Environmental and Social Impact Assessment Report (ESIA) — Appendices 11, 12 and 13

Project No.: 51209-001
November 2017

INO: Eastern Indonesia Renewable Energy Project

Prepared by ESC for PT Energi Bayu Jeneponto (EBK) (Republic of Indonesia)

Appendix 11

Shadow Flicker Modelling Study and Summary of Results

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Tolo 1 Wind Farm Design For Shadow Flicker + Mitigation Plan

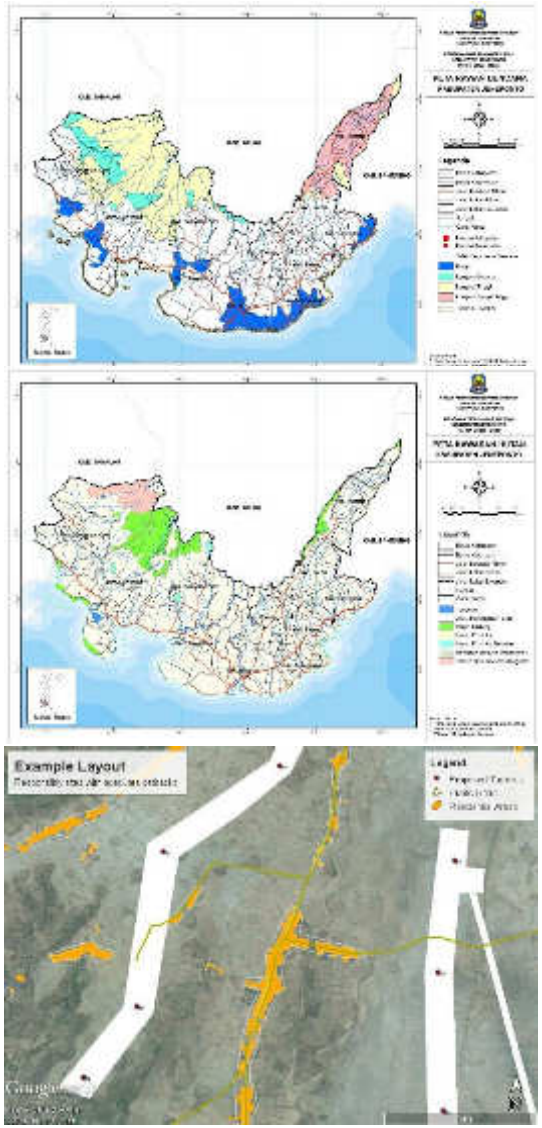
Privileged Information

Principles Used in Early Site Layout Design

- Know your Buildable Area (BA)
  - Any regulations that exist
  - Responsible development
  - Active stakeholder engagement
  - Use of local PETA maps for land use, forestry, population density, spatial planning, strategic zones, geology, natural disasters, administration, etc.

- Know your terrain and site area
  - Use of high resolution 2.5 m terrain contours - aids in undertaking conceptual design of roads to minimise impact on surrounding paddy fields
  - Use of high resolution satellite imagery – aids in identifying sensitive receptors

- Noise and shadow modelling need to feature
  - Use of DNV GL's WindFarmer shadow modelling modules to assess impact according to industry best practice guidelines and comply with regional requirements



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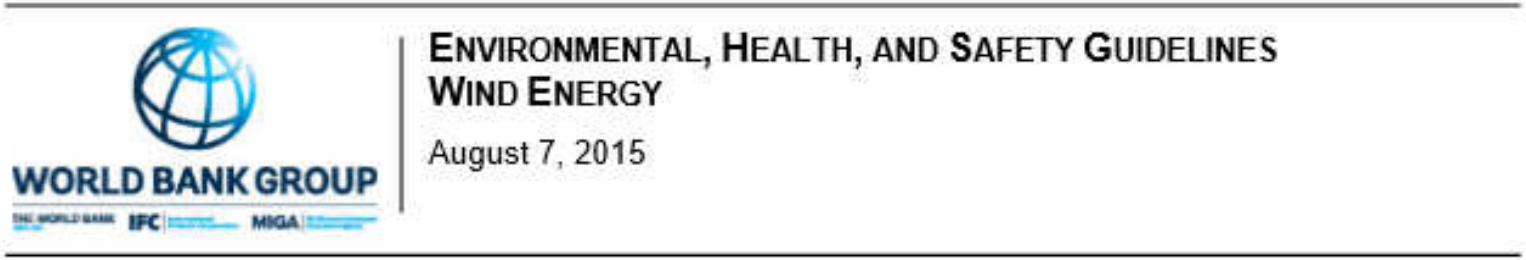
World Bank Group Guidelines



ENVIRONMENTAL, HEALTH, AND SAFETY GUIDELINES FOR WIND ENERGY

"1. The Environmental, Health, and Safety (EHS) Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP).1 When one or more members of the World Bank Group are involved in a project, these EHS Guidelines are applied as required by their respective policies and standards. These industry sector EHS Guidelines are designed to be used together with the General EHS Guidelines document, which provides guidance to users on common EHS issues potentially applicable to all industry sectors."

"5. The EHS Guidelines for wind energy include information relevant to environmental, health, and safety aspects of onshore and offshore wind energy facilities. It should be applied to wind energy facilities from the earliest feasibility assessments, as well as from the time of the environmental impact assessment, and continue to be applied throughout the construction and operational phases. Annex A contains a full description of industry activities for this sector. EHS issues associated with the construction and operation of transmission lines are addressed in the EHS Guidelines for Electric Transmission and Distribution."

Shadow Flicker Guidelines

- What is shadow flicker?

  "Shadow flicker occurs when the sun passes behind the wind turbine and casts a shadow. As the rotor blades rotate, shadows pass over the same point causing an effect termed shadow flicker. Shadow flicker may become a problem when potentially sensitive receptors (e.g., residential properties, workplaces, learning and/or health care spaces/facilities) are located nearby, or have a specific orientation to the wind energy facility."

  Potential shadow flicker issues are likely to be more important in higher latitudes, where the sun is lower in the sky and therefore casts longer shadows that will extend the radius within which potentially significant shadow flicker impact will be experienced.

  - In an equatorial latitude such as that in South Sulawesi, this impact is minimised

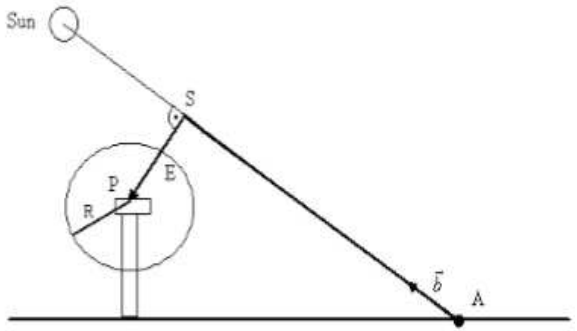


Figure 1: Shadow Flicker Calculation

- Shadow Flicker Modelling

  Where there are nearby receptors, commercially available software can be used to model shadow flicker in order to identify the distance to which potential shadow flicker effects may extend. The same software can typically also be used to predict the duration and timing of shadow flicker occurrence under real weather conditions at specific receptors located within the zone of potential shadow flicker impact.

