation of all the wind turbines located to the west of the Vredenburg to Stompneus Bay Road.

4.7 CUMULATIVE IMPACT ON LOCAL SERVICES AND ACCOMMODATION

The establishment of the proposed 140 MW Boulders WF and the other renewable energy facilities in the WCDM and SBLM may place pressure on local services, specifically medical, education and accommodation. This pressure will be associated with the influx of workers to the area associated with the construction and operation phases of renewable energy projects proposed in the area, including the proposed WF. The potential impact on local services can be mitigated by employing local community members. The presence of non-local workers during both the construction and operation phases will also place pressure on property prices and rentals. As a result, local residents, such as government officials, municipal workers, school teachers, and the police, may no longer be able to buy or afford to rent accommodation in towns such as Vredenburg, Saldanha Bay, St Helena Bay and Paternoster. However, both Vredenburg and Saldanha Bay are established medium

sized towns. The potential impacts on local services are therefore likely to be low, specifically given that the majority of the low and semi-skilled worker involved in renewable energy projects are likely to come from Vredenburg, Saldanha Bay and other local towns in the area.

In addition, all of the coastal towns have holiday houses that are available for rental. The impact on accommodation is therefore likely to be limited. In addition, as indicated below, this impact should also be viewed within the context of the potential positive cumulative impacts for the local economy associated with the establishment of renewable energy as an economic driver in the area. These benefits will create opportunities for investment in Paternoster, St Helena Bay, Vredenburg and Saldanha Bay, including the opportunity to up-grade and expand existing services and the construction of new houses. In this regard the establishment of renewable energy facilities will create an opportunity for economic development in the area.

The Community Trusts associated with each project will also generate revenue that can be used by the WCDM and SBLM in consultation with the Western Cape Provincial Government, to invest in up-grading local services where required. It should also be noted that it is the function of national, provincial and local government to address the needs created by development and provide the required services. The additional demand for services and accommodation created by the establishment of renewable energy projects should therefore be addressed in the Integrated Development Planning process undertaken by the WCDM and SBLM.

Table 4.17: Cumulative impacts on local services (Alternative 1 and 2)

Nature: The establishment of a number of renewable energy facilities has the potential to place pressure on local services, specifically medical, education and accommodation		
	Without Mitigation	**With Mitigation**
Extent	Local and regional (2)	Local and regional (1)
Duration	Medium term (3)	Medium term (3)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Low (27)	Low (24)
Status	Negative	Negative
Reversibility	Yes. WF components and other infrastructure can be removed.	
Irreplaceable loss of resources?	No	
Can impact be mitigated?	Yes	
Enhancement: See below		
Residual impacts: Pressure on local services that may impact on service delivery		

Comment on No-Go option
There is no impact as it maintains the current status quo.

Recommended mitigation measures
The Western Cape Provincial Government, in consultation with the WCDM and SBLM and the proponents involved in the development of renewable energy projects in the WCDM and SBLM area should consider establishing a Development Forum to co-ordinate and manage the development and operation of renewable energy projects in the area, with the specific aim of mitigating potential negative impacts and enhancing opportunities. This would include identifying key needs, including capacity of existing services, accommodation and housing and the implementation of an accredited training and skills development programmes aimed at maximising the opportunities for local workers to be employed during the construction and operation phases of the various proposed projects. These issues should be addressed in the Integrated Development Planning process undertaken by the WCDM and SBLM.

4.8 CUMULATIVE IMPACT ON LOCAL ECONOMY

In addition to the potential negative impacts, the establishment of the proposed 140 MW Boulders WF and other renewable energy facilities in the area has the potential to result in significant positive cumulative socio-economic opportunities for the region, which, in turn, will result in a positive social benefit. As indicated above, there are a number of renewable energy projects proposed in the SBLM and WCDM. The positive cumulative impacts include the creation of employment, skills development and training opportunities, and downstream business opportunities. The Community Trusts associated with each project will also create significant socio-economic benefits.

The Overview of the IPPP (2017) confirms the benefits associated with renewable energy projects for local and regional economies. The total projected procurement spend for BW1 to BW4, 1S2 and 1S2 during the construction phase was R75 billion, while the operational procurement over 20 years is estimated to be in the region of R72 billion. The reports note that the construction spend of R75 billion has resulted in a substantial stimulus for establishing local manufacturing capacity. Actual local content spend reported for IPPs that have started construction amounts to R38.1 billion against a corresponding project value (as realised to date) of R75.8 billion. This means 50% of the project value has been locally procured, exceeding the 45% commitment from IPPs and the thresholds for BW1 – BW4 (25%-45%). The report also notes that the REIPPPP has prompted several technology and component manufacturers to establish local manufacturing facilities.

The potential cumulative benefits for the local and regional economy are therefore associated with both the construction and operation phases of renewable energy projects and extend over a period of 20-25 years.

Table 4.18: Cumulative impacts on local economy (Alternative 1 and 2)

Nature: The establishment of a number of renewable energy facilities in the WCDM and SBLM will create employment, skills development and training opportunities, creation of downstream business opportunities.		
	Without Mitigation	**With Mitigation**
Extent	Local and regional (3)	Local and regional (4)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Moderate (6)
Probability	Highly Probable (4)	Definite (5)
Significance	Medium (44)	High (70)
Status	Positive	Positive
Reversibility	N/A	
Irreplaceable loss of resources?	No	
Can impact be mitigated?	Yes	
Enhancement: See below		
Residual impacts: Positive impact on the local and regional economy through the creation of downstream opportunities and wage spend in the local economy		

Assessment of No-Go option
There is no impact as it maintains the current status quo. This would represent a lost socio-economic opportunity for the WCDM and SBLM.

Recommended mitigation measures
The proposed establishment of suitably sited renewable energy facilities within the WCDM and SBLM should be supported.

4.9 ASSESSMENT OF NO-DEVELOPMENT OPTION

As indicated above, South Africa currently relies on coal-powered energy to meet more than 90% of its energy needs. As a result South Africa is one of the highest per capita producers of carbon emissions in the world and Eskom, as an energy utility, has been identified as the world's second largest producer carbon emissions. The No-Development option would reduce South Africa's potential to supplement its current energy needs with clean, renewable energy.

While the No-Development Option would result in a continuation of the current status quo it would represent a lost opportunity in terms of the socio-economic benefits associated with construction and operational phase. The SED initiatives that would benefit the local communities in Paternoster and St Helena Bay would also be forgone. Given the current socio-economic conditions in Paternoster and St Helena Bay this would represent a significant negative social cost.

However, at a provincial and national level, it should be noted that the proposed WF development is not unique. In this regard, a significant number of other renewable energy developments are currently proposed in the Western Cape and other parts of South Africa. Foregoing the proposed establishment of WFs would therefore not necessarily compromise the development of renewable energy facilities in the Western Cape Province and or South Africa. However, the socio-economic benefits for local communities of Paternoster and St Helena Bay would be forfeited. In terms of site specific impacts, the no-development option would result in a loss of income for the affected landowners, which would also represent a lost opportunity. In terms of current farming operations, the no-development option would have no impact on current activities.

Table 4.19: Assessment of no-development option (Alternative 1 and 2)

Nature: The no-development option would result in the lost opportunity for South Africa to supplement is current energy needs with clean, renewable energy, creation of SED benefits for local communities and affected landowners		
	Current Status Quo	**Socio-economic impact if project is developed**
Extent	N/A	Local and regional (4)
Duration	N/A	Long term (4)
Magnitude	N/A	Moderate (6)
Probability	N/A	Highly Probable (4)
Significance	N/A	Medium (56)
Status	N/A	Positive
Reversibility	Yes. WF components and other infrastructure can be removed.	
Irreplaceable loss of resources?	No	
Can impact be mitigated?	Yes	
Mitigation: See below		
Cumulative impacts: Reduced carbon emissions, improved socio-economic opportunities for local communities in Paternoster and St Helena Bay and affected landowners		
Residual impacts: See cumulative impacts		

4.10 COMMENT ON DIFFERENT VIEWS ON THE WIND FARM

Based on the findings of the SIA there are a number of members of the local community who appear to be strongly opposed to the proposed Boulders WF. However, there are also members of the community of Paternoster and St Helena Bay who support the development of the WF and/or are indifferent to the project. A number of community members that support the proposed WF are HD members of the local community that have lived in the area for generations.

Opposition to the proposed WF is largely linked to the visual impact associated with the wind turbines and the associated impact that this will have on the areas sense of place, property values and tourism. Concerns have also been raised regarding the potential impact on birds. The concerns relating to impact on property values are largely linked to residents of Britannica Heights.

Support for the proposed WF is associated with the potential employment and socio-economic opportunities associated with the project, including the potential opportunities associated local shareholding and SED contributions during the operation phase. As indicated above, the majority of the community members that support the proposed development are HDIs that were born in the area and who have a long standing association with the area. The support of the proposed WF is however conditional on a commitment from the developers make provision for community shareholding, the creation of meaningful employment opportunities for local community members during both the construction and operation phases, and the implementation of an effective socio-economic development (SED) programme. Local community representatives have also indicated that the focus should be on benefitting the communities of the Paternoster and the St Helena Bay areas.

SECTION 5: KEY FINDINGS AND RECOMMENDATIONS

5.1 INTRODUCTION

Section 5 lists the key findings of the study and recommendations. These findings are based on:

- A review of the issues identified during the Scoping Process;
- A review of key planning and policy documents pertaining to the area;
- Semi-structured interviews with interested and affected parties[42];
- A review of social and economic issues associated with similar developments;
- A review of selected specialist studies undertaken as part of the EIA[43];
- A review of relevant literature on social and economic impacts;
- The experience of the authors with other wind energy projects in South Africa.

5.2 SUMMARY OF KEY FINDINGS

The key findings of the study are summarised under the following sections:

- Fit with policy and planning;
- Construction phase impacts;
- Operation phase impacts;
- Cumulative Impacts;
- Decommissioning phase impacts;
- No-development option.

5.2.1 Policy and planning issues

The findings of the review indicated that renewable energy is strongly supported at a national, provincial and local level. The development of and investment in renewable energy is supported by the National Development Plan (NDP), New Growth Path Framework and National Infrastructure Plan, which all make reference to renewable energy. The development of renewable energy is also strongly supported by the National Integrated Energy Plan (2016) and Draft Integrated Resource Plan (August 2018). At a provincial level the development of renewable energy is supported by the Western Cape Provincial Strategic Plan, Western Cape Provincial Spatial Development Framework (SDF), West Coast District Municipality Integrated Development Plan (IDP) and SDF and the Saldanha Bay Municipality IDP and SDF.

However, while these documents all support the development of renewable energy in principle, some also provide guidance on the location of renewable energy facilities[44].

[42] This includes interviews undertaken in 2016 as part of the previous EIA process.
[43] Visual Impact Assessment, Heritage Impact Assessment and Assessment of economic impacts, and Impact on Property Values and Tourism.
[44] A detailed review of key policy and planning documents is provided in Section 4.2.

Of specific relevance the West Coast District Municipality SDF notes that wind farms should be located where they will cause least visual impact taking into consideration the viability of the project and located where their visual and environmental impact will be the lowest. The Saldanha Bay SDF and IDP refer to the principles contained in the 2006 DEA&DP Regional Methodology document, specifically that large, commercial WEF developments should be excluded from areas with high aesthetic landscape value.

In conclusion, based on the review of key planning documents that pertain to the study area it is clear that the development of renewable energy (including wind farms) in the West Coast District and Saldanha Bay Local Municipality is strongly supported. However, there is a need to ensure that the siting of renewable energy facilities (including wind farms) are appropriately located and do not impact on the areas scenic assets and tourism potential. These issues will need to be considered by the relevant authorities when considering the application.

5.2.2 Construction phase impacts

Alternative 1 and 2 both consist of forty five (45) wind turbines. As such there will be no difference in the nature and significance of the construction related impacts between Alternative 1 and 2. The summary of findings presented below therefore applies to both Alternative 1 and 2.

