YUNSHUI WASTEWATER TREATMENT PLANT PROJECT IN GUANGDONG PROVINCE

Document Prepared by Profit Carbon Environmental Energy Technology (Shanghai) Co., Ltd.

Project Title	Yunshui Wastewater Treatment Plant Project in Guangdong Province
Version	02
Date of Issue	09/03/2022
Prepared By	Profit Carbon Environmental Energy Technology (Shanghai) Co., Ltd.
Contact	Address: No.2815 Longteng Avenue, Baihui Park full river view office building, Shanghai, China Telephone : +86 21 6127 2386 Email: yanan.zhu@profitcarbon.com Website: http://www.profitcarbon.com/

CONTENTS

1 PROJECT DETAILS

1.1 Summary Description of the Project

Yunshui Wastewater Treatment Plant Project is in Guangdong province (hereafter referred to as the project) introduces aerobic wastewater treatment plant to treat wastewater from towns in many regions of Guangdong Province, there are 16 wastewater plants, each using the same treatment process (A^2O+MBR). The project owner is Yunshui Guangdong Environmental Protection Co.,Ltd. The whole aerobic process includes pre-treatment process, secondary biological treatment process, tertiary deep treatment process and sludge treatment process, with an total maximum design influent flow of 175,150 m^3/d, The influent COD concentrations of all wastewater treatment plants are shown in the following table, and the effluent COD concentration is 40 mg/L. The wastewater is composed of residents' domestic wastewater within the service area. The project can reduce environmental pollution and destroy methane emissions from the open anaerobic lagoons in baseline scenario, the best available low-cost solution for wastewater treatment.

Table 1.1 COD concentration in the influent of wastewater treatment plants

Name of wastewater plant	The COD of influent
Xiaqiao Town wastewater Treatment Plant	450 mg/L
Qujie Town wastewater Treatment Plant	500 mg/L
Xinyi City Dinbao Town wastewater treatment Plant	300 mg/L
Xinyi City Qianpai Town wastewater treatment Plant	450 mg/L
Xianqiao South Wastewater Treatment Plant	500 mg/L
Qiankeng Town North wastewater Plant	450 mg/L
Shangsha Town wastewater Treatment Plant	400 mg/L
Baita Town wastewater Treatment Plant	450 mg/L
Luoding Fourth Domestic wastewater Treatment Plant	500 mg/L
Shitan Town wastewater Treatment Plant	450 mg/L
Litan Town wastewater Treatment Plant	500 mg/L
jiulong Town wastewater Treatment Plant	350 mg/L
Shakou Town wastewater Treatment Plant	550 mg/L
Bomei Town wastewater Treatment Plant	550 mg/L
Nantang Town wastewater Treatment Plant	550 mg/L
Chikeng Town wastewater Treatment Plant	450 mg/L

In the baseline scenario, village sewage and some industrial wastewater from the county would have been treated through a series of deep open anaerobic lagoons. The open lagoons are the best available low-cost solution for wastewater treatment, which is also in compliance with the environmental regulations. However, open anaerobic lagoons would have been released into methane directly to the atmosphere when treating wastewater. In the project scenario, the wastewater will be treated through aerobic biological treatment technology, which includes pre-treatment process, secondary biological treatment process, tertiary deep treatment process and sludge treatment process. Aerobic wastewater treatment plants produce essentially no methane emissions during the entire process of wastewater treatment, and the treated effluent meets the Level A standard of the "Emission Standard for Pollutants from Municipal Wastewater Treatment Plants(GB18918-2002)" and the level 1 standard of the Guangdong local standards "water pollutants emission limits (DB44/26-2001) ".

Emission reductions of this project are generated by reducing methane emissions of the open anaerobic lagoons in baseline scenario. The first wastewater treatment plant began construction on 02/07/2019, and it was officially put into operation on 18/9/2020, the earliest one began put into operation on 03/09/2020, and the last one was put into operation on 20/09/2020. Annual average estimation of GHG emission reductions from the project activity is 79,404 tCO_2e/year, the total GHG emission reductions are 794,043 t CO_2e during the fixed 10 years crediting period.

1.2 Sectoral Scope and Project Type

The project is not AFOLU project and not a grouped project

Sectoral Scope 13: Waste handling and disposal.

Project Type: According to the Section 3.9.1 of VCS standard v4.2, the annual emission reduction of this project is Less than 300,000 tonnes of CO_2e per year, which belongs to “projects.

Project Methodology: AM0080 Mitigation of greenhouse gases emissions with treatment of wastewater in aerobic wastewater treatment plants (Version 01).

1.3 Project Eligibility

As per section 2.1.1 of *VCS Standard* (version 4.2), the scope of the VCS Program include：

1) The six Kyoto Protocol greenhouse gases:
2) Ozone-depleting substances.
3) Project activities supported by a methodology approved under the VCS Program through the methodology approval process.
4) Project activities supported by a methodology approved under a VCS approved GHG program, unless explicitly excluded under the terms of Verra approval.
5) Jurisdictional REDD+ programs and nested REDD+ projects as set out in the VCS Program document Jurisdictional and Nested REDD+ (JNR) Requirements.

The project activity reduces methane emissions by replacing open anaerobic ponds in the baseline scenario with the aerobic wastewater treatment plant. Meanwhile, the project is not belonged to the projects excluded in Table 1 of VCS Standard 4.2. Therefore, the project is eligible under the scope of VCS program.

According to section 3.1 of the *VCS-Standard* (version 4.2), establishing a consistent and standardized certification process is critical to ensuring the integrity of VCS projects. Accordingly, certain high-level requirements must be met by all projects, as set out below:

Reference to VCS Standard (Version 4.2)	Requirement	Justification
3.1.1	Projects shall meet all applicable rules and requirements set out under the VCS Program, including this document. Projects shall be guided by the principles set out in Section 2.2.	The project meets all applicable rules and requirements as set out under the VCS Program.
3.1.2	Projects shall apply methodologies eligible under the VCS Program. Methodologies shall be applied in full, including the full application of any tools or modules referred to by a methodology, noting the exception set out in Section 3.13.1. The list of methodologies and their validity periods is available on the Verra website.	The project applies CDM approved methodology AM0080 (version 1.0) which is an eligible VCS methodology along with tool or modules as applicable. Refer to section 3.1 and 3.2 of the PD below for more details.
3.1.3	Projects and the implementation of project activities shall not lead to the violation of any applicable law, regardless of whether or not the law is enforced.	Projects are in compliance with currently applicable laws. According to the environmental impact assessment report (EIA) of the project, the project complies with all Chinese relevant laws and regulations. Refer to section 1.14 of the PD below for more details.
3.1.4	Where projects apply methodologies that permit the project proponent its own choice of model (see the VCS Program document *Program*	Not applicable. There is no model needs to be chosen by the project proponent as per

	Definitions for definition of model), such model shall meet with the requirements set out in the VCS Program document *VCS Methodology Requirements* and it shall be demonstrated at validation that the model is appropriate to the project circumstances (i.e., use of the model will lead to an appropriate quantification of GHG emission reductions or removals).	the applied methodology AM0080 (version 1.0).
3.1.5	Where projects apply methodologies that permit the project proponent its own choice of third party default factor or standard to ascertain GHG emission data and any supporting data for establishing baseline scenarios and demonstrating additionality, such default factor or standard shall meet with the requirements set out in the VCS Program document *VCS Methodology Requirements*	Not applicable. There are no third party default factor or standard need to be chosen by the project proponent as per the applied methodology AM0080 (version 1.0).
3.1.6	Projects shall preferentially apply methodologies that use performance methods (see the VCS Program document *VCS Methodology Requirements* for further information on performance methods) where a methodology is applicable to the project that uses a performance method for determining both additionality and the crediting baseline (i.e., a project shall not apply a methodology that uses a project method where such a performance method is applicable to the project). Methodologies approved under the VCS Program that use performance methods provide a list of similar methodologies that use project	Baseline scenario and additionality have been analysed as per the applied methodology AM0080 (version 1.0) and tool 02 (Version 07.0). Refer to section 3.4 and 3.5 of the PD for more details.

	methods (that were approved under the VCS Program or an approved GHG program at the time the performance method was developed). Such lists are not necessarily exhaustive but can serve as the starting point for determining whether a performance method is applicable to the project. Following the approval of a methodology that uses a performance method, projects may use any applicable pre-existing methodology that uses a project method for a six-month grace period.	
3.1.7	Where the rules and requirements under an approved GHG program conflict with the rules and requirements of the VCS Program, the rules and requirements of the VCS Program shall take precedence.	Not applicable.
3.1.8	Where projects apply methodologies from approved GHG programs, they shall comply with any specified capacity limits (see the VCS Program document *Program Definitions* for definition of capacity limit) and any other relevant requirements set out with respect to the application of the methodology and/or tools referenced by the methodology under those programs.	Not applicable. There is no specified capacity limits and any other relevant requirements set out as per the applied methodology and tools.
3.1.9	Where Verra issues new requirements relating to projects, registered projects do not need to adhere to the new requirements for the remainder of their project crediting periods (i.e., such projects remain eligible to issue VCUs through to the end of their project crediting period without revalidation against the new requirements). The	This is the first crediting period of the project, and it has fellow all the latest requirements of Verra.

	new requirements shall be adhered to at project crediting period renewal, as set out in Section 3.8.9.	

1.4 Project Design

The project activity involves the construction and operation of multiple aerobic wastewater treatment plant with the wastewater treatment capacity of 175,150 m^3 per day. The project activity involves 16 wastewater treatment plants, which belong to multiple project activity instances. This project is not a grouped project. The proposed project description is in Section 1.1 and the detail of installed technology is in Section 1.11. The proposed project location is described in Section 1.12.

Eligibility Criteria

The project is not a grouped project. Thus, this section is not applicable.

1.5 Project Proponent

Organization name	Yunshui Guangdong Environmental Protection Co., Ltd.
Contact person	Huang Danyu
Title	General Manager
Address	264 Xingtai Road, Shiqiao Street, Panyu District, Guangzhou city, Guangdong Province, China
Telephone	+86 19921532695
Email	DanyuHuang520@163.com

1.6 Other Entities Involved in the Project

Organization name	Profit Carbon Environmental Energy Technology (Shanghai) Co., Ltd.
Role in the project	VCS Consultant
Contact person	Joanna Zhu
Title	Project Director
Address	No.2815 Longteng Avenue, Baihui Park full river view office building, Shanghai, China

Telephone	+86 21 6127 2386
Email	yanan.zhu@profitcarbon.com

1.7 Ownership

The project owner of the project is Yunshui Guangdong Environmental Protection Co., Ltd., who has the legal right to control and operate the project activities. The business license, approval of Environmental Impact Assessment (EIA), Feasibility Study Report (FSR), and project investment license are evidences for the ownership of the project and carbon credits generated.

1.8 Project Start Date

As per section 3.7 of VCS Standard (Version 4.2), the project start date of a non-AFOLU project is the date on which the project began generating GHG emission reductions or removals. The project activity is a non-AFOLU project, and the earliest wastewater treatment plant began put into operation on 03/09/2020. Thus, the project start date is 03/09/2020 (See Table 1.2 below for the time of construction and operation of the wastewater treatment plant).

Table 1.2 The time when wastewater treatment plant started construction and started operation

Name of wastewater plant	Time of starting construction	Time of starting operation
Xiaqiao Town wastewater Treatment Plant	2019/9/21	2020/9/5
Qujie Town wastewater Treatment Plant	2019/9/12	2020/9/8
Xinyi City Dinbao Town wastewater treatment Plant	2019/10/3	**2020/9/3**
Xinyi City Qianpai Town wastewater treatment Plant	2019/9/19	2020/9/6
Xianqiao South Wastewater Treatment Plant	2019/8/5	2020/9/13
Qiankeng Town North wastewater Plant	2019/8/14	2020/9/10
Shangsha Town wastewater Treatment Plant	2019/7/28	2020/9/14
Baita Town wastewater Treatment Plant	2019/8/31	2020/9/13
Luoding Fourth Domestic wastewater Treatment Plant	2019/7/15	2020/9/15
Shitan Town wastewater Treatment Plant	2019/9/12	2020/9/9
Litan Town wastewater Treatment Plant	2019/9/13	2020/9/12
jiulong Town wastewater Treatment Plant	2019/9/12	2020/9/11
Shakou Town wastewater Treatment Plant	2019/8/26	2020/9/12
Bomei Town wastewater Treatment Plant	2019/7/2	2020/9/18
Nantang Town wastewater Treatment Plant	2019/7/5	2020/9/20
Chikeng Town wastewater Treatment Plant	2019/9/19	2020/9/9

1.9 Project Crediting Period

This project adopts fixed crediting periods of 10 years. The crediting period is 10 years 10 month from 03/09/2020 to 02/09/2030 (both days included).

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

The estimated volume of emission reduction from the project activity is 79,404 tCO_2e, which is less than 300,000 tonnes of CO_2e per year. As per section 3.9.1 of the VCS Standard (Version 4.2), the scale of the project activity is under "Project" category.

Project Scale	
Project	√
Large project	

Year	Estimated GHG emission reductions or removals (tCO_2e)
03/09/2020-31/12/2020	23,747
01/01/2021-31/12/2021	79,647
01/01/2022-31/12/2022	79,647
01/01/2023-31/12/2023	79,647
01/01/2024-31/12/2024	79,647
01/01/2025-31/12/2025	79,647
01/01/2026-31/12/2026	79,647
01/01/2027-31/12/2027	79,647
01/01/2028-31/12/2028	79,647
01/01/2029-31/12/2029	79,647
01/01/2030-02/09/2030	53,474
Total estimated ERs	794,043
Total number of crediting years	10
Average annual ERs	79,404

1.11 Description of the Project Activity

Yunshui Wastewater Treatment Plant Project is in Guangdong province introduces aerobic wastewater treatment plant to treat wastewater from towns in many regions of Guangdong Province, where the aerobic treatment process can significantly reduce greenhouse gas emissions. The wastewater is composed of industrial wastewater and some domestic wastewater within the service area. Project activities mainly include pre-treatment process, secondary biological treatment process, tertiary deep treatment process and sludge treatment process. The process flow diagram of this project activity is shown in Figure 1-1.

- **Pre-treatment process**

The pre-treatment process includes coarse screen, adjusting tank, fine screen and horizontal-flow Grit Chamber. The purpose of pre-treatment process is to remove large suspended matter and dense sand particles from the wastewater.

- **Secondary biological treatment process**

The secondary biological treatment process includes A^2O biological treatment stage and MBR tank treatment stage, where the A^2O treatment includes pre-anoxic tank, anaerobic tank, anoxic tank, aerobic tank, combined as a reinforced concrete tank. The COD is basically removed in the aerobic stage.

- **Tertiary deep treatment process**

The deep treatment stage includes two stages. The first stage use water production tank; the second stage is the disinfection process of wastewater.

- **sludge treatment process**

The sludge treatment process consists of a sludge dewatering plant and a sludge storage tank where the sludge is dewatered to below 60% moisture content under controlled conditions and finally transported to a controlled landfill for landfill.

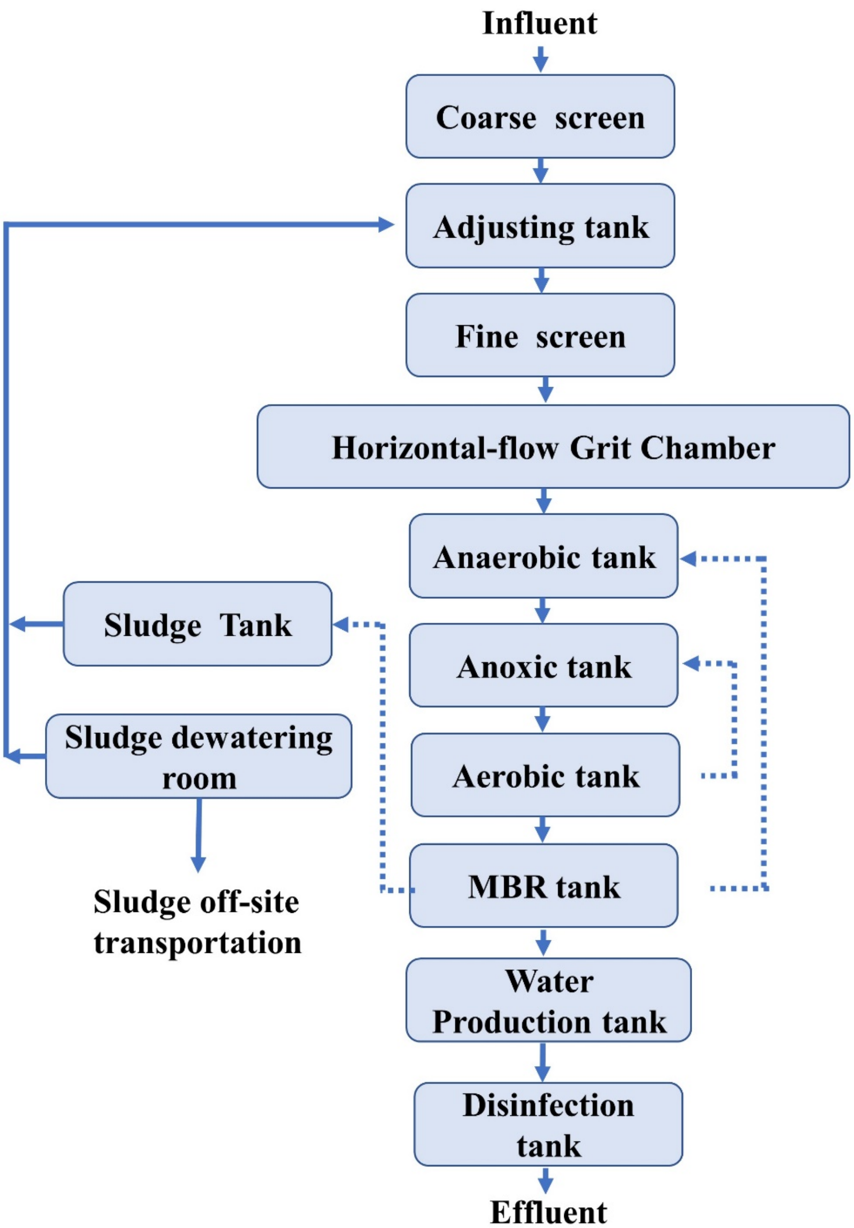

Figure 1-1 Process flow diagram of the project activity

Table 1 Parameters of the main structures and Equipments of the wastewater plant

1.12 Project Location

Yunshui Wastewater Treatment Plant Project in Guangdong province introduces 16 aerobic wastewater treatment plant to treat wastewater from towns in some regions of Guangdong Province. Project coordinates of the wastewater plant are shown in table 1.3.

Table 1.3 Project coordinates of the wastewater plant

Name of the plant	City	Project coordinates
Xiaqiao Town wastewater Treatment Plant	zhanjiang	20.448619°N 110.111337E
Qujie Town wastewater Treatment Plant	zhanjiang	110.323205°E 20.479807°N
Xinyi City Dinbao Town wastewater treatment Plant	Xinyi	110.969115°E 22.308241°N
Xinyi City Qianpai Town wastewater treatment Plant	Xinyi	111.250925°E 22.389742°N
Xianqiao South Wastewater Treatment Plant	Jieyang	116.356663°E 23.482307°N
Qiankeng Town North wastewater Plant	Jieyang	23°23' 33.28" N 116°00' 10.59" E
Shangsha Town wastewater Treatment Plant	Jieyang	23°27'60.0"N 115°41'44.8"E
Baita Town wastewater Treatment Plant	Jieyang	23°33'04.5"N 116°12'36.8"E
Luoding Fourth Domestic wastewater Treatment Plant	Luoding	22°46'20.8"N 111°32'43.4"E
Shitan Town wastewater Treatment Plant	Qingyuan	24°06'41.1"N 112°46'30.5"E
Litan Town wastewater Treatment Plant	Qingyuan	24.054227°N 112.827304°E
jiulong Town wastewater Treatment Plant	Yingde	24°8′6.54″N 112°55′2.61″E
Shakou Town wastewater Treatment Plant	Yingde	24°25'32.7"N 113°31'16.1"E
Bomei Town wastewater Treatment Plant	Shanwei	22°55′44.10″N

		115°46′05.73″E
Nantang Town wastewater Treatment Plant	Shanwei	115.904010°E 22.925668°N
Chikeng Town wastewater Treatment Plant	Shanwei	115°28′11.26″E 22°51′04.55″N

1.13 Conditions Prior to Project Initiation

The project is a Greenfield project. Thus, there are no project activities at the project sites before the construction of the proposed project activities. The baseline scenario is the same as the conditions existing prior to the project initiation.

Refer to section 1.1 of the PD for detailed baseline scenario.

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

According to the environmental impact assessment report (EIA) of the project, the project complies with all Chinese relevant laws and regulations. Mainly include:

1. Environmental Protection Law of the People's Republic of China;

2. Water Pollution Prevention and Control Law of the People's Republic of China;

3. Law of the People's Republic of China on the Prevention and Control of Environmental Pollution by Solid Wastes;

4. Law of the People's Republic of China on the Prevention and Control of Atmospheric Pollution;

5. Law of the People's Republic of China on Prevention and Control of Pollution from Environmental Noise;

6. Law of the People's Republic of China on Environmental Impact Assessment.

The project obtained the project approval and EIA approval from governmental authorities: Guangdong Development and Reform Bureau and Guangdong Environmental Protection Bureau. Guangdong Housing and Urban-Rural Development Bureau and the project owner also signed a sewage service treatment agreement. These approvals well demonstrate that local government permits the construction of the project. Consequently, the project is compliance with laws, status and other regulatory frameworks.

1.15 Participation under Other GHG Programs

1.15.1 Projects Registered (or seeking registration) under Other GHG Program(s)

The project has neither been registered nor seeking registration under any other GHG programs. The project is seeking registration only in VCS program.

1.15.2 Projects Rejected by Other GHG Programs

The project activity is not participating in other environment credits, other GHG programs and has not been rejected by any other GHG Programs.

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

The project proponent is not part of any emission trading program. The net GHG emission reductions from the project will not be used for compliance with emission trading programs or to meet binding limits on GHG emissions. The project activity has not participated under any other GHG programs.

1.16.2 Other Forms of Environmental Credit

The project hasn't sought or received another form of environmental credits.

1.17 Sustainable Development Contributions

SDG6

The project activity treats wastewater by building several aerobic wastewater treatment plants in villages and towns in Guangdong Province, and the project can reduce water pollution and increase the proportion of wastewater treatment nationwide. So it can ensure availability and sustainable management of water and sanitation for more people.

SDG8

The project activity provides direct and indirect employment to the local community during construction of the project activity as well as during operation. During construction, employment was offered for a lot of local unskilled labors contributing to social wellbeing and economic wellbeing. The involvement of local employees in the project activity helps to enhance the skills of the labour in the region by training them in different technical areas. As well, regional economic development can foster through contracts to local firms.

SDG13

China is currently pursuing a strong policy of carbon peaking and carbon neutrality goals. emission reductions of this project are generated by reducing methane emissions of the open anaerobic lagoons in baseline scenario. Annual average estimation of GHG emission reductions from the project activity is 79,404 tCO_2e/year, the total GHG emission reductions are 794,043 t CO_2e during the fixed 10 years crediting period.

1.18 Additional Information Relevant to the Project

Leakage Management

According to paragraph 35 of approved baseline and monitoring methodology AM0080” Mitigation of greenhouse gases emissions with treatment of wastewater in aerobic wastewater treatment plants” (Version 01), no leakage is considered in this methodology.

Commercially Sensitive Information

There is no information deemed as commercially sensitive for this project activity.

Further Information

Not applicable.

2 SAFEGUARDS

2.1 No Net Harm

The Environmental Impact Assessment (EIA) Report for the Project has been approved by Guangdong Provincial Department of Environmental Protection. A short summary of the environmental impacts is presented below. Every aspect of environmental impact has been considered in the EIA report with corresponding measures during project development, the construction of the project is in line with national policies and has a good energy-saving and emission reduction effect, and no net harm has been detected. Meanwhile, the implementation of the project will improve local-socio economic development through creating career opportunities.