  - Equis Energy has made use of DNV GL's Shadow Flicker Module available in the WindFarmer software for modelling

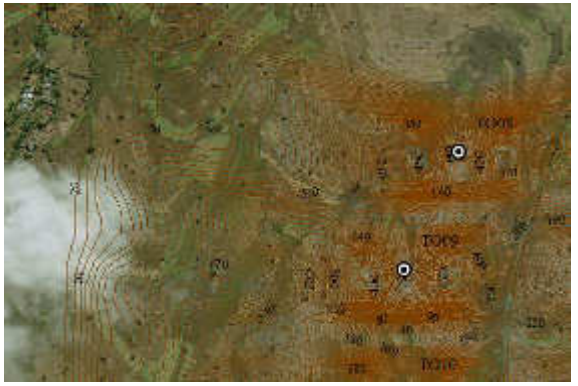


Figure 2: Typical WindFarmer Shadow Flicker Output

Shadow Flicker Compliance

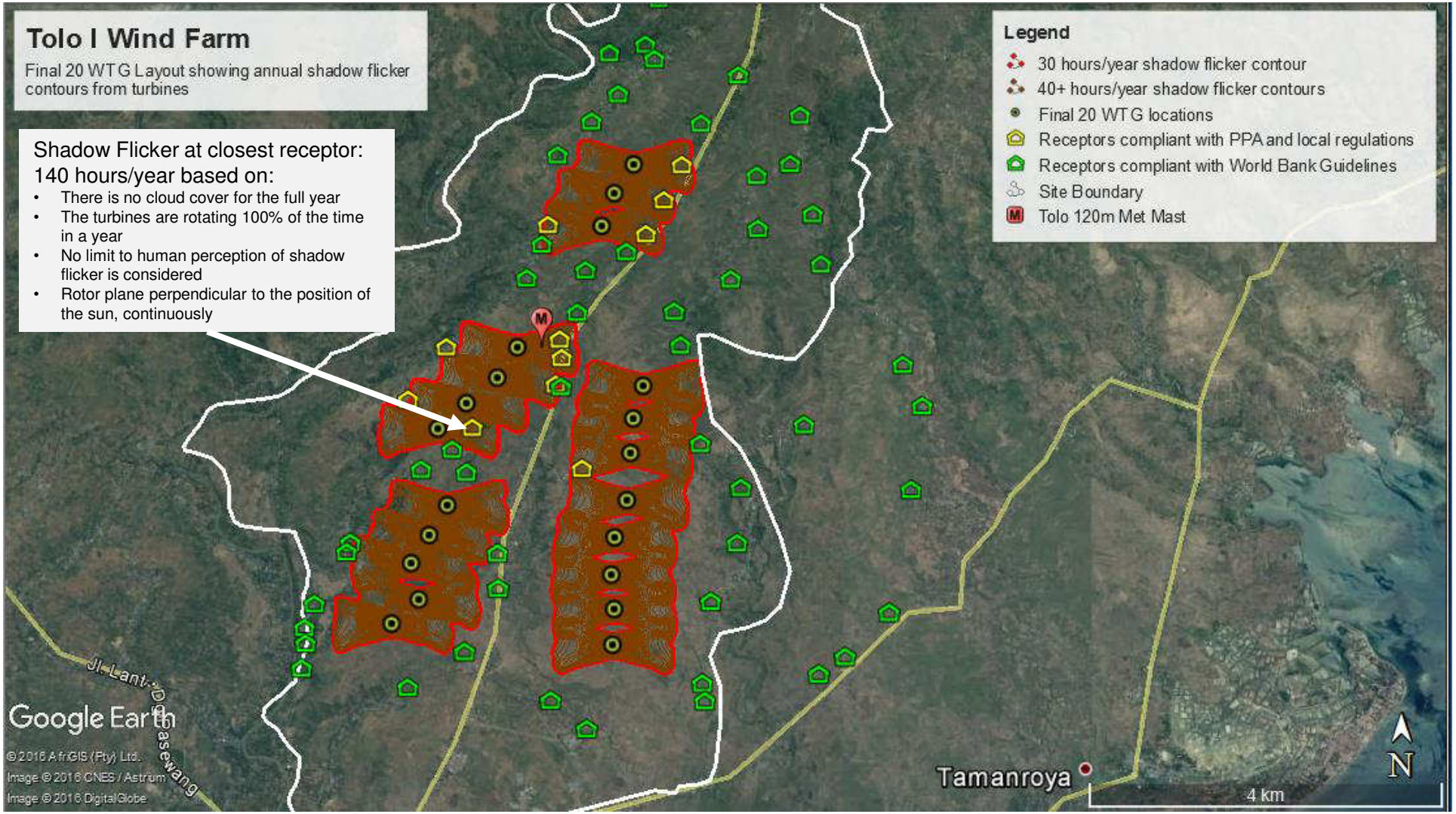
1. Shadow Flicker Guidelines

   If it is not possible to locate the wind energy facility/turbines such that neighbouring receptors experience no shadow flicker effects, it is recommended that the predicted duration of shadow flicker effects experienced at a sensitive receptor not exceed 30 hours per year and 30 minutes per day on the worst affected day, based on a worst-case scenario.

2. In order to assess compliance with the guidelines, shadow flicker should be modelled and predicted based on an astronomical worst-case scenario, which is defined as follows:
   - *There is continual sunshine and permanently cloudless skies from sunrise to sunset.*
   - *There is sufficient wind for continually rotating turbine blades.*
   - *Rotor is perpendicular to the incident direction of the sunlight.*
   - *Sun angles less than 3 degrees above the horizon level are disregarded (due to likelihood for vegetation and building screening).*
   - *Distances between the rotor plane and the tower axis are negligible.*
   - *Light refraction in the atmosphere is not considered.*

3. Equis Energy has made use of the aforementioned astronomical worst-case scenario to model and predict shadow flicker from each turbine on identified receptors from high resolution up-to-date satellite imagery.

Final 20 Turbine Layout with Shadow Flicker Map – Worst Case Modelling



15. Final 20 turbine layout with assessed shadow flicker levels from turbines with sensitive receptors based on worst case modelling

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Jeneponto Cloud Cover and Long Term Wind Speed Frequency Distributions

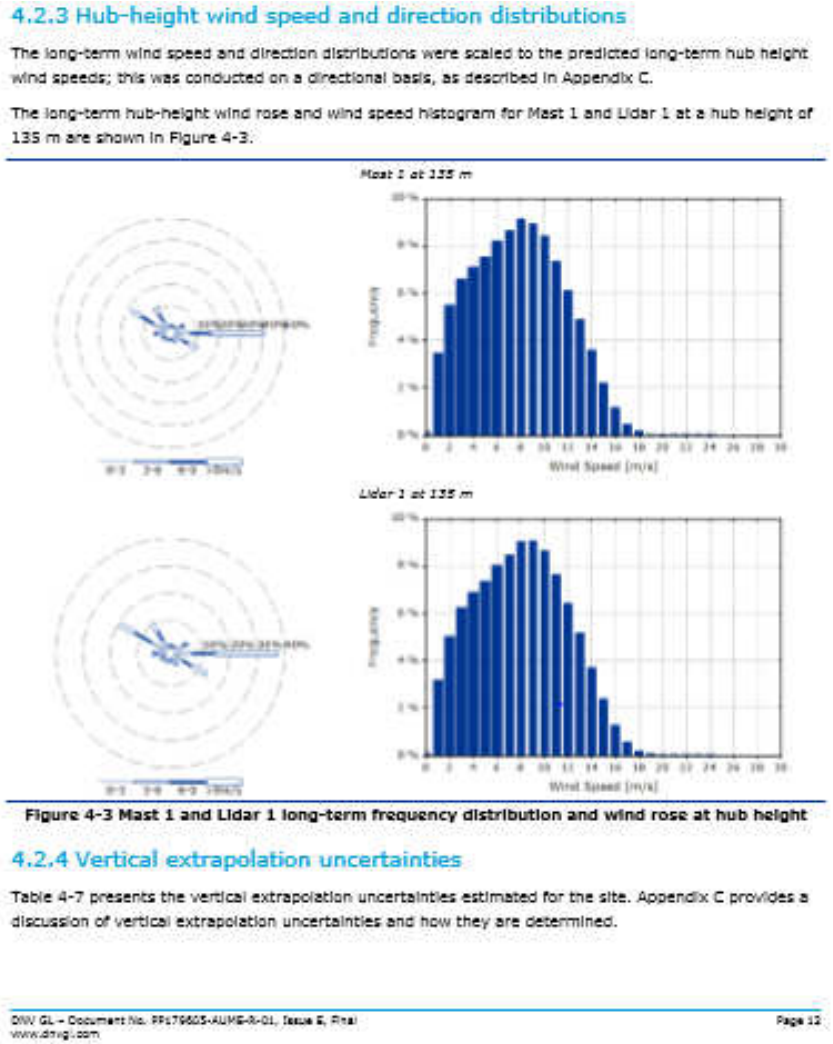
Cloud cover for 2016 at Jeneponto, South Sulawesi (Source: worldweatheronline.com)

Cloud Cover

- Based on third party remote sensing based cloud observations
- All sources indicate annual cloud cover at Tolo I site of 28 – 30%

Wind Speed Frequency Distribution

- DNV GL long term wind speed frequency distribution estimates that turbines will only rotate for 87% of the time assuming 100% availability or 84% of the time in a year assuming warranted availability of 97%



4.2.3 Hub-height wind speed and direction distributions

The long-term wind speed and direction distributions were scaled to the predicted long-term hub height wind speeds; this was conducted on a directional basis, as described in Appendix C.

