

Initial Environmental Examination Report (Final)

Project Number: 49067-001
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THA: Southern Thailand Waste-to-Energy Project (Part 5 of 5)

Prepared by Chana Green Company Ltd.

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CHAPTER 8

GRIEVANCE REDRESS MECHANISM

A. Community Grievances

Complaints related to communities' issues complaints or inconveniences caused by the project during construction and implementation shall be handled and prioritized for immediate resolution. Scheme of operation on Chana Green Power Plant Project's complaint receiving as shown in **Figure 8.1**.

The power plant will be the complaint receiving center (**CRC**) and this information will be continuously disseminated by the public relations staff including project information using local radio, announcement post on strategic areas such as community leader offices and sub district organization offices, and other methods which are related to objectives for a month before starting construction activities. Local peoples could send complaints by verbal, telephone, memorandum, letters, e-mail, and fax. Timely and effective redress of stakeholder grievances contribute to bringing sustainability in the operations of a project. In particular, it will help advocate the process of forming and strengthening relationships between the project and the stakeholder community groups and bridge any gaps to create a common understanding, providing the project management a good environment to operate in the area. The grievance redress mechanism proposed for the Project will help achieve the objectives of sustainability and cooperation by dealing with the environmental and social issues of the Project.

The proposed grievance redress mechanism will be designed to cater for the issues of the people that can be affected by the Project. The population that can be affected by the Project has been identified in previous sections (Description of Socioeconomic Environment), and comprises of the people residing within three kilometers from both banks of the river. The identified potential impacts of the Project are described in Section 9 with proposed mitigation measures.

Framework for Grievance Redress Mechanism

External Communications

CGCL will implement and maintain a procedure for external communications that includes methods to (i) receive and register external communications from the public; (ii) screen and assess the issues raised and determine how to address them; (iii) provide, track, and document responses, if any; and (iv) adjust the management program, as appropriate. In addition, CGCL is encouraged to make publicly available periodic reports on their environmental and social sustainability.

Grievance Mechanism for Affected Communities

Where there are affected communities, CGCL will establish a grievance mechanism to receive and facilitate resolution of Affected Communities' concerns and grievances on the power plant's construction and operation. The grievance mechanism should seek to resolve concerns promptly, using an understandable and transparent consultative process that is culturally

appropriate and readily accessible, and at no cost and without retribution to the party where the issue or concern. The mechanism should not impede access to judicial or administrative remedies. The client will inform the Affected Communities about the mechanism in the course of the stakeholder engagement process.

Ongoing Reporting to Affected Communities

CGCL will provide periodic reports to the affected communities that describe progress of implementation of the agreed action plan/remedial measures on issues raised. The frequency of these reports will be proportionate to the concerns of affected communities but not less than annually.

Proposed Mechanism for Grievance Redress

Under the Project the following will be established or appointed to ensure timely and effective handling of grievances:

- Complaint Receiving Center (CRC), which will be responsible to receive, log, and resolve complaints.
- Local Committee or Environmental Impact Committee, may be leaders or representatives from each community or village that can be approached by the community members for their grievances against the Project. The Local Committee or Environmental Impact Committee also forms part of a group in charge of monitoring environmental impacts of the project. Facilitation of grievance resolution will be their additional function

Details of the proposed mechanism are given below.

Function and Structure of CRC

During the construction period when the issues are mainly expected to arise, public relations staff will be responsible for coordinating correspondence and preparing documentation work and will assist the unit. The local staff assigned at the site will be responsible to prepare the documentation which will be reviewed by the head of CRC. The CRC will be responsible to receive, log, and resolve grievances during construction and operation of the project.

Function and Structure of CRC

942. The CRC will function as an independent body that will operationalize the grievance redress process. It will comprise of:

- Manager of environment, health and safety department, CGCL
- Site Manager / Plant Manager that is responsible to oversee the contractors, CGCLOperation Manager
- Maintenance Manager
- Administrative Manager

- A representative of Community Relation Department

The CRC will meet with the Local Committee or the Environmental Impact Committee once every three months to review the grievance redress process; the frequency can be changed depending on the nature and frequency of grievances received. The performance will be gauged in terms of the effectiveness and the timeliness with which grievances were managed. In case there are any unresolved or pending issues, the CRC will deliberate on mechanisms to resolve those and come up with solutions acceptable to everyone.

Procedure of Filing and Resolving Grievances

Grievances will be logged and resolved using the following steps:

Step 1: Receive and Acknowledge Complaint

Once the CRC receives a complaint, which could be the complainant giving it in person, via letter or email, through phone call, or through the Local Committee or the Environmental Impact Inspection Committee (LC/EIIC), an acknowledgement of receipt of the complaint will be sent within one working days to the complainant.

Step 2: Investigation

The CRC will work to understand the cause of the grievance for which the CRC may need to contact the complainant again and obtain details. The CRC will be required to complete preliminary investigations within five working days upon receipt of complaint and send a response to the complainant documenting the results of their investigations and what the CRC plans to do ahead.

Step 3: Resolution through CRC

Once the CRC have investigated a grievance, it will share with the complainant the proposed course of action to resolve the complaint, should CRC believe any to be necessary. If the complainant considers the grievance to be satisfactorily resolved, the CRC will log the complaint as resolved in their records.

In case the grievance remains unresolved it will be reassessed and LC/EIIC will have further dialogue with the complainant to discuss if there are any further steps, which may be taken to reach a mutually agreed resolution to the problem.

943. For minor or less complex grievances, Steps 1, 2 and 3 or Steps 2 and 3 can be merged.

Step 4: Resolution through LC/EIIC

944. In case the CRC is unable to resolve the issue, the matter will be referred to LC/EIIC. All complaints that could not be resolved within four weeks will by default be referred to LC/EIIC. However, the complainant or the CRC can convene the LC/EIIC at any point in time, depending on the nature and urgency of the issue.

945. If the complainant is still not satisfied with the resolution of issues or complaints, he/she can go to local judicial proceedings.

Operating Principles for CRC

The CRC will operate on the principles of transparency, approachability and accountability. To achieve these, the CRC will be required to:

- be equipped to handle grievances in the local languages;
- be equipped to work through all possible modes of communication, such as, emails, by-post and face-to-face meetings at plant site or requiring visits;
- maintain a log of all grievances, with record of the date and time of the complaint logged and stakeholder information, such as, name, designation and contact details;
- provide opportunity to the stakeholder to revert with their comments on the proposed plan of action;
- keep the stakeholder informed of the progress in grievance resolution;
- obtain stakeholder consent on the mechanism proposed to redress the grievance and document consent; and
- maintain confidentiality of the stakeholder, if requested so.

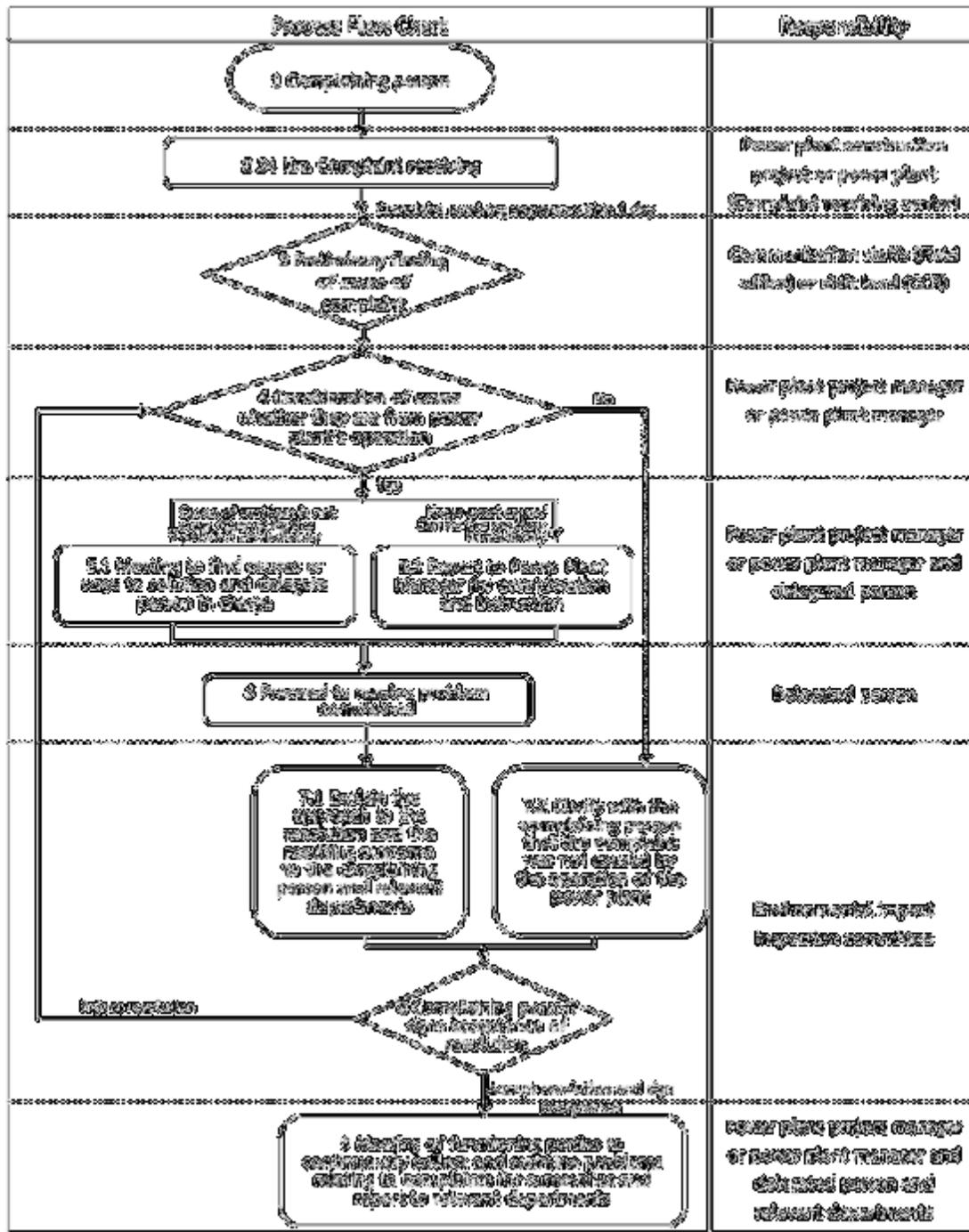
Stakeholder Awareness

The stakeholders will be informed of the establishment of the CRC through a short and intensive awareness campaign.

Under the awareness campaign, the proponent will share:

- objective, function and the responsibilities of the CRC;
- means of accessing the CRC and the mechanics of registering a grievance at the CRC;
- operating principles of the CRC; and
- contact details.

Additional awareness campaigns may be organized, if necessary.



Note: 1. Report construction including time to complainting party with the Budget.
 2. Report progress in solving problems to the complainting party every 1 day or 2 days.

Figure 8-1 Scheme of operation on Chana Green Power Plant Project's complaint receiving

B. Workers grievance

For workers' grievance, the HR department will be responsible for overall workers in our company, including those working at the site. Grievances/issues will be handled according the regulation of Ministry of Labour. The HR Manager will take the lead in Grievance redress mechanism for workers and grievances will be logged and reported by the HR Department as part of E&S Annual Report for the project.

CHAPTER 9

ENVIRONMENTAL AND SOCIAL ACTION PLAN

The Chana Green Co.ltd. has planned to develop Chana Green Power Plant Project at Khu subdistrict, Chana, Songkhla which is a biomass power plant using residual from wood transformation industry or wood piece from rubber tree, and Mangium tree. The power plant has capacity of 25 MW cover an area of 161.49 Rai (Thai area unit: 1 Rai = 1,600 sq.m.) by which Chana Green Power Plant Project is one of the renewable energy power plant (not include solar cell) promoted for 3 deep south provinces (Pattani, Yala, and Narathiwat), and 4 districts of Songkhla (Chana, Thepa, Sabayoi, and Nathawee). Currently, the project has accepted FiT from the Electricity Generation Authority of Thailand (EGAT) under a small power plant electricity buying campaign especially renewable energy B.E. 2550 (revised B.E. 2552) which can reduce electricity generation from fossil fuel power plant (natural gas, fuel oil, and coal) for greenhouse gases reduction causing global warming.

Main compartments of the project is an installation of 98 tons/hr boiler, 25 MW electricity generator, and auxiliary equipment. Electricity generating rate is 25 MW with the possible maximum rate of 24.915 MW which is used for power plant operation by 4.293 MW, and sell to EGAT under Non-Firm contract by 20.622 MW.

The Chana Green Co., Ltd. has concerned about good governance enterprise by which consideration for environmental quality, hygiene, and safety of local peoples and related organizations. Thus, the company had planned for environmental quality mitigations for operation consisting of 9 issues which are;

- (1) Air quality management,
- (2) Noise management,
- (3) Water consumption,
- (4) Water quality/irrigation and flooding prevention,
- (5) Traffic management,
- (6) Waste management plan,
- (7) Socio-economic management plan,
- (8) Occupational health and safety management, and
- (9) Aesthetics management.

Details of the each action plans are shown in **Table 9-1** (Action plan) and **Table 9-2** (Monitoring program).

