CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD)
Version 03 - in effect as of: 22 December 2006

CONTENTS

Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
03	22 December 2006	The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.

SECTION A. General description of small-scale project activity

A.1 Title of the small-scale project activity:

Bethlehem Hydroelectric project
PDD Version 7 rev 4
Date: 7 Ocotber 2009

A.2. Description of the small-scale project activity:

The purpose of the project activity is to generate hydroelectricity, which will be distributed into the South African grid.

The project involves the development and operation of 7.0MW of hydro generation capacity within the boundaries of the Dihlabeng Local Municipality (Free State Province, South Africa). The project will generate 37 GWH per annum and is comprised of two generation facilities i.e.

- A run of river site located on the As River (4 MW), midway between Bethlehem and Clarens; and,
- Facility to be located at the existing concrete wall of the Sol Plaatje Dam (3 MW), in the town of Bethlehem. The Saulspoort Dam supplies water to the town and is not used for hydropower generation so far.

The project will involve the construction of these facilities as well as a 5km transmission line at 11KV on wood poles to deliver 7 MW to the Panorama substation to link the project to the national grid. A step-up transformer will be required at the power station in order to deliver power at 11kVA. Existing access roads to the site will also be upgraded.

The water resource in the As River is artificially fed from the Lesotho Highlands Water Project (LHWP). Water from the project is currently transferred from the Katse Dam in Lesotho to South Africa via the transfer tunnel and the delivery tunnel. During the transfer it is used to generate electricity for Lesotho in the Muela hydropower plant situated between the two tunnels. After driving the turbines the water flows to South Africa via the delivery tunnel, the outfall of which is located in the upper reaches of the As River (a tributary of the Liebenbergsvlei River). The flow rate in the river is therefore not seasonally dependent and remains almost constant throughout the year and over time.

The project will contribute to sustainable development in South Africa through supporting the development of renewable energy in the country and assisting South Africa in the achievement of its renewable energy target of 10000 GWH renewable energy contribution to final energy consumption by 2013 (White Paper on Renewable Energy, Republic of South Africa, November 2003).

At a local level the project will lead to increased economic activity in the area. In terms of job creation the project will create 40 skilled and 100 to 160 unskilled job opportunities during the construction phase, which will last approximately 12 months. Three full-time permanent jobs will be created once the project goes into implementation.

A.3. Project participants:

Name of Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
South Africa (host)	Bethlehem Hydro (Pty) Ltd	N
The Netherlands	Statkraft Markets BV	N

A.4. Technical description of the small-scale project activity:

A.4.1. Location of the small-scale project activity:

A.4.1.1. Host Party(ies):

South Africa

A.4.1.2. Region/State/Province etc.:

Free State province

A.4.1.3. City/Town/Community etc:

Bethlehem (Dihlabeng Local Municipality)

A.4.1.4. Details of physical location, including information allowing the unique identification of this small-scale project activity :

The 3 MW facility will be located at the Sol Plaatje dam which is 5km from the centre of Bethlehem. The actual location is at the existing concrete dam wall adjacent to a pumping station, which supplies the town of Bethlehem with water.

The 4MW As River site is located on farmland on the As River on the farms 'Merino' and 'De Burg Susan', some 15 km outside Bethlehem in the direction of the town of Clarens.