The long-term hub-height wind rose and wind speed histogram for Mast 1 and Lidar 1 at a hub height of 135 m are shown in Figure 4-3.

Mast 1 at 135 m

Lidar 1 at 135 m

Wind Speed [m/s]

Figure 4-3 Mast 1 and Lidar 1 long-term frequency distribution and wind rose at hub height

4.2.4 Vertical extrapolation uncertainties

Table 4-7 presents the vertical extrapolation uncertainties estimated for the site. Appendix C provides a discussion of vertical extrapolation uncertainties and how they are determined.

DNV GL – Document No. PP179605-AUMS-R-01, Issue E, Final
www.dnvgl.com
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Long term hub height wind speed frequency distribution at mast location and LIDAR (Source: DNV GL)

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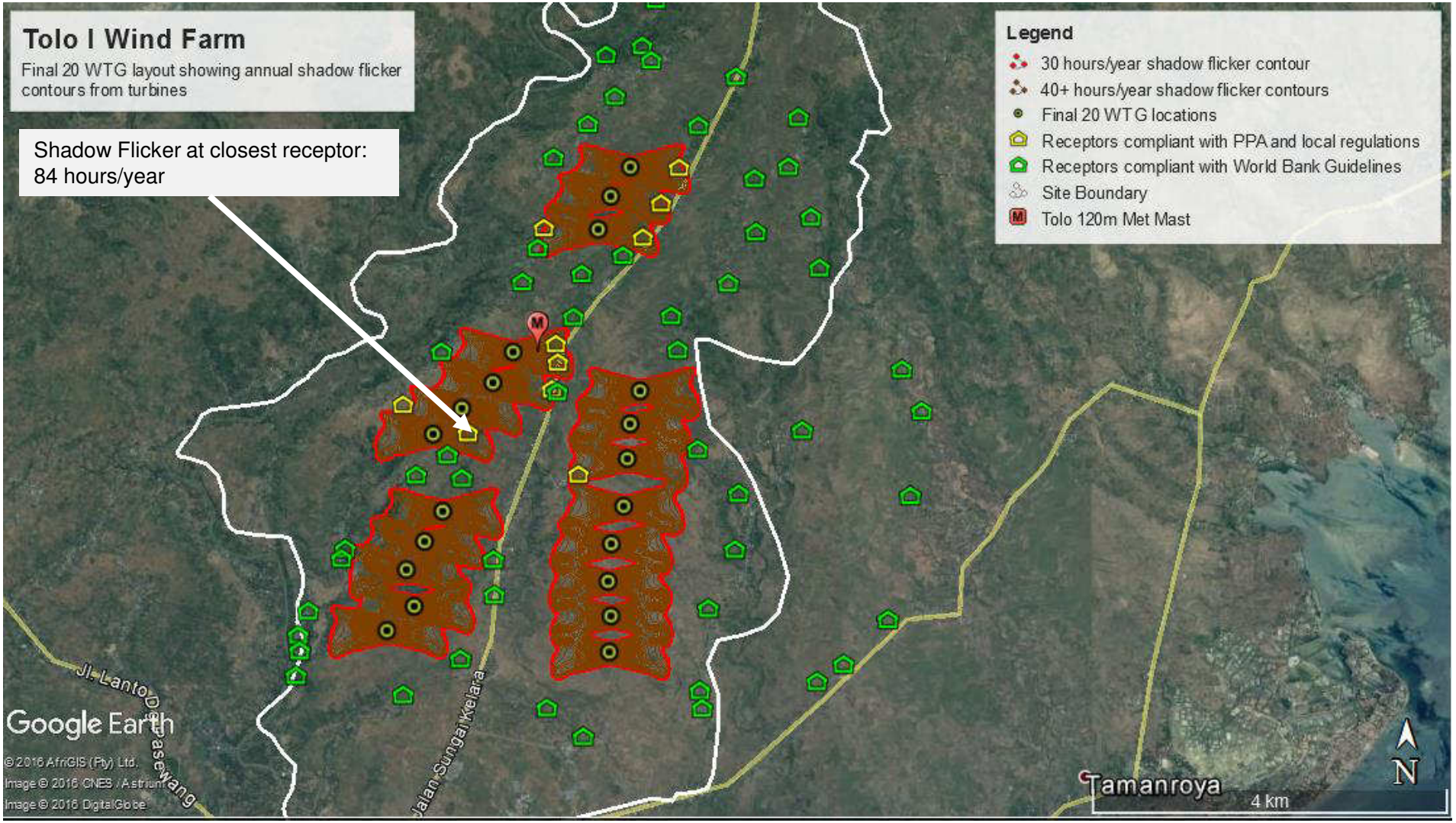
Final 20 Turbine Layout with Shadow Flicker Map – Realistic Modelling



15. Final 20 turbine layout with assessed shadow flicker levels from turbines with sensitive receptors

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Shadow Flicker Modelling Result

Sensitive receptor no.	Distance from the nearest WTG	Worst case scenario[1]				Realistic scenario				Remarks (Current receptor conditions)
		Total annual hours	Total annual hours > 30 hours per year[2]	No. of days with exceedance of 30 min per day	Total annual hours > 30 minutes per day[3]	Total annual hours	Total annual hours > 30 hours per year[2]	No. of days with exceedance of 30 min per day	Total annual hours > 30 minutes per day[3]	
1	550m from WTG01	56.0	26.0	65	14.8	33.9	3.9	37	2.2	Houses with no window facing the shadow direction.
2	595m from WTG02	72.0	42.0	99	16.5	43.5	13.5	39	5.3	Natural barrier (trees) covering houses in the shadow direction.
3	540m from WTG03	76.0	46.0	82	29.7	46.0	16.0	53	10.3	The houses are either equipped with awning or trees in the shadow direction.
4	520m from WTG03	52.0	22.0	55	18.2	31.4	1.4	45	1.2	
5	440m from WTG04	66.0	36.0	66	26.5	39.9	9.9	49	7.3	
6	515m from WTG04	58.0	28.0	67	21.5	35.1	5.1	51	3.9	Natural barrier (trees) covering houses in the shadow direction.
7	675m from WTG05	44.0	14.0	36	6.0	26.6	0.0	0	0.0	The houses do not have windows facing the shadow direction or even if some have, those are equipped with awning.
8	370m from WTG07	140.0	110.0	149	71.3	84.7	54.7	97	35.5	The houses are either equipped with awning or trees in the shadow direction.
9	405m from WTG07	62.0	32.0	66	13.8	37.5	7.5	29	3.2	Natural barrier (trees) covering houses in the shadow direction.
10	490m from WTG16	89.0	59.0	95	27.3	53.8	23.8	44	11.0	The houses are either equipped with awning or trees in the shadow direction.