TABLE 9-1

ENVIRONMENTAL AND SOCIAL ACTION PLAN FOR CHANA GREEN POWER PLANT PROJECT OF CHANA GREEN COMPANY LIMITED

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
Air quality management	<p>Construction period</p> <p>(1) Spraying water over construction, soil stockpile, or related activities causing dust dispersion such as roads and land preparation areas to reduce dust dispersion from the construction activities at least 2 times/day (morning and afternoon session), and considering for additional spraying time for dry condition or high wind speed which causing dust dispersion.</p> <p>(2) Covering trucks used by project construction activity with canvas to avoid material falling to ground.</p> <p>(3) Cleaning truck wheels before leaving the construction area to reduce dust dispersion.</p> <p>(4) Limiting, and controlling truck speed to reduce dust dispersion by which controlled speed is not over 30 km/hr.</p> <p>(5) Checking machine, and equipment used for construction activities monthly to reduce air pollutants from exhaust pipe.</p>	Construction area	Construction period	CHANA GREEN CO.,LTD.
Air quality management (Cont'd)	<p>Operation period</p> <ul style="list-style-type: none"> - General measures; - Controlling emission loading from boiler not to exceed emission standard from all size new biomass power plant according to the Promulgation of the Ministry of Natural Resources and Environment B.E. 2553 (25°C, and 7% O₂) (boiler capacity 98 tons/hr: using electrostatic system of air quality control equipment) by; <ul style="list-style-type: none"> • Particulate less than 85.73 mg/cu.m. or 4.71 g/sec (normal case) • Particulate less than 107.17 mg/cu.m. or 5.88 g/sec (soot generating case) • SO₂ less than 53.49 PPM or 7.7 g/sec 	Project area	Operation period	CHANA GREEN CO.,LTD.

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
	<ul style="list-style-type: none"> • NO_x as NO₂ less than 171.40 PPM or 17.70 g/sec - Controlling moisture content in fuel to feed boiler which is less than 50%. - Making Preventive Maintenance Program for boiler, air quality control equipment, and all equipment for maintaining system operation efficient to cause lowest environmental impact, and reducing risk of equipment damage. - Preparing sufficiently spare parts of related equipment used by air quality control system for ready to use. - Providing professional and experienced staffs to operate air quality control equipment according to the Ministry of Industry Promulgation B.E. 2545 or the current enforcing ministry promulgations. - Stop the operation in case of air quality control equipment is broken to maintain emission loading to meet emission standard, and reoperation when the problem is solved. - Operation guideline for project operation to operation staffs for used as practicing procedures. - Making training document with practicing for repairing air quality control equipment to good condition before operation to control, and audit the operation for maintaining emission loading to meet emission standard. <p>(1) Measures for fuel storage area</p> <ul style="list-style-type: none"> - Limiting fuel storage height less than 5 m. - Prohibiting area for the fuel storage area, and fuel storage building by which not allowed for non-related staffs nor smoking in the area. - Growing 2 rows of small tree as a zigzag pattern around fuel storage areas to reduce wind speed over those areas. 			

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
	<p>(2) Fuel conveying to combustion chamber of the boiler</p> <ul style="list-style-type: none"> - Using closed system of belt conveyor from storage areas to combustion chamber to avoid dust dispersion. - Checking belt conveyor to maintain proper operation by responsible staffs. <p>(3) Measure for fuel transportation trucks</p> <ul style="list-style-type: none"> - Assigning condition in the employment contract to avoid material falling to ground and dust dispersion along the transportation routes to the project area with good maintenance for trucks to a proper condition to reduce soot from exhaust pipe. <p>(4) General measures for operation staffs under routinely dust exposure risk</p> <ul style="list-style-type: none"> - Operation staffs in a risk area of dust exposure (fuel storage areas and fuel storage buildings) must using proper attire which is long sleeves shirt and pants, safety boots, and mask to reduce risk of dust exposure. - Cleaning fuel storage areas and fuel storage buildings routinely to avoid dust dispersion. <p>(5) Ash dispersion control</p> <ul style="list-style-type: none"> - Providing covering material for belt conveyor of ash to reduce dust dispersion. - Assigning cleaning staffs to clean ash from boiler, belt conveyor, and ash silo to reduce dust dispersion for 1 time/day. - Covering ash trucks with canvas to avoid material falling to ground, - Maintaining good condition for ash truck for proper transportation. - Asking operation staffs to use dust protection mask while working in those risk areas. 			

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
	<p>(6) Land filling area for Ash</p> <ul style="list-style-type: none"> - Installing wind direction monitoring bags for detecting wind direction in the area. - Spraying water to land filling area while the area is not closed to avoid dust dispersion. <p>(7) Measures for avoiding dust dispersion during ash transportation</p> <ul style="list-style-type: none"> - All trucks have to install floor supporting material with sides and tailing protection equipment, and covering trucks with canvas to reduce ash dispersion by which the trucks have to wait before and after entering or exiting the project area, and check for leakage. <p>(8) Odor management for fuel storage area, and fuel storage building</p> <ul style="list-style-type: none"> - Designing building floor, and fuel storage area floor as a tapering type for collecting spraying water to spillway to avoid flooding problem. - Checking, and pumping water from spillway, and fuel storage area for maintaining dry condition for controlling odor from wastewater. 			
<p>Noise management</p>	<p>Construction period</p> <p>(1) Limiting working operation period of loud noise equipment only daytime from 7.00-18.00 hrs. Nighttime operation must be strictly acquire for permission from responsible organization which is needed to inform communities before operation at least 2 weeks prior to working date.</p> <p>(2) Concerning for noise impact from the construction activity to educational activities of nearby schools by which noise control is strictly required for reducing noise impact</p> <p>(3) Selecting low noise machine and equipment with a routinely maintenance for reducing loud noise such as those pile rig.</p>	<p>Construction area</p>	<p>Construction period</p>	<p>CHANA GREEN CO.,LTD.</p>

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
	(4) Labelling warning signs to use PPE over those loud noise areas according to risk area classification assessed by occupational health and safety staffs.			
	(5) Asking workers to use PPE for noise protection over a loud noise areas which has noise level louder than 85 dB(A). (6) Training staffs about safety driving according to related safety driving laws, and assigning campaign for vehicle maintenance to maintain proper condition of vehicles. (7) Informing community leaders before using loud noise equipment such as pile rig operation at least 2 weeks prior to working date. (8) Installing portable sound barrier which is made from thick wall stainless steel fence (1.27 mm. thick: steel 18 ga) with height of 3 m.			
Noise management (Cont'd)	Operation period (1) Covering noise sources according to engineering principles, and set up preventive maintenance routinely for reducing noise level. (2) Making Noise Contour over the entire area of the power plant within 1 year, and reviewing the noise contour map every 3 years especially a new equipment installation for using as guideline for controlling and resolving noise problem. An additional measure is to labelling warning signs to use PPE over those loud noise areas for saving hearing ability of operation staffs. (3) Setting up preventive maintenance routinely for reducing noise level by checking vibration of machine, and checking machine alignment. (4) Using lubricants to moving parts of machine, and covering noise sources with proper material to reduce vibration and noise. (5) Setting up preventive maintenance plan and operation routinely according to preventive maintenance frequency to reduce noise impact.	Project area	Operation period	CHANA GREEN CO.,LTD.

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
	(6) Providing community relation staffs to acquire opinion about noise impact from project operation continuously, and use opinion data to review noise reduction plan.			
	(7) Informing communities about noise impact according to timing of engine start for power plant test-run.			
Water consumption	<p>Operation period</p> <p>(1) Following conditions of the Royal Irrigation Department strictly when using water supply from the Nathawee Canal.</p> <p>(2) Irrigating water from the Nathawee Canal under inspection by the Royal Irrigation Department.</p> <p>(3) Installing fresh water reservoir with total capacity of 370,000 cu.m. to collect rain fall in the project areas with remaining irrigated water from the Nathawee Canal at least 4 months when the project is not allowed to used water by the Royal Irrigation Department.</p> <p>(4) Covering fresh water reservoir floor with HDPE.</p> <p>(5) Prohibiting to irrigate water from the Nathawee Canal to fresh water reservoir in drought season in case of water level is less than 0.15 m. from bottom of the water level in the canal by which any operation must be consulted by the Royal Irrigation Department properly.</p> <p>(6) Checking strength of reservoir routinely before entering rainy season.</p> <p>(7) Acquiring permission for irrigation, discharging, and installation irrigation station of the project from related organization before operation.</p>	Project area	Operation period	CHANA GREEN CO.,LTD.

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
Water quality/irrigation and flooding prevention	<p>Construction period</p> <p>(1) Water quality</p> <ul style="list-style-type: none"> - Providing sufficient sanitary lavatories to those construction workers according to related laws with an installation of septic tank or instant wastewater treatment tank to treat wastewater discharged from worker consumption. Thus, treated wastewater has water quality according to related standards before sending to further treatment by responsible organizations. The septic tank or instant wastewater treatment tank will be maintain to a proper condition for using over the construction period, and treating those wastewater according to the wastewater quality of building type Kor (Thai Alphabet) under the promulgation of the Ministry of Natural Resources and Environment about wasterwater quality discharged from some building types, and sizes. Monitoring parameters for wastewater are pH, BOD, Suspended Solid (SS), Sulfide, Total Dissolved Solids (TDS), Sattleable Solids, Oil and Grease, and TKN. Additional equipment for wastewater treatment system is an inatallation of water quality monitoring pond for wastewater to collect wastewater at least 1 day for quality monitoring before using as water spraying to construction site, and roads over entering and exiting areas of the project for dust dispersion reduction. - Installing 1 unit of sedimentation pond with capacity of 20 cu.m. to collect wastewater discharged from construction activities, and resue for water spraying over construction site, and entering-exiting areas to reduce dust dispersion. - Controlling contaminated wastewater from oil and grease from containers, and sending to authorized organization for elimination. 	Construction area	Construction period	CHANA GREEN CO.,LTD.

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
	(2) Water drainage, and flooding prevention <ul style="list-style-type: none"> - Installing of temporary spillways in the same location of permanent spillway to bring water back for reuse. - Commanding construction workers not to leave any garbage to spillway for avoiding water drainage blocking or wastewater generating. - Removing sediments from spillway every 6 months. - Checking for water blocking of those spillways monthly, and checking material storage area to avoid water drainage blocking. 			
Water quality/irrigation and flooding prevention (Cont'd)	Operation period <ol style="list-style-type: none"> (1) Wastewater from office <ul style="list-style-type: none"> - Providing sufficient sanitary lavatories to staffs according to related laws with instant wastewater treatment tank for maintaining wastewater quality standard. (2) Wastewater from manufacturing and auxiliary processes <ul style="list-style-type: none"> - Providing very polluted wastewater treatment system (Up flow Anaerobic Filter Tank) for treating wood cleaning water, trucks, and wastewater discharged from cleaning process from wood storage area by 250 cu.m./day. - Making Preventive Maintenance Program for wastewater treatment system, and operation under the program strictly. - Using HDPE with thick of 1.5 mm. to wastewater treatment ponds, and equalization ponds. - Providing pipeline and spillway auditing staffs to check for leakage monthly by which any repairing must be operated suddenly. 	Project area	Operation period	CHANA GREEN CO.,LTD.

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
	<ul style="list-style-type: none"> - Providing Oil Separator to contain oil contamination water for 100 cu.m./day to remove oil from contamination and rain fall within 15 minutes, and fire protection water over electricity generator and boiler areas, major and minor pumps to cooling tower, and maintenance unit area. Those separated oil is collected to eliminated by authorized organization from the Department of Industrial Works. - Removing sediments from pipeline and spillways weekly to avoid accumulation of waste causing low quality of water. - Controlling water quality according to wastewater standard quality of the commanding of the Royal Irrigation Department 73rd/2554 about Prevention, and Solution for low quality discharged water to irrigation canals and connection canals issued by 1st April B.E. 2554 by which temperature is less than 34°C, and TDS less than 1,300 mg/L. - Checking for the Trihalomethane at wastewater holding pond of the project monthly for 2 years. In case of result trend is less than 0.08 mg/L (Standard obtained from the US.EPA, 2009), monitoring process is terminated. However, if an exceedance is found, a correction of water quality to meet standard value is required and continuously conducted monitoring process for 2 years. - Installing 900 cu.m. emergency pond to collect wastewater for 1 day to find a proper solution of exceedance water quality before asking for wastewater treatment from authorized organizations from the Department of Industrial Works. - Installing continuous online monitoring system at discharging point to the Nathawee Canal by which monitoring parameters are Temperature, pH, DO, and EC to use for TDS calculation. And installation of the monitoring report screen for wastewater quality in front of the project site. 			

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
	(3) Water drainage, and flooding prevention <ul style="list-style-type: none"> - Separating total wastewater collection spillway for rain fall, and wastewater. - Removing sediments from spillway to avoid water drainage blocking. - Collecting those rain fall as recycling water by containing to the permanent spillway to fresh water reservoir. 			
Traffic management	Construction period <ol style="list-style-type: none"> (1) Advising, and controlling driving staff to follow traffic laws strictly. (2) Providing traffic staff, and controlling traffic condition overall time for construction period. (3) Limiting truck loading to avoid road surface damaged. (4) Avoiding construction material transportation during urgent time which are 07.30-08.30 hrs, and 16.00-17.00 hrs to reduce traffic jam. In case of the urgent time required, informing to responsible organizations for permission and informing communities at least 2 weeks before operation. (5) Installing traffic signs, and limiting vehicle speed less than 30 km/hr. 	Construction area	Construction period	CHANA GREEN CO.,LTD.
Traffic management (Cont'd)	Operation period <ol style="list-style-type: none"> (1) Providing training course to manufacturing staffs about safety driving, following traffic laws, and limiting speed during shift changing to reduce impact to communities. (2) Providing traffic staff, and controlling traffic condition over entire area of the project and overall time for entering-exiting areas to the project. (3) Limiting truck loading to avoid road surface damaged, and limiting vehicle speed less than 30 km/hr. (4) Avoiding fuel, chemical, and waste transportation during urgent period, and after 19.00 hrs to reduce traffic impact and effect to surrounding communities. 	Project area	Operation period	CHANA GREEN CO.,LTD.

