



An AB Sugar company

ILLOVO SUGAR (MALAWI) Plc (ISM)

Owner of

Dwangwa Sugar Corporation Limited (DSCL)

**ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN:
DWANGWA COGENERATION PROJECT, NKHOTAKOTA,
MALAWI**

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CHIDULE CHA ZONSE

Zambiri za Pulojekiti:

Malawi ndi limodzi mwa maiko omwe ali ndi magetsi ochepa pa dziko lapansi ndipo anthu pafupifupi ma pelesenti pakati pa asanu ndi ziwiri ndi khumi ndi ziwiri ndi omwe ali ndi magetsi pamene madela akumudzi ali ndi magetsi ochepetsetsa kwambiri osapitilira ma pelesenti awiri. Kusakwanira kwa magetsi ndi limodzi mwa mavuto akuluakulu omwe dziko la Malawi likukumana nalo zomwe zikuchepetsa chitukuko cha anthu, chuma ndi ma fakitale. Nthambi yomwe imapeleka magetsi yotchedwa Energy Supply Corporation of Malawi (ESCOM) imayenera kugawa magetsi mlingo oduladula m'madera chifukwa cha kuchepa kwa magetsi omwe amapangidwa (351MW) omwe sangathe kukwanira potengera chiwelengero cha anthu omwe amagwiritsira ntchito magetsiwo (400MW). Chifukwa cha kudalira kwambiri mphamvu ya magetsi yochokera ku madzi (pafupifupi magetsi ma pelesenti makumi asanu ndi anayi mphambu zisanu ndi zitanu amapangidwa kuchokera ku mtsinje wa Shire), mphamvu ya magetsi idatsika panso kwambiri kufika pa mlingo wa 200MW chifukwa cha mvula ya mkuntho yotchedwa Ana yomwe idachitika mu chaka cha 2022.

Anthu akumidzi ku Malawi amadalira kwambiri mphamvu yochokela ku zachilengedwe. Chifukwa chakuti anthu ambiri sangakwanitse kulumikiza zingwe za magetsi kapena kugwiritsira ntchito mphamvu yochokera ku mpweya (gas), ma banja ambiri akumidzi sangachitire mwina koma kudalira nkhuhi ndi makala pophika. Izi zimaika chiopsezo chochulukira pa nkhalango zomwe zinayamba kale kuwonongeka, zomwe zimabweletsa kuwonongeka kwa chilengedwe ndi kudula mitengo. Komanso, chifukwa chakuti mitengo ndi gawo la kayendedwe ka madzi a chilengedwe, zosokonezazi zimatha kukhudza kachulukidwe ka madzi, kotero zimasokonedza kapangidwe ka magetsi.

Illovo Group Africa ilinso ndi ukadaulo opanga magetsi kuchokera ku zosala za mzimbe pomwe imagwiritsa ntchito miphika ya moto makumi anayi kuzungulira afilika yense yomwe imatulutsa mpweya otentha kwambiri pogwiritsa ntchito pafupifupi matani pakati pa 4 ndi 4.5 million a zosala za mzimbe pa chaka omwe amayendetsa makina opangila magetsi kuchokera ku mpweya otentha otchedwa turbo alternator (TA) setsi okwana makumi atatu ndi zitanu. Mphamvu zonse zopangira magetsi ku Afilika zikaphatikizidwa zimakwana mulingo wa 169MW zomwe zimapanga magetsi osachepela ma pelesenti makumi asanu ndi limodzi omwe amafunikira m'ma kampani a Illovo Group Africa. Pa gulu lonselo, mphamvu zosala za magetsi zimatuzidwa kwa ogula omwe si a nyumba komanso zina zimatuzidwa ku zida za magetsi za mayiko.

Fakitale ya Shuga ya Dwangwa imagwira ntchito kwa milungu pafupifupi makumi atatu ndi anayi pa chaka ndipo yakhala ikupanga magetsi ake kwa zaka zopitilira makumi asanu. Kotero, magetsi ake azingopangidwa nthawi ya chaka ya epulo mpaka novembala. Njira yopangira magetsi owonjezera imagwiritsa kale ntchito miphika iwiri ya 60T, 31bar komanso kupanikizika kwa m'mbuyo kwa ma TA awiri omwe anaikidwa pa mlingo wa 3.5MW iliyonse kuti apange mphamvu ya magetsi okwana 28GWh pa chaka. Pali mwayi wosintha kapangidwe ka mpweya otentha powonjezera TA ina kuti patengeledwepo mwayi ogwiritsira ntchito mphamvu zomwe zilipo kale ndi kupanga magetsi owonjezera. Mphamvuzi pakadali pano zikungowonongeka kudzera pa sithoni yotsitsa yomwe imachepetsa mphamvu ya nthunzi otentha.

Fakitale yopanga shuga ya Dwangwa ikufuna kusintha kapangidwe ka magetsi poika turbo alternator (TA) ya mlingo wa 17MW yatsopano mkati mwa magetsi omwe alipo kale. Izi zipangitsa kuti magetsi azipangidwa okwanira kuti azigwiridwa ntchito m'manyumba komanso ulimi wa mthirira pa fakitale

ya Dwangwa (4,000MWh), komanso kutumiza magetsi okwana 19,696MWh pa chaka ku ESCOM. Zosinthidwa zonse zomwe zikuganiziridwa pa kusintha kwa malo opangira magetsi owonjezedwaku zili mkati mwa fakitale ya Dwangwa.

Malo omwe akuganiziridwa kumapangila magetsi owonjezelawa azakhalanso ndi ubwino wambiri pakapezedwe ka magetsi mu dziko lonse la Malawi monga:

- Kutumiza magetsi a mtengo wa patali ku dziko lino.
- Kupanga ndi kutumiza mphamvu ya magetsi kunja mu nyengo yomwe magetsi amafunikira kwambiri ku dziko lino, pamene madzi a m'adamu amakhala ochepa.
- Amapeleka mphamvu zozungulitsira zapamwamba, zomwe zimapangitsa kuti pakhale kukhazikika kwa mphamvu komanso kukhazikika kwa kapezedwe ka magetsi mu dziko;
- Kukhala ndi magetsi a dziko opangidwa mosiyanasiyana (kuphatikizira ku magetsi opangidwa kuchokera ku madzi ndi mphamvu ya dzuwa);
- Ndi magetsi osawononga za chilengedwe.

Ntchito yomwe ikuganiziridwayi ikhala ndi zochitika zomwe zili m'musimu zomwe zikuganiziridwa kuti zigwirizana ndi zomwe zikuchitika ku fakitale yopanga shuga ku Malawi ya Dwangwa:

- Kulumikizidwa kwa mphamvu ya mlingo okwana +/-17MW (TBC) kupanikizika kwa m'mbuyo kwa TA, posinthanitsa ndi mlingo wa 3.5MW TA's yomwe ili yosakwanira. TA yatsopanoyi ikuganiziridwa kukhala mkati mwa nyumba yopangira magetsi yomwe ilipo ndipo ikuyenera kukhala pafupifupi 90m² kukula kwake.
- Kuchotsedwa kwa turbo alternator (TA) imodzi, chifukwa imodzi mwama TA yomwe ilipo kale izakhalapobe kuti idzagwire ntchito nthawi ina.
- Kuyikidwazitsulo zoyenda ndi magetsi. Makina atsopano ophwanyira zinthu (pafupifupi 70m²).
- Nyumba ya tsopano ya mpheru ndi yokonza nzimbe MCC (Motor Control Center) yomwe ili mkati mwa malo omwe alipo kale (pafupifupi 90m² ndi 60m² motsatana).
- Chotenthetsera madzi a shuga cha tsopano mkati mwa zomwe zilipo kale (pafupifupi 90m²).
- Nyumba yokhalamo zipangizo zamagetsi yatsopano yocheperako pafupifupi 1,000m² yomwe ili mkati mwa fakitale yomwe ilipo kale.
- Kukwezedwa kwa mbali yowunikira mmene magetsi akupangidwira komanso kulumikizidwa kwa magetsi kuti atumizidwe kunja, mu malo omwe alipo kale.

NTHAMBI YOWONA ZA MALAMULO, ZIPHASO KOMANSO KAYENDESELEDWE KA NTCHITO

Fakitale yopanga shuga ya Dwangwa yakhala ikugwira ntchito kwa zaka pafupifupi makumi asanu ndipo pakadali pano, fakitaleyo ili ndi ziphaso zosiyanasiyana zokhudzana ndi chilengedwe komanso/kapena ziphaso za ntchito yomwe iliko panopa.

Pa za makina atsopano opangira magetsiwa, malamulo ndi ndondomeko za mayiko ena zinaganiziridwa ndipo chizakhala chanzeru kutsata ndondomeko ndi malamulo onse a m'deralo ndi a padziko lonse. Zilolezo ndi ziphatso zonse zomwe zilipo kale zalongosoledwa mu gawo la chitatu la kafukufuku wa ESMP ndipo ndondomeko ndi malamulo onse a m'dziko muno ndi m'mayiko ena okhudza malo opangira magetsi owonjezera atsopanowa akufotokozedwa mu gawo la chinayi la lipoti la ESMP.

Ndondomeko yotenga nawo mbali anthu

Kafukufuku wa ESMP akuchitika motsatira ndondomeko ya EIA yaku Malawi yomwe inakhazikitsidwa mchaka cha 1997. Ndondomekozi sizifotokoza bwinobwino pa nkhani ya anthu kutenga nawo mbali zomwe zikuyenera kutsatiridwa; kotero, kukambirana ndi kudziwitsa anthu kukuyenera kuchitika pofuna kuonetsetsa kuti pali kukambirana koyenera ndi anthu okhudzidwa komanso anthu ena a chidwi ndi pulojekiti imeneyi

Anthu okhudziwa anadziwika powayika m' magulu otsatirawa: (a) Magulu a anthu omwe akhudzidwa ndi pulojekitiyi (anthu kapena magulu omwe akhudzidwa kapena omwe angakhudzidwe ndi pulojekitiyi): Madera omwe akhudzidwa ndi ntchito za pulojekitiyi. (b) Magulu achidwi (anthu kapena magulu omwe angakhale ndi chidwi ndi pulojekitiyi): Maboma a zigawo; Maboma adziko; Unduna wa boma, Ma dipatimenti ndi mabungwe; NGO, CBOs, ndi ena otero.

Njira zoyankhulirana zoyenerera, komanso njira zoyankhulirana zoyenera pa chikhalidwe zidzagwiritsidwa ntchito pokumana ndi anthu onse okhudzidwa ndi pulojekitiyi. Njira zomwe zikugwiritsidwa ntchito komanso zomwe zizapitirire kugwiritsidwa ntchito ndi izi:

- Kulemberana makalata (imelo ndi telefoni);
- Misonkhano yokumana ndi mmodzi mmodzi;
- Misonkhano yopangidwa mwa dongosolo;;
- Misonkhano yapa gulu;
- Misonkhano ya gulu la anthu ochepa
- Kugwiritsa Ntchito malo omwe pamayikidwa zidziwitso;
- Owulutsa nkhani (nyuzipepala, wailesi ya mmudzi);

Kutengela ndi zotsatira zomwe zapezeka pa kafukufuku oyamba wa ESMP, ogwira nawo ntchito, komanso gulu la anthu a chidwi ndi okhudzidwa (I and AP's) adzapezedwa ndi kukambilana nawo, pogwiritsa ntchito izi:

- Kagawidwe koyamba ka zotsatira za ESMP kwa ogwira nawo ntchito, ma dipatimenti komanso ma I's ndima AP's kwa masiku makumi atatu opereka ndemanga. Zolembedwa zoyamba mu ESMP zizizapezeka kudzera mu izi:
 - Ma pepala a zotsatira za ESPM azayikidwa polandirira alendo ku kampani ya Dwangwa Sugar.
 - Zotsatira za ESMP zizapelekedwanso kwa anthu omwe ali ndi makina a kompyuta kudzera pa imelo.
 - Kukambilana ndi anthu okhudzidwa, khonsolo ya Nkhotakota, ma khansala a ma wadi, komanso mafumu.
- Ogwira nawo ntchito, komanso gulu la anthu a chidwi ndi okhudzidwa adzadziwitsidwa za kupezeka kwa chikalata cha ESMP pogwiritsa ntchito izi:
 - Kalata yapa kompyuta yopita kuma dipatimeti onse, ogwira nawo ntchito, komanso ma I ndima AP omwe ali ndima imelo;
 - Mapepala a zidziwitso omwe azalembedwe mu chiyankhuro cha m'deramo, Chichewa, ndipo azayikidwa pa malopo (pa khomo la zipata zolowera pa fakitale ya Shuga ya Dwangwa komanso pa bolodi la zidziwitso la fakitale ya Shuga ya Dwangwa);

Kumayambiriro kwa ntchitoyi, padachitika mkumano ndi mfumu Kanyenda komwe adafotokoza za ntchito yomwe ikufunika kuchitika. Zimene zinakambidwa pa msonkhanowo zikupezeka mu gawo C la zowonjezera. Mwachidule, msokhanowo udatsimikiza kuti pulojekitiyi yalandiridwa bwino

komanso kuti zokambirana zina zizayenera kudzakhalapo pamene zotsatira za ESMP yoyambirira zizalembedwe ndikutulutsidwa kuti anthu apereke ndemanga.

Zotsatira za kuwunika za chilengedwe ndi chikhalidwe cha anthu (EIA)

Za chilengedwe, za chikhalidwe, komanso za chuma zitha kukhudzidwa pa nthawi yomanga, kugwira ntchito ndi kuyimitsa ntchito zomwe zaperekedwa. Pa chifukwa ichi, zotsatira zake zinafufuzidwa, ndipo kufunika kwa chotsatira chilichonse kunapezekanso malingana ndi kuchuluka kwake, kukula kwake, komanso nthawi yake. Kotero, njira zochepetsera zidakonzedwa kuti zichepetse zomwe zingakhudze chilengedwe komanso chikhalidwe cha anthu ndipo zinaphatikizidwa mkati mwa gawo khumi.

Chidule cha kufunika kwa zotsatirazo pambuyo pa kuunika, chaperekedwa mu tebulo ili m'munsimu.

Zochitika	Zotsatira/chiopsezo	Kufunika kwake	Mulingo omwe zingathere		
			Zikhoza kusinthidwa	Zitha kuyambitsa kuwonongeka komwe sikungasinthike	Zitha kupewedwa, kukonzedwa kapena kuchepetsedwa
Ntchito zomanga zokhudzana ndi kuyika kwa TA, kuyika magetsi ku zoyendetsela zitsulo, kukwezedwa kwa mbali yopanga magetsi ya MV.	Kukokoloka kwa nthaka	Kotsika kwambiri (-)	Inde	Zosatheka	Inde – Kuchepetsedwa
	Kuwonongeka kwa nthaka –kutayikira kwa mankhwala (hydrocarbon).	Kotsika kwambiri (-)	Inde	Zosatheka	Inde – Kuchepetsedwa
	Kutulutsa fumbi	Kotsika (-)	Inde	Zosatheka	Inde – Kukonzedwa komanso kuchepetsedwa
	Kupanga phokoso	Kotsika (-)	Inde	Zosatheka	Inde – Kukonzedwa komanso kuchepetsedwa
	Kuchuluka kwa magalimoto	Kotsika (-)	Inde	Zosatheka	Inde – Kukonzedwa komanso kuchepetsedwa
	Kuchuluka kwa mitundu ya zomera zachilendo	Kotsika (-)	Inde	Zosatheka	Inde – Kukonzedwa komanso kuchepetsedwa
	Kuwonongeka kwa madzi a pansi komanso pamwamba pa nthaka	Kopanda mbali	Inde	Zosatheka	Inde – Kupewedwa