Notes:

1. *Astronomical worst-case scenario as defined in the IFC EHS Guidelines for Wind Energy has been used for modelling in DNV GL's WindFarmer software.*
2. *Hours in a year for which the shadow flicker at the receptor is greater than 30 hours.*
3. *Sum of hours per day in a year for which the shadow flicker is greater than 30 mins per day at the receptor.*

Conclusions for the Final 20 WTG Layout: Shadow Flicker Modelling

Shadow Flicker Modelling

- Conducted based on worst case assumptions:
- There is no cloud cover for the full year
- The turbines are rotating 100% of the time in a year
- No limit to human perception of shadow flicker is considered
- Rotor plane perpendicular to the position of the sun, continuously

Using the worst case assumptions:

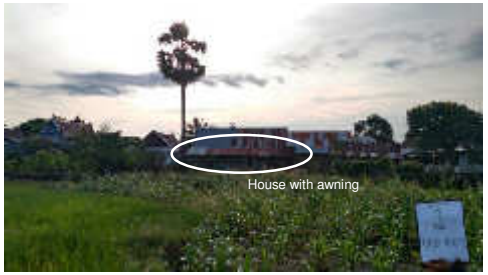
- Layout is largely compliant with World Bank Guidelines of no more than 30 hours/year of shadow flicker at receptors
- 11 out of 57 groups of receptors have shadow flicker greater than the World Bank Guideline with 10 out of the 11 with shadow flicker levels of 40-90 hours/year
- Worst case shadow flicker at closest receptor to layout is 140 hours/year

Shadow Flicker Impact Assessment – Realistic Impact

- Cloud cover of 28% results in a 28% reduction of shadow flicker impact
- Wind turbines rotating for 84% of the year, results in a 16% reduction of shadow flicker impact
- **10 out of 57 groups of receptors will now have shadow flicker levels of 30-54 hours/year**
- **Worst case shadow flicker at closest receptor to layout is now 84 hours/year**

Shadow Flicker Impact (Baseline): Receptor Group 1 - 4

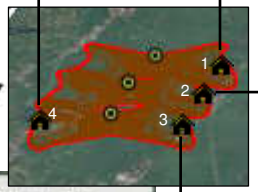
Looking west from TO.03

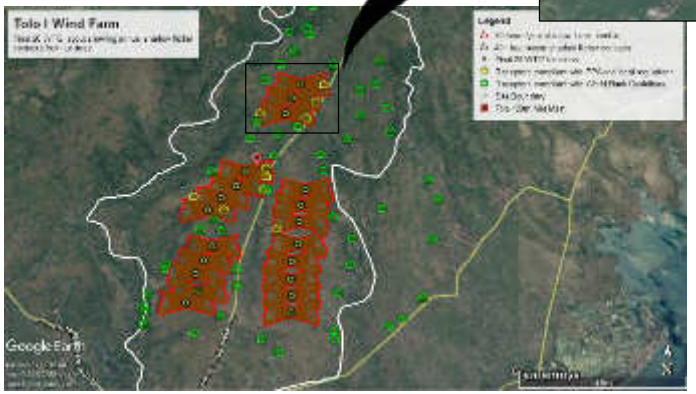


Looking northwest from TO.03

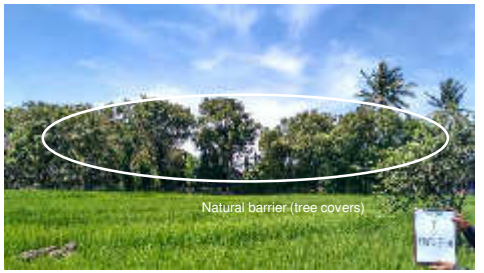
Looking northeast from TO.01

Looking east from TO.01





Looking east from TO.01



Looking east from TO.02

Looking east from TO.03

Looking east from TO.03

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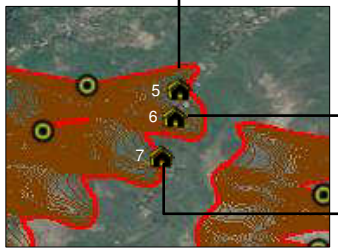
Shadow Flicker Impact (Baseline): Receptor Group 5 - 7

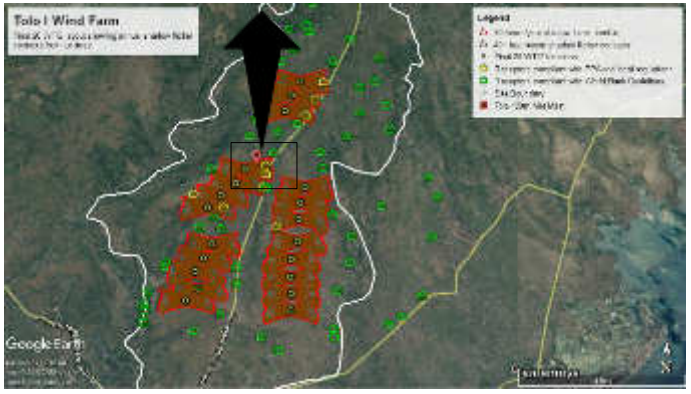
Looking east from TO.04

Looking east from TO.04



Looking east from TO.04

Looking east from TO.04



Looking east from TO.05

Looking east from TO.05

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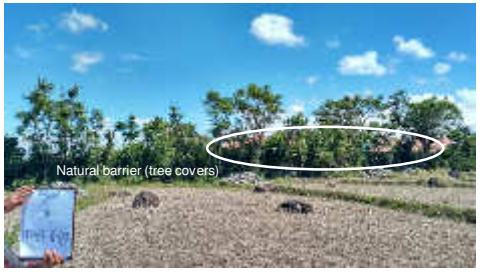
Shadow Flicker Impact (Baseline): Receptor Group 8 - 10

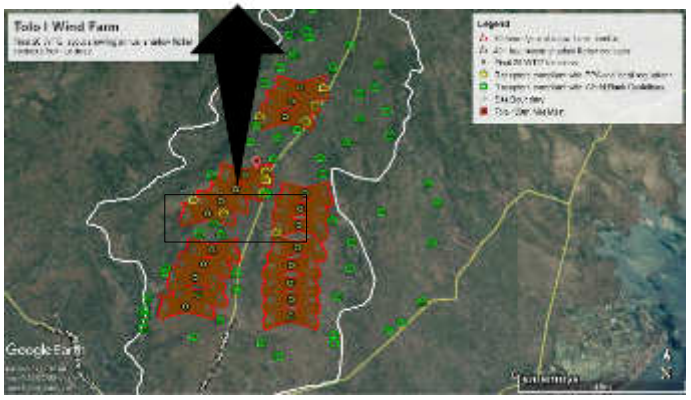
Looking west from TO.07



Looking west from TO.07

Looking east from TO.07

Looking east from TO.07



Looking southwest from TO.15

Looking northwest from TO.16

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Shadow Flicker Impact (Baseline) – Conclusion

- Majority of receptor was observed to have no windows facing the shadow direction of the turbines. Even if the house is observed to have windows, the shadow flicker impact should not be a concern because the house is equipped with awning.

- There were also observed existing natural barrier in the form of trees covering the receptor group area which is considered to be able to reduce shadow flicker impact.

Shadow Flicker Impact Mitigation

Foreword

It should be understood that shadow flicker is considered an environmental 'nuisance', rather than medical risk, as there is insufficient evidence to indicate that shadow flicker causes health problems. Thus, the first mitigation of this impact is to provide appropriate, frequent socialization / publication regarding the cause and effect of shadow flicker from wind turbines. This is important to avoid any complaints / claims / grievances being addressed to the company on the basis of medical / health problems as such grievances shall be rejected.

Mitigation Strategy

The following steps have and will be taken by EBJ in order to eliminate the cause and / or mitigate the impact of shadow flicker on project stakeholders, primarily being the surrounding communities and residences:

1. **Siting** - Wind turbines have been sited according to the World Bank / IFC Guidelines in order to ensure shadow flicker is below 30 hours per year at all potential sensitive receptors, where possible, while maintaining economic viability of the Project.

2. **Monitoring & Grievance Reporting** - This measure is considered applicable to residences located at a distance greater than that which shadow flicker modelling indicates could generate up to 30 hours per year, the threshold limit of the World Bank - Wind Energy EHS Guideline. Should any complaint be raised to the company, a robust grievance mechanism will be implemented. This includes the investigation of complaints using video during claimed occurrences of shadow flicker. A hotline number for grievances to be raised with EBJ will be disclosed to the community, for ease of reporting.

3. **Visual Screening (Natural)** - Potential sensitive receptors, for which shadow flicker modelling indicates could exceed 30 hours per year, will be assessed to ascertain the extent of existing natural visual screening in place. If current natural visual screening is considered insufficient, EBJ will plant trees, grow hedges etc. at suitable areas around receptors to minimise shadow flicker impact.

Shadow Flicker Impact Mitigation

4. **Visual Screening (Architectural / Structural)** - If grievances are received or if natural visual screening at potential sensitive receptors are found to be insufficient, EBJ will implement architectural / structural screening such as the installation of blinds, window shades, window tinting, awnings or fences at affected receptors to further minimize the effect of shadow flicker.