The key social issues associated with the construction phase include:

Potential positive impacts

- Creation of employment and business opportunities, and the opportunity for skills development and on-site training;

Employment

813 direct full-time equivalent person-years will be created during the construction of the proposed Boulder Wind Farm. Based on other WF projects approximately 55% will be taken up by low skilled workers, 30% by semi-skilled workers and 15% by skilled workers. The majority of the low skilled and a proportion of the semi-skilled employment opportunities are likely to accrue to Historically Disadvantaged (HD) members from the local WCDM and SBLM community. The levels of unemployment in the SBLM are high, specifically on the St Helena Bay area. The creation of potential employment opportunities, even temporary employment, will represent a significant, if localised, social benefit. In addition to the direct jobs created, the project will also create employment opportunities through backward linkages. It is estimated that an additional 1 049 full-time equivalent person-years will be created through the multiplier effects. Overall, the project is expected to create a total of 1 861 full-time equivalent person-years, which equates to about 931 jobs created and maintained for two years (Urban Econ, June 2018).

The potential benefits for local communities is confirmed by the findings of the Overview of the Independent Power Producers Procurement Programme (IPPPP) undertaken by the Department of Energy, National Treasury and DBSA (30 June 2017). The study found that employment opportunities created during the construction phase of the projects implemented to date had created 40% more job years[45] for South African citizens than anticipated. The study also found that

[45] The equivalent of a full time employment opportunity for one person for one year

significantly more people from local communities were employed during construction than was initially planned.

The number of low skilled and semi-skilled positions taken up by members from the local community will depend on the effective implementation of these enhancement measures by the proponent in consultation with the WCDM and SBLM. In this regard the local Councillor (Mrs Scholtz) indicated that the local Paternoster and St Helena Bay communities did not benefit significantly from the employment opportunities associated with the construction of West Coast One WF. Mrs Scholtz indicated that these communities should be earmarked for preferential employment and skills training.

Capital investment and business opportunities

The Boulders Wind Farm will require an investment of ~ R1.5 billion, of which 33% or R494 million will be spent in South Africa (Urban Econ, June 2018). Construction will last for just about two years. During this period, the procurement of goods and services will create a direct, as well as a multiplier effect on the economic activities in the local economy of the SBLM, as well as the provincial economy of the Western Cape, and possibly the national economy. The expenditure of R 494 million on procurement of construction-related services, materials, equipment, machinery and other items is expected to generate an additional R573 million through multiplier effects. The project will therefore result in an increase in domestic production in the region of R1.06 billion over the two-year construction period (Urban Econ, June 2018).

The Green Jobs study (IDC, DBSA, and TIPS, 2011) found that South Africa is in a position to leverage upon some of its existing manufacturing capacities in order to produce components and parts for various sections of wind turbines, especially those industries involved in the production of steel and metal products, as well as the boat building and electrical industries. These types of industries are all located in the Saldanha Bay Municipality and the broader West Coast DM. A Market Intelligence Report on Renewable Energy (Greencape, 2014) indicates that a Green Development Hub is being established in Atlantis. In this regard Gestamp has established a wind turbine manufacturing operation in Atlantis. The proposed WF will therefore create opportunities for engineering and construction companies in Vredenburg and Saldahna Bay. Opportunities will also be created for companies based Cape Town and Atlantis.

The wage bill for the construction phase will be in the region of R 200 million (Urban Econ, June 2018). Given that the construction workers will be based in local towns in the area, specifically Paternoster, St Helena Bay and Vredenburg, a percentage of the wage bill will be spent in the local economy over the 18-24 month construction phase. This will create opportunities for local businesses in local towns in the area. The sector of the local economy that is most likely to benefit from the proposed development is the local service industry. The potential opportunities for the local service sector are linked to accommodation, catering, cleaning, transport and security, etc. associated with the construction workers on the site. The local tourism industry in the area, including restaurants and accommodation facilities, will also benefit.

The implementation of the proposed enhancement measures would also enable the establishment of the proposed WF to support co-operation between the public and

private sectors which would support local economic development in the WCDM and SBLM.

Training and skills development
The construction phase has the potential to create training and skills development opportunities that would benefit local community members, specifically HDIs from Paternoster and St Helena Bay. Representatives from the SBLM and the local communities recommended that the developer implement a training and skills development skills prior to the commencement of the construction phase so as to ensure that local employment opportunities are maximised. The interviewees also indicated that the skills development and training programme should focus on community members from Paternoster and the St Helena Bay area.

Potential negative impacts
- Impacts associated with the presence of construction workers on site and in the area;
- Influx of job seekers to the area;
- Increased safety risk to farmers, risk of stock theft and damage to farm infrastructure associated with presence of construction workers on the site;
- Increased risk of grass fires;
- Impact of heavy vehicles, including damage to roads, safety and dust;
- Impact on farming activities.

The findings of the SIA indicate that the significance of all the potential negative impacts with mitigation were **Low Negative**. The potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented. Given that the majority of the low and semi-skilled construction workers can be sourced from the local area the potential risk posed by construction workers on local family structures and social networks is regarded as low for the community as a whole. Table 5.1 summarises the significance of the impacts associated with the construction phase. The significance ratings apply to Alternative 1 and 2.

Table 5.1: Summary of impacts associated with construction phase

Impact	Significance No Mitigation/ Enhancement	Significance With Mitigation/ Enhancement
Creation of employment and business opportunities	Medium (+)	Medium (+)
Presence of construction workers and potential impacts on family structures and social networks	Medium (-)	Low (-)
Influx of job seekers	Low (-)	Low (-)
Increased risks to livestock and farming infrastructure associated with the construction related activities and presence of construction workers on the site	Medium (-)	Low (-)
Increased fire risk	Medium (-)	Low (-)
Impact of heavy vehicles and construction activities	Medium (-)	Low (-)
Impact on farming activities	Medium (-)	Low (-)

5.2.3 Operation phase

Both alternatives consist of forty five (45) wind turbines. As such the potential positive impacts associated with Alternative 1 and 2 are the same. Based on the findings of the Visual Impact Assessment (VIA)(Logis, November 2018) and the Heritage Impact Assessment (HIA)(Smuts, November 2018) the potential visual impacts on the areas sense of place and the cultural landscape will differ. This is reflected in the assessment below.

The key social issues affecting the operation phase include:

Potential positive impacts

- The establishment of renewable energy infrastructure.
- Creation of employment and business opportunities. The operation phase will also create opportunities for skills development and training;
- Generate income of affected landowners;
- Socio-economic benefits for local communities..

Development of renewable energy infrastructure

The establishment of renewable energy infrastructure, such as the proposed Boulders WF, should be viewed, firstly within the context of the South Africa's current reliance on coal powered energy to meet the majority of its energy needs, and secondly, within the context of the success of the REIPPPP.

The Green Jobs study (2011) notes that South Africa has one of the most carbon-intensive economies in the world, thus making the greening of the electricity mix a national imperative. The Greenpeace Report (Powering the future: Renewable Energy Roll-out in South Africa, 2013), notes that within a broader context of climate change, coal energy does not only have environmental impacts, it also has socio-economic impacts. Acid mine drainage from abandoned mines in South Africa impacts on water quality and poses the biggest threat to the country's limited water resources. Huge volumes of water are also required to wash coal and cool operating power stations.

The Green Jobs study (2011) identifies a number of advantages associated with wind power as a source of renewable energy, including zero carbon dioxide (CO_2) emissions during generation and low lifecycle emissions. Greenhouse gases (GHG) associated with the construction phase are offset within a very short period of time compared with the project's lifespan. Wind power therefore provides an ideal means for reaching emission reduction targets in a relatively easy manner. In addition, and of specific relevance to South Africa, wind as energy source is not dependent on water (as compared to the massive water requirements of conventional power stations), has a limited footprint and therefore does not impact on large tracts of land, poses limited pollution and health risks, specifically when compared to coal and nuclear energy plants.

In terms of investment, the REIPPPP has attracted R48.8 billion in foreign investment and financing in the seven bid windows (BW1 – BW4, 1S2 and IS2). This is more than double the inward FDI attracted into South Africa during 2015 (R22.6 billion). In terms of local equity shareholding, 48% (R31.5 billion) of the total equity shareholding (R66.7 billion) was held by South African's across BW1 to BW4, 1S2 and IS2. As far as Broad Based Black Economic Empowerment is concerned, Black South Africans own, on average, 31% of projects that have reached financial close.

The combined (construction and operations) procurement value for BW1 to BW4, 1S2 and IS2 is projected as R147.6 billion, of which R47.4 billion has been spent to date. In terms of employment, a total of 32 532 job years[46] have been created for South African citizens, of which 29 046 were in construction and 3 486 in operations.

The establishment of renewable energy facilities, such as the Boulders WF, therefore not only address the environmental issues associated with climate change and consumption of scarce water resources, but also creates significant socio-economic opportunities and benefits, specifically for historically disadvantaged, rural communities.

Creation of employment and business opportunities

The project will employ in the region of 17 people, the majority of who will be technicians (Urban Econ, June 2018). Given that the average household size in the SBLM 3.5, it could be argued that a total of 60 people will benefit from the project as a result of the direct employment created by the Boulders Wind Farm. In addition, another 33 full-time equivalent jobs could be created through the multiplier effect primarily within agriculture, trade, business services, and community services sectors. The annual wage bill for the operation phase would be ~ R 3.5 million (Urban Econ, 2018). With effective training and skills development the majority of employment opportunities associated with the operation phase is likely to benefit HDIs from the local of the community.

Procurement during the operation phase will also create opportunities for the local economy and businesses. In this regard the overview of the IPPPP (2017) notes that the procurement spend over the 20 year operation phase for BW1 to BW4, 1S2 and IS2 will be in the region of R 75 billion. The Green Jobs study (2011) also found that energy generation is expected to become an increasingly important contributor to green job creation over time, as projects are constructed or commissioned. The study notes that largest gains are likely to be associated with operations and maintenance (O&M) activities. In this regard, operations and maintenance employment linked to renewable energy generation plants will also be substantial in the longer term.

The establishment of WFs, such as the proposed WF, also support the development of a green energy manufacturing sector in South Africa. Manufacturing segments with high employment potential in the long term would include suppliers of components for wind farms, such as Gestamp in Atlantis. The Green Jobs study (2011) found that South Africa is in a position to leverage upon some of its existing manufacturing capacities in order to produce components and parts for various sections of wind turbines, especially those industries involved in the production of steel and metal products, as well as the boat building and electrical industries. Local manufacturing capacity can be promoted through engagement with established global manufacturers. The study does however note that critical mass would have to be developed in order to obtain economies of scale. The establishment of WFs, such as the proposed WF, would therefore contribute to achieving this critical mass.

The study also found that there was also significant potential for local involvement in the wind sector. Local companies can also exploit market opportunities in other

[46] The equivalent of a full time employment opportunity for one person for one year

African countries with higher wind power potential. This would create additional opportunities for improving economies of scale and enhancing the local industry's chances to succeed.

Generate income for affected landowners

The income earned by the farmers whose land the wind turbines are located on will reduce the risks to their livelihoods posed by droughts and fluctuating market prices for their outputs and inputs, such as fuel, feed etc. The additional income from the WF would therefore improve economic security of farming operations, which in turn would improve job security of farm workers and benefit the local economy.

Socio-economic benefits for local communities

An important focus of the REIPPPP is to ensure that the build programme secures sustainable value for the country and enables local communities to benefit directly from the investments attracted into the area. In this regard IPPs are required to contribute a percentage of projected revenues accrued over the 20 year project operational life toward socio-economic development (SED) initiatives. These contributions are linked to Community Trusts and accrue over the 20 year project operation life and are used to invest in housing and infrastructure as well as healthcare, education and skills development.

The establishment of a community benefit structure (typically, a Community Trust) also creates an opportunity to support local economic development in the area. The requirement for the project to allocate funds to socio-economic contributions (through structures such as Community Trusts) provides an opportunity to advance local community projects, which is guaranteed for a 20 year period (project lifespan). The revenue from the proposed WEF can be used to support a number of social and economic initiatives in the area, including but not limited to:

- Creation of jobs;
- Education;
- Support for and provision of basic services;
- School feeding schemes;
- Training and skills development; and
- Support for SMME's.