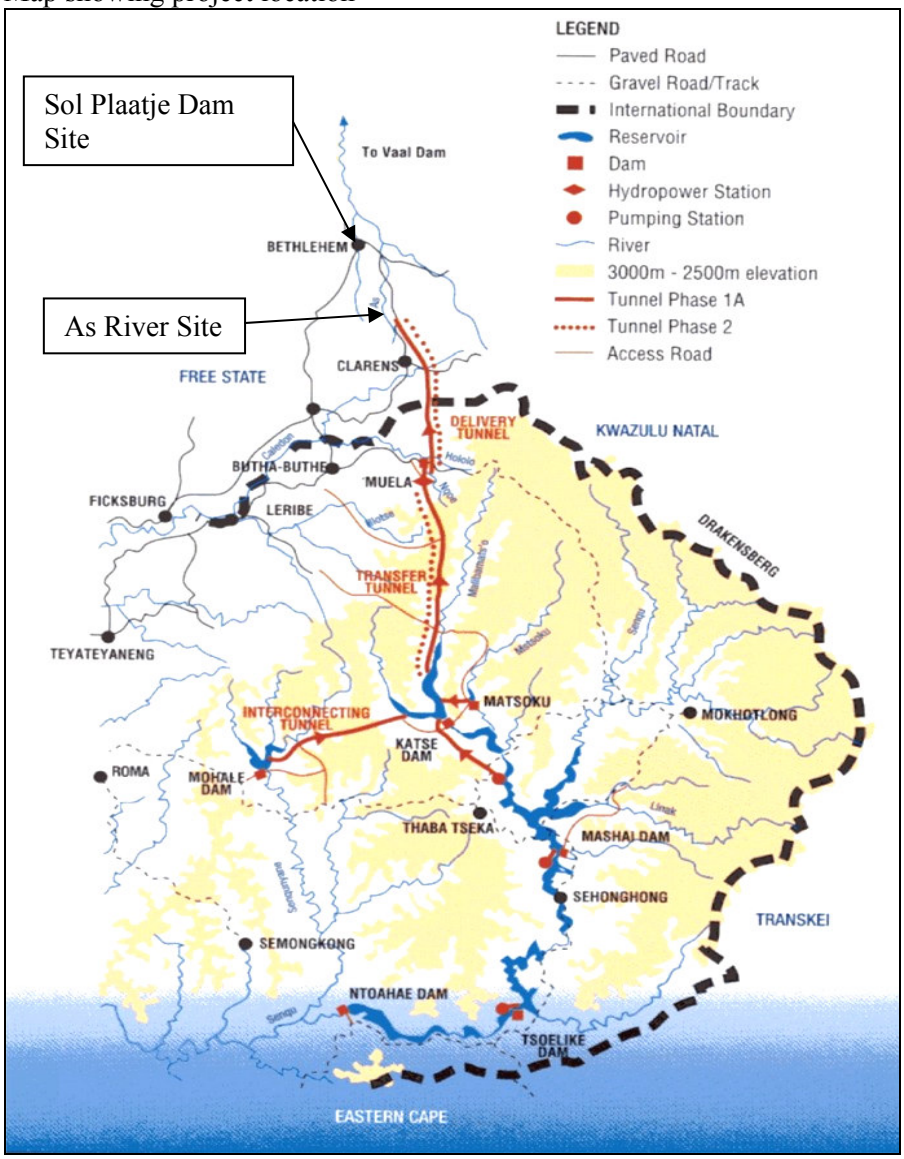
The co-ordinates for the two sites are:

Merino:
28deg 22' 09" South
028deg 21' 42" East

Sol Plaatje
28deg 12' 59" South
028deg 21' 50" East

Bethlehem Hydro (Pty) Ltd is located at REAM house, 53 De Havilland Crescent , Persequor Park, Pretoria 0020, South Africa

Map showing project location



A.4.2. Type and category(ies) and technology/measure of the small-scale project activity:

Type 1 – Renewable Energy Projects
1.D Grid connected renewable electricity generation

A.4.3 Estimated amount of emission reductions over the chosen crediting period:

Year No	Calendar year	Estimations of Annual Emission Reductions in tons of CO2e
1	2009	11 868
2	2010	34 712
3	2011	34 712
4	2012	34 712
5	2013	34 712
6	2014	34 712
7	2015	34 712
8	2016	8 678
	TOTAL	**228 816**
Total number of Crediting Years		7
Annual average of the estimated reductions over the crediting period in tons CO2e		**32 688**

Note:
Year 1 Generating Unit 1 will start production in April 2009
Generating Unit 2 will start production in December 2009
Year 8 4 months of generation for both units in this year as the first year's crediting period started in April

A.4.4. Public funding of the small-scale project activity:

The project has received project development assistance from The Netherlands Government i.e. funds for feasibility related work and the EIA. The Government of the Netherlands is not claiming any emission reductions as a result of their early support to the project

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a large scale project activity:

Bethlehem Hydro is a stand alone project, which does not form part of any large scale project

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the small-scale project activity:

Methodology used: AMS 1.D

Reference: Simplified Modalities and Procedures for Small-Scale CDM project activities, category I.D Version 13 Scope 01.