2.2 Local Stakeholder Consultation

Procedure followed to invite stakeholder comments

Public hearing for local stakeholders:

Invitation procedure

The stakeholder consultation was conducted by Yunshui Guangdong Environmental Protection Co., Ltd. with assistance from Profit Carbon Environmental Energy Technology (Shanghai) Co., Ltd. Stakeholder groups were identified, and they were informed through oral and written means about the meeting. The invitation letter was sent by email to participants. This invitation email was done 2 weeks before the meeting date.

Place and date of the meeting

The stakeholder consultation was held at a meeting room of Unit 1505, Building A, No.264 Xingtai Road, Shiqiao Street, Panyu District, Guangzhou. on 02/05/2019.

Meeting Participants

The meeting was attended by local residents and representatives from the following stakeholder categories:

1. Local residents/farmers
2. Local government representatives
3. Representative of the project owner

There were 30 participants who accepted the invitation, attended the meeting and returned the questionnaire.

Meeting procedure

- Registration (30 min)
- Opening (15 min)
- Introduction by Yunshui Guangdong Environmental Protection Co., Ltd. (15 min)
- Description of the project and environmental impacts (30 min)
- Purpose of VCS, and relation of the project and VCS (30 min)
- Questions and Answers session (10 min)
- Completing questionnaire (20 min)

In the stakeholder consultation, all attendees were invited to express their comments. some feedback and comments were received, however, these feedbacks mainly focus on the questions of project technology, project mechanism operation and the environmental impact. There were no comments on project design and monitoring methods. The minutes of stakeholder meeting was recorded by PP.

Continuous Input / Grievance Expression Process Book

A grievance book is put in the communication room at the main door of the project owner company and local town office. The local stakeholders can provide feedbacks there as well. The town head will reach project owner if any comments are received.

In all, all the villagers and local government attending the meeting are all supportive of the Project and to date there has been no need to modify the due to the comments received.

2.3 Environmental Impact

Air Quality

The treatment facilities emitting odor in the wastewater treatment plant are closed units, and the odor is collected and then enters the deodorization system through the fan. According to the environmental impact assessment report, after treatment, the odor emission can reach the emission standard of odorous pollutants and will not affect the air quality.

Water Quality

The wastewater treatment plant treats a mixture of residential sewage and industrial wastewater, and the treated effluent meets the Level A standard of the "Emission Standard for Pollutants from Municipal Wastewater Treatment Plants(GB18918-2002)" and the level 1 standard of the Guangdong local standards "water pollutants emission limits (DB44/26-2001) ". Therefore, the project's effluent discharge meets national discharge standards and does not cause water pollution problems.

Noise

According to the environmental impact assessment report, the sound generated by the project after it is put into operation can meet the third category of the national sound environment quality standard, and will not produce noise pollution to the surrounding environment.

Solid Waste

Solid waste is disposed of in accordance with methods that comply with national environmental regulations, so there is no environmental risk.

Guangdong province Environmental Protection Bureau believed that the construction of the project is in line with national industrial policy, and has a good energy-saving emission reduction effect, from the perspective of environmental protection, the project will not cause any environmental impact, and therefore agreed to the construction of Yunshui Wastewater Treatment Plant Project in Guangdong Province. The above description can be proved by the approval of environmental impact assessment from Guangdong government.

2.4 Public Comments

Besides, as per section 3.17.6 of the VCS Standard (Version 4.2), all projects are subject to a 30-day public comment period. The date on which the project is listed on the project pipeline marks the beginning of the project’s 30-day public comment period. This project will be open for public comment on the verra website. The project shall be listed and comments shall be incorporated later.

2.5 AFOLU-Specific Safeguards

Not applicable.

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

The following methodologies are applicable to the project activity:

AM0080 Mitigation of greenhouse gases emissions with treatment of wastewater in aerobic wastewater treatment plants (Version 01.0)[1]

The latest version of the following tools will also be used in this Project activity:

Tool 02 Combined tool to identify the baseline scenario and demonstrate additionality (Version 07.0)[2]

Tool 05 Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation (Version 03.0)[3]

Tool 07 Tool to calculate the emission factor for an electricity system (Version 07.0)[4]

Tool 24 Common practice (Version 03.1)[5]

3.2 Applicability of Methodology

Justification for the choice of the selected methodology is shown in the following table:

AM0080 Mitigation of greenhouse gases emissions with treatment of wastewater in aerobic wastewater treatment plants (Version 01)	
Eligibility Criteria	**Justification for the Project Activity**
This methodology is applicable to project activities that implement a new aerobic wastewater treatment plant for the treatment of domestic and/or industrial wastewater. The sludge produced in the aerobic wastewater treatment plant in the project activity is either: (1) Treated in the same way as the sludge that would have been produced in the anaerobic open lagoons system in the baseline scenario would	Yunshui Wastewater Treatment Plant Project in Guangdong province (hereafter referred to as the project) introduces 16 aerobic wastewater treatment plant to treat wastewater from towns in some regions of Guangdong Province. The sludge generated from the aerobic wastewater treatment plant in the project activity is dried under controlled and aerobic conditions and subsequently sent to a landfill for disposal.

[1]https://cdm.unfccc.int/filestorage/C/D/M/CDMWF_AM_5FZ9G0W3ZKWF7Y8X3F07T11YNQIDQR/EB47_repan02_AM0080_NM0250.pdf?t=RTJ8cXpjemxsfDCOO44xil_J65OfshjSTUAF

[2] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-02-v7.0.pdf

[3] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v3.0.pdf

[4] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf

[5] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-24-v1.pdf

have been treated. This includes one of the following two options: (i) the sludge is dumped or left to decay; or (ii) the sludge is dried under controlled and aerobic conditions, and then disposed to a landfill with methane recovery or used in soil application (2) Treated in a new anaerobic digester, with the biogas extracted from the anaerobic digester being flared and/or used to generate electricity and/or heat. The residues from the anaerobic digester are dehydrated, limed and stored before final disposal in a controlled landfill.	According to issued Sludge Disposal Letter, and the sludge would be transported to the local landfill, which has a methane recovery device. Therefore, this condition is applicable.
The project activity either replaces an existing anaerobic open lagoons system, with or without conversion of the sludge treatment system, or is an alternative to a new to be built anaerobic open lagoons system;	The project activity is an alternative to a new to be built anaerobic open lagoons system. Therefore, this condition is applicable.
Loading in the wastewater streams has to be high enough to ensure that the existing or new to be built anaerobic open lagoons system develops an anaerobic bottom layer and that algal oxygen production can be ruled out;	The existing anaerobic open lagoons system inthe baseline scenario is an open stabilization lagoons with a depth greater than 5 m. According to the stabilization lagoons design specification, the entire open pond is completely in an anaerobic environment at this depth level, anaerobic open lagoons system can develop an anaerobic bottom layer and that algal oxygen production can be ruled out[6]. Therefore, this condition is applicable.
The average depth of the existing or new to be built anaerobic open lagoons system is at least 1 meter. In case of an existing anaerobic open lagoons system in the baseline scenario, the depth of the lagoons should be verified based on historical data available for one year before the implementation of the project activity. In case of a new to be built anaerobic open lagoons system, the depth of the lagoons should be determined following the guidance provided in Step 1 of the section "Procedure for the identification of the most plausible baseline scenario and assessment of additionality";	As established in section 1.1, the project activity is an alternative to a new to be built anaerobic open lagoons system. As per Tool 02 "Combined tool to identify the baseline scenario and demonstrate additionality" and the document "stabilization lagoons design specification[6]", describing the baseline, the average depth of the existing or new to be built anaerobic open lagoons system is at least 1 meter. Therefore, this condition is applicable.
The residence time of the organic matter in the anaerobic open lagoons system is at least 30 days. In case of an existing anaerobic open lagoons system	As established in section 1.1, the project activity is an alternative to a new to be built anaerobic open lagoons system.

[6]http://shigongdaquan.max.book118.com/%E5%BB%BA%E7%AD%91%E8%A7%84%E8%8C%83/%E5%BB%BA%E7%AD%91%E8%A7%84%E8%8C%83CJJ/CJJ54T-1993%E6%B1%A1%E6%B0%B4%E7%A8%B3%E5%AE%9A%E5%A1%98%E8%AE%BE%E8%AE%A1%E8%A7%84%E8%8C%83.pdf

in the baseline scenario, the residence time of the organic matter in the lagoon should be verified based on historical data available for one year before the implementation of the project activity. In case of a new to be built anaerobic open lagoons system, the residence time of organic matter in the lagoons should be determined following the guidance provided in Step 1 of the section "Procedure for the identification of the most plausible baseline scenario and assessment of additionality".	As per to tool 02 *Combined tool to identify the baseline scenario and demonstrate additionality* and the document "Guideline on Project Construction and Investment for Rural Sewage Treatment", describing the baseline, residence time of organic matter is at least 30 days. Therefore, this condition is applicable.
The wastewater would have been treated in an existing (W3) or new to be built (W6) anaerobic open lagoons system under clearly anaerobic conditions and without methane recovery and flaring;	As established in section 1.1 of the PD, the wastewater would have been treated in a new to be built (W6) anaerobic open lagoons system under clearly anaerobic conditions and without methane recovery and flaring. Therefore, this condition is applicable.
The sludge that would have been produced in the baseline lagoons system would have been dumped or left to decay (S1), or dried under controlled and aerobic conditions and then disposed to a landfill with methane recovery or used in soil application (S2);	The sludge generated in this baseline scenario is treated in the same way as in the project scenario, where it is dried under controlled conditions and then sent to a landfill with methane recovery for disposal (S2). Therefore, this condition is applicable.
The electricity produced with biogas in the project scenario, if any, would have been produced using fossil fuels in a captive power plant (E1), or obtained from the grid (E2);	As per Feasibility Study Report, biogas power generation does not exist in the project scenario. Therefore, this condition is not applicable.
The heat produced with biogas in the project scenario, if any, would have been produced using fossil fuels in a captive cogeneration power plant (H1), or using fossil fuels in a boiler (H2).	As per Feasibility Study Report, there is no biogas for heat production in the project scenario. Therefore, this condition is not applicable.
Tool 02 Combined tool to identify the baseline scenario and demonstrate additionality (Version 07.0)	
The tool is applicable to all types of proposed project activities. However, in some cases, methodologies referring to this tool may require adjustments or additional explanations as per the guidance in the respective methodologies. This could include, inter alia, a listing of relevant alternative scenarios that should be considered in Step 1, any relevant types of barriers other than those presented in this tool and guidance on how common practice should be established.	Alternative scenarios, barrier analysis, investment analysis and common practice analysis will be carried out based on Tool 02. Refer to section 3.4 and 3.5 of the PD for more details.
Tool 05 Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation (Version 03.0)	
If emissions are calculated for electricity consumption, the tool is only applicable if one out of	The project activity will use electricity from grid (the Project is connected to the South China

the following three scenarios applies to the sources of electricity consumption: (a) Scenario A: Electricity consumption from the grid. The electricity is purchased from the grid only, and either no captive power plant(s) is/are installed at the site of electricity consumption or, if any captive power plant exists on site, it is either not operating or it is not physically able to provide electricity to the electricity consumer; (b) Scenario B: Electricity consumption from (an) off-grid fossil fuel fired captive power plant(s). One or more fossil fuel fired captive power plants are installed at the site of the electricity consumer and supply the consumer with electricity. The captive power plant(s) is/are not connected to the electricity grid; or (c) Scenario C: Electricity consumption from the grid and (a) fossil fuel fired captive power plant(s). One or more fossil fuel fired captive power plants operate at the site of the electricity consumer. The captive power plant(s) can provide electricity to the electricity consumer. The captive power plant(s) is/are also connected to the electricity grid. Hence, the electricity consumer can be provided with electricity from the captive power plant(s) and the grid.	Power Grid (SCPG), which falls under scenario A of Tool 05 (Version 03.0). Therefore, emissions related to electricity consumption need to be calculated. Electricity bill were provided as evidence.
This tool can be referred to in methodologies to provide procedures to monitor amount of electricity generated in the project scenario, only if one out of the following three project scenarios applies to the recipient of the electricity generated: (a) Scenario I: Electricity is supplied to the grid; (b) Scenario II: Electricity is supplied to consumers/electricity consuming facilities; or (c) Scenario III: Electricity is supplied to the grid and consumers/electricity consuming facilities.	This methodological tool is applied for calculating for emission by electricity consumption in project activity. Therefore, this criterion is not applicable.
This tool is not applicable in cases where captive renewable power generation technologies are installed to provide electricity in the project activity, in the baseline scenario or to sources of leakage. The tool only accounts for CO_2 emissions.	Yunshui Wastewater Treatment Plant Project introduces aerobic wastewater treatment plant to treat wastewater from towns in some regions of Guangdong Province to replace the traditional open anaerobic lagoon. No captive renewable power generation technologies will be installed to provide electricity in the project activity, in the baseline scenario or to sources of leakage. Tool 05 is used for calculating project emissions of CO_2. This criterion is not applicable.
Tool 07 Tool to calculate the emission factor for an electricity system (Version 07.0)	

This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity that is where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).	Baseline scenario is an open anaerobic lagoon. No electricity will be used, this criterion is not applicable.
Under this tool, the emission factor for the project electricity system can be calculated either for grid power plants only or, as an option, can include off-grid power plants. In the latter case, two sub-options under the step 2 of the tool are available to the project participants, i.e. option IIa and option IIb. If option IIa is chosen, the conditions specified in "Appendix 1: Procedures related to off-grid power generation" should be met. Namely, the total capacity of off-grid power plants (in MW) should be at least 10 per cent of the total capacity of grid power plants in the electricity system; or the total electricity generation by off-grid power plants (in MWh) should be at least 10 per cent of the total electricity generation by grid power plants in the electricity system; and that factors which negatively affect the reliability and stability of the grid are primarily due to constraints in generation and not to other aspects such as transmission capacity.	The electricity used by the project activity comes only from the South China Power Grid (SCPG). Electricity bill were provided as evidence. Emission factor for the project electricity system will be calculated for grid power plants only as per Tool 07.
In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex I country.	The project electricity system is located totally in Guangdong Province of China, which is not an Annex I country.
Under this tool, the value applied to the CO_2 emission factor of biofuels is zero.	The electricity used by the project activity comes only from the South China Power Grid (SCPG). As per requirements of this criterion, the value applied to the CO_2 emission factor of biofuels were zero. The latest available emission factor of ECPG issued by China DNA on 29/12/2020 was used to calculate emissions.
Tool 24 Common practice (Version 03.1)	
This methodological tool is applicable to project activities that apply the methodological tool "Tool for the demonstration and assessment of additionality", the methodological tool "Combined tool to identify the baseline scenario and demonstrate additionality", or baseline and monitoring methodologies that use the common practice test for the demonstration of additionality.	The project applies the methodological tool "Combined tool to identify the baseline scenario and demonstrate additionality" that use the common practice test for the demonstration of additionality.

In case the applied approved baseline and monitoring methodology defines approaches for the conduction of the common practice test that are different from those described in this methodological tool, the requirements contained in the methodology shall prevail.	It is consistent of Tool 24 (Version 03.1) and AM0080 (Version 01.0) on approaches for the conduction of the common practice test.

3.3 Project Boundary

According to the methodology AM0080, the spatial extent of the project boundary includes:

1) The site and facilities where the wastewater and sludge are treated in both the baseline and the project scenario;

2) Any on-site power plants that supply electricity to the wastewater and sludge treatment systems;

3) Any on-site facilities that generate heat used by the wastewater and sludge treatment systems;

4) If applicable, the anaerobic digester, the power and/or heat generation equipment and/or the flare installed under the project activity;

5) If grid electricity is displaced from electricity generation with biogas from an aerobic digester: the power plants connected to the grid, with the geographical boundary as specified in the latest approved version of the “Tool to calculate the emission factor for an electricity system”.

The project boundary is the physical and geographic boundary of 16 wastewater treatment plant, which mainly includes the site and facilities for sewage and sludge, electricity grid, the ancillary facilities for sewage and sludge treatment, and the office area of the wastewater treatment plant. The project boundary is shown in Figure 3-1 below.

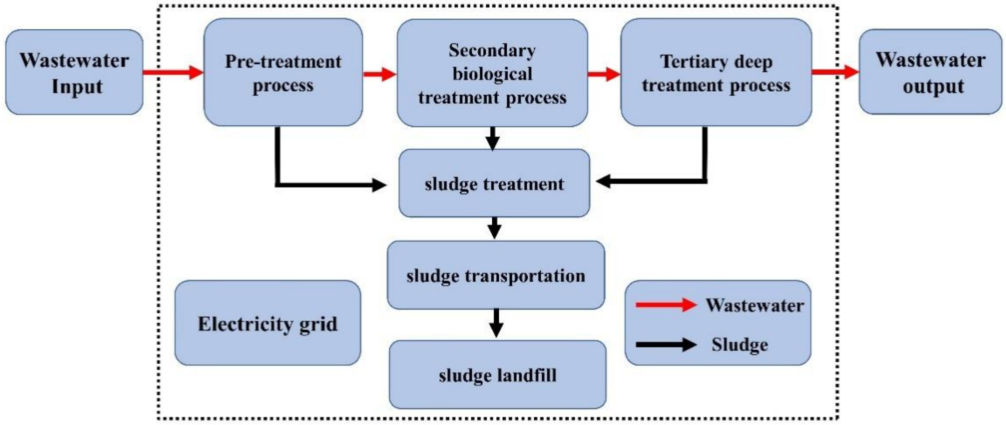

Figure 3-1 Diagram of the project boundary

The emission sources included in the project boundary are described in Table 3-3 below:

Table 3-3 Emission sources included in or excluded from the project boundary

Source		Gas	Included?	Justification/Explanation
Baseline	Wastewater and sludge treatment	CO_2	Excluded	CO_2 emissions from the decomposition of organic waste are not accounted for.
		CH_4	Included	Major source of emissions in the baseline.
		N_2O	Excluded	Excluded for simplification. This is conservative.
	Electricity and thermal energy generation	CO_2	Included	Emissions from electricity/thermal energy generation in the baseline scenario arise from: (i) Electricity/thermal energy used for the operation of the baseline wastewater/sludge treatment systems; (ii) Electricity/thermal energy displaced by biogas based electricity/thermal energy generated in the project activity, if any.
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.
	Transportation of sludge	CO_2	Included	Emissions from transportation of sludge may be included
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.
Project	Wastewater and	CO_2	Included	Major source of emissions in the baseline.

Source		Gas	Included?	Justification/Explanation
	sludge treatment	CH_4	Excluded	CO_2 emissions from the decomposition of organic waste are not accounted for.
		N_2O	Included	In case of projects that involve land application of sludge this is an important emission source. However, the sludge was sent to the landfill for sanitary landfill, and there is no land use. Therefore, N_2o emission is 0.
	On-site use of electricity and fossil fuels	CO_2	Included	May be an important emission source.
		CH_4	Excluded	Excluded for simplification. This emission source is assumed to be very small.
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be very small.
	Transportation of sludge	CO_2	Included	Emissions from transportation of sludge may be included.
		CH_4	Excluded	Excluded for simplification. This emission source is assumed to be very small.
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be very small.

3.4 Baseline Scenario

As per section of AM0080 Mitigation of greenhouse gases emissions with treatment of wastewater in aerobic wastewater treatment plants (Version 01.0), the most plausible baseline scenario shall be determined through the use of Tool 02 Combined tool to identify the baseline scenario and demonstrate additionality (Version 07.0) by the application of the following steps:

The most plausible baseline scenario is identified in the following steps:

Step 0. Demonstration that a proposed project activity is the First-of-its-kind;

Step 1. Identification of alternative scenarios;

Step 2. Barrier analysis;

Step 3. Investment analysis (if applicable);

Step 4. Common practice analysis.

Step 1: Identification of alternative scenarios

Step 1a: Define alternative scenarios to the proposed project activity

The identification of alternative baseline scenario should include all realistic and credible alternatives to the project activity that are consistent with current laws and regulations of the host country and that provide output or service (i.e. wastewater treatment capacity) with comparable quality as the proposed project activity. To identifying relevant alternative scenarios, provide an overview of other technologies or practices used for wastewater treatment that have been implemented prior to the start of the project activity or are currently underway in the relevant geographical area. The realistic and credible alternative(s) for the implementation of a new wastewater treatment may include

Identification of alternative scenarios – Wastewater			
Option	Description	Credibility	**Conclusion**
W1	Direct release of wastewaters to a nearby water body;	This option cannot be considered an alternative in the absence of the project activity as the direct release of wastewater to nearby water body is prohibited according to national legislation. This violates the Environmental Protection Law of the People's Republic of China [7]. Therefore, W1 can therefore not be considered as an alternative.	No
W2	Aerobic wastewater treatment facilities (e.g., activated sludge or filter bed type treatment);	Aerobic treatment processes such as activated sludge and biofilm comply with national government legislation on water quality and water discharge. **Therefore, W2 can therefore be considered as an alternative.**	Yes
W3	Existing anaerobic open lagoons system without methane recovery and flaring;	The treatment capacity of the existing open anaerobic lagoons at the project site has reached saturation. Therefore, there is no existing anaerobic open lagoons system. Therefore, W3 can therefore not be considered as an alternative.	No
W4	Existing anaerobic open lagoons system with methane recovery and flaring;	The treatment capacity of the existing open anaerobic lagoons at the project site has reached saturation, so there is no existing anaerobic open lagoons system. Therefore, W4 can therefore not be considered as an alternative.	No
W5	Existing anaerobic open lagoons system with methane recovery and	The treatment capacity of the existing open anaerobic lagoons at the project site has reached saturation. So there is no existing	No

[7] http://www.gov.cn/zhengce/2014-04/25/content_2666434.htm

	utilization for energy generation;	anaerobic open lagoons system. Therefore, W5 can therefore not be considered as an alternative.	
W6	New to be built anaerobic open lagoons system without methane recovery and flaring;	Due to the relatively low level of economic development of villages and towns and the decentralized nature of most of the wasterwater, anaerobic open lagoons system has a high potential for treating such village sewage as a low-cost wastewater treatment method[8,9]. And the treatment capacity of the existing open anaerobic lagoons at the project site has reached saturation, the implementation of a new to be built anaerobic open lagoons system without methane recovery and flaring is an option that can be considered as an alternative to the project activity. **Therefore, W6 can therefore be considered as an alternative.**	Yes
W7	New to be built anaerobic open lagoons system with methane recovery and flaring;	As described in W6, the implementation of a new to be built anaerobic open lagoons system is an option. Compared with other anaerobic processes, open anaerobic lagoons with methane recovery and flaring are technically more difficult at present, and there is generally no methane recovery process[10]. Therefore, W7 can therefore not be considered as an alternative.	No
W8	New to be built anaerobic open lagoons system with methane recovery and	As described in W6 and W7, although the implementation of a new to be built anaerobic open lagoons system is an option. Compared with other anaerobic processes, open	No

[8] https://journal.hep.com.cn/fese/EN/article/downloadArticleFile.do?attachType=PDF&id=11431

[9] https://kns.cnki.net/kcms/detail/detail.aspx?dbcode=CJFD&dbname=CJFDLAST2017&filename=HLKX201714094&v=gFyf77XR2GiRrOE9cn5x9rRnbDSd%25mmd2B1fJJq3RFhYRsbwnpa5H89MYwgAV7hTisTue

[10] https://kns.cnki.net/kcms/detail/detail.aspx?dbcode=CJFD&dbname=CJFD8589&filename=HLJO198904005&uniplatform=NZKPT&v=0CKCd%25mmd2BbemBbU0ovd2MIqzT2nDmQ1nzvEYiNniTxsKoXSikPSPowHYd3e%25mmd2BOgxxNou

	utilization for energy generation;	anaerobic lagoons with methane recovery and flaring are technically more difficult at present, and there is generally no methane recovery process[11]. Therefore, W8 can therefore not be considered as an alternative.	
W9	Anaerobic digester without methane recovery and flaring;	Nowadays, anaerobic wastewater digesters are normally applied in small quantity industrial wastewater treatment units, this time the influent of wastewater treatment plant is quite large. And then anaerobic digestion reactors in the field of wastewater treatment are generally suitable for treating organic wastewater with high concentration and difficult to biodegrade, and the effluent generally cannot meet the current primary A standard for wastewater discharge (less than 40mg/L)[12]. Therefore, W9 can therefore not be considered as an alternative.	No
W10	Anaerobic digester with methane recovery and flaring;	Nowadays, anaerobic wastewater digesters are normally applied in small quantity industrial wastewater treatment units, this time the influent of wastewater treatment plant is quite large, and then anaerobic digestion reactors in the field of wastewater treatment are generally suitable for treating organic wastewater with high concentration and difficult to biodegrade, and the effluent generally cannot meet the current primary A standard for wastewater discharge (less than 40mg/L)[12]. Therefore, W10 can therefore not be considered as an alternative.	No
W11	Anaerobic digester with methane recovery and utilization for electricity or heat generation.	Nowadays, anaerobic wastewater digesters are normally applied in small quantity industrial wastewater treatment units, this time the influent of wastewater treatment	No

[11]https://kns.cnki.net/kcms/detail/detail.aspx?dbcode=CJFD&dbname=CJFD8589&filename=HLJO198904005&uniplatform=NZKPT&v=0CKCd%25mmd2BbemBbU0ovd2MIqzT2nDmQ1nzvEYiNniTxsKoXSikPSPowHYd3e%25mmd2BOgxxNou

[12] https://www.mee.gov.cn/gkml/hbb/bgth/201108/W020110826366697455079.pdf

		plant is quite large, and then anaerobic digestion reactors in the field of wastewater treatment are generally suitable for treating organic wastewater with high concentration and difficult to biodegrade, and the effluent generally cannot meet the current primary A standard for wastewater discharge (less than 40mg/L)[12]. Therefore, W11 can therefore not be considered as an alternative.	