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
	<p>(5) Recording type, and vehicle amount to the project area, and use recording data for maintaining traffic jam especially parking lot by which prohibiting parking outside the project area.</p> <p>(6) Providing condition to chemical transportation by;</p> <ul style="list-style-type: none"> - Normal case: <ul style="list-style-type: none"> • Avoiding transportation during urgent period, and limiting vehicle speed to the project, and • Training truck drivers about regulations of chemical transportation to the project by which denying buying contract if the condition is broken. - Emergency case: <ul style="list-style-type: none"> • Informing chemical agents about transportation standard, and checking vehicle condition with labelling emergency sign before use, • Informing chemical agents to present Safety Data Sheet (SDS) for indicating actual practicing for emergency case with first aid operation, and • Informing chemical agents to labelling telephone number on chemical transportation trucks for suddenly response in case of emergency. 			
<p>Waste management plan</p>	<p>Construction period</p> <p>(1) Providing proper and sufficient waste containers with lids to collect waste without any leakage to the project area, and assigning cleaning workers to keep and collect waste to proper containers before sending to elimination by authorized organizations.</p> <p>(2) Recycling material for reuse, and sell some recycle waste to recycle retailers.</p>	<p>Construction area</p>	<p>Construction period</p>	<p>CHANA GREEN CO.,LTD.</p>

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
<p>Waste management plan (Cont'd)</p>	<p>Operation period</p> <p>(1) General management</p> <ul style="list-style-type: none"> - Applying 3R principle (Reduce, Reused , and Recycle) to waste management, and considering waste management results in the monthly for making actual practicing, and - Analyzing ash composition yearly for classifying waste type according to permission condition for reuse of the Ministry of Industry Promulgation about Waste Elimination B.E. 2548 or any functional promulgation by which waste transportation without permission can not be operated. <p>(2) General waste management</p> <ul style="list-style-type: none"> - Providing sufficient trash bins for collecting waste generated from project activities and sending to eliminated by the Banna Sub District Municipality while hazardous waste is sent to eliminated by authorized organization from the Department of Industrial Works. <p>(3) Industrial waste management</p> <ul style="list-style-type: none"> - Manufacturing waste is collected and separated before eliminated by; <ul style="list-style-type: none"> • Combustion ash from boiler which is drop down to boiler platform is sent to Wet Ash Conveying System by which ash is pumped with water to Ash Dumping Pond (approximate capacity of 23 cu.m.). Separated water from ash is pumped back to convey ash continuously while removal ash is dried at nearby ash drying area before those dry ash is sent to land filling area or distributed to ash users which is permitted by the Department of Industrial Works before operation, 	<p>Project area</p>	<p>Operation period</p>	<p>CHANA GREEN CO.,LTD.</p>

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
	<ul style="list-style-type: none"> • Collecting lubricant from related activities to 200 Liters tanks with proper lids for keeping and sending to eliminated by authorized organization from the Department of Industrial Works, • Collecting unused chemical packagings to hazardous waste bins with proper lids for keeping and sending back to chemical seller or eliminated by authorized organization from the Department of Industrial Works, • Collecting depleted membrane, and unused activated carbon from water supply process to 200 Liters tanks with proper lids for keeping and sending to eliminated by authorized organization from the Department of Industrial Works, and • Collecting sediments from water supplying process to eliminated by authorized organization from the Department of Industrial Works. <ul style="list-style-type: none"> - Providing 10,000 cu.m. land filling areas (capacity to collect ash for 2 years/area) with floor covered by HDPE for ash elimination, and - Installing industrial waste storage building for collecting industrial waste before sending to eliminated by authorized organizations. <p>(4) Ash management</p> <ul style="list-style-type: none"> - Making and distributing ash utilization manuals to farmers who are ash users, and providing public relation for strictly operation to aash according to the utilization manual which is routinely updated to protect environment due to ash utilization. - Training and providing knowledge about ash management (storage, application, amount of using, and duration for utilization) to ash users before distributing ash. - Randomly analyzing chemical compositions of ash yearly for using by ash transportation permission from the Department of Industrial Works. 			

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
	<ul style="list-style-type: none"> - Following related laws for ash distribution such as the Ministry of Industry Promulgation about Waste Elimination or Unused Material B.E. 2548. 			
Greenhouse gas emission	<p>Operation Period</p> <p>Monitor gross GHG emission from the thermal power plant operation. If it is more than 100,000t it needs to be annually monitored.</p>	Project area	Operation period	CHANA GREEN CO.,LTD.
Source of Biomass	<p>Operation Period</p> <p>Prohibit the purchase of any residual waste that has been sourced from natural forests</p>	Project area	Operation period	CHANA GREEN CO.,LTD.
Socio-economic management plan	<p>Construction period</p> <p>(1) General measures</p> <ul style="list-style-type: none"> - Public relation of the project will be conducted by information distribution using local radio, announcement post on those important areas such as community leader offices and sub district organization offices, and other methods which are related to objectives for a month before starting construction activities. - Helping community activities for making good relationship between the company and communities as a social benefit. - Providing “complaint center” for public relation and receiving opinions, suggestions, and complaints from the operation by which local peoples could sending complaints by verbal, telephone, memorandum, letters, e-mail, and fax. The flow chart for complaints receiving is shown in the Figure 9-1 - Following the environmental and social impact mitigations procedures strictly. - Receiving complaints from local peoples about impact caused by construction activities, and responding to the problem urgently. <p>(2) Measures for life, and property safety</p> <ul style="list-style-type: none"> - Considering to employ qualified local workers as the 1st priority. 	Construction area	Construction period	CHANA GREEN CO.,LTD.

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
	<ul style="list-style-type: none"> - Assigning worker leader for controlling those workers, and providing security staffs to maintain safety at the entrance area strictly. - Controlling construction activities, and construction workers behavior to avoid impact to local peoples. - Separating temporary workers resting areas from construction areas. - Making worker records for both remote, and foreigner workers. - Controlling construction workers behavior for those workers living in shelters located nearby communities to avoid any interfering to communities. - Following related laws strictly for foreigner workers employment, and assessing historical health condition. <p>(3) Public relation, and participation</p> <ul style="list-style-type: none"> - Public relation of the project will be conducted by information distribution using local radio, announcement post on those important areas such as community leader offices and sub district organization offices, and other methods which are related to objectives for a month before starting construction activities. - Helping community activities for making good relationship between the company and communities as a social benefit. - Assigning Environmental Impact Auditing Committee completely before starting construction activities by which the Environmental Impact Auditing Committee have to operate over the construction, and operation periods. <p>(4) Environmental Impact Auditing Committee/Establishment of Local Committee: Environmental Impact Auditing Committee of the project composes of community representative, governmental organizations, professional members, and power plant represented by which;</p>			

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
	<ul style="list-style-type: none"> - Community representatives are seeking from local communities within a radius of 5 km from the power plant according to the EIA report by which obtained from 3 members from the power plant sub district and 2 members from other sub districts (member from community representatives are at least a half of all Environmental Impact Auditing Committee members), - Governmental section representatives are obtained from 1 member of Chana district, and other members from related organizations (1 member for each organization) according to committee member agreement by which total governmental section representatives must be around 4-6 members, and - Professional member of 2 members must be obtained from an agreement of community representatives and power plant representatives, while the power plant representative is 1 member assigned by the power plant board. <p><u>Recruitment</u></p> <ul style="list-style-type: none"> • Community representatives could be recruited by voting, or nomination as details follows; <ul style="list-style-type: none"> ▪ The power plant will send recruitment letters to communities within a radius for 5 km for nomination of qualified person to be committee members by which community response must be conducted within 30 days after receiving nomination letters. Those nominated person must living in the area at least 1 year according to the recruitment date. ▪ Age at least 25 years old according to recruitment date, ▪ No prohibited qualification as; <ul style="list-style-type: none"> * Bad behavior or corruption, 			

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
	<p>* Go bankrupt or punished to be prison except for mild faults * insane or be unhinged, or decided to unfunctional person or likely unfunctional person,</p> <ul style="list-style-type: none"> • Governmental section representatives are nominated by the Chana District-chief Officer for 1 person per organizations while other governmental section representatives are nominated by the agreement between the power plant representative and the community representatives such as the provincial natural resources and environment office, provincial industry office, or other related organizations. Total members of the Governmental section representatives in committee is 4-6 person. • Professional members are obtained from the agreement between community representatives and the power plant representative by which the professional member must be experienced with knowledgeable for environmental impact auditing, or those professional member are nominated persons from communities submitted to the power plant representative for choosing 2 suitable candidates, and • Power plant representative is 1 member assigned by the power plant board. <p><u>Duration of operation</u></p> <ul style="list-style-type: none"> • Committee chairman obtained from an agreement of the member meeting which is being in the position for 4 years, • Member from community representatives are being in the position for 4 consecutive years/period by which operation as committee member not more than 2 periods, and 			

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
	<ul style="list-style-type: none"> • Environmental Impact Auditing Committee are being in the position for 4 consecutive years/period according to the first operation date by which operation as committee member not more than 2 periods, <p><u>Power and duty</u></p> <ul style="list-style-type: none"> • Issuing guideline and methods for environmental monitoring according to environmental impact from the power plant over the construction and operation periods, • Receiving complaints and considering for finding solution according to the complaint with concerning for opinions and suggestion from local peoples about environmental impact from the power plant over the construction and operation periods • Providing suggestion for modification of construction or operation of the power plant according to conditions offered by the EIA report, • Sending agreement to governmental organizations to stop construction or operation if the condition in the EIA report is neglect, • Assigning assistance according to the duty, • Conducting meeting at least 1 time/quarter, • Providing the information about the power plant operation to public, • Field operation for monitoring the construction, and operation activity, • Posting complaints and solution agreement of the committee to 3 areas of those related organizations located in surrounding communities, • Making regulation for complaint receiving and solving or other regulations required for operation, • Considering for compensation cost according to impact caused by project operation, 			

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
	<ul style="list-style-type: none"> • Assigning the Environmental Impact Auditing Committee to operate before starting construction activities, • Modifying any condition related to the recruitment of the Environmental Impact Auditing Committee by an agreement of the Environmental Impact Auditing Committee which is not significant issued in the EIA report such as duration of operation, and composition of committee which is consists of at least a half of all committee members obtained from community representatives, and • Distributing project information with progress of operation by issuing related data such as project name, construction plan, subcontractor, project owner, connector, and telephone number to local medias such as radio, posted over important places such as community leader offices, front area of the project, or related activities following objectives overall construction period, • Providing Environmental Impact Auditing Committee in the construction period, • Receiving information from communities routinely and continuously, • Providing the power plant visiting program for presenting environmental management plan with communication session for opinion exchange to reduce public worrying, and • Assisting community activities by providing scholarship to students, lunch fund for students, sport equipment sponsorship, and occupational promotion fund. 			
<p>Socio-economic management plan (Cont'd)</p>	<p>Operation period (1) General measures</p>	<p>Project area</p>	<p>Operation period</p>	<p>CHANA GREEN CO.,LTD.</p>

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
	<ul style="list-style-type: none"> - Considering to employ qualified local workers as the 1st priority to reduce impact of public relation to local peoples and community leaders by providing employment and vacant position information to communities. - Making benefit return campaign to communities such as supporting educational or public health activities, and religion assistance or public benefit. - Assigning public relation staffs for receiving opinions, suggestions, and complaints from the operation by which local peoples could sending complaints by verbal, telephone, memorandum, letters, e-mail, and fax. The flow chart for complaints receiving is shown in the Figure 9-1. 			
	<ul style="list-style-type: none"> - Inviting communities for power plant visiting to reduce worrying. - Life quality promotion policy, and supporting local business for maintaining sustainable economic development. - Following operation plan strictly for reducing accidents, and impacts from the project to communities. - Making subgroup talking for 1 time in the first 3 years of project operation by; <ul style="list-style-type: none"> • Cooperation with governmental organizations, and local administration organizations. • Set up focus group meeting for sub district/district by concerning for studied target groups during pre-construction and construction periods. • Comparing conditions before and after the project development for living quality, social, economic, and environment. • Making summary for subgroup talking. <p>(2) Public relation, and participation plan</p> <ul style="list-style-type: none"> - Distributing information and the project details to communities with providing opening session to communities for monitoring the project performance overall 			

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
	<p>operation period using multiple channels such as brochures, medias, and related activities according to measure objectives.</p> <ul style="list-style-type: none"> - Making benefit return campaign to communities such as supporting educational or public health activities, and religion assistance or public benefit. - Maintaining good relationship between local governmental officers, and local peoples by making a routine meeting, and solving complaint urgently. - Receiving information from communities routinely and continuously. - Assigning public relation staffs for receiving opinions, suggestions, and complaints from the operation by which local peoples could sending complaints by verbal, telephone, memorandum, letters, e-mail, and fax. The flow chart for complaints receiving is shown in the Figure 9-1. 			
<p>Occupational health and safety management</p>	<p>Construction period</p> <p>(1) Occupational health and safety</p> <ul style="list-style-type: none"> - General aspect <p>Issuing agreement about occupational health and safety measures to subcontractors in the employment contract by;</p> <ul style="list-style-type: none"> • The project will assign conditions to subcontractors, and working teams in the power plant area for strictly using occupational health and safety and working environment measures for designing, construction, and operation according to the occupational health and safety regulations. • Providing skillful with experienced staffs to operate for occupational health and safety management. • Establishing the Occupational Health and Safety, and Working Environment Committee by an agreement between the project and subcontractors by which the committee is covering minor subcontractors in the project area. The 	<p>Construction area</p>	<p>Construction period</p>	<p>CHANA GREEN CO.,LTD.</p>

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
	<p>occupational health and safety, and working environment manager has to work under supervision by the project manager, and the committee has to conduct the meeting monthly for assessing and suggestion problem solution.</p> <ul style="list-style-type: none"> • Providing first aid equipment with basic medical equipment and ambulance car for emergency case according to the Ministry of Labor Promulgation about welfare in working area B.E.2548. <p>Providing sufficient facilities according to sanitary principle to staffs such as drinking water, and lavatories.</p>			
	<ul style="list-style-type: none"> • Providing warning signs in the construction area, and risk area for using Personal Protective Equipment. • Major subcontractor has to provide firefighting plan to connect with local firefighting organizations in case of emergency. • Making working permission system for some operation according to related laws. • Making cooperative meeting for occupational health and safety, and working environment units to summarize and find out solution every working morning with details and statistical recording. • Making a routine checking operation for Personal Protective Equipment according to manual for Safety Procedure of the project. <p>- Measures for safety operation of construction activity</p> <ul style="list-style-type: none"> • Providing, and commanding to use Personal Protective Equipment according to work types such as Safety Helmets, Safety Shoes, and Safety Glasses, and • Preparing fire extinguishers sufficiently, and routinely checking readiness for using. <p>- Measures for risk reduction</p>			