	Kusintha kwa kagwiritsidwe ntchito ka malo	Kopanda mbali	Inde	Zosatheka	Inde – Kuchepetsedwa
	Kuchuka kwa zinyalala (<i>zinyalala za pakhomu ndi zochokera ku zomanga</i>)	Pakati (-)	Inde	Zosatheka	Inde – Kuchepetsedwa
	Kugwiritsira ntchito madzi ambiri pomanga	Pakati (-)	Inde	Zosatheka	Inde – Kuchepetsedwa
	Nkhani ya ukhondo pa nthawi yomanga	Kotsika (-)	Inde	Zosatheka	Inde – Kuchepetsedwa
	Zotsatira pa nkhani za chuma kwa anthu (<i>kupezeka kwa ntchito</i>)	Pakati (+)	Inde	Zosatheka	Inde, njira zochepetsera zidzaperekedwa kuti ziwonjezere zotsatira zabwino
	Zotsatira pa nkhani za chuma kwa anthu (kuchuluka kwa ma kontilakitala, kuchuluka kwa ndalama kwa anthu othandizira ntchito)	Pakati (+)	Inde	Zosatheka	Inde, njira zochepetsera zidzaperekedwa kuti ziwonjezere zotsatira zabwino
	Za umoyo ndi chitetezo (Kuchulika kwa ma kontilakitala, kuchuluka kwa Umbanda komanso kufalikira kwa matenda opatsirana pogonana)	Pakati (-)	Inde	Zosatheka	Inde - Kuchepetsedwa
	Thanzi ndi chitetezo pa nthawi yomanga	Kotsika (-)	Inde	Zosatheka	Inde, kuchepetsedwa komanso kupewedwa
Zochitika nthawi yogwira ntchito (zochitika zokhudzana ndi kuwonjezera	Zotsatira pa nkhani za chuma kwa anthu (<i>kuchulukitsidwa kwa magetsi opangidwa komanso kuikidwa kwa magetsi ambiri ku midzi</i>).	Kokwela (+)	Inde, ngati ntchitoyo sinavomerezedwe	Zosatheka	Palibe kuchepetsa komwe kuzafunikire chifukwa zotsatira zake ndi zabwino

kwa mphamvu ya magetsi)	Zotsatira pa nkhani za chuma ku Illovo Sugar (kuchuluka kwa ndalama)	Kokwela (+)	Inde, ngati ntchitoyo sinavomerezedwe	Zosatheka	Palibe kuchepetsa komwe kuzafunikire chifukwa zotsatira zake ndi zabwino
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Mapeto/Mathero

Kutengera tsatanetsatane wa pulojekiti yomwe inalandilidwa ya malo opangira magetsi owonjezera, ndizoonekeratu kuti zovuta zomwe zingakhudzidwe ndi gawo lomanga, kugwira ntchito komanso kuyimitsa ntchito zitha kukhala zochepa kwambiri chifukwa cha zifukwa izi:

- Zomangamanga zonse zikuganiziridwa m'malo omwe ali mkati mwa fakitale ya Dwangwa Sugar ndipo akugwiritsidwa ntchito ngati ma fakitale.
- Sipakufunika kuchotsedwa zomera zinazilizonse.
- Palibe madzi omwe ali pafupi ndi malo omwe ntchitoyo ikufunidwa.
- Kusintha kwa zomangamanga kulibe vuto lina lililonse ku ntchito zomwe zikuchitika pakadali pano. Zosinthazi zidzangothandizira kuwonjezereka kwa magetsi omwe amapangidwa pogwiritsa ntchito mphamvu ya magetsi osawononga za chilengedwe.
- Dera la pulojekitiyi pakadali pano likugwiritsidwa ntchito ndi kampani ya Dwangwa Sugar Factory kupanga shuga. Kotero, phokoso lake silingakhale lokwela kwambiri kuposa zomwe zikuchitika kale pa malopo.
- Anthu omwe akuyenera kugwira ntchitoyi (ma kontilakitala) azakhala mnyumba zomwe zakhazikitsidwa kale mkati mwa Dwangwa ndi ma kalabu a Kasasa. Malo ogona ena owonjezera adzaikidwa ku kalabu ya Dwangwa pomwe malo ena onse ku kalabu ya Dwangwa azitha kukhala ndi ma kontilakitala pa nthawi yomanga.
- Madzi okwanira ndi ukhondo, komanso magetsi alipo pa malopa.

Pofuna kuchepetsa zovuta zina zilizonse zomwe zingakhudzidwe ndi ntchito yomanga, kugwira ntchito ndi kuyimitsa ntchito yomwe ikuyembekezedwa, tikulimbikitsidwa kuti njira zonse zochepetsera zomwe zaperekedwa mkati mwa lipoti la ESMP zizachitike pa nthawi ya chitukukocho.

Lipotili likupereka malingaliro oti ntchitoyo iloledwe kupitilira pokhapokha ngati zomwe zaperekedwa mu gawo khumi la lipotili zikwaniritsidwa.

Project Information:

Malawi is among the least electrified countries in the world with only 7–12 % of the population connected to the grid while the rural electrification rate remains below 2%. Inadequate energy supply is one of the major problems confronting Malawi and limiting its social, economic and industrial development. The national utility Energy Supply Corporation of Malawi (ESCOM) needs to ration power supply by regular load-shedding as the maximum installed capacity of 351MW cannot feed an estimated energy demand of about 400MW. Due to Malawi's high dependency on hydro-power (almost 98% of the electricity is generated from the Shire River) the generation capacity went down to below 200MW after the tropical storm Ana in 2022.

Rural populations within Malawi are almost entirely dependent on biofuels. Since grid connections and gas fuels are not affordable to most, a huge number of the rural families are left with no choice but to rely on firewood and charcoal for cooking. This puts excessive pressure on the already fast depleting forests, leading to environmental degradation and deforestation. However, as trees are part of the natural water cycle, these interruptions eventually have a direct impact on the water levels, hence on electricity generation.

Illovo Group Africa also has vast experience in cogeneration of electrical power from bagasse as it operates 40 bagasse fired boilers around Africa generating high pressure steam by consuming approximately 4 – 4.5 million tons of bagasse per annum which drives 33 power generation steam driven turbo alternator (TA) sets. The combined power generation capacity of the Africa operations is 169MW generating over 60% of the companies' own electrical requirements. Across the group, surplus power is exported to non-estate consumers and national power utilities.

The Dwangwa Sugar Factory operates for approximately 34 weeks per year and has been generating its own power for over 50 years. The electricity will therefore also only be generated during the crushing season of April until November. The cogeneration power production process already operates two 60T, 31bar boilers and two back pressure TA's rated at 3.5MW each to produce 28GWh of electrical power per annum. There is an opportunity to modify the steam process by including an additional TA to take advantage of existing energy to generate additional power. This energy is currently being lost through a let-down station that reduces the steam pressure.

Dwangwa Sugar Factory proposes an upgrade of its present cogeneration facility by installing a new 17MW Turbo Alternator (TA) within the existing powerhouse. This will result to sufficient electricity being generated for the domestic and irrigation consumption at the Dwangwa factory operation (4,000MWh), as well as the exportation of 19,696MWh per annum to ESCOM. All modifications proposed for the upgrading of the cogeneration facility are located within the already disturbed footprint of the Dwangwa Sugar Factory.

The proposed Cogeneration Power Plant will also have a number of benefits for the Malawian national power grid such as:

- Offering high availability, base-load quality for export;
- Produces and exports power during the high demand season for the national grid, when the water levels of the dams are low;
- Provides high quality rotating power, resulting to strong static and dynamic stability to the national grid;
- Diversifies the National Grid energy mix (hydro and solar power);
- It is 100% renewable.

The proposed project would entail the following activities which is all proposed within the existing footprint of the Dwangwa Sugar Factory in Malawi:

- Installation of a +/-17MW (TBC) back pressure TA, replacing the inefficient 3.5MW TA's. The new TA is proposed within the existing powerhouse and proposed to be approximately 90m² in size.
- Decommissioning of the one Turbo Alternator (TA), as one of the existing TA's will remain as a back-up.
- Electrification of prime movers. New shredder motor (approximately 70m²).
- New mill house and cane preparation MCC (Motor Control Centre) building within existing and disturbed footprint (approximately 90m² and 60m² respectively).
- New juice heater within existing footprint (approximately 90m²).
- New substation building of approximately 1,000m² within the existing factory footprint, within an area already disturbed.
- Upgrading of the electrical MV board and electrical reticulation for export, within existing footprints.

Policy, Legal and Administrative Framework

The Dwangwa Sugar Factory has been operating for approximately 46 years and at present, the factory is in possession of the various environmental related certificates and/or licenses for the existing operation.

For the new cogeneration power plant, various policies, regulations and international frameworks were considered and compliance with all applicable local and international policies and regulations will be prudent. All existing permits and licenses are outlined in Section 3 of the ESMP and all local and international policies and regulations applicable to the new cogeneration power plant are described in Section 4 of the ESMP Report.

Public Participation Process

The ESMP is undertaken in accordance with the EIA Guidelines of Malawi which was developed in 1997. These guidelines are not very specific in terms of the public participation process which must be undertaken; however, extensive public consultation is proposed to be undertaken to ensure meaningful consultations with relevant stakeholders including affected groups and other interested parties.

Stakeholders were identified by means of categorizing the stakeholders as follows: (a) Project Affected Parties (individual or groups who are affected or likely to be affected by the project): Communities impacted by project activities. (b) Interested Parties (individual or groups who may have an interest in the project): District Councils; National Authorities; Government Ministries, Departments and Agencies; NGO, CBOs, etc.

Appropriate consultation techniques, and culturally appropriate consultation methods will be used to engage the respective parties and stakeholders. The techniques used and which will continue to be used for the remainder of consultations to be undertaken are as follows:

- Correspondences (email and telephone);
- One-on-one meetings;
- Formal meetings;
- Public meetings;
- Focus group meetings;
- Information boards;
- Media (newspaper, community radio);

Following the compilation of the Draft ESMP, Stakeholders and Interested and Affected Parties (I&AP's) will be consulted, by means of the following:

- Distribution of the Draft ESMP to Stakeholders, Departments and I&AP's for a 30-day commenting period. The Draft ESMP will be made available by means of the following:
 - Hard copy of the Draft ESMP to be placed at the reception of Dwangwa Sugar Factory;
 - An electronic copy of the Draft ESMP will be distributed to all parties who have an email address.
 - Consultations with respective Stakeholders, Nkhosakota District Council, Ward Councillors, and Chiefs
- Stakeholders and Interested and Affected Parties will be made aware of the availability of the Draft ESMP by means of the following:
 - Electronic letter to all Departments, Stakeholders and I&AP's with email addresses;
 - Site Notice boards in the local language, Chichewa, to be placed on site (at the entrance of the access gates at Dwangwa Sugar Factory as well as the notification board of Dwangwa Sugar Factory);

During the project inception phase, a meeting was held with Chief Kanyenda where the details of the proposed project was presented. The minutes of the meeting is found attached as Appendix C. In summary, the meeting concluded that the project is well received and that further consultations would be appreciated when the Draft ESMP has been drafted for public comment.

Environmental and Social Impact Assessment Results

The biophysical, social, and economic environment could be impacted during the construction, operation and decommissioning phases of the activities proposed. For this reason, the impacts were identified, and the significance of each impact was determined in terms of its extent, magnitude and duration. Mitigation measures were then drafted to reduce the possible impact on the biophysical and social environment and included within [Section 10](#).

A summary of the significance of the impacts following the assessment, is provided in the table below.

Activity	Impact / Risk	Significance	Degree to which impact:		
			Can be reversed	May cause irreplaceable loss of resources	Can be avoided, managed or mitigated
Construction activities associated with the installation of the TA, electrification of the prime movers, upgrading of the electrical MV Board	Soil erosion	Very Low (-)	Yes	Improbable	Yes - mitigated
	Soil pollution – hydrocarbon spillages	Very Low (-)	Yes	Improbable	Yes - mitigated
	Dust generation	Low (-)	Yes	Improbable	Yes – managed and mitigated
	Noise generation	Low (-)	Yes	Improbable	Yes- managed and mitigated
	Traffic	Low (-)	Yes	Improbable	Yes – managed and mitigated
	Increase in establishment of alien invasive plant species	Low (-)	Yes	Improbable	Yes – managed and mitigated.
	Ground and surface water pollution	Neutral	Yes	Improbable	Yes – avoided.
	Change of land use	Neutral	Yes	Improbable	Yes - mitigated
	Generation of waste (<i>domestic and construction waste</i>)	Medium (-)	Yes	Improbable	Yes, mitigated
Water consumption	Medium (-)	Yes	Improbable	Yes, mitigated	

Activity	Impact / Risk	Significance	Degree to which impact:		
			Can be reversed	May cause irreplaceable loss of resources	Can be avoided, managed or mitigated
	during construction				
	Sanitation during construction	Low (-)	Yes	Improbable	Yes, mitigated
	Socio-Economic Impact (<i>Job creation</i>)	Medium (+)	Yes	Improbable	Yes, mitigation measures will be proposed to enhance positive impacts
	Socio-Economic Impact (Influx of contractors, increase revenue for service suppliers)	Medium (+)	Yes	Improbable	Yes, mitigation measures will be proposed to enhance positive impacts
	Health and Safety (Influx of contractors, increasing crime and the spreading of sexual transmitted diseases)	Medium (-)	Yes	Improbable	Yes, mitigation
	Health and Safety during construction	Low (-)	Yes	Improbable	Yes, mitigated

Activity	Impact / Risk	Significance	Degree to which impact:		
			Can be reversed	May cause irreplaceable loss of resources	Can be avoided, managed or mitigated
					and avoided
Operational activities (activities associated with the increase in electricity capacity)	Socio-economic impact (<i>Increased power generation and greater rural electrification</i>)	High (+)	Yes, if application is not approved	Improbable	No mitigation required as the impact is positive
	Socio-Economic Impact for Illovo Sugar (Increase in revenue)	High (+)	Yes, if application is not approved	Improbable	No mitigation required as the impact is positive

Conclusion

From the details of project received for the proposed cogeneration power plant it is evident that the impacts associated with the construction, operational and decommissioning phase would be very low to negligent due to the following reasons:

- All structures and infrastructure are proposed on areas within the existing footprint of the Dwangwa Sugar Factory and therefore all areas are already disturbed and being used for industrial purposes.
- No vegetation clearance would be required.
- No water resources are located within a close proximity to where the activities are proposed.
- The changing of infrastructure and structures have no impact on the current operational processes. The changes will only result to the increase in electricity being generated by means of a renewable energy source.

- The project area is currently utilised by Dwangwa Sugar Factory for the extraction and manufacturing of sugar. The noise levels would therefore not be significantly higher than what is currently experienced on site.
- Contractors will be accommodated in already established buildings within the Dwangwa and Kasasa Clubs. Additional accommodation containers will be placed at the Dwangwa Club while all other facilities at the Dwangwa Club would be able to accommodate the contractors during the construction period.
- Sufficient water and sanitation services and electricity is available at these facilities.

In order to mitigate any possible impacts associated with the construction, operation and decommissioning phase of the proposed project, it is recommended that all mitigation measures proposed within the Environmental and Social Management Plan be implemented during the respective phases of the development.

This report provides a view that the project should be allowed to proceed on condition that the measures proposed in [Section 10](#) of this report are fully implemented.

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APPENDIX

Appendix A: Maps

Appendix B: Site Photos

Appendix C: Public Participation

Appendix D: Existing Environmental Permits

ABBREVIATIONS

AMSL	Above Mean Sea Level
CBL	Convective Boundary Layer
CBO	Community Based Organisation
CFD	Computational Fluid Dynamics
DSCL	Dwangwa Sugar Corporation Limited
EHS	Environmental Health and Safety
EMA	Environment Management Act
ESMP	Environmental and Social Management Plan
ESCOM	Electricity Supply Corporation of Malawi
GEA	Gender Equality Act
GHG	Green House Gas
GW	Gigawatts
HA	Hectare
IFC	International Finance Corporation
IMS	Illovo Sugar (Malawi) Plc
kV	Kilovolt

kW	Kilowatt
MCC	Motor Control Centre
MEPA	Malawi Environment Protection Authority
MFD	Mechanical Flow Diagrams
MM	Millimeter
MS	Malawian Standard
MSDS	Material Safety Data Sheets
MW	Mega Watt
NCIC	National Construction Industry Council
NGO	Non-Governmental Organisation
ODS	Ozone Depleting Substances
PM	Particulate Matter
PPA	Power Purchase Agreement
SBL	Stable Boundary Layer
SOR	Sources of Release
SPV	Special Purpose Vehicle
TA	Turbo Alternator

1. OVERVIEW OF THE PROJECT

1.1 Introduction

Illovo Sugar Group is the largest sugarcane producer in Africa and has operations in South Africa, Malawi, Zambia, Eswatini, Tanzania and Mozambique. Illovo Sugar produces raw and refined sugar from sugar cane supplied by its own farms and independent growers. Illovo Group Africa also has vast experience in cogeneration of electrical power from bagasse as it operates 40 bagasse fired boilers around Africa generating high pressure steam by consuming approximately 4 – 4.5 million tons of bagasse per annum which drives 33 power generation steam driven turbo alternator (TA) sets. The combined power generation capacity of the Africa operations is 169MW generating over 60% of the companies' own electrical requirements. Across the group, surplus power is exported to non-estate consumers and national power utilities. The Dwangwa Sugar Factory operates for approximately 34 weeks per year and has been generating its own power for over 46 years. The electricity will therefore also only be generated during the crushing season of April until November. The cogeneration power production process already operates two 60T, 31bar boilers and two back pressure TA's rated at 3.5MW each to produce 28GWh of electrical power per annum. There is an opportunity to modify the steam process by including an additional TA to take advantage of existing energy to generate additional power. This energy is currently being lost through a let-down station that reduces the steam pressure.