Identification of alternative scenarios – Sludge			
Option	Description	Credibility	**Conclusion**
S1	The sludge would have been dumped or left to decay	According to national legislation, sludge is a waste product and must therefore be treated in a manner that prevents the waste to have a nocuous impact on the environment and the quality of life[13]. Therefore, S1 can therefore not be considered as an alternative.	No
S2	The sludge would have been dried under controlled and aerobic conditions, with disposal in a landfill with methane recovery or with use in soil application	According to the Law of the People's Republic of China on the Prevention and Control of Environmental Pollution by Solid Waste, the activities of solid waste eventually placed in landfills that meet the requirements of environmental protection regulations are in accordance with the requirements of laws and regulations[13]. As per to *Feasibility Study Report*, in the project activities, sludge would be treated by means of controlled drying under aerobic conditions and then disposed to a landfill with methane recovery. **Therefore, S2 can therefore be considered as an alternative.**	Yes
S3	Disposal of sludge in sludge pits under clearly anaerobic conditions	According to national legislation, sludge is a waste product and must therefore be treated in a manner that prevents the waste to have a	No

[13] https://www.mee.gov.cn/ywgz/fgbz/fl/202004/t20200430_777580.shtml

		nocuous impact on the environment and the quality of life[13]. In addition, the anaerobic treatment of sludge in the sludge pits is actually an incomplete treatment method. Therefore, S3 can therefore not be considered as an alternative.	
S4	Land application of the sludge	According to national legislation, sludge is a waste product and must therefore be treated in a manner that prevents the waste to have a nocuous impact on the environment and the quality of life[13]. Considering the COD concentration of the wastewater influent and some of its industrial characteristics, the land use of sludge cannot be considered. Therefore, S4 can therefore not be considered as an alternative.	No
S5	Composting	Composting requires expensive equipment and consumes a lot of manpower and management, and occupies a considerable amount of land. Therefore, S5 can therefore not be considered as an alternative	
S6	Mineralization	The option complies with the national legislation, and might be considered for W2 and W6 in absence of the project activity. However, the sludge mineralization technology developed both domestically and internationally is not mature and expensive enough to be used industrially. Therefore, S6 can therefore not be considered as an alternative.	No
S7	Disposal of sludge in a landfill without landfill gas capture	This option does not comply with national legislation. The Technical Specifications for Sludge Treatment of Municipal Wastewater Treatment Plant stipulates that when sludge from municipal wastewater treatment plants enters a domestic waste landfill, its sludge	No

		moisture content should be less than 60%[14]. However, S7 scenario does not specify reducing the moisture content of the sludge to below 60% before sending it to the landfill. Therefore, the sludge needs to be dewatered before entering the landfill for landfill treatment. Therefore, S7 can therefore not be considered as an alternative.	
S8	Disposal of sludge in a landfill with landfill gas capture and flare	This option does not comply with national legislation. The technical specification for sanitary landfill treatment of domestic waste in China stipulates that when sludge from municipal wastewater treatment plants enters a domestic waste landfill, its sludge moisture content should be less than 60% above[14]. However, S8 scenario does not specify reducing the moisture content of the sludge to below 60% before sending it to the landfill. Therefore, the sludge needs to be dewatered before entering the landfill for landfill treatment. Therefore, S8 can therefore not be considered as an alternative.	No
S9	Disposal of sludge in a landfill with landfill gas capture and utilization for energy generation	This option does not comply with national legislation. The technical specification for sanitary landfill treatment of domestic waste in China stipulates that when sludge from municipal wastewater treatment plants enters a domestic waste landfill, its sludge moisture content should be less than 60%[14]. However, S9 scenario does not specify reducing the moisture content of the sludge to below 60% before sending it to the landfill. Therefore, the sludge needs to be dewatered before entering the landfill for landfill treatment. Therefore, S9 can therefore not be considered as an alternative.	No

[14] http://www.mee.gov.cn/gkml/hbb/bgth/201004/W020100401574292358556.pdf

S10	Anaerobic digestion with methane recovery and utilization for energy generation	Sludge from wastewater treatment plants has the characteristics of high sand content and low organic matter in China, in which the organic matter content of sludge is only 30%-60%, much lower than 60%-75% in foreign countries, so the sludge often produces less gas in the process of anaerobic digestion, and the benefits of sludge treatment projects are low, and the gas production of many anaerobic digestion projects are not up to the design value; in addition, the high sand content will also cause a certain degree of damage to the anaerobic digestion equipment[15]. Therefore, S10 can not be considered as an alternative.	No
S11	Anaerobic digestion with methane recovery and flaring;	Sludge from wastewater treatment plants has the characteristics of high sand content and low organic matter in China, in which the organic matter content of sludge is only 30%-60%, much lower than 60%-75% in foreign countries, so the sludge often produces less gas in the process of anaerobic digestion, and the benefits of sludge treatment projects are low, and the gas production of many anaerobic digestion projects are not up to the design value; in addition, the high sand content will also cause a certain degree of damage to the anaerobic digestion equipment[15]. Therefore, S11 can not be considered as an alternative.	No
S12	Anaerobic digestion with methane recovery and utilization for energy generation and following disposal in a landfill without further methane recovery.	Sludge from wastewater treatment plants has the characteristics of high sand content and low organic matter in China, in which the organic matter content of sludge is only 30%-60%, much lower than 60%-75% in foreign countries, so the sludge often produces less gas in the process of anaerobic digestion, and the benefits of sludge treatment projects are low, and the gas production of many anaerobic	No

[15] http://qikan.cqvip.com/Qikan/Article/Detail?id=7105351862

		digestion projects are not up to the design value; in addition, the high sand content will also cause a certain degree of damage to the anaerobic digestion equipment[15]. Therefore, S12 can not be considered as an alternative.	

Identification of alternative scenarios – Electricity			
Option	Description	Credibility	**Conclusion**
E1	Power generation using fossil fuels in a captive power plant;	Open anaerobic lagoon in the baseline scenario do not consume electricity. Therefore, E1 cannot be considered as an alternative.	No
E2	Electricity generation in the grid;	Open anaerobic lagoon in the baseline scenario do not consume electricity. Therefore, E2 cannot be considered as an alternative.	No
E3	Electricity generation using renewable sources of energy.	Open anaerobic lagoon in the baseline scenario do not consume electricity. Therefore, E3 cannot be considered as an alternative.	No

Identification of alternative scenarios – Heat			
Option	Description	Credibility	**Conclusion**
H1	Heat generation using fossil fuels in a captive cogeneration plant;	Neither aerobic wastewater treatment plants nor open anaerobic ponds use fossil fuels to generate heat in a captive cogeneration plant. Therefore, H1 cannot be considered as an alternative.	No
H2	Heat generation using fossil fuels in a boiler;	Neither aerobic wastewater treatment plants nor open anaerobic ponds use fossil fuels to generate heat in a captive cogeneration plant. . Therefore, H2 cannot be considered as an alternative.	No

H3	Heat generation using renewable sources of energy.	Neither aerobic wastewater treatment plants nor open anaerobic ponds use fossil fuels to generate heat in a captive cogeneration plant. . Therefore, H3 cannot be considered as an alternative.	No

In summary, the remaining realistic and credible alternative scenarios for wastewater treatment processes are:

Alternative	Wastewater/Sludge /Electricity/Heat	Description
1	W2-S2	Aerobic wastewater treatment facilities (e.g. activated sludge or filter bed type treatment) with sludge being dried under controlled and aerobic conditions and its disposal in a landfill with methane recovery or with use in soil application. This scenario is same to the project but is not a VCS project activity
2	W6-S2	New to be built anaerobic open lagoons system without methane recovery and flaring with sludge being dried under controlled and aerobic conditions and its disposal in a landfill with methane recovery or with use in soil application. This scenario continue adopts best available and commonly used low-cost solution for wastewater treatment.

3.5 Additionality

Additionality for the project activity is demonstrated using Tool 02 Combined tool to identify the baseline scenario and demonstrate additionality (Version 07.0).

Step 1b: Consistency with mandatory laws and regulations

The above options are all considered to follow all mandatory applicable legal and regulatory requirements. The outcome of Step 1b is unchanged from Step 1a.

Step 2: Barrier analysis

There are no technology barriers, acceptability barriers and financial barriers that may prevent these two alternative scenarios to occur. As per Tool 02 Combined tool to identify the baseline scenario and demonstrate additionality (Version 07.0), go to Step 3 investment analysis.

Step 3: Investment analysis

As per paragraph 25 in section 4.4 of Tool 02 of Combined tool to identify the baseline scenario and demonstrate additionality (Version 07.0). Identify the financial indicator, such as IRR, NPV, cost benefit ratio, or unit cost of service (e.g. levelized cost of electricity production in $/kWh or levelized cost of delivered heat in $/GJ) most suitable for the project type and decision-making context. The unit cost of wastewater treatment (UCWT) has been used as the most meaningful indicator for the investment comparison analysis. The unit cost of service is calculated taking into consideration costs defined in the methodology: Land cost, Engineering, procurement and construction cost, operation and maintenance cost, administration cost, fuel cost, capital cost and interest, revenue from electricity and/or heat sales, all other costs of implementing the technology of each alternative option and all revenues generated by the implementation of the proposed technology except for carbon credits revenues.

Inputs to the financial analysis

The parameters required in calculating UCWT for the two remaining alternatives after step 2 are listed in Table 3-4 below

Table 3-4 Calculating UCWT for the two remaining alternatives

Financial analysis		
Parameters \ Alternatives	Value[16]	
	Alternative 1 (W2-S2)	Alternative 2 (W6-S2)
Construction Investment (10,000 RMB)	89,159.94	27,674
1 Annual Operation Cost (10,000 RMB):	8,075.65	3,196[17]
1.1 Power cost (10,000 RMB)	1,499.08	——
1.2 Salary and welfare cost (10,000 RMB)	1,920.00	——
1.3 Water cost (10,000 RMB)	153.46	——
1.4 Sludge treatment cost (10,000 RMB)	846.45	——
1.5 Reagent fee (10,000 RMB)	259.48	——
1.6 Maitenance cost (10,000 RMB)	243.23	——

[16] The data source for Alternative 1 is from FSR, the data source for Alternative 2 is from Guideline on Project Construction and Investment for Rural Sewage Treatment.

[17] According to the "Guideline on Project Construction and Investment for Rural Sewage Treatment", the annual operation cost of anaerobic open lagoons is 0.5 RMB/m^3, so the operating cost is 175,150m^3/d×0.5RMB/m^3×365d=3,1960,000 RMB/year.

1.7 Management and other cost (10,000 RMB)	2,910.72	——
1.8 Depreciation of fixed assets (10,000 RMB)	243.23	——
Average Annual Total Cost (10,000 RMB)	11,936.81	4,362
Amount of Wastewater Treated (10000 m^3/Year)	6,393	6,393
UCWT (10,000 RMB)	1.87	0.68

The comparison of the two alternatives lead to the conclusion that based on the chosen parameters, anaerobic open lagoons system with sludge dried under controlled and aerobic conditions, with disposal in a landfill with methane recovery, is the financially most attractive scenario.

Sensitivity analysis

A sensitivity analysis of +/- 10% on the following parameters was conducted:

a. Construction Investment;

b. Annual Operation Cost; and

c. Wastewater Treated.

Table 3-5 Sensitivity Analysis of UCWT on Construction Investment (Unit: RMB/m^3)

Construction Investment	-10%	-5%	0%	5%	10%	Critical point
Alternative 1 (W2-S2)	1.80	1.83	1.87	1.90	1.93	-179%
Alternative 2 (W6-S2)	0.66	0.67	0.68	0.69	0.70	

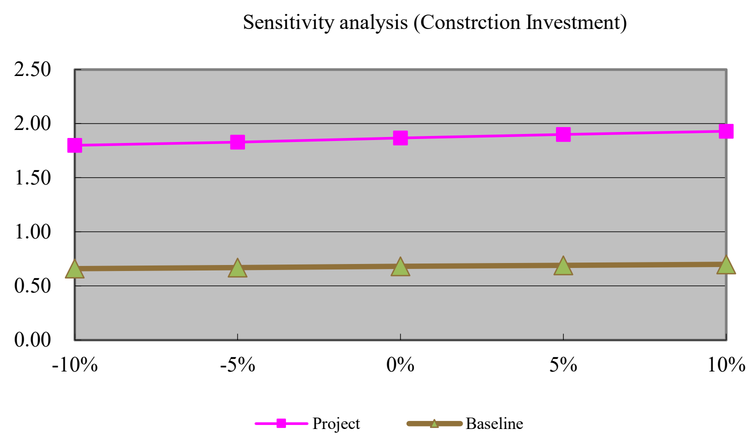

Figure 3-2 Sensitivity Analysis (Construction Investment)

According to Table 3-4, Alternative 2 is the most economical attractive alternative. The unit wastewater treatment cost of Alternative 1 becomes the same as Alternative 2 only when the construction cost of Alternative 1 decreases by 179%. The price index of investment in fixed asset for Guangdong Province has continued increased in recent years[18]. Therefore, it is not likely to implement the project activity with the Construction Investment reducing by 179%.

Table 3-6 Sensitivity Analysis of TCPU on Annual Operation Cost (Unit: RMB/m^3)

Annual Operation Cost	-10%	-5%	0%	5%	10%	Critical point
Alternative 1 (W2-S2)	1.75	1.81	1.87	1.93	1.99	-99%
Alternative 2 (W6-S2)	0.63	0.66	0.68	0.71	0.73	

[18] http://www.gd.gov.cn/zwgk/sjfb/sjkx/content/post_2090799.html

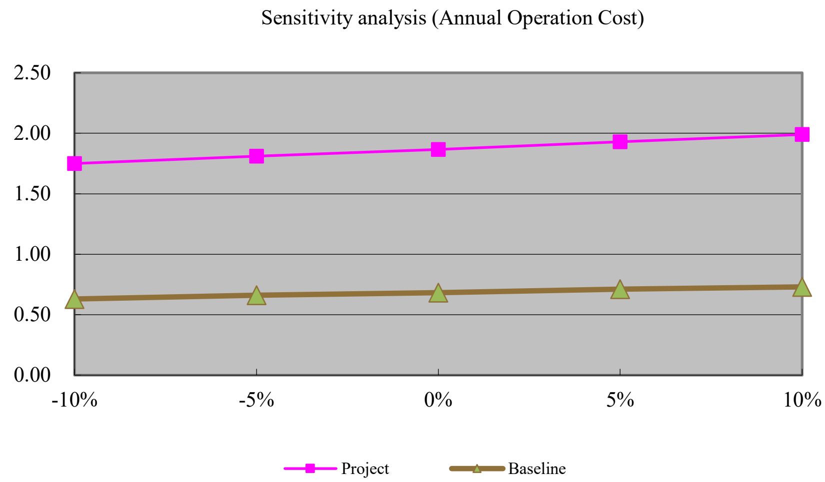

Figure 3-3 Sensitivity Analysis (Annual Operation Cost)

When the Annual Operation Cost decreases 99%, the unit wastewater treatment cost of Alternative 1 becomes the same as Alternative 2. The Annual Operation Cost mainly consist of power cost, salary and welfare cost, water cost, sludge treatment cost, reagent fee, maitenance cost, management and other management cost, depreciation of fixed assets. According to the Feasibility Study Report, the above costs remain basically stable, so, it is not likely to decrease the Annual Operation Cost by 99%.

Table 3-7 Sensitivity Analysis of TCPU on Wastewater Treated (Unit: RMB/m^3)

Wastewater Treated	**-10%**	**-5%**	**0%**	**5%**	**10%**	**Critical point**
Alternative 1 (W6-S2)	2.07	1.97	1.87	1.78	1.70	175%
Alternative 2 (W6-S2)	0.76	0.72	0.68	0.65	0.62	

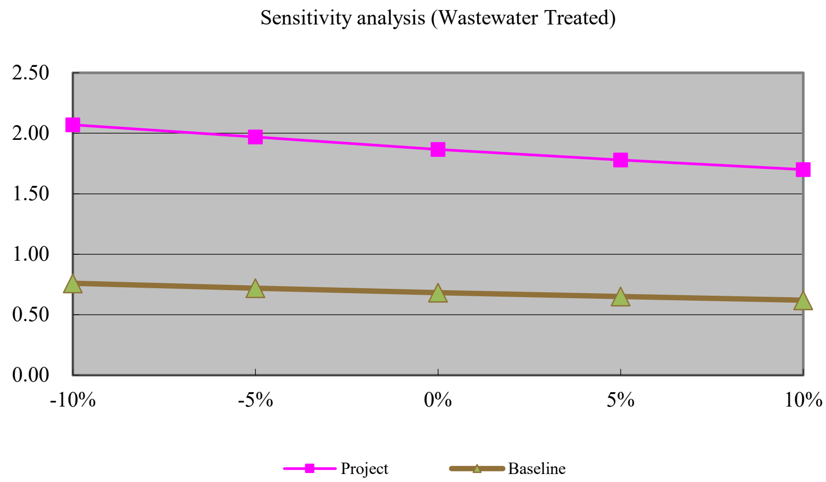

Figure 3-5 Sensitivity Analysis (Wastewater Treated)

When the Wastewater Treated increased by 175.00%, the unit wastewater treatment cost of Alternative 1 becomes the same as Alternative 2. However, from the Feasibility Study Report of the project, the amount of wastewater treated is fixed. A further 175% increase in the amount of wastewater to be treated is not possible. So, the increase in amount of wastewater treated by 77.00% is unrealistic.

The sensitivity analysis further confirms that construction of alternative 2 is the most economically attractive option. Compared with the proposed project activity under taken without being registered as a VCS project activity, construction of a new open anaerobic lagoon in several towns in Guangdong Province is the lowest cost option and is selected as the most economically attractive alternative.

According to the unit cost of wastewater treatment, alternative 2 is the most economically attractive option. Furthermore, the sensitivity analysis is conclusive and confirms the result of the investment comparison analysis.

Therefore, the lowest unit cost of wastewater treatment (alternative 2) is considered as the baseline scenario.

Investment analysis has been conducted in section B.4. As per *Tool 24 Common practice* (Version 03.1), Step 4 common practice analysis will be conducted as follows:

Step 4: Common practice analysis

The proposed project will achieve significant greenhouse gas (GHG) reductions by replacing open anaerobic lagoons in the baseline scenario with an aerobic wastewater plant. Therefore, according to the "*Tool for the demonstration and assessment of additionality*" (version 07.0.0), the measure of the proposed project belongs to “Methane formation avoidance”. Thus, sub-steps are adopted to take the common practice analysis

Sub-step 4a. The proposed CDM project activity(ies) applies measure(s) that are listed in the definitions section above.

The proposed project is belonged to type (D) measure listed in the latest version of the “Guidelines on common practice, i.e., Methane formation avoidance (example: use of biomass that would have been left to decay in a solid waste disposal site resulting in the formation and emission of methane, for energy generation). As per additionality tool, the “Guidelines on common practice” available on the UNFCCC website is applied as below:

Sub-step 4a.1: calculate applicable capacity or output range as +/-50% of the total design capacity or output of the proposed project activity.

As above, treatment capacity of wastewater treatment projects between 87,575 m^3/d - 262,725 m^3/d are included in the range of similar projects.

Sub-step 4a.2: identify similar projects (both CDM and non-CDM) which fulfill all of the following conditions:

(a) The projects are located in the applicable geographical area;

Guangdong Province is selected as the applicable geographical area for the common practice, and the reasons are detailed as follows:

- Due to the differences of economic development level, population size, industrial structure, fundamental infrastructure, strategic planning etc, the investment environment of each province in China varies widely.Therefore, a project in the same province as the proposed project (i.e. Guangdong Province) was selected as a similar project.

In summary, the waste water treatment projects within the same province are selected for the common practice analysis.

(b) The projects apply the same measure as the proposed project activity;

Projects using aerobic biological treatment technology for wastewater treatment should be used.

(c) The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity;

The project is an aerobic wastewater treatment process, sludge would be dried under controlled and aerobic conditions, with disposal in a landfill with methane recovery;

Besides, the following conditions should also be fulfilled:

(d) The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant;

(e) The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1;

(f) The projects started commercial operation before the project design document is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project act.

In Guangdong province, all wastewater plants that deliver the same output or capacity as calculated in step 1 (range of 87,575 m^3/d - 262,725 m^3/d), as the proposed project activity using aerobic biological treatment technology for wastewater treatment and have started commercial operation before the start date of the project (03/09/2020), the project is included.

Sub-step 4a.3: within the projects identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number N_{all}.

Through searching UNFCC website, CDM website, China CER exchange info-platform, GS website, VCS website, Anhui Provincial Statistics Bureau website. local Development and Reform Commission of Guangdong Province website and other public information, there are no similar projects, therefore $N_{all}=0$

Sub-step 4a.4: within similar projects identified in Step 3, identify those that apply technologies different that the technology applied in the proposed project activity. Note their number N_{diff}.

$N_{diff}=0$

Sub-step 4a.5: calculate factor $F=1-N_{diff}/N_{all}$ representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity.

According to the analysis above, $N_{all}= N_{diff}$, and the factor $F=1-N_{diff}/N_{all}=1-1=0<0.2$. Therefore, the result of common practice assessment is: $N_{all}-N_{diff}=0 < 3$. Therefore, the proposed activity is not a common practice in the region.

Conclusion of the assessment and demonstration of additionality

As per paragraph 18 of *Tool 24 Common practice* (Version 03.1), the proposed project activity is not a “common practice” within a sector in the applicable geographical area. As per paragraph 40 of *Tool 02 Combined tool to identify the baseline scenario and demonstrate additionality* (Version 07.0), the project activity is additional.