The minimum compliance threshold for SED contributions is 1% of revenue with 1.5% the targeted level over the 20 year project operational life. The current portfolio of projects has committed on average 2.2%, which is 125% higher than the minimum threshold level. The 57 projects that are currently operational have contributed R407.7 million to SED. The province with the highest SED contribution has been the Northern Cape, followed by the Eastern and Western Cape respectively (IPPP Overview, 2016).

The 2017 IPPP Overview notes that to date (across 7 bid windows) a total contribution of R20.6 billion has been committed to Socio-economic Development (SED) initiatives linked to Community Trusts. Of this total commitment, R16.5 billion has been specifically allocated to local communities where the IPPs operate. The Green Jobs study (2011), found that the case for wind power is enhanced by the positive effect on rural or regional development. Wind farms located in rural areas create an opportunity to benefit the local and regional economy through the creation of jobs and tax revenues. In this regard the towns of Paternoster and St Helena Bay can be regarded in the same category of small rural towns.

The long term duration of the contributions from the WEF also enables local municipalities and communities to undertake long term planning for the area. Experience has, however, shown that Community Trusts can be mismanaged. This issue will need to be addressed in order to maximise the potential benefits associated with the establishment of a Community Trust or other community benefit structure (entity). The REIPPP programme does however have stringent audit requirements in place to try and prevent the mismanagement of trusts.

The findings of the SIA indicate that the social spend associated with the West Coast One WF has created a number of benefits for local communities in the SBLM, specifically communities and households in the low-middle income suburb of Louwville in Vredenburg. Aurora Power which operates West Coast One has teamed up with ELRU (Early Learning Resource Unit), Soul City and Valued Citizens to support Early Childhood Education (ECD) programmes and secondary and primary schools in the SBLM as part of it socio-economic development (SED) contribution. The SED contribution associated with the West Coast One WF has benefitted a significant number of community members living in the SBLM, specifically HD school children and their families. A well-managed SED programme associated with the proposed Boulders WF would have similar benefits and would add to the benefits already associated with the West Coast One WF.

Potential negative impacts

- The visual impacts and associated impact on sense of place;
- Impact on property values; and
- Potential impact on tourism.

Visual impacts and impact on sense of place

The findings of the SIA indicate that a number of stakeholders, specifically residents in Britannica Heights, have raised concerns regarding the visual impacts associated with the proposed Boulders WF. Some residents from Paternoster have also raised concerns regarding visual impacts. However, the perception of what constitutes a high negative impact is subjective and differs from person to person. In this regard a number of interviewees indicated that they did not regard the wind turbines associated with the existing West Coast One WF as having a negative impact on the landscape and the areas sense of place. Likewise they also indicated that they did not believe that the wind turbines associated with proposed Boulders WF would result in a negative visual impact.

The findings of the Visual Impact Assessment (Logis, October 2018) indicate that the cumulative visual impact of the West Coast 1 WEF and the Boulders WF is expected to be of high negative significance. In this regard the findings of the VIA indicate that the construction of all the proposed wind turbines in their proposed locations may pose a critical risk to the visual quality and landscape of the Paternoster *plateau*. If no mitigation is undertaken (i.e. if the identified wind turbines cannot be relocated or removed) the cumulative visual impact may have as an effect the potential loss of the Paternoster *plateau* as a scenic resource. If mitigation is considered the potential cumulative impact may be within acceptable limits. This would include, as a ***minimum requirement***, the removal or relocation of the wind turbines west of the Vredenburg to Stompneus Bay Road and an investigation into the potential overall reduction in the wind turbine size, in order to match the dimensions of the West Coast 1 wind turbines.

The findings of the HIA (Smuts, October 2018) also indicated that the impact of Alternative 1 on the rural cultural landscape would be **High Negative**. The preferred alternative for the HIA also recommends the removal or relocation of the wind turbines west of the Vredenburg to Stompneus Bay Road to address this impact. With mitigation the impact is regarded as **Moderate Negative**.

Comment on Alternative 2

The VIA recommends that all thirteen (13) wind turbines west of the Vredenburg to Stompneus Bay Road should be removed or relocated as a minimum requirement to mitigate the visual and cumulative impact. This recommendation is also in line with the preferred alternative recommended by the HIA. While all seven (7) located in the area to the north of Kasteelberg have been relocated or removed, an additional two have been added to the area to the south of Kasteelberg. Therefore, while an attempt has been made to address the visual impact on the areas sense of place, the minimum requirement set by the VIA has not been met. The requirements for the HIAs preferred option have also not been met. Therefore, based on the findings of the VIA and the HIA, Alternative 2 does not fully mitigate the impacts on the areas visual quality, sense of place and cultural landscape.

However, the SIA also found that a number of interviewees did not identify visual impacts as a key concern. These interviewees had no preference between Alternative 1 and 2.

Impact on property values

The potential impact of the proposed Boulders WF on property values was raised as a key concern, specifically by residents of Britannica Heights and Paternoster. A literature review was undertaken as part of the SIA. In addition, an assessment of the potential impact on property values was included in the study undertaken by Urban Econ as part of the EIA (Property Values, Tourism and Economic Issues Assessment Report, Urban Econ, June 2018). The potential impact on property values was also assessed by a study undertaken by the Appraisal Corporation (July 2018).

The findings of the literature review indicate that the most comprehensive study appears to the study by Gibbons (2014), which found that "averaging over wind farms of all sizes" the price reduction was around 5-6% within 2km, falling to less than 2% between 2 and 4km, and less than 1% by 14km which is at the limit of likely visibility. The properties that stand to be most affected are those located in Britannica Heights and to a lesser degree Paternoster. Based on the information from the Visual Impact Assessment (VIA)(Logis, October 2018), the closest turbines are located 4.1km and 5.4km from Britannica Heights and Paternoster respectively. Based on the findings of the Gibbons study the potential impact on residential property values in Paternoster would be less than 2%. In addition, the value of the properties in Paternoster is largely linked to the village's coastal location and its traditional, west coast architecture. The demand for properties and their market value have continued to increase despite the establishment of the West Coast One WF. The proposed Boulders WF is therefore unlikely to impact on the property values in Paternoster. This is also confirmed by the findings of the studies undertaken by Urban Econ and Appraisal Corporation. The findings of the study undertaken by the Appraisal Corporation found the proposed Boulders Wind Farm Project, will not impact negatively on the market values of properties in the area.

In terms of potential impact on agricultural properties, the findings of the Urbis (2016) study indicate that "wind farms may not significantly impact rural properties used for agricultural purposes". This finding was also supported by the Appraisal Corporation study.

However, while the findings of the literature review indicate that the impact on property values is less than 2% for distances of between 2 and 4km, is it recognised that property values in Britannica Heights are linked to the views towards the south. These views have been impacted by the existing wind turbines associated with the West Coast One WF, which are located in the region of 8-9 km from Britannica Heights. Given that the wind turbines will be located closer to Britannica Heights, the establishment of the proposed Boulders WF will increase the visual impact on the properties in Britannica Heights. This may influence potential buyers, which, in turn, may impact on property values. The magnitude of this potential impact cannot however be quantified based on the available information. However, the study undertaken by the Appraisal Corporation indicated that the proposed Boulders WF is unlikely to impact on property values in the area, including Britannica Heights.

While the findings of the literature review and the studies undertaken by Urban Econ and the Appraisal Corporation indicate that the proposed Boulders WF (Alternative 1 and 2) is unlikely to impact on property values, Alternative 2 would be the preferred option given the reduced impact of views from Britannica Heights towards Kasteelberg and Paternoster.

Impact on tourism

Based on the findings of the literature review there is limited evidence to suggest that the proposed Boulders WF would impact on impact on the areas tourism industry, specifically Paternoster. The findings also indicate that wind farms do not impact on tourist routes. In this regard the findings of research by Professor Atchison (April, 2012) for the Scottish Government found that the "findings from both primary and secondary research relating to the actual and potential tourism impact of wind farms indicate that there will be neither an overall decline in the number of tourists visiting an area nor any overall financial loss in tourism-related earnings as a result of a wind farm development".

The findings of the Urban Econ (June 2018) support the findings of the literature review, namely that the proposed Boulders WF is unlikely to have a measurable impact on tourism in the area.

While the findings of the literature review and the Urban Econ study indicate that the potential impact on tourism of Alternative 1 and 2 is likely to be low, Alternative 2 is the preferred option given the reduced impact on Kasteelberg and views towards the coast from the Vredenburg-Stompneus Bay Road.

Table 5.2 summarises the significance of the impacts associated with the operation phase. The significance ratings apply to Alternative 1 and 2.

Table 5.2: Summary of impacts associated with operation phase

Impact	Significance No Mitigation/ Enhancement	Significance With Mitigation/ Enhancement
Promotion of renewable energy projects	High (-)	High (+)
Creation of employment and business opportunities	Medium (+)	Medium (+)
Generate additional income for landowners	Medium (+)	Medium (+)
Establishment of Community Trust	Medium (+)	High (+)
Visual impact and impact on sense of place (based on VIA and HIA)	High (-)	Moderate-High (-)[47]
Visual impact and impact on sense of place (interviewees that were not concerned about visual impacts)	Low (-)	Low (-)
Impact on property values	Low (-)	Low (-)
Impact on tourism	Low (- and +)	Low (- and +)

5.2.4 Assessment of cumulative impacts

Cumulative impact on sense of place

Based on the available information there is only one WF located with a 30 km radius of the proposed Boulders WF, namely the adjacent West Coast One WF (Figure 4.1). The potential for cumulative impacts associated with combined visibility (whether two or more wind energy facilities will be visible from one location) and sequential visibility (e.g. the effect of seeing two or more wind energy facilities along a single journey, e.g. road or walking trail) within the 30km radius is therefore high. However, as indicated above, the findings of the review on tourism found that wind farms do not impact on tourist routes.

The potential cumulative impact formed a key focus of the VIA (Logis, 2018). The findings of the VIA indicate that the construction of all the proposed wind turbines in their proposed locations may pose a critical risk to the visual quality and landscape of the Paternoster *plateau*. If no mitigation is undertaken (i.e. if the identified wind turbines cannot be relocated or removed) the cumulative visual impact may have as an effect the potential loss of the Paternoster *plateau* as a scenic resource. However, the VIA indicates that with effective mitigation the potential cumulative impact may be within acceptable limits. The recommended mitigation, ***as a minimum requirement***, is the removal or relocation of the wind turbines west of the Vredenburg to Stompneus Bay Road and an investigation into the potential overall reduction in the wind turbine size, in order to match the dimensions of the West Coast 1 wind turbines.

The findings of the HIA also indicate that the cumulative impacts of the proposed WEF and associated infrastructure on the rural cultural landscape, in context of the authorised West Coast 1 WEF, are **high** given the current layout. As in the case of the VIA, the preferred alternative for the HIA also recommends that all turbines west of the Vredenburg-Stompneus Bay Road be relocated or removed. The less

[47] The full mitigation measures recommended by the VIA and HIA (preferred option) which require the removal of all wind turbines to the west of the Vredenburg-Stompneus Bay Road have not been fully implemented in terms of Alternative 2. The significance rating therefore remains **Moderate-High Negative.**

preferable alternative recommendation is that all turbines north of Kasteelberg be relocated or removed, but that the turbines south of the Kasteelberg remain. With mitigation the impact is regarded as **Moderate Negative**.

Comment on Alternative 2
The VIA recommends that all thirteen (13) wind turbines west of the Vredenburg to Stompneus Bay Road should be removed or relocated as a minimum requirement to mitigate the visual and cumulative impact. This recommendation is also in line with the preferred alternative recommended by the HIA. While all seven (7) located in the area to the north of Kasteelberg have been relocated or removed, an additional two have been added to the area to the south of Kasteelberg. Therefore, based on the findings of the VIA and the HIA, Alternative 2 does not fully mitigate the cumulative impacts on the areas visual quality, sense of place and cultural landscape.