Illovo Sugar Malawi Plc proposes an upgrade of its present cogeneration facility by installing a new 17MW Turbo Alternator (TA) within the existing powerhouse. This will result to sufficient electricity being generated for the domestic and irrigation consumption at the Dwangwa factory operation (4000MWh), as well as the exportation of 19 696MWh per annum to ESCOM. All modifications proposed for the upgrading of the cogeneration facility, are located within the already disturbed footprint of the Dwangwa Sugar Factory footprint.

1.2 ESMP Approach and Objectives

The ESMP is a required assessment tool that guides the environmental and social implementation of any development project providing procedures for environmental and social management. This plan outlines necessary environmental and social mitigation measures for the project and its proposed components during the development and operational phases of the project.

This Environmental and Social Management Plan (ESMP) is an implementation guiding tool for the environmental and social impacts management. It will guide the implementation of the proposed project to mitigate environmental, social and climate change impacts.

The ESMP will support in addressing the environmental, social and climate change challenges of the project. Specifically, the project aims: (1) to improve electricity capacity within the Country; (2)

to reduce the requirement for diesel for the generation of electricity within the plant; and (3) to improve the livelihood of the community as more electricity generation for the country of Malawi results to the improvement of the socio-economic environment. The ESMP preparation is a requirement by Malawi Environment Protection Authority (MEPA) that environmental and social assessments are carried out at the identification, preparation or appraisal stages of any development project in order to identify the possible impacts of the project and to formulate mitigation measures.

The main objective of the ESMP is, therefore, to ensure that the implementation of the Cogeneration Project is preceded by assessments of its environmental and social impacts and the environmental sustainability of the project are determined early enough. The ESMP provides the project implementers with an environmental and social management plan that enables them to mitigate potential environmental and social impacts.

The ESMP sets out, in general, the mitigation and monitoring measures and institutional arrangements to address adverse environmental and social impacts.

1.3 Project and Process Description

The existing process for sugar extraction and energy generation will not change from the current operational process. All operational process for sugar extraction will remain the same.

The structures and infrastructure proposed for the purpose of the project will only result to the increase in the generation of electricity. At present, electricity is generated by means of two boilers (2 x 60t/h MCR) and two Turbo Alternators (2 x 3.5MW MCR) which produces 28GWh of electrical power per annum. In order to increase this electricity capacity, the following changes to existing structures and infrastructure are proposed:

- Installation of a 17MW (TBC) back pressure TA, replacing the inefficient 3.5MW TA's. The new TA is proposed within the existing powerhouse and proposed to be approximately 90m² in size.
- Decommissioning of the one Turbo Alternator (TA), as one of the existing TA's will remain as a back-up.
- Electrification of prime movers. New shredder motor (approximately 70m²).
- New mill house and cane preparation MCC (Motor Control Centre) building within existing and disturbed footprint (approximately 90m² and 60m² respectively).
- New juice heater within existing footprint (approximately 90m²).
- New substation building of approximately 1000m² within the existing factory footprint, within an area already disturbed.
- Upgrading of the electrical MV board and electrical reticulation for export, within existing footprints.

Please refer to Figure 1.1 below.

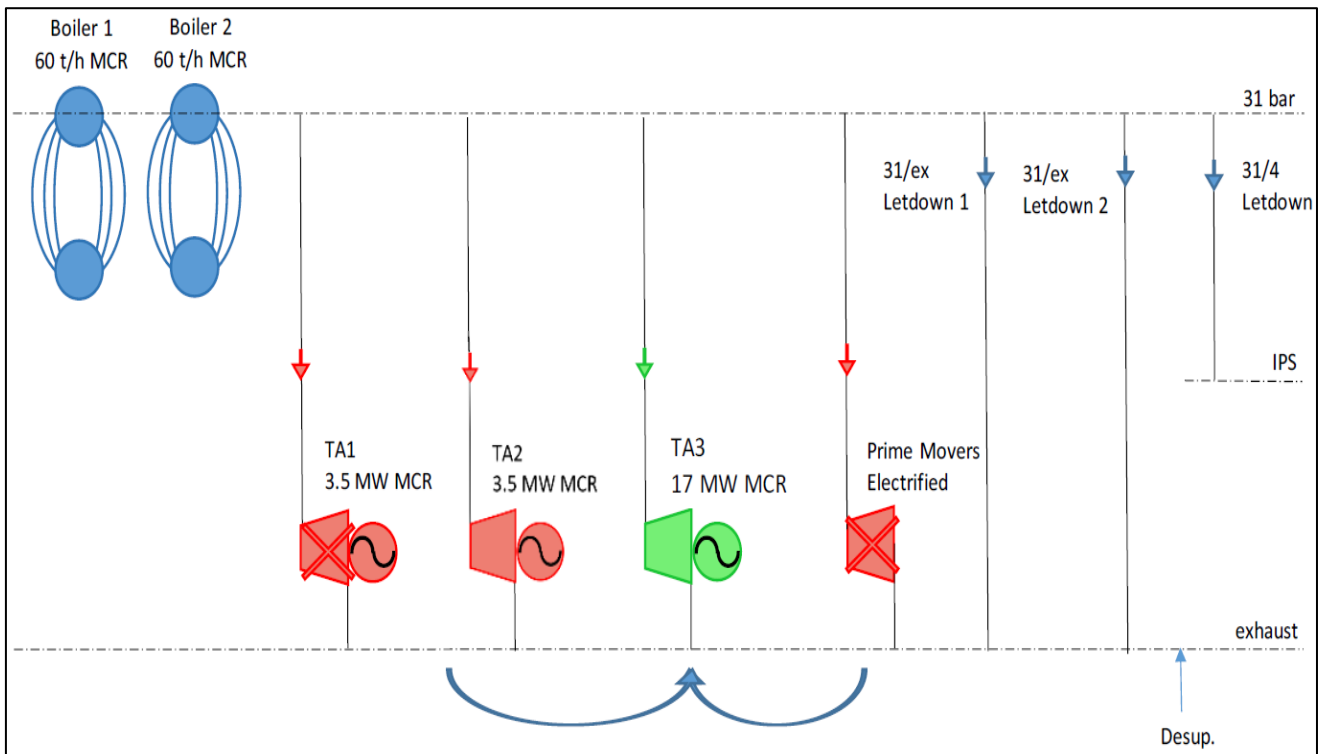


FIGURE 1.1: DIAGRAM OF EXISTING AND PROPOSED ELECTRICITY GENERATION STRUCTURES



FIGURE 1.2: EXISTING POWERHOUSE WHERE NEW 17MW TA IS PROPOSED (ONE 3.5MW TA WILL BE REMOVED)



FIGURE 1.3: AREA WHERE NEW SHREDDER MOTOR AND NEW CRANE PREPARATION MCC BUILDING ARE PROPOSED



FIGURE 1.4: AREA WHERE MATERIAL LAYDOWN AREA AND SUBSTATION BUILDING IS PROPOSED

1.4 Project Proponent Details

Name of Proponent: Illovo Sugar (Malawi) Plc
Postal Address: Private Bag 580,
Limbe
Malawi

1.5 Details of the Environmental Consultant and Specialists

Core Environmental Services has been appointed by Illovo Sugar (Malawi) Ltd as the independent Environmental Consultant to compile the Environmental and Social Management Plan (ESMP) for the proposed project. Table 1-1 below, presents the details of the Environmental Consultant.

TABLE 1-1: DETAILS OF THE ENVIRONMENTAL CONSULTANT:

Name of Company	Core Environmental Services
Person Responsible	Anne-Mari White
Professional Registration	<ul style="list-style-type: none">Environmental Assessment Practitioners Association of South Africa (EAPASA Reg No: 2020/602)South African Council for Natural Scientific Professionals as a Certificated Natural Scientist (Reg. No 300067/15)
Address	10 Nartjie street Mbombela 1200
Telephone Number	+2760 878 1591
Email	Anne-mari@coreenviro.co.za
Qualifications & Experience	BSc. Environmental Management 14 years of experience

1.6 Location of the proposed project

The proposed project site is located within the footprint of the Dwangwa Estate, which is located in the central region of Malawi, in Nkhonkhotakota District. The proposed upgrading of structures and infrastructure for the cogeneration power plant is proposed within the footprint of the Sugar Factory.

Please refer to Figure 1-5 and 1.6 below indicating the locality of the Dwangwa Sugar Factory where the upgrading of structures and infrastructure is proposed for the cogeneration power generation.



FIGURE 1.5: LOCALITY MAP: ILLOVO SUGAR DWANGWA FACTORY, MALAWI



FIGURE 1.6: LAYOUT MAP – STRUCTURES PROPOSED WITHIN THE EXISTING DWANGWA FACTORY FOOTPRINT

2. CURRENT AND PROPOSED PROJECT ACTIVITIES

As noted within [Section 1.3](#), the project entails the construction and upgrading of electrical structures and infrastructure within the existing footprint of the Dwangwa Sugar Factory. It must be noted that no additional boilers will be installed, and the current boiler configuration will remain intact. No new transmission power lines are required. The proposed activities will have no impact on the existing operational process of extracting sugar and the only change would be increase in the electricity generated, resulting to the excess electricity being exported to ESCOM for distribution.

The electricity generation process can be explained as follows:

Cogeneration in a sugar factory makes use of bagasse as a fuel source, which is the fibrous residue which remains after the sugar cane has been crushed. The upgrading of the infrastructure will have no impact in the volume of bagasse currently utilised for electricity generation and therefore the same process will remain as depicted in the flow diagram below.

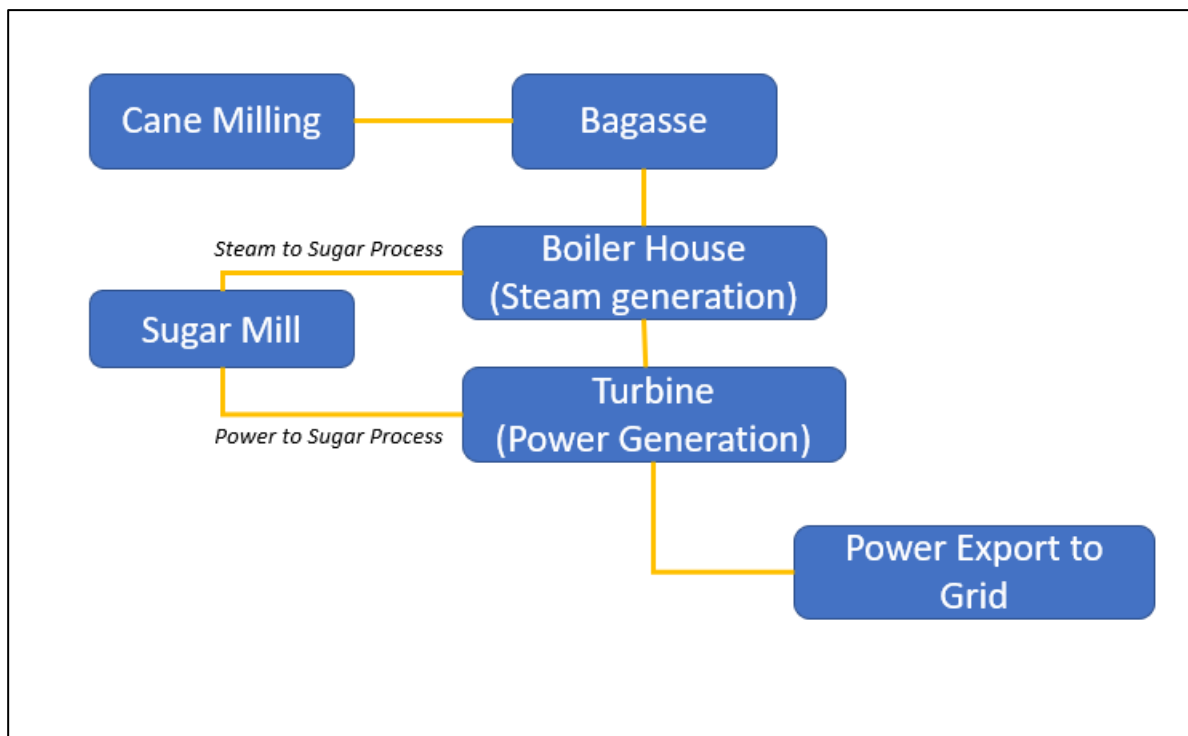


FIGURE 2.1: COGENERATION POWER GENERATION PROCESS

The bagasse is conveyed to the boilers for burning as fuel or to storage facilities. When bagasse is burned within the boilers, heat and steam is generated which is used to power the Turbo-Alternator which generates electricity, used by the Dwangwa Sugar Factory and exported to the Grid.

Waste generated following the combustion in the power plant includes bottom ash and fly ash. Bottom ash is part of the non-combustible residue which is a by-product following the combustion of

the bagasse for steam generation. Bottom ash is collected following the combustion process and is recycled into the existing sugarcane fields as a soil conditioner. Fly ash is the portion of the ash which escapes from the stack and is released into the atmosphere.

As there will be no upgrades to incineration capacity or additional boilers, the storage and handling of bagasse will remain the same as no additional fuel is required. The process of waste generation, collection and recycling will remain the same with the bottom ash being collected and recycled to the sugarcane fields as a soil conditioner.

2.1 Pre-Construction Phase

The rationale of the project is to export electricity to the ESCOM grid. There is a regulatory Independent Power Producer Framework (2017) describing the steps to sign a Power Purchase Agreement (PPA) with the ESCOM (Energy Supply Company of Malawi). Several workstreams have to be achieved for that purpose during the pre-construction phase:

- Technical feasibility of the project: including planning, design
- Costing with a construction contract signed
- Bankability feasibility of the project
- Have all permits agreed (including and not limited to grid connection and ESMP as advised by MEPA)

The project is currently in the pre-construction phase with the design, bankability and application processes being undertaken.

As part of this pre-application phase, the ESMP is being undertaken to apply for approval from the Malawi Environment Protection Authority (MEPA).

2.2 Construction Phase

As soon as the (PPA) is signed with ESCOM and all conditions of precedent of the PPA and other approvals such as the approval required by MEPA have been obtained, the construction process can commence.

It is estimated that approximately 120 job opportunities will be created during the construction phase and although some contractors will be local, numerous contractors will be contracted and require accommodation facilities during this period. The contractors are proposed to be accommodated within existing facilities such as the Techserve area located directly opposite the Dwangwa Sugar Factory, while the Kasassa Club, located further from site, could facilitate the senior managers during the construction period. The existing facilities are all serviced with water, sewer systems and electricity and therefore no additional bulk services would be required.

The existing Techserve area can accommodate 21 people within their rooms while an additional estimated 42 semi-skilled contract workers could be accommodated within temporary rooms (containers) on the area surrounding the existing facilities. Some non-essential buildings and trees might have to be removed for the purposes of positioning the accommodation containers.



FIGURE 2.2: EXISTING FACILITIES TO BE UTILISED FOR ACCOMMODATION OF SEMI-SKILLED LABOUR



FIGURE 2.3: EXISTING ACCOMMODATION FACILITIES (21 ROOMS)



FIGURE 2.4: ADDITIONAL AVAILABLE AREA FOR TEMPORARY CONTAINERS (TECHSERVE AREA)

The Kasassa Club will be able to accommodate approximately 20 senior staff members during the construction phase of the project. All these facilities are existing and no upgrading or additional facilities will be required at the Kasassa Club.

The Dwangwa Sugar Factory will continue with their current operations during the time of construction as construction activities are planned to ensure that there are no interruptions of the current operations during the construction process.

The material laydown area is proposed to be located within the footprint of the development area. (Figure 2-5 below).



FIGURE 2.5: AREA PROPOSED FOR THE LAYDOWN OF CONSTRUCTION MATERIAL

2.3 Operational Phase

The project proposed will not have any impact or change on the operational activities of the factory or the inputs, products or by-products produced. Operationally, all activities would remain the same.

The installation of the new 17MW TA, will only increase the electricity generation capacity, thereby generating sufficient electricity to supply the electricity needs of the Illovo Sugar Dwangwa Estate and exporting the additional 19,696MWh per annum to ESCOM.

2.4 Decommissioning Phase

Decommissioning in this instance refers to the decommissioning of the infrastructure proposed to be installed if it ever becomes redundant. At this stage of the process, the new structures and/or infrastructure is not proposed to be decommissioned, however, if these structures are proposed to be decommissioned, the following activities will be undertaken as part of the decommissioning process:

- **Shutdown:** During this process the power generation process is halted and it is announced that the power generation unit will shut down. Site re-use options are investigated to inform the clean-up decisions and determine the appropriate level of work needed for the decommissioning.
- **Decommissioning:** During this phase, the decommissioning plan drafted during the shutdown, is executed. This could include the following:
 - Removing all structures associated with the cogeneration power plant.
 - This phase will also include the recycling of material which can be used in other equipment and structures/infrastructure.
 - Discarding hazardous, construction (cement) and domestic waste and materials as per the Waste Management Standard of Illovo Sugar and in accordance with the national and local regulations.
- **Remediation:** The cost and extent of the remediation, will depend on the anticipated reuse of the project property. For example, if industrial use is planned for the area where the electricity structures and infrastructures are decommissioned, the cleanup requirements could be less stringent. The remediation phase could entail the collection of soil and groundwater samples to investigate and document any possible contamination and remediate if any pollution is detected.