3.6 Methodology Deviations

There is no methodology deviation for the project.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

This section details the applicable formulas from the methodologies applied to the project Activity. The baseline emission of the project may have consisted of the following emission sources in water treatment, sludge treatment, transport and energy consumption:

i) Baseline methane emissions from anaerobic treatment of the wastewater in open lagoons;

ii) Baseline emissions on account of decomposition of final sludge;

iii) Baseline emissions associated with electricity generation avoided, equivalent to electricity generated with biogas recovery in project activity;

iv) Baseline carbon dioxide emissions on account of heat consumption in water and sludge treatment processes;

Therefore, baseline emissions can be calculated as:

$$BE_y = BE_{CH_4,ww,y} + BE_{CH_4,sl,y} + BE_{EL,y} + BE_{HG,y} + BE_{TR,sl,y} \quad (1)$$

Where:

BE_y	=	Baseline emissions in year y (tCO_2e/year)
$BE_{CH_4,ww,y}$	=	Methane emissions from anaerobic treatment of the wastewater in the baseline scenario in year y (tCO_2e/year)
$BE_{CH_4,sl,y}$	=	Methane emissions from treatment of sludge in the baseline scenario in year y (tCO_2e/year)
$BE_{EL,y}$	=	CO_2 emissions associated with electricity generation that is displaced by the project activity and/or electricity consumption in the baseline scenario in year y (tCO_2/year)
$BE_{HG,y}$	=	CO_2 emissions associated with fossil fuel combustion for heating equipment that is displaced by the project in year y (tCO_2/year)
$BE_{TR,sl,y}$	=	CO_2 emissions associated with transportation of sludge in the baseline scenario in year y(tCO_2/year)

i). Calculation of baseline emissions from treatment of wastewater ($BE_{CH4,ww,y}$):

$$BE_{CH_4,ww,y} = GWP_{CH_4} \times B_o \times COD_{BL,ww,y} \times MCF_{BL,ww,y} \quad (2)$$

Where:

$BE_{CH_4,ww,y}$	=	Methane emissions from anaerobic treatment of the wastewater in the baseline scenario in year y (tCO_2e/year)
GWP_{CH_4}	=	Global Warming Potential of methane valid for the commitment period (tCO_2e/tCH_4)
B_o	=	Quantity of chemical oxygen demand that would have been treated in the baseline scenario in year y (tCOD/year)
$COD_{BL,ww,y}$	=	Quantity of chemical oxygen demand that would have been treated in the baseline scenario in year y (tCOD/year)
$MCF_{BL,ww,y}$	=	Average baseline methane conversion factor in year y, representing the fraction of organic load that would be degraded to CH_4 in the baseline scenario (fraction)

$$COD_{BL,ww,y}=AD_{BL} \times COD_{PJ,ww,y} \quad (3)$$

Where：

$COD_{BL,ww,y}$	=	Quantity of chemical oxygen demand that would have been treated in the baseline scenario in year y (tCOD/year)
AD_{BL}	=	Effluent adjustment factor expressing the percentage of COD that is degraded in open lagoons in the baseline scenario (fraction)
$COD_{PJ,ww,y}$	=	Quantity of chemical oxygen demand that is treated in the aerobic wastewater treatment plant in the project activity in year y (tCOD/year)

With $COD_{PJ,ww,y}=\sum Q_{PJ,ww,y} \times W_{PJ,COD,ww,m}$ (4)

Where：

$Q_{PJ,ww,y}$	=	Quantity of wastewater that is treated in the aerobic wastewater plant in the project activity in month m
$W_{PJ,COD,ww,m}$	=	Average Chemical Oxygen Demand in the wastewater that is treated in the aerobic wastewater treatment plant in the project activity in month m

With $AD_{BL}=(1-(COD_{BL,out,x}/COD_{BL,in,x}))$ (5)

Where：

AD_{BL}	=	Effluent adjustment factor expressing the percentage of COD that is degraded in open lagoons in the baseline scenario (fraction)
$COD_{BL,out,x}$	=	COD of the effluent of open lagoons in the baseline scenario in the period x (tCOD)
$COD_{BL,in,x}$	=	COD directed to the open lagoons in the baseline scenario in the period x (tCOD)
x	=	Representative historical reference period (at least one year)

With $MCF_{BL,ww,y}=f_{BL,d} \times f_{BL,T,y} \times 0.89$ (6)

Where:

$MCF_{BL,ww,y}$	=	Average baseline methane conversion factor in year y, representing the fraction of organic load that would be degraded to CH_4 in the baseline scenario (fraction)
$f_{BL,d}$	=	Factor expressing the influence of the depth of the lagoon on methane generation (fraction)
$f_{BL,T,y}$	=	Factor expressing the influence of the temperature on the methane generation in year y(fraction)
0.89	=	Conservativeness factor

With $f_{BL,T,y} = \frac{\sum_{m=1}^{12} f_{T,m} \times COD_{BL,available,m}}{\sum_{m=1}^{12} AD_{BL} \times Q_{PJ,ww,m} \times w_{PJ,ww,COD,m}}$ (7)

Where:

$f_{BL,T,y}$	=	Factor expressing the influence of the temperature on the methane generation in year y(fraction)
$f_{T,m}$	=	Factor expressing the influence of the temperature on the methane generation in month m(fraction)
$COD_{BL,available,m}$	=	Quantity of chemical oxygen demand available for degradation in month m (tCOD)

AD_{BL}	=	Effluent adjustment factor expressing the percentage of COD that is degraded in open lagoons in the baseline scenario (fraction)
$Q_{PJ,ww,m}$	=	Quantity of wastewater that is treated in the aerobic wastewater treatment plant in the project activity in month m (m³)
$w_{PJ,ww,COD,m}$	=	Average chemical oxygen demand in the wastewater that is treated in the aerobic wastewater treatment plant in the project activity in month m (tCOD/m³)
m	=	Months of year y of the crediting period

$$\text{With } f_{T,m} = \begin{cases} 0 \quad if\ T_{2,m} < 283K \\ exp\left(\frac{E\times\ (T_{2,m}-T_1)}{R\times T_1\times T_{2,m}}\right)\ \ if\ 283K < T_{2,m} < 303K \\ 1\ \ if\ T_{2,m} > 303K \end{cases} \tag{8}$$

Where:

$f_{T,m}$	=	Factor expressing the influence of the temperature on the methane generation in month m(fraction)
E	=	Activation energy constant (15,175 cal/mol)
T1	=	303.16 K (273.16 K + 30 K)
R	=	Ideal gasconstant (1.987 cal/K.mol)
$T_{2,m}$	=	Average temperature at the project site in month m (K)
m	=	Months of year y of the crediting period

With $COD_{BL,available,m}$=$AD_{BL} \times Q_{PJ,ww,m} \times w_{PJ,ww,m}$×(1-$f_{T,m}$)×$COD_{BL,available,m-1}$ (9)

Where:

$COD_{BL,available,m}$	=	Quantity of chemical oxygen demand available for degradation in month m (tCOD)
AD_{BL}	=	Effluent adjustment factor expressing the percentage of COD that is degraded in open lagoons in the baseline scenario (fraction)
$Q_{PJ,ww,m}$	=	Quantity of wastewater that is treated in the aerobic wastewater treatment plant in the project activity in month m (m³)
$w_{PJ,ww,m}$	=	Average chemical oxygen demand in the wastewater that is treated in the aerobic wastewater treatment plant in the project activity in month m (tCOD/m³)

$f_{T,m}$	=	Factor expressing the influence of the temperature on the methane generation in month m (fraction)
$COD_{BL,available,m-1}$	=	Months of year y of the crediting period

The baseline emissions from treatment of wastewater are calculated as:

Wastewater Treatment Plant	$BE_{CH_4,ww,y}$ tCO2e/year
Xiaqiao Town wastewater Treatment Plant	2,613
Qujie Town wastewater Treatment Plant	3,731
Xinyi City Dinbao Town wastewater treatment Plant	1,115
Xinyi City Qianpai Town wastewater treatment Plant	2,993
Xianqiao South Wastewater Treatment Plant	5,330
Qiankeng Town North wastewater Plant	4,703
Shangsha Town wastewater Treatment Plant	5,172
Baita Town wastewater Treatment Plant	3,563
Luoding Fourth Domestic wastewater Treatment Plant	11,193
Shitan Town wastewater Treatment Plant	3,135
Litan Town wastewater Treatment Plant	3,731
jiulong Town wastewater Treatment Plant	2,514
Shakou Town wastewater Treatment Plant	5,230
Bomei Town wastewater Treatment Plant	16,546
Nantang Town wastewater Treatment Plant	16,546
Chikeng Town wastewater Treatment Plant	3,040

ii). Calculation of baseline emissions from treatment of sludge ($BE_{CH4,sl,y}$)

Based on the analysis of the baseline scenario in Section 3.4, the sludge that produced in the baseline scenario from the treatment of wastewater in the open lagoons system would have been treated by means of controlled drying under aerobic conditions and then disposed to a landfill with methane recovery (S2), the corresponding methane emissions ($BE_{CH4,sl,y}$) are considered to be negligible and are not accounted for.

Therefore, the baseline emissions from treatment of sludge are calculated as:

Wastewater Treatment Plant	$BE_{CH_4,sl,y}$ tCO2e/year
Xiaqiao Town wastewater Treatment Plant	0
Qujie Town wastewater Treatment Plant	0
Xinyi City Dinbao Town wastewater treatment Plant	0

Xinyi City Qianpai Town wastewater treatment Plant	0
Xianqiao South Wastewater Treatment Plant	0
Qiankeng Town North wastewater Plant	0
Shangsha Town wastewater Treatment Plant	0
Baita Town wastewater Treatment Plant	0
Luoding Fourth Domestic wastewater Treatment Plant	0
Shitan Town wastewater Treatment Plant	0
Litan Town wastewater Treatment Plant	0
jiulong Town wastewater Treatment Plant	0
Shakou Town wastewater Treatment Plant	0
Bomei Town wastewater Treatment Plant	0
Nantang Town wastewater Treatment Plant	0
Chikeng Town wastewater Treatment Plant	0

iii). Calculation of baseline emissions from consumption of electricity ($BE_{EL,y}$)

There is no power consumption in this baseline scenario. Therefore, the baseline emissions from treatment of sludge are calculated as:

Wastewater Treatment Plant	$BE_{EL,y}$ tCO_2e/year
Xiaqiao Town wastewater Treatment Plant	0
Qujie Town wastewater Treatment Plant	0
Xinyi City Dinbao Town wastewater treatment Plant	0
Xinyi City Qianpai Town wastewater treatment Plant	0
Xianqiao South Wastewater Treatment Plant	0
Qiankeng Town North wastewater Plant	0
Shangsha Town wastewater Treatment Plant	0
Baita Town wastewater Treatment Plant	0
Luoding Fourth Domestic wastewater Treatment Plant	0
Shitan Town wastewater Treatment Plant	0
Litan Town wastewater Treatment Plant	0
jiulong Town wastewater Treatment Plant	0
Shakou Town wastewater Treatment Plant	0
Bomei Town wastewater Treatment Plant	0

Nantang Town wastewater Treatment Plant	0
Chikeng Town wastewater Treatment Plant	0

iv). **Baseline emissions from the generation of heat ($BE_{HG,y}$)**

There are no emissions from the generation of heat in this baseline scenario, therefore, the baseline emissions from treatment of sludge are calculated as:

Wastewater Treatment Plant	$BE_{HG,y}$ $tCO_2e/year$
Xiaqiao Town wastewater Treatment Plant	0
Qujie Town wastewater Treatment Plant	0
Xinyi City Dinbao Town wastewater treatment Plant	0
Xinyi City Qianpai Town wastewater treatment Plant	0
Xianqiao South Wastewater Treatment Plant	0
Qiankeng Town North wastewater Plant	0
Shangsha Town wastewater Treatment Plant	0
Baita Town wastewater Treatment Plant	0
Luoding Fourth Domestic wastewater Treatment Plant	0
Shitan Town wastewater Treatment Plant	0
Litan Town wastewater Treatment Plant	0
jiulong Town wastewater Treatment Plant	0
Shakou Town wastewater Treatment Plant	0
Bomei Town wastewater Treatment Plant	0
Nantang Town wastewater Treatment Plant	0
Chikeng Town wastewater Treatment Plant	0

v). **Baseline emissions from transportation of sludge ($BE_{TR,sl,y}$)**

The baseline emissions resulting from transportation of sludge that would have been produced in the baseline scenario should be calculated as:

$$BE_{TR,sl,y} = \sum_i N_{BL,i,y} \times D_{BL,i} \times F_{BL,i} \times NCV_{BL,j} \times EF_{BL,j} \quad (10)$$

Where:

$BE_{TR,sl,y}$	CO_2 emissions associated with transportation of sludge in the baseline scenario in year y (tCO_2/year)

$N_{BL,i,y}$	Number of trips (vehicle of type i with similar loading capacity) for transportation of the sludge that would have been produced in the baseline scenario in year y (trips)
$D_{BL,i}$	Average distance per trip, that would have been travelled by the transportation vehicle of type i, for transportation of sludge in the baseline scenario (km)
$F_{BL,i}$	Specific fuel consumption of the transportation vehicle of type i (mass or volume units of fuel/km)
$NCV_{BL,j}$	Net calorific value of the transportation fuel j (TJ/mass or volume units)
$EF_{BL,j}$	CO_2 emission factor of the transportation fuel j (tCO_2/TJ)
i	Vehicle type
j	Fuel type used in vehicles
y	Year of the crediting period

Determination of $N_{BL,i,y}$

$$N_{BL,i,y} = \frac{Q_{BL,sl,y}}{q_{BL,i}} \quad (11)$$

Where：

$N_{BL,i,y}$	=	Number of trips (vehicle of type i with similar loading capacity) for transportation of final sludge generated by the waste water treatment system in the baseline scenario in the year y (trips)
$Q_{BL,sl,y}$	=	Quantity of sludge that would have been produced and treated in the baseline scenario in the year y (tonnes)
$q_{BL,i}$	=	Average vehicular capacity of the transportation vehicle of type i (tonnes/trip)
y	=	Year of the crediting period

The baseline emissions from transportation of sludge are calculated as:

Wastewater Treatment Plant	$BE_{TR,sl,y}$ tCO_2e/year
Xiaqiao Town wastewater Treatment Plant	0.95
Qujie Town wastewater Treatment Plant	1.32
Xinyi City Dinbao Town wastewater treatment Plant	0.70
Xinyi City Qianpai Town wastewater treatment Plant	1.19
Xianqiao South Wastewater Treatment Plant	1.42
Qiankeng Town North wastewater Plant	1.40
Shangsha Town wastewater Treatment Plant	1.76

Baita Town wastewater Treatment Plant	1.06
Luoding Fourth Domestic wastewater Treatment Plant	2.97
Shitan Town wastewater Treatment Plant	0.93
Litan Town wastewater Treatment Plant	0.99
jiulong Town wastewater Treatment Plant	0.99
Shakou Town wastewater Treatment Plant	1.25
Bomei Town wastewater Treatment Plant	3.97
Nantang Town wastewater Treatment Plant	3.97
Chikeng Town wastewater Treatment Plant	0.90

Therefore, baseline emissions can be calculated as:

$$BE_y = BE_{CH_4,ww,y} + BE_{CH_4,sl,y} + BE_{EL,y} + BE_{HG,y} + BE_{TR,sl,y}$$

Wastewater Treatment Plant	BE tCO_2e/year
Xiaqiao Town wastewater Treatment Plant	2,613
Qujie Town wastewater Treatment Plant	3,732
Xinyi City Dinbao Town wastewater treatment Plant	1,115
Xinyi City Qianpai Town wastewater treatment Plant	2,994
Xianqiao South Wastewater Treatment Plant	5,331
Qiankeng Town North wastewater Plant	4,704
Shangsha Town wastewater Treatment Plant	5,174
Baita Town wastewater Treatment Plant	3,564
Luoding Fourth Domestic wastewater Treatment Plant	11,195
Shitan Town wastewater Treatment Plant	3,136
Litan Town wastewater Treatment Plant	3,731
jiulong Town wastewater Treatment Plant	2,515
Shakou Town wastewater Treatment Plant	5,230
Bomei Town wastewater Treatment Plant	16550
Nantang Town wastewater Treatment Plant	16550
Chikeng Town wastewater Treatment Plant	3,041

4.2 Project Emissions

The project emissions associated with project wastewater and sludge treatment systems may consist of the following emissions sources;

i) Methane emissions on account of inefficiency of the wastewater treatment system;

ii) Project emissions from physical leakage of methane from anaerobic digesters and flare system;

iii) Project N_2O emissions on account of energy final sludge land application;

iv) Project emissions on account of energy consumption (electrical and/or thermal) of the wastewater and sludge treatment systems;

v) Project emissions from fossil fuel consumption in the project activity;

vi) Project emissions on account of transportation of final sludge produced.

Project emissions are calculated as follows:

$$PE_y = PE_{CH_4,ww,y} + PE_{CH_4,sl,y} + PE_{N_2O,sl,y} + PE_{EC,y} + PE_{FC,y} + PE_{TR,sl,y} \quad (12)$$

Where：

PE_y	=	Project emissions in the year y (tCO_2e/year)
$PE_{CH_4,ww,y}$	=	Project emissions from inefficiency of the wastewater treatment system and presence of degradable organic carbon in the treated wastewater.
$PE_{CH_4,sl,y}$	=	Methane emissions from treatment of sludge in the project activity in year y (tCO_2/year).
$PE_{N_2O,sl,y}$	=	Project N_2O emissions on account of energy final sludge land application.
$PE_{EC,y}$	=	Project emissions associated with electricity consumption in the project activity.
$PE_{FC,y}$	=	Project emissions associated with fossil fuel consumption in the project activity.
$PE_{TR,sl,y}$	=	Project emissions on account of transportation of final sludge produced in the year y(tCO_2/annum).

i) Methane emissions from treatment of wastewater ($PE_{CH4,ww,y}$)

$$PE_{CH_4,ww,y} = PE_{CH_4,wwtp,y} + PE_{CH_4,effl,y} \quad (13)$$

If $OR_i \geq 0.8$, $PE_{CH_4,wwp,y} = 0$ (14)

If $OR_i < 0.8$, $PE_{CH_4,wwp,y} = \sum_{i=1}^{365} GWP_{CH_4} \times B_{0,ww} \times 0.4 \times (COD_{PJ,ww,i} - COD_{PJ,effl,i})$ (15)

Where：

$PE_{CH_4,wwtp,y}$	=	Methane emissions from the aerobic wastewater treatment plant in year y due to inadequate operation and/or overloading (tCO_2e/year);

$PE_{CH_4,effl,y}$	=	Methane emissions due to the presence of degradable organic carbon in the effluent from the aerobic wastewater treatment plant in year y (tCO_2e/year);
OR_i	=	Oxidisation ratio, representing the ratio between organic matter in the output and organicmatter in the input of the aerobic wastewater treatment plant in day i of year y (fraction);
GWP_{CH_4}	=	Global Warming Potential of CH_4. (tCO_2/tCH_4);
$B_{0,ww}$	=	Maximum methane producing capacity of the wastewater treated in the year y.(Faction)
0.4	=	Default methane conversion factor (MCF) for not well managed plants (fraction);
$COD_{PJ,ww,i}$	=	Quantity of chemical oxygen demand that enters the aerobic wastewater treatment plant in the project activity in the day i of year y (tCOD);
$COD_{PJ,effl,i}$	=	Quantity of chemical oxygen demand in the effluent of the wastewater treatment plant in the project activity in the day i of year y (tCOD).

With $OR_i = (COD_{PJ,ww,i} - COD_{PJ,effl,i}) / COD_{PJ,ww,i}$ (16)

Where:

OR_i	=	Oxidisation ratio, representing the ratio between organic matter in the output andorganic matter in the input of the aerobic wastewater treatment plant in day iof year y (fraction)
$COD_{PJ,ww,i}$	=	Quantity of chemical oxygen demand that enters the aerobic wastewater treatment plant in the project activity in the day i of year y (tCOD)
$COD_{PJ,effl,i}$	=	Quantity of chemical oxygen demand in the effluent of the wastewater treatment plant in the project activity in the day i of year y (tCOD)

The quantities of chemical oxygen demands in the wastewater and effluent are calculated as follows:

$$COD_{PJ,ww,i}=Q_{PJ,ww,i} \times w_{PJ,COD,ww,i} \quad (17)$$

$$COD_{PJ,effl,i}=Q_{PJ,effl,i} \times w_{PJ,COD,effl,i} \quad (18)$$

Where:

$COD_{PJ,ww,i}$	=	Quantity of chemical oxygen demand that enters the aerobic wastewater treatment plant in the project activity in the day i of year y (tCOD)
$Q_{PJ,ww,i}$	=	Quantity of wastewater that is treated in the aerobic wastewater treatment plant in the project activity in day i of year y (m^3)
$w_{PJ,COD,ww,i}$	=	Average chemical oxygen demand in the wastewater that is treated in the aerobic wastewater treatment plant in the project activity in day i of year y ($tCOD/m^3$)
$COD_{PJ,effl,i}$	=	Quantity of chemical oxygen demand in the effluent of the wastewater treatment plant in the project activity in the day i of year y (tCOD)
$Q_{PJ,effl,i}$	=	Quantity of effluent that leaves the aerobic wastewater treatment plant in the project activity in day i of year y (m^3)

$w_{PJ,COD,effl,i}$	=	Average chemical oxygen demand in the effluent that leaves the aerobic wastewater treatment plant in the project activity in day i of year y ($tCOD/m^3$)

Determination of the oxidisation ratio (OR_i)

$$OR_i = \frac{COD_{PJ,ww,i} - COD_{PJ,effl,i}}{COD_{PJ,ww,i}} \quad (19)$$

Where:

OR_i	=	Oxidisation ratio, representing the ratio between organic matter in the output and organic matter in the input of the aerobic wastewater treatment plant in day i of year y (fraction)
$COD_{PJ,ww,i}$	=	Quantity of chemical oxygen demand that enters the aerobic wastewater treatment plant in the project activity in the day i of year y (tCOD)
$COD_{PJ,effl,i}$	=	Quantity of chemical oxygen demand in the effluent of the wastewater treatment plant in the project activity in the day i of year y (tCOD)

After calculation, $OR_i \geq 0.8$, so:

Wastewater Treatment Plant	$PE_{CH_4,wwtp,y}$ tCO_2e/year
Xiaqiao Town wastewater Treatment Plant	0
Qujie Town wastewater Treatment Plant	0
Xinyi City Dinbao Town wastewater treatment Plant	0
Xinyi City Qianpai Town wastewater treatment Plant	0
Xianqiao South Wastewater Treatment Plant	0
Qiankeng Town North wastewater Plant	0
Shangsha Town wastewater Treatment Plant	0
Baita Town wastewater Treatment Plant	0
Luoding Fourth Domestic wastewater Treatment Plant	0
Shitan Town wastewater Treatment Plant	0
Litan Town wastewater Treatment Plant	0
jiulong Town wastewater Treatment Plant	0
Shakou Town wastewater Treatment Plant	0
Bomei Town wastewater Treatment Plant	0
Nantang Town wastewater Treatment Plant	0
Chikeng Town wastewater Treatment Plant	0

ii). Methane emissions due to the presence of degradable organic carbon in the effluent $PE_{CH4,effl,y}$

The methane emissions due to the presence of degradable organic carbon in the effluent from the aerobic wastewater treatment plant are calculated as:

$$PE_{CH_4,effl,y} = GWP_{CH_4} \times MCF_{PJ,effl,y} \times \sum_{i=1}^{365} COD_{PJ,effl,i} \times B_0 \quad (20)$$

Where:

$PE_{CH_4,effl,y}$	=	Methane emissions due to the presence of degradable organic carbon in the effluent from the aerobic wastewater treatment plant in year y (tCO_2e/year)
GWP_{CH_4}	=	Global Warming Potential of methane valid for the commitment period (tCO_2e/tCH_4)
$MCF_{PJ,effl,y}$	=	Average methane conversion factor in year y, representing the fraction of organic load in the effluent that is degraded to CH_4 in year y. The factor is based on the type of treatment and discharge pathway of the effluent of the aerobic wastewater treatment plant (fraction)
B_0	=	Maximum methane producing capacity of wastewater treated in the year y, expressing the maximum amount of CH_4 that can be produced from a given quantity of chemical oxygen demand (tCH_4/tCOD)
$COD_{PJ,effl,i}$	=	Quantity of chemical oxygen demand in the effluent of the wastewater treatment plant in the project activity in the day i of year y (tCOD)
y	=	Year of the crediting period

Determination of $MCF_{PJ,effl,y}$

$$MCF_{PJ,effl,y} = f_{PJ,d,y} \times f_{PJ,T,y} \times 0.89 \quad (21)$$

Where:

$MCF_{PJ,effl,y}$	=	Average baseline methane conversion factor in year y, representing the fraction of organic load in the effluent that is degraded to CH_4 in year y. The factor is based on the type of treatment and discharge pathway of the effluent of the aerobic wastewater treatment plant (fraction)
$f_{PJ,d,y}$	=	Factor expressing the influence of the depth on methane generation in year y
$f_{PJ,T,y}$	=	Factor expressing the influence of the temperature on the methane generation in year y
0.89	=	Conservativeness factor

Determination of $f_{PJ,T,y}$

$$f_{PJ,T,y} = \frac{\sum_{m=1}^{12} f_{T,m} \times COD_{PJ,available,m}}{\sum_{m=1}^{12} Q_{PJ,effl,m} \times w_{PJ,COD,effl,m}} \quad (22)$$

Where:

$f_{PJ,T,y}$	=	Factor expressing the influence of the temperature on the methane generation in year y
$f_{T,m}$	=	Factor expressing the influence of the temperature on the methane generation in month m
$COD_{PJ,available,m}$	=	Quantity of chemical oxygen demand in the effluent from the aerobic wastewater treatment plant available for degradation in month m (tCOD)
$Q_{PJ,effl,m}$	=	Quantity of effluent that leaves the aerobic wastewater treatment plant in the project activity in month m of year y (m^3)
$w_{PJ,COD,effl,m}$	=	Average chemical oxygen demand in the effluent that leaves the aerobic wastewater treatment plant in the project activity in month m of year y ($tCOD/m^3$)
m	=	Months of year y of the crediting period

$$\text{With } f_{T,m} = \begin{cases} 0 \quad if\ T_{2,m} < 283K \\ exp\left(\frac{E\times\ (T_{2,m}-T_1\ )}{R\times T_1\times T_{2,m}}\right)\ \ if\ 283K < T_{2,m} < 303K \\ 1\ \ if\ T_{2,m} > 303K \end{cases} \qquad (23)$$

Where:

$f_{T,m}$	=	Factor expressing the influence of the temperature on the methane generation in month m (fraction)
E	=	Activation energy constant (15,175 cal/mol)
T_1	=	303.16 K (273.16 K + 30 K)
R	=	Ideal gasconstant (1.987 cal/K.mol)
$T_{2,m}$	=	Average temperature at the project site in month m (K)
m	=	Months of year y of the crediting period

$$COD_{PJ,available,m} = Q_{PJ,effl,m} \times w_{PJ,COD,effl,m} + \left(1 - f_{T,m}\right) \times COD_{PJ,available,m-1} \qquad (24)$$

Where:

$COD_{PJ,available,m}$	=	Quantity of chemical oxygen demand available for degradation in the effluent from the aerobic wastewater treatment plant in month m (tCOD)
$Q_{PJ,effl,m}$	=	Quantity of effluent that leaves the aerobic wastewater treatment plant in the project activity in month m of year y (m^3)
$w_{PJ,COD,effl,m}$	=	Average chemical oxygen demand in the effluent that leaves the aerobic wastewater treatment plant in the project activity in month m of year y ($tCOD/m^3$)
$f_{T,m}$	=	Factor expressing the influence of the temperature on the methane generation in month m
$COD_{PJ,available,m-1}$	=	Months of year y of the crediting period

Methane emissions due to the presence of degradable organic carbon in the effluent are calculated as:

Wastewater Treatment Plant	$PE_{CH_4,effl,y}$ tCO2e/year
Xiaqiao Town wastewater Treatment Plant	0
Qujie Town wastewater Treatment Plant	0
Xinyi City Dinbao Town wastewater treatment Plant	0
Xinyi City Qianpai Town wastewater treatment Plant	0
Xianqiao South Wastewater Treatment Plant	0
Qiankeng Town North wastewater Plant	0
Shangsha Town wastewater Treatment Plant	0
Baita Town wastewater Treatment Plant	0
Luoding Fourth Domestic wastewater Treatment Plant	0
Shitan Town wastewater Treatment Plant	0
Litan Town wastewater Treatment Plant	0
jiulong Town wastewater Treatment Plant	0
Shakou Town wastewater Treatment Plant	0
Bomei Town wastewater Treatment Plant	0
Nantang Town wastewater Treatment Plant	0
Chikeng Town wastewater Treatment Plant	0

So the methane emissions from treatment of wastewater ($PE_{CH4,ww,y}$) can be calculated as:

$PE_{CH_4,ww,y} = PE_{CH_4,wwtp,y} + PE_{CH_4,effl,y}$ = 0 tCO_2e/year+0 tCO_2e/year=0 tCO_2e/year

iii). Methane emissions from treatment of sludge in the project activity in year y ($PE_{CH4,sl,y}$)

Sludge in this project activity is dried under controlled and aerobic conditions, and then disposed to a landfill with methane recovery or used in soil application, corresponding project emissions are considered to be negligible and should not be accounted for. Therefore:

Wastewater Treatment Plant	$PE_{CH_4,sl,y}$ tCO2e/year
Xiaqiao Town wastewater Treatment Plant	0
Qujie Town wastewater Treatment Plant	0
Xinyi City Dinbao Town wastewater treatment Plant	0
Xinyi City Qianpai Town wastewater treatment Plant	0
Xianqiao South Wastewater Treatment Plant	0
Qiankeng Town North wastewater Plant	0
Shangsha Town wastewater Treatment Plant	0

Baita Town wastewater Treatment Plant	0
Luoding Fourth Domestic wastewater Treatment Plant	0
Shitan Town wastewater Treatment Plant	0
Litan Town wastewater Treatment Plant	0
jiulong Town wastewater Treatment Plant	0
Shakou Town wastewater Treatment Plant	0
Bomei Town wastewater Treatment Plant	0
Nantang Town wastewater Treatment Plant	0
Chikeng Town wastewater Treatment Plant	0

$PE_{CH_4,sl,y} = 0$ tCO_2e/year

iv). N_2O emissions from treatment of sludge in the project activity in year y ($PE_{N2O,sl,y}$)

Nitrous oxide emissions are assumed to be negligible and need not be accounted for if the sludge is:

- Dried under controlled and aerobic conditions, and then disposed to a landfill; or,
- Treated in a new anaerobic digester and the residues from the anaerobic digester are dehydrated, limed and stored before final disposal in a controlled landfill.

As per FSR of the project activity, sludge generated by the project activity will be dried under controlled and aerobic conditions, with disposal in Yujixiangershan Landfill Site with methane recovery. Therefore:

Wastewater Treatment Plant	$PE_{N2O,sl,y}$ tCO_2e/year
Xiaqiao Town wastewater Treatment Plant	0
Qujie Town wastewater Treatment Plant	0
Xinyi City Dinbao Town wastewater treatment Plant	0
Xinyi City Qianpai Town wastewater treatment Plant	0
Xianqiao South Wastewater Treatment Plant	0
Qiankeng Town North wastewater Plant	0
Shangsha Town wastewater Treatment Plant	0
Baita Town wastewater Treatment Plant	0
Luoding Fourth Domestic wastewater Treatment Plant	0
Shitan Town wastewater Treatment Plant	0
Litan Town wastewater Treatment Plant	0
jiulong Town wastewater Treatment Plant	0

Shakou Town wastewater Treatment Plant	0
Bomei Town wastewater Treatment Plant	0
Nantang Town wastewater Treatment Plant	0
Chikeng Town wastewater Treatment Plant	0

$PE_{N2O,sl,y} = 0$ tCO_2e/year

v). **Project emissions associated with electricity consumption in the project activity($PE_{EC,y}$)**

Project emissions from electricity consumption (PEEC) used to run the entire aerobic wastewater treatment plant shall be calculated using Tool 05 Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation (Version 03.0). Electricity consumption from each relevant source should be monitored and summed up to EC_y

As per paragraph 16 of Tool 05 (Version 03.0), project emissions from consumption of electricity are calculated based on the quantity of electricity consumed, an emission factor for electricity generation and a factor to account for transmission losses, as follows:

$$PE_{Ec,y} = \sum j\, EC_{PJ,j,y} \times EF_{EL,j,y} \times (1 + TDL_{j,y}) \quad (25)$$

Where:

$PE_{Ec,y}$	=	Project emissions from electricity consumption in year y (t CO_2/yr).
$EC_{PJ,j,y}$	=	Quantity of electricity consumed by the project electricity consumption source j in year y (MWh/yr).
$EF_{EL,j,y}$	=	Emission factor for electricity generation for source j in year y(t CO_2/MWh).
$TDL_{j,y}$	=	Average technical transmission and distribution losses for providing electricity to source j in year y.

The electricity consumed by facilities of the geothermal system is sourced from local power grid connected to South China Power Grid (SCPG). Scenario A: Electricity consumption from the grid is applied to the proposed project. For project electricity consumption sources, a default value of 20% is used for $TD_{Lj,y}$.

Determination of the emission factor for electricity generation ($EF_{EL,j,y}$)

The determination of the emission factor for generation: Calculate the combined margin emission factor of the applicable electricity system using Tool to calculate the emission factor for an electricity system" (Version 07.0). $EF_{EL,j,y}$=$EF_{grid,CM,y}$.

The tool determines the CO_2 emission factor for the displacement of electricity generated by power plants in an electricity system, by calculating the "combined margin" emission factor (CM) of the electricity system. The CM is the result of a weighted average of two emission factors pertaining to the electricity system: the "operating margin" (OM) and the "building margin" (BM). The operating margin is the emission factor that refers to the group of existing power plants whose current electricity generation would be affected by the proposed project activity. The build margin is the emission factor that refers to the group of power plants whose construction and future operation would be affected by the proposed project activity

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times \omega_{OM} + EF_{grid,BM,y} \times \omega_{BM} \quad (26)$$

Where:

$EF_{grid,OM,y}$ = Operating margin CO_2 emission factor in year y, tCO_2/MWh

ω_{OM} = Weighting of operating margin emissions factor

$EF_{grid,BM,y}$ = Building margin CO_2 emission factor in year y, tCO_2/MWh.

ω_{BM} = Weighting of build margin emissions factor.

As per 2019 China regional power grid carbon dioxide baseline emission factor OM calculation instructions published by Ministry of Ecology and Environment of the People's Republic of China, $EF_{grid,OM,y}$= of South China Power Grid (SCPG) is 0.8042 tCO_2/MWh. $EF_{grid,BM,y}$= of East China Power Grid (ECPG) is 0.2135 tCO_2/MWh.

The project emissions from electricity consumption are calculated as:

Wastewater Treatment Plant	$PE_{Ec,y}$ tCO_2e/year
Xiaqiao Town wastewater Treatment Plant	370.7
Qujie Town wastewater Treatment Plant	471.8
Xinyi City Dinbao Town wastewater treatment Plant	249.4
Xinyi City Qianpai Town wastewater treatment Plant	467.1
Xianqiao South Wastewater Treatment Plant	763.6
Qiankeng Town North wastewater Plant	599.6
Shangsha Town wastewater Treatment Plant	751.0
Baita Town wastewater Treatment Plant	515.3
Luoding Fourth Domestic wastewater Treatment Plant	1,905.6
Shitan Town wastewater Treatment Plant	399.7
Litan Town wastewater Treatment Plant	442.2
jiulong Town wastewater Treatment Plant	442.2
Shakou Town wastewater Treatment Plant	536.0
Bomei Town wastewater Treatment Plant	1,677.4
Nantang Town wastewater Treatment Plant	1,695.7
Chikeng Town wastewater Treatment Plant	367.8

vi). Project emissions from transportation of sludge ($PE_{TR,sl,y}$)

The project emissions resulting from transportation of final sludge produced in the project activity should be calculated as:

$$PE_{TR,sl,y} = \sum_i N_{PJ,i,y} \times D_{PJ,i,y} \times F_{PJ,i,y} \times NCV_{PJ,j,y} \times EF_{PJ,j,y} \quad (27)$$

Where:

$PE_{TR,sl,y}$	=	CO_2 emissions associated with transportation of sludge in the project activity in year y (tCO_2/year)
$N_{PJ,i,y}$	=	Number of trips (vehicle of type i with similar loading capacity) for transportation of the sludge produced in the project activity in the year y (trips)
$D_{PJ,i,y}$	=	Average distance per trip travelled by the transportation vehicle of type i for transportation of sludge generated by the wastewater treatment system in the project activity in the year y (km)
$F_{PJ,i,y}$	=	Specific fuel consumption of the transportation vehicle of type i in the year y (mass or volume units of fuel/km)
$NCV_{PJ,j,y}$	=	Net calorific value of the transportation fuel j in the year y (TJ/mass or volume units)
$EF_{PJ,j,y}$	=	CO_2 emission factor of the transportation fuel j in the year y (tCO_2/TJ)
i	=	Type of vehicle
j	=	Year of the crediting period
y	=	Year of the crediting period

Determination of $N_{PJ,i,y}$

$$N_{PJ,i,y} = \frac{Q_{PJ,sl,y}}{q_{PJ,i}} \quad (12)$$

Where:

$Q_{PJ,sl,y}$	=	Quantity of sludge produced in the project activity in the year y (tonnes)
$q_{PJ,i}$	=	Average vehicular capacity of the transportation vehicle of type i (tonnes/trip)

The project emissions from transportation of sludge are calculated as:

Wastewater Treatment Plant	$PE_{TR,sl,y}$ tCO_2e/year
Xiaqiao Town wastewater Treatment Plant	2.8
Qujie Town wastewater Treatment Plant	2.2
Xinyi City Dinbao Town wastewater treatment Plant	1.5
Xinyi City Qianpai Town wastewater treatment Plant	2.5
Xianqiao South Wastewater Treatment Plant	3.0
Qiankeng Town North wastewater Plant	2.3
Shangsha Town wastewater Treatment Plant	2.9

Baita Town wastewater Treatment Plant	1.7
Luoding Fourth Domestic wastewater Treatment Plant	7.6
Shitan Town wastewater Treatment Plant	2.5
Litan Town wastewater Treatment Plant	2.6
jiulong Town wastewater Treatment Plant	2.6
Shakou Town wastewater Treatment Plant	3.2
Bomei Town wastewater Treatment Plant	10.2
Nantang Town wastewater Treatment Plant	9.8
Chikeng Town wastewater Treatment Plant	2.3

Project emissions are calculated as follows:

$$PE_y = PE_{CH_4,ww,y} + PE_{CH_4,sl,y} + PE_{N_2O,sl,y} + PE_{EC,y} + PE_{FC,y} + PE_{TR,sl,y}$$

Wastewater Treatment Plant	PE tCO_2e/year
Xiaqiao Town wastewater Treatment Plant	374
Qujie Town wastewater Treatment Plant	474
Xinyi City Dinbao Town wastewater treatment Plant	251
Xinyi City Qianpai Town wastewater treatment Plant	470
Xianqiao South Wastewater Treatment Plant	767
Qiankeng Town North wastewater Plant	602
Shangsha Town wastewater Treatment Plant	754
Baita Town wastewater Treatment Plant	518
Luoding Fourth Domestic wastewater Treatment Plant	1914
Shitan Town wastewater Treatment Plant	403
Litan Town wastewater Treatment Plant	445
jiulong Town wastewater Treatment Plant	251
Shakou Town wastewater Treatment Plant	540
Bomei Town wastewater Treatment Plant	1688
Nantang Town wastewater Treatment Plant	1706
Chikeng Town wastewater Treatment Plant	371

4.3 Leakage

The used technology is not equipment transferred from another activity, So no leakage is considered in this methodology.

$LE_y = 0$

4.4 Net GHG Emission Reductions and Removals

Emission reductions for any given year of the crediting period are obtained by subtracting project emissions and leakage from baseline emissions

ER_y = $BE_y - PE_y - LE_y$

Where:

ER_y = Emissions reductions of the project activity in year y (tCO_2e/year)

BE_y = Baseline emissions in year y (tCO_2e/year)

PE_y = Project emissions in year y (tCO_2e/year)

LE_y = Leakage emissions in year y (tCO_2e/year)

Emissions reductions are calculated as:

Xiaqiao Town wastewater Treatment Plant				
Year	**BE_y (t CO_2e)**	**PEy (t CO_2e)**	**LE_y (t CO_2e)**	**ER_y (t CO_2e)**
05/09/2020-31/12/2020	845	121	0	724
01/01/2021-31/12/2021	2,613	374	0	2,239
01/01/2022-31/12/2022	2,613	374	0	2,239
01/01/2023-31/12/2023	2,613	374	0	2,239
01/01/2024-31/12/2024	2,613	374	0	2,239
01/01/2025-31/12/2025	2,613	374	0	2,239
01/01/2026-31/12/2026	2,613	374	0	2,239
01/01/2027-31/12/2027	2,613	374	0	2,239
01/01/2028-31/12/2028	2,613	374	0	2,239
01/01/2029-31/12/2029	2,613	374	0	2,239
01/01/2030-02/09/2030	1,754	251	0	1,503
Total (t CO_2e)	26,116	3,738	0	22,378
Qujie Town wastewater Treatment Plant				
Year	**BE_y (t CO_2e)**	**PEy (t CO_2e)**	**LE_y (t CO_2e)**	**ER_y (t CO_2e)**
08/09/2020-31/12/2020	1,176	149	0	1,027
01/01/2021-31/12/2021	3,732	474	0	3,258

01/01/2022-31/12/2022	3,732	474	0	3,258
01/01/2023-31/12/2023	3,732	474	0	3,258
01/01/2024-31/12/2024	3,732	474	0	3,258
01/01/2025-31/12/2025	3,732	474	0	3,258
01/01/2026-31/12/2026	3,732	474	0	3,258
01/01/2027-31/12/2027	3,732	474	0	3,258
01/01/2028-31/12/2028	3,732	474	0	3,258
01/01/2029-31/12/2029	3,732	474	0	3,258
01/01/2030-02/09/2030	2,505	318	0	2,187
Total (t CO_2e)	37,269	4,733	0	32,536
Xinyi City Dinbao Town wastewater treatment Plant				
Year	BE_y (t CO_2e)	PEy (t CO_2e)	LE_y (t CO_2e)	ER_y (t CO_2e)
03/09/2020-31/12/2020	367	82	0	285
01/01/2021-31/12/2021	1,115	251	0	864
01/01/2022-31/12/2022	1,115	251	0	864
01/01/2023-31/12/2023	1,115	251	0	864
01/01/2024-31/12/2024	1,115	251	0	864
01/01/2025-31/12/2025	1,115	251	0	864
01/01/2026-31/12/2026	1,115	251	0	864
01/01/2027-31/12/2027	1,115	251	0	864
01/01/2028-31/12/2028	1,115	251	0	864
01/01/2029-31/12/2029	1,115	251	0	864
01/01/2030-02/09/2030	748	154	0	594
Total (t CO_2e)	11,150	2,495	0	8,655
Xinyi City Qianpai Town wastewater treatment Plant				
Year	BE_y (t CO_2e)	PEy (t CO_2e)	LE_y (t CO_2e)	ER_y (t CO_2e)
06/09/2020-31/12/2020	960	151	0	809
01/01/2021-31/12/2021	2,994	470	0	2,524
01/01/2022-31/12/2022	2,994	470	0	2,524
01/01/2023-31/12/2023	2,994	470	0	2,524
01/01/2024-31/12/2024	2,994	470	0	2,524
01/01/2025-31/12/2025	2,994	470	0	2,524
01/01/2026-31/12/2026	2,994	470	0	2,524
01/01/2027-31/12/2027	2,994	470	0	2,524
01/01/2028-31/12/2028	2,994	470	0	2,524
01/01/2029-31/12/2029	2,994	470	0	2,524
01/01/2030-02/09/2030	2,010	315	0	1,695
Total (t CO_2e)	29,916	4,696	0	25,220
Xianqiao South Wastewater Treatment Plant				

Year	BE_y (t CO_2e)	PEy (t CO_2e)	LE_y (t CO_2e)	ER_y (t CO_2e)
13/09/2020-31/12/2020	1,607	231	0	1,376
01/01/2021-31/12/2021	5,331	767	0	4,564
01/01/2022-31/12/2022	5,331	767	0	4,564
01/01/2023-31/12/2023	5,331	767	0	4,564
01/01/2024-31/12/2024	5,331	767	0	4,564
01/01/2025-31/12/2025	5,331	767	0	4,564
01/01/2026-31/12/2026	5,331	767	0	4,564
01/01/2027-31/12/2027	5,331	767	0	4,564
01/01/2028-31/12/2028	5,331	767	0	4,564
01/01/2029-31/12/2029	5,331	767	0	4,564
01/01/2030-02/09/2030	3,578	515	0	3,063
Total (t CO_2e)	53,164	7,649	0	45,515
Qiankeng Town North wastewater Plant				
Year	BE_y (t CO_2e)	PEy (t CO_2e)	LE_y (t CO_2e)	ER_y (t CO_2e)
10/09/2020-31/12/2020	1,456	186	0	1,270
01/01/2021-31/12/2021	4,704	602	0	4,102
01/01/2022-31/12/2022	4,704	602	0	4,102
01/01/2023-31/12/2023	4,704	602	0	4,102
01/01/2024-31/12/2024	4,704	602	0	4,102
01/01/2025-31/12/2025	4,704	602	0	4,102
01/01/2026-31/12/2026	4,704	602	0	4,102
01/01/2027-31/12/2027	4,704	602	0	4,102
01/01/2028-31/12/2028	4,704	602	0	4,102
01/01/2029-31/12/2029	4,704	602	0	4,102
01/01/2030-02/09/2030	3,157	404	0	2,753
Total (t CO_2e)	46,949	6,008	0	40,941
Shangsha Town wastewater Treatment Plant				
Year	BE_y (t CO_2e)	PEy (t CO_2e)	LE_y (t CO_2e)	ER_y (t CO_2e)
14/09/2020-31/12/2020	1,545	225	0	1,320
01/01/2021-31/12/2021	5,174	754	0	4,420
01/01/2022-31/12/2022	5,174	754	0	4,420
01/01/2023-31/12/2023	5,174	754	0	4,420
01/01/2024-31/12/2024	5,174	754	0	4,420
01/01/2025-31/12/2025	5,174	754	0	4,420
01/01/2026-31/12/2026	5,174	754	0	4,420
01/01/2027-31/12/2027	5,174	754	0	4,420
01/01/2028-31/12/2028	5,174	754	0	4,420
01/01/2029-31/12/2029	5,174	754	0	4,420