However, the SIA also found that a number of interviewees did not identify visual impacts as a key concern. These interviewees had no preference between Alternative 1 and 2.

Cumulative impact on services
The establishment of the proposed Boulders WF and the other renewable energy facilities in the WCDM and SBLM may place pressure on local services, specifically medical, education and accommodation. This pressure will be associated with the potential influx of workers to the area associated with the construction and operation phases of renewable energy projects proposed in the area, including the proposed WEF. The potential impact on local services can be mitigated by employing local community members. With effective mitigation the impact is rated as **Low Negative.**

In addition, as indicated below, this impact should also be viewed within the context of the potential positive cumulative impacts for the local economy associated with the establishment of renewable energy as an economic driver in the area. These benefits will create opportunities for investment in the SBLM, including the opportunity to up-grade and expand existing services. In this regard the establishment of a renewable energy will create an opportunity for economic development in the area.

Cumulative impact on local economies
In addition to the potential negative impacts, the establishment of the proposed WF and other renewable energy projects in the area also has the potential to create a number of socio-economic opportunities for the WCDM and SBLM, which, in turn, will result in a positive social benefit. The positive cumulative impacts include creation of employment, skills development and training opportunities, creation of downstream business opportunities. The SED contributions associated with each project will also create significant socio-economic benefits. This benefit is rated as **High Positive** with enhancement.

5.2.5 Potential health impacts

The potential health impacts typically associated with WFs include, noise, shadow flicker and electromagnetic radiation. As indicated above, the findings of a literature review undertaken by the Australian Health and Medical Research Council published in July 2010 indicate that there is no evidence of wind farms posing a threat to human health. The research also found that wind energy is associated with fewer

health effects than other forms of traditional energy generation and in fact will have positive health benefits (WHO, 2004). Based on these findings it is assumed that the significance of the potential health risks posed by the proposed WF is of **Low Negative** significance.

5.2.6 Assessment of no-development option

The No-Development option would reduce South Africa's potential to supplement its current energy needs with clean, renewable energy. While the No-Development Option would result in a continuation of the current status quo it would represent a lost opportunity in terms of the socio-economic benefits associated with construction and operational phase. The SED initiatives that would benefit the local communities in Paternoster and St Helena Bay would also be forgone. Given the current socio-economic conditions in Paternoster and St Helena Bay this would represent a significant negative social cost.

However, at a provincial and national level, it should be noted that the proposed WF development is not unique. In this regard, a significant number of other renewable energy developments are currently proposed in the Western Cape and other parts of South Africa. Foregoing the proposed establishment of WFs would therefore not necessarily compromise the development of renewable energy facilities in the Western Cape Province and or South Africa. However, the socio-economic benefits for local communities of Paternoster and St Helena Bay would be forfeited. In terms of site specific impacts, the no-development option would result in a loss of income for the affected landowners, which would also represent a lost opportunity. In terms of current farming operations, the no-development option would have no impact on current activities.

5.2.7 Decommissioning phase

In the case of decommissioning ~ 17 permanent jobs associated with the operation phase would be lost. The potential impacts associated with the decommissioning phase can however be effectively managed with the implementation of a retrenchment and downscaling programme. With mitigation, the impacts are assessed to be **Low Negative.**

5.3 COMMENT ON DIFFERENT VIEWS ON THE WIND FARM

The findings of the SIA indicate that there is both opposition to and support for the proposed Boulders WF. The opposition to the proposed WF is largely linked to the visual impact associated with the wind turbines and the associated impact that this will have on the areas sense of place, property values and tourism. Concerns have also been raised regarding the potential impact on birds. The concerns relating to impact on property values are largely linked to residents of Britannica Heights.

Support for the proposed WF is associated with the potential employment and socio-economic opportunities associated with the project, including the potential opportunities associated local shareholding and SED contributions during the operation phase. The majority of the community members that support the proposed development are HDIs that were born in the area and who have a long a long standing association with the area. The support of the proposed WF is however conditional on a commitment from the developers make provision for community

shareholding, the creation of meaningful employment opportunities for local community members during both the construction and operation phases, and the implementation of an effective socio-economic development (SED) programme. Local community representatives have also indicated that the focus should be on the benefitting the communities of Paternoster and the St Helena Bay area.

5.4 CONCLUSIONS AND RECOMMENDATIONS

Conclusion

The findings of the SIA indicate that the development of the proposed Boulders WF will create employment and business opportunities for locals during both the construction and operation phases of the project. The establishment of a Community Trust will also benefit the local community. The proposed development also represents an investment in clean, renewable energy infrastructure, which, given the negative environmental and socio-economic impacts associated a coal based energy economy and the challenges created by climate change, represents a significant positive social benefit for society as a whole. The findings of the SIA also indicate that the Renewable Energy Independent Power Producers Procurement Programme (REIPPPP) has resulted in significant socio-economic benefits, both at a national level and at a local, community level. These benefits are linked to foreign Direct Investment, local employment and procurement and investment in local community initiatives. The establishment of the proposed Boulders WF will therefore create positive socio-economic benefits for the area and the local community, specifically the local community in Paternoster and the St Helena Bay area, the majority of who are HDIs.

The key concerns identified during the SIA relate to the visual impacts associated with the wind turbines, and the potential impact on the areas sense of place, property values and tourism. A number of local residents also indicated that they did not regard the wind farm as having a negative visual impact. Visual impacts and the impact on sense of place were confirmed by the findings of the VIA (Logis 2018) and HIA (Smuts 2018).

The findings of the VIA and HIA also indicate that with effective mitigation the potential visual impacts may be within acceptable limits. The recommended mitigation involves the removal or relocation of wind turbines west of the Vredenburg to Stompneus Bay Road. Alternative 2 represents a response to the findings of the VIA and HIA. In terms of Alternative 2 the seven (7) wind turbines located to north of Kasteelberg and to the west of the Vredenburg-Stompneus Bay Road have been relocated. Five have been relocated to the east of the road, while two (2) wind turbines have been added to the area to the south of Kasteelburg. Therefore, while an attempt has been made to address the visual impact on the areas sense of place, the minimum requirement set by the VIA and the preferred option of the HIA, namely the removal of all wind turbines to the west of the Vredenburg-Stompneus Bay Road has not been fully met.

Based on the findings of the literature review undertaken as part of the SIA and the findings of the Urban Econ (June 2018) and Appraisal Corporation (July 2018) studies the potential impact on residential property values in Paternoster is likely to be negligible. However, while the findings of the literature review indicate that the impact on property values is less than 2% for distances of between 2 and 4km, is it recognised that property values in Britannica Heights are linked to the views towards

the south. These views will be further impacted by the wind turbines associated with the proposed Boulders WF. The magnitude of this potential impact cannot be quantified based on the available information. However, the study undertaken by the Appraisal Corporation indicated that the proposed Boulders WF is unlikely to impact on property values in the area, including Britannica Heights.

In terms of the potential impact on tourism, there is limited evidence in the literature to suggest that the proposed Boulders WF will impact on the areas tourism industry. This finding was supported by the Urban Econ study (June 2018). The findings of the literature also indicate that wind farms do not impact on tourist routes.

In conclusion, the impact on the areas sense of place is an issue that the relevant authorities will need to consider when assessing the application. As indicated above, while the development of renewable energy (including wind farms) in the West Coast District and Saldanha Bay Local Municipality is strongly supported, the key policy and planning documents highlight the need to ensure that renewable energy facilities are appropriately located and do not impact on the areas scenic assets and tourism potential. In this regard the HIA indicates that the wider area has been proposed as a Grade II cultural landscape.

Based on the findings of the VIA and HIA the visual impacts and impact on the areas cultural landscape can be addressed by the removal and or relocation of all wind turbines located to the west of the Vredenburg to Stompneus Bay Road. These measures are also considered acceptable to address the social impacts associated with visual impacts on the areas sense of place and cultural landscape. As indicted above, an attempt has been made to address the visual impact by removing seven (7) turbines located in the area to the north of Kasteelburg and west of the Vredenburg to Stompneus Bay Road. However, the minimum requirement set by the VIA that all wind turbines located to the west of the Vredenburg to Stompneus Bay Road has not been fully met. While the removal of all wind turbines located to the west of the Vredenburg to Stompneus Bay Road may impact on the financial viability of the proposed Boulders WF, the findings of the VIA and the HIA and the potential impact on the areas sense of place cannot be ignored.

Recommendations
Based on the findings of the SIA the following recommendations are made:

- Alternative 1 is not supported;
- Given the potential visual impacts and impact on sense of place, the preferred option supported by the SIA is the removal of all thirteen (13) wind turbines located to the west of the Vredenburg-Stompneus Bay Road;
- However, it is recognised that the preferred SIA option may impact on the financial viability of the proposed WF, which in turn may result in the loss of the socio-economic benefits associated with the proposed development for local communities in Paternoster and St Helena Bay;
- The SIA therefore also supports the first (but less preferable alternative) identified by the HIA of relocating all turbines north of Kasteelberg. This corresponds to Alternative 2. In this regard the potential site specific negative impacts associated with the proposed Boulders WF should also be considered within the context of the broader socio-economic benefits of the REIPPPP;
- The developer should make provision for community shareholding in the project;

- The developer should commit to the creation of meaningful employment opportunities for local community members during both the construction and operation phases;
- The developer should commit to creating meaningful business opportunities for local SMME companies based in the SBLM;
- The developer should implement a skills development and training programme prior to the commencement of the construction phase; and
- The developer should implement of an effective socio-economic development (SED) programme.

The focus of the community enhancement measures listed above should be towards the communities of Paternoster and the greater St Helena Bay area.

ANNEXURE A

LIST OF SOURCES

INTERVIEWS (2018)

- Mario Classens (19-06-18). ELRU Regional Manager;
- Bernie Dawood (19-06-18). ELRU Project Manager;
- Charita Bardens (20-06-18). West Coast Aboriginal Interest Group;
- Matilda Willoughby (20-06-18). West Coast Aboriginal Interest Group;
- Gerald Cloete (20-06-18). Ward 11 representative;
- Julian Engelbrecht ((20-06-18). Ward 11 representative;
- Pietie Classens (20-06-18). St Helena Bay business man;
- Shawn Langely (20-06-18). St Helena Bay business man;
- Martin Robinson (20-06-18). Paternoster resident and member of tax payers association;
- Naomi Cloete (20-6-18). Paternoster resident.
- Sharon Scholtz (21-06-18). Ward 11 Councillor;
- Abe du Plessis (21-06-18). Saldanha Bay Municipality IDP Manager;
- David Joubert (21-06-18). West Coast District Municipality Municipal Manager.

INTERVIEWS (2016)

- Adendorf, Ms Barbara (20-10-16). Country Cabin, Britannica Heights.
- Adendorf, Mr Meyer (20-10-16). Property owner Britannica Heights.
- Barends, Mr Charles (21-10-16). Saldanha Bay Municipality Local Economic Development.
- Botha, Ms Christa (20-10-16). Property owner Britannica Heights.
- Clarke, Ms Minerva (21-10-16). Paternoster Tourism Office.
- Coetzee, Mr Moller (20-10-16). Paternoster Ratepayers Association.
- Duarte, Ms Nazeema (21-10-16). Saldanha Bay Municipality Environmental Management.
- Elliott, Mr Mark (20-10-16). Property owner Britannica Heights.
- Enslin, Ms Marina (20-10-16). Stay in Paternoster; Seeff Paternoster.
- Gaffley, Mr Lindsay (21-10-16). Saldanha Bay Municipality Town Planner.
- Heydenrych, Mr. Pierre (20-10-16). Uitkoms Boerdery.
- Jordaan, Mr Wally (20-10-16). InfoProp Real Estate, St Helena Bay.
- Lombard, Mr Nico (21-10-16). Skuitjies Farm.
- Lubitz, Ms Marion (20-10-16). Farr Out guest house, Paternoster.
- Kotze, Mr Danie (20-10-16). Rooiheuwel Farm.
- Kotze, Ms Doretha (19-10-16 telephonic). Head Planner West Coast District Municipality.
- Mare, Mr Stefan (20-10-16). Property owner Britannica Heights.
- Mouton, Mr Riaan (21-10-16). Office of Executive Mayor, Saldanha Bay Municipality.
- Portsmouth, Mr Doug (20-10-16). Property owner Britannica Heights.
- Roon, Mr Alvin (20-10-16). Paternoster Ratepayers Association.
- Scholtz, Cllr Sharon (21-10-16). Saldanha Bay Municipality Ward Councillor Paternoster and St Helena Bay.
- Slabig, Ms Hedwig (20-10-16). Voorstrand Restaurant, Paternoster.