The specific technology for the CDM project is hydropower as a substitute for existing fossil fuel power.

B.2 Justification of the choice of the project category:

The project involves a grid connected renewable energy plant with the sale of electricity into the national grid, which is the only option open to the project developer and corresponds with category I.D.

B.3. Description of the project boundary:

The project boundary encompasses the physical geographical location of the two generating units. No emissions are emitted at site.

B.4. Description of baseline and its development:

In accordance with Methodology I.D for small-scale CDM project activities, the baseline selected for the project is the combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the 'Tool to calculate the emission factor for an electricity system'. The calculation and references used in calculation of the Combined Margin is attached to the PDD as Annex 3 baseline Information

The latest data for the calculation of the Combined Margin is 2005. The Combined Margin is calculated as follows:

$$\mathbf{EF_{grid,CM,y} = EF_{grid,OM,y} * w_{OM} + EF_{grid,BM,y} * w_{BM}}$$

With

$EF_{grid,OM,}$ = 0.99 y t CO_2/MWh
W_{OM} = 0.5
$EF_{grid,BM}$, = 1.05 y t CO_2/MWh
W_{BM} = 0.5

Therefore

$\mathbf{EF_{grid,CM,y}}$ = 0.99 *0.5 + 1.05*0.5
= 1.02 tCO_2/MWh

The calculations for $EF_{grid,OM}$ and $EF_{grid,BM}$ is given in Annex 3 Baseline Information. According to the Tool for calculating the Emission factor for an electricity system weighting given to the Operating Margin (W_{OM}) and the Built Margin (W_{BM}) for the first crediting period is 50% each.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered small-scale CDM project activity:

According to Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities, the project is additional in terms of the following barriers:

Barrier due to prevailing practice: the entry of Independent Power Producers in the South African power market is a recent phenomenon, with ESKOM still playing the dominant role in terms of generation capacity. Only some 5% of South Africa's generation capacity comes from non Eskom sources. These are all either municipally owned plants or generators imbedded in large industrial operations supplying primarily for own internal use. There are therefore almost no privately owned power plants in South Africa apart from co-generation plants owned by large industry. In fact private ownership within the power generation sector of South Africa was only mandated by the SA cabinet in 2003.

The National Energy Regulator of South Africa (NERSA) has licensed a total of 5 private power plants. These private plants have a combined installed capacity of 1387MW of which 1279 MW is coal fired plants run by large industrial companies for their own supply and 105MW is baggage plants run by the sugar mills for their own internal power consumption. A single 3MW hydro plant is licensed.
(Source: Energy Supply Statistics 2004
http://www.nersa.org.za/UploadedFiles/Publication/ESS2004.pdf)

The South African Department of Mineral and Energy (DME) provide the following information on the South African power generation sector:

Almost 90 percent of South Africa's electricity is generated in coal-fired power stations. Koeberg, a large nuclear station near Cape Town, provides about 5 percent of capacity. A further 5 percent is provided by hydroelectric and pumped storage schemes. In South Africa there are few, if any, new economic hydro sites that could be developed to deliver significant amounts of power. Generation is dominated by Eskom, the national wholly state-owned utility, which also owns and operates the national electricity grid. Eskom supplies about 95 percent of South Africa's electricity.
(Source: http://www.dme.gov.za/energy/electricity.stm)

This figure is supported by the electricity generation statistics published by the National Energy Regulator of South Africa (NERSA). Of the total electricity produced in 2004 in South Africa of 230 004GWh, Eskom produced 221 382GWh . In 2004 therefore Eskom produced 96% of the electricity in South Africa.
(Source: Energy Supply Statistics 2004 p 13
http://www.nersa.org.za/UploadedFiles/Publication/ESS2004.pdf)