01/01/2030-02/09/2030	3,473	506	0	2,967
Total (t CO_2e)	51,584	7,517	0	44,067
Baita Town wastewater Treatment Plant				
Year	BE_y (t CO_2e)	PEy (t CO_2e)	LE_y (t CO_2e)	ER_y (t CO_2e)
13/09/2020-31/12/2020	1,074	156	0	918
01/01/2021-31/12/2021	3,564	518	0	3,046
01/01/2022-31/12/2022	3,564	518	0	3,046
01/01/2023-31/12/2023	3,564	518	0	3,046
01/01/2024-31/12/2024	3,564	518	0	3,046
01/01/2025-31/12/2025	3,564	518	0	3,046
01/01/2026-31/12/2026	3,564	518	0	3,046
01/01/2027-31/12/2027	3,564	518	0	3,046
01/01/2028-31/12/2028	3,564	518	0	3,046
01/01/2029-31/12/2029	3,564	518	0	3,046
01/01/2030-02/09/2030	2,392	348	0	2,044
Total (t CO_2e)	35,542	5,166	0	30,376
Luoding Fourth Domestic wastewater Treatment Plant				
Year	BE_y (t CO_2e)	PEy (t CO_2e)	LE_y (t CO_2e)	ER_y (t CO_2e)
15/09/2020-31/12/2020	3,312	566	0	2,746
01/01/2021-31/12/2021	11,195	1,914	0	9,281
01/01/2022-31/12/2022	11,195	1,914	0	9,281
01/01/2023-31/12/2023	11,195	1,914	0	9,281
01/01/2024-31/12/2024	11,195	1,914	0	9,281
01/01/2025-31/12/2025	11,195	1,914	0	9,281
01/01/2026-31/12/2026	11,195	1,914	0	9,281
01/01/2027-31/12/2027	11,195	1,914	0	9,281
01/01/2028-31/12/2028	11,195	1,914	0	9,281
01/01/2029-31/12/2029	11,195	1,914	0	9,281
01/01/2030-02/09/2030	7,514	1,285	0	6,229
Total (t CO_2e)	111,581	19,077	0	92,504
Shitan Town wastewater Treatment Plant				
Year	BE_y (t CO_2e)	PEy (t CO_2e)	LE_y (t CO_2e)	ER_y (t CO_2e)
09/09/2020-31/12/2020	979	126	0	853
01/01/2021-31/12/2021	3,136	403	0	2,733
01/01/2022-31/12/2022	3,136	403	0	2,733
01/01/2023-31/12/2023	3,136	403	0	2,733
01/01/2024-31/12/2024	3,136	403	0	2,733
01/01/2025-31/12/2025	3,136	403	0	2,733
01/01/2026-31/12/2026	3,136	403	0	2,733

01/01/2027-31/12/2027	3,136	403	0	2,733
01/01/2028-31/12/2028	3,136	403	0	2,733
01/01/2029-31/12/2029	3,136	403	0	2,733
01/01/2030-02/09/2030	2,105	271	0	1,834
Total (t CO_2e)	31,308	4,024	0	27,284
Litan Town wastewater Treatment Plant				
Year	**BE_y (t CO_2e)**	**PEy (t CO_2e)**	**LE_y (t CO_2e)**	**ER_y (t CO_2e)**
12/09/2020-31/12/2020	1,135	135	0	1,000
01/01/2021-31/12/2021	3,731	445	0	3,286
01/01/2022-31/12/2022	3,731	445	0	3,286
01/01/2023-31/12/2023	3,731	445	0	3,286
01/01/2024-31/12/2024	3,731	445	0	3,286
01/01/2025-31/12/2025	3,731	445	0	3,286
01/01/2026-31/12/2026	3,731	445	0	3,286
01/01/2027-31/12/2027	3,731	445	0	3,286
01/01/2028-31/12/2028	3,731	445	0	3,286
01/01/2029-31/12/2029	3,731	445	0	3,286
01/01/2030-02/09/2030	2,504	299	0	2,205
Total (t CO_2e)	37,218	4,439	0	32,779
jiulong Town wastewater Treatment Plant				
Year	**BE_y (t CO_2e)**	**PEy (t CO_2e)**	**LE_y (t CO_2e)**	**ER_y (t CO_2e)**
11/09/2020-31/12/2020	772	77	0	695
01/01/2021-31/12/2021	2,515	251	0	2,264
01/01/2022-31/12/2022	2,515	251	0	2,264
01/01/2023-31/12/2023	2,515	251	0	2,264
01/01/2024-31/12/2024	2,515	251	0	2,264
01/01/2025-31/12/2025	2,515	251	0	2,264
01/01/2026-31/12/2026	2,515	251	0	2,264
01/01/2027-31/12/2027	2,515	251	0	2,264
01/01/2028-31/12/2028	2,515	251	0	2,264
01/01/2029-31/12/2029	2,515	251	0	2,264
01/01/2030-02/09/2030	1,688	169	0	1,519
Total (t CO_2e)	25,095	2,506	0	22,589
Shakou Town wastewater Treatment Plant				
Year	**BE_y (t CO_2e)**	**PEy (t CO_2e)**	**LE_y (t CO_2e)**	**ER_y (t CO_2e)**
12/09/2020-31/12/2020	1,590	164	0	1,426
01/01/2021-31/12/2021	5,230	540	0	4,690
01/01/2022-31/12/2022	5,230	540	0	4,690
01/01/2023-31/12/2023	5,230	540	0	4,690

01/01/2024-31/12/2024	5,230	540	0	4,690
01/01/2025-31/12/2025	5,230	540	0	4,690
01/01/2026-31/12/2026	5,230	540	0	4,690
01/01/2027-31/12/2027	5,230	540	0	4,690
01/01/2028-31/12/2028	5,230	540	0	4,690
01/01/2029-31/12/2029	5,230	540	0	4,690
01/01/2030-02/09/2030	3,511	362	0	3,149
Total (t CO_2e)	52,171	5,386	0	46,785
Bomei Town wastewater Treatment Plant				
Year	BE_y (t CO_2e)	PEy (t CO_2e)	LE_y (t CO_2e)	ER_y (t CO_2e)
18/09/2020-31/12/2020	4,761	486	0	4,275
01/01/2021-31/12/2021	16,550	1,688	0	14,862
01/01/2022-31/12/2022	16,550	1,688	0	14,862
01/01/2023-31/12/2023	16,550	1,688	0	14,862
01/01/2024-31/12/2024	16,550	1,688	0	14,862
01/01/2025-31/12/2025	16,550	1,688	0	14,862
01/01/2026-31/12/2026	16,550	1,688	0	14,862
01/01/2027-31/12/2027	16,550	1,688	0	14,862
01/01/2028-31/12/2028	16,550	1,688	0	14,862
01/01/2029-31/12/2029	16,550	1,688	0	14,862
01/01/2030-02/09/2030	11,109	1,133	0	9,976
Total (t CO_2e)	164,820	16,811	0	148,009
Nantang Town wastewater Treatment Plant				
Year	BE_y (t CO_2e)	PEy (t CO_2e)	LE_y (t CO_2e)	ER_y (t CO_2e)
20/09/2020-31/12/2020	4,670	481	0	4,189
01/01/2021-31/12/2021	16,550	1,706	0	14,844
01/01/2022-31/12/2022	16,550	1,706	0	14,844
01/01/2023-31/12/2023	16,550	1,706	0	14,844
01/01/2024-31/12/2024	16,550	1,706	0	14,844
01/01/2025-31/12/2025	16,550	1,706	0	14,844
01/01/2026-31/12/2026	16,550	1,706	0	14,844
01/01/2027-31/12/2027	16,550	1,706	0	14,844
01/01/2028-31/12/2028	16,550	1,706	0	14,844
01/01/2029-31/12/2029	16,550	1,706	0	14,844
01/01/2030-02/09/2030	11,109	1,145	0	9,964
Total (t CO_2e)	164,729	16,980	0	147,749
Chikeng Town wastewater Treatment Plant				
Year	BE_y (t CO_2e)	PEy (t CO_2e)	LE_y (t CO_2e)	ER_y (t CO_2e)
09/09/2020-31/12/2020	950	116	0	834

01/01/2021-31/12/2021	3,041	371	0	2,670
01/01/2022-31/12/2022	3,041	371	0	2,670
01/01/2023-31/12/2023	3,041	371	0	2,670
01/01/2024-31/12/2024	3,041	371	0	2,670
01/01/2025-31/12/2025	3,041	371	0	2,670
01/01/2026-31/12/2026	3,041	371	0	2,670
01/01/2027-31/12/2027	3,041	371	0	2,670
01/01/2028-31/12/2028	3,041	371	0	2,670
01/01/2029-31/12/2029	3,041	371	0	2,670
01/01/2030-02/09/2030	2,041	249	0	1,792
Total (t CO_2e)	30,360	3,704	0	26,656

The emission reductions can be obtained as below:

Table 4-1 The estimation of ER_y

Year	Estimated baseline emissions or removals (tCO_2e)	Estimated project emissions or removals (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated net GHG emission reductions or removals (tCO_2e)
03/09/2020-31/12/2020	27,199	3,452	0	23,747
01/01/2021-31/12/2021	91,175	11,528	0	79,647
01/01/2022-31/12/2022	91,175	11,528	0	79,647
01/01/2023-31/12/2023	91,175	11,528	0	79,647
01/01/2024-31/12/2024	91,175	11,528	0	79,647
01/01/2025-31/12/2025	91,175	11,528	0	79,647
01/01/2026-31/12/2026	91,175	11,528	0	79,647
01/01/2027-31/12/2027	91,175	11,528	0	79,647
01/01/2028-31/12/2028	91,175	11,528	0	79,647
01/01/2029-31/12/2029	91,175	11,528	0	79,647
01/01/2030-02/09/2030	61,198	7,724	0	53,474
Total	908,972	114,929	0	794,043

5 MONITORING

5.1 Data and Parameters Available at Validation

Data / Parameter	GWP_{CH4}
Data unit	tCO_2/tCH_4
Description	Global Warming Potential of methane valid for the commitment period
Source of data	IPCC Fifth Assessment Report - Climate Change 2014
Value applied	28
Justification of choice of data or description of measurement methods and procedures applied	Default IPCC value applied.
Purpose of Data	Calculation of baseline emissions and project emissions
Comments	-

Data / Parameter	$EF_{EL,j,y}$ ($EF_{grid,CM,y}$)
Data unit	tCO_2/MWh
Description	Combined margin emission factor for the grid in year y
Source of data	Calculate the combined margin emission factor, using the procedures in Tool 07 Tool to calculate the emission factor for an electricity system (Version 07.0). The data of $EF_{grid,OM,y}$ and $EF_{grid,BM,y}$ are from Baseline emission factors of China's regional power grid for emission reduction projects in 2019 published by Ministry of Ecology and Environment of the People's Republic of China.
Value applied	0.5089 tCO_2/MWh (0.8042 tCO_2/MWh*0.5+0.2135 tCO_2/MWh *0.5)
Justification of choice of data or description of measurement methods and procedures applied	As per Tool 07 Tool to calculate the emission factor for an electricity system (Version 07.0).
Purpose of Data	Calculation of project emissions
Comments	N/A

Data / Parameter	Bo
Data unit	$tCH_4/tCOD$
Description	Maximum methane producing capacity of wastewater, expressing the maximum amount of CH_4 that can be produced from a given quantity of chemical oxygen demand
Source of data	2006 IPCC Vol5 Ch6 table 6.2 & AM0080 v.1 p.28
Value applied	0.21
Justification of choice of data or description of measurement methods and procedures applied	Default IPCC value applied. The default IPCC value for Bo is 0.25 kg CH_4/kg COD. However, taking into account the uncertainty of this estimate, project participants should use a value of 0.21 kg CH_4/kg COD as a conservative assumption for Bo.
Purpose of Data	Calculation of baseline emissions and project emissions
Comments	-

Data / Parameter	$COD_{BL,in,x}$ and $COD_{BL,out,x}$
Data unit	tCOD/year
Description	Respectively, COD directed to the open lagoons in the baseline scenario in the period x, and COD of the effluent of open lagoons in the baseline scenario in the period x.
Source of data	Calculated based on maximum design influent flow of the project activity, influent COD concentration,effluent COD concentration sourced from FSR of the project activity.
Value applied	Xiaqiao Town wastewater Treatment Plant: $COD_{BL,in,x}$= 903 tCOD/year; $COD_{BL,out,x}$= 80 tCOD/year Qujie Town wastewater Treatment Plant: $COD_{BL,in,x}$= 1,278 tCOD/year; $COD_{BL,out,x}$= 102 tCOD/year Xinyi City Dinbao Town wastewater treatment Plant: $COD_{BL,in,x}$= 405 tCOD/year; $COD_{BL,out,x}$= 54 tCOD/year Xinyi City Qianpai Town wastewater treatment Plant:

	$COD_{BL,in,x}$= 1,035 tCOD/year; $COD_{BL,out,x}$= 92 tCOD/year Xianqiao South Wastewater Treatment Plant: $COD_{BL,in,x}$= 1,825 tCOD/year; $COD_{BL,out,x}$= 146 tCOD/year Qiankeng Town North wastewater Plant: $COD_{BL,in,x}$= 1,626 tCOD/year; $COD_{BL,out,x}$= 145 tCOD/year Shangsha Town wastewater Treatment Plant: $COD_{BL,in,x}$= 1,810 tCOD/year; $COD_{BL,out,x}$= 181 tCOD/year Baita Town wastewater Treatment Plant: $COD_{BL,in,x}$= 1,232 tCOD/year; $COD_{BL,out,x}$= 110 tCOD/year Luoding Fourth Domestic wastewater Treatment Plant: $COD_{BL,in,x}$= 3,833 tCOD/year; $COD_{BL,out,x}$= 307 tCOD/year Shitan Town wastewater Treatment Plant: $COD_{BL,in,x}$= 1,084 tCOD/year; $COD_{BL,out,x}$= 96 tCOD/year Litan Town wastewater Treatment Plant: $COD_{BL,in,x}$= 1,278 tCOD/year; $COD_{BL,out,x}$= 102 tCOD/year jiulong Town wastewater Treatment Plant: $COD_{BL,in,x}$= 894 tCOD/year; $COD_{BL,out,x}$= 102 tCOD/year Shakou Town wastewater Treatment Plant: $COD_{BL,in,x}$= 1,777 tCOD/year; $COD_{BL,out,x}$= 129 tCOD/year Bomei Town wastewater Treatment Plant: $COD_{BL,in,x}$= 5,621 tCOD/year; $COD_{BL,out,x}$= 409 tCOD/year Nantang Town wastewater Treatment Plant: $COD_{BL,in,x}$= 5,621 tCOD/year; $COD_{BL,out,x}$= 409 tCOD/year Chikeng Town wastewater Treatment Plant:

	$COD_{BL,in,x}$= 1,051 tCOD/year; $COD_{BL,out,x}$= 93 tCOD/year
Justification of choice of data or description of measurement methods and procedures applied	This parameter is the same as the COD inflow and the COD outflow in the project activity.
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	$f_{BL,d}$
Data unit	fraction
Description	Factor expressing the influence of the depth of the lagoon on methane generation
Source of data	Apply the following values for the corresponding average depth of the open lagoon: Depth > 5 m: 70% Depth 1 – 5 m: 50% Depth < 1 m: 0%
Value applied	70% (Depth > 5 m)
Justification of choice of data or description of measurement methods and procedures applied	The baseline scenario is a new open anaerobic lagoons system with a depth greater than 5m, so the value is taken as 70%.
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	$Q_{BL,sl,y}$
Data unit	t
Description	Quantity of sludge that would have been produced and treated in the baseline scenario in the year y

Source of data	Guideline on Project Construction and Investment for Rural Sewage Treatment
Value applied	Xiaqiao Town wastewater Treatment Plant: $Q_{BL,sl,y}$ = 352.23 t/a Qujie Town wastewater Treatment Plant: $Q_{BL,sl,y}$ = 489.10 t/a Xinyi City Dinbao Town wastewater treatment Plant: $Q_{BL,sl,y}$ = 259.15 t/a Xinyi City Qianpai Town wastewater treatment Plant: $Q_{BL,sl,y}$ = 438.00 t/a Xianqiao South Wastewater Treatment Plant: $Q_{BL,sl,y}$ = 697.15 t/a Qiankeng Town North wastewater Plant: $Q_{BL,sl,y}$ = 689.85 t/a Shangsha Town wastewater Treatment Plant: $Q_{BL,sl,y}$ = 865.05 t/a Baita Town wastewater Treatment Plant: $Q_{BL,sl,y}$ = 521.95 t/a Luoding Fourth Domestic wastewater Treatment Plant: $Q_{BL,sl,y}$ = 1,463.65 t/a Shitan Town wastewater Treatment Plant: $Q_{BL,sl,y}$ = 459.90 t/a Litan Town wastewater Treatment Plant: $Q_{BL,sl,y}$ = 488.01 t/a jiulong Town wastewater Treatment Plant: $Q_{BL,sl,y}$ = 488.01 t/a Shakou Town wastewater Treatment Plant: $Q_{BL,sl,y}$ = 616.85 t/a Bomei Town wastewater Treatment Plant: $Q_{BL,sl,y}$ = 1,952.75 t/a Nantang Town wastewater Treatment Plant: $Q_{BL,sl,y}$ = 1,952.75 t/a Chikeng Town wastewater Treatment Plant: $Q_{BL,sl,y}$ = 445.30 t/a

Justification of choice of data or description of measurement methods and procedures applied	Guideline on Project Construction and Investment for Rural Sewage Treatment
Purpose of Data	Calculation of baseline emissions from treatment of sludge
Comments	-

Data / Parameter	$D_{BL,i}$
Data unit	km
Description	Average distance per trip, that would have been travelled by the transportation vehicle of type i, for transportation of sludge in the baseline scenario
Source of data	Historical data available on-site, the distance of sludge transportation between the two sites can be determined by Google satellite map.
Value applied	Xiaqiao Town wastewater Treatment Plant: $D_{BL,i}$ = 20 km Qujie Town wastewater Treatment Plant: $D_{BL,i}$ = 20 km Xinyi City Dinbao Town wastewater treatment Plant: $D_{BL,i}$ = 20 km Xinyi City Qianpai Town wastewater treatment Plant: $D_{BL,i}$ = 20 km Xianqiao South Wastewater Treatment Plant: $D_{BL,i}$ = 15 km Qiankeng Town North wastewater Plant: $D_{BL,i}$ = 15 km Shangsha Town wastewater Treatment Plant: $D_{BL,i}$ = 15 km Baita Town wastewater Treatment Plant: $D_{BL,i}$ = 15 km Luoding Fourth Domestic wastewater Treatment Plant: $D_{BL,i}$ = 15 km Shitan Town wastewater Treatment Plant:

	$D_{BL,i}$ = 15 km Litan Town wastewater Treatment Plant: $D_{BL,i}$ = 15 km jiulong Town wastewater Treatment Plant: $D_{BL,i}$ = 15 km Shakou Town wastewater Treatment Plant: $D_{BL,i}$ = 15 km Bomei Town wastewater Treatment Plant: $D_{BL,i}$ = 15 km Nantang Town wastewater Treatment Plant: $D_{BL,i}$ = 15 km Chikeng Town wastewater Treatment Plant: $D_{BL,i}$ = 15 km
Justification of choice of data or description of measurement methods and procedures applied	–
Purpose of Data	Calculation of baseline emissions
Comments	–

Data / Parameter	$F_{BL,i}$
Data unit	Liter/km
Description	Specific fuel consumption of the transportation vehicle of type i
Source of data	Table 1 Guidelines for Accounting Methods and Reporting of Greenhouse Gas Emissions of Transportation Enterprises (Diesel, ＞4 tonne ＜8 tonne). https://www.ndrc.gov.cn/xxgk/zcfb/tz/201511/W020190905506438255108.pdf
Value applied	0.251
Justification of choice of data or description of measurement methods and procedures applied	–
Purpose of Data	Calculation of baseline emissions

Comments	–

Data / Parameter	$NCV_{BL,j}$ and $EF_{BL,j}$
Data unit	Respectively: TJ/tonne, and tCO_2/TJ
Description	Respectively: net calorific value of the transportation fuel j , and CO_2 emission factor of the transportation fuel j
Source of data	$NCV_{BL,j,y}$: Table 2 Guidelines for Accounting Methods and Reporting of Greenhouse Gas Emissions of Transportation Enterprises (Diesel) $EF_{BL,j,y}$: IPCC Vol2 Ch3 table 3.2.1
Value applied	$NCV_{BL,j,y}$ = 0.04333 TJ/tonne; $EF_{BL,j,y}$ = 74.1 tCO_2/TJ (For ex ante estimation, $NCV_{PJ,j,y}$ is from Table 2 Guidelines for Accounting Methods and Reporting of Greenhouse Gas Emissions of Transportation Enterprises (Diesel), $EF_{BL,j,y}$ is from IPCC Vol2 Ch3 table 3.2.1)
Justification of choice of data or description of measurement methods and procedures applied	–
Purpose of Data	Calculation of baseline emissions
Comments	–

Data / Parameter	$q_{BL,i}$
Data unit	tonnes/trip
Description	Average vehicular capacity of the transportation vehicle of type i
Source of data	5 (For ex ante estimation, the data is from Feasibility Study Report of the project)
Value applied	5
Justification of choice of data or description of measurement methods and procedures applied	–
Purpose of Data	Calculation of baseline emissions

Comments	–

5.2 Data and Parameters Monitored

Data / Parameter	$Q_{PJ,ww,m}$ and $Q_{PJ,ww,i}$
Data unit	m^3
Description	Quantity of wastewater that is treated in the aerobic wastewater treatment plant in the project activity in month m and in day i, respectively
Source of data	Wastewater treatment plant wastewater flow statistics
Description of measurement methods and procedures to be applied	$Q_{PJ,ww,m}$ and $Q_{PJ,ww,i}$ was measured by the electromagnetic flowmeter converter
Frequency of monitoring/recording	Parameter monitored continuously and aggregated daily and monthly for calculations
Value applied	For ex ante estimation, the data is from Feasibility Study Report of the project. The actual flow rate will be monitored. $Q_{PJ,ww,I}$ is maximum design influent flow , $Q_{PJ,ww,m}$ is obtained by multiplying $Q_{PJ,ww,i}$ by the number of days in the corresponding month. **Xiaqiao Town wastewater Treatment Plant:** $Q_{PJ,ww,i}$=5,500 m^3, $Q_{PJ,ww,m}$ can be calculated as below:

Month	Days	Q（m^3/m）
Jan	31	170,500
Feb	28	154,000
Mar	31	170,500
Apr	30	165,000
May	31	170,500
June	30	165,000
July	31	170,500
Aug	31	170,500
Sept	30	165,000
Oct	31	170,500

Nov	30	165,000
Dec	31	170,500

Qujie Town wastewater Treatment Plant

$Q_{PJ,ww,i}$=7,700 m³, $Q_{PJ,ww,m}$ can be calculated as below:

Month	Days	Q（m³/m）
Jan	31	217,000
Feb	28	196,000
Mar	31	217,000
Apr	30	210,000
May	31	217,000
June	30	210,000
July	31	217,000
Aug	31	217,000
Sept	30	210,000
Oct	31	217,000
Nov	30	210,000
Dec	31	217,000

Xinyi City Dinbao Town wastewater treatment Plant

$Q_{PJ,ww,i}$=3,700 m³, $Q_{PJ,ww,m}$ can be calculated as below:

Month	Days	Q（m³/m）
Jan	31	114,700
Feb	28	103,600
Mar	31	114,700
Apr	30	111,000
May	31	114,700
June	30	111,000
July	31	114,700
Aug	31	114,700

Sept	30	111,000
Oct	31	114,700
Nov	30	111,000
Dec	31	114,700

Xinyi City Qianpai Town wastewater treatment Plant

$Q_{PJ,ww,i}$=6,300 m³, $Q_{PJ,ww,m}$ can be calculated as below:

Month	Days	Q（m³/m）
Jan	31	195,300
Feb	28	176,400
Mar	31	195,300
Apr	30	189,000
May	31	195,300
June	30	189,000
July	31	195,300
Aug	31	195,300
Sept	30	189,000
Oct	31	195,300
Nov	30	189,000
Dec	31	195,300

Xianqiao South Wastewater Treatment Plant

$Q_{PJ,ww,i}$=1,0000 m³, $Q_{PJ,ww,m}$ can be calculated as below:

Month	Days	Q（m³/m）
Jan	31	310,000
Feb	28	280,000
Mar	31	310,000
Apr	30	300,000
May	31	310,000
June	30	300,000

July	31	310,000
Aug	31	310,000
Sept	30	300,000
Oct	31	310,000
Nov	30	300,000
Dec	31	310,000