- Van der Merwe, Ms Annelie (21-10-16). Manager Saldanha Bay Municipality Tourism Office.

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ANNEXURE B

METHODOLOGY FOR THE ASSESSMENT OF POTENTIAL IMPACTS

Direct, indirect and cumulative impacts of the above issues, as well as all other issues identified will be assessed in terms of the following criteria:

- The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The **extent**, where it will be indicated whether the impact will be local (limited to the immediate area or site of development), regional, national or international. A score between 1 and 5 will be assigned as appropriate (with a score of 1 being low and a score of 5 being high).
- The **duration**, where it will be indicated whether:
  - the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
  - the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
  - medium-term (5–15 years) – assigned a score of 3;
  - long term (> 15 years) - assigned a score of 4; or
  - permanent - assigned a score of 5.
- The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
  - 0 is small and will have no effect on the environment;
  - 2 is minor and will not result in an impact on processes;
  - 4 is low and will cause a slight impact on processes;
  - 6 is moderate and will result in processes continuing but in a modified way;
  - 8 is high (processes are altered to the extent that they temporarily cease); and
  - 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- The **probability** *of occurrence*, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale, and a score assigned:
  - Assigned a score of 1–5, where 1 is very improbable (probably will not happen);
  - Assigned a score of 2 is improbable (some possibility, but low likelihood);
  - Assigned a score of 3 is probable (distinct possibility);
  - Assigned a score of 4 is highly probable (most likely); and
  - Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).
- The **significance**, which shall be determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high.
- The **status**, which will be described as either positive, negative or neutral.
- The *degree* to which the impact can be *reversed*.
- The *degree* to which the impact may cause *irreplaceable loss of reso*urces.
- The *degree* to which the impact can be *mitigated.*

The **significance** is determined by combining the criteria in the following formula:

S=(E+D+M)P; where

S = Significance weighting
E = Extent
D = Duration
M = Magnitude
P = Probability

The **significance weightings** for each potential impact are as follows:

- < 30 points: Low (i.e. where this impact would not have a direct influence on the decision to develop in the area),
- 30-60 points: Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- > 60 points: High (i.e. where the impact must have an influence on the decision process to develop in the area).

ANNEXURE C: CV

Tony Barbour
ENVIRONMENTAL CONSULTING AND RESEARCH

10 Firs Avenue, Claremont, 7708, South Africa
(Tel) 27-21-761 2355 - (Fax) 27-21-761 2355 - (Cell) 082 600 8266
(E-Mail) tbarbour@telkomsa.net

Tony Barbour's experience as an environmental consultant includes working for ten years as a consultant in the private sector followed by four years at the University of Cape Town's Environmental Evaluation Unit. He has worked as an independent consultant since 2004, with a key focus on Social Impact Assessment. His other areas of interest include Strategic Environmental Assessment and review work.

EDUCATION

- BSc (Geology and Economics) Rhodes (1984);
- B Economics (Honours) Rhodes (1985);
- MSc (Environmental Science), University of Cape Town (1992)

EMPLOYMENT RECORD

- Independent Consultant: November 2004 – current;
- University of Cape Town: August 1996-October 2004**:** Environmental Evaluation Unit (EEU), University of Cape Town. Senior Environmental Consultant and Researcher;
- Private sector: 1991-August 2000: 1991-1996**:** Ninham Shand Consulting (Now Aurecon, Cape Town). Senior Environmental Scientist; 1996-August 2000: Steffen, Robertson and Kirsten (SRK Consulting) – Associate Director, Manager Environmental Section, SRK Cape Town.

LECTURING

- University of Cape Town: Resource Economics; SEA and EIA (1991-2004);
- University of Cape Town: Social Impact Assessment (2004-current);
- Cape Technikon: Resource Economics and Waste Management (1994-1998);
- Peninsula Technikon: Resource Economics and Waste Management (1996-1998).

RELEVANT EXPERIENCE AND EXPERTISE

Tony Barbour has undertaken in the region of 200 SIA's, including SIA's for infrastructure projects, dams, pipelines, and roads. All of the SIAs include interacting with and liaising with affected communities. In addition he is the author of the Guidelines for undertaking SIA's as part of the EIA process commissioned by the Western Cape Provincial Environmental Authorities in 2007. These guidelines have been used throughout South Africa.

Tony was also the project manager for a study commissioned in 2005 by the then South African Department of Water Affairs and Forestry for the development of a Social Assessment and Development Framework. The aim of the framework was to enable the Department of Water Affairs and Forestry to identify, assess and manage social impacts associated with large infrastructure projects, such as dams. The study also included the development of guidelines for Social Impact Assessment, Conflict Management, Relocation and Resettlement and Monitoring and Evaluation.

Countries with work experience include South Africa, Namibia, Angola, Botswana, Zambia, Lesotho, Swaziland, Ghana, Mozambique, Mauritius, Kenya, Ethiopia, Oman, South Sudan and Sudan.

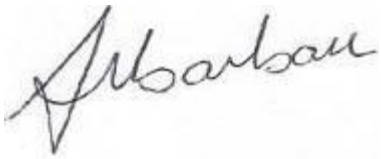
ANNEXURE D: DECLARATION

The specialist declaration of independence in terms of the Regulations_

I, Tony Barbour , declare that --

General declaration:

I act as the independent specialist in this application;
I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
I declare that there are no circumstances that may compromise my objectivity in performing such work;
I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
I will comply with the Act, Regulations and all other applicable legislation;
I have no, and will not engage in, conflicting interests in the undertaking of the activity;
I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
all the particulars furnished by me in this form are true and correct;
and
I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.



Signature of the specialist:

Tony Barbour Environmental Consulting and Research

Name of company (if applicable):

1 November 2018

Date:

ANNEXURE E

IMPACT ON TOURISM: LITERATURE REVIEW

The potential impact on tourism was raised a key concern by a number of interested and affected parties during the Scoping Process and SIA. The literature review undertaken as part of the SIA seeks to comment on the potential impact of wind farms on tourism based on the findings of studies undertaken overseas, specifically in the United Kingdom. The most comprehensive appears to be a review undertaken by Professor Cara Aitchison from the University of Edinburgh in 2012 which formed part Renewable Energy Inquiry by Scottish Government.

Professor Atchison, (April, 2012). Tourism Impact of Wind Farms: Submitted to Renewables Inquiry Scottish Government. University of Edinburgh

The paper notes that tourism plays an increasingly important role in contributing to rural regeneration in the UK. New forms of rural tourism associated with landscape, culture and active recreation are increasingly important to rural tourism economies. Activities related to natural history and birdlife, cultural heritage and historic gardens, local food and drink and a range of active outdoor pursuits, including walking and mountain biking, are increasingly promoted as policy priorities through which wider agendas of sustainable development can be addressed.

However, the prevalence of high wind speeds in these same coastal and upland areas means that they are also the preferred destinations for wind farm developments. In spite of this proximate and apparent inter-relationship between wind farms and tourism it is only recently that research examining tourists' attitudes towards the location of wind farms in or near areas that they visit for holiday and/or leisure has been conducted in any depth (UWE, 2004, British Wind Energy Association 2006; Glasgow Caledonian University, 2008; MORI Scotland, 2002; Starling, 2006).

The paper notes that although tourism research relating to wind farm developments is limited compared with that on policy, landscape, ecology and noise it is increasingly evident that there is an emerging consensus within the research examining the actual and potential impact of wind farms on tourism. The clear consensus is that there has been no measurable economic impact, either positively or negatively, of wind farms on tourism. Similarly, there is consensus among researchers of studies that have sought to predict the potential economic impact of wind farms on tourism. Here again, there is no evidence to support the assertion that wind farms are likely to have a negative economic impact on tourism. In addition, all of the studies that have sought to predict impact have demonstrated that any negative impact of wind farms on tourism will be more than outweighed by the increase in tourists that are attracted by wind farms, by the increase in employment brought about by the development of wind farms and/or by the continuing growth of tourism.

However, despite these findings some local authorities, business owners and residents in rural areas that fall within Strategic Search Areas for wind farm developments continue to voice opposition to such developments, increasingly citing negative impact on tourism as a reason to reject planning applications.

The aim of the submission by Professor Aitchison was to clarify the evidence relating to tourism impacts of wind farms so that remaining opposition to development is based on *fact* rather than unfounded, but nonetheless understandable, *fear*.

The research undertaken by Aitchison indicates that two major academic studies of the impact of wind farms on tourism have been conducted in the UK: the University of the West of England's (UWE)(Aitchison, 2004) study titled *The Potential Impact of Fullabrook Wind Farm Proposal, North Devon: Evidence Gathering of the Impact of Wind Farms on Visitor Numbers and Tourist Experience* and Glasgow Caledonian University's (GCU) study *The Economic Impact of Wind Farms on Scottish Tourism* (2008).

Both of these studies address many of the shortcomings of earlier research in relation to weaknesses in the use of survey methods, sampling, interpretation and extrapolation of data associated with other studied. Aitchison also indicates that both university studies meet the criteria of 'originality, significance and rigour' set out in the UK Government's Research Excellence Framework which is designed to identify high quality research in UK universities (Higher Education Funding Councils, 2011). The two studies therefore arguably provide the most reliable knowledge base from which to draw conclusions about the impact of wind farms on tourism. The paper also notes that the research methodology, analysis and presentation of the UWE study findings relating to the tourism impact of wind farms were fully accepted by the Inspector in his report and were seen as a model of good practice in research design, implementation and analysis (The Planning Inspectorate, 2007).

The UWE study was designed to provide evidence of the potential impact of the proposed wind farm development on both visitor numbers and tourist expenditure. The findings of the study revealed overwhelming support for renewable energy in general and the proposed wind farm in particular. The findings demonstrated that the construction of Fullabrook wind farm would not have a detrimental impact on visitor numbers, tourist experience or tourist expenditure in the area of North Devon.

The findings from the study demonstrated that the potential impact of a wind farm in North Devon on day visitor and tourist numbers would be as follows:

- A total of 86.7% (n=170) respondents stated that the presence of a wind farm would neither encourage nor discourage them from visiting;
- A further 7.2% (n=14) of those surveyed said that a wind farm would either marginally encourage or strongly encourage them to visit the area;
- A further 6.1% (n=12) said that the presence of a wind farm would either marginally discourage or strongly discourage them from visiting.

The findings of the study indicated that the potential impact of wind farms on the tourist experience was:

- The majority of respondents (58.2%, n=114) thought that wind farms have 'no overall impact' on the visitor or tourist experience;
- A total of 18.4% (n=36) of those questioned thought that wind farms have a positive impact on the visitor or tourist experience;
- A total of 14.8% (n=29) thought that wind farms have a negative impact on the visitor or tourist experience.

The findings of the research therefore contradicted the argument that tourists would inevitably view the turbines as having a detrimental impact on the attractiveness of the landscape and would therefore be put off visiting North Devon as suggested by North Devon Marketing Bureau on behalf of North Devon District Council (2004). The findings from the UWE study in North Devon broadly accord with those of the other major academic study of the impact of wind farms on tourism; that conducted by Glasgow Caledonian University (GCU) in 2008 into *The Economic Impact of Wind Farms on Scottish Tourism*. The GCU study found that only a negligible fraction of tourists will change their decision whether to return to Scotland as a whole because they have seen a wind farm during their visit' (Glasgow Caledonian University 2008).