5. **Compensation** - If shadow flicker mitigation through natural or architectural / structural visual screening methods are found to be insufficient, EBJ will provide compensation to affected receptors based on assessment of the economic impacts of shadow flicker, and taking into consideration the residual impact of shadow flicker following mitigation through alternative means (outlined above). A socioeconomic census has been undertaken at sensitive receptors prior to construction of the wind farm to support application of any compensation process.

6. **Relocation** - If visual screening, both natural and architectural / structural, and compensation methods fail to mitigate shadow flicker impact at sensitive receptors, EBJ will facilitate relocation. Any relocation will take into account the standards / principles stipulated in IFC PS-5 regarding resettlement. This includes the undertaking of a socioeconomic census prior to construction of the wind farm. Any replacement of land or residences, including farmland if necessary, will be provided by EBJ. However, the project will not be responsible for any affected settlements constructed after the commencement of wind farm construction. It is not expected that relocation or resettlement will be required to mitigate shadow flicker impacts for the Project.

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Appendix 12

Laboratory Results of Water Quality and Air Quality Assessment

KEMENTERIAN KETENAGAKERJAAN R.I.
DIREKTORAT JENDERAL
PEMBINAAN PENGAWASAN KETENAGAKERJAAN
DAN KESELAMATAN DAN KESEHATAN KERJA
BALAI BESAR PENGEMBANGAN
KESELAMATAN DAN KESEHATAN KERJA
Jln. KH.Abd Jabar Akhsiri No.35 Km. 17 Tlp. 0411- 4813186 Fax. 0411-4813018 Makassar
Laman : http://www.naker.go.id

LAPORAN HASIL UJI

No.: N.0044/AS/LHU/BBK3-MKS/III/2016

Jenis Contoh : Air Sungai
Nama Pelanggan : PT. Energi Bayu Jeneponto
Alamat : Kabupaten Jeneponto
Tanggal/Jam Sampling : 12 Maret 2016 /09.15 Wita
Tanggal/Jam Penerimaan : 18 Maret 2016 /09.05 Wita
Lokasi/Titik Pengambilan : Air Sungai saluran irigasi primer Dusun Sunggumanai Kec. Turatea A1
Titik Koordinat : [CONFIDENTIAL INFORMATION DELETED]

Setelah dilakukan pengujian diperoleh hasil sebagai berikut:

NO.	PARAMETER	SATUAN	BAKU MUTU	HASIL	SPESIFIKASI METODE
A.	**FISIKA**				
1	Temperatur	°C	deviasi 3	28	Termometrik
2	Residu Terlarut (TDS)	mg/L	1000	364	Gravimetrik
3	Residu Tersuspensi (TSS)	mg/L	50	16,0	Gravimetrik
B.	**KIMIA**				
4	pH	-	6 - 9	7,3	Elektrometrik
5	BOD_5	mg/L	3	1,044	Titrimetrik
6	COD	mg/L	25	5,493	Titrimetrik
7	DO	mg/L	4	6,993	Titrimetrik
8	Total Fospat sbg P	mg/L	0,2	0,333	Spektrofotometrik
9	Amoniak Bebas (NH_3-N)	mg/L	(-)	0,057	Spektrofotometrik
C.	**LOGAM TERLARUT**				
10	Kadmium (Cd)	mg/L	0,01	<0,0054	SNI 6989.16:2009
11	Khrom VI (Cr^{6+})	mg/L	0,05	0	Spektrofotometrik
12	Khrom (Cr)	mg/L	(-)	<0,0043	SNI 6989.17:2009
13	Tembaga (Cu)	mg/L	0,02	<0,0001	AAS-Flame
14	Besi (Fe)	mg/L	(-)	0,018	Spektrofotometrik
15	Timbal (Pb)	mg/L	0,03	<0,0074	SNI 6989.8:2009
16	Mangan (Mn)	mg/L	(-)	<0,0001	AAS-Flame
17	Seng (Zn)	mg/L	0,05	<0,0001	AAS-Flame
18	Khlorida (Cl)	mg/L	(-)	5,538	Titrimetrik
19	Sulfat	mg/L	(-)	27,468	SNI 6989.20:2009
20	Klorin bebas (Cl_2)	mg/L	0,03	0,18	Titrimetrik
D.	**MIKROBIOLOGI**				
21	Total Coliform	Jml/100 ml	5000	156	MPN
E.	**KIMIA ORGANIK**				
22	Minyak dan Lemak	µg/L	1000	0	Gravimetrik

Makassar, 29 Maret 2016

Manajer Teknik,

M. Ismail, ST. M.Kes
NIP 19601212 198303 1 007

Manajer Mutu,

Suyanto, SKM. M.Kes
NIP 19650327 198803 1 002

Manajer Puncak,

Drs. Ferry Benzon, M.Si
NIP 19580131 198703 1 002

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LAPORAN HASIL UJI

No.: N.0045/AS/LHU/BBK3-MKS/III/2016

Jenis Contoh : Air Sungai
Nama Pelanggan : PT. Energi Bayu Jeneponto
Alamat : Kabupaten Jeneponto
Tanggal/Jam Sampling : 12 Maret 2016 /09.30 Wita
Tanggal/Jam Penerimaan : 18 Maret 2016 /09.05 Wita
Lokasi/Titik Pengambilan : Air Sungai saluran irigasi sekunder Bontoma'tene Kec. Turatea A2
Titik Koordinat : [CONFIDENTIAL INFORMATION DELETED]

Setelah dilakukan pengujian diperoleh hasil sebagai berikut:

NO.	PARAMETER	SATUAN	BAKU MUTU	HASIL	SPESIFIKASI METODE
A.	**FISIKA**				
1	Temperatur	°C	deviasi 3	28	Termometrik
2	Residu Terlarut (TDS)	mg/L	1000	128	Gravimetrik
3	Residu Tersuspensi (TSS)	mg/L	50	31,6	Gravimetrik
B.	**KIMIA**				
4	pH	-	6 – 9	7,5	Elektrometrik
5	BOD_5	mg/L	3	1,082	Titrimetrik
6	COD	mg/L	25	5,692	Titrimetrik
7	DO	mg/L	4	6,588	Titrimetrik
8	Total Fospat sbg P	mg/L	0,2	0,291	Spektrofotometrik
9	Amoniak Bebas (NH_3-N)	mg/L	(-)	0,157	Spektrofotometrik
C.	**LOGAM TERLARUT**				
10	Kadmium (Cd)	mg/L	0,01	<0,0054	SNI 6989.16:2009
11	Khrom VI (Cr^{6+})	mg/L	0,05	0	Spektrofotometrik
12	Khrom (Cr)	mg/L	(-)	<0,0043	SNI 6989.17:2009
13	Tembaga (Cu)	mg/L	0,02	<0,0001	AAS-Flame
14	Besi (Fe)	mg/L	(-)	0,238	Spektrofotometrik
15	Timbal (Pb)	mg/L	0,03	<0,0074	SNI 6989.8:2009
16	Mangan (Mn)	mg/L	(-)	<0,0001	AAS-Flame
17	Seng (Zn)	mg/L	0,05	<0,0001	AAS-Flame
18	Khlorida (Cl)	mg/L	(-)	4,260	Titrimetrik
19	Sulfat	mg/L	(-)	28,904	SNI 6989.20:2009
20	Klorin bebas (Cl_2)	mg/L	0,03	0,40	Titrimetrik
D.	**MIKROBIOLOGI**				
21	Total Coliform	Jml/100 ml	5000	216	MPN
E.	**KIMIA ORGANIK**				
22	Minyak dan Lemak	µg/L	1000	0	Gravimetrik

Makassar, 29 Maret 2016

Manajer Teknik,	Manajer Mutu,	Manajer Puncak,
M. Ismail, ST. M.Kes	Suyanto, SKM. M.Kes	Drs. Ferry Benzon, M.Si
NIP 19601212 198303 1 007	NIP 19650327 198803 1 002	NIP 19580131 198703 1 002