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
	<ul style="list-style-type: none"> • Installing steel structure platform, and ladder to boiler section for maintaining stable and safety operation, • Installing insulation to steam pipeline, and boiling water pipeline for safety operation, • Assigning confidential and experienced subcontractor for equipment installation during construction and operation periods by which assigning safety staffs to control operation according to conditions issued in the employment contract, and testing the installation according to operation standard by licensed engineers, • Testing safety operation for boiler, and safety valve before test run by licensed engineers for boiler testing according to the Engineering Act. B.E. 2542. • Fire protection, and fire prevention system <ul style="list-style-type: none"> * The major subcontractor has to provide fire extinguishers sufficiently, and readiness to use by staffs in the risk areas or high temperature areas which is causing fire such as metal welding operation by which all welding operation staffs have to use proper equipment with fire extinguishers nearby the working areas, and preparing fire insulation under high elevation welding operation areas to avoid fire sparking from welding operation which is unsafe for ground staffs, * Major subcontractor has to provide firefighting plan to connect with local firefighting organizations in case of emergency, * Controlling entering-existing danger construction areas by traffic control and warning signs under supervision by foreman, or safety staffs, 			

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
	<ul style="list-style-type: none"> * Checking working condition, and construction equipment for those fire risk areas, and * Checking readiness of fire extinguishers routinely according to the Manual of Safety Procedure of the project. <p>(2) Measures for health condition</p> <ul style="list-style-type: none"> - Safety to life and property - Connecting to local police offices for maintaining safety activities to avoid any problem about life and property safety over the construction period, 			
	<ul style="list-style-type: none"> - Shelter sanitary <ul style="list-style-type: none"> • Monitoring, and auditing sanitary system in workers shelters, • Assisting health staffs for disease prevention, and destroying disease sources such as mosquitoes and rats. <p>(3) Cooperation with local health organizations</p> <ul style="list-style-type: none"> - Assisting to local health organizations for maintaining health promotion and protection networks, - Informing number, and living places of construction workers to use as baseline data for disease prevention, and - Assisting local health organizations for personnel health promotion training, infectious, and disease prevention to all levels of construction worker. <p>(4) Health Impact Monitoring – Based on baseline data collected on basic data of 4 diseases (cardiovascular disease, dermatitis, respiratory disease and eye disease), there will be an annual comparison of trend and local could also assess or flag health impacts that may be related to the operation of the project</p>		<p>Annual starting project operation (data collection to continue annually)</p>	<p>CGCL</p>

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
<p>Occupational health and safety management (Cont'd)</p>	<p>Operation period</p> <p>(1) Occupational health and safety</p> <ul style="list-style-type: none"> - General measures <ul style="list-style-type: none"> • Establishing Occupational Health and Safety, and Working Environment Committee to maintain, and control operation, and making a monthly committee meeting for assessing and suggesting problem solution, and activities promotion for occupational health and safety, and working environment. • Making a Manual of Safety Procedure of the Project for referencing in operation to staffs, and training operation staffs according to the manual by which describing about equipment detail installed in the power plant according to related laws about working environment and safety, and training safety operation to new staffs. • Providing sufficient Personal Protective Equipment to staffs according to working condition. • Providing first aid equipment with basic medical equipment and ambulance car for emergency case according to the Ministry of Labor Promulgation about welfare in working area B.E.2548. • Issuing type, and number of safety equipment according to related standard with checking for readiness of using to those equipment routinely. • Providing auxiliary system for electricity and light in case of emergency, and designing sufficient light and safety for operation. • Making health condition monitoring before and during operation yearly, • Providing safety activity week for stimulating, and training staffs about safety operation, 	<p>Project area</p>	<p>Operation period</p>	<p>CHANA GREEN CO.,LTD.</p>

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
	<ul style="list-style-type: none"> • Providing fire prevention system, and fire fighting for the power plant according to the National Fire Protection Association (NFPA) or conditions, and related standards, • Making a routine checking for equipment according to the Manual for Safety Procedure of the project, • Making 3 levels of emergency plan to use as guideline for emergency operation by; <ul style="list-style-type: none"> * Emergency case level 1: Emergency case level 1 is the situation inside the power plant by which the emergency staffs could stop and control damage level using cooperation with staffs, workers, and emergency equipment in the project for maintaining normal condition, * Emergency case level 2: Emergency case level 2 is the situation for both inside, and outside the power plant by which the emergency staffs determined that the case could not stop according to condition of the emergency case level 1 and required assistance from local administration organizations for controlling the case, and * Emergency case level 3: Emergency case level 3 is the situation for both inside, and outside the power plant by which the emergency staffs determined that the case could not stop according to condition of the emergency case level 2 and required assistance from district or provincial administration organizations for controlling the case. • Making a yearly emergency training for both the power plant, and cooperation with other organizations including training operation staffs to have experience and skill for maintaining emergency case, 			

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
	<ul style="list-style-type: none"> • Following occupational health and safety, and working environmental laws for all issues and activities according to project operation, • Designing fire protection system according to the Ministry of Industry Promulgation about Fire Prevention, and Protection in Factory B.E. 2552, and the Ministry of Labor Promulgation about Occupational Health and Safety, and Working Environment for Fire Prevention and Protection Standard B.E. 2555. • Training/providing knowledge of occupational health and safety according to work type properly and sufficiently to operation staffs, • Checking working condition of fuel feeding system of the belt conveyor routinely, • Making working procedures related to fuel feeding system from upstream to downstream operation, • Providing proper and sufficient PPE for operation staffs according to work type by which the PPE are ears muff, ears plug, safety glasses, safety shoes, and safety mask etc., • Making warning signs for loud noise areas (noise level exceeding 85 dB(A)), • Setting up Hearing Conservation Program to prevent long term noise exposure to operation staffs, • Distributing ears muffs to operation staffs, and sending official notice to those staffs who are warned to use the PPE by 3 times, • Training for a proper using of ears protection equipment for health safety of operation staffs working in loud noise areas, 			

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
	<ul style="list-style-type: none"> • Operation staffs in a risk area of dust exposure (fuel storage areas and fuel storage buildings) must using proper attire which is long sleeves shirt and pants, safety boots, and mask to reduce risk of dust exposure, • Prohibiting area for the fuel storage area, and fuel storage building by which not allowed for non-related staffs nor smoking in the area, and • Installing fire protection pipeline around the fuel storage area, and fuel storage building for assisting firefighting. <p>- Chemical transportation safety measures</p> <ul style="list-style-type: none"> • Following the safety procedure of the project for safety chemical transportation to communities, property, and environment by which the chemical transporters have to follow related laws and standards such as the Manual for Hazardous Material Transportation of the Pollution Control Department, September B.E.2554, the Manual for Hazardous Chemical Management in Manufacturing, July B.E. 2556, and the Department of Industrial Works Promulgation about the Manual for Chemicals, and Hazardous Material Storage B.E.2550 by; <ul style="list-style-type: none"> * Acquiring permission for transportation, * Labelling signs, and labels on trucks used for chemical transportation according to related laws of the Department of Land Transportation, * Separating, and transferring chemicals properly, and safety, * Making Shipping Paper, and * Making documents related to Material Safety Data Sheet (MSDS) according to chemicals property in both Thai, and English. • Choosing proper chemical trucks with tank safety locked, and checking for safety preparation before making transportation, 			

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
	<ul style="list-style-type: none"> • Choosing standard links for leakage prevention during operation, and checking while operation, • Avoiding chemicals storage with other material, • Making auditing plan with chemicals expiring date according to auditing plan, and • Making summary, and reviewing type, usage, storage, and hazard of used chemicals, and submitting summary report to the Chana Hospital Yearly for using by Emergency Case Preparation. <p>- Measures for health impact protection to operation staffs in Confined Space (Boiler cleaning)</p> <ul style="list-style-type: none"> • Prohibiting respiratory illness, heart disease, or other disease according to doctor diagnostic staffs to work in the confined space, • Opening confined space as much as possible, and providing ventilation using blower or maintaining safety ventilation to the confined space by; <ul style="list-style-type: none"> * Maintaining oxygen higher than 19.5% by volume, * Limiting flammable fume or gas less than the minimum explosive threshold at 10 % (Lower Flammable Limit or Lower Explosive Limit), * Limiting flammable dust less than the minimum explosive threshold (Lower Flammable Limit or Lower Explosive Limit), * Limiting concentration of other hazardous chemicals to less than the minimum safety threshold, * Monitoring, recording, and assessing air in the confined space which is causing danger or not, * Using permission system for working in confined space before operation, 			

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
	<ul style="list-style-type: none"> * Closing/separating/cutting system to avoid energy or substances entering the confined space while operation, * Providing, and controlling operation staffs to use proper PPE according to working condition, * Training about safety operation in the confined space to operation staffs yearly, * Prohibiting, and controlling according to working conditions such as no smoking, prohibiting to enter cavities or holes, and using warning signs to the confined space which is easily for seeing at the entering path to the confined spaces, and installing fence/barrier to avoid unauthorized person enter to the confined space, * Assigning experienced and skillful working control staffs for operation such as planning for accidental prevention, training for operation and using of PPE, and stopping processing in case of unsafe operation, * Making a proper safety measures for operation of the welding, punching, sparking operation, and using flammable material in the confined space, * Provided trained assistant staffs to help injured staffs, and checking at the confined space entering areas, and connecting to operation staffs in the confined space with lifesaving equipment according to work type for assisting the operation, * Using safety insulated electricity equipment and auxiliary equipment to avoid heat, dust, explosion, fire, and electricity short circuit in the confined space, * Closing, and using Lock out-Tag out to those valves to avoid un intention operation, and 			

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
	<ul style="list-style-type: none"> * Providing fire extinguishers sufficiently, and readiness to use in case of fire. • Preparing reserved vehicle for using in an emergency case, • Setting permission working system for; <ul style="list-style-type: none"> * Hot Work Permit such as welding, cutting, and sparking, and * Confined space operation (Confine Space Entry Permit). • Making emergency assistant operation plan inside and outside the project area by which asking for helping from other organizations and training according to operation plan yearly, • Informing operation staffs about operation procedures for safety management, personal responsibility with emergency operation according to the emergency assistant operation plan, • Connecting to the Chana Hospital, and the Chana Police Station for the emergency assistant operation plan training yearly, • Training basic fire protection operation to all operation sections from recognition governmental organizations, and assigning at least 40% of the section staffs to participate in each training. All staffs must have to pass the training course, and repeat the fire protection practicing according to an agreement of safety staffs, or the Welfare Office Staffs, and Provincial Labor Protection Office Songkhla. Theories for training course are fire occurring theory, fire protection station, fire prevention methods, fire protection equipment, fire prevention and protection plan, fire management and protection, application of equipment in working place for fire protection, and fire protection equipment in manufacturing process. Practicing part for 			

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
	<p>training course is about an application of fire protection equipment and fire protection pipeline,</p> <ul style="list-style-type: none"> • Practicing for fire protection, and staffs migration in case of fire yearly. Theories of the training course are fire protection plan, fire protection method for factory, staffs migration in case of fire, and injury staffs finding and helping. Practicing part for training course is about fire protection using portable fire extinguisher, fire protection using firefighting pipeline, types of firefighting, staffs migration in case of fire, and injury staffs finding, helping, and moving, • Providing first aid equipment according to related laws, • Sending all illness staffs to health service centers, • Monitoring health condition of staffs before and during operation regularly at 1 time/yr . • Recording accidental statistic with causes, and solutions for each accidental case, • Making safety promotion activities in the work place such as poster about safety information, and • Maintaining boiler, and electricity generator safety by; <p>- Designing, and operation of boiler</p> <ul style="list-style-type: none"> • Engineering <ul style="list-style-type: none"> * Designing boiler using international standard criteria according to the American Society of Mechanical Engineers (ASME) * Installing pump to boiler * Installing safety valve 			

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
	<ul style="list-style-type: none"> * Installing water level gauge such as glass tube, glass bulb, or magnetic tape, * Installing check valve or non-return valve * Installing pressure indicator or pressure gauge) * Installing blow down valve) * Installing insulation * Installing steam valve * Installing automatic water level control * Installing pressure switch * Installing stack emission thermometer * Installing ladder, and platform for boiler • Management <ul style="list-style-type: none"> * Checking, and auditing an installation according to accepted standards, * Testing readiness of the system before starting operation by legalized engineers according to Engineering Act. B.E. 2542, and * Using DCS for boiler control by which the DCS is urgently shutdown operation by stopping fuel feeding to boiler if the DCS warning that water level or steam pressure is lower or higher than normal criteria. - Boiler maintenance <ul style="list-style-type: none"> • Assigning boiler control staff for maintaining boiler operation, • Posting boiler control license in an open/easily for seeing in the boiler installation area, • Providing licensed engineers for controlling and managing boiler operation to responsible for boiler management under conditions and criteria of the promulgation of the Department of Industrial Works, 			