The study also found that 51.0% of respondents indicated that they thought wind farms could be tourist attractions. In this regard the *Investigation into the Potential Impact of Wind Farms on Tourism in Wales*, by the Wales Tourist Board in 2003 found that 68% of those questioned would be interested in attending a visitor centre at a wind farm, while the visitor centre at the Whitelee Wind Farm in east Ayrshire has become one of the most popular 'eco-attractions' in Scotland. The visitor centre run by ScottishPower Renewables has received 200 000 visitors since it opened in 2009 and an estimated 50 000 more have used the 90km of access tracks at the project site for recreational purposes. The popularity of the wind farm as a visitor attraction for schools and families and outdoor sports enthusiasts has completely surpassed the expectations of the developers.

Aitchison notes that the UWE and GCU studies are consistent in their conclusion that the development of wind farms will not result in a reduction in tourist numbers, tourist experience or tourism revenue. Given the similarity between North Devon, Mid-Wales and Scotland in tourism landscapes, visitor attractions and tourists themselves, it is possible that the planned and sustainable development of wind farms in Scotland, will induce no overall financial loss in tourism-related earnings. In fact, as indicated in the UWE research, it is possible that the planned and sustainable development of wind farms in Scotland could result in a small increase in visitor numbers and tourist-related expenditure. This is most likely to be the case where renewable energy projects are developed in tandem with the development of visitor attractions.

The paper by Aitchison also indicates that previous research from other areas of the UK has demonstrated that wind farms are very unlikely to have any adverse impact on tourist numbers (volume), tourist expenditure (value) or tourism experience (satisfaction) (Glasgow Caledonian University, 2008; University of the West of England, 2004). Moreover, to date, there is no evidence to demonstrate that any wind farm development in the UK or overseas has resulted in any adverse impact on tourism. In conclusion, the findings from both primary and secondary research relating to the actual and potential tourism impact of wind farms indicate that there will be neither an overall decline in the number of tourists visiting an area nor any overall financial loss in tourism-related earnings as a result of a wind farm development.

Glasgow Caledonian University (2008). The economic impacts of wind farms on Scottish tourism. A report prepared for the Scottish Government

The report notes that Scottish tourism depends heavily on the country's landscape, with 92% of visitors stating that scenery was important in their choice of Scotland as a holiday destination, the natural environment being important to 89% of visitors

(Tourism Attitudes Survey 2005). As part of the general policy to create a more successful country, with increasing sustainable economic growth, the Tourism sector has agreed a target of 50% revenue growth in the ten years to 2015. As in South Africa, tourism is therefore regarded as a key sector. Likewise, the natural environment is identified as a key tourist asset.

As part of the study some 40 studies in the UK and Ireland were reviewed. In addition, to ensure that international experiences were considered the review also examined reports from Denmark, Norway, the US, Australia, Sweden and Germany. The findings of the review can be summarised as follows:

- There is often strong hostility to developments at the planning stage on the grounds of the scenic impact and the perceived knock on effect on tourism. However developments in the most sensitive locations do not appear to have been given approval so that where negative impacts on tourism might have been a real outcome there is, in practice, little evidence of a negative effect;
- There is a loss of value to a significant number of individuals but there are also some who believe that wind turbines enhance the scene;
- An established wind farm can be a tourist attraction in the same way as a hydro-electric power station. This of course is only true whilst a visit remains a novel occurrence;
- In Denmark, a majority of tourists regard wind turbines as a positive feature of the landscape;
- Over time hostility to wind farms lessens and they become an accepted even valued part of the scenery. Those closest seem to like them most;
- Overall there is no evidence to suggest a serious negative **economic** impact of wind farms on tourists.

The study also included an intercept survey which focused on tourists most of whom had had a recent experience of a wind farm. The aim was primarily to identify if the experience had altered the likelihood of a return to Scotland. The findings of the survey indicated that vast majority (99%) of those who had seen a wind farm suggested that the experience would not have any affect. Indeed there were as many tourists for whom the experience increased the likelihood of return as decreased. Surprisingly there was no difference between those who has a close and extensive experience and those who had a minimal experience. Those who had not seen a farm were more likely to state a decrease in the likelihood of return, which was even stronger when all tourists were faced with a potential extension of the relevant wind farm. However even then this only related to a small minority of tourists.

The study concludes that the "Overall the finding of the research is that if the tourism and renewable industries work together to ensure that suitably sized wind farms are sensitively sited, whilst at the same time affording parts of Scotland protection from development, then the impacts on anticipated growth paths are expected to be so small that there is no reason to believe that Scottish Government targets for both sectors are incompatible' (Glasgow Caledonian University).

Regeneris Consulting, (2014). Study into the Potential Economic Impact of Wind Farms and Associated Grid Infrastructure on the Welsh Tourism Sector

The key findings of the study indicate that visitor responses and reactions to wind farms are subjective and depend on the individual's own judgements and

interpretation of the relative value of wind farms and their aesthetics. In this regard a key factor is the reaction of individual tourists to the impact of wind farms in the landscape. This is potentially very important to the performance of tourism in many parts of Wales, where surveys have shown that beautiful and unspoiled countryside is an important reason for the visit and a key contributor to visitor enjoyment.

However, the study notes that previous studies have shown that while individuals vary widely in their reaction to wind farms, a clear majority do not react negatively to them in the landscape and will not change their destination choice on account of the presence of wind farms. In this regard there are a number of factors which could influence people's perceptions of wind farms. These are likely to include their views on renewable energy and the effectiveness of wind farms as a means of energy production. The research suggests that these wider perceptions play a role in how tourists weigh up the positive and negative aspects of wind farm development.

In this regard the study notes that based on current evidence of visitor responses and reactions, and the balance of public support for wind energy over time, there is little to suggest that the planned increase in onshore wind production would result in significant changes in visitor numbers, even in those areas where there may be multiple wind farm developments.

However, the study does indicate that there is also a potential danger that the increased rate of development in some parts of Wales could change the value judgements made by some visitors if they feel a point is reached when wind farms become too dominant a presence on Welsh landscapes. This could alter their perceptions of the relative merits of wind turbines and in turn change their visitor behaviour. The study indicates that while this is acknowledged as a potential risk, risk also needs to be considered in light of the fact that wind farms will become a more common sight in the UK and Europe in general. This increased familiarity with turbines could mean that many visitors become more tolerant of turbines as a feature of rural landscapes, and their visiting behaviour may change little as a result.

Likewise, it is also important to recognise that the wider perceptions that influence visitor reactions are not set in stone. They are likely to be influenced by a wide set of factors related to climate change and energy production over the next ten years, including changes in energy prices and views on the relative merits of wind energy compared to alternatives, such as fracking or other forms of renewable energy.

While most of the evidence points toward limited impacts on tourism from wind farms, there are examples of certain locations which are, on balance, more sensitive to wind farm development. This is on account of their landscapes, types of visitor, limited product diversity and proximity to wind farms. This is particularly the case where the key visitor markets are older people visiting for the tranquillity, remoteness and natural scenery offered in some parts of Wales.

However, the study also notes that in these more sensitive locations, the findings of the study indicate that the potential negative effect on visitor numbers may still be low overall, but in some circumstances could be moderate. The greatest concern exists amongst areas and businesses closest to wind farms and appealing to visitor markets most sensitive to changes in landscape quality. The case studies did highlight some businesses reporting negative reaction from visitors and also holding back investment on account of the uncertain impact, although a majority were not affected negatively at all.

The study also found that there was no evidence that wind farms would deter tourists from traveling along designated visitor or tourists routes. The study indicated that small minorities of visitors would be encouraged, whilst others would be discouraged. Overall, however, there was no evidence to suggest that there would be any significant change in visitor numbers using these routes to reach destination elsewhere.

ANNEXURE F

IMPACT ON PROPERTY VALUES: LITERATURE REVIEW

The potential impact on property values was raised as a concern by a number of interested and affected parties interviewed during the SIA, specifically owners of game farms located to the east of the site. The literature review undertaken as part of the SIA does not constitute a property evaluation study, but merely seeks to comment on the potential impact of wind farms on property values based on the findings of studies undertaken overseas.

The literature reviewed was based on an attempt by the authors of the SIA to identify what appear to be "scientifically" based studies that have been undertaken by reputable institutions. In this regard it is apparent that there are a number of articles available on the internet relating to the impact of wind farms on property values that lack scientific vigour. The literature review also sought to identify research undertaken since 2010. The literature review does not represent an exhaustive review.

In total five articles were identified and reviewed namely:

- Stephen Gibbons (April, 2014): Gone with the wind: Valuing the Visual Impacts of Wind turbines through house prices. London School of Economics and Political Sciences & Spatial Economics Research Centre, SERC Discussion Paper 159;
- Review of the Impact of Wind Farms on Property Values, Urbis Pty Ltd (2016): Commissioned by the Office of Environment and Heritage, NSW, Australia;
- Yasin Sunak and Reinhard Madlener (May 2012): The Impact of Wind Farms on Property Values: A Geographically Weighted Hedonic Pricing. School of Business and Economics / E.ON Energy Research Center, RWTH Aachen University. Model Working Paper No. 3/2012;
- Martin D. Heintzelman and Carrie M. Tuttle (March 3, 2011): Values in the Wind: A Hedonic Analysis of Wind Power Facilities. Economics and Financial Studies School of Business, Clarkson University;
- Ben Hoen, Jason P. Brown, Thomas Jackson, Ryan Wiser, Mark Thayer and Peter Cappers (August 2013): A Spatial Hedonic Analysis of the Effects of Wind Energy Facilities on Surrounding Property Values in the United States. Ernest Orlando Lawrence Berkeley National Laboratory.

Three of the articles indicate that wind farms have the potential to impact on property values, while two indicate that the impacts are negligible and or non-existent.

Stephen Gibbons (April, 2014): Gone with the wind: Valuing the Visual Impacts of Wind turbines through house prices. London School of Economics and Political Sciences & Spatial Economics Research Centre

The paper notes that there has been a rapid expansion of wind farm developments in the UK, like other areas in Europe and parts of the US, since the mid-1990s. While renewable energy technology clearly provides potential global environmental benefits in terms of reduced CO_2 emissions and slower depletion of natural energy resources,

like most power generation and transmission infrastructure, the plant, access services and transmission equipment associated with renewable electricity generation may involve environmental costs. This is particularly so in the case of wind turbine developments, where the sites that are optimal in terms of energy efficiency are typically in rural, coastal and wilderness locations that offer many natural environmental amenities. These natural amenities include the aesthetic appeal of landscape, outdoor recreational opportunities and the existence values of wilderness habitats. The visual impacts of these 'wind farms' may be especially important because they are often on high ground with extensive visibility. As a result there has been significant opposition from local residents and other stakeholders with interests in environmental preservation. This opposition suggests that the environmental costs may be important. It is interesting to note that similar trends have also started to emerge in South Africa.

Gibbons states that the paper provides quantitative evidence on the local benefits and costs of wind farm developments in England and Wales, focussing on the effects of wind turbine visibility, and the implied cost in terms of loss of visual landscape amenities. The approach is based on "hedonic" pricing which uses housing costs to reveal local preferences for views of wind farms. This is feasible, because wind farms are increasingly encroaching on rural, semi-rural and even urban residential areas in terms of their proximity and visibility, so the context provides a large sample of housing sales that potentially affected (at the time of writing, around 1.8% of residential postcodes are within 4 km of operational or proposed wind farm developments). The paper notes that the study offers a significant advance over previous studies in the US and UK, which have mostly been based on relatively small samples of housing transactions and cross-sectional price comparisons. Estimation in this current work is based on quasi experimental, difference-in-difference based research designs that compare price changes occurring in postcodes where wind farms become visible, with postcodes in appropriate comparator groups. These comparator groups include: places where wind farms became visible in the past, or where they will become visible in the future and places close to where wind farms became operational but where the turbines are hidden by the terrain. The postcode fixed effects design implies that the analysis is based on repeat sales of the same, or similar housing units within postcode groups (typically 17 houses grouped together).