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Jln. KH.Abd Jabar Akhsiri No.35 Km. 17 Tlp. 0411- 4813186 Fax. 0411-4813018 Makassar
Laman : http://www.naker.go.id

LAPORAN HASIL UJI

No.: N.0046/AS/LHU/BBK3-MKS/III/2016

Jenis Contoh : Air Sungai
Nama Pelanggan : PT. Energi Bayu Jeneponto
Alamat : Kabupaten Jeneponto
Tanggal/Jam Sampling : 12 Maret 2016 /10.25 Wita
Tanggal/Jam Penerimaan : 18 Maret 2016 /09.05 Wita
Lokasi/Titik Pengambilan : Air Sungai saluran irigasi sekunder Kel. Empong Utara Kec. Binamu A3
Titik Koordinat : [CONFIDENTIAL INFORMATION DELETED]

Setelah dilakukan pengujian diperoleh hasil sebagai berikut:

NO.	PARAMETER	SATUAN	BAKU MUTU	HASIL	SPESIFIKASI METODE
A.	**FISIKA**				
1	Temperatur	°C	deviasi 3	29	Termometrik
2	Residu Terlarut (TDS)	mg/L	1000	248	Gravimetrik
3	Residu Tersuspensi (TSS)	mg/L	50	8,4	Gravimetrik
B.	**KIMIA**				
4	pH	-	6 - 9	7,4	Elektrometrik
5	BOD_5	mg/L	3	1,028	Titrimetrik
6	COD	mg/L	25	5,411	Titrimetrik
7	DO	mg/L	4	7,221	Titrimetrik
8	Total Fospat sbg P	mg/L	0,2	0	Spektrofotometrik
9	Amoniak Bebas (NH_3-N)	mg/L	(-)	0,051	Spektrofotometrik
C.	**LOGAM TERLARUT**				
10	Kadmium (Cd)	mg/L	0,01	<0,0054	SNI 6989.16:2009
11	Khrom VI (Cr^{6+})	mg/L	0,05	0	Spektrofotometrik
12	Khrom (Cr)	mg/L	(-)	<0,0043	SNI 6989.17:2009
13	Tembaga (Cu)	mg/L	0,02	<0,0001	AAS-Flame
14	Besi (Fe)	mg/L	(-)	0,029	Spektrofotometrik
15	Timbal (Pb)	mg/L	0,03	<0,0074	SNI 6989.8:2009
16	Mangan (Mn)	mg/L	(-)	<0,0001	AAS-Flame
17	Seng (Zn)	mg/L	0,05	<0,0001	AAS-Flame
18	Khlorida (Cl)	mg/L	(-)	4,345	Titrimetrik
19	Sulfat	mg/L	(-)	48,798	SNI 6989.20:2009
20	Klorin bebas (Cl_2)	mg/L	0,03	0,05	Titrimetrik
D.	**MIKROBIOLOGI**				
21	Total Coliform	Jml/100 ml	5000	224	MPN
E.	**KIMIA ORGANIK**				
22	Minyak dan Lemak	µg/L	1000	0	Gravimetrik

Makassar, 29 Maret 2016

Manajer Teknik,	Manajer Mutu,	Manajer Puncak,
M. Ismail, ST. M.Kes	Suyanto, SKM. M.Kes	Drs. Ferry Benzon, M.Si
NIP 19601212 198303 1 007	NIP 19650327 198803 1 002	NIP 19580131 198703 1 002

KEMENTERIAN KETENAGAKERJAAN R.I.
DIREKTORAT JENDERAL
PEMBINAAN PENGAWASAN KETENAGAKERJAAN
DAN KESELAMATAN DAN KESEHATAN KERJA
BALAI BESAR PENGEMBANGAN
KESELAMATAN DAN KESEHATAN KERJA
Jln. KH.Abd Jabar Akhsiri No.35 Km. 17 Tlp. 0411- 4813186 Fax. 0411-4813018 Makassar
Laman : http://www.naker.go.id

L A P O R A N H A S I L U J I

No.: N.0047/AS/LHU/BBK3-MKS/III/2016

Jenis Contoh : Air Sungai
Nama Pelanggan : PT. Energi Bayu Jeneponto
Alamat : Kabupaten Jeneponto
Tanggal/Jam Sampling : 12 Maret 2016 /10.45 Wita
Tanggal/Jam Penerimaan : 18 Maret 2016 /09.05 Wita
Lokasi/Titik Pengambilan : Air Sungai saluran irigasi tersier Kel. Empong Selatan Kec. Binamu A4
Titik Koordinat : [CONFIDENTIAL INFORMATION DELETED]

Setelah dilakukan pengujian diperoleh hasil sebagai berikut:

NO.	PARAMETER	SATUAN	BAKU MUTU	HASIL	SPESIFIKASI METODE
A.	**FISIKA**				
1	Temperatur	°C	deviasi 3	29	Termometrik
2	Residu Terlarut (TDS)	mg/L	1000	174	Gravimetrik
3	Residu Tersuspensi (TSS)	mg/L	50	14,8	Gravimetrik
B.	**KIMIA**				
4	pH	-	6 - 9	7,3	Elektrometrik
5	BOD_5	mg/L	3	1,071	Titrimetrik
6	COD	mg/L	25	5,636	Titrimetrik
7	DO	mg/L	4	6,453	Titrimetrik
8	Total Fospat sbg P	mg/L	0,2	0,502	Spektrofotometrik
9	Amoniak Bebas (NH_3-N)	mg/L	(-)	0,044	Spektrofotometrik
C.	**LOGAM TERLARUT**				
10	Kadmium (Cd)	mg/L	0,01	<0,0054	SNI 6989.16:2009
11	Khrom VI (Cr^{6+})	mg/L	0,05	0	Spektrofotometrik
12	Khrom (Cr)	mg/L	(-)	<0,0043	SNI 6989.17:2009
13	Tembaga (Cu)	mg/L	0,02	<0,0001	AAS-Flame
14	Besi (Fe)	mg/L	(-)	0,052	Spektrofotometrik
15	Timbal (Pb)	mg/L	0,03	<0,0074	SNI 6989.8:2009
16	Mangan (Mn)	mg/L	(-)	<0,0001	AAS-Flame
17	Seng (Zn)	mg/L	0,05	<0,0001	AAS-Flame
18	Khlorida (Cl)	mg/L	(-)	0,426	Titrimetrik
19	Sulfat	mg/L	(-)	38,904	SNI 6989.20:2009
20	Klorin bebas (Cl_2)	mg/L	0,03	0,14	Titrimetrik
D.	**MIKROBIOLOGI**				
21	Total Coliform	Jml/100 ml	5000	148	MPN
E.	**KIMIA ORGANIK**				
22	Minyak dan Lemak	µg/L	1000	0	Gravimetrik

Makassar, 29 Maret 2016

Manajer Teknik,	Manajer Mutu,	Manajer Puncak,
M. Ismail, ST. M.Kes	Suyanto, SKM. M.Kes	Drs. Perry Benzon, M.Si
NIP 19601212 198303 1 007	NIP 19650327 198803 1 002	NIP 19580131 198703 1 002

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L A P O R A N H A S I L U J I

No. :N.0126/ULS/LHU/BBPK3-MKS/IV/2016

Jenis Contoh : Udara Lingkungan Sekitar
Nama Pelanggan : PT. Bayu Energi Jeneponto (PLTB Jeneponto)
Alamat : Kabupaten Jeneponto
Tanggal/Jam Pengambilan : 06 April 2016/13.00 – 14.00 Wita
Tanggal/Jam Penerimaan : 08 April 2016/09.30 Wita
Lokasi/Titik Pengambilan : Sekitar Tower Dusun Ujung Boni
Desa Kayu Uloe Timur, Kecamatan Turatea
Titik Koordinat : [CONFIDENTIAL INFORMATION DELETED]

Setelah dilakukan pengujian diperoleh hasil sebagai berikut:

NO.	PARAMETER	SATUAN	BAKU MUTU	HASIL	SPESIFIKASI METODE
1.	Sulfur Dioksida (SO_2)	µg/Nm^3	900	15,630	SNI 19-7119.7-2005
2.	Nitrogen Dioksida (NO_2)	µg/Nm^3	400	17,800	SNI 19-7119.2-2005
3.	Karbon Monoksida (CO)	µg/Nm^3	30000	1946,830	Spektrofotometrik
4.	Partikel (TSP)	µg/Nm^3	230	182,00	Direct Reading
5.	Pb (Timah Hitam)	µg/Nm^3	2	0,019	AAS-Flame
6.	Amoniak (NH_3)	ppm	2	0,010	Spektrofotometrik

Makassar, 15 April 2016

Manajer Teknik,	Manajer Mutu,	Manajer Puncak,
M. Ismail, ST. M.Kes	Suyanto, SKM. M.Kes	Drs. Ferry Benzon, M.Si
NIP 19601212 198303 1 007	NIP 19650323 198803 1 002	NIP 19580131 198703 1 002

KEMENTERIAN KETENAGAKERJAAN R.I.
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KESELAMATAN DAN KESEHATAN KERJA
Jln. KH.Abd Jabar Akhsiri No.35 Km. 17 Tlp. 0411- 4813186 Fax. 0411-4813018 Makassar
Laman : http://www.naker.go.id

L A P O R A N H A S I L U J I

No. :N.0127/ULS/LHU/BBPK3-MKS/IV/2016

Jenis Contoh : Udara Lingkungan Sekitar
Nama Pelanggan : PT. Bayu Energi Jeneponto (PLTB Jeneponto)
Alamat : Kabupaten Jeneponto
Tanggal/Jam Pengambilan : 06 April 2016/14.30 - 15.30 Wita
Tanggal/Jam Penerimaan : 08 April 2016/09.30 Wita
Lokasi/Titik Pengambilan : Dusun Mangongi, Kecamatan Kelara
Titik Koordinat : [CONFIDENTIAL INFORMATION DELETED]

Setelah dilakukan pengujian diperoleh hasil sebagai berikut:

NO.	PARAMETER	SATUAN	BAKU MUTU	HASIL	SPESIFIKASI METODE
1.	Sulfur Dioksida (SO_2)	µg/Nm^3	900	8,667	SNI 19-7119.7-2005
2.	Nitrogen Dioksida (NO_2)	µg/Nm^3	400	12,970	SNI 19-7119.2-2005
3.	Karbon Monoksida (CO)	µg/Nm^3	30000	1603,272	Spektrofotometrik
4.	Partikel (TSP)	µg/Nm^3	230	130,00	Direct Reading
5.	Pb (Timah Hitam)	µg/Nm^3	2	0,026	AAS-Flame
6.	Amoniak (NH_3)	ppm	2	0,011	Spektrofotometrik

Makassar, 15 April 2016

Manajer Teknik,	Manajer Mutu,	Manajer Puncak,
M. Ismail, ST. M.Kes	Suyanto, SKM. M.Kes	Drs. Ferry Benzon, M.Si
NIP 19601212 198303 1 007	NIP 19650323 198803 1 002	NIP 19580131 198703 1 002

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L A P O R A N H A S I L U J I

No. :N.0128/ULS/LHU/BBPK3-MKS/IV/2016

Jenis Contoh : Udara Lingkungan Sekitar
Nama Pelanggan : PT. Bayu Energi Jeneponto (PLTB Jeneponto)
Alamat : Kabupaten Jeneponto
Tanggal/Jam Pengambilan : 06 April 2016/16.00 - 17.00 Wita
Tanggal/Jam Penerimaan : 08 April 2016/09.30 Wita
Lokasi/Titik Pengambilan : Kelurahan Empong Utara, Kec. Binamu
Titik Koordinat : [CONFIDENTIAL INFORMATION DELETED]

Setelah dilakukan pengujian diperoleh hasil sebagai berikut:

NO.	PARAMETER	SATUAN	BAKU MUTU	HASIL	SPESIFIKASI METODE
1.	Sulfur Dioksida (SO_2)	µg/Nm³	900	16,904	SNI 19-7119.7-2005
2.	Nitrogen Dioksida (NO_2)	µg/Nm³	400	18,135	SNI 19-7119.2-2005
3.	Karbon Monoksida (CO)	µg/Nm³	30000	1603,272	Spektrofotometrik
4.	Partikel (TSP)	µg/Nm³	230	140,00	Direct Reading
5.	Pb (Timah Hitam)	µg/Nm³	2	0,021	AAS-Flame
6.	Amoniak (NH_3)	ppm	2	0,013	Spektrofotometrik

Makassar, 15 April 2016

Manajer Teknik,	Manajer Mutu,	Manajer Puncak,
M. Ismail, ST. M.Kes	Suyanto, SKM. M.Kes	Drs. Ferry Benzon, M.Si
NIP 19601212 198303 1 007	NIP 19650323 198803 1 002	NIP 19580131 198703 1 002

KEMENTERIAN KETENAGAKERJAAN R.I.
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KESELAMATAN DAN KESEHATAN KERJA
Jln. KH.Abd Jabar Akhsiri No.35 Km. 17 Tlp. 0411- 4813186 Fax. 0411-4813018 Makassar
Laman : http://www.naker.go.id

L A P O R A N H A S I L U J I

No. : N.0043/FB/LHU/BBPK3-MKS/IV/2016

Jenis Contoh : Kebisingan
Nama Pelanggan : PT. Bayu Energi Jeneponto (PLTB Jeneponto)
Alamat : Kabupaten Jeneponto
Nama Alat : Sound Level Meter

Setelah dilakukan pengujian diperoleh hasil sebagai berikut:

NO	LOKASI	TITIK KOORDINAT	TANGGAL/JAM PENGAMBILAN	SATUAN	BAKU MUTU	HASIL	SPESIFIKASI METODE
1.	Sekitar Tower Desa Ujung Boni, Kecamatan Turatea	[CONFIDENTIAL INFORMATION DELETED]	06/04/2016 13.00 Wita	dBA	55	47,2	Direct Reading
2.	Dusun Mangongi, Kecamatan Kelara	[CONFIDENTIAL INFORMATION DELETED]	06/04/2016 14.29 Wita	dBA	55	50,3	Direct Reading
3.	Kelurahan Empong Utara Kecamatan Binamu	[CONFIDENTIAL INFORMATION DELETED]	06/04/2016 16.00 Wita	dBA	55	51,7	Direct Reading

Makassar, 15 April 2016

Manajer Teknik,	Manajer Mutu,	Manajer Puncak,
M. Ismail, ST. M.Kes	Suyanto, SKM. M.Kes	Drs. Ferry Benzon, M.Si
NIP 19601212 198303 1 007	NIP 19650323 198803 1 002	NIP 19580131 198703 1 002

Appendix 13

PT EBJ Environmental, Social, Health, and Safety (ESHS) Policy Statement

EQUIS ENERGY

ENVIRONMENTAL, SOCIAL, HEALTH, and SAFETY (ESHS) POLICY STATEMENT	KEBIJAKAN LINGKUNGAN, SOSIAL, KESEHATAN, dan KESELAMATAN KERJA (K3L dan SOSIAL)
Our Commitments PT Energi Bayu Jeneponto (EBJ) is committed to the effective implementation of our ESHS Policy and to the continual improvement of our ESHS performance.	**Komitment Kami** PT Energi Bayu Jeneponto (EBJ) berkomitmen pada pelaksanaan Kebijakan K3L dan Sosial yang efektif dan kepada peningkatan kinerja yang berkelanjutan dalam aspek K3L dan Sosial kami.
Environment We care for the environment. It is in the nature of our business as a renewable energy IPP that we are contributing to the reduction of Greenhouse Gas (GHG) emissions. The largest anthropogenic source of GHG has been from fossil fuel burning to generate electricity. We have strong commitment to sustainable development by providing electricity generated from renewable resources. We are committed to comply with the following principles: • Compliance with applicable environmental laws and regulations; • Efficient use of resources, cleaner production principles in product design and production processes; and • Prevention of pollution and minimizing the environmental impacts of our operations including the materials that we use.	**Lingkungan** Kami peduli terhadap lingkungan. Adalah keinginan dari bisnis kami sebagai pengembang energi terbarukan untuk dapat berkontribusi terhadap penurunan emisi Gas Rumah Kaca (GRK) yang sebagian besar berasal dari pembakaran bahan bakar fosil untuk produksi listrik. Kami memiliki komitmen kuat terhadap pembangunan berkelanjutan dengan menyediakan listrik dari sumber terbarukan. Kami berkomitmen untuk memenuhi prinsip-prinsip berikut: • Mematuhi hukum dan peraturan yang berlaku yang berkaitan dengan lingkungan hidup; • Penggunaan sumber daya secara efisien, prinsip produksi yang lebih ramah lingkungan, baik dalam desain produk dan proses produksi, dan • Menghindari polusi dan meminimalisasi dampak lingkungan dari proses operasi kami, termasuk di dalamnya material yang kami gunakan.
Community and Stakeholder Engagement We strive to be a valued corporate citizen to the communities in the vicinity of our operations. We are committed to the following principles: • We respect the values and cultural heritage of local communities; • We aim to improve the livelihood of local community where possible and to minimize any impact on their living conditions;	**Keterlibatan Masyarakat dan Pemangku Kepentingan** Kami senantiasa berusaha menghargai keberadaan masyarakat di tempat kami beroperasi. Kami berkomitmen pada prinsip-prinsip berikut: • Kami menghargai nilai-nilai dan warisan budaya masyarakat lokal; • Kami berusaha meningkatkan taraf hidup masyarakat lokal dan meminimalisasi