Qiankeng Town North wastewater Plant

$Q_{PJ,ww,i}$=9,900 m³, $Q_{PJ,ww,m}$ can be calculated as below:

Month	Days	Q（m³/m）
Jan	31	306,900
Feb	28	277,200
Mar	31	306,900
Apr	30	297,000
May	31	306,900
June	30	297,000
July	31	306,900
Aug	31	306,900
Sept	30	297,000
Oct	31	306,900
Nov	30	297,000
Dec	31	306,900

Shangsha Town wastewater Treatment Plant

$Q_{PJ,ww,i}$=1,2400 m³, $Q_{PJ,ww,m}$ can be calculated as below:

Month	Days	Q（m³/m）
Jan	31	384,400
Feb	28	347,200
Mar	31	384,400
Apr	30	372,000

May	31	384,400
June	30	372,000
July	31	384,400
Aug	31	384,400
Sept	30	372,000
Oct	31	384,400
Nov	30	372,000
Dec	31	384,400

Baita Town wastewater Treatment Plant

$Q_{PJ,ww,i}$=7,500 m³, $Q_{PJ,ww,m}$ can be calculated as below:

Month	Days	Q（m³/m）
Jan	31	232,500
Feb	28	210,000
Mar	31	232,500
Apr	30	225,000
May	31	232,500
June	30	225,000
July	31	232,500
Aug	31	232,500
Sept	30	225,000
Oct	31	232,500
Nov	30	225,000
Dec	31	232,500

Luoding Fourth Domestic wastewater Treatment Plant

$Q_{PJ,ww,i}$=21,000 m³, $Q_{PJ,ww,m}$ can be calculated as below:

Month	Days	Q（m³/m）
Jan	31	651,000
Feb	28	588,000

Mar	31	651,000
Apr	30	630,000
May	31	651,000
June	30	630,000
July	31	651,000
Aug	31	651,000
Sept	30	630,000
Oct	31	651,000
Nov	30	630,000
Dec	31	651,000

Shitan Town wastewater Treatment Plant

$Q_{PJ,ww,i}$=66,00 m³, $Q_{PJ,ww,m}$ can be calculated as below:

Month	Days	Q（m³/m）
Jan	31	204,600
Feb	28	184,800
Mar	31	204,600
Apr	30	198,000
May	31	204,600
June	30	198,000
July	31	204,600
Aug	31	204,600
Sept	30	198,000
Oct	31	204,600
Nov	30	198,000
Dec	31	204,600

Litan Town wastewater Treatment Plant

$Q_{PJ,ww,i}$=70,00 m³, $Q_{PJ,ww,m}$ can be calculated as below:

Month	Days	Q（m³/m）

Jan	31	217,000
Feb	28	196,000
Mar	31	217,000
Apr	30	210,000
May	31	217,000
June	30	210,000
July	31	217,000
Aug	31	217,000
Sept	30	210,000
Oct	31	217,000
Nov	30	210,000
Dec	31	217,000

jiulong Town wastewater Treatment Plant

$Q_{PJ,ww,i}$=70,00 m³, $Q_{PJ,ww,m}$ can be calculated as below:

Month	Days	Q（m³/m）
Jan	31	217,000
Feb	28	196,000
Mar	31	217,000
Apr	30	210,000
May	31	217,000
June	30	210,000
July	31	217,000
Aug	31	217,000
Sept	30	210,000
Oct	31	217,000
Nov	30	210,000
Dec	31	217,000

Shakou Town wastewater Treatment Plant

$Q_{PJ,ww,i}$=88,50 m³, $Q_{PJ,ww,m}$ can be calculated as below:

Month	Days	Q（m³/m）
Jan	31	274,350
Feb	28	247,800
Mar	31	274,350
Apr	30	265,500
May	31	274,350
June	30	265,500
July	31	274,350
Aug	31	274,350
Sept	30	265,500
Oct	31	274,350
Nov	30	265,500
Dec	31	274,350

Bomei Town wastewater Treatment Plant

$Q_{PJ,ww,i}$=28,000 m³, $Q_{PJ,ww,m}$ can be calculated as below:

Month	Days	Q（m³/m）
Jan	31	868,000
Feb	28	784,000
Mar	31	868,000
Apr	30	840,000
May	31	868,000
June	30	840,000
July	31	868,000
Aug	31	868,000
Sept	30	840,000
Oct	31	868,000
Nov	30	840,000

Dec	31	868,000

Nantang Town wastewater Treatment Plant

$Q_{PJ,ww,i}$=28,000 m³, $Q_{PJ,ww,m}$ can be calculated as below:

Month	Days	Q（m³/m）
Jan	31	868,000
Feb	28	784,000
Mar	31	868,000
Apr	30	840,000
May	31	868,000
June	30	840,000
July	31	868,000
Aug	31	868,000
Sept	30	840,000
Oct	31	868,000
Nov	30	840,000
Dec	31	868,000

Chikeng Town wastewater Treatment Plant

$Q_{PJ,ww,i}$=64,00 m³, $Q_{PJ,ww,m}$ can be calculated as below:

Month	Days	Q（m³/m）
Jan	31	198,400
Feb	28	179,200
Mar	31	198,400
Apr	30	192,000
May	31	198,400
June	30	192,000
July	31	198,400
Aug	31	198,400
Sept	30	192,000

	<table><tr><td>Oct</td><td>31</td><td>198,400</td></tr><tr><td>Nov</td><td>30</td><td>192,000</td></tr><tr><td>Dec</td><td>31</td><td>198,400</td></tr></table>
Monitoring equipment	$Q_{PJ,ww,m}$ and $Q_{PJ,ww,i}$ was monitored by the electromagnetic flowmeter converter.
QA/QC procedures to be applied	Electromagnetic flowmeter converter will be calibrated periodically based on manufacturer's specification by a certified testing agency but at least once every three years.
Purpose of data	Calculation of project emissions
Calculation method	-
Comments	The data will be stored for the crediting period + 2 years

Data / Parameter	$W_{PJ,COD,ww,m}$ and $W_{PJ,COD,ww,i}$
Data unit	$tCOD/m^3$
Description	Average chemical oxygen demand in the wastewater that is treated in the aerobic wastewater treatment plant in the project activity in month m and in day i, respectively
Source of data	Wastewater treatment plant wastewater COD concentration statistics
Description of measurement methods and procedures to be applied	Measure the COD according to national or international standards: Water Quality-Determination of the chemical oxygen demand- Fast digestion spectrophotometric method.
Frequency of monitoring/recording	COD monitoring frequency is once every two hours
Value applied	$W_{PJ,COD,ww,m}$ =$W_{PJ,COD,ww,i}$=0.000550 $tCOD/m^3$ (For ex ante estimation, the data is from Feasibility Study Report of the project. The actual COD concentration will be monitored.) Xiaqiao Town wastewater Treatment Plant: $W_{PJ,COD,ww,m}$ =$W_{PJ,COD,ww,i}$ =0.000450 $tCOD/m^3$ Qujie Town wastewater Treatment Plant: $W_{PJ,COD,ww,m}$ =$W_{PJ,COD,ww,i}$=0.000500 $tCOD/m^3$ Xinyi City Dinbao Town wastewater treatment Plant:

	$W_{PJ,COD,ww,m}$ = $W_{PJ,COD,ww,i}$=0.000300 tCOD/m³ Xinyi City Qianpai Town wastewater treatment Plant: $W_{PJ,COD,ww,m}$ = $W_{PJ,COD,ww,i}$=0.000450 tCOD/m³ Xianqiao South Wastewater Treatment Plant: $W_{PJ,COD,ww,m}$ = $W_{PJ,COD,ww,i}$=0.000500 tCOD/m³ Qiankeng Town North wastewater Plant: $W_{PJ,COD,ww,m}$ = $W_{PJ,COD,ww,i}$=0.000450 tCOD/m³ Shangsha Town wastewater Treatment Plant: $W_{PJ,COD,ww,m}$ = $W_{PJ,COD,ww,i}$=0.000400 tCOD/m³ Baita Town wastewater Treatment Plant: $W_{PJ,COD,ww,m}$ = $W_{PJ,COD,ww,i}$=0.000450 tCOD/m³ Luoding Fourth Domestic wastewater Treatment Plant: $W_{PJ,COD,ww,m}$ = $W_{PJ,COD,ww,i}$=0.000500 tCOD/m³ Shitan Town wastewater Treatment Plant: $W_{PJ,COD,ww,m}$ = $W_{PJ,COD,ww,i}$=0.000450 tCOD/m³ Litan Town wastewater Treatment Plant: $W_{PJ,COD,ww,m}$ = $W_{PJ,COD,ww,i}$=0.000500 tCOD/m³ jiulong Town wastewater Treatment Plant: $W_{PJ,COD,ww,m}$ = $W_{PJ,COD,ww,i}$=0.000350 tCOD/m³ Shakou Town wastewater Treatment Plant: $W_{PJ,COD,ww,m}$ = $W_{PJ,COD,ww,i}$=0.000550 tCOD/m³ Bomei Town wastewater Treatment Plant: $W_{PJ,COD,ww,m}$ = $W_{PJ,COD,ww,i}$=0.000550 tCOD/m³ Nantang Town wastewater Treatment Plant: $W_{PJ,COD,ww,m}$ = $W_{PJ,COD,ww,i}$=0.000550 tCOD/m³ Chikeng Town wastewater Treatment Plant: $W_{PJ,COD,ww,m}$ = $W_{PJ,COD,ww,i}$=0.000450 tCOD/m³
Monitoring equipment	COD_{cr} water qualityonline automaticmonitor
QA/QC procedures to be applied	The COD water quality online automatic monitor will be in line with the manufacturer's specification. The COD_{cr} water quality online automatic monitor will be calibrated based on standard samples as well by an external agency at least once every three years.
Purpose of data	Calculation of project emissions
Calculation method	Fast digestion spectrophotometric method
Comments	The data will be stored for the crediting period + 2 years.

<table>
<tr><td>Data / Parameter</td><td>$T_{2,m}$</td></tr>
<tr><td>Data unit</td><td>K</td></tr>
<tr><td>Description</td><td>Average temperature at the project site in month m</td></tr>
<tr><td>Source of data</td><td>Data from the website at https://m.tianqi.com/qiwen/city/</td></tr>
<tr><td>Description of measurement methods and procedures to be applied</td><td>The temperature is obtained from the Meteorological Bureau website: https://m.tianqi.com/qiwen/city/</td></tr>
<tr><td>Frequency of monitoring/recording</td><td>Continuously, aggregated in monthly average values</td></tr>
<tr><td>Value applied</td><td>The temperature is obtained from the Meteorological Bureau website: https://m.tianqi.com/qiwen/city/
(For ex ante estimation, the actual temperature will be monitored).
Xiaqiao Town wastewater Treatment Plant
Source: https://m.tianqi.com/qiwen/city_zhanjiang/
<table>
<tr><td>Month</td><td>Average temperature/K</td></tr>
<tr><td>Jan</td><td>290.15</td></tr>
<tr><td>Feb</td><td>290.15</td></tr>
<tr><td>Mar</td><td>294.15</td></tr>
<tr><td>Apr</td><td>298.15</td></tr>
<tr><td>May</td><td>302.15</td></tr>
<tr><td>June</td><td>303.15</td></tr>
<tr><td>July</td><td>303.15</td></tr>
<tr><td>Aug</td><td>302.15</td></tr>
<tr><td>Sept</td><td>302.15</td></tr>
<tr><td>Oct</td><td>299.15</td></tr>
<tr><td>Nov</td><td>296.15</td></tr>
<tr><td>Dec</td><td>291.15</td></tr>
</table>
Qujie Town wastewater Treatment Plant
Source: https://m.tianqi.com/qiwen/city_zhanjiang/</td></tr>
</table>

Month	Average temperature/K
Jan	290.15
Feb	290.15
Mar	294.15
Apr	298.15
May	302.15
June	303.15
July	303.15
Aug	302.15
Sept	302.15
Oct	299.15
Nov	296.15
Dec	291.15

Xinyi City Dinbao Town wastewater treatment Plant

Source: https://m.tianqi.com/qiwen/city_xinyi1/

Month	Average temperature/K
Jan	290.15
Feb	291.15
Mar	295.15
Apr	298.15
May	301.15
June	303.15
July	303.15
Aug	303.15
Sept	302.15
Oct	299.15
Nov	296.15
Dec	291.15

Xinyi City Qianpai Town wastewater treatment Plant

Source: https://m.tianqi.com/qiwen/city_xinyi1/

Month	Average temperature/K
Jan	290.15
Feb	291.15
Mar	295.15
Apr	298.15
May	301.15
June	303.15
July	303.15
Aug	303.15
Sept	302.15
Oct	299.15
Nov	296.15
Dec	291.15

Xianqiao South Wastewater Treatment Plant

Source: https://m.tianqi.com/qiwen/city_jieyang/

Month	Average temperature/K
Jan	288.15
Feb	289.15
Mar	292.15
Apr	296.15
May	299.15
June	302.15
July	303.15
Aug	303.15
Sept	302.15
Oct	298.15

Nov	295.15
Dec	290.15

Qiankeng Town North wastewater Plant

Source: https://m.tianqi.com/qiwen/city_jieyang/

Month	Average temperature/K
Jan	288.15
Feb	289.15
Mar	292.15
Apr	296.15
May	299.15
June	302.15
July	303.15
Aug	303.15
Sept	302.15
Oct	298.15
Nov	295.15
Dec	290.15

Shangsha Town wastewater Treatment Plant

Source: https://m.tianqi.com/qiwen/city_jieyang/

Month	Average temperature/K
Jan	288.15
Feb	289.15
Mar	292.15
Apr	296.15
May	299.15
June	302.15
July	303.15
Aug	303.15

Sept	302.15
Oct	298.15
Nov	295.15
Dec	290.15

Baita Town wastewater Treatment Plant

Source: https://m.tianqi.com/qiwen/city_jieyang/

Month	Average temperature/K
Jan	288.15
Feb	289.15
Mar	292.15
Apr	296.15
May	299.15
June	302.15
July	303.15
Aug	303.15
Sept	302.15
Oct	298.15
Nov	295.15
Dec	290.15

Luoding Fourth Domestic wastewater Treatment Plant

Source: https://m.tianqi.com/qiwen/city_luoding/

Month	Average temperature/K
Jan	288.15
Feb	289.15
Mar	293.15
Apr	298.15
May	301.15
June	303.15

July	303.15
Aug	303.15
Sept	302.15
Oct	298.15
Nov	294.15
Dec	288.15

Shitan Town wastewater Treatment Plant

Source: https://m.tianqi.com/qiwen/city_qingyuan3/

Month	Average temperature/K
Jan	287.15
Feb	288.15
Mar	292.15
Apr	296.15
May	300.15
June	303.15
July	303.15
Aug	303.15
Sept	302.15
Oct	298.15
Nov	293.15
Dec	288.15

Litan Town wastewater Treatment Plant

Source: https://m.tianqi.com/qiwen/city_qingyuan3/

Month	Average temperature/K
Jan	287.15
Feb	288.15
Mar	292.15
Apr	296.15

May	300.15
June	303.15
July	303.15
Aug	303.15
Sept	302.15
Oct	298.15
Nov	293.15
Dec	288.15

jiulong Town wastewater Treatment Plant

Source: https://m.tianqi.com/qiwen/city_yingde/

Month	Average temperature/K
Jan	286.15
Feb	287.15
Mar	291.15
Apr	295.15
May	300.15
June	302.15
July	303.15
Aug	303.15
Sept	302.15
Oct	297.15
Nov	292.15
Dec	287.15

Shakou Town wastewater Treatment Plant

Source: https://m.tianqi.com/qiwen/city_yingde/

Month	Average temperature/K
Jan	286.15
Feb	287.15

Mar	291.15
Apr	295.15
May	300.15
June	302.15
July	303.15
Aug	303.15
Sept	302.15
Oct	297.15
Nov	292.15
Dec	287.15

Bomei Town wastewater Treatment Plant

Source: https://m.tianqi.com/qiwen/city_Shanwei/

Month	Average temperature/K
Jan	289.15
Feb	290.15
Mar	293.15
Apr	296.15
May	300.15
June	302.15
July	302.15
Aug	302.15
Sept	302.15
Oct	299.15
Nov	296.15
Dec	290.15

Nantang Town wastewater Treatment Plant

Source: https://m.tianqi.com/qiwen/city_Shanwei/

Month	Average temperature/K

Jan	289.15
Feb	290.15
Mar	293.15
Apr	296.15
May	300.15
June	302.15
July	302.15
Aug	302.15
Sept	302.15
Oct	299.15
Nov	296.15
Dec	290.15

Chikeng Town wastewater Treatment Plant

Source: https://m.tianqi.com/qiwen/city_Shanwei/

Month	Average temperature/K
Jan	289.15
Feb	290.15
Mar	293.15
Apr	296.15
May	300.15
June	302.15
July	302.15
Aug	302.15
Sept	302.15
Oct	299.15
Nov	296.15
Dec	290.15

Monitoring equipment	Temperatures are monitored by the local weather bureau

QA/QC procedures to be applied	The temperature gauge shall be calibrated as per manufacturer's specification but at least once every three years.
Purpose of data	Calculation of baseline emissions and project emissions
Calculation method	-
Comments	The data will be stored for the crediting period +2 years.

Data / Parameter	$Q_{PJ,effl,i}$ and $Q_{PJ,effl,m}$
Data unit	m^3
Description	Quantity of effluent that leaves the aerobic wastewater treatment plant in the project activity in day i and month m, respectively
Source of data	Wastewater treatment plant wastewater flow statistics
Description of measurement methods and procedures to be applied	$Q_{PJ,effl,i}$ and $Q_{PJ,effl,m}$ was measured by the electromagnetic flowmeter converter.
Frequency of monitoring/recording	Parameter monitored continuously and aggregated daily and monthly for calculations
Value applied	For ex ante estimation, the data is from Feasibility Study Report of the project. The actual flow rate will be monitored. $Q_{PJ,effl,i}$ is quantity of effluent that leaves the aerobic wastewater treatment plant in the project activity in day i of year y, $Q_{PJ,effl,m}$ is obtained by multiplying $Q_{PJ,effl,i}$ by the number of days in the corresponding month. **Xiaqiao Town wastewater Treatment Plant:** $Q_{PJ,effl,i}$=5,500 m^3, $Q_{PJ,effl,m}$ can be calculated as below:

Month	Days	Q（m^3/m）
Jan	31	170,500
Feb	28	154,000
Mar	31	170,500
Apr	30	165,000
May	31	170,500
June	30	165,000

July	31	170,500
Aug	31	170,500
Sept	30	165,000
Oct	31	170,500
Nov	30	165,000
Dec	31	170,500

Qujie Town wastewater Treatment Plant

$Q_{PJ,effl,i}$=7,700 m³, $Q_{PJ,effl,m}$ can be calculated as below:

Month	Days	Q（m³/m）
Jan	31	217,000
Feb	28	196,000
Mar	31	217,000
Apr	30	210,000
May	31	217,000
June	30	210,000
July	31	217,000
Aug	31	217,000
Sept	30	210,000
Oct	31	217,000
Nov	30	210,000
Dec	31	217,000

Xinyi City Dinbao Town wastewater treatment Plant

$Q_{PJ,effl,i}$=3,700 m³, $Q_{PJ,effl,m}$ can be calculated as below:

Month	Days	Q（m³/m）
Jan	31	114,700
Feb	28	103,600
Mar	31	114,700
Apr	30	111,000

May	31	114,700
June	30	111,000
July	31	114,700
Aug	31	114,700
Sept	30	111,000
Oct	31	114,700
Nov	30	111,000
Dec	31	114,700

Xinyi City Qianpai Town wastewater treatment Plant

$Q_{PJ,\ effl,i}$=6,300 m³, $Q_{PJ,effl,m}$ can be calculated as below:

Month	Days	Q（m³/m）
Jan	31	195,300
Feb	28	176,400
Mar	31	195,300
Apr	30	189,000
May	31	195,300
June	30	189,000
July	31	195,300
Aug	31	195,300
Sept	30	189,000
Oct	31	195,300
Nov	30	189,000
Dec	31	195,300

Xianqiao South Wastewater Treatment Plant

$Q_{PJ,\ effl,i}$=1,0000 m³, $Q_{PJ,\ effl,m}$ can be calculated as below:

Month	Days	Q（m³/m）
Jan	31	310,000
Feb	28	280,000

Mar	31	310,000
Apr	30	300,000
May	31	310,000
June	30	300,000
July	31	310,000
Aug	31	310,000
Sept	30	300,000
Oct	31	310,000
Nov	30	300,000
Dec	31	310,000

Qiankeng Town North wastewater Plant

$Q_{PJ,effl,i}$=9,900 m^3, $Q_{PJ, effl,m}$ can be calculated as below:

Month	Days	Q（m^3/m）
Jan	31	306,900
Feb	28	277,200
Mar	31	306,900
Apr	30	297,000
May	31	306,900
June	30	297,000
July	31	306,900
Aug	31	306,900
Sept	30	297,000
Oct	31	306,900
Nov	30	297,000
Dec	31	306,900

Shangsha Town wastewater Treatment Plant

$Q_{PJ, effl,i}$=1,2400 m^3, $Q_{PJ, effl,m}$ can be calculated as below:

Month	Days	Q（m^3/m）

Jan	31	384,400
Feb	28	347,200
Mar	31	384,400
Apr	30	372,000
May	31	384,400
June	30	372,000
July	31	384,400
Aug	31	384,400
Sept	30	372,000
Oct	31	384,400
Nov	30	372,000
Dec	31	384,400

Baita Town wastewater Treatment Plant

$Q_{PJ,\ effl,i}$=7,500 m^3, $Q_{PJ,\ effl,m}$ can be calculated as below:

Month	Days	Q（m^3/m）
Jan	31	232,500
Feb	28	210,000
Mar	31	232,500
Apr	30	225,000
May	31	232,500
June	30	225,000
July	31	232,500
Aug	31	232,500
Sept	30	225,000
Oct	31	232,500
Nov	30	225,000
Dec	31	232,500

Luoding Fourth Domestic wastewater Treatment Plant

$Q_{PJ,\ effl,i}$=21,000 m^3, $Q_{PJ,\ effl,m}$ can be calculated as below:

Month	Days	Q（m^3/m）
Jan	31	651,000
Feb	28	588,000
Mar	31	651,000
Apr	30	630,000
May	31	651,000
June	30	630,000
July	31	651,000
Aug	31	651,000
Sept	30	630,000
Oct	31	651,000
Nov	30	630,000
Dec	31	651,000

Shitan Town wastewater Treatment Plant

$Q_{PJ,\ effl,i}$=66,00 m^3, $Q_{PJ,\ effl,m}$ can be calculated as below:

Month	Days	Q（m^3/m）
Jan	31	204,600
Feb	28	184,800
Mar	31	204,600
Apr	30	198,000
May	31	204,600
June	30	198,000
July	31	204,600
Aug	31	204,600
Sept	30	198,000
Oct	31	204,600
Nov	30	198,000

Dec	31	204,600

Litan Town wastewater Treatment Plant

$Q_{PJ,\ effl,i}$=70,00 m³, $Q_{PJ,\ effl,m}$ can be calculated as below:

Month	Days	Q（m³/m）
Jan	31	217,000
Feb	28	196,000
Mar	31	217,000
Apr	30	210,000
May	31	217,000
June	30	210,000
July	31	217,000
Aug	31	217,000
Sept	30	210,000
Oct	31	217,000
Nov	30	210,000
Dec	31	217,000

jiulong Town wastewater Treatment Plant

$Q_{PJ,\ effl,i}$=70,00 m³, $Q_{PJ,\ effl,m}$ can be calculated as below:

Month	Days	Q（m³/m）
Jan	31	217,000
Feb	28	196,000
Mar	31	217,000
Apr	30	210,000
May	31	217,000
June	30	210,000
July	31	217,000
Aug	31	217,000
Sept	30	210,000