Bethlehem Hydro will be the one of the first new (not refurbished) Independent Power Plant to be constructed in South Africa for the sole purpose of selling power commercially and not for internal use. The ability of new generators to break into this market is difficult as a result of a number of factors including the ability to negotiate access to the grid, the need for an Independent Power Producers license from the national regulator and the price paid for electricity. To date no other new IPP could compete with the low cost of power produced by Eskom. All of these requirements require resource levels that are generally beyond the capacity of producers. Therefore the grid contribution of small and independent hydro producers is currently extremely limited. In the case of Bethlehem this manifested itself in terms of the long lead time required to develop such a project (in the order of four years) as well as the time required to discuss and get agreement on the possibility of a power purchase agreement with the municipality.

Other barriers (financial resources): the ability of small and independent hydro power plants to be financially viable is constrained by their ability to compete with the prices of ESKOM electricity. ESKOM is one of the lowest cost producers in the world as a result of the historically subsidised investment in generation capacity which is most coal based but includes a small (less than 10%) large

hydro and nuclear. The effect of this is that income stream from electricity sales for independent power projects is strongly influenced by the wholesale prices ESKOM charges to its customers, rather than being directly related to the cost of production of power. The low electricity prices make small and independent hydropower in general, financially unattractive as investments as measured by their returns for investors. There have therefore been no new and independent small hydro power plants in South Africa since the early 1980's. The general price available to facilities is usually in the range 12 – 14 South African cents (approximately 2 US cents based on an exchange rate of R7 to the dollar) depending of course what the buyer (local municipality) is paying to Eskom. The national Electricity Regulator of South Africa (NERSA) requires distributors of electricity (municipalities) to purchase the cheapest electricity (Eskom or an own embedded generator) available for on sale to their customers.

Without the income from the carbon revenue, the project would not generate sufficient cash flow to meet the minimum debt service coverage ratio requirements of the Development Bank of Southern Africa (DBSA). The carbon revenue is an essential component of the project's income in order to meet its debt payment requirements. The DBSA has therefore included a signed sales agreement for the emission reductions as a suspensive condition for its loan disbursement. This barrier applies specifically to the proposed project activity; it is not necessary for thermal power plants to meet this requirement.

The timeline below shows the mayor milestones during the project's development.

Milestone	Date
Feasibility study completed	May 2003
Environmental Impact Assessment approval	5 July 2004
Water use licence awarded	26 May 2005
Loan Agreement Signed	6 June 2005
International Stakeholder Consultation	20 September 2005 to 19 October 2005
Power generation license awarded	7 November 2005
Power Purchase Agreement signed	21 November 2006
Emission Reduction Purchase Agreement signed	28 November 2006
Project Start date (Commencement of Civil Works notice)	28 November 2006
International Stakeholder Consultation (No Comments)	15 June 2007 to 14 July 2007
International Stakeholder Consultation (ISHC with updated Methodology)	12 March 2008 to 10 April 2008
Start of Crediting Period	30 March 2009 or Date of Registration, whichever is the latest

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

According to the Small Scale Methodology I.D. the baseline can be calculated as:

‘’A combined margin (CM) combined margin consisting as the combination of the operating Margin (OM)and Built Margin (BM) according to the procedure prescribed in the “tool to calculate the emission factor for an electricity system”

B.6.2. Data and parameters that are available at validation:	
Data / Parameter:	
Data unit:	kWh
Description:	Electricity produced by the generating units
Source of data used:	Estimated power production as provided by turbine suppliers
Value applied:	N/A
Justification of the choice of data or description of measurement methods and procedures actually applied :	As prescribed by Small scale Methodology I.D.
Any comment:	

Data / Parameter:	
Data unit:	Tons/years
Description:	Fuel (coal) consumption at Eskom Power Plants (Eskom)
Source of data used:	Eskom Annual Report
Value applied:	Refer to attached document: Calculation of the Emission Factor for the South African Grid (Appendix A, Table 2)
Justification of the choice of data or description of measurement methods and procedures actually applied :	As prescribed by Small scale Methodology I.D.
Any comment:	

