



भारत सरकार  
जल शक्ति मंत्रालय  
जल संसाधन, नदी विकास और गंगा संरक्षण विभाग

**STANDARD OPERATING PROCEDURE**  
**for**  
**Preparation of Water Audit Report and**  
**its Evaluation Criteria**

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# **STANDARD OPERATING PROCEDURE FOR PREPARATION OF WATER AUDIT REPORT AND ITS EVALUATION CRITERIA**

## **1. Background**

Central Government constituted the Central Ground Water Authority (hereinafter referred to as the Authority) vide notification Number S.O. 38(E), dated 14th January, 1997, followed by notification number S.O. 1124(E) dated 6th November, 2000 and S.O. 1121 (E) dated 13th May, 2010 of the Government of India in the Ministry of Environment & Forests, for the purposes of regulation and control of ground water development and management in the whole of India and to issue necessary regulatory directions.

The Ministry of Jal Shakti has issued 'Guidelines to control and regulate ground water extraction in India' vide notification number S.O. 3289(E) dated 24th September, 2020, notified by Department of Water Resources, River Development and Ganga Rejuvenation, Ministry of Jal Shakti, wherein Paragraph 4.1 (iii) provided that *"All industries abstracting ground water in excess of 100 m<sup>3</sup>/d shall be required to undertake annual water audit through Confederation of Indian Industries (CII)/ Federation Indian Chamber of Commerce and Industry (FICCI)/ National Productivity Council (NPC) certified auditors and submit audit reports within three months of completion of the same to CGWA. All such industries shall be required to reduce their ground water use by at least 20% over the next three years through appropriate means."*

## **2. Applicability of Water audit**

Amendment Notification dated 29.03.2023 has been further issued by Ministry of Jal Shakti, published in the Gazette of India, Extraordinary, Part II, section 3, sub-section (ii), vide Notification number S.O. 1509 (E), wherein Paragraph 5(i) provides the amendment of the above provision as *'All industries abstracting ground water in excess of 100 m<sup>3</sup>/day shall be required to undertake biennial (once in two years) water audit through certified auditors of agencies as approved by CGWA and submit audit reports within three months of completion of the same to CGWA. Compliance of the*

*earlier given reports may be checked by certified water auditors after one year and the report in this regard may be shared with CGWA. All such industries shall be required to reduce their ground water use by at least 20% over the next three years through appropriate means.'*

As per the approval from the Ministry of Jal Shakti, Govt of India, vide letter No. T-81011/53/2022-GW Section-MOWR dated 27.09.2022, entrusted Rajiv Gandhi National Ground Water and Training Institute (RGNGWTRI), Naya Raipur, Chhattisgarh in collaboration with National Water Academy (NWA), Pune, Maharashtra to conduct training certificate course.

**The submission of 'Water Audit Report' is applicable to all industries abstracting ground water in excess of 100 m<sup>3</sup>/day and shall be required to undertake biennial (once in two years) water audit.**

### **3. Need for SOP:**

It is observed that the report submitted by the Water Auditors has varied topics and needs revision in terms of recommendation as per the Notified guidelines. To standardize the water audit report as per the compliance of the NOC and to rationalize the need of Water Auditing, the Standard Operating Procedure (SOP) for Preparation of Water Audit Report is developed. It also contains the Evaluation Criteria and applicability of Water Audit Report. The report should be restricted in the pre-defined format (**Annexure –I**) and Evaluation sheet must be duly filled, signed by water auditor and project proponent (**Annexure-II**)

### **4. Instruction and guideline for preparation of Water Audit Report**

It is suggested to adopt following pattern of content. However, as per the field study/scenario of a particular industry the certified water auditor may add additional points/topics, without modifying the structure/ main body of the report. The structure of Water Audit Report should include the following sections:

- Title Page- (CGWA Application no., Name of Firm, Year, water audit period)
- Table of Contents
- List of Figures/Graphs

- List of Tables
- List of Annexure (Measured Data and Data Provided by Industry)
- Executive Summary (1 Pages)

Chapters:

1. Background and Introduction (1-2 page)
2. Scope of Work and Objectives(1 page)
3. Methodology of the Study (1 page)
4. Industry Process Study (Products, Process and Process Flow Diagram including Utilities) (1 page)
5. Assessment of Present Water Usage including Recycling(1 page)
6. Assessing Use of Technologies and Best Practices (1 page)
7. Waste Water Treatment and Discharge (1-2page)
8. Data/Information Analysis and Interpretation (1-2page)
9. Water Conservation Measures, Feasibility and Management Plan (1 page)
10. Conclusion and Recommendations (1 page)

- References (List of information and data sources)
- Annexure (Measured data)
- Annexure (Data provided by the industry)
- Annexure (Copy of other statutory clearances, if any, obtained by the industry such as CTE, CTO, Environment/forest clearance etc.)
- Annexure (Note of agreement by the industry on water audit report)

## **1. EXECUTIVE SUMMARY**

This should include the brief about the followings (summary):

### ***Section 1: Background and introduction (1 page)***

Brief introduction of the industry, its location, product(s), production process, annual production, number and types of utilities, number of employees, working hours/shifts, permanent and casual workers in each shift, size and type of township, number of people/workers residing, if any, hydrology/hydro-geology of the area, rainfall intensity and duration, river/lake within 5 kms, number of bore wells,

piezometers, flow measurement devices available with industry and used by CWA during the study.

**Section 2: Water consumption, monitoring, and treatment (1 page)**

Sources of fresh water, daily fresh and recycled water consumption in KLD, overall water quality, water consumption in 1) process and 2) utilities, separately for each utility, 3) domestic; water usage monitoring system of industry, minimum and maximum monthly water consumption in a year, assessment of performance of each utility, amount of wastewater generation and treatment system (ETP, STP), process and amount of water recycling, rain water harvesting system and use of harvested water, specific water consumption (SWC) based on water audit study, SWC of last two years based on available data from industry, comparison of SWC with available benchmark, if any

**Section 3: Potential for reduction in water consumption (0.5 page)**

Briefly provide initiatives taken by the industry for reduction in water consumption in last 1-2 years (CWA to discuss with the industry personnel).

Brief of short, medium, and long-term water reduction potential based on water audit study. CWA to state as following based on water audit study:

Potential reduction in water consumption 1) in industrial process, 2) in each utility, 3) domestic water use, 4) green belt, 5) washing equipment, vehicles etc, 6) dust suppression, 7) Enhanced recycling, 8) for any other activity (please specify) in percentage and KLD, Total reduction in water consumption in percentage and KLD including all measures.

**Section 4: Implementation plan for water reduction and recommendations (0.5 pages)**

Briefly provide overall economic, technical, and environmental feasibility of implementation of water reduction/conservation measures; implementation period along with total investment and payback period, recommendations for future, note of acceptance from the industry management for implementation of water saving measures.

**Conclusion:** The quantum of water extraction to be permitted in KLD as well as KLY is to be mentioned based on the findings of the water audit.

## **MAIN AUDIT REPORT**

### **1. BACKGROUND OF THE PROJECT & INTRODUCTION OF THE INDUSTRY**

1.1 Background of the project and need of water audit in the industry.

1.2 Brief introduction of the industry, its location, product(s), production process, annual production, number and types of utilities, number of employees, working hours/shifts, permanent and casual workers in each shift, size and type of township, number of people/workers residing, if any, hydrology/hydro-geology of the area, rainfall intensity and duration, river/lake within 5 kms, number of bore wells, piezometers, CGWA Application no., name of the water audit firm, year & water audit period

### **2. OBJECTIVE AND SCOPE OF WORK**

Objective of the water audit should be to accurately quantify water consumption, measure and monitor water usage and its quality for different activities and processes, spot water leakage/loss areas and identify water saving opportunities through optimizing water use, recycling, process interventions, technological improvements, and adoption of best practices.

Scope of work of the water audit study includes but not limited to the following:

2.1 Detailed process study including all utilities and water usage with process flow diagram

2.2 Collect data for last two years on monthly water consumption and calculate specific water consumption (SWC) for each product.