The study also notes that there have been several previous attempts to quantify impacts on house prices in the US, including the study in the US by Hoen et al (2013), which attempts a difference-in-difference comparison for wind farms, but using cross-sectional comparisons between houses at different distances from the turbines. The conclusions of the Hoen et al study was there is 'no statistical evidence that home values near turbines were affected' by wind turbines. Gibbons does however note that the Hoen et al study (2013) uses fairly sparse data on 61 wind farms across nine US states. While the sample contains over 50 000 transactions, very few of transactions are in areas near the wind farms. In this regard on 1 198 (2%) transactions were reported within 1 mile of current or future turbines and only 300 post.

The study undertaken by Gibbons has nearly 38 000 quarterly, postcode-specific housing price observations over 12 years, each representing one or more housing transactions within 2km of wind farms (about 1.25 miles). Turbines are potentially visible for 36 000 (94.7%) of these. The study therefore notes that there is a much greater chance than in previous work of detecting price effects if these are indeed present. The overall finding is that operational wind farm developments reduce prices

in locations where the turbines are visible, relative to where they are not visible, and that the effects are causal. This price reduction is around 5-6% on average for housing with a visible wind farm within 2km, falling to under 2% between 2-4km, and to near zero between 8-14km, which is at the limit of likely visibility. Evidence from comparisons with places close to wind farms, but where wind farms are less visible suggests that the price reductions are directly attributable to turbine visibility. As might be expected, large visible wind farms have much bigger impacts that extend over a wider area.

The conclusion of the study notes that the fairly crowded geographical setting, with numerous wind farms developed within sight of residential property, provides a unique opportunity to examine the visual impacts of wind farms through hedonic property value methods. In undertaking the study comparisons were made between house price changes occurring in areas where nearby wind farms become operational and visible, with the price changes occurring where nearby wind farms become operational but are hidden from view. The overall findings of the study indicate that wind farms reduce house prices in postcodes where the turbines are visible, and reduce prices relative to postcodes close to wind farms where the wind farms are not visible. The overall finding is that "averaging over wind farms of all sizes, this price reduction is around 5-6% within 2km, falling to less than 2% between 2 and 4km, and less than 1% by 14km which is at the limit of likely visibility". The study notes that small wind farms have no impact beyond 4km, whereas the largest wind farms (20+ turbines) reduce prices by 12% within 2km, and reduce prices by small amounts right out to 14km (by around 1.5%).

The study also found that there are small (~2%) increases in neighbouring prices where the wind farms are not visible, although these are only statistically significant in the 4-8km band. The paper also notes that the findings are in line with existing literature that suggests that other tall power infrastructure has negative impacts on prices (e.g. high voltage power lines, Sims and Dent 2005).

Urbis Pty Ltd (2016). Review of the Impact of Wind Farms on Property Values, Commissioned by the Office of Environment and Heritage, NSW, Australia

The purpose of the study was to analyse the impact of wind farm development on the value of surrounding properties in NSW. A 2009 study commissioned by the NSW Valuer-General's Office to address concerns in the community that wind farms have a detrimental impact on property values found that there was no conclusive evidence available at the time to indicate a universal fall in the value of properties surrounding wind farm developments. The follow up study undertaken by Urbis was commissioned by Office of Environment and Heritage (OEH), New South Wales (NSW), Australia. The Australian experience is regarded as highly relative to South Africa given the similarities between the two countries both in terms of the development of the wind energy sector and the rural landscapes and properties affected.

In terms of potential limitations the study does note that in most cases there were a limited number of transactions over the 15-year period from 2000 to 2015. This paper does note that this is typical of rural and rural residential areas that have a relatively low population density and larger individual properties. The study notes that the limited data availability precluded a broad based statistical analysis (e.g.

multiple regression or Monte Carlo analysis) to establish any trends in value change as a result of proximity to wind farm infrastructure.

The study sought to determine what sample size is required to undertake an analysis of sales data within a 2 kilometre radius of a wind farm. Adopting a confidence level of 95%, a minimum sample of 97 transactions would be required to arrive at a result accurate within 10%. This increases to a sample size of 385 transactions to arrive at a result accurate within 5%.

The wind farms reviewed in the study experienced far fewer than 100 sales transactions, ranging from 9 to 44 sales within a 2 kilometre radius over the past 15 years (between 2000 and 2015). Based on this there was insufficient data to undertake a traditional statistical analysis that would produce a result with a sufficient degree of confidence. As a result the study adopted a same property repeat sale approach to test value change of properties within 2 km of wind farms relative to the comparable property market within each relevant Local Government Area.

The study notes that Australia had 1 866 wind turbines spread across 71 wind farms at the end of 2014. Approximately 82% of these wind turbines were located in wind farms with more than 50 MW installed capacity with the remaining 18% installed in smaller wind farms under 50 MW. The majority of wind farms in South Africa also tend to be over 50 MW. Of relevance to the current project, the majority of Australia's wind resources are concentrated in its south-western, southern and south-eastern regions, typically closer to the coast or in elevated exposed areas. The study notes that while wind farms are broadly viewed as a sustainable source of energy the level of acceptance begins to fall away the closer respondents reside to the development. In this regard a survey found that 81% of the respondents supported the development of wind farms within NSW. This dropped to 73% for one within their local region and 59% for one 1–2 km from their residence.

The findings of the survey clearly illustrate that proximity to the development impacts the level of acceptance of wind farms. The concerns typically raised regarding wind farms located within 1-2 kilometres of their homes included noise (61%), negative visual impact (38%) and health (23%). A study undertaken in the UK by Bond et al (2013) found that the five most frequently cited reasons for objection to wind farms were; visual eyesore (22.9%); effect on wildlife (11.4%); turbine noise (11.4%); construction traffic (6.8%) and industrialisation of the countryside (6.4%).

Apart from surveying residents, another way of exploring community perceptions about wind farms is to analyse data from property sales. A range of quantitative evaluation techniques such as hedonic price can identify differences between wind farm affected and non-affected transactions. Put simply, transactions are analysed based on specific characteristics such as proximity to wind farms or other non-amenities. This comes in the form of a 'hedonic analysis', which is effectively a multivariate regression analysis of the impact of 'quality' on the price of a commodity.

The study notes that research has shown that public perception of negative non-physical property attributes such as views, noise and odour can impact the value of residential property. However, accurately identifying the impact of a dis-amenity, be it wind farms or other impacts, is a challenging exercise that requires a large sample size of property transactions covering a number of years, with data that include a

measure of the dis-amenity (e.g. distance from wind farm development, degree of visual impact) to establish statistically significant results (Bond et al. 2013).

The study undertaken by Urbis (2016) includes a review of relevant literature, and refers to research undertaken by Hoen (2009 & 2013), noting that Hoen found no statistical evidence that home values near wind turbines were affected in the post-construction or post-announcement/ pre-construction periods. Hoen (2009 & 2013) also concluded that if there was an effect, it is possible that the impact is sporadic, affecting only particular types of homes or in markets where consumer preferences were ill-disposed to wind farms. However, other studies found mixed results. Research by Heintzelman and Tuttle (2012) found that when testing across three different US counties, that in some instances there was a negative relationship between proximity to wind turbines and property values; however, it was not consistent and there was no identifiable factor driving the difference. The authors of the report note that the lack of consistency between the results may point to a qualitative factor associated with the wind farm itself, or a difference in consumer preferences between counties when it comes to co-location with wind farms. This would make it difficult to draw conclusive implications about compensating all landholders in close proximity to wind farms.

Research undertaken by Sunak and Madlener (2014) in Germany found that the asking prices for properties whose view was strongly affected by the construction of wind turbines decreased by 10–17%, while properties with a minor or marginal view experienced no price effect. The impact of visual amenity is complex however, with the angle of view, distance and size of the wind farm all playing a part in the potential negative impact on a property's amenity.

The 2009 NSW Valuer-General's assessment of the impact of wind farms on property values did not conduct a hedonic analysis like many of the international studies because:

- The sample of comparable sales transactions was limited;
- Wind farm development occurred on rural land, with low population density;
- There was significant variation in property characteristics (view from the dwelling, lot size, improvements, etc.) and the level of visual impact;
- The complex array of factors that impact property prices was difficult to capture.

The Urbis study notes that similar limitations also impacted the study undertaken in 2016. This was despite the time that has passed and the increase in the number of wind farms between the 2009 study and 2016. The 2009 NSW Valuer-General's assessment of the impact of wind farms on property values reviewed 45 property transactions within eight study areas. Of these only five were identified as potentially being adversely affected by their view of a wind farm: a small impact was observed for one township property, and potential impacts were observed on four out of 13 lifestyle properties. There were no observed impacts on the 12 rural properties analysed.

The 2009 study found that properties in rural/agricultural areas appeared to be the least affected by wind farm development, with no reductions found near any of the eight wind farms investigated. The only properties where a possible effect was observed were lifestyle properties in Victoria within 500 metres of a wind farm, some of which were found to have lower than expected land values. Generally, the 2009

NSW Valuer-General's assessment of the impact of wind farms on property values found that the separation distance identified in NSW appears to be sufficient to ameliorate any dis-amenity associated with the presence of wind farm development. Ultimately the 2009 NSW Valuer-General's assessment of the impact of wind farms on property values found that the wind farms that had been developed up to that time had not negatively affected property values in the majority of cases. For the minority of transactions that showed a fall in value, other factors may have been involved.

The literature review of Australian and international studies on the impact of wind farms on property values revealed that the majority of published reports conclude that there is no impact or a limited definable impact of wind farms on property values. Those studies which identified a negative impact are based in the northern hemisphere and are associated with countries with higher population densities and a greater number of traditional residential and lifestyle properties affected by wind farms. This is generally contrary to the Australian experience, with most wind farms being located in low population density environments that derive the majority of their value from productive farming purposes.

The key conclusions of the study note that there is insufficient sales data to provide a definitive answer to the question of whether wind farm development in NSW impacts on surrounding land values utilising statistically robust quantitative analysis techniques. The study was therefore based on the best available data and traditional valuation sales analysis techniques to compare the change in values around wind farms over time and qualitative information from a review of the international literature on the impact of wind farms on property values.

Based on the outcome of these research techniques, the opinion of the authors was that that wind farms may not significantly impact rural properties used for agricultural purposes. However, the study found that there is limited available sales data to make a conclusive finding relating to value impacts on residential or lifestyle properties located close to wind farm turbines, noting that wind farms in NSW have been constructed in predominantly rural areas.

Based on the available literature and the sales evidence analysed around wind farms in Australia, the study notes that "in our professional opinion, there are some factors that may be more likely to negatively influence property values around wind farms. Whilst evidence to support these effects in the present Australian context is somewhat limited, the following factors are worthy of consideration":

- Proximity to residential dwellings – Issues surrounding noise, shadow flicker and close visual impacts are likely to be exacerbated if wind turbines are located close to residential dwellings, and therefore any such perceived diminution of residential amenity has the potential to influence property values;
- Proximity to higher density populations – The location of wind farms near areas of higher population density could be expected to result, in absolute terms if nothing else, in an increase in perceived and actual impacts on a larger number of residential use properties**;**
- Uncertainty – Community concern around the development of a local wind farm and its potential impacts may increase the amount of time required to sell a property, as potential buyers defer their decision until specific details of the proposed wind farm are known. (note that historic data that allows comprehensive analysis of time-on-market impacts is limited; however, the

available evidence does not indicate that an increase in the time required to sell a property near a wind farm has corresponded to a loss in value.)

It is clear that the properties located around wind farms (particularly in NSW) are predominantly rural or rural residential in nature. There are very few smaller residential properties (such as those in towns) that are within close proximity of a wind turbine. For rural properties used for primary production, there is no direct loss of productivity resulting from wind farms. Therefore they are unlikely to negatively impact the value of such properties.