As decommissioning of the proposed structures and infrastructure is not being proposed at this stage of the development and it is unclear when and if it would be required, no recommendations can be made in terms of the location of the construction camp for decommissioning.

3. EXISTING ENVIRONMENTAL MANAGEMENT

The Dwangwa Sugar Factory has been operating for approximately 50 years.

At present, the factory is in possession of the following environmental related certificates and/or licenses:

TABLE 3-1: EXISTING LICENSES AND PERMITS

Existing Licenses / Permits	Description	Act / Regulation	Permit / Licence Number
Gaseous Emissions License (Release Emissions – Medical Incinerator)	Description of emitted material: i. Carbon Monoxide; ii. Carbon Dioxide; iii. Nitrogen Oxides; iv. Hydrocarbons; v. Fine Particulate Matter	Environment Management Act No.19 of 2017	MEPA 12-07-009-22-12a
Gaseous Emissions License (Release Emissions – Industrial Boilers)	Description of emitted material: i. Carbon Monoxide; ii. Carbon Dioxide; iii. Nitrogen Oxides; iv. Sulphur Oxides v. Hydrocarbons; vi. Fine Particulate Matter	Environment Management Act No.19 of 2017	MEPA 12-07-009-22-12b
Gaseous Emissions License (Release Emissions – Waste Incinerator)	Description of emitted material: i. Carbon Monoxide; ii. Carbon Dioxide; iii. Nitrogen Oxides; iv. Sulphur Oxides v. Hydrocarbons; vi. Fine Particulate Matter	Environment Management Act No.19 of 2017	MEPA 12-07-009-22-12c
Waste Management License (Transportation of Waste to Chisita Dumpsite and Landfill, Dwangwa from Dwangwa Estate Industrial Premises)	Licensing of 4 Tractors with Trailers transporting waste to the Chisita Dumpsite and Landfill	Environment Management Act No.19 of 2017, Environmental Management (Waste Management and Sanitation) Regulations 2008	MEPA-12-07-009-22-02
Waste Management License (Own and operate a waste disposal)	Licensing of the waste disposal facility/plant at Dwangwa Estate Industrial Premises	Environment Management Act No.19 of 2017, Environmental Management (Waste Management and	MEPA-12-07-009-22-05

facility/plant at Dwangwa Estate Industrial Premises)		Sanitation) Regulations 2008	
Waste Management License (Handle and Storage of waste at Dwangwa Estate Industrial Premises)	Licensing for the handling and storage of waste at Dwangwa Estate Industrial Premises. 1. General (Municipal) Waste (Paper, Plastics, Food Wastes etc.) 2. Industrial/Commercial Waste (Waste Wood, Scrap Metal, Broken Glass etc.)	Environment Management Act No.19 of 2017, Environmental Management (Waste Management and Sanitation) Regulations 2008	MEPA-12-07-009-22-05
Waste Management License (Transportation of hazardous waste to Chisita Dumpsite)	Licensing for the transportation of hazardous waste to Chistia Dumpsite	Environment Management Act No.19 of 2017, Environmental Management (Waste Management and Sanitation) Regulations 2008 Environmental Management (Chemicals and Toxic Substances Management) Regulations 2008	MEPA-12-07-009-23-10
Waste Management License (Handling and storage at Dwangwa Estate)	Licensing for the handling and storage of hazardous waste at Dwangwa Estate	Environment Management Act No.19 of 2017, Environmental Management (Waste Management and Sanitation) Regulations 2008 Environmental Management (Chemicals and Toxic Substances Management) Regulations 2008	MEPA-12-07-009-23-08
Licence for surface water abstraction (Abstraction from Ukasi River)	The maximum amount of water which may be taken is: 18 144 m ³ /day For irrigation purposes	Water Resources Act 2013 Water Resources Regulations, 2018	SL 4/1998 File Nr: WRA 234
Licence for surface water abstraction (Abstraction from Dwangwa River)	The maximum amount of water which may be taken is: 34 000 m ³ /day For irrigation purposes	Water Resources Act 2013 Water Resources Regulations, 2018	SL 3/1993 File Nr: WRA 234

Licence for surface water abstraction (Abstraction from Dwangwa River)	The maximum amount of water which may be taken is: 402 109.20 m ³ /day For irrigation purposes	Water Resources Act 2013 Water Resources Regulations, 2018	SL 875/1978 File Nr: WRA 234
Licence for surface water abstraction (Abstraction from Lake Malawi)	The maximum amount of water which may be taken is: 12 096 m ³ /day For irrigation purposes	Water Resources Act 2013 Water Resources Regulations, 2018	SL 873/1978 File Nr: WRA 234
Licence for surface water abstraction (Abstraction from Lake Malawi)	The maximum amount of water which may be taken is: 316 742.40 m ³ /day For irrigation purposes	Water Resources Act 2013 Water Resources Regulations, 2018	SL 874/1978 File Nr: WRA 234
Licence for surface water abstraction (Abstraction from Dwangwa River)	The maximum amount of water which may be taken is: 34 000 m ³ /day For irrigation purposes	Water Resources Act 2013 Water Resources Regulations, 2018	SL 5/1988 File Nr: WRA 234

As the proposed construction of electrical structures and infrastructure will not have any impact on the operational process of the sugar factory, the proposed project will have no impact on the licenses already issued for the Dwangwa Sugar Factory.

4. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

4.1 National Environmental Policy 2004

The Government of Malawi adopted a National Environmental Policy in 1996 to provide guidance and set standards for development of sector policies in environment and natural resources. It provided an overall framework against which relevant sectoral environmental policies were revised and adopted to ensure that these are consistent with the principles of sustainable development. More specifically, the National Environmental Policy sought to:

- Promote the efficient utilization and management of our natural resources;
- Facilitate the rehabilitation and management of essential ecosystems and ecological processes;
- Enhance public awareness of the importance of sound environmental management; and
- Promote cooperation between Government, local communities, and women groups, non-governmental organizations and the private sector in the management and sustainable utilization of the natural resources and the environment;
- Integrate sustainable environment and natural resources management into the decentralised governance systems and ensure that the institutional framework for the management of the

environment and natural resources support environmental governance in local government authorities;

- Develop and regularly update environmental information systems to facilitate planning and decision-making at local, national and international levels;
- Facilitate development and regular review of policies and legislation to promote sustainable management of the environmental and natural resources;
- Facilitate development of mechanisms for management of conflicts in the environment and natural resources sector.

The guiding principles of the National Environmental Policy of 2004, includes the following:

- Every person has a right to a clean and healthy environment and a duty to maintain and enhance the environment.
- It is the obligation of every person to take measures to promote sustainable utilization and management of the environment and natural resources, including taking legal action against any person whose activities or omissions have or are likely to have adverse effects on the environment.
- Children and the youth should be sensitised in environmental issues to facilitate their participation in the conservation, protection and management of the environment as future custodians.
- Women should effectively participate in policy, program and project design and implementation to enhance their role in natural resource use and management activities.
- While sectoral environment and natural resources management is inevitable, there is need for effective co-ordination mechanisms so as to promote an ecosystems management approach.
- The use of renewable natural resources should be sustainable for the benefit of the present and future generations.
- Malawi's economy is highly dependent on natural resources. If these are depleted or degraded, long-term food security and sustainable economic growth will be seriously affected.
- The participation of the private sector, NGOs, and Community Based Organizations (CBOs) is critical to improved protection, conservation, management and sustainable utilization of Malawi's natural resources.
- Community-based management and revenue sharing from the sustainable utilization of natural resources on customary and public lands will be encouraged.
- Regulations will be complemented by social and economic incentives to influence behaviour for individuals or organizations to invest in sustainable environment and natural resources management.
- Regular and accurate assessment, monitoring, and dissemination of information on environmental conditions will be facilitated through appropriate legislative instruments.
- Trade-offs between economic development and environmental degradation will be minimized through use of environmental impact assessment and natural resource monitoring.

- Rational and secure tenure over land and resources is a fundamental requirement for sustainable natural resource management.
- Environmental management principles should be incorporated in development planning and decision-making processes at all levels.
- Conflict management is essential for sustainable environment and natural resources management.
- Some of Malawi's natural resources such as Lake Malawi, National Parks and Wildlife Reserves and Forest Reserves are shared with and are very much affected by the activities of her neighbours and those of the region at large. This calls for concerted efforts in preparation of policies and plans for their utilization, management and conservation to ensure sustainable national and regional development.

4.2 Environmental Management Act No.19 of 2017

In accordance with the Environmental Management Act (EMA) 19 of 2017, a Director's certificate terms and conditions are required prior to the commencement of the construction of an energy production facility. As prescribed under section 24(1) of the EMA, the activities for which an EIA is mandatory within the Energy Sector, is noted as:

A6: Energy generation, transmission and storage project

1. *Construction or expansion of electrical generating facilities designed to operate at greater than 4 MW or, in the case of hydroelectric generating facilities, where the total head is greater than 20 m or where there is a firm flow of 100 m³ per second;*

Although the electricity to be generated exceeds 4MW, all activities are taking place within an already existing electrical generating facility, and the footprint of the facility is not expanded. The project only entails the replacement of the inefficient 2 x 3.5MW turbo alternator, with one 17MW turbo alternator. The above activity is therefore not applicable and as per the response from MEPA following the submission of the Project Brief, an ESMP must be compiled for the proposed activities.

The other activities listed under energy generation is noted below, however, it is noted that none of these activities are applicable.

2. Construction of electrical transmission facilities operating at a voltage of 132 kV or greater;
3. Construction or expansion of oil and gas pipelines longer than 1 km;
4. Construction or expansion of storage facilities (excluding services station) for oil, gas, petrol or diesel, located within 3 km of commercial, industrial or residential areas and with a storage capacity of 500 000 litres or more; and
5. All activities associated with nuclear power development.

The types of projects for which an ESIA might be required are provided in List B as indicated below:

List B (List of projects for which EIA might be required)

- Agriculture and aquaculture schemes
- Drainage and irrigation projects
- Forestry and logging schemes
- Industrial projects
- Land development projects
- Mining projects
- Industrial projects
- Energy generation, transmission and use projects
- Tourism projects
- Waste treatment and disposal projects
- Water supply projects
- Health and population projects
- Projects in areas protected under legislation
- Projects in areas containing rare or endangered fauna and flora
- Projects in areas containing unique or outstanding scenery; and
- Projects in tribal habitats.

A Project Brief was submitted to MEPA and a response was received whereby it was requested to undertake an Environmental and Social Management Plan.

4.3 Forestry Act, 1997

The Act makes provision for participatory forestry, forest management, forestry research, forestry education, forest industries, protection and rehabilitation of environmentally fragile areas and international co-operation in forestry and for matters incidental thereto or connected therewith. The Act also notes that no person shall (a) cut, take, fell, destroy, uproot, collect and remove forest produce from a forest reserve, customary land, public land and protected forest area; (b) cultivate crops, graze livestock, clear land, dig or break up land for any road or for any purpose whatsoever on such area of the forest reserve and protected forest area that may be specified in the licence.

No forest produce will be removed as part of the construction or operational phase of the proposed project and therefore the Forestry Act, of 1998 is not applicable.

4.4 Energy Regulation Act, 2004

The Energy Regulation Act states that no person may establish, operate, carry on or be involved in any manner in an energy undertaking in Malawi, without a licence issued by the Authority. Illovo

Sugar Malawi is consulting with the Authority in order to obtain a license as required within the Energy Regulation Act of 2004, for the proposed operation of the cogeneration power plant.

4.5 National Energy Policy, 2018

The goal of this policy is to increase access to affordable, reliable, sustainable, efficient and modern energy for every person in the country. It aims to diversify energy sources, enhance the sector's efficiency, modernise the services and make them more sustainable, improve living standards and equity, and increase access to clean, sustainable and affordable energy for all people.

The proposed Cogeneration Power Plant will be generating sufficient electricity for the operations of the Dwangwa Sugar Factory, while the additional electricity generated will be exported to the national grid. At present, Malawi is mostly dependent on generating electricity by means of hydro power stations. However, this generation is unreliable when faced with drought or floods. The proposed cogeneration powerplant will diversify the energy source as aimed within the National Energy Policy.

4.6 Water Resources Act No. 2 of 2013

In accordance with Section 39 of the Water Resources Act of 2013, no person shall abstract and use water unless it is authorized to undertake such activity. Section 92 of the Water Resources Act of 2013 also states that a person who wishes to discharge effluent shall apply to the Authority for a discharge permit.

It is not proposed that the operation of the Cogeneration Plant would have any change in the volume of water to be used or effluent to be discharged and therefore, water use and effluent discharge will be in accordance with the existing permits/licenses issued for Dwangwa Sugar Factory.

4.7 Water Policy Act, 2005

The National Water Policy as reflected in its new title is meant to address all aspects of water including resource management, development and service delivery. The Policy, among other issues, aims at:

- Achieving sustainable and integrated water resources management and development that make water readily available and equitably accessible by all Malawians in pursuit of their socio-economic development and for environmental sustenance;
- To ensure water of acceptable quality for all the needs in Malawi;
- Achieving sustainable provision of water supply and sanitation services that are equitably accessible and used by individuals and entrepreneurs for socio-economic development at affordable cost;

- Promoting efficient and effective utilization, conservation and protection of water resources for sustainable agriculture and irrigation, fisheries, navigation, eco-tourism, forestry, hydropower and disaster management and environmental protection;
- Undertaking the rehabilitation, upgrading, extension and construction of water infrastructure;
- Promoting international cooperation in the management of trans-boundary and cross boundary waters without compromising the country's sovereignty, security and territorial integrity;
- Dealing with challenges facing water resources management which include the need to adopt Integrated Water Resources Management (IWRM) Principles, the need to conform to current regional and international agreements and protocols on shared water resources, catchment protection and management, and water resources monitoring;
- Promoting the participation of the private sector in water resources development, management and service delivery;
- Strengthen and building capacity in the water sector; and
- Clarifying the roles of the Ministry for Water Affairs and other stakeholders in the water sector.

The proposed project will have no impact on the existing water use and therefore the above act is not applicable to the proposed project.

4.8 Malawi Standard Emission Limits

MS 737-1:2021 Malawi Standard Emission Limits – Emissions from Stationary Sources specifies maximum allowable limits for particulate matter and other common air pollutants in gaseous emissions from stationary sources. The standard also suggests the mechanisms for reduction or removal of the pollutants. The proposed project does not propose any change to the existing boilers and for this reason, the Malawi Standard Emission Limits are not affected by this project.

4.9 Malawi National Land Policy, 2002

The goal of the National Land Policy in Malawi is to ensure tenure security and equitable access to land, to facilitate the attainment of social harmony and broad based social and economic development through optimum and ecologically balanced use of land and land-based resources.

The proposed construction of electrical infrastructure is all proposed on land which is already used by Illovo Sugar for industrial purposes. No additional land will be required for the purposes of this project and therefore the Malawi National Land Policy of 2002 is not applicable to this project.

4.10 Public Health Act, 1948 (No. 12 of 1948)

The Act creates the legal framework for the protection of public health in Malawi and for this purpose provides for powers of the administration to regulate and control and animal and food production and handling, food and water supply, sewerage, etc. The Act also provides for the notification of infectious diseases, and the prevention and suppression of such diseases.

The activities proposed for the project will not be using or be producing any food product, and therefore the Act is not applicable to the proposed project.

4.11 Occupational Safety, Health and Welfare Act, 1997 (No. 21 of 1997)

This Act makes provision for the regulation of conditions of employment in workplaces with regard to safety, health and welfare of employees; for the inspection of certain plant and machinery; for the prevention and regulation of accidents occurring to persons employed or authorised to go into the workplace, and for some related matters. It will be imperative for the construction and operational activities of the proposed project to comply with the Occupational Safety, Health and Welfare Act, of 1997.

4.12 National Construction Industry Act, 1996 (No. 19 of 1996)

This act makes provision for the regulation, development, and promotion of the local construction industry. Construction activities will have to comply with the National Construction Industry Act, of 1996 which states that 30% of the construction on site must be delivered by a local company, and 51% of the professional consultants will also have to be local. During the construction activities, compliance with the National Construction Industry Act, 1996 (No. 19 of 1996) will be ensured.

4.13 Malawi Vision 2063

The 2063 Malawi Vision states that it aims to become an inclusively wealthy and self-reliant nation by 2063 and includes goals such as:

- No poverty
- Zero hunger
- Good health and well-being
- Quality education
- Gender equality
- Clean water and sanitation
- Affordable and clean energy
- Decent work and economic growth

- Industry, innovation and infrastructure
- Reduced inequalities
- Sustainable cities and communities
- Responsible consumption and production
- Climate action
- Life below water
- Life on land
- Peace, justice, and strong institutions
- Partnerships for the goals

The proposed project will aid in supplying additional, much needed electricity to ESCOM who would be in a position to distribute the electricity for the country to grow economically. The increase in the availability of electricity will not only aid in economic growth, which would lead to decent work and reduced inequalities, but also assist in protecting life on earth, as increase in electricity supply would lead to a decrease in deforestation as less wood would be required for cooking purposes.