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
	<ul style="list-style-type: none"> • Providing boiler testing by inspection engineer or engineering testing institute yearly, • Making boiler testing report and safety report according to the form issued by the Department of Industrial Works, and submit to the Department of Industrial Works within 30 days after testing is finished, • Checking water quality before feeding to boiler, and boiler system according to testing frequency designed by boiler designer to maintain water quality supply to boiler for preventing corrosion or slags in boiler, • Making a proper preventive maintenance plan for boiler, • Making boiler control procedure, and training staffs for operation, • Testing Safety Release Valve using Manual Blow weekly, and • Practicing for emergency operation yearly. <p>- Boiler repairing</p> <ul style="list-style-type: none"> • Providing licensed engineers for boiler repairing, and modification, • Testing repairing result for quality control under the supervision by engineering boiler maintaining units, and • Submitting boiler repairing and testing report to the Department of Industrial Works within 30 days prior to the finishing of repairing date according to the promulgation of the Department of Industrial Works <p>- Controlling, and prevention of Steam Turbine</p> <ul style="list-style-type: none"> • Engineering <ul style="list-style-type: none"> * Installing control valve for passive steam to turbine to maintain stability of steam pressure, * Installing bypass valve to reduce steam pressure in case of the pressure is higher than control ability of the control valve 			

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
	<ul style="list-style-type: none"> • Management <ul style="list-style-type: none"> * Monitoring temperature, and pressure for both steam turbine inlet and outlet, * Checking steam property before feeding to boiler, and boiler system according to testing frequency designed by boiler designer to maintain steam property supply to boiler for preventing corrosion or slags in boiler, * Checking condition of control equipment around steam turbine routinely to avoid turbine overloading, * Making Preventive Maintenance Program for steam turbine, and auxiliary equipment for maintaining boiler efficiency and safety, * Preparing substitution equipment for steam turbine such as safety valve, and * Training operation staffs about safety operation with steam turbine, - Controlling, and hazard prevention for electricity generator • Engineering <ul style="list-style-type: none"> * Installing over current relays according to electricity current under generator standard from generator manufacturer, * Installing temperature indicator for stator coils for monitoring coils temperature of those 3 phases according to temperature range provided by generator manufacturer, * Installing over voltage relay according to voltage range provided by generator manufacturer, * Installing reverse power relay according to standard range provided by generator manufacturer, and 			

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
	<ul style="list-style-type: none"> * Installing ground over voltage relay according to standard range provided by generator manufacturer. • Management <ul style="list-style-type: none"> * Checking, and testing equipment operation during test run for maintaining electricity generation according to the standard, * Checking and recording all controlled parameters during operation to maintain parameter values within the controlled values according to operation period to the form of electricity supply of electricity generator, * Reporting bias values to commanders for finding solution, * Providing regulations, procedures, and safety operation for electricity generator by checking equipment before operation and repairing all faults in the working areas for strictly operation, * Making Preventive Maintenance Program and maintaining equipment routinely, 			
	<ul style="list-style-type: none"> * Providing auxiliary sensor for temperature indicator stator coils, and checking for proper operation routinely, * Providing electricity generator controlling staffs for maintaining proper operation, * Training operation staffs about safety operation with electricity generator routinely, and * Providing electricity safety system monitoring by licensed engineers yearly, and submitting monitoring results to the Department of Industrial Works. <p>(2) Measures for health service system</p>			

TABLE 9-1 (Cont'd)

ENVIRONMENTAL IMPACT	MITIGATION MEASURE	LOCATION	DURATION	RESPONSIBILITY
	<ul style="list-style-type: none"> - Informing number and age range of project staffs to health service organizations for planning health service operation, - Supporting the Natural resources and Environment Office, or the Environmental Impact Auditing Committee for establishing of community environmental and health volunteers to monitor and observe environmental and health problems, - Assisting to the sub district health promotion hospitals, and village health volunteers for health promotion and disease prevention activities to support health service operation, and - Supporting and assisting community activities for maintaining good relationship for communities and social. 			
Aesthetics management	<p>(1) Locating green space areas at least 6.97% of the total area, or at least 11.25 Rai (Thai area unit) by growing tall trees, small trees, and grass. Tall trees are Cemetary tree, Copper Pod Peltophorum, or other suitable trees with diameter more than 5 inches. Plant growing must has optimum space for each tree according to shape of trees which is maintaining by;</p> <ul style="list-style-type: none"> - Adjusting soil condition for green spaces of the project for maintaining plant growth, - Conserving green space of the project to maintain beat vision and proper landscape, and - Rehabilitation for those death plants with in 1 month for landscape conservation to total green space areas. 	Project area	Operation period	CHANA GREEN CO.,LTD.
Post Project Operation	<p>The Project will develop a decommissioning plan, 6 months prior to final closure to ensure proper disposal, site restoration and remediation, if required. The land acquired will be used for other purposes according to the Company policy at that time.</p>	Project area	Post project operation	CGCL

TABLE 9-2

MONITORING PROGRAM FOR CHANA GREEN POWER PLANT PROJECT OF CHANA GREEN COMPANY LIMITED

ENVIRONMENTAL IMPACT	MEASUREMENT INDICES	MEASUREMENT METHOD	MEASUREMENT STATION	FREQUENCY	RESPONSIBILITY
Air quality management	Pre-Construction period <ul style="list-style-type: none"> - TSP (24 hrs average) - PM-10 (24 hrs average) - PM-2.5 (24 hrs average) - SO₂ (1 hr average) - SO₂ (24 hrs average) - NOx as NO₂ (1 hr average) - Wind speed and direction 	Installing monitoring equipment, and analyzing according to the NEB promulgation	Monitoring stations are 4 points which are Nuruchchamchee Mosque , Chana Chanupatham School, Rohmah Mosque, and Mungwan Mosque (for wind direction and wind speed are monitored 1 point at Chana Chanupatham School)	Once, before construction activities with 7 consecutive days	CHANA GREEN CO.,LTD.
Air quality management (Cont'd)	Construction period <u>Ambient air quality</u> <ul style="list-style-type: none"> - TSP (24 hrs average) - PM-10 (24 hrs average) - PM-2.5 (24 hrs average) - SO₂ (1 hr average) - SO₂ (24 hrs average) - NOx as NO₂ (1 hr average) - Wind speed and direction 	Installing monitoring equipment, and analyzing according to the NEB promulgation	Monitoring stations are 4 points which are Nuruchchamchee Mosque , Chana Chanupatham School, Rohmah Mosque, and Mungwan Mosque (for wind direction and wind speed are monitored 1 point at Chana Chanupatham School)	Twice a year, during construction activities with 7 consecutive days	CHANA GREEN CO.,LTD.

TABLE 9-2 (Cont'd)

ENVIRONMENTAL IMPACT	MEASUREMENT INDICES	MEASUREMENT METHOD	MEASUREMENT STATION	FREQUENCY	RESPONSIBILITY
	<p><u>Heat detection for power plant</u></p> <ul style="list-style-type: none"> - Monitoring parameters which are thermal interpretation data obtained from satellite image 	<p>Requesting satellite image from the Geo-Informatics and Space Technology Development Agency (Public Organization) - GISTDA or organizations/company which could analyzing satellite image for interpretation surface temperature data to make monitoring report</p>	<p>Covering construction area, and air quality monitoring stations of the project</p>	<p>Monitoring for 3 times before test-run covering all seasons by which operated during summer (mid February to mid May), rainy season (mid May to mid October), and winter (mid October to mid February) which is refer to the Thailand Meteorological Department (www.tmd.go.th)</p>	<p>CHANA GREEN CO.,LTD.</p>
<p>Air quality management (Cont'd)</p>	<p>Operation period</p> <p><u>Air Quality from Pollutant Emission Stack</u></p> <ul style="list-style-type: none"> - CEMs: NO_x, SO₂, TSP, O₂, Flow rate - Random sampling: NO_x, SO₂, TSP, O₂ - Audit the CEMs (Audit/RAA/RATA): NO_x, SO₂, TSP, O₂ 	<ul style="list-style-type: none"> - Installation of CEMs at stack of project. Measuring NO_x, SO₂, TSP, O₂, Flow rate continuously for the entire period of power generation - Auditing CEMs operation to confirm that monitoring results are precise, and accurate using auditing methods suggested by the U.S.EPA 	<p>Emission stacks of the project</p>	<ul style="list-style-type: none"> - CEMs measures continuously over the entire power generation period - Monitoring 2 times/year on the same period for air quality monitoring including data of 	<p>CHANA GREEN CO.,LTD.</p>

TABLE 9-2 (Cont'd)

ENVIRONMENTAL IMPACT	MEASUREMENT INDICES	MEASUREMENT METHOD	MEASUREMENT STATION	FREQUENCY	RESPONSIBILITY
		<p>or methodology mentioned by governmental organizations by;</p> <ul style="list-style-type: none"> * System Auditing which is a CEMs auditing for efficiency assessment of Qualitative Evaluation, and operation status of the CEMs, * Performance Audit which is a CEMs auditing for efficiency assessment of Quantitative Evaluation to evaluate accuracy of monitoring results for NO_x SO₂ TSP, and O₂ using Relative Test Audit (RATA) by comparing monitoring results of NO_x SO₂ TSP, and O₂ from the CEMs to compare with grab sampling results of stack and using the same reference condition to calculate Relative Accuracy, and brought those comparing results to estimate correction performance from referenced criteria. 		<p>production rate (% Load) , and wind direction over monitoring period</p>	

TABLE 9-2 (Cont'd)

ENVIRONMENTAL IMPACT	MEASUREMENT INDICES	MEASUREMENT METHOD	MEASUREMENT STATION	FREQUENCY	RESPONSIBILITY
	<p><u>Ambient air quality</u></p> <ul style="list-style-type: none"> - TSP (24 hrs average) - PM-10 (24 hrs average) - PM-2.5 (24 hrs average) - SO₂ (1 hr average) - SO₂ (24 hrs average) - NOx as NO₂ (1 hr average) - Wind speed and direction 	<p>Installing monitoring equipment, and analyzing according to the NEB promulgation</p>	<p>Monitoring stations are 4 points which are Nuruchamchee Mosque , Chana Chanupatham School, Rohmah Mosque, and Mungwan Mosque (for wind direction and wind speed are monitored 1 point at Chana Chanupatham School)</p>	<p>Twice a year, during construction activities with 7 consecutive days</p>	<p>CHANA GREEN CO.,LTD.</p>
	<p><u>Heat detection for power plant</u></p> <ul style="list-style-type: none"> - Monitoring parameters which are thermal interpretation data obtained from satellite image 	<p>Requesting satellite image from the Geo-Informatics and Space Technology Development Agency (Public Organization) - GISTDA or organizations/company which could analyzing satellite image for interpretation surface temperature data to make monitoring report</p>	<p>Covering construction area, and air quality monitoring stations of the project</p>	<p>Monitoring for 3 times before test-run covering all seasons by which operated during summer (mid February to mid May), rainy season (mid May to mid October), and winter (mid October to mid February) which is refer to the Thailand Meteorological Department (www.tmd.go.th)</p>	<p>CHANA GREEN CO.,LTD.</p>

TABLE 9-2 (Cont'd)

ENVIRONMENTAL IMPACT	MEASUREMENT INDICES	MEASUREMENT METHOD	MEASUREMENT STATION	FREQUENCY	RESPONSIBILITY
Noise management	Pre-Construction period - Leq-24 hr - L ₉₀ - L _{max} - Ldn	Installing standard monitoring equipment according to the NEB promulgation by which the calculation is followed guideline of the PCD	Monitoring stations are 2 points which are Chana Chanupatham School, Moo 6 Bangtung (Nearest house)	Once, before construction activities with 7 consecutive days	CHANA GREEN CO.,LTD.
Noise management (Cont'd)	Construction period - Leq-24 hr - L ₉₀ - L _{max} - Ldn	Installing standard monitoring equipment according to the NEB promulgation by which the calculation is followed guideline of the PCD	Monitoring stations are 2 points which are Chana Chanupatham School, Moo 6 Bangtung (Nearest house)	Twice a year, during construction activities with 7 consecutive days	CHANA GREEN CO.,LTD.
Noise management (Cont'd)	Operation period - Leq-24 hr - L ₉₀ - L _{max} - Ldn	Installing standard monitoring equipment according to the NEB promulgation by which the calculation is followed guideline of the PCD	Monitoring stations are 6 points which are Chana Chanupatham School, Moo 6 Bangtung (Nearest house), Northern area of the fence line, Southern area of the fence line, Eastern area of the fence line, Western area of the fence line	Twice a year, during construction activities with 7 consecutive days	CHANA GREEN CO.,LTD.
Water quality/irrigation and flooding prevention	Construction period <u>Surface water quality</u> - Temperature - pH - DO - BOD - NO ₃ -N - NH ₃ -N	Sampling and analyzing according to the promulgation of the Ministry of Industry	Monitoring station 3 points which are Nathawee Canal: distance of 500 m. before the project discharging point, Nathawee Canal: the project discharging point, Nathawee Canal: distance of 500 m. after the project discharging point	2 times/yr (rainy and dry seasons)	GREEN CO.,LTD.