Oct	31	217,000
Nov	30	210,000
Dec	31	217,000

Shakou Town wastewater Treatment Plant

$Q_{PJ, effl,i}$=88,50 m^3, $Q_{PJ, effl,m}$ can be calculated as below:

Month	Days	Q（m^3/m）
Jan	31	274,350
Feb	28	247,800
Mar	31	274,350
Apr	30	265,500
May	31	274,350
June	30	265,500
July	31	274,350
Aug	31	274,350
Sept	30	265,500
Oct	31	274,350
Nov	30	265,500
Dec	31	274,350

Bomei Town wastewater Treatment Plant

$Q_{PJ, effl,i}$=28,000 m^3, $Q_{PJ, effl,m}$ can be calculated as below:

Month	Days	Q（m^3/m）
Jan	31	868,000
Feb	28	784,000
Mar	31	868,000
Apr	30	840,000
May	31	868,000
June	30	840,000
July	31	868,000

Aug	31	868,000
Sept	30	840,000
Oct	31	868,000
Nov	30	840,000
Dec	31	868,000

Nantang Town wastewater Treatment Plant

$Q_{PJ, effl,i}$=28,000 m^3, $Q_{PJ, effl,m}$ can be calculated as below:

Month	Days	Q（m^3/m）
Jan	31	868,000
Feb	28	784,000
Mar	31	868,000
Apr	30	840,000
May	31	868,000
June	30	840,000
July	31	868,000
Aug	31	868,000
Sept	30	840,000
Oct	31	868,000
Nov	30	840,000
Dec	31	868,000

Chikeng Town wastewater Treatment Plant

$Q_{PJ, effl,i}$=64,00 m^3, $Q_{PJ, effl,m}$ can be calculated as below:

Month	Days	Q（m^3/m）
Jan	31	198,400
Feb	28	179,200
Mar	31	198,400
Apr	30	192,000
May	31	198,400

	<table><tr><td>June</td><td>30</td><td>192,000</td></tr><tr><td>July</td><td>31</td><td>198,400</td></tr><tr><td>Aug</td><td>31</td><td>198,400</td></tr><tr><td>Sept</td><td>30</td><td>192,000</td></tr><tr><td>Oct</td><td>31</td><td>198,400</td></tr><tr><td>Nov</td><td>30</td><td>192,000</td></tr><tr><td>Dec</td><td>31</td><td>198,400</td></tr></table>
Monitoring equipment	$Q_{PJ,effl,m}$ and $Q_{PJ,effl,i}$ was measured by the electromagnetic flowmeter converter.
QA/QC procedures to be applied	Electromagnetic flowmeter converter will be calibrated periodically based on manufacturer's specification from a certified testing agency but at least once every three years.
Purpose of data	Calculation of baseline emissions and project emissions.
Calculation method	-
Comments	The data will be stored for the crediting period + 2 years

Data / Parameter	$W_{PJ,COD,effl,i}$ and $W_{PJ,COD,effl,m}$
Data unit	t COD/m³
Description	Average chemical oxygen demand in the effluent that leaves the aerobic wastewater treatment plant in the project activity in day i and month m, respectively
Source of data	Wastewater treatment plant wastewater COD concentration statistics
Description of measurement methods and procedures to be applied	Measure the COD according to national or international standards: Water quality-Determination of the chemical oxygen demand- Fast digestion spectrophotometric method.
Frequency of monitoring/recording	COD monitoring frequency is once every two hours
Value applied	For ex ante estimation, the data is from Feasibility Study Report of the project. The actual COD concentration will be monitored $W_{PJ,COD,effl,i}$= $W_{PJ,COD,effl,m}$=0.000040 t COD/m³

Monitoring equipment	COD_{cr} water quality online automatic monitor
QA/QC procedures to be applied	The COD_{cr} water quality online automatic monitor will be in line with the manufacturer's specification. COD_{cr} water quality online automatic monitor will be calibrated based on standard samples as well by an external agency at least once every three years.
Purpose of data	Calculation of project emissions
Calculation method	Fast digestion spectrophotometric method
Comments	The data will be stored for the crediting period + 2 years.

Data / Parameter	$f_{PJ,d,y}$
Data unit	fraction
Description	Factor expressing the influence of the depth on methane generation in year y
Source of data	Apply the following values for the corresponding average depth: Depth > 5 m: 70% Depth 1 – 5 m: 50% Depth < 1 m: 0% The effluent from the wastewater treatment plant is discharged through the sewage pipe, and the diameter of the pipe is certainly less than 1 m in general (The diameter of the pipe is from FSR). Therefore, Depth < 1 m: 0%
Description of measurement methods and procedures to be applied	Monthly measurements of depth under normal operating conditions will be done through a meter rod and the annual average value for calculations will be used.
Frequency of monitoring/recording	Once a month
Value applied	For ex ante estimation, the data is from Feasibility Study Report of the project. The actual depth will be monitored. 0% (Depth < 1 m)
Monitoring equipment	The effluent from the wastewater treatment plant is discharged through the sewage pipe, and the diameter of the pipe is certainly less than 1 m in general (The diameter of the pipe is from FSR), so there is no need to measure here.

QA/QC procedures to be applied	–
Purpose of data	Calculation of project emissions
Calculation method	Conduct monthly measurements of depth under normal operating conditions and take the annual average value for calculations
Comments	The data will be stored for the crediting period + 2 years.

Data / Parameter	$Q_{PJ,sl,y}$
Data unit	tonnes
Description	Quantity of sludge produced in the project activity in the year y
Source of data	Wastewater treatment plant sludge amount statistics
Description of measurement methods and procedures to be applied	The amount of sludge produced by the wastewater treatment plant is weighed by weighbridge
Frequency of monitoring/recording	Parameter monitored continuously or in batches, and aggregated yearly for calculations
Value applied	For ex ante estimation, the data is from Feasibility Study Report of the project. The actual quantity of sludge will be monitored. Xiaqiao Town wastewater Treatment Plant: $Q_{PJ,sl,y}$ = 1,029.30 t/a Qujie Town wastewater Treatment Plant: $Q_{PJ,sl,y}$ = 810.30 t/a Xinyi City Dinbao Town wastewater treatment Plant: $Q_{PJ,sl,y}$ = 543.85 t/a Xinyi City Qianpai Town wastewater treatment Plant: $Q_{PJ,sl,y}$ = 927.10 t/a Xianqiao South Wastewater Treatment Plant: $Q_{PJ,sl,y}$ = 1,470.95 t/a Qiankeng Town North wastewater Plant: $Q_{PJ,sl,y}$ = 1,127.85 t/a Shangsha Town wastewater Treatment Plant: $Q_{PJ,sl,y}$ = 1,412.55 t/a Baita Town wastewater Treatment Plant:

	$Q_{PJ,sl,y}$ = 854.10 t/a Luoding Fourth Domestic wastewater Treatment Plant: $Q_{PJ,sl,y}$ = 3,744.90 t/a Shitan Town wastewater Treatment Plant: $Q_{PJ,sl,y}$ = 1,204.50 t/a Litan Town wastewater Treatment Plant: $Q_{PJ,sl,y}$ = 1,277.50 t/a jiulong Town wastewater Treatment Plant: $Q_{PJ,sl,y}$= 1,255.60 t/a Shakou Town wastewater Treatment Plant: $Q_{PJ,sl,y}$ = 1,584.10 t/a Bomei Town wastewater Treatment Plant: $Q_{PJ,sl,y}$ = 5,011.45 t/a Nantang Town wastewater Treatment Plant: $Q_{PJ,sl,y}$ = 4,814.35 t/a Chikeng Town wastewater Treatment Plant: $Q_{PJ,sl,y}$ = 1,146.10 t/a
Monitoring equipment	weighbridge
QA/QC procedures to be applied	The weighbridge will be calibrated annually to ensure the reliability of the parameter.
Purpose of data	Calculation of project emissions
Calculation method	–
Comments	The data will be stored for the crediting period + 2 years.

Data / Parameter	$D_{PJ,i,y}$
Data unit	km
Description	Average distance per trip travelled by the transportation vehicle of type i for transportation of sludge generated by the wastewater treatment system in the project activity in the year y
Source of data	The distance of sludge transportation between the two sites can be determined by Google satellite map.
Description of measurement methods	Determination by Google satellite map

and procedures to be applied	
Frequency of monitoring/recording	Once a year
Value applied	For ex ante estimation, the data is from Feasibility Study Report of the project. The actual average distance will be monitored. Xiaqiao Town wastewater Treatment Plant: $D_{PJ,i,y}$ = 20 km Qujie Town wastewater Treatment Plant: $D_{PJ,i,y}$ = 20 km Xinyi City Dinbao Town wastewater treatment Plant: $D_{PJ,i,y}$ = 20 km Xinyi City Qianpai Town wastewater treatment Plant: $D_{PJ,i,y}$ = 20 km Xianqiao South Wastewater Treatment Plant: $D_{PJ,i,y}$ = 15 km Qiankeng Town North wastewater Plant: $D_{PJ,i,y}$ = 15 km Shangsha Town wastewater Treatment Plant: $D_{PJ,i,y}$ = 15 km Baita Town wastewater Treatment Plant: $D_{PJ,i,y}$ = 15 km Luoding Fourth Domestic wastewater Treatment Plant: $D_{PJ,i,y}$ = 15 km Shitan Town wastewater Treatment Plant: $D_{PJ,i,y}$ = 15 km Litan Town wastewater Treatment Plant: $D_{PJ,i,y}$ = 15 km jiulong Town wastewater Treatment Plant: $D_{PJ,i,y}$ = 15 km Shakou Town wastewater Treatment Plant: $D_{PJ,i,y}$ = 15 km Bomei Town wastewater Treatment Plant: $D_{PJ,i,y}$= 15 km Nantang Town wastewater Treatment Plant: $D_{PJ,i,y}$= 15 km

	Chikeng Town wastewater Treatment Plant: $D_{PJ,i,y}$ = 15 km
Monitoring equipment	Determination by satellite map
QA/QC procedures to be applied	The parameter is obtained from the transporter. Furthermore, the same can also be verified during the proposed crediting period. This will ensure reliability and hence ‘Low’ level of uncertainty of the parameter.
Purpose of data	Calculation of project emissions.
Calculation method	–
Comments	The data will be stored for the crediting period + 2 years.

Data / Parameter	$F_{PJ,i}$
Data unit	Liter/km
Description	Specific fuel consumption of the transportation vehicle of type i
Source of data	Table 1 Guidelines for Accounting Methods and Reporting of Greenhouse Gas Emissions of Transportation Enterprises (Diesel, ＞4 tonne ＜8 tonne)
Description of measurement methods and procedures to be applied	The parameter will be obtained from transporter and stored on the logbook. Data will be aggregated yearly.
Frequency of monitoring/recording	Once a year
Value applied	0.251 (For ex ante estimation, the data is from Table 1 Guidelines for Accounting Methods and Reporting of Greenhouse Gas Emissions of Transportation Enterprises (Diesel, ＞4 tonne ＜8 tonne))
Monitoring equipment	
QA/QC procedures to be applied	The parameter is obtained from the transporter. Furthermore, the same can also be verified during the proposed crediting period. This will ensure reliability and hence ‘Low’ level of uncertainty of the parameter.
Purpose of data	Calculation of project emissions.

Calculation method	–
Comments	The data will be stored for the crediting period + 2 years.

Data / Parameter	$NCV_{PJ,j,y}$ and $EF_{PJ,j,y}$
Data unit	Respectively: TJ/mass or volume units, and tCO_2/T
Description	Respectively: net calorific value of the transportation fuel j, and CO_2 emission factor of the transportation fuel j in the year
Source of data	$NCV_{PJ,j,y}$: Table 2 Guidelines for Accounting Methods and Reporting of Greenhouse Gas Emissions of Transportation Enterprises (Diesel) $EF_{PJ,j,y}$: IPCC Vol2 Ch3 table 3.2.1
Description of measurement methods and procedures to be applied	The Net Calorific Value of the transportation fuel is taken from default value in Guidelines for Accounting Methods and Reporting of Greenhouse Gas Emissions of Transportation Enterprises. The CO_2 emission factor of the transportation fuel is taken from IPCC default value.
Frequency of monitoring/recording	Once a year
Value applied	$NCV_{PJ,j,y}$= 0.04333 TJ/tonne; $EF_{PJ,j,y}$= 74.1 tCO_2/TJ (For ex ante estimation, $NCV_{PJ,j,y}$ is from Table 2 Guidelines for Accounting Methods and Reporting of Greenhouse Gas Emissions of Transportation Enterprises (Diesel), $EF_{PJ,j,y}$ is from IPCC Vol2 Ch3 table 3.2.1)
Monitoring equipment	–
QA/QC procedures to be applied	The uncertainty level of the parameter is considered to be 'Low' since it is determined with default value. Therefore, no QA/QC procedure will be required for the parameter
Purpose of data	Calculation of project emissions.
Calculation method	–
Comments	The data will be stored for the crediting period + 2 years.

Data / Parameter	$q_{PJ,i}$
Data unit	tonnes/trip

Description	Average vehicular capacity of the transportation vehicle of type i
Source of data	Wastewater treatment plant sludge amount statistics
Description of measurement methods and procedures to be applied	Manual records
Frequency of monitoring/recording	Once a day
Value applied	5 (For ex ante estimation, the data is from Feasibility Study Report of the project. The actual average vehicular capacity will be monitored)
Monitoring equipment	Manual records
QA/QC procedures to be applied	–
Purpose of data	Calculation of project emissions.
Calculation method	Manual records
Comments	The data will be stored for the crediting period + 2 years.

Data / Parameter	$EC_{PJ,j,y}$ (EC_y)
Data unit	MWh
Description	Electricity consumption for the year y in operating the wastewater plant.
Source of data	Electricity meters.
Description of measurement methods and procedures to be applied	Electricity meters will be installed at the wastewater plant. Readings will be done monthly.
Frequency of monitoring/recording	continuously
Value applied	For ex ante estimation, the data is from Feasibility Study Report of the project. The actual electricity consumption will be monitored. Xiaqiao Town wastewater Treatment Plant: $EC_{PJ,j,y}$ = 607.07 MWh Qujie Town wastewater Treatment Plant:

	$EC_{PJ,j,y}$ = 772.63 MWh Xinyi City Dinbao Town wastewater treatment Plant: $EC_{PJ,j,y}$ = 408.39 MWh Xinyi City Qianpai Town wastewater treatment Plant: $EC_{PJ,j,y}$ = 764.92 MWh Xianqiao South Wastewater Treatment Plant: $EC_{PJ,j,y}$ = 1,250.56 MWh Qiankeng Town North wastewater Plant: $EC_{PJ,j,y}$ = 981.88 MWh Shangsha Town wastewater Treatment Plant: $EC_{PJ,j,y}$ = 1,229.82 MWh Baita Town wastewater Treatment Plant: $EC_{PJ,j,y}$ = 843.84 MWh Luoding Fourth Domestic wastewater Treatment Plant: $EC_{PJ,j,y}$ = 3,120.80 MWh Shitan Town wastewater Treatment Plant: $EC_{PJ,j,y}$ = 654.58 MWh Litan Town wastewater Treatment Plant: $EC_{PJ,j,y}$ = 724.25 MWh jiulong Town wastewater Treatment Plant: $EC_{PJ,j,y}$ = 724.25 MWh Shakou Town wastewater Treatment Plant: $EC_{PJ,j,y}$ = 877.74 MWh Bomei Town wastewater Treatment Plant: $EC_{PJ,j,y}$ = 2,747.02 MWh Nantang Town wastewater Treatment Plant: $EC_{PJ,j,y}$ = 2,777.02 MWh Chikeng Town wastewater Treatment Plant: $EC_{PJ,j,y}$ = 602.30 MWh
Monitoring equipment	Electricity meters installed in the wastewater plant
QA/QC procedures to be applied	Readings will be verified using monthly electricity bills. Calibration of the electricity meters will be done according to national standard by qualified organizations. Readings will be verified using electricity bill of the wastewater plant. For missing data, average monthly electricity consumption in the PD or

	average electricity consumption of the previous months whichever is higher will be used. This is the most conservative approach.
Purpose of data	To calculate project emissions
Calculation method	Electricity bill
Comments	N/A

Data / Parameter	$TDL_{j,y}$
Data unit	_
Description	Average technical transmission and distribution losses for providing electricity to source j in year y.
Source of data	As per the Methodological Tool 05 (V3.0) "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" In case of scenario B and scenario C, case C.II, assume TDLj,y=0 as a simplification. In case of other scenarios (scenario A and scenario C, cases C.I and C.III), choose one of the following options: 1. Use annual average value based on the most recent data available within the host country. 2. Use as default values of 20% for: (a) project or leakage electricity consumption sources; (b) baseline electricity consumption sources if the electricity consumption by all project and leakage electricity consumption sources to which scenario A or scenario C (cases C.I or C.III) applies is larger than the electricity consumption of all baseline electricity consumption sources to which scenario A or scenario C (cases C.I or C.III) applies. 3. Use as default values of 3% for: (a) baseline electricity consumption sources. (b) project and leakage electricity consumption sources if the electricity consumption by all project and leakage electricity consumption sources to which scenario A or scenario C (cases C.I or C.III) applies is smaller than the electricity consumption of all baseline electricity consumption sources to which scenario A or scenario C (cases C.I or C.III) applies.
Description of measurement methods and procedures to be applied	Scenario A: Electricity consumption from the grid is applied to the proposed project. For project electricity consumption sources, a default value of 20% is used for $TDL_{j,y}$.

Frequency of monitoring/recording	Annually. In the absence of data from the relevant year, most recent figures should be used, but not older than 5 years.
Value applied	20%
Monitoring equipment	Electricity meters installed in the wastewater plant
QA/QC procedures to be applied	–
Purpose of data	To calculate project emissions
Calculation method	–
Comments	For (a): $TDL_{j,y}$ should be estimated for the distribution and transmission networks of the electricity grid of the same voltage as the connection where the proposed project activity is connected to. The technical distribution losses should not contain other types of grid losses (e.g. commercial losses/theft). The distribution losses can either be calculated by the project participants or be based on references from utilities, network operators or other official documentation.

5.3 Monitoring Plan

The monitoring plan presented in this PD assures that real, measurable, long term GHG emission reductions can be monitored, recorded and reported. It is a crucial procedure to identify the final VCUs of the project. This monitoring plan will be implemented by the project owner during the project operation. The details of the monitoring plan are specified as follows:

Monitoring framework

Figure 5-1 below outlines the organization structure of the monitoring system for the related three parameters. The project owner will be responsible for the whole monitoring work. The VCS monitoring team will be responsible for the monitoring of all the parameters to be monitored. All the data will be reviewed by the project developer and VVB

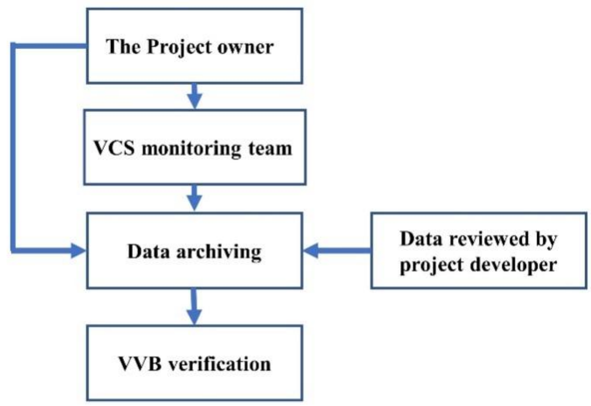

Figure 5-1 Organization Structure of the Monitoring Team

Monitoring equipment and installation

Installation and configuration of meters are shown as Figure 5-2. In order to ensure measurements with a low degree of uncertainty, the data metering equipment and gauges will be calibrated and checked by an appropriately qualified third party according to an appropriate national standard. The calibration records will be appropriately maintained and made available for review by VVB.

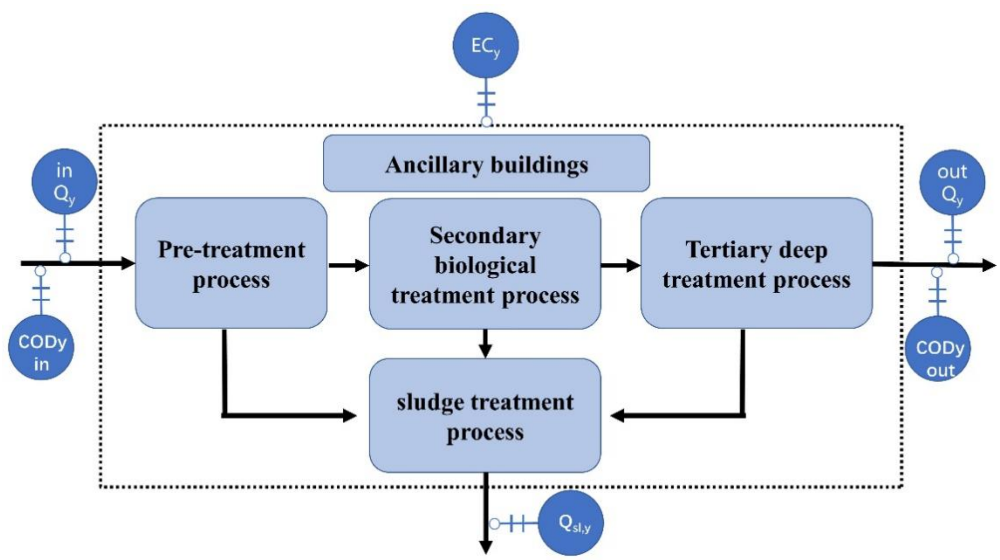

Figure 5-2 Installation and Configuration of Meters

Quality control and quality assurance procedures

A quality management system will be established, which ensures the quality and accuracy of the measured data.

Training

For all members involved in the project, necessary trainings will be provided by the project owner. Besides, the project owner should ensure that only skilled employees are allowed to undertake the monitoring work. The training contents should be regard to the general and technical aspects of the project to the extent appropriate, as well as basic understandings of VCS Standard and climate change.

Data management

All data collected as part of monitoring plan should be saved with at least 1 backup copy until the end of the crediting period. After the crediting period ends, the data should be archived electronically on hard disks and be kept at least 2 years after the end of the last crediting period.

Corrective actions

The project will sign an agreement that it will not participate in other environment credits, other GHG programs and has not been rejected by any other GHG Programs. The whole VCS monitoring team will follow recognized standard data evaluation methods to guarantee that the data is reliable and accurate. The quality control and quality assurance procedures include the handling and correction of nonconformities in the implementation of the project or the monitoring plan. In case such nonconformities are observed:

- An analysis of the nonconformity and its causes will be carried out immediately by the project owner, with the help of external experts if necessary.

- A corrective action plan should then be developed to eliminate the non-conformity and its causes to prevent its recurrence.

- Corrective actions are implemented and reported back to the VCS monitoring team.

- Relative information will be included in the monitoring report and reported to VVB during the verification.

If the data record is missing or damaged during the monitoring periods, the following makeup process will be conducted:

-The general principle is that zero value will be used for the missing or damaged data. This is most conservative approach. The monitoring personnel will be trained before the starting of the project operation to ensure that each team member is fully aware of and able to strictly follow this conservative principle. During the monitoring process, the monitoring personnel will be required to strictly abide by the above conservative principle in data recording, i.e., use zero values for all the missing or damaged data.

-If this is due to the working error of the monitoring personnel, further train the person until he or she can perform the job properly. And in the meantime, use zero value for the missing or damaged data;

-If this is due to the inability or attitude of a particular worker in monitoring team, dismiss such worker and re-hire those with proper ability and attitude. And in the meantime, use zero value for the missing or damaged data;

-If some data recorded are significantly higher than the normal range, the monitoring personnel should ask for the reason. If the measurement is high due to the damage of measurement equipment, zero value will be used for that day's data. And need to calibrate and maintain the measuring equipment immediately and avoid this situation in the future.

If the monitoring results are satisfactory in terms of correct reporting, data completeness and correct analysis, the data will be accepted for the monitoring report.