4.14 Gender Equality Act, 2014

The Gender Equality Act (GEA) in Malawi was drafted to begin to redress the gender inequalities present in Malawian society. Gender inequalities affect us all and are all too often present in all our communities. It is the responsibility of all Malawi citizens to implement the GEA in our schools, homes and communities. The emphasis of the GEA is on improving the lives of girls and women. This resource highlights key areas within the Act that are relevant to young people and should be seen as a positive step to benefit Malawian society as a whole.

During the construction and operational phases of the project, the project developers and contractors should provide job opportunities to woman, where feasible and possible, to assist in improving the lives of woman as stated within the Gender Equality Act of 2014.

4.15 HIV and Aids Act, 2018

According to the Act, the State shall respect, protect, and promote human rights as the cornerstones of an effective response to the country's HIV and AIDS situation. The Act also makes provision for the prevention and management of HIV and AIDS, provides for the rights and obligations of the persons living with HIV or affected by HIV and AIDS, and provides for the establishment of the National AIDS Commission.

During the project, measures must be taken to ensure the prevention and management of HIV and AIDS and it must be ensured that there is no discrimination against people living with HIV and AIDS.

4.16 Liquid Fuels and Gas (Production and Supply) Act 2004

The Liquid Fuel and Gas Act of 2004 makes provisions for production, blending, extraction, conversion, importing, transforming, transporting, storing, distributing and selling liquid fuels and gas in a liberalized market and for matters connected therewith or incidental thereto.

It is noted that the proposed project will not result to any production, transporting or storing of fuels and gas and for this reason, the regulations stipulated within the Liquid Fuel and Gas Act of 2004 is not applicable to the proposed project.

4.17 Malawi Growth and Development Strategy

The Malawi Growth and Development Strategy was drafted with the aim of building a productive, competitive and resilient nation. The Strategy aims to support Malawi's development into a productive nation, competing on the global stage while ensuring that the nation builds systems that deal with natural shocks and disasters. The Strategy is focussing on Key Priority Areas which includes (i) Agriculture, Water Development and Climate Change Management; (ii) Education and Skills Development; (iii) Energy, Industry and Tourism Development; (iv) Transport and ICT Infrastructure; and (v) Health and Population.

The Growth and Development Strategy set specific goals in terms of sustainable energy and socio-economic development and these goals includes the improved access to reliable and sustainable energy supply, and enhanced use of renewable and clean energy. The proposed project will be making use of a renewable energy source to generate additional electricity which will be exported to ESCOM for distribution within Malawi. For this reason, the proposed project is in line with the Malawi Growth and Development Strategy.

4.18 IFC Performance Standards on Environmental and Social Sustainability (2012)

IFC's Sustainability Framework articulates the Corporation's strategic commitment to sustainable development and is an integral part of IFC's approach to risk management. The Sustainability Framework comprise of IFC's Policy and Performance Standards on Environmental and Social Sustainability, and IFC's Access to Information Policy. The Performance Standards are directed towards clients, providing guidance on how to identify risks and impacts, and are designed to help avoid, mitigate, and manage risks and impacts as a way of doing business in a sustainable way, including stakeholder engagement and disclosure obligations of the client in relation to project-level activities. The IFC sustainability Framework comprise of eight Performance Standards:

Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts Performance Standard

Performance Standard 1 establishes the importance of:

- a. integrated assessment to identify the environmental and social impacts, risks, and opportunities of projects;

- b. effective community engagement through disclosure of project-related information and consultation with local communities on matters that directly affect them; and
- c. the client's management of environmental and social performance throughout the life of the project

Performance Standard 2: Labour and Working Conditions Performance Standard

Performance Standard 2 recognizes that the pursuit of economic growth through employment creation and income generation should be accompanied by protection of the fundamental rights of workers. For any business, the workforce is a valuable asset, and a sound worker-management relationship is a key ingredient in the sustainability of a company. The objective of this performance standard includes:

- a) To promote the fair treatment;
- b) Non-discrimination, and equal opportunity of workers;
- c) To establish, maintain, and improve the worker-management relationship;
- d) To promote compliance with national employment and labour laws;
- e) To protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in the client's supply chain;
- f) To promote safe and healthy working conditions, and the health of workers.
- g) To avoid the use of forced labour.

Performance Standard 3: Resource Efficiency and Pollution Prevention Performance Standard

Performance Standard 3 recognizes that increased economic activity and urbanization often generate increased levels of pollution to air, water, and land, and consume finite resources in a manner that may threaten people and the environment at the local, regional, and global levels. This Performance Standard outlines a project-level approach to resource efficiency and pollution prevention and control in line with internationally disseminated technologies and practices. In addition, this Performance Standard promotes the ability of private sector companies to adopt such technologies and practices as far as their use is feasible in the context of a project that relies on commercially available skills and resources.

Performance Standard 4: Community Health, Safety, and Security Performance Standard

Performance Standard 4 recognizes that project activities, equipment, and infrastructure can increase community exposure to risks and impacts. In addition, communities that are already subjected to impacts from climate change may also experience an acceleration and/or intensification of impacts due to project activities. The objective of this performance standard includes:

- a) To anticipate and avoid adverse impacts on the health and safety of the affected community during the project life from both routine and non-routine circumstances; and
- b) To ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the Affected Communities.

Performance Standard 5: Land Acquisition and Involuntary Resettlement Performance Standard

Performance Standard 5 recognizes that project-related land acquisition and restrictions on land use can have adverse impacts on communities and persons that use this land. Involuntary resettlement refers both to physical displacement (relocation or loss of shelter) and to economic displacement (loss of assets or access to assets that leads to loss of income sources or other means of livelihood) as a result of project-related land acquisition and/or restrictions on land use. The objectives of this performance standard are:

- a) To avoid, and when avoidance is not possible, minimize displacement by exploring alternative project designs;
- b) To avoid forced eviction;
- c) To anticipate and avoid, or where avoidance is not possible, minimize adverse social and economic impacts from land acquisition or restrictions on land use by (i) providing compensation for loss of assets at replacement cost and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected;
- d) To improve, or restore, the livelihoods and standards of living of displaced persons; and
- e) To improve living conditions among physically displaced persons through the provision of adequate housing with security of tenure at resettlement sites.

Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources Performance Standard

Performance Standard 6 recognizes that protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development. This Performance Standard addresses how clients can sustainably manage and mitigate impacts on biodiversity and ecosystem services throughout the project's lifecycle;

- a) To protect and conserve biodiversity;
- b) To maintain the benefits from ecosystem services; and
- c) To promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities.

Performance Standard 7: Indigenous Peoples Performance Standard

Performance Standard 7 recognizes that Indigenous Peoples, as social groups with identities that are distinct from mainstream groups in national societies, are often among the most marginalized and vulnerable segments of the population. In many cases, their economic, social, and legal status limits their capacity to defend their rights to, and interests in, lands and natural and cultural resources, and may restrict their ability to participate in and benefit from development. The objectives of this Performance Standard include:

- a) To ensure that the development process fosters full respect for the human rights, dignity, aspirations, culture, and natural resource-based livelihoods of Indigenous Peoples;
- b) To anticipate and avoid adverse impacts of projects on communities of Indigenous Peoples, or when avoidance is not possible, to minimize and/or compensate for such impacts;
- c) To promote sustainable development benefits and opportunities for Indigenous Peoples in a culturally appropriate manner;

- d) To establish and maintain an ongoing relationship based on Informed Consultation and Participation (ICP) with the Indigenous Peoples affected by a project throughout the project's life-cycle;
- e) To ensure the Free, Prior, and Informed Consent (FPIC) of the Affected Communities of Indigenous Peoples when the circumstances described in this Performance Standard are present.

Performance Standard 8: Cultural Heritage

Performance Standard 8 recognizes the importance of cultural heritage for current and future generations. The objective of this Performance Standard includes the following:

- a) To protect cultural heritage from the adverse impacts of project activities and support its preservation; and
- b) To promote the equitable sharing of benefits from the use of cultural heritage.

Although all eight IFC Performance Standards are noted above, it must be noted that Performance Standard 5, 6, 7 and 8 will not be applicable to this project as no community or individual will be resettled, no natural vegetation will be cleared, no indigenous people will be affected, and there will be no impact on any cultural heritage.

4.19 IFC Industry Sector Guidelines (2016)

The Environmental Health and Safety (EHS) Guidelines for Thermal Power Plants include information relevant to combustion processes fuelled by gaseous, liquid and solid fossil fuels and biomass and designed to deliver electrical or mechanical power, steam, heat or any combination of these. The EHS applies to boilers in new and existing facilities and therefore the proposed project must be in compliance with the IFC Industry Sector Guidelines of 2016 which notes the following:

- Industry-Specific Impacts and Management;
- Performance Indicators and Monitoring;
- Description of Industry Activities;
- Environmental Health and Safety Guidance for Thermal Power Projects

5. NEED AND DESIRABILITY

Malawi is among the least electrified countries in the world with only 7–12 % of the population connected to the grid while the rural electrification rate remains below 2%. Inadequate energy supply is one of the major problems confronting Malawi and limiting its social, economic and industrial development. The national utility Energy Supply Corporation of Malawi (ESCOM) needs to ration power supply by regular load-shedding as the maximum installed capacity of 351MW cannot feed an estimated energy demand of about 400MW. Due to Malawi's high dependency on hydro-power (almost 98% of the electricity is generated from the Shire River) the generation capacity went down to below 200MW after storm Freddy hit in 2022.

In terms of Greenhouse Gas Emissions (GHG), it is noted that the energy sector is accounting for almost three quarters of human-caused greenhouse gas emissions, and for this reason shifts to clean, renewable sources are critical to solving the climate crisis. Energy is therefore now a priority in many countries' climate action plans.

Rural populations are almost entirely dependent on biofuels. Since grid connections and gas fuels are not affordable to most, a huge number of the rural families are left with no choice but to rely on firewood and charcoal for cooking. The data in wood consumption in Nkhotakota shows that wood consumption has increased rapidly. It was 425,000 cubic metres in 2012 but increased to 501,300 in 2017 representing a 17.9% increase. The increasing trend is also observed in timber (49 %) and charcoal (87%). This consumption rate is a serious threat to forest resource and puts excessive pressure on the already fast depleting forests, leading to environmental degradation and deforestation. However, as trees are part of the natural water cycle, these interruptions eventually have a direct impact on the water levels, hence on electricity generation.

According to the *Journal of Energy in Southern Africa, Vol 26, No 2 of May 2015 John L Taulo, Kenneth Joseph Gondwe and Adoniya Ben Sebitosi*, the contribution of renewable energy sources is only 0.3%, which is very low in comparison to other countries. Sugar cane is a major commercially grown agricultural crop in the vast majority of countries in Africa. It is one of the plants having the highest bioconversion efficiency of capture of sunlight through photosynthesis and is able to fix around 55 tonnes of dry matter per hectare of land under this crop on annually renewable basis. Annual average production of sugarcane in Malawi is estimated at 2.5 million tons/year leaving behind over 950 000 tons bagasse which is a significant renewable power source for electricity generation. There are two sugar mills in Malawi having potential to generate 62 Mwe of electricity but currently only 18 Mwe has been utilised. This proposed project will add a portion of the identified potential (19 696MWh /year) to the electricity grid in Malawi.

The proposed 17 MW TA installation will have the following direct benefits for Illovo Sugar:

- Increase the installed electricity capacity from 7MW to 17MW;
- Cost saving of R7.586 million as no electricity would have to be imported;

- Reduce the requirement for diesel generation, saving 153 320L of diesel per annum, which accumulates to a saving of R8.643 million;
- Increasing the revenue through the sale of the 19,696MWh per annum which is available to be sold to ESCOM.

Other benefits associated with the project include:

- Improvements in energy efficiency which contributes to long term sustainability.
- Diversification of revenue to include power sales in addition to the sugar sales.
- Establish a strategic relationship with Malawi's power utility (ESCOM) which may hold future benefits for the business in Malawi.
- Improvement of power supply within the Dwangwa Sugar Factory as imported power during the crushing season, will be replaced with self-generated power.
- Replacement of switch gear that will shortly require upgrade as it may no longer be supported by Siemens.
- Reduction of emissions through reducing diesel usage by the diesel generators.
- Pave the way for future projects that improve power self-sustainability, eg allowing for water usage reduction projects and community electrification.

The construction activities associated with the Dwangwa Cogeneration Power Project will provide an estimated 120 temporary job opportunities, further benefiting the local communities. In accordance with the National Construction Industry Council (NCIC), of 1996, and to ensure compliance thereof, local companies will be engaged during the construction process.

6. PUBLIC PARTICIPATION PROCESS

Section 5 of the **Environment Management Act No.19 of 2017**, states the following in terms of public consultation:

- (1) For the purpose of ensuring effective public participation, enforcement of rights and duties created under this Act, the Authority shall promote the right of every person to –*
 - (a) Access environmental information and lead agencies, private sector and non-governmental organisations shall have a duty to provide such information in a timely manner;*
 - (b) Participate in environmental decision-making processes directly or through representative bodies and mechanisms for effective, direct and indirect public participation shall be created by lead agencies; and*
 - (c) Be afforded an adequate and effective administrative or judicial remedy for any harmful or adverse effect resulting from acts or omissions affecting the environment.*
- (2) The Authority shall establish guidelines and, where necessary recommend promulgation of regulations for ensuring the realisation and implementation of the provisions of subsection (1).*
- (3) No derogation from the rights and duties provided for in subsection (1) shall be permissible unless the same is necessary in a free, accountable and democratic society and in accordance with the Constitution.*

As part of the development of the ESMP, a public consultation process is undertaken to identify and determine whether there are any socio-economic aspects to be considered which must be addressed as part of the process. Stakeholder engagement will therefore be undertaken by means of the following steps:

- (1) To plan ahead;
- (2) Consult using basic principles of good practise;
- (3) Incorporate feedback;
- (4) Document the process and results of consultation; and
- (5) Report back.

6.1 Stakeholder Identification and Analysis

During a project, various stakeholders and interested and affected parties were identified to provide valuable input to maximize benefits and reduce negative consequences. The areas directly adjacent to the project site and Illovo Sugar Factory is used for sugar cane farming while some villages are found within the larger agricultural area which is mostly being occupied by Illovo staff members. All the surrounding property is owned by DSCL. A large portion of the people residing in Dwangwa is also employed by DSCL. The project stakeholders were categorized as: (a) Project Affected Parties

(individual or groups who are affected or likely to be affected by the project): Communities impacted by project activities. (b) Interested Parties (individual or groups who may have an interest in the project): District Councils; National Authorities; Government Ministries, Departments and Agencies; NGO, CBOs, etc.

The Stakeholder Register contains details related to the Identified stakeholders, and the method proposed for consultation. Such information includes the following: Organization, Name and Surname, and proposed method of consultation.