TABLE 9-2 (Cont'd)

ENVIRONMENTAL IMPACT	MEASUREMENT INDICES	MEASUREMENT METHOD	MEASUREMENT STATION	FREQUENCY	RESPONSIBILITY
	<ul style="list-style-type: none"> - TDS SS - Oil & Grease - Trihalomethane - Free Chlorine (Cl) 				
	<p><u>Wastewater from worker camp and office building</u></p> <ul style="list-style-type: none"> - pH - BOD - Sulfide - Settleable Solids - TDS - SS - Oil & Grease - TKN - Fecal Coliform Bacteria 	<p>Methods mentioned by the Standard Methods for the Examination of Water and Wastewater</p>	<p>Wastewater holding pond at workers camp and office building</p>	<p>Monthly</p>	<p>GREEN CO.,LTD.</p>
	<p><u>Aquatic biological resource</u></p> <ul style="list-style-type: none"> - Phytoplankton - Zooplankton - Benthos - Fish - Aquatic plant 	<p>Sampling and analyzing according to acceptable methods</p>	<p>Monitoring station 3 points which are Nathawee Canal: distance of 500 m. before the project discharging point, Nathawee Canal: the project discharging point, Nathawee Canal: distance of 500 m. after the project discharging point</p>	<p>2 times/yr (rainy and dry seasons)</p>	<p>CHANA GREEN CO.,LTD.</p>

TABLE 9-2 (Cont'd)

ENVIRONMENTAL IMPACT	MEASUREMENT INDICES	MEASUREMENT METHOD	MEASUREMENT STATION	FREQUENCY	RESPONSIBILITY
<p>Water quality/irrigation and flooding prevention (Cont'd)</p>	<p>Operation period <u>Surface water quality</u></p> <ul style="list-style-type: none"> - Temperature - pH - DO - BOD - NO₃-N - NH₃-N - TDS - SS - Oil & Grease - PO₄³⁻ - TKN - Chlorophyll (a) - Trihalomethane - Free Chlorine (Cl) - Sodium (Na) for quantifying SAR - Calcium (Ca) for quantifying SAR - Magnesium (Mg) for quantifying SAR - (SAR = Sodium Adsorption Ratio) 	<p>Using standard methods of the Standard Methods for the Examination of Water and Wastewater assigned by the APHA, AWWA , and WEF or methodology assigned by governmental organizations</p>	<p>Monitoring station 3 points which are Nathawee Canal: distance of 500 m. before the project discharging point, Nathawee Canal: the project discharging point, Nathawee Canal: distance of 500 m. after the project discharging point</p>	<p>Monitoring for 2 times/yr (rainy and dry seasons), except for Trihalomethane which is 3 month/time for 2 years if the monitoring results still not exceed 0.08 mg/L (Standard of the US.EPA, 2009), and stopping monitoring process. If the results exceed water quality standard, project should improve discharge water quality and continue monitoring for 2 years.</p>	<p>CHANA GREEN CO.,LTD.</p>

TABLE 9-2 (Cont'd)

ENVIRONMENTAL IMPACT	MEASUREMENT INDICES	MEASUREMENT METHOD	MEASUREMENT STATION	FREQUENCY	RESPONSIBILITY
	<p><u>wastewater quality monitoring</u></p> <ul style="list-style-type: none"> - Random sampling <ul style="list-style-type: none"> ▪ BOD ▪ COD ▪ Temperature ▪ pH ▪ DO ▪ BOD ▪ NO₃-N ▪ NH₃-N ▪ TDS ▪ SS ▪ Oil & Grease ▪ Trihalomethane ▪ Free Chlorine (Cl) - Online monitoring <ul style="list-style-type: none"> ▪ Temperature ▪ pH ▪ Conductivity 	<p>Standard Methods for the Examination of Water and Wastewater which is mentioned by APHA, AWWA, and WEF or other recommended methods according to governmental assignment</p>	<p>Waste Water Holding Pond</p>	<ul style="list-style-type: none"> - Twice a month for BOD, COD - Monthly for other parameters except for Trihalomethane which is 3 month/time for 2 years if the monitoring results still not exceed 0.08 mg/L (Standard of the US.EPA, 2009), and stopping monitoring process. If the results exceed water quality standard, project should improve discharge water quality and continue monitoring for 2 years 	<p>CHANA GREEN CO.,LTD.</p>

TABLE 9-2 (Cont'd)

ENVIRONMENTAL IMPACT	MEASUREMENT INDICES	MEASUREMENT METHOD	MEASUREMENT STATION	FREQUENCY	RESPONSIBILITY
	<p><u>Underground water quality monitoring</u></p> <ul style="list-style-type: none"> - pH - Cl - Hardness - TDS - SS - NO₃-N - Coliform Bacteria - Fecal Coliform Bacteria - Calcium (Ca) - Magnesium (Mg) - Electrical Conductivity 	<p>Sampling and analyzing according to the promulgation of the Ministry of Industry</p>	<p>Monitoring station 3 points which are Well located up-gradient of the referenced monitoring well 1 unit, Well located down-gradient of the referenced monitoring well for assessing level of contamination 2 units</p>	<p>2 times/yr (rainy and dry seasons)</p>	<p>CHANA GREEN CO.,LTD.</p>
	<p><u>Aquatic biological resource</u></p> <ul style="list-style-type: none"> - Phytoplankton - Zooplankton - Benthos - Fish - Aquatic plant 	<p>Sampling and analyzing according to acceptable methods</p>	<p>Monitoring station 3 points which are Nathawee Canal: distance of 500 m. before the project discharging point, Nathawee Canal: the project discharging point, Nathawee Canal: distance of 500 m. after the project discharging point</p>	<p>2 times/yr (rainy and dry seasons)</p>	<p>CHANA GREEN CO.,LTD.</p>
<p>Traffic management</p>	<p>Construction period</p> <ul style="list-style-type: none"> - Recording amount of vehicle entering and exiting to the project - Recording accidental statistic according to transportation 	<ul style="list-style-type: none"> - Recording amount of vehicle entering and exiting to the project - Recording accidental statistic according to transportation activity 	<p>Construction area</p>	<p>Entire construction period</p>	<p>CHANA GREEN CO.,LTD.</p>

TABLE 9-2 (Cont'd)

ENVIRONMENTAL IMPACT	MEASUREMENT INDICES	MEASUREMENT METHOD	MEASUREMENT STATION	FREQUENCY	RESPONSIBILITY
	activity to the project, and finding solution for problem prevention	to the project, and finding solution for problem prevention			
Traffic management (Cont'd)	<p>Operation period</p> <ul style="list-style-type: none"> - Recording amount of vehicle entering and exiting to the project daily for using in traffic management plan - Recording accidental statistic according to transportation activity to the project, and finding solution for problem prevention 	<ul style="list-style-type: none"> - Recording amount of vehicle entering and exiting to the project - Recording accidental statistic according to transportation activity to the project, and finding solution for problem prevention 	Project area	Entire operation period	CHANA GREEN CO.,LTD.
Waste management plan	<p>Construction period</p> <ul style="list-style-type: none"> - Recording statistic of type, amount, property, and management for waste generated from construction activities monthly overall construction period. 	<ul style="list-style-type: none"> - Recording statistic of type, amount, property, and management for waste generated from construction activities monthly overall construction period. 	Construction area	Entire construction period	CHANA GREEN CO.,LTD.
Waste management plan (Cont'd)	<p>Operation period</p> <ul style="list-style-type: none"> - Recording statistic of type, amount, property, and management for waste generated from manufacturing yearly 	<ul style="list-style-type: none"> - Recording statistic of type, amount, property, and management for waste generated from manufacturing yearly 	Project area	Entire operation period	CHANA GREEN CO.,LTD.

TABLE 9-2 (Cont'd)

ENVIRONMENTAL IMPACT	MEASUREMENT INDICES	MEASUREMENT METHOD	MEASUREMENT STATION	FREQUENCY	RESPONSIBILITY
	<ul style="list-style-type: none"> - Making summary report of ash users (name list of farmers), and quantity of ash utilization yearly 	<ul style="list-style-type: none"> - Making summary report of ash users (name list of farmers), and quantity of ash utilization yearly 			
<p>Socio-economic management plan</p>	<p>Construction period</p> <ul style="list-style-type: none"> - Surveying socio-economic conditions, opinions from local peoples and community leaders, opinion from related organizations, and yearly assessment for a changing conditions over the surrounding areas of project operation, and opinions of communities located in the area of environmental quality monitoring stations - Recording complaints with solution and time for problem solving, and making summary report 2 times/yr. 	<ul style="list-style-type: none"> - Surveying socio-economic conditions, opinions - Recording complaints with solution and time for problem solving. 	<ul style="list-style-type: none"> - People within 5 km radius around the project area. - Communities located in the area of environmental quality monitoring stations. 	<p>Entire construction period</p>	<p>CHANA GREEN CO.,LTD.</p>
<p>Socio-economic management plan (Cont'd)</p>	<p>Operation period</p> <ul style="list-style-type: none"> - Surveying socio-economic conditions, opinions from local peoples and community leaders, opinion from related organizations, and yearly 	<ul style="list-style-type: none"> - Surveying socio-economic conditions, opinions. 	<ul style="list-style-type: none"> - People within 5 km radius around the project area. - Communities located in the area of environmental quality monitoring stations. 	<p>Entire operation period</p>	<p>CHANA GREEN CO.,LTD.</p>

TABLE 9-2 (Cont'd)

ENVIRONMENTAL IMPACT	MEASUREMENT INDICES	MEASUREMENT METHOD	MEASUREMENT STATION	FREQUENCY	RESPONSIBILITY
	assessment for a changing conditions over the surrounding areas of project operation, and opinions of communities located in the area of environmental quality monitoring stations. - Recording operation results of the Environmental Impact Auditing Committee every 6 months - Information dissemination on findings of Local Committee/Environmental Impact Committee on the results of monitoring activities including information on health trends which is also being monitored annually	- Recording operation results of the Environmental Impact Auditing Committee			
Occupational health and safety management plan	Construction period - Recording accidental statistic with cause of accident, results to staff health, losing/damage, and solution for all accident cases according to safety management	- Record	Construction area	Entire construction period	CHANA GREEN CO.,LTD.
Occupational health and safety	Operation period <u>Monitoring health condition of staffs</u>		- New staffs		

TABLE 9-2 (Cont'd)

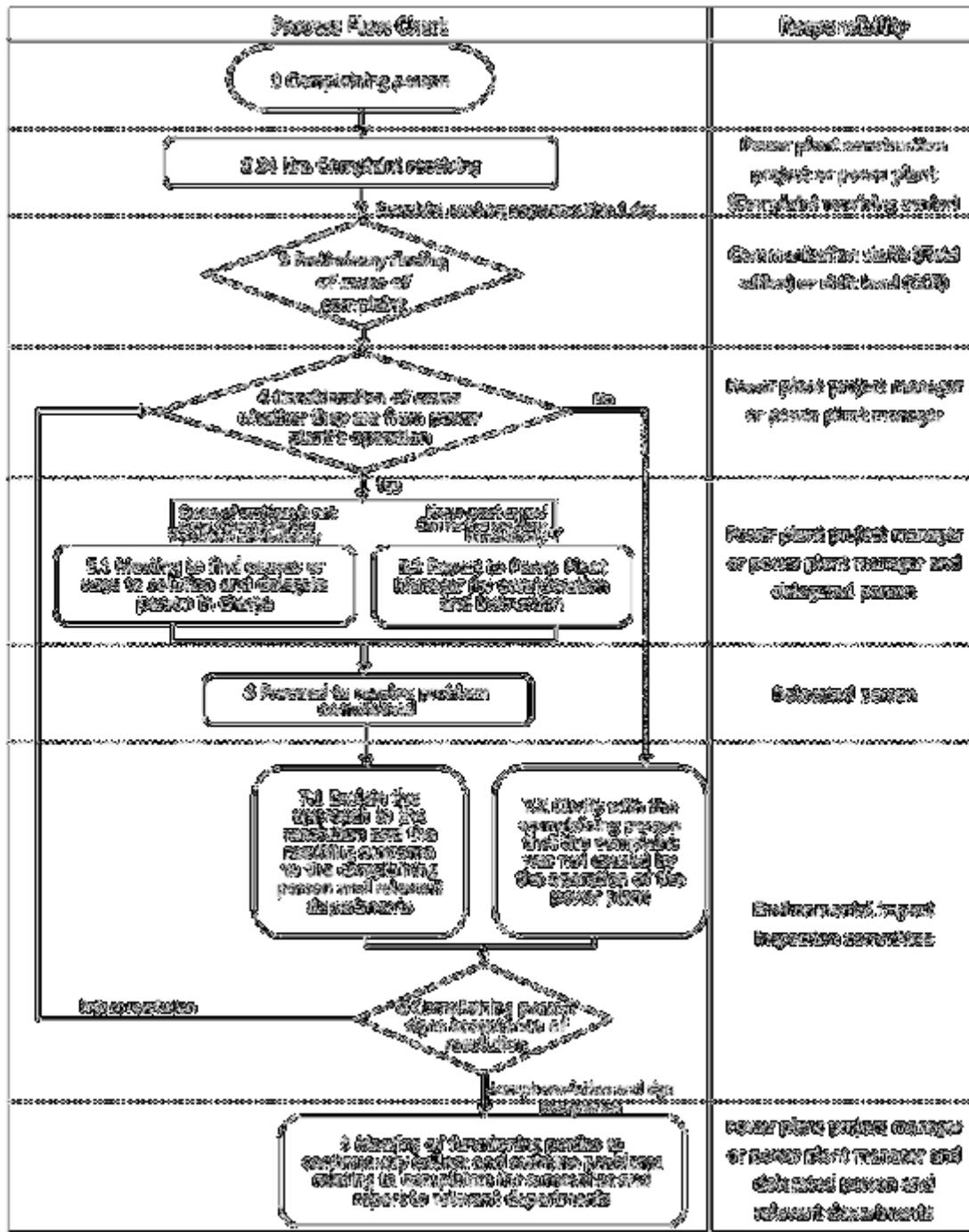
ENVIRONMENTAL IMPACT	MEASUREMENT INDICES	MEASUREMENT METHOD	MEASUREMENT STATION	FREQUENCY	RESPONSIBILITY
<p>management plan (Cont'd)</p>	<ul style="list-style-type: none"> - General health monitoring for new staffs <ul style="list-style-type: none"> ▪ Physical exam ▪ X-ray for Lung ▪ Blood testing (Completeness, blood type, and Hepatitis-B) - General health monitoring for full time staffs <ul style="list-style-type: none"> ▪ Physical exam ▪ X-ray for Lung ▪ Blood testing (Completeness, blood type, and Hepatitis-B) ▪ Visibility ▪ Audiography ▪ Pulmonary function test 		<ul style="list-style-type: none"> - Full time staffs 	<ul style="list-style-type: none"> - Health check prior to work commencement - Once a year 	<p>CHANA GREEN CO.,LTD.</p>
	<p><u>Public health condition</u></p> <ul style="list-style-type: none"> - Following public health condition from community peoples by recording information obtained by health service stations yearly, and analyzing illness trend with summary and discussion 	<ul style="list-style-type: none"> - Following public health condition from community peoples by recording information obtained by health service stations yearly, and analyzing illness trend with summary and discussion 	<ul style="list-style-type: none"> - Public health service stations within 5 km radius from project area 	<p>Yearly</p>	<p>CHANA GREEN CO.,LTD.</p>
	<p><u>Working environment</u></p> <p>(1) Noise</p>	<ul style="list-style-type: none"> - Installing monitoring equipment, and analyzing according to the NEB promulgation 	<ul style="list-style-type: none"> - the risk areas which are electricity generator and wood chopping areas 	<p>2 times/year</p>	<p>CHANA GREEN CO.,LTD.</p>

TABLE 9-2 (Cont'd)

ENVIRONMENTAL IMPACT	MEASUREMENT INDICES	MEASUREMENT METHOD	MEASUREMENT STATION	FREQUENCY	RESPONSIBILITY
	<ul style="list-style-type: none"> - Monitoring noise level in work places (TWA) according to the Ministry of Labor regulation about standard for occupational health management, and working environment about heat, light, and noise B.E. 2559, to control daily noise exposure to staffs under the maximum noise exposure limitation. - Monitoring noise level in loud noise areas - Monitoring peak sound pressure level of impact or impulse noise. 				
	(2) Dust <ul style="list-style-type: none"> - Total dust - Respiratory dust 	- Installing monitoring equipment, and analyzing according to the NEB promulgation	- Risk areas which are fuel storage building, and fuel storage area	2 times/year	CHANA GREEN CO.,LTD.
	(3) WBGT	- Installing monitoring equipment, and analyzing according to the NEB promulgation	- The heat risk areas which are boiler and electricity generator	2 times/year	CHANA GREEN CO.,LTD.
	(4) Light intensity	- Installing monitoring equipment, and analyzing according to the NEB promulgation	- Office, and controlled room	2 times/year	CHANA GREEN CO.,LTD.
	<u>Preparation for emergency case</u>	- Training and drilling	Project area	Yearly	CHANA GREEN CO.,LTD.