2.3 Study/examine each utility and its water usage with regard to its performance efficiency.

2.4 Discuss and describe as to why surface water cannot be utilized in place of ground water. Provide your findings.

- 2.5 Identify water consumption areas based on process study and develop an adequate plan for carrying out field measurements with maximum accuracy and reasonableness.
- 2.6 Monitor and measure water flow/usage using scientific methods and devices according to the plan.
- 2.7 Quantify water usage, identify water-intensive activities and processes and mark water leakage/loss areas and activities.
- 2.8 Assess/examine water quality for usage in different processes, domestic use, green belt, washing, dust suppression etc with an objective to explore potential use of recycled water.
- 2.9 Calculate SWC based on water audit study and compare it with SWC obtained based on last two year water consumption data. Compare SWC with the best industry benchmarks in the same sector.
- 2.10 Evaluate the water usage practices of the industry as compared to the best practices in the same sector or similar processes.
- 2.11 Prepare water balance diagram-I including all water input and output points and quantities.
- 2.12 Discuss findings with the industry management in order to ensure accuracy of data/information and water balance diagram.
- 2.13 Develop water saving measures (short-, medium-, and long-term) for process, each utility, domestic use, green belt, washing, dust suppression etc.
- 2.14 Carry out economic, technical, and environmental feasibility of each water saving measure.
- 2.15 Examine waste water treatment systems (ETP/STP) and explore possibilities of recycling by utilizing advanced wastewater treatment technologies and tertiary treatment.
- 2.16 Examine rainwater harvesting facilities and use of harvested water in place of fresh water in the industry.
- 2.17 Develop a detailed plan with timeline, investment and payback for each water-saving measure, recycling, and maximized use of rain water harvesting.
- 2.18 Discuss the water saving action plan at two levels in the industry; firstly with workers /operators and secondly with the management and obtain their understanding and agreement.

2.19 Prepare water balance diagram-II assuming implementation of all water saving measures, maximized recycling, maximized use of harvested water etc.

2.20 Develop futuristic recommendations to enhance water use efficiency of the industry.

### **3. METHODOLOGY OF THE STUDY**

In this section, brief about the methodology adopted for carrying out the study is to be provided. Please also include following:

1. Pre-audit data/information collection
2. Audit study plan
3. Description of water audit team and their qualifications
4. Names and specifications of instruments used
5. Dates of water audit study with total duration.
6. Names and designations of industry personnel with whom interactions were held during the water audit study including workers/operators and management.

### **4. INDUSTRY PROCESS STUDY**

In this section, provide details of products manufactured, process technology, process flow diagram, details of utilities along with their make and year of establishment, advanced water efficient technologies available in market for similar process/operations, assessment of zero-liquid discharge, if applicable.

Geo-tagged photos of each utility with date and time during water audit.

### **5. ASSESMENT OF PRESENT WATER USAGE INCLUDING RECYCLING**

In this section, assessment of present water usage is to be discussed.

Sources of water, daily fresh water and recycled water consumption for industrial processes, each utility, domestic purpose, green belt, washing, dust suppression etc. Mention water consumption for each category distinctly.

Collection and analysis of data pertaining to monthly water consumption for last two years



Flow measurement instruments/devices available with the industry and instrument/equipment used by the auditors for flow measurement, assessment of water quantity and quality, wastewater quantity and quality, performance of the utilities (eg. cooling tower, boiler, softener, RO, DM, STP, ETP, MEE etc.), quantity and quality of water discharge outside the premises of the industry.

Present level of water recycling in the industry along with quantity and how and where recycled water is utilized.

Present status of rainwater harvesting (recharge and/or storage structures) and use of harvested water, if any along with quantity.

Current specific water consumption and benchmark (if any) for the similar industrial sector/processes/operations.

Provide initiatives taken by the industry towards water conservation.

Develop water balance diagram-I based on present water usage (without water audit study)

## **6. ASSESSING THE USE OF TECHNOLOGY AND BEST PRACTICES**

This section discusses technologies and best practices being used 1) in production process, 2) for utilities, 3) reuse and recycling and 4) waste water treatment (ETP, STP etc). Identify and include technologies, best practices and house-keeping measures that can make industry more water efficient. Gather information about similar industries and processes/operations including utilities which are more water efficient.

Assess the scope of technology up-gradation in the process, utilities, water treatment, wastewater treatment, recycle/reuse of treated water and achieving Zero Liquid Discharge to the extent possible. Provide these details in this section.