The types of locations chosen to date for wind farms in NSW have differed from many chosen for wind farms in the USA and Europe. Overseas countries with relatively high population densities have situated wind farms close to small urban centres or villages more often. This could account for a small number of overseas studies finding a property value reduction associated with the development of a wind farm; however, most studies undertaken in the northern hemisphere have essentially supported the notion that wind farms have a limited impact on property values. The findings from the northern hemisphere studies that have identified a negative impact are also more likely to be associated with a greater number of traditional residential and lifestyle properties affected by wind farms.

In conclusion, the authors of the Urbis study indicated that the review of case studies in NSW and Victoria did not identify any conclusive trends that would indicate that wind farms have negatively impacted on property values. A property resale analysis indicated that all of the properties examined as part of the study demonstrated capital growth that was aligned with the broader property market of the time. As such, the circumstances of wind farms in NSW and the differences between those circumstances and those in other countries where similar studies have been conducted, have led the study to reach the following conclusions:

- Appropriately located wind farms within rural areas, removed from higher density residential areas, are unlikely to have a measurable negative impact on surrounding land values;
- There is limited available sales data to make a conclusive finding relating to value impacts on residential or lifestyle properties located close to wind farm turbines, noting that wind farms in NSW have been constructed in predominantly rural areas.

Yasin Sunak and Reinhard Madlener (May 2012): The Impact of Wind Farms on Property Values: A Geographically Weighted Hedonic Pricing Model, FCN Working Paper No. 3/2012

The paper notes that the extensively promoted expansion of renewable energy technologies is mostly justified by referring to the advantages and benign attributes associated with them. In the case of wind power, these attributes are, e.g., a "green" and CO_2-free energy generation without fuel costs as well as reasonable land consumption (Ackermann and Söder, 2002; Manwell, et al., 2009, pp.443-447; BWE, 2012). However, the paper notes that there are also negative impacts associated with wind farms, including changes to landscapes and vistas. The negative externalities associated with wind farm sites have led to public concerns relating to the impact on the environment and landscape. The authors indicate that at the time of preparing the paper there were, to their knowledge, only four peer-reviewed

papers on the topic of impacts on property values., namely, Sims and Dent, 2007; Sims et al., 2008; Laposa and Mueller, 2010; Heintzelman and Tuttle, 2011.

Sims and Dent (2007) investigated the impact of a wind farm near Cornwall, UK, on house prices, using a hedonic pricing approach and comparative sales analysis. Applying straightforward OLS regression, they found some correlation between the distance to a wind farm and property values. Due to data limitations, the overall model results had a fairly weak explanatory power. Sims et al. (2008) modelled the impact of wind farm proximity to houses for a region near Cornwall, UK. There was some evidence to suggest that noise and flicker effects as well as visibility may influence property value in a wind farm's vicinity. The hedonic analysis, in which standard OLS regression techniques were used, showed no significant impacts caused by the wind farm.

Laposa and Müller (2010) examined the impact of wind farm project announcements on property values for northern Colorado, US. Including observations before and after the announcement of the wind farm project, they applied a hedonic pricing model using standard OLS regression. The results obtained indicate a significant impact of the project announcement at the 10% level. However, they conclude that this impact is likely more attributable to the beginning of the national housing crisis rather than the announcement itself. Heintzelman and Tuttle (2011) study exploring the impacts of new wind facilities on property values in northern New York, US found that nearby wind facilities can significantly reduce property values. Decreasing the distance to the wind farm to one mile indicated a property price devaluation of between 7.73% and 14.87%. In addition, they controlled for omitted variables and endogeneity biases by applying a repeat-sales analysis.

The aim of the study by Sunak and Madlener was to investigate the impacts of wind farms on the surrounding area through property values, by means of a geographically-weighted hedonic pricing model. The main focus of the study was to assess the potential visual impacts associated with wind farms. A wind farm near the cities of Rheine and Neuenkirchen in the federal state of North Rhine-Westphalia (Germany), constructed in 2002, was chosen for conducting a pilot application of the model developed for the study. In 2000, the federal district administration announced the construction of a wind farm consisting of nine turbines, which were built in July 2002. The nine turbines, each with a capacity of 1.5 MW, have hub heights of 100 meters and rotor sizes of 77 meters. The areas of northern North Rhine-Westphalia is very flat with an average altitude only varying between 30 and 90 m above sea level. The wind farm therefore substantially influences the landscape.

The study focused on property sales within an area of 119 km^2 in the north of the federal state of North Rhine-Westphalia, including parts of the city of Rheine and the city of Neuenkirchen. Both cities, at least two districts in the case of Rheine (Mesum and Hauenhorst), are in the immediate proximity of the wind farm site. This northern region of North Rhine-Westphalia can be defined as a semi-urban region mainly characterized by medium- and small-sized towns. In 2011, a population of 26 900 lived within a radius of about 5.5 km around the site. The area is therefore more densely populated that the study area.

The distance of the wind turbines from affected properties ranged from 945 m to 5.5 km. To measure the visibility of the wind farm site, the study calculated viewsheds for each property. A precise measurement of the view crucially depends on capturing

all features in the landscape that are visible from the observer's point of view. The view of a certain feature in the landscape might be hindered by heights, slopes, vegetation, or buildings. In order to calculate viewsheds as precisely as possible, a digital surface model was applied with an accuracy of one meter. The digital surface model included height level information of the terrain, the vegetation, and buildings. The study also looked at aural impacts (noise) of wind turbines. The research indicated that increases of the dB-level above the average ambient noise level in urban or semi-urban regions are only measureable within the immediate vicinity of a turbine of about 350 m (Hau, 2006; Rogers et al., 2006; Harrison, 2011). The shortest distance to a property is 945 m. As such aural impacts were not considered by the study.

Three different global model specifications were applied. The first two models included 452 properties that were sold after the construction of the wind farm. The findings of the study indicated that proximity to wind farms negatively affects property prices within the first two kilometres. The approach also enabled the study to investigate the impact of the wind farm project announcement and construction by means of dummy variables. The findings of the study indicate that there was no evidence for an announcement effect. Alternatively, the construction of the wind farm is negatively related to the property price. The study concludes that "it seems obvious to deduce that wind farm presence is significantly influencing the surrounding property prices".

Martin D. Heintzelman and Carrie M. Tuttle (March 3, 2011): Values in the Wind: A Hedonic Analysis of Wind Power Facilities. Economics and Financial Studies School of Business, Clarkson University

The study area where the research was undertaken was New York State, which is a leader in wind power development in the US. In 1999, New York had 0 MW of installed wind capacity, but by 2009 had 14 existing facilities with a combined capacity of nearly 1300 MW, ranking it in the top 10 of states in terms of installed capacity. The paper notes that when discussing wind power development it is important to understand the costs that such development might impose. Unlike traditional energy sources, where external/environmental costs are spread over a large geographic area through the transport of pollutants, the costs of wind development are largely, but not exclusively, borne by local residents. Only local residents are likely to be negatively affected by any health impacts, and are the people who would be most impacted by aesthetic damages, either visual or audible. These impacts are likely to be capitalized into property values and, as a consequence, property values are likely to be a reasonable measuring stick of the imposed external costs of wind development.

The paper, although dated (2011), indicates that the literature assessing impact on property values is limited. The study looked at data on 11 369 arms-length residential and agricultural property transactions between 2000 and 2009 in Clinton, Franklin, and Lewis Counties in Northern New York to explore the effects of relatively new wind facilities. The findings of the study indicate that nearby wind facilities do impact on property values. In this regard, based on the repeat sales model, the construction of turbines within 0.5 miles (0.8 km) of the property resulted in a 10.87%-17.77% decline in sales price depending on the initial distance to the nearest turbine and the particular specification. At a distance of 1 mile (1.6km) (about 20% of the sample), the decline in value was between 7.73% and 14.87%. The study notes that from a policy perspective, these results indicate that there is a

need to compensate local homeowners/communities for allowing wind development within their borders.

The paper concludes that the results of the study appear to indicate that proximity to wind turbines does have a negative and significant impact on property values. Importantly, the best and most consistent measure of these effects appears to be the simple, continuous, proximity measure, the (inverse distance) to the nearest turbine.

This study does not say anything about the societal benefits from wind power and should not be interpreted as saying that wind development should be stopped. However, when comparing the environmental benefits of wind power one must not only include the take into account the costs to developers, but also the external costs to property owners located close to new wind facilities. In this regard the study notes that property values are an important component of any cost-benefit analysis and should be accounted for as new projects are proposed and go through the approval process.

Ben Hoen, Jason P. Brown, Thomas Jackson, Ryan Wiser, Mark Thayer and Peter Cappers (August 2013): A Spatial Hedonic Analysis of the Effects of Wind Energy Facilities on Surrounding Property Values in the United States. Ernest Orlando Lawrence Berkeley National Laboratory

The paper notes that previous research on the effects of wind energy facilities on surrounding home values has been limited by small samples of relevant home-sale data and the inability to account adequately for confounding home-value factors and spatial dependence in the data. The authors note that this study helps fill those gaps by collecting data from more than 50 000 home sales among 27 counties in nine states of the USA. The homes were located within 10 miles of 67 different wind facilities, and 1 198 sales were within 1 mile (1.6 km) (331 of which were within a half mile (0.8km)) of a turbine. This total represents 2 % of the total survey and, as indicated above, has been raised an issue by commentators.

The approach was aimed at answering the following questions:

- Did homes that sold prior to the wind facilities' announcement (PA)—and located within a short distance (e.g., within a half mile) from where the turbines were eventually located—sell at lower prices than homes located farther away?
- Did homes that sold after the wind facilities' announcement but before construction (PAPC)—and located within a short distance (e.g., within a half mile)—sell at lower prices than homes located farther away?
- Did homes that sold after the wind facilities' construction (PC)—and located within a short distance (e.g., within a half mile)—sell at lower prices than homes located farther away?
- For question 3 above, if no statistically identifiable effects are found, what is the likely maximum effect possible given the margins of error around the estimates?

In order to answer these questions the hedonic pricing model (Rosen, 1974; Freeman, 1979) was used. The paper notes this approach allows one to disentangle and control for the potentially competing influences of home, site, neighbourhood, and market characteristics on property values, and to uniquely determine how home values near announced or operating facilities are affected.

The summary of the key findings notes that previous published and academic research on this topic has tended to indicate that wind facilities, after they have been constructed, produce little or no effect on home values. At the same time, some evidence has emerged indicating potential home-value effects occurring after a wind facility has been announced but before construction. The paper indicates that previous studies, however, have been limited by their relatively small sample sizes, particularly in relation to the important population of homes located very close to wind turbines, and have sometimes treated the variable for distance to wind turbines in a problematic fashion.

This study by Hoen seeks to fill this gap by collecting a very large data sample and analyzing it with methods that account for confounding factors and spatial dependence. AsWe collected data from more than 50,000 home sales among 27 counties in nine states. These homes were within 10 miles of 67 different then-current or existing wind facilities, with 1,198 sales that were within 1 mile of a turbine—many more than were collected by previous research efforts. The data span the periods well before announcement of the wind facilities to well after their construction.

The findings of the study indicated that across all model specifications, there was no statistical evidence that home prices near wind turbines were affected in either the post-construction or post-announcement/pre-construction periods. Therefore, if effects do exist, either the average impacts are relatively small (within the margin of error in the models) and/or sporadic (impacting only a small subset of homes). In addition, the sample size and analytical methods enabled the study to bracket the size of effects that would be detected, if those effects were present at all.

Based on the results, the study found that it is *highly unlikely* that the actual average effect for homes that sold in the sample areas within 1 mile (1.6km) of an existing turbine is larger than +/-4.9%. In other words, the average value of these homes could be as much as 4.9% higher than it would have been without the presence of wind turbines, as much as 4.9% lower, the same (i.e., zero effect), or anywhere in between. Similarly, it is highly unlikely that the average actual effect for homes sold in the sample area within a half mile of an existing turbine is larger than +/-9.0%. In other words, the average value of these homes could be as much as 9% higher than it would have been without the presence of wind turbines, as much as 9% lower, the same (i.e., zero effect), or anywhere in between. The study notes that, regardless of these potential maximum effects, the core results of the study consistently show no sizable statistically significant impact of wind turbines on nearby property values.