TABLE 9-2 (Cont'd)

ENVIRONMENTAL IMPACT	MEASUREMENT INDICES	MEASUREMENT METHOD	MEASUREMENT STATION	FREQUENCY	RESPONSIBILITY
	<ul style="list-style-type: none"> - Training for basic firefighting operation using related or accepted organization for at least 40% of total staffs - Practicing firefighting operation, and fire escaping 				
	<p><u>Recording accidental statistic</u></p> <ul style="list-style-type: none"> - Cause - Health impact - Losing/damaging - Solution 	<ul style="list-style-type: none"> - Record 	<p>Project area</p>	<p>Yearly</p>	<p>CHANA GREEN CO.,LTD.</p>



Note: 1. Report on construction including time to complainting party with the Budget.

2. Report progress in solving problems to the complainting party every 1 day or 2 days.

Figure 9-1 Scheme of operation on Chana Green Power Plant Project’s complaint receiving

CHAPTER 10

CONCLUSION AND RECOMMENDATION

The Chana Green Co.ltd. has planned to develop Chana Green Power Plant Project at Ku subdistrict, Chana, Songkhla which is a biomass power plant using residual from wood transformation industry or wood piece from rubber tree, and mangium tree. The power plant has capacity of 25 MW cover an area of 161.49 Rai (Thai area unit: 1 Rai = 1,600 sq.m.) by which Chana Green Power Plant Project is one of the renewable energy power plant (not include solar cell) promoted for 3 deepsouth provinces (Pattani, Yala, and Narathiwat), and 4 districts of Songkhla (Chana, Thepa, Sabayoi, and Nathawee). Currently, the project has accepted FiT from the Electricity Generation Authority of Thailand (EGAT) under a small power plant electricity buying campaign especially renewable energy B.E. 2550 (revised B.E. 2552) which can reduce electricity generation from fossil fuel power plant (natural gas, fuel oil, and coal) for greenhouse gases reduction causing global warming.

The main equipment of the Project is a boiler with a capacity of 98 ton/hour, power generator with a capacity of 25 MW, and supporting system. The designed capacity of the power plant is 25 MW and the operating capacity is 23.003 MW. About 2.381 MW will be used in the Project and the rest of 20.622 MW will be supplied to the grid of Electricity Generating Authority of Thailand in non-firm contract basis.

10.1 SUMMARY OF POTENTIAL IMPACTS OF CHANA GREEN POWER PLANT

A. PHYSICAL RESOURCES

(1) Air Quality

The potential air quality impacts from the Chana Green Power Plant during the construction and operation periods will be from dust dispersion during the construction phase and stack emissions during the operation phase.

During construction, air quality impact assessment of the project was studied such as TSP dispersion from construction activities using data obtained from the U.S. EPA which was based on the "Compilation of Air Pollution Emission Factors" Publication NO.AP-42 (1995) approximately 1.2 tonne/acre/month, or 9.88 g/sq.m./day (0.000114 g/sq.m./sec), and soil type of the construction area which is clay loam (containing PM-10 around 35-60%, or approximately 0.42 tonne/acre/month, or 0.0000399 g/sq.m./sec). Activity of the project for soil surface removal is conducted from a small area for those construction area of 200 sq.m. (according to efficiency of machine) which was allowed to

operate the construction activities only 8.00-17.00 hrs, and working from Monday to Saturday only (air quality impact assessment was considered for PM-10 emission loading from construction machine and soil surface removal activity). Then, predicted ground concentration from AERMOD modeling system was compared to Ambient Air Quality Standard (AAQS) according to the NEB promulgation issued 21st (B.E. 2544), issued 24th (B.E. 2547), and issued 33rd (B.E. 2552). It was found out that all predicted results have not exceeded the national AAQS and WB IFC EHS on General Ambient Air Quality Guidelines.

During operation, the project has emission sources from those boiler stacks of the project. Predicted ambient air quality studied grid area of 13x13 sq.km. had 3 assumptions;

- 1) Case 1: Forecasting air emission source from construction period of the project,
- 2) Case 2: Forecasting air emission source of the project (including downwash), and
- 3) Case 3: Forecasting air emission source of the project (including downwash) by

which air quality control equipment of the boiler (capacity 98 tonne/hr) is not working.

Then, predicted ground concentration for all cases (some case was combined with monitoring background concentration) obtained from the AERMOD modeling system was compared to Ambient Air Quality Standard (AAQS) according to the NEB promulgation issued 21st (B.E. 2544), issued 24th (B.E. 2547), and issued 33rd (B.E. 2552). It was found that all predicted results for TSP, SO₂ and NO₂ have not exceeded national AAQS. Predicted results also complied with WB IFC EHS General Guidelines for Small Combustion Facilities Emissions Guidelines (3MWth – 50MWth).

(2) Noise level

Noise impact assessment has been assessed by the consultant on 2 sensitive areas: Chana Chanupatham School located in the north-west direction from the noise sources of the project approximately 318 m.; and Moo 6 Bantung or first home project located in the east direction from the noise sources of the project approximately 600 m. during construction and operation period.

During construction, the noise level will be assessed for Leq-24hr to include surrounding communities for the worst case such as foundation installation which generate the maximum noise of 88 dB(A) at the distance of 15m. Noise level reduction calculation to those affected areas such as Chana Chanupatham School, and Moo 6 Bantung (first home project) were 61.47, and 55.96 dB(A), respectively. Additional monitoring of maximum noise was conducted during 23rd-30th August 2016 to calculate noise level at Chana Chanupatham School, and Moo 6 Bantung (nearest home from the project) were 62.17 dB(A), and 58.22 dB(A), respectively that indicate that the noise level meet the standard according to the NEB promulgation issued 15th B.E. 2540 about ambient noise level

standard which was limited less than 70 dB(A). However, the results exceeded the IFC EHS ambient noise standard based on the WHO guidelines of LAeq 55/45 day/night and LA max 60 dB at the nearest residential receptor. The project has defined suitable mitigation measure so the impact on noise is considered low.

Noise level impact assessment on disturbance sound level based on actual construction activities equipped with portable sound barrier revealed that noise impact will occur in daytime to the Chana Chanupatham School, and Moo 6 Bantung (nearest home from project site). The predicted noise levels will be from 0.0-1.6 dB(A), and 4.8-8.2 dB(A), respectively indicating that noise level comply with NEB promulgation issued 29th (B.E.2550) for interfering noise level which has standard of 10 dB(A).

Therefore, noise level impact from construction activities of the project is considered low.

During operation, noise impact assessment was assessed based on continuous 24 hours operation activities of the project consists of 1 unit of boiler 98 tonne/hr, 1 unit of 25 MW electricity generator, 1 unit of cooling tower, 2 units of grinder, and 2 units of pre-shredder. Total noise level from those equipment is 94.99 dB(A) at the distance of 1 m. Noise level results gathered from the observation points such as Chana Chanupatham School and Moo 6 Bantung (nearest home from project site) are 54.07 dB(A) and 54.34 dB(A), respectively. This noise level result has complied with the NEB promulgation issued 15th B.E. 2540 about ambient noise level standard which is less than 70 dB(A). Therefore, noise level impact from operation activities of the project is considered low.

Interfering noise level from operation activities during 06.00 – 18.00 hours at Chana Chanupatham School was 0.0-4.1 dB(A) and at Moo 6 Bangtung (nearest home from the project site) was 6.1-10.8 dB(A). During 22.00 – 06.00 hours at Chana Chanupatham School, the noise level was 0.1-10.7 dB(A) and at Moo 6 Bangtung was 0.0-5.6 dB(A). The estimated noise level met the standard according to the NEB promulgation issued 29th (B.E.2550) about interfering noise level, that is, 10 dB(A). Therefore, noise level impact from operation activities of the project is considered low.

(3) Surface water quality/ water irrigation and flooding prevention

During construction, water drainage in the project area will be via the installed temporary spillways in the same location as the permanent spillway to drain rainfall to freshwater reservoir for reuse. As part of the flood prevention measures, the project will require subcontractors not to leave any garbage to the spillway and remove sediments every 6 months to check for water blocking in the spillways. Therefore, impact to water drainage and flooding prevention is low.

There will be separate design of rainfall and wastewater spillways using pipeline with safety factor of more than 1.3. It was found that the project will have capacity of captured rainfall up to 35,937.57 cu.m./3 hr by which the project will use freshwater reservoir with capacity of 370,000 cu.m. to maintain sufficient rainfall.

Wastewater discharge during construction is mainly from water consumption of workers which is approximately 17 cu.m./day (calculated from 80% of water consumption) from 300 workers. The project will provide sufficient sanitary lavatories to construction workers according to related laws through installation of septic tank or instant wastewater treatment tank to treat wastewater discharge from worker consumption. Thus, treated wastewater will have water quality according to related standards before sending for further treatment to registered organizations. The septic tank or instant wastewater treatment tank will be maintained to proper condition for use over the construction period, and treating wastewater according to the wastewater quality of building type Kor (Thai Alphabet) under the promulgation of the Ministry of Natural Resources and Environment about wastewater quality discharged from some building types, and sizes. Monitoring parameters for wastewater are pH, BOD, Suspended Solid (SS), Sulfide, Total Dissolved Solids (TDS), Settleable Solids, Oil and Grease, and TKN. Additional equipment for wastewater treatment system is the installation of water quality monitoring pond for wastewater to collect wastewater at least 1 day for water quality monitoring before using for spraying to construction site, and to roads entering and exiting areas of the project to reduce dust dispersion.

During operation, wastewater will be from: (1) wastewater discharge from daily consumption of staff; (2) wastewater from manufacturing and auxiliary processes; (3) contaminated rain fall/oil contamination water; (4) wood cleaning water; and (5) leachate from land filling area for ash. The above sources of wastewater including wastewater from cooling tower and wastewater from oil removal pond are pumped to Wastewater Holding Pond before sending to water quality monitoring pond for automatic monitoring of pH, temperature and conductivity in the pipeline. Treated wastewater will be discharged to the Nathawee Canal, unless water quality of the treated wastewater did not comply with the wastewater quality standard. Poor quality wastewater will be pumped to emergency pond with capacity to store wastewater for 1 day until a proper solution will be identified such as neutralized pH in the emergency pond, temperature adjustment, or resending those wastewater to fresh water reservoir for sedimentation and maintaining conductivity before reuse as recycling wastewater. In case of untreated wastewater need storage over 1 day, the project will ask for wastewater treatment from authorized organizations.

Treated wastewater will follow wastewater standard quality of the commanding of the Royal Irrigation Department 73rd/2554 about Prevention, and Solution for low quality discharged water to irrigation canals and connection canals is reused and discharged to the Nathawee Canal by which the water quality impact for BOD Mixing, DO Mixing, and DO Sag Curve of the Nathawee Canal is low. Therefore, using discharge wastewater to the Nathawee Canal for agricultural purpose gives low impact.

The Wastewater Holding Pond is designed to prevent water leakage by HDPE lining or reinforced concrete. Regular inspection and maintenance will be performed. Repair will be done at once if damages are observed.

(4) Groundwater Quality

During the construction and operation period, no groundwater will be used. Groundwater in the Project area is confined aquifer within rock, clay, and sand aquitard with the depth of 30 meters. Considering that the Project will not dispose hazardous waste in the area and the wastewater treatment system is lined with HDPE or reinforced concrete, thus, impact on groundwater quality is in low level.

B. BIOLOGICAL RESOURCES

(1) Terrestrial Ecology

Majority of the Project and adjacent areas are rubber plantations. No forest area in accordance with the Notification of National Reserved Forests Area near the Project, hence, rare wildlife was not found. The nearest forest area to the Project is a forest on a red mountain about two kilometers from the Project which is already deteriorated. Thus, the impact on terrestrial biological resources is in low level

(2) Aquatic Ecology

There are no impacts to aquatic biological resources during construction period, because wastewater will not be discharged to the Nathawee Canal. Thus, construction gives low impact to aquatic biological resources. While during the operation period, the plant will have Wastewater Holding Pond during dry season which the floor will be covered with HDPE and with capacity of 58,820 cu.m. in order to maintain wastewater up to approximately 4 months (or $58,820/464.6 = 126$ days) to reduce impact to the Nathawee Canal during that period. Treated wastewater will have water quality according to wastewater standard quality of the commanding of the Royal Irrigation Department 73rd/2554 about Prevention, and Solution for low quality discharge water to irrigation canals and connection canals by which

the water quality impact for BOD Mixing, DO Mixing, and DO Sag Curve of the Nathawee Canal is low. Therefore, a using of discharged wastewater to the Nathawee Canal gives low impact.