## **7. WASTE WATER TREATMENT & DISCHARGE**

This section provides the detailed analysis of the data along with the key findings regarding generation of waste water, collection, and treatment systems in place, disposal/discharge/recycling/reuse of treated waste water.

7.1 Treatment scheme for industrial wastewater and treatment cost per KL

7.2 Treatment scheme for domestic wastewater and treatment cost per KL.

Geo-tagged photos of ETP, STP etc. with date and time during water audit.

## **8. DATA / INFORMATION ANALYSIS & INTERPRETATION**

This section provides the detailed analysis of the data along with the key findings, brief discussion on discussion on water balance of all important water consuming activities/utilities.

Discuss water efficient technologies available for the industrial processes for the least consumption of water and how to achieve reduction in specific water consumption.

Examine the water consumption for green belt, dust suppression, washing of equipment/vehicles etc. and indicate area of green belt, area in which dust suppression is applied and calculate water consumed per square meter for green belt and per square meter for dust suppression. Water saving options should be evolved based on established benchmark or best practices. Examine the adequacy of water used for washing etc. and clearly state in the water audit report whether the water consumption is adequate or not and identify water saving opportunities for activities such as washing etc. Mentioning of miscellaneous water consumption should be avoided.

Discuss leakages. Check for leaks in pipes, valves, fittings, and equipment that could be wasting water. Look for signs of water leakage, such as damp spots, puddles, or water stains. Repair any identified leaks promptly.

Assess equipment efficiency. Evaluate the efficiency of equipment/utilities that utilize water, such as cooling towers, boilers, and process equipment. Check for scaling, fouling, or inefficient operation that may lead to excessive water usage. Optimize equipment performance and maintenance to reduce water consumption.

Analyze water flow process, examine the process flow diagram and identify potential areas for process optimization. Look for opportunities to eliminate or reduce water usage through process modifications, equipment upgrades, or alternative technologies.

Describe whether and how change of technology, equipment, adoption of best practices, maximizing reuse and recycling, use of treated water in process/non-potable use/green belt/washing/dust suppression or implementation of any other suitable water saving measure could result in fresh water saving and identify if such specific opportunities exist for the industry.

For domestic water consumption, compare the per person water consumption based on established benchmark.

## **9. WATER CONSERVATION MEASURES, FEASIBILITY & MANAGEMENT PLAN**

This section includes details of water conservation/saving measures.

Describe in detail, each short-term, medium-term and long-term water saving measures for industrial process, each utility, domestic consumption, green belt, dust suppression, washing or any other water use in the industry.

Describe opportunities for enhanced reuse and recycling of water and rain water harvesting.

Assess economic, technical, and environmental feasibility of each evolved water saving/conservation measure. Provide tabulation of all the feasible options (i) Name of the Water Conservation Measures, (ii) Investment required, (iii) Payback Period, (iv) Quantum of Estimated Water Saving (KLD).

Indicate reduction in fresh water/ specific water consumption in industrial process in each year with trend analysis of production versus water usage.

Based on the findings of audit, set specific targets for reducing specific water consumption in industry and develop an action plan to achieve those targets. Prioritize actions based on their potential water savings, cost-effectiveness, and feasibility.

Develop water balance diagram-II. (based on water audit and assuming all water saving measures have been implemented by the industry).

## **10. CONCLUSION AND RECOMMENDATIONS**

In this section, provide overall outcome of the study and summary of findings including recommendations. The limitations faced during the water audit to be incorporated.

### **10.1 Conclusion**

The quantum of water extraction to be permitted in KLD as well as KLY is to be mentioned based on the findings of the water audit. Mention specific water consumption 1) before water audit and 2) after implementation of water saving measures

### **10.2 Recommendations**

Futuristic recommendations to enhance water use efficiency of the industry so that the industry can achieve 20 % or more reduction in ground water usage as compared to its water usage in September 2020 (Notification of new Guideline of C.G.W.A).

**REFERENCE** (List of data/information sources)

**ANNEXURES** (Measured data)

**ANNEXURES** (Data provided by the industry)

**ANNEXURES** (Copy of other statutory clearances, if any, obtained by the industry such as CTE, CTO, Environment/forest clearance etc.)