Data / Parameter:	
Data unit:	MWh/annum
Description:	Annual electricity generation for Eskom Power plants (Eskom)
Source of data used:	Eskom Annual Report
Value applied:	Refer to attached document: Calculation of the Emission Factor for the South African Grid (Appendix A, Table 3)
Justification of the choice of data or description of	As prescribed by Small scale Methodology I.D.

measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	
Data unit:	GJ/ton
Description:	Average calorific value for coal used by Eskom Power Plants (Eskom)
Source of data used:	Eskom Annual Report
Value applied:	19.4 GJ/annum
Justification of the choice of data or description of measurement methods and procedures actually applied :	As prescribed by Small scale Methodology I.D.
Any comment:	

Data / Parameter:	
Data unit:	Ton CO_2/MWh
Description:	Emission factor calculated using the Combined Margin methodological tool
Source of data used:	Eskom Annual report figures for total electricity produced, coal consumption, calorific values of fuel and electricity output.
Value applied:	1.02 tCO_2/MWh (refer to Section B4 for calculation)
Justification of the choice of data or description of measurement methods and procedures actually applied :	No direct measurements will be taken. Figures published by Eskom (national utility) will be used
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

ER = (E1+E2) * EF

Where:

ER = annual emission reductions in tons CO2

E1 = annual electricity generated at generating unit 1

E2 = annual electricity generated at generating unit 2

EF = Emission Factor..

E1 = 18 946.229 MWh/annum
E2 = 15 084.882 MWh/annum
EF = 1.02 tonCO_2/MWh

ER = (18 946.229 + 15 084.882) * 1.02
= 34 712 ton CO_2/annum

B.6.4 Summary of the ex-ante estimation of emission reductions:

Year	Estimation of Project Activity Emissions (tCO2e)	Estimation of Baseline Emissions (tCO2e)	Estimations of Leakage (tCO2e)	Estimation of overall emission reductions (tCO2e)
2009	0	11 868	0	11 868
2010	0	34 712	0	34 712
2011	0	34 712	0	34 712
2012	0	34 712	0	34 712
2013	0	34 712	0	34 712
2014	0	34 712	0	34 712
2015	0	34 712	0	34 712
2016	0	8 678	0	8 678
Total (t CO2e)	**0**	**228 816**	**0**	**228 816**

Note:
Year 1 Generating Unit 1 will start production in April 2009
Generating Unit 2 will start production in December 2009
Year 8 4 months of generation for both units in this year as the first year's crediting period started in April

B.7 Application of a monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

Data / Parameter:	
Data unit:	kWh
Description:	Total annual power generated at each generating unit
Source of data to be used:	Electricity meters installed at each generating unit
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Total annual electricity produced (kWh) will be used to calculate annual emission reductions
Description of measurement methods	Remote monitored meters will be used which records each Wh produced. Data will be downloaded daily via a wireless GPRS (cell phone) system.

and procedures to be applied:	
QA/QC procedures to be applied:	Meters to be calibrated by accredited calibration authority. Real time digital data recording.
Any comment:	

B.7.2 Description of the monitoring plan:

The approved monitoring methodology for category Type I.D, renewable electricity generation for a grid is described as follows in appendix B of the simplified M&P for CDM small-scale project activities:

"Monitoring shall consist of metering the electricity generated by the renewable technology."

This methodology will be applied to the two hydropower generating facilities that constitute the project. Separate remote monitored electricity meters will be installed at each generation unit. Data will be transmitted daily via a GPRS (cell phone) connection and recorded electronically.