Table 6-1 below notes the stakeholders, departments, interested and affected parties identified during the process:

TABLE 6-1: STAKEHOLDER, DEPARTMENTAL AND I&AP LIST

Stakeholder Category	Stakeholder Name	Contact Name	Communication Details
National Regulators	MEPA	Cathy Musa	0999346466
Government	Ministry of Energy, Including the Alternative Energy Division (AED)	Lucious Mawanga	0888582874
	Malawi Energy Regulatory Authority (MERA)	Shaibu Muludi	0888834436
	Department of Forestry and Natural Resources	Patricia Masupayi Assistant Director	0999667801
	Department of Water Resources	Peter Banda	0999333069
	Ministry of Lands	John Phiri Deputy Director for Policy and Planning	0999073842
	Ministry of Agriculture, Irrigation, and Water	Mannet	0888589707
	Department of Museums and Monuments	Dr Oris Malinjani Principal Geo-Archaeologist	0886389777
	Department of National Parks and Wildlife	Brighton Kumchedwa Director	0999915411
District Level Government	Nkhotakota District Council, District Commissioner (DC)	Ben Tonho	0999278385 bentonho@gmail.com

Stakeholder Category	Stakeholder Name	Contact Name	Communication Details
	District Environmental Sub-Committee (DESC)	Alick Munthali	0995432959
	Nkhotakota Regional Lands Office	Precious Khondowe	0992414200
	Nkhotakota Regional Forestry Office	George Zibophe	0999609739
	Nkhotakota District Environmental Officer	Jane Kayira	0888742690
	Nkhotakota District Labour Office	Charity Mwambira	0993831542
	Nkhotakota District Medical Officer	Dr Stalin Zinkanda	0995 655 574
Community Level	Representing Local Leadership, Senior Group Village heads (SGVH), Group Village Heads (GVH), and Village Heads (VH). Communities are: Kasasa; Majiga. Mowe; DCGL Village.	Senior Chief Kanyenda: Edward Takondwa Harlod	0888379538
	Community members affected by the project.	Taza Biza	0999277401
NGOs	African Parks (Nkhotakota Wildlife Reserve)	David Nangoma	0999965042
	WESM	Rashid	0999324743
Civil Society Groups	Civil Society Organizations	Jawadu	0999196535

Stakeholder Category	Stakeholder Name	Contact Name	Communication Details
Commerce and Industry	Energy Generation Company Malawi (EGENCO)	Lawrence Chilimampungu	0888879555
	Electricity Supply Corporation of Malawi (ESCOM)	Getrude Malulu	0888838231
	Kasasa Sports Club	Justin Dzinkambani	0888959222
Illovo Sugar (Dwangwa)	General Manager	McLean Debwe	0999952321
	Estate Support Manager	Jeromy Ngolombe	0888897077
	Agric Head	Lengster Mlenga	0884864472
	Factory Manager	Harvey Machinjiri	0884708300
	SHREQ Manager	Alfeo Mwenda	0999732773
	Finance Manager	Chimwemwe Mhango	0888823999
	HR Head	Leyla Jere	0886 670038
Business Partners at Dwangwa Mill	ETHCO	Lusubilo Chakaniza	0999958899
	Gardaworld	Nicodemus Mbatha	0994773869
	Unitrans	Vic Botha	0995803136
	DCGL	Chananga Banda	0993409444
	Entyre	Richard Mzumara	0999958709
	Carbon Dioxide and Allied Products	Munason Munthali	0888 574 733
	Lake Shore Cane Growers Association	Robert Seyara	0888 202 522

Appropriate consultation techniques, and culturally appropriate consultation methods will be used to engage the respective parties and stakeholders. The techniques to be used for the consultations to be undertaken are as follows:

- Correspondences (email and telephone);
- One-on-one meetings;
- Formal meetings;
- Public meetings;
- Focus group meetings;
- Information boards;

6.2 Public Consultation

During the project inception phase, a meeting was held with Chief Kanyenda where the details of the proposed project was presented. The minutes of the meeting is found attached as Appendix C. In summary, the meeting concluded that the project is well received and that further consultations would be appreciated when the Draft ESMP has been drafted for public comment.

Once the Draft ESMP is available, the following public consultations will be undertaken with by using the Draft ESMP as reference for such consultations:

- Draft ESMP will be distributed to the Stakeholders, Departments and I&AP's for a 30-day review and consultation period. The Draft ESMP, with the executive summary of the report being in Chichewa, will be made available by means of the following:
 - Hard copy of the Draft ESMP will be placed at the reception of Illovo Sugar Dwangwa;
 - An electronic copy of the Draft ESMP will be distributed to all parties who has an email address.
- Stakeholders and Interested and Affected Parties will be informed of the availability of the Draft ESMP by means of the following:
 - Electronic letter to all Departments, Stakeholders and I&AP's with email addresses;
 - Site Notice boards in the local language of Chichewa, to be placed on site (at the entrance of Illovo Sugar Dwangwa, as well as the notification board of Illovo Sugar);
- Engagement with the Nkhotakota District Council to discuss the proposed project.
- Meeting with the respective Traditional Leaders, Religious Leader and Ward Councillors of the Dwangwa area.
- Meeting with the local cane growers.

Following the 30-day comment period and consultations to be undertaken, all comments received, and minutes of the meetings held, will be included within the ESMP to be submitted to MEPA for consideration.

6.4 Grievance Redress Mechanism

Projects which result to environmental and social impacts, can expect grievances to be raised and how a business respond to such grievances can have a significant implication on business performance. Having a good overall community engagement process in place and providing access to information on a regular basis can substantially help to prevent grievances from arising in the first place, or from escalating to a level that can potentially undermine business performance.

Grievance procedures should exist throughout all phases of the project lifetime (planning, construction, commissioning, closure and decommissioning). The purpose of the Grievance Redress Mechanism would be to address any issues arising from community members, by means of ensuring a transparent and fair process whereby people's concerns will be heard and addressed. Raising concerns must therefore be an easily accessible procedure and/or process.

The principles of a good Grievance Redress Mechanism System include the following:

- Proportionality: Designing the Grievance Redress Mechanism according to the scale and adverse impact on the affected communities;
- Cultural appropriateness: Designing the Grievance Redress Mechanism taking into account culturally appropriate ways of handling community concerns;
- Accessibility: A clear and understandable mechanism that is accessible to all segments of the affected communities at no cost;
- Transparency and accountability to all stakeholders;
- Appropriate protection: A mechanism that prevents retribution and does not impede access to other remedies;

The process involved for grievance management is a five-step process which includes the following:

Step 1: Publicizing the Grievance Management Procedures:

During this process, the Grievance Management Procedure is made public to inform all affected communities of the methods of lodging a grievance. The information to be included within this publication includes the following:

- What project-level mechanisms are (and are not) capable of delivering and what benefits complainants can receive from using the company grievance mechanism, as opposed to other resolution mechanisms;
- Who can raise complaints (affected communities);
- Where, when, and how community members can file complaints;
- Who is responsible for receiving and responding to complaints, and any external parties that can take complaints from communities;
- What sort of response complainants can expect from the company, including timing of response;
- What other rights and protection are guaranteed.

Step 2: Receiving and Keeping Track of Grievances:

Once communities are aware of the mechanism and access it to raise grievances, the company needs to process them. Processing includes: 1) collecting grievances; 2) recording grievances as they come in; 3) registering them in a central place; and 4) tracking them throughout the processing cycle to reflect their status and important details.

Step 3: Reviewing and Investigating Grievances:

For a grievance mechanism to work, all complaints should be handled as promptly as possible, depending on the nature and complexity of the matter. All grievances will need to undergo some degree of review and investigation, depending on the type of grievance and clarity of circumstances. Minor, straightforward issues may only need screening before proceeding to the next step whereby information can be provided on the spot. Less clear, more problematic, or repetitive issues, or group complaints may need a more detailed review prior to action. Staff involved in handling grievances may need to seek advice internally, and in some cases turn to outside parties to help in the validation process, especially in cases of damage claims.

Step 4: Developing Resolution Options and Preparing a Response:

Once the grievance is well understood, resolution options can be developed taking into consideration community preferences, project policy, past experience, current issues, and potential outcomes. General approaches to grievance resolution may include proposing a solution:

- i. unilaterally (the company proposes a solution);
- ii. bilaterally (the company and the complainant reach a resolution through discussion or negotiation);
- iii. through a third party (either informally or formally through mediation); or
- iv. through traditional and customary practices.

Regardless of the outcome, a response should be provided to all complainants. Responses can be either oral or written, depending on whether the grievance was received orally or in writing.

Step 5: Monitoring, Reporting, and Evaluating a Grievance Mechanism

Monitoring and reporting can be tools for measuring the effectiveness of the grievance mechanism and the efficient use of resources, and for determining broad trends and recurring problems so they can be resolved proactively before they become points of contention. Depending on the extent of project impacts and the volume of grievances, monitoring measures can be as simple as tracking the number of grievances received and resolved, or as complex as involving independent third-party evaluations. It is important for the project to adapt the mechanism to correct inefficiencies. The final objective of monitoring is to ensure that the design and implementation of the grievance mechanism adequately respond to the stakeholders' needs in a cost-effective manner.

Grievance Redress Mechanism

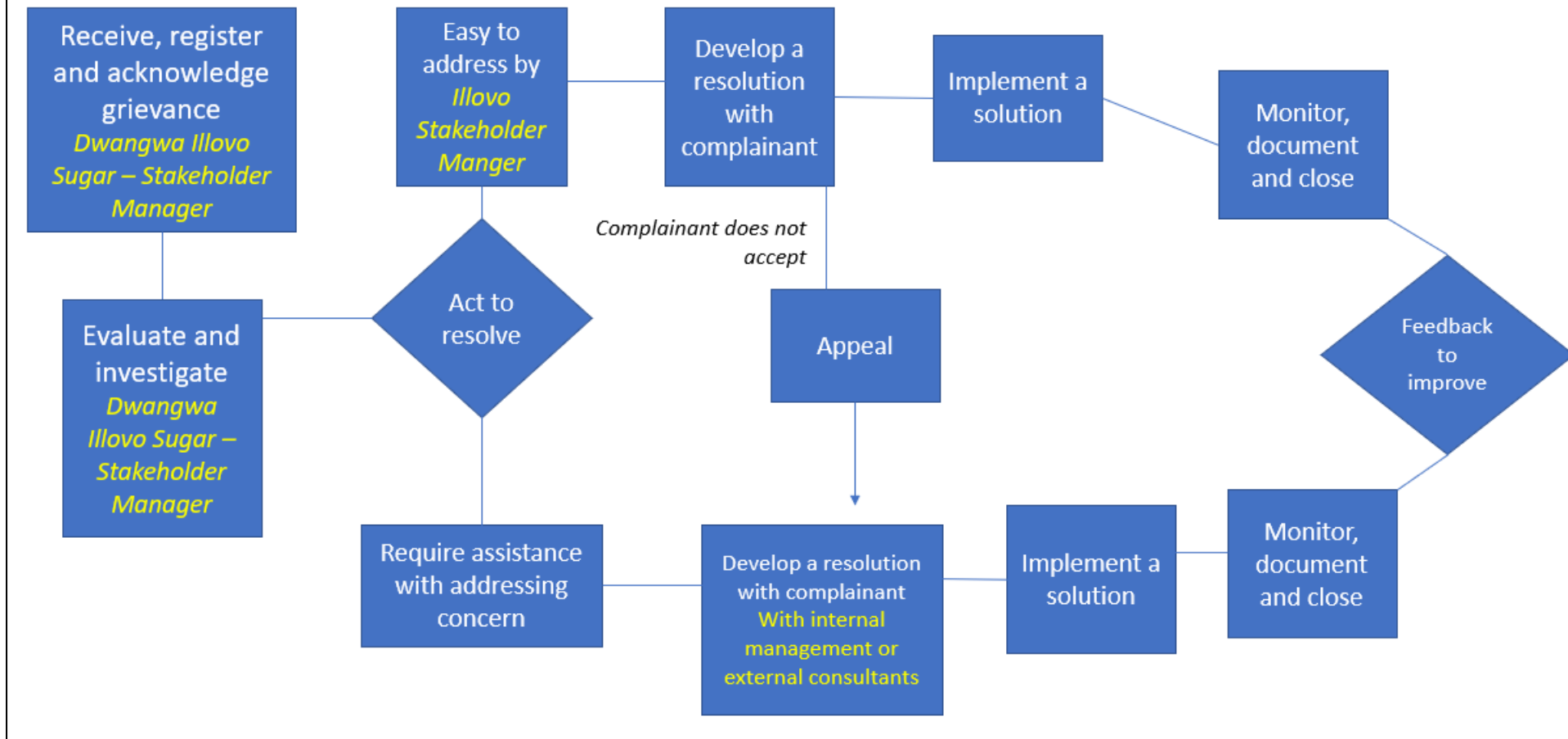


FIGURE 6.1: GRIEVANCE REDRESS MECHANISM PROCESS DESCRIPTION

7. DESCRIPTION OF THE AFFECTED ENVIRONMENT

7.1 Topography

The Dwangwa Illovo Sugar Factory where the project is proposed, is relatively flat at approximately 490m above mean sea level (amsl). The factory is located approximately 4km west of Lake Malawi and therefore the topography of the general area slopes slightly towards the east (Lake Malawi), however, at the project site, the topography of the project area is flat and will have no impact on the proposed project.

7.2 Geology and Soils

The site is marked by rocks of amphibolite facies and gneiss of the Pre-Mafingi group of the landscape. The geology of Dwangwa area is mainly characterised by sediments of lakeshore deposits and metamorphic rocks especially undifferentiated biotite and hornblende rich gneisses of the early Precambrian to early Paleozoic period. Clay, loam and sandy soils predominate much of the soils in the district which are suitable for cultivation of wide range of crops.

The geology and soils for the project area is not significant in terms of having an impact on the proposed project as most of the structures and infrastructures are proposed on existing surfaces or within existing buildings.

7.3 Climate

With Dwangwa located in central Malawi, the climate can be described as warm with average temperatures ranging between 15⁰C and 32⁰C. Nkhosha has a tropical type of climate that consists of two main seasons. These are the wet season from November to April and the dry season from May to October. The coldest months are experienced in June and July as seen by Figure 7.1 below.

Average Monthly Rainfall and Temperature shows that on average, the district receives annual rainfall of about 1000 mm but may vary to as low as 400 mm to as high as 1700 mm. Local differences in rainfall are caused by complex topography causing deflections of moisture-bearing winds that are responsible for precipitation and rain-shadow effects in various terrains (World Bank Group, 2021). Steady rains fall from December to March with the wettest month within the region being March while the least rainfall is normally experienced in September.

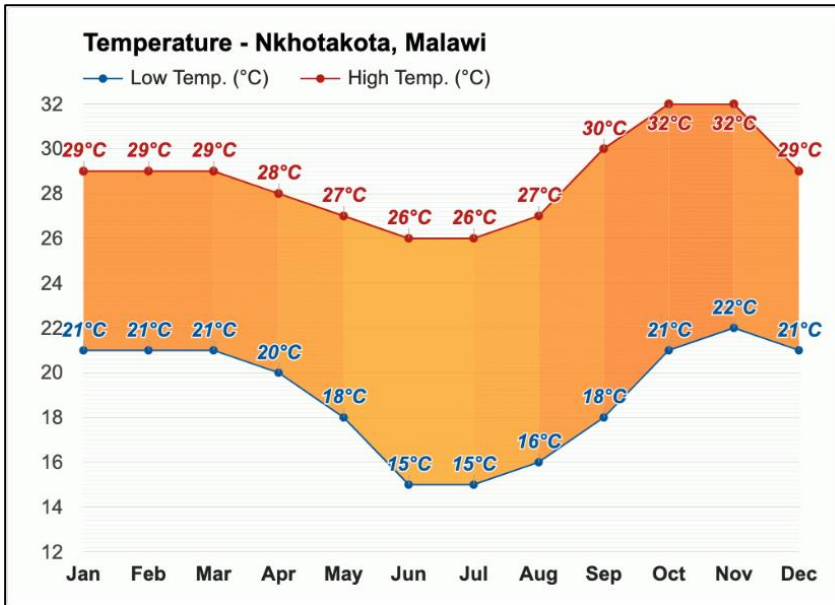


FIGURE 7.1: AVERAGE TEMPERATURES IN NKHOTAKOTA, DWANGWA, MALAWI

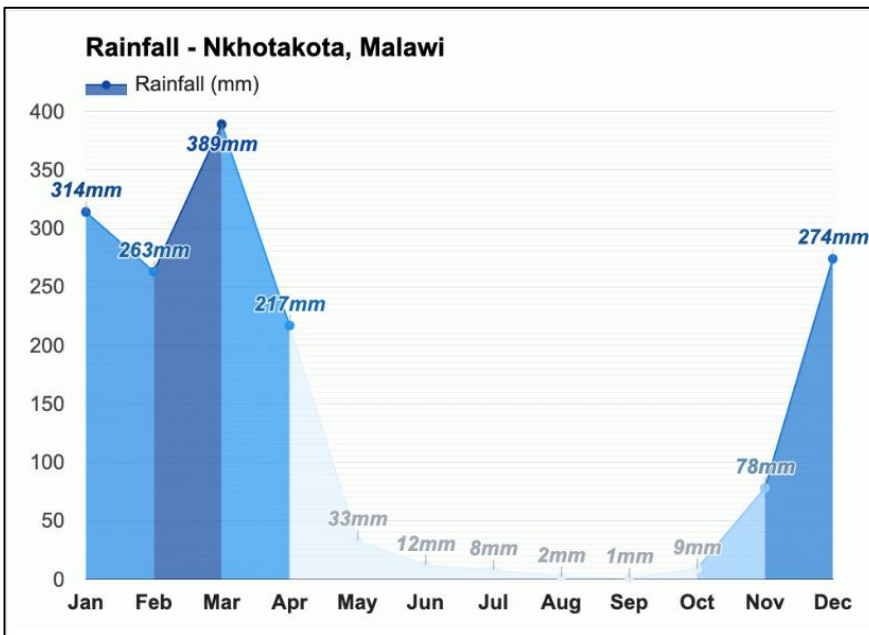


FIGURE 7.2: AVERAGE ANNUAL RAINFALL FOR NKHOTAKOTA, DWANGWA, MALAWI

During construction, the high rainfall expected during the month of January to April must be incorporated into the project schedule.

7.4 Surface and Ground Water Resources

Aquatic ecosystems constitute about 22% of the total surface area of Malawi and are characterised into four major types of ecosystems, namely, lakes, rivers, small water bodies and other wetlands. Water bodies within the district are highly affected by pollution as a result of human activities such

as waste disposal, agricultural activities, deforestation which leads to siltation and eventually the drying up of the watercourse. Lake Malawi is located approximately 4km to the east of the Dwangwa Factory.