• We are committed to developing strong, constructive, and responsive relationships with the affected communities and stakeholders including but not limited to government entities, non-governmental organizations (NGOs), shareholders, and other interested parties in carrying out our activities including planning, design, construction, and operation. We will achieve this objective through stakeholder engagement, operating a robust grievance mechanism, and ongoing reporting to the affected communities.	timbulnya dampak pada keberlangsungan hidup masyarakat; • Kami berkomitmen untuk mengembangkan hubungan yang kuat, konstruktif, dan responsif dengan komunitas terdampak dan pemangku kepentingan, termasuk namun tidak terbatas pada pemerintah, lembaga swadaya masyarakat (LSM), pemegang saham, dan pihak lain yang berkepentingan dalam pelaksanaan kegiatan kami, termasuk pada aktivitas perencanaan, desain, konstruksi, dan operasi. Kami akan mencapai tujuan ini melalui keterlibatan pemangku kepentingan, pelaksanaan mekanisme keluhan yang baik, dan pelaporan secara rutin kepada komunitas yang terdampak.
Labor and Working Conditions We and our contractors recognize our responsibility to respect and protect the rights of our workers. We adopt the following principles: • We obey and comply with local labor practices relating to term of employment, work hours, payment of wages, and maintaining good working relationships with our workers; and, **we demand the same from our contractors**; • We will not employ or support the use of any form of child labor or forced/coerced labor, either **directly or through suppliers or contractors;** • We respect our workers' right to associate and engage in the collective bargaining process pursuant to local labor practices; • We guarantee our workers that they will be free from all forms of harassment and discrimination based on race, color, religion, national origin, gender (including pregnancy), age, disability, sexual orientation, gender identity, HIV status, marital status, or any other status protected by the laws and regulations in the locations where we operate; and • We protect workers' rights by allowing each worker to deal directly with management on	**Kondisi Kerja dan Tenaga Kerja** Kami dan seluruh kontraktor kami menyadari tanggung jawab kami untuk menghargai dan menjaga hak-hak pekerja kami. Kami mengadopsi prinsip-prinsip berikut: • Kami mematuhi dan taat kepada peraturan ketenagakerjaan yang berkaitan dengan masa kerja, jam kerja, pembayaran upah, serta menjaga hubungan kerja yang baik dengan pekerja kami; dan **kami menuntut hal yang sama dari kontraktor kami;** • Kami tidak akan mempekerjakan atau mendukung segala bentuk kegiatan yang memperkerjakan anak, pekerja paksa, baik **secara langsung maupun melalui pemasok atau kontraktor;** • Kami menghargai hak pekerja kami untuk berasosiasi dan terlibat dalam proses perundingan bersama sesuai dengan peraturan ketenagakerjaan; • Kami menjamin agar pekerja kami bebas dari segala bentuk pelecehan dan diskriminasi berdasarkan ras, warna kulit, agama, asal negara, jenis kelamin (termasuk wanita hamil), usia, kecacatan, orientasi seksual, identitas gender, status HIV, status pernikahan, atau status lainnya yang dilindungi oleh hukum dan peraturan di lokasi kami beroperasi; dan

issues of importance to that worker. Thus, we provide a grievance mechanism to receive, analyze, and address workers' concerns.	• Kami melindungi hak-hak pekerja dengan mengijinkan setiap pekerja untuk berurusan langsung dengan pihak manajemen mengenai isu-isu penting bagi pekerja bersangkutan. Dengan demikian, kami akan menyediakan mekanisme untuk menerima, menganalisa, dan mengatasi keluhan dari pekerja tersebut.
Health and Safety We do not compromise the health and safety of our workers and our contractors' workers. We will provide a safe and comfortable working environment to our workers and will ensure our contractors to do the same. We aspire to achieve a *Zero Harm* track record for all of our workers as well as the surrounding communities. It is our fundamental belief that all accidents can be prevented.	**Kesehatan dan Keselamatan Kerja (K3)** Kami tidak akan berkompromi terhadap masalah kesehatan dan keselamatan kerja (K3) atas pekerja kami dan pekerja kontraktor kami. Kami akan menyediakan lingkungan kerja yang aman dan nyaman kepada pekerja kami dan memastikan bahwa kontraktor kami juga melakukan hal yang sama. Kami mengedepankan pencapaian *Zero Harm* untuk semua pekerja serta masyarakat sekitar. Keyakinan utama kami adalah bahwa semua kecelakan kerja dapat dihindari.
Our Actions To meet our ESHS commitments, we will: • Ensure that all activities undertaken by us, our contractors and consultants are complying with the applicable regulations of the Republic of Indonesia as well as international standard that we are subscribed; • Continuously review, measure, and evaluate our environmental, social, health, and safety objectives; • Perform Environmental, Social, Health, and Safety Management System (ESHS-MS) performance reviews, which will be reported to Senior Management to ensure the effectiveness of ESHS-MS implementation; • Take any necessary and appropriate follow-up action to ensure the intent of the ESHS policy is met, that procedures and plans are being implemented, and are seen to be effective; • Ensure that all workers, shareholders, and other stakeholders understand our ESHS Policy commitments; and • Manage external interactions through an active stakeholder engagement program and	**Aksi Kami** Untuk memenuhi komitmen K3L kami, kami akan: • Memastikan bahwa semua aktivitas yang dilakukan oleh kami, kontraktor, dan konsultan kami memenuhi persyaratan peraturan yang berlaku di Republik Indonesia juga persyaratan internasional lainnya yang kami adopsi. • Secara berkelanjutan mengkaji, mengukur, dan mengevaluasi tujuan kami dalam hal lingkungan, sosial, kesehatan, dan keselamatan kerja; • Melakukan tinjauan kerja Sistem Pengelolaan Lingkungan, Sosial, Kesehatan, dan Keselamatan Kerja (K3L dan Sosial) yang akan dilaporkan kepada pihak manajemen senior untuk memastikan efektivitas pelaksanaan ESHS-MS; • Mengambil tindakan tindak lanjut yang tepat untuk memastikan maksud dari kebijakan K3L dan Sosial dapat terpenuhi, dan segala prosedur dan rencana dapat terlaksana secara efektif. • Memastikan semua pekerja, pemegang saham, dan pemangku kebijakan lainnya memahami komitmen dalam Kebijakan K3L dan Sosial kami; dan

a mechanism to receive, analyze, and address stakeholder grievances.	• Mengelola interaksi eksternal melalui program keterlibatan aktif para pemangku kepentingan dan mekanisme untuk menerima, menganalisis, dan mengatasi keluhan dari pemangku kepentingan.
This Policy will be communicated to all staffs and stakeholders of EBJ.	Kebijakan ini akan dikomunikasikan kepada seluruh staf dan pemangku kepentingan dari EBJ.

[CONFIDENTIAL INFORMATION DELETED]

President Director / Presiden Direktur
September 2017