C. HUMAN USE VALUE

(1) Land Use

The Project is located near public place, i.e., the Chana Chanupathum School which is about 136 meters away from the Project fence. It complies with the Ministerial Regulation No.2 (B.E.2535) Section 1, since the Project is categorized into a factory type 3, and according to this regulation it cannot be constructed within 100 meters from the border of public places, i.e., school or academic institute, temple or religious place, hospital, archaeological site, and office of government agency as well as natural and environmental conservation area in which defined by the cabinet.

The Project location also complies with the Ministerial Regulation, Songkhla town planning B.E.2559 announced in the government gazette Vol.134 Section 4 Kor dated 13 January 2017, since the Project is a power plant generating heat energy, it is not a type of factory that is prohibited in rural and agricultural land areas in Khu Sub-district, Chana District, Songkhla Province.

(2) Traffic

The consultant assessed traffic impact for highway no. 43, and highway no. 408 (no data record of daily average traffic condition) which are main transportation routes to the Project.

Daily averaging impact (Normal case)

During _construction, the project will have traffic loading of approximately 40 PCU/day or 5 PCU/ hour (based on 8 hours operation period). It was found that highway no. 43 has traffic index (V/C) around 0.184-0.193 which was indicating good traffic condition (A level, V/C ratio = 0.00-0.60) by which vehicle flow smoothly without interfering from any factor, and drivers have freely vehicle control.

During operation, the project will be operated by B.E. 2561 under the traffic loading of approximately 165.97 PCU/day or 6.92 PCU/ hr. It was found that highway no. 43 gonna has (V/C) around 0.202-0.243 which was indicating good traffic condition (A level, V/C ratio = 0.00-0.60). Therefore, traffic impact is considered low.

Impact over urgent period and non- urgent period

During construction, project will have traffic loading approximately 40 PCU/day or 5 PCU/ hr (based on 8 hrs operation period). It was found that highway no. 43 has traffic index (V/C) around 0.200-0.428 which was indicating good traffic condition (A level, V/C ratio = 0.00-0.60). For highway no. 408, it has traffic index (V/C) around 0.321-0.628 which is indicating free flow traffic with slightly interfering by some factor, and drivers have low interfering for vehicle control.

During operation, the project will be operated by B.E. 2561 under the traffic loading approximately 165.97 PCU/day or 6.92 PCU/ hr. It was found that highway no. 43 gonna has (V/C) around 0.220-0.540 which was indicating good traffic condition (A level, V/C ratio = 0.00-0.60). Therefore, traffic impact is considered low. The highway no. 408 has (V/C) of around 0.332-0.794 indicating free flow traffic with slightly interfering by some factor, and drivers have low interfering for vehicle control (B level, V/C ratio = 0.61-0.70). Therefore, traffic impact is considered low.

(3) Electricity Use

During construction, the Project will use electricity from Chana Provincial Electricity Authority with total of 2 MW together with a diesel power generator which will be provided by the contractor. At present, Chana Provincial Electricity Authority has Chana power station, with a 24 MVA transformer, with maximum capacity of 25 MW and maximum power supply is 10 MW covers the Chana District and some parts of Thepha District. Thus, impact on electricity consumption during construction is in low level.

The Project has a designed capacity of 25 MW wherein 20.622 MW will be supplied to Electricity Generating Authority of Thailand and the rest of 2.4 MW will be used in the Project. Thus, the impact is in low level.

(4) Water Consumption

Water consumption of workers during construction is approximately 21 cu.m./day (at water consumption rate of 70 L/person/day × 300 construction workers). Drinking water will be supplied by subcontractor by providing bottled water from local markets. For construction activity, the water requirement is 2 cu.m. to be used for concrete mixing and cleaning.

During operation, water consumption of the project will be supplied by 2 sources from the rainfall to be stored in the fresh water reservoir, and irrigation water from the Nathawee Canal. Total water consumption of the project will be 728,354 cu.m./yr. Estimated water consumption of all activities in the study areas from the Nathawee Canal watershed over 30 years are tap water production of the Provincial Tap Water Authority Nathawee Branch (approximately 1.63 million cu.m./yr), total

water consumption in Nathawee District (approximately 3.35 million cu.m./yr), total water consumption for agriculture (approximately 98.89 million cu.m./yr), total water consumption in Chana District (approximately 4.98 million cu.m./yr), and water consumption for ecological conservation for the Nathawee watershed (approximately 47.28 million cu.m./yr). From the study, it was indicated that water irrigation without any impact to community is required fresh water reservoir to maintain water supply for at least 4 months by which water head to supply for the project must be started at +5.35 m. above mean sea level (msl) or water head is higher than bottom stream level around 0.15 m. for maintain water supplying of 15,365 cu.m./day. Therefore, an installation of fresh water reservoir with water irrigation will cause acceptable impact to water consumption.

(5) Waste Management

During construction, waste generated could be classified into 2 types which are general waste generated by construction workers and waste generated from construction activities. General waste generated from construction workers such as food residual and plastic bags is approximately 300 kg/day (i.e., calculated based on averaging waste generation rate of 1 kg/person/day × 300 workers). The project will provide sufficient trash bins with capacity of 200 Liters covered by lids to collect general waste for elimination by the Banna Sub District Municipality. For those construction waste which is steel, wood, and bricks is reused or all to recycling retailer, and unwanted material will be used for elevation adjustment in the project area.

During operation, general waste is generated from office, and staff daily activities which are piece of papers, office material, and food residual approximately 65 kg/day or 21 tonne/yr (calculated based on averaging waste generation rate of 1 kg/person/day × 65 staffs). Those waste is an omission from the Ministry of Industry Promulgation about waste management or unused material B.E. 2548, but required to follow the Public Health Act. (issued 2nd) B.E. 2550. The project plan to recycle waste for reuse by separating waste from sources and collected in separated trash bin with capacity of 200 Liters by which the separated trash bins are wet, dry, and hazardous waste. This procedure can sell dry waste before sending unused parts to eliminated by the Banna Sub District Municipality. Other waste such as used lubricant from maintenance activity, unused chemical packaging, depleted membrane, and unused activated carbon from water supply process will be sent to eliminated by authorized organization from the Department of Industrial Works.

Ash generated from boiler is classified to 2 types: Fly Ash, and Bottom Ash. Those ashes will be send to land filling area with size of 33,600 sq.m. or 21 Rai. The land filling area has capacity to operate more than 5 years, and an excess ash is distributed to ash users which is permitted by the Department of Industrial Works before operation.

Therefore, waste management impact to community is considered low.

D. QUALITY OF LIFE VALUES

(1) Socio-economic Management Plan

An installation of the project makes an expansion of local construction business which is increasing provincial gross domestic product. Furthermore, the installation of the power plant can turn business cycle in the province such as material supply, and service business to related business sectors. Therefore, the power plant construction has positive impact to provincial fiscal structure. In addition, the biomass power plant project can increase agricultural product income to local farmers by which an increasing income is support the provincial gross domestic product according to an increasing of buying power in local community. Economic expansion due to buying cycle from product and service buying is considered a positive impact to socio-economic in Songkhla. However, a negative impact from power plant installation is a duration of construction period which is approximately 24 months using 300 construction workers. Those construction workers are provided by subcontractors which is normally employ local or regional workers for operation. Thus, construction workers for power plant installation during the construction period are local workers which is not affect population structure, and indirect impact according to worker migration to the area. Therefore, socio-economic impact is considered low.

The biomass power plant project can increase provincial income, and make provincial buying cycle to provide sufficient money returns for making basic infrastructure to serve local peoples. Those money returns are posted tax, building and land tax, juristic person tax, and power plant development fund. Furthermore, additional positive impact is an employment of local workers for project operation. Nevertheless, negative impact is about a relocation of occupational system from agricultural sector to industrial sector of adolescents according to higher income stable income from industrial sector for maintaining better living quality.

Unconfident perception to the project and responsible organization from local peoples is related to educational background of family leaders (normally primary level), and occupation which are famers. Thus, those local peoples are not interested in socio-economic news or academic report about the operation of the project which are difficult to understand. The local peoples are easily getting news from T.V. according to brief news or series, communication with neighbors, and community leaders

which are normally lack of details and distorting main information of the news. These factors lead to make unconfident to the project operation and responsible organizations. Therefore, information perception is required to distribute project operation data to communities effectively for reducing worrying and unconfident of environmental quality management using suggested channels. Public relation can be made by informing to community leaders or community tower public relation with an easy to understand information, and using the method as guideline for public relation of project operation. According to previous summary table, community leaders communication for understanding of operation is suggested to make confident to local peoples, and transferred information from community leaders to local peoples.

(2) Occupational health and safety management

Health impact assessment scope of study is based on impact type, emission sources, risk of exposure, and exposure pathway, and the target groups are:

(1) Spatial proximity on project location for direct and indirect impacts – (a) Project operation area is the area where staff and subcontractors operate during construction and operation and (b) Surrounding area is neighboring communities within 5 km radius around the project area to cover all health impact to people. Target groups are those with high risk that includes baby, children, working age, elderly peoples, and very old person and people living or working in the sensitive areas such as schools, hospitals/sub district health promotion hospital, governmental offices, and religion places.

2) Temporal proximity on project activities for short and long term impacts - To support safety of staff, and property of the project based on the analysis of issues causing alteration for health factors during construction and operation. Suitable measures and mitigations for health impact reduction during construction and operation to monitor the occupational health and safety dimension.

(3) Aesthetics Management

Construction activities are land preparation, building construction, and machine installation by which those activities are unavoidable and causing visual pollution. However, the project area is located far away from communities, and surrounding by rubber trees which could helping for visual impact, and the project does not has any activities affecting to tourism destinations, natural conservation, and ancient areas directly. Therefore, aesthetical impact is considered low.

The project will provide green spaces of 18,000 sq.m. or 11.25 Rai (6.97% of the entire project area) by which the areas are conserved for growing local trees such as neem tree (local tree which is promoted to be Tree of Songkhla province), tall shape trees such as pine tree, and

cemetery tree, and small trees by designing a zigzag pattern to reduce wind speed and maintain diversity of trees with making good landscape for using as buffer zone to surrounding communities.

Furthermore, area in a radius of 5 km from the project areas does not contain any tourism destinations, natural conservation, and ancient area by which the project operation will not cause direct impact to significant aesthetical areas. Therefore, aesthetical impact is considered low.

10.3 INFORMATION DISCLOSURE, PUBLIC CONSULTATIONS AND PARTICIPATIONS

Two levels of public participation were undertaken for the Project: the Public Participation round 1 (PP1) and Public Participation round 2 (PP2). The PP1 occurred during project design preparation and scoping (Public Scoping) and was held last 25 April – 19 May 2016. There were 7 stakeholder groups invited and attended these consultations: (i) population who received impacts such as people living in the location and in nearby areas of the project; (ii) responsible agency on providing the EIA report such as the project owner and corporation with the right to prepare an EIA report; (iii) authority with the duty of considering the EIA/ authority for approval/permits in central and local levels; (iv) government organizations at various levels (central, provincial and local); (v) academic institutions including institutions of higher education in the province, temples, mosques and companies located in the nearby project area; (vi) community radio station and local newspaper; and (vii) general public who are interested in the project. Respondents of the evaluation after the meeting provided concerns and additional suggestions to the project on following aspects: (a) environmental such as smoke from the combustion, dust, wastewater treatment system before releasing into public water source etc.; (b) social such as promotion/support activities of the community, local employment, visit the area to educate local people, take the community for a study tour at the Yala Green Power Plant, etc.; and (c) health such as how the project take care/solve problems that might arise from operation, provide the mobile medical unit for public, promote/support health related activities such as sport activity etc. All the issues and concerns raised during the consultations were detailed in Section 7.6.1.

The PP2 occurred during the preparation of the draft report on environmental impact prevention and measures (Public Review) and was undertaken last 3 November 2016 – 3 March 2017. First, the Company organized a site visit to the Yala Green Power Plant and a meeting to review draft EIA report from 3 to 26 November 2016. After receiving suggestions/ concerns from stakeholders during the meeting, the project revised project details which include the master plan to increase distance between the machine and sensitive areas. The company also increased the capacity of water storage ponds to reserve water for at least four months in order to reduce competition for water use in the community

during the dry season. On 28 February to 3 March 2017, the project conducted additional meetings to inform the stakeholders about the details that has been revised in different focus group meetings with representatives of agencies and people in the study area. Comments from the process was also summarized and detailed in Section 7.6.4.

Interview with landowners, land users and community leaders were also done. The land owners interviewed shared the same belief that the plant will not posed any threats to communities based on their experience from other power plants in Yala. They are willing to sell his land and do not worry about the power plant. The Community in Ku Subdistrict was resettled around 200 years ago without ethnic minority community in the area.

10.2 RECOMMENDATIONS

Based on the results of the EIA study, the necessary recommendations can be emphasized as follows:

(1) The project shall be under all conditions, strictly enforce the implementation of the proposed environmental measures designed for the construction and operation phases in order to avoid or minimize both environmental and social impacts on the surrounding communities and general public,

(2) The project shall always conduct an environmental study for any modification of the project design and/or the environmental action plan to find out the environmental feasibility before making the decision,

(3) The public participations are the ongoing activities throughout the project implementation. The comments, concerns and suggestions from concerned stakeholders shall be considered and incorporated into the project environmental management plan as appropriate,