Within the project area where construction activities are proposed, there are however, no surface water resources which could be impacted as a result of the activities. The depth of the groundwater table is unknown and no studies were undertaken as part of the ESMP to determine the depth of the groundwater table. However, considering the proposed project and construction activities, and the fact that all activities are proposed within an existing footprint, it is not expected that ground water resources would be affected negatively.

7.5 Noise Pollution

Dwangwa Illovo Sugar Estate is a factory/industry with various noise generating sources within the factory as well as surrounding area. Typical activities generating noise associated with the existing sugar plant includes heavy moving vehicles travelling to and from the factory, as well as operational and current power generation activities at the factory.

There have been a few studies focusing on the noise levels in sugar mills, with measurements done by Munir (2012) measuring levels ranging between 85 – 112 dBA. Macey (1978) defined common sources of noises in a sugar mill as: preparation equipment, mill-drive gearboxes, hydraulic pumps, high-pressure fans, boiler feed pumps, steam valves, steam vents and leaks, vacuum-breaking valves, compressors, vacuum pumps, centrifuges, pneumatic tools, workshop and maintenance operations.

Exposure to noise in a work environment causes a number of physiological and psychological responses. Noise could have the following effects:

- Annoyance and speech interference;
- Interference with concentration and thought processes;
- Loss of productivity;
- Sleep disturbance;
- Fatigue and aggression;
- Increasing heart rate and blood pressure;

It is not expected that the operations of the proposed project would have any impact on the existing noise levels, as the operational process will remain the same. During construction, some activities might add to the existing noise levels and for this reason, measures are recommended with the ESMP to mitigate the possible noise impact during construction.

7.7 Biodiversity

All construction activities are proposed within the already disturbed footprint of the Dwangwa Factory. In addition to this, all surrounding areas have already been transformed by agricultural activities (sugar cane). For this reason, there are no natural areas which would be impacted by the proposed project and therefore the impact on biodiversity is not assessed. No mitigation measures are therefore proposed to reduce the impact on biodiversity.

7.8 Socio-Economic Environment

7.8.1 Population

Illovo Sugar Dwangwa falls within the Nkhotakota District, which is 4,259km² in size and had a population of 404,012 people according to the census undertaken in 2017 and this population is growing at an average rate of 3.13% annually. The Illovo Sugar Dwangwa Estate falls within the Kanyenda Traditional Authority (TA), and according to the 2017 census undertaken, the TA has a population of 130,058 people of which the distribution between male and female is similar.

7.8.2 Employment and Education

In Malawi, more than two-thirds of the population lives in extreme poverty and rely on small-scale farming for their livelihoods. The poor cultivates approximately 0.5Ha which does not fulfil their daily requirements and is therefore also dependent on purchasing food. Most of their income is generated from crop sales which is limited, and therefore results in the increased sale of firewood as an energy source. Malawi also has one of the youngest populations in the world with 43% of the people under the age of 15 and therefore not economically active.

In terms of literacy, 67% of people living within Malawi was found to be literate. Adult literacy is the percentage of people ages 15 and above who can both read and write with understanding a short simple statement about their everyday life. It is noted that the literacy rate is worse among older adults and men were found to be more literate than woman. In Malawi, primary education is the highest level of education most people will achieve. The Nkhotakota District has 161 primary schools, of which 155 are public primary schools and six are approved private primary schools. The district also has 25 Secondary Schools of which one is Government Boarding Secondary School (GBSS), three Day Secondary Schools (DSSs), 16 Community Day Secondary Schools (CDSSs) and five Private Secondary Schools (PSSs). In terms of Tertiary Education, the district has one Community Technical College which is based at Mbandira and three Vocational college namely: Nkhotakota Business Centre, Nkhotakota Youth Organization (NYO) and Foundation for Community Capacity and Development (FOCCAD).

Agriculture is the mainstay of the economy, contributing close to a third of the country's GDP and employing approximately 70% of the workforce. Illovo Sugar Malawi has two factories within

the country, namely Nchalo within the southern region as well as Dwangwa within the central region of the country. Within Nkhotakota District, Dwangwa Sugar Factory is the largest employer.

7.8.3 Infrastructure, Services and Facilities

- Roads

Nkhotakota is one of the districts with poorly developed road network with accessibility reducing to about fifty percent during rainy season due to slippery road sections and impassable waterways. The roads are classified into two main categories namely designated and undesignated. The designated roads include main, secondary, tertiary, and district roads. The M5 is the primary road which provides access to Illovo Sugar Dwangwa.

Unpaved roads which comprise of 45% designated roads are in poor conditions which create accessibility problems especially during the rainy seasons. The undesignated roads include community roads or feeder roads. Most of these roads require drainage structures such as bridges, drifts and culverts.

- Sanitation and Waste Management

Communities in the district access safe water from different sources which include; boreholes, shallow wells fitted with hand pumps, standpipes from gravity fed piped water systems and mechanised systems. As of 2017, the proportion of people having access to safe water in the district is at 83.9%, while 88% of households make use of pit latrines for sanitation purposes.

Within the Illovo Sugar Dwangwa Estate, access to potable water and proper sanitation facilities are however provided.

In terms of waste generation and disposal, the most common waste management practice in Malawi is reuse. Reuse practices in Malawian households are diverse: most waste items get reused multiple times before being discarded. Research has shown that the overwhelming motivator for reusing items is economic incentive, because it is cheaper to reuse a product than to buy a new one that does the same function.

- Electricity

Malawi is one of the least electrified countries globally, with 42% of the urban and only 4% of the rural population connected to electricity. Primary energy supplies of the country consist of hydropower, biomass, petroleum products, coal and other renewable energy sources. In terms of energy supply, the Malawi Energy Policy indicates that approximately 85% of energy comes from biomass largely exploited in a non-sustainable manner which is mainly leading to deforestation at the moment.

The Illovo Sugar Dwangwa Estate is however well serviced with electricity, which is currently being generated by the burning of bagasse. This supply of electricity is however not sufficient and therefore electricity is also being supplied by ESCOM.

The proposed structures and infrastructure will enable the Illovo Sugar Dwangwa Estate to become completely self-sufficient as the Cogeneration Power Plant will generate sufficient electricity for the operation of the Estate, with the remainder of the electricity generated being exported to the national grid.

7.8.4 Health Care

- Hospitals and Clinic

Health services that are provided in the district include; curative, preventive, promotive and rehabilitative.

Nkhotakota has 14 Health Centres, 10 owned by the Ministry of Health, 3 by the Christian Health Association of Malawi (CHAM) and only 1 is private. T/A Kanyenda has the highest number of health centres due to large population compared to the rest of the district and it has two private owned health centres under its jurisdiction.

There are 3 categories of hospitals in Nkhotakota; two full Hospitals (The district hospital and St Anne's Mission Hospital), one Rural hospital (Dwambazi Rural Hospital) and one Community Hospital (Alinafe Community Hospital).

7.8.5 Vulnerable Groups

Malawi, and specifically Dwangwa has various vulnerable groups which are to be considered. These vulnerable groups include the following:

- Subsistence dependent households:

Poverty rates in Malawi is high with 51% living below the national poverty line, being dependent on subsistence farming for survival. These groups are heavy reliant on rainfed agriculture and therefore heavily affected by climate shocks such as drought or flooding. These households have little to no source of income.

- Woman and children

It is often women who require social protection interventions, as they are disproportionately vulnerable due to lack of capital, high wage differentials and gendered work norms, bearing the responsibility for childcare, and exclusion from basic services. Women and children are among the most vulnerable populations in the world, suffering the most from illness, poverty, and disparity. Women are also more likely to live in poverty than men and commonly have less schooling, decision-making power, and access to finance. Woman and children are also the groups mostly affected by family violence.

- Female headed households

Female headed households are highly vulnerable and experience many problems such as low income, widespread economic problems, mental, neurological and physical disorders and isolation.

- Elderly

Certain problems common in old age creates vulnerability. These include, decreased strength, poor tolerance of physical activity. Functional limitations and decreased sensory awareness. These problems also affect the elderly in being able to provide for themselves.

- Youth

Youth tend to get involved in high-risk behaviours making themselves susceptible to criminal offences, accidents, physical injuries, emotional trauma and medical problems. Young people are more vulnerable than adults to sexual, physical and verbal abuse because they are less able to prevent or stop such manifestations of power.

- Mentally and physically disabled

People with disabilities, like other marginalized groups, are particularly vulnerable to violence and abuse in the home or in public places. Certain disabilities, particularly physical disabilities, may decrease their ability to physically defend themselves and escape from abuse. Other disabilities can limit a person's ability to understand and recognise potential signs of abuse.

8. SIGNIFICANCE RATING OF THE IMPACTS

This section outlines the significance rating criteria associated with each impact for which mitigation must be proposed.

For each impact, the **EXTENT** (spatial scale), **MAGNITUDE** and **DURATION** (time scale) would be described, as shown in Table 8-1. These criteria are then used to determine the **SIGNIFICANCE** of the impact.

TABLE 8-1: ASSESSMENT CRITERIA FOR THE EVALUATION OF IMPACTS

Criteria	Category	Description
Extent or spatial influence of impact	Regional	Beyond a 30km radius of the candidate site.
	Local	Within a 30km radius of the candidate site.
	Site-specific	On site or within 100 m of the candidate site.
Magnitude of impact (at the indicated spatial scale)	High	Natural and/ or social functions and/ or processes are <i>severely</i> altered
	Medium	Natural and/ or social functions and/ or processes are <i>notably</i> altered
	Low	Natural and/ or social functions and/ or processes are <i>slightly</i> altered
	Very low	Natural and/ or social functions and/ or processes are <i>negligibly</i> altered
	Zero	Natural and/ or social functions and/ or processes remain <i>unaltered</i>
Duration of impact	Long-term	More than 10 years after construction
	Medium-term	Up to 5 years after construction
	Construction-term	Up to 3 years

The **SIGNIFICANCE** of an impact is derived by taking into account magnitude, duration and extent of each impact. The criteria employed in arriving at the different significance ratings is shown in Table 8-2.

TABLE 8-2: DEFINITION OF SIGNIFICANCE RATINGS

Significance ratings	Level of criteria required
High	<ul style="list-style-type: none"> • High magnitude with a regional extent and long-term duration • High magnitude with either a regional extent and medium-term duration or a local extent and long-term duration • Medium magnitude with a regional extent and long-term duration
Medium	<ul style="list-style-type: none"> • High magnitude with a local extent and medium-term duration • High magnitude with a regional extent and construction period or a site-specific extent and long-term duration • High magnitude with either a local extent and construction period duration or a site-specific extent and medium-term duration • Medium magnitude with any combination of extent and duration except site specific and construction period or regional and long term • Low magnitude with a regional extent and long-term duration
Low	<ul style="list-style-type: none"> • High magnitude with a site-specific extent and construction period duration • Medium magnitude with a site-specific extent and construction period duration • Low magnitude with any combination of extent and duration except site specific and construction period or regional and long term • Very low magnitude with a regional extent and long-term duration
Very low	<ul style="list-style-type: none"> • Low magnitude with a site-specific extent and construction period duration • Very low magnitude with any combination of extent and duration except regional and long term
Neutral	<ul style="list-style-type: none"> • Zero magnitude with any combination of extent and duration

Once the significance of an impact has been determined, the **PROBABILITY** and **CONFIDENCE** of this impact are determined using the rating systems outlined in Table 8-3 and Table 8-4. The significance of an impact should always be considered in concert with the probability of that impact occurring. Lastly, the **REVERSIBILITY** of the impact is estimated using the rating system outlined in Table 8-5.

TABLE 8-3: DEFINITION OF PROBABILITY RATINGS

Probability ratings	Criteria
Definite	Estimated greater than 95 % chance of the impact occurring.
Probable	Estimated 5 to 95 % chance of the impact occurring.
Unlikely	Estimated less than 5 % chance of the impact occurring.

TABLE 8-4: DEFINITION OF CONFIDENCE RATINGS

Confidence ratings	Criteria
Certain	Wealth of information on and sound understanding of the environmental factors potentially influencing the impact.
Sure	Reasonable amount of useful information on and relatively sound understanding of the environmental factors potentially influencing the impact.
Unsure	Limited useful information on and understanding of the environmental factors potentially influencing this impact.

TABLE 8-5: DEFINITION OF REVERSIBILITY RATINGS

Reversibility ratings	Criteria
Irreversible	The activity will lead to an impact that is in all practical terms permanent.
Reversible	The impact is reversible within 2 years after the cause of the impact is removed.

9. SIGNIFICANCE OF IMPACTS DURING CONSTRUCTION, OPERATIONAL AND DECOMMISSIONING PHASE

The biophysical, social and economic environment could be impacted during the construction, operation and decommissioning phases of the project. For this reason, the significance of the impacts is determined as per the methodology in Section 8, and mitigation measures are proposed to enhance positive impacts and reduce negative impacts identified.

TABLE 9.1: SIGNIFICANCE RATING OF IDENTIFIED IMPACTS DURING CONSTRUCTION, OPERATION AND MITIGATION

Activity	Impact / Risk	Magnitude	Extent	Duration	Probability	Significance	Degree to which impact:		
							Can be reversed	May cause irreplaceable loss of resources	Can be avoided, managed or mitigated
Proposed construction of structures and infrastructure for the cogeneration power plant									
Construction activities associated with the installation of the of the TA, electrification of the prime movers, upgrading of the electrical MV Board	Soil erosion	Low - negative	Site specific	Short term	Unlikely	Very Low (-)	Yes	Improbable	Yes - mitigated
	Soil pollution – hydrocarbon spillages	Low - negative	Site specific	Short term	Unlikely	Very Low (-)	Yes	Improbable	Yes - mitigated
	Dust generation	Medium - negative	Site Specific	Short-term	Probable	Low (-)	Yes	Improbable	Yes – managed and mitigated
	Noise generation	Low - negative	Local	Short term	Probable	Low (-)	Yes	Improbable	Yes- managed and mitigated
	Traffic	Low - negative	Local	Short term	Probable	Low (-)	Yes	Improbable	Yes – managed and mitigated
	Increase in establishment of alien invasive plant species	Medium - negative	Site specific	Short-term	Probable	Low (-)	Yes	Improbable	Yes – managed and mitigated.
	Ground and surface water pollution	Zero - negative	Site Specific	Medium-term	Improbable	Neutral	Yes	Improbable	Yes – avoided.
	Change of land use	Zero	Site Specific	Long-term	Unlikely	Neutral	Yes	Improbable	Yes - mitigated

Generation of waste (<i>domestic and construction waste</i>)	Medium - negative	Local	Short-term	Probable	Medium (-)	Yes	Improbable	Yes, mitigated
Water consumption during construction	Medium - negative	Local	Short-term	Probable	Medium (-)	Yes	Improbable	Yes, mitigated
Sanitation during construction	Low - negative	Local	Short-term	Improbable	Low (-)	Yes	Improbable	Yes, mitigated
Socio-Economic Impact (<i>Job creation</i>)	High – positive	Local	Short-term	Definite	Medium (+)	Yes	Improbable	Yes, mitigation measures will be proposed to enhance positive impacts
Socio-Economic Impact (Influx of contractors, increase revenue for service suppliers)	High – positive	Local	Short-term	Definite	Medium (+)	Yes	Improbable	Yes, mitigation measures will be proposed to enhance positive impacts
Health and Safety (Influx of contractors, increasing crime and the spreading of sexual transmitted diseases, and COVID-19)	High – negative	Local	Short-term	Definite	Medium (-)	Yes	Improbable	Yes, mitigation
Health and Safety during construction	High - negative	Site Specific	Short-term	Probable	Low (-)	Yes	Improbable	Yes, mitigated and avoided

Operational activities (activities associated with the increase in electricity capacity)	Socio-economic impact (<i>Increased power generation and greater rural electrification</i>)	High – positive	Regional	Long term	Definite	High (+)	Yes, if application is not approved	Improbable	No mitigation required as the impact is positive
	Socio-Economic Impact for Illovo Sugar (Increase in revenue)	High – positive	Regional	Long term	Definite	High (+)	Yes, if application is not approved	Improbable	No mitigation required as the impact is positive

10. ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN

The previous chapter has presented an analysis and assessment of a wide range of the negative and positive environmental and social impacts from the proposed project. The aim of this chapter is three-fold:

- To recommend an environmental management plan for addressing potential negative impacts.
- To recommend a plan for enhancement measures for some potential positive impacts.
- To recommend an environmental monitoring plan for tracking environmental management plan.

10.1 Roles and Responsibilities

Illovo Sugar Malawi is the project proponent for the proposed cogeneration power plant and is therefore ultimately responsible for the successful implementation of the project. To ensure the successful implementation of the project, various resources will be allocated specific responsibilities during the construction and operational phases of the development.