B.8 Date of completion of the application of the baseline and monitoring methodology and the name of the responsible person(s)/entity(ies)

Date: 11 March 2008
Responsible person: Anton-Louis Oliver, NuPlanet South Africa, al@nuplanet.nl

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

Commencement of Civil Works Notice on 28 November 2006

C.1.2. Expected operational lifetime of the project activity:

In excess of 20 years

C.2 Choice of the crediting period and related information:

C.2.1. Renewable crediting period

C.2.1.1. Starting date of the first crediting period:

30 March 2009

The starting date of the crediting period is 30 March 2009 or the date of registration, whichever comes latest

C.2.1.2. Length of the first crediting period:

7 years

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

N/A

C.2.2.2. Length:

N/A

SECTION D. Environmental impacts

D.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

In terms of South Africa's Environmental Impact Assessment (EIA) Regulations an EIA Scoping study was completed by independent consultants. The environmental impacts assessed during the scoping study covered both the construction and the operational phases of the project. An Environmental Control Officer (ECO) has been appointed and mandated by the Free State Provincial Authority to monitor environmental impacts on their behalf. The conclusions and recommendations of the scoping study as approved by the Free State Provincial Authorities were:

Conclusions

This Report has assessed the potential impacts associated with the proposed hydropower scheme construction. This investigation has not identified any potential impacts on the environment, which are so severe as to suggest that the proposed infrastructure should not be constructed. However, an environmental cost associated with the development of the 4MW mini hydro power station at the As River Site, is the flooding of a wetland identified in a natural basin.

The proposed development is aimed at enhancing/ augmenting the electricity supply to nearby Bethlehem. The expected long term effects on the environment is mostly positive, while the short term negative effects of construction activities of has limited impact on the environment, and with the implementation of the recommendations contained in this report, could be managed and minimised.

Considering the present environmental conditions, the assessment of the environmental issues, and the recommendations contained in this report, it is believed that the Environmental Assessment could be completed at this Scoping Stage, and that no further assessment is required.

Recommendations

The following recommendations are considered professional opinions and are based on experience in the field, knowledge of the local environment, and are informed by comments received during the course of the Scoping process. The recommendations can be separated into the following groups:

- Construction recommendations; and
- Operational and maintenance recommendations

Construction recommendations

- It is recommended that the mitigation measures detailed in the report be implemented in order to reduce the significance of the impacts associated with the construction of the proposed hydropower scheme.
- In order to manage construction and limit the significance of impacts mentioned in Section 4, an EMP should be developed and implemented. An appropriately qualified environmental consultant, taking cognisance of the mitigation measures outlined in this report should draft this EMP. It is crucial that the implementation of the EMP is enforced by an Environmental Control Officer during construction, and that the environmental conditions, costs and penalties are written onto the contract documentation
- In particular, it is recommended that disturbed areas should be rehabilitated and re-vegetated with suitable vegetation.
- The initial design of the Merino site would have flooded a small wetland. The flooding of the wetland was approved under the RoD. However, a change from a head pond to a canal design at Merino managed to avoid any impact on the wetland

Operational and maintenance recommendations

- Develop and implement an operational Environmental Management Programme (EMP), with appropriate guidelines for the optimal operation of the plant and a contingency plan to deal with upset operating conditions and emergency situations (*e.g.* flooding, mechanical failure) should they arise. The EMP should incorporate appropriate monitoring protocols and make adequate provision for appropriate action in the event of potentially significant thresholds being reached or trends indicating potentially significant adverse impacts be noted.
- Related to the aforementioned EMP, ensure the continued implementation of a monitoring programme.
- Ensure that the plant operators have been properly trained in the operation of the works.

In accordance with the RoD requirements an EMP has been developed. The EMP clearly identifies the environmental indicators to be monitored during construction and operation as well as the monitoring procedures. The enforcement of compliance with the EMP lies with the ECO who conducts regulatr site visits and reports to the relevant ministry

The Construction indicators monitored for compliance by the ECO are (EMP table 4.1 p 20):

- Compliance with relevant legislation
- Site established and access roads constructed to minimise environmental impact
- Injuries to construction workers and residents
- Water supply
- Proper signage
- Visual Impact
- Dust pollution
- Noise levels
- Litter and waste production
- Disposal sites
- Terrestrial and aquatic fauna and flora
- Sensitive sites
- Soil and Surface water
- Secutiry

- Traffic
- Fires
- Flooding

The Operational Indicators monitored for compliance by the ECO are (EMP table 4.1p 21):

- Visual
- Terrestrial fauna and flora
- Sensitive sites
- Erosion
- Infrastructure
- Recreational use of river

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

In terms of South Africa's Environmental Impact Assessment (EIA) Regulations the project had to undertake an EIA and was given a positive Record of Decision authorisation by the Free State Provincial Authorities which will enable the project to go into operation, as no environmental flaws were identified. The RoD covered both the construction and the operational phases of the project. The bulk of the environmental impact will occur during construction and will be mitigated as part of the construction process according to the Environmental Management Plan.

The project was also granted a water licence as required by the National Water Act (36 of 1998).

SECTION E. Stakeholders' comments

E.1. Brief description how comments by local stakeholders have been invited and compiled:

The main form of stakeholder consultation was through the environmental impact assessment (EIA) process. Local stakeholders were invited to comment on the scoping report, produced for the EIA process through the following mechanisms:

- Scoping advertisements were released in the local press in May 2003.
- In May 2003, poster notices of the EIA process were erected.
- Letters including a background information document and response form were distributed to the identified stakeholders in May 2003. Moreover various authorities were consulted during the process.
- In June 2003, the public meeting was held in Bethlehem to provide the local stakeholders with an opportunity to meet with the consultants, project proponent and authorities and to comment on the proposed development and raise any issues and concerns.
- Following the completion of the draft scoping report in July 2003, the report was sent to the stakeholders and also lodged in the library in Bethlehem. The public was notified to the lodging of the draft report by means of letters to identified stakeholders and given a three week period in which to comment on the report. At the end of the comment period, all relevant issues and concerns raised by the public have been noted and incorporated into the final scoping report.

In addition the project draft PDD was posted on the South African DNA website for comments for the period 24 October 2005 to 23 November 2005. Any interested party could post comments on the project to the DNA. As indicated in the DNA's letter of "Host Country Approval", the DNA approved the project without requiring any changes.

E.2. Summary of the comments received:

The only comments that can be summarised are those associated with the EIA process. These included;

- The requirements that the project would be subject to in terms of the licensing requirements of the Department of Water Affairs and Forestry;
- The actual benefits that would accrue to the community from such a project;
- What employment opportunities would actually be created by the project;
- The nature of the diversions to be created as part of the project;
- A request for an archaeological impact assessment report; and,
- Discussions with regard to the alternatives associated with the project.

E.3. Report on how due account was taken of any comments received:

The comments received were incorporated into the final scoping report that was submitted to the Provincial Environmental Authorities, and was used by the authorities to give the record of decision. As a result of the comments received an archaeological impact assessment report was commissioned and used in the EIA process.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

The Government of Netherlands provided resources for early project identification and development related activities with regard to this project from their AIJ programme. As such the funding did not result in a diversion of official development assistance. The Government of the Netherlands is not claiming any emission reductions as a result of their early support to the project.

No public funding from ODA has been used to acquire CERs from this project.

Annex 3

BASELINE INFORMATION

Refer to the attached PDF document:

''Calculation of the emission factor for Eskom'' Promethium Carbon 2 April 2008

Refer to the attached Excel spreadsheet:

"Bethlehem Hydro EF calcs"

Annex 4

MONITORING INFORMATION
MONITORING PLAN

1 Overall project management

Bethlehem Hydro has a clear and well defined management structure Consisting of Managing Director, a Operational Manager and an Administrative Clerk Overall responsibility at the plant lies with the Managing Director who also has final responsibility for the CDM project. The management structure is flat with the Managing Director and the Operational Manager having direct day to day responsibilities in the running of the plant.

2 Management of project registration, monitoring, measurement and reporting

The Operational Manager will have final responsibility for all aspects relating to data measurements, monitoring of data recording and will sign off all reports on monitoring.

Data will be collected digitally and consolidated by the Bethlehem Hydro Administrative Clerk, who will also draw up the monthly and annual emission reduction monitoring reports.