The responsibilities of the project proponent will include the following:

- Appoint an EPC (Engineering, Procurement and Construction) Contractor who would take all responsibilities to complete the capital project successfully;
- Issue *ad hoc* instructions, corrective action requests, or initiate punitive proceedings where non-compliances are not adequately addressed;
- The EPC Contractor will ultimately report to Illovo Sugar Malawi.

EPC Contractor will be responsible for the following:

- The implementation of all construction related mitigation measures included within the Environmental and Social Management Plan (ESMP);
- Be fully conversant with the ESMP for the project, the conditions therein and all relevant environmental legislation;
- Make financial provisions for the inclusion of an Environmental Monitor as part of the Project Manager's Contract, inclusive of all staff and equipment and resources needed to execute their functions.

The Site Environmental Compliance Officer (SECO) must be appointed by the EPC contractor for the duration of the construction period and be responsible for the following:

- Compilation of daily and weekly checklists;
- Conducting monthly audits and prepare monthly environmental auditing reports;
- Ensure record keeping and environmental administrative tasks are undertaken;

- Ensure implementation and adherence to all environmentally related permits and licenses;
- Responding to incidents on site;
- Environmental Awareness Training in the form of on-site talks and demonstrations. Prior to construction, all contractor teams must be briefed on their obligation towards environmental controls and methodologies in terms of the ESMP. All new employees arriving on site must also undertake such training before commencement of work.

The proposed environmental management plan is presented in tabulated format in Table 10-1. The table has been presented to show clearly the linkages between the predicted negative impacts and recommended mitigation measures, and on the other hand to show the link between recommended mitigation measures, the estimated budget for the activities and stakeholders responsible for implementation. In addition, the plan indicates the suggested period for implementation of the mitigation measures within the project cycle. The estimated budget for mitigation measures is integrated into the construction budget. It should be highlighted; however that much of this suggested budget for mitigation measures will be covered within the project activities of the project.

TABLE 10-1: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (NEGATIVE IMPACTS)

Identified Negative Impacts for mitigation	Recommended mitigation measures	Recommended Period of Implementation	Budget Estimates	Responsible Authority for Implementation of the measures	Recommended Performance Targets on implementation	Monitoring Frequency
1. Impact on Soil						
1.1. Soil Erosion	a) Construction activities must be limited to the footprint of the project area; b) Areas prone to erosion must be monitored and sandbags must be used to reduce the occurrence during the construction phase; c) Areas prone to erosion during the operation phase must be identified and permanent erosion protection structures must be installed to minimise the impact; d) The velocity of stormwater on site must be reduced; e) A stormwater management plant must be drafted and implemented on site; f) During operation, it must be ensured that any stormwater drains or grids are cleared from sediment or vegetation build-up	Construction, operation and decommissioning phases	No budget	Appointed contractor, SECO and Dwangwa Sugar Estate Management,	<ul style="list-style-type: none"> • No erosion is noticed on site during any of the phases; • Possibility of flooding on site is minimised; 	<ul style="list-style-type: none"> • Weekly during construction and decommissioning • Monthly during operation

Identified Negative Impacts for mitigation	Recommended mitigation measures	Recommended Period of Implementation	Budget Estimates	Responsible Authority for Implementation of the measures	Recommended Performance Targets on implementation	Monitoring Frequency
	which could block these drains and cause flooding					
1.2 Soil Pollution	<p>a) Hazardous substances may only be handled by people trained to handle such materials;</p> <p>b) Obtain Material Safety Data Sheets (MSDS) for all chemicals before use and all materials must be used and handled according to instruction;</p> <p>c) Should there be any spillage of hazardous substances during the construction activities, polluted soil must be removed and be disposed of at a registered hazardous waste disposal facility. Proof of such disposal must be kept on file;</p> <p>d) Drip trays must be placed under all leaking equipment and heavy machinery and must not be allowed to work on site until it has been repaired;</p> <p>e) All contents of drip trays must be collected in one</p>	Construction, operation and decommissioning phases	Part of construction budget	Appointed contractor, SECO, and Dwangwa Sugar Estate Management,	<ul style="list-style-type: none"> No soil pollution is noticed on site; All machinery is serviced regularly 	<ul style="list-style-type: none"> Daily during all phases of development Must be addressed immediately

Identified Negative Impacts for mitigation	Recommended mitigation measures	Recommended Period of Implementation	Budget Estimates	Responsible Authority for Implementation of the measures	Recommended Performance Targets on implementation	Monitoring Frequency
	<p>container and be removed from site as hazardous waste;</p> <p>f) All hazardous substances must be stored within a designated area which is bunded;</p> <p>g) Concrete batches must be centralised, and no concrete mixing is allowed on bare soil;</p> <p>h) Any concrete spillages must be cleaned immediately.</p>					
2. Impact on Air Quality						
2.1 Dust generation	<p>a) The project site must be sprayed with water to reduce the excessive generation of dust during construction, if required;</p> <p>b) The construction site should also be fenced with shade cloth to act as a barrier for wind, which transports dust off site.</p> <p>c) Construction workers using grinding machinery must make use of the correct PPE, and dust masks to</p>	Construction and decommissioning phases	No additional cost	Appointed contractor, SECO, and Dwangwa Sugar Estate Management,	<ul style="list-style-type: none"> Dust on site during construction and decommissioning is minimised to not affect workers and surrounding land users significantly; No complaints regarding dust are received. 	<ul style="list-style-type: none"> Monitored quarterly during construction and decommissioning and annually during operation

Identified Negative Impacts for mitigation	Recommended mitigation measures	Recommended Period of Implementation	Budget Estimates	Responsible Authority for Implementation of the measures	Recommended Performance Targets on implementation	Monitoring Frequency
	prevent inhalation of small particles.					
3. Noise Generation						
3.1 Generation of noise caused by construction and decommissioning activities	<ul style="list-style-type: none"> a) Choose appropriate construction equipment for the job and ensure that all equipment is functional before use; b) Make use of low noise machinery. c) Limit the amount of time a worker spends near the source of noise; d) Provide quiet areas where workers can find relief during breaks; e) Work should only take place during working hours as specified in the Contract Specification; f) No loud music is allowed on site or the contractors accommodation. 	Construction and decommissioning phase	No cost	Appointed contractor SECO and Dwangwa Sugar Estate Management,	<ul style="list-style-type: none"> • Noise levels are within acceptable standards; • No noise complaints are received from surrounding land users. 	Quarterly noise level monitoring during construction and decommissioning

Identified Negative Impacts for mitigation	Recommended mitigation measures	Recommended Period of Implementation	Budget Estimates	Responsible Authority for Implementation of the measures	Recommended Performance Targets on implementation	Monitoring Frequency
4. Traffic						
4.1 Impact on the flow of traffic	<ul style="list-style-type: none"> a) Speed limits must be imposed, and all contractors and workers must adhere to such limits; b) Construction site planning must incorporate and separate vehicle and pedestrian access points; c) Pedestrian walkways must be demarcated on site; 	Construction, and decommissioning phases	No cost	Appointed contractor, SECO and Dwangwa Sugar Estate Management,	Traffic to and from the construction site and the Dwangwa Illovo Sugar Factory is uninterrupted.	<ul style="list-style-type: none"> • Daily monitoring during construction and decommissioning
5. Water						
5.1 Groundwater pollution	<ul style="list-style-type: none"> a) Any spillages or leaking sewer systems must be cleaned immediately. Soil affected must be removed from site prior to it impacting any water resource; 	Construction phase		Appointed contractor, SECO and Dwangwa Sugar Estate Management,	No groundwater pollution	<ul style="list-style-type: none"> • Weekly inspections of any spillages on site
5.2 Water consumption	<ul style="list-style-type: none"> a) Ensure that there are no leaking taps on site and ensure all hoses have auto shut off nozzles; b) Use water sparingly and ensure that water use still 	Construction, operation and decommissioning phase	Part of CAPEX and OPEX	Appointed contractor, SECO and Dwangwa Sugar Estate Management,	Water consumption is within the limits specified in the existing Water Permits issued for Dwangwa Illovo Sugar Estate.	<ul style="list-style-type: none"> • Monthly monitoring of water consumption during all phases of the development

Identified Negative Impacts for mitigation	Recommended mitigation measures	Recommended Period of Implementation	Budget Estimates	Responsible Authority for Implementation of the measures	Recommended Performance Targets on implementation	Monitoring Frequency
	complies with the Water Permit issued by the National Water Resources Authority;					
6. Biodiversity						
6.1 Spreading of alien invasive plant species	<p>a) The use of herbicides and pesticides must be limited as this could affect adjacent farming practises. Mechanical removal is preferred;</p> <p>b) Alien vegetation growing on topsoil stockpiles must be removed throughout the construction phase;</p> <p>c) The management of alien invasive plant species must be undertaken in accordance with the Biodiversity Group Policy drafted for Illovo Sugar.</p>	Construction, operation and decommissioning phase		Appointed contractor, SECO and Dwangwa Sugar Estate Management,	No alien invasive plant species on site or the surrounding areas	<ul style="list-style-type: none"> Monthly investigation of the project area immediate surrounding area
7. Waste						
7.1 Waste generation, storage and disposal	<p>a) Littering on site and the surroundings areas are prohibited;</p> <p>b) Waste must be disposed, as soon as possible and not be</p>	Construction, Operation and Decommissioning	Part of construction cost and sugar mill's operating costs	Appointed contractor and Dwangwa Sugar Estate Management, specifically the	All waste is stored and disposed of as per the Illovo Sugar Group Policy on waste management	During construction and decommissioning, a daily walkthrough on site to address littering.

Identified Negative Impacts for mitigation	Recommended mitigation measures	Recommended Period of Implementation	Budget Estimates	Responsible Authority for Implementation of the measures	Recommended Performance Targets on implementation	Monitoring Frequency
	<p>allowed to stand on to decay, resulting in bad odours and attracting vermin;</p> <p>c) Sufficient refuse bins must be provided along the perimeter of the site;</p> <p>d) Waste must be recycled as much as possible, therefore waste must be split for these purposes;</p> <p>e) Refuse bins must be scavenger proof;</p> <p>f) All waste removed from site must be disposed at the waste disposal site permitted as per license MEPA-12-07-009-22-05;</p> <p>g) Temporary storage of construction waste must take place within areas designated by the Contractor's Environmental Control Officer and the Environmental Manager;</p> <p>h) Construction waste may not be stored for periods longer than the time</p>			Environmental Manager		<p>Weekly monitoring of temporary waste storage areas</p> <p>Monthly monitoring and records of wastes removed and disposed of during construction and decommissioning phases.</p>

Identified Negative Impacts for mitigation	Recommended mitigation measures	Recommended Period of Implementation	Budget Estimates	Responsible Authority for Implementation of the measures	Recommended Performance Targets on implementation	Monitoring Frequency
	<p>determined by the Environmental Manager;</p> <ul style="list-style-type: none"> i) All empty cement bags may not be left on site uncontrolled overnight; j) Ensure that solid waste is transported in a manner that will avoid waste spills en-route; k) Chemical toilets must be provided to construction workers. At least 1 toilet per 15 workers. l) A registered third-party contractor must be appointed to collect sewage from the temporary toilet facilities on a regular basis; m) All hazardous and domestic waste must be stored and removed as stipulated with the existing EWMS n) Solid waste must be recycled and reused as far as possible and if this is not possible, it must be 					

Identified Negative Impacts for mitigation	Recommended mitigation measures	Recommended Period of Implementation	Budget Estimates	Responsible Authority for Implementation of the measures	Recommended Performance Targets on implementation	Monitoring Frequency
	disposed of at the approved landfill site. o) Medical waste must be handled and disposed of in accordance with the Environmental Management System drafted for Waste Management					
8. Health and Safety						
8.1 Impact on the health and safety of workers and surrounding land users	a) Construction workers must ensure that all work is undertaken with the correct PPE; b) All contractors must comply with the SHE Specification drafted for Dwangwa Sugar Estate; c) All contractors must adhere to the Health and Safety Plan issued to the contractor and drafted specifically for the proposed construction activities;	Construction, Operation and Decommissioning	Part of construction budget	Appointed contractor, Health and Safety Officer and Dwangwa Sugar Estate Management,	No injuries caused during construction, operational or decommissioning phases	<ul style="list-style-type: none"> • Daily monitoring during construction, decommissioning and operational phases; • Monthly reporting

Identified Negative Impacts for mitigation	Recommended mitigation measures	Recommended Period of Implementation	Budget Estimates	Responsible Authority for Implementation of the measures	Recommended Performance Targets on implementation	Monitoring Frequency
	<p>d) Illovo must increase and run suitable awareness campaigns on negative coping strategies, HIV and AIDs, COVID-19, both within the community and at local schools prior to construction starting;</p> <p>e) Illovo should prepare an ‘Influx Management Plan’ to identify any health and safety risks on the surrounding community with the influx of construction workers, and to compile measures to effectively mitigate such impacts.</p> <p>f) Maintenance of equipment must be undertaken on a continuous basis;</p> <p>g) Danger signs must be placed on all areas where any risk has been identified;</p> <p>h) Health and safety of the site must be undertaken in accordance with the Health and Safety Plan</p>					

Identified Negative Impacts for mitigation	Recommended mitigation measures	Recommended Period of Implementation	Budget Estimates	Responsible Authority for Implementation of the measures	Recommended Performance Targets on implementation	Monitoring Frequency
	specifically drafted for the project; i) Health and safety of the site must be undertaken in accordance with the IFC: Environmental Health and Safety Guidelines.					
9. Socio-Economic Impact						
9.1 Impact on the socio-economic environment	<p>a) Illovo will increase and run suitable awareness campaigns on negative coping strategies, HIV and AIDs, and COVID-19 both within the community and at local schools prior to construction starting;</p> <p>b) Illovo will consider establishing a partnership during the construction period with a National or Local NGOs who focuses on these issues, who will be able to run the campaigns, set up monitoring mechanisms with teachers for example to identify those at risk of</p>	Construction, and decommissioning phases	Part of the sugar mill operating costs	Appointed contractor, SECO and Dwangwa Sugar Estate Management,	<ul style="list-style-type: none"> ▪ No significant increases in diseases and teenage pregnancies and school dropouts during the construction and decommissioning phases. ▪ No significant price increases during the construction and decommissioning phases 	<ul style="list-style-type: none"> • Specific plans to mitigate the impacts during the construction and decommissioning phase must be drafted prior to these phases and be monitored and reviewed annually • The monitoring during operation would be once off following the training and

Identified Negative Impacts for mitigation	Recommended mitigation measures	Recommended Period of Implementation	Budget Estimates	Responsible Authority for Implementation of the measures	Recommended Performance Targets on implementation	Monitoring Frequency
	<p>dropping out of school, and to provide counselling services available to assist any vulnerable school pupils and individuals needing support or guidance;</p> <p>c) Illovo will consult and work with the relevant Local Authorities and Business stakeholders to identify possible risks in terms of increased demand for local services, natural resources and an increase in prices. This plan should include implementing a suitable strategy to monitor any price changes during construction and ways to address areas of concern.</p>					<p>upskilling of employees</p>

11. CONCLUSION AND RECOMMENDATIONS

From the details of project received for the proposed cogeneration power plant it is evident that the impacts associated with the construction, operational and decommissioning phase would be very to negligent due to the following reasons:

- All structures and infrastructure are proposed on areas within the existing footprint of the Dwangwa Sugar Factory and therefore all areas are already disturbed and being used for industrial purposes.
- No vegetation clearance would be required.
- No water resources are located within a close proximity to where the activities are proposed.
- The changing of infrastructure and structures have no impact on the current operational processes. The changes will only result to the increase in electricity being generated by means of a renewable energy source.
- The project area is currently utilised by Illovo Sugar for the extraction and manufacturing of sugar. The noise levels would therefore not be significantly higher than what is currently experienced on site.
- Contractors will be accommodated in already established buildings within the Dwangwa and Kassasa Club. Additional accommodation containers will be placed at the Dwangwa Club while all other facilities at the Dwangwa Club would be able to accommodate the contractors during the construction period.
- Sufficient water and sanitation services and electricity is available at these facilities.

In order to mitigate any possible impacts associated with the construction, operation and decommissioning phase of the proposed project, it is recommended that all mitigation measures proposed within the Environmental and Social Management Plan be implemented during the respective phases of the development.

This report provides a view that the project should be allowed to proceed on condition that the measures proposed in Section 10 of this report are fully implemented.

12. REFERENCES

National Environmental Policy, 2004, Malawi

Environmental Management Act, 2017 (No. 19 of 2017)

Water Resources Act, 2013 (No. 2 of 2013)

National Climate Change Management Policy, 2016

Occupational Safety, Health and Welfare Act, 1997 (No. 21 of 1997)

Monuments and Relics Act (1990)

Nkhatakota District Council Socio Economic Profile, 2017 – 2022

Weather Atlas (<https://www.weather-atlas.com/en/malawi/nkhotakota>)