Monitoring itself will be integrated as far as possible into existing plant operating procedures. The data required for the monitoring of the emission reductions will come from data already collected as part of the plant's operations, i.e the metering of electricity sales

Data will be recorded at in real time with remote monitored electricity meters that records each Watt hour (Wh) generated intervals according to the table attached to the monitoring plan. The actual measured data will be entered into the "Emission Reduction Spreadsheet" attached to the PDD to calculate the emission reductions for the period.

Training of monitoring personnel
Due to the nature of the project and its monitoring needs there is no need for specific or specialised training of personnel for monitoring. The data which will be collected is also collected for general plant operational and financial administration.

3 Emergency preparedness procedures

The following emergency events can be foreseen which could have an impact on the project's emission reductions or the data collection procedures:

- Loss of power at plant

In the case of loss of power at a plant no data will be lost. When power is lost the meter retains an internal record of the electricity metered since the last transmission of data. Once power is restored the meter will continue to record electricity production.

4 Calibration of monitoring equipment

The only relevant monitoring equipment for this project relates to the electricity meters. One electricity meter will be installed at each generation unit. The metering equipment (meters and GPRS data transmission systems) will be calibrated by a certified calibration laboratory according to accepted national standards. Due to the fact that digital electricity meters are used recalibration will not be necessary.

5 Maintenance of monitoring equipment and installations

The digital electricity meters will not require any ongoing maintenance.

6 Day-to-day records handling procedures

Day to day record keeping is done according to a fixed programme indicating what measurements are taken, who is responsible and how the data is processed as outlined in the table below.

Variable	Monitoring interval	Monitoring methodology	Responsible person	Quality control	Data storage procedure
Electricity generated at Merino site	Per Watt hour (Wh) generated	Automatic reading by electricity meters	Operational Manager Back up: Managing Director	Compare to Dihlabeng Meters	Data transmitted daily and digitally stored on website
Electricity generated at Sol Plaatje site	Per Watt hour (Wh) generated	Automatic reading by electricity meters	Operational Manager Back up: Managing Director	Compare to Dihlabeng Meters	Data transmitted daily and digitally stored on website
Annual Combined Margin Emission Factor	annual	Calculate Combined Margin according to "Tool to calculate the emission factor for	Managing Director	N/A	N/A

		an electricity system (VS1)" based on data published in Eskom's Annual Report			

7 Monitoring data adjustment procedures

Data will be collected on daily and monthly basis and consolidated on a monthly basis where the data will be checked for quality control purposes against an independently measured value as indicated in the table above. Should there be any discrepancies in the data the source of the variation will be identified, be it the main measured value or the quality control value. The incorrect value will be deleted and the measured data compared to historical and predicted values before being finally recorded.

8 Data and reports review procedures

Data will be reviewed by the Operational Manager and signed off by the Managing Director on a monthly basis again predicted and historical values. Should there be discrepancies in the data the procedure indicated in Point 7 above will be followed to adjust the data.

9 Internal GHG audit procedures

There are no requirements for internal audits of GHG project compliance with the plants operational requirements

10 Project performance review before verification

Data and project performance will be reviewed by the Manaing Director and the Operational Manager on a monthly basis against predicted and historical values. The consolidated annual project emission reduction reports will be reviewed by Bethlehem Hydro's auditors for compliance before being submitted for verification.

11 Procedures for improving quality of project monitoring

The main procedure for improving the accuracy of the monitoring is the quality control procedures described above in the Monitoring Plan. The data collection and reporting formats are checked on a monthly basis for accuracy and the monitoring procedures will be adjusted as required for improved integration with plant operations and to minimise faulty measurement or meter reading errors.

Emission reduction data recording and calculation format

Merino Generating Plant

Month	Start Meter reading (kWh)	End Meter reading (kWh)	Electricity generated

01			
02			
03			
04			
05			
06			
07			
08			
09			
10			
11			
12			
Total			

Sol Plaatje Generating Plant

Month	Start Meter reading (kWh)	End Meter reading (kWh)	Electricity generated
01			
02			
03			
04			
05			
06			
07			
08			
09			
10			
11			
12			
Total			

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