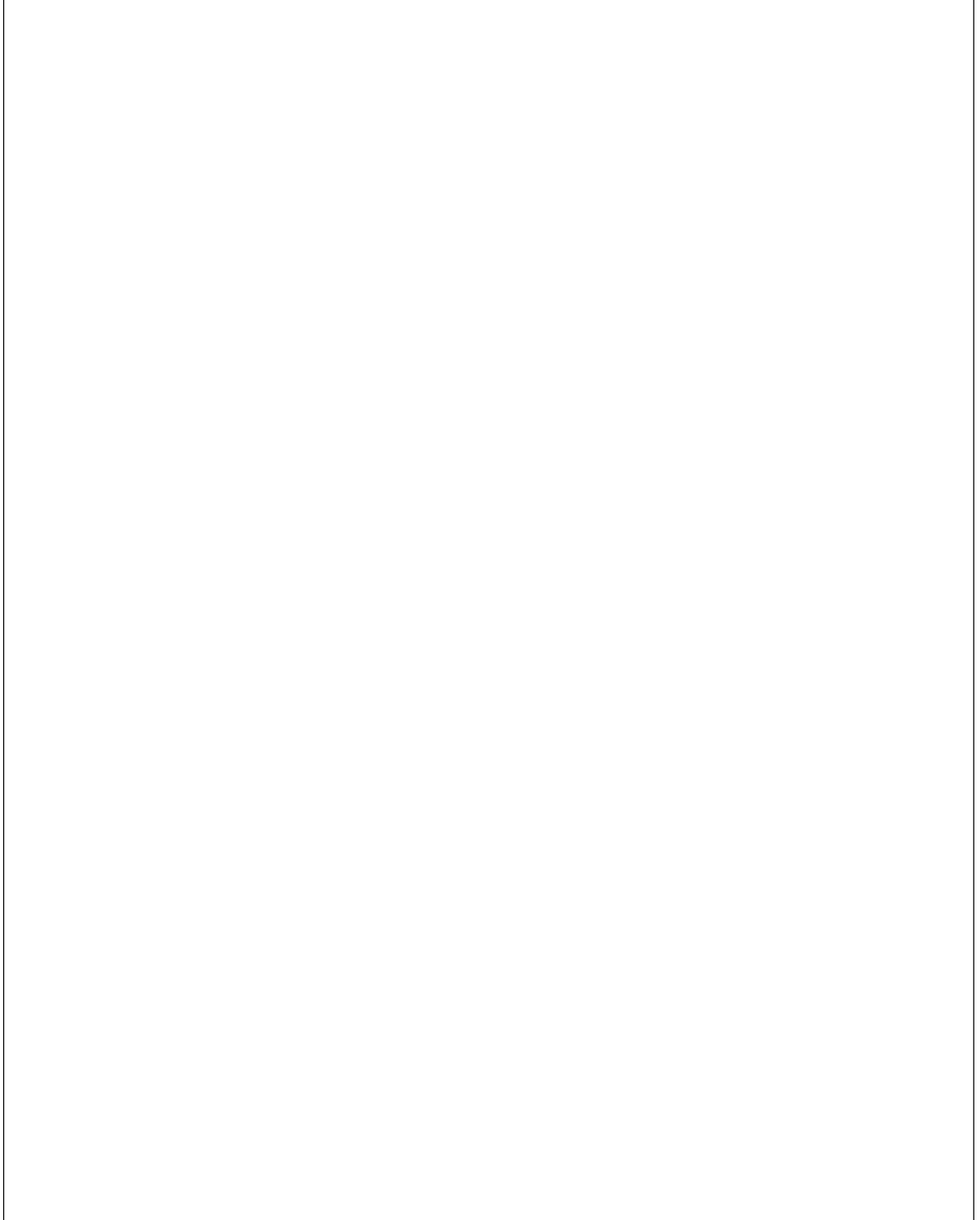
**ANNEXURE** (Note of agreement by the industry on water audit report)

#### **Note:**

- Short term: Immediate implementation within 6 months
- Medium term: 6 months to 12 months
- Long term: 12 to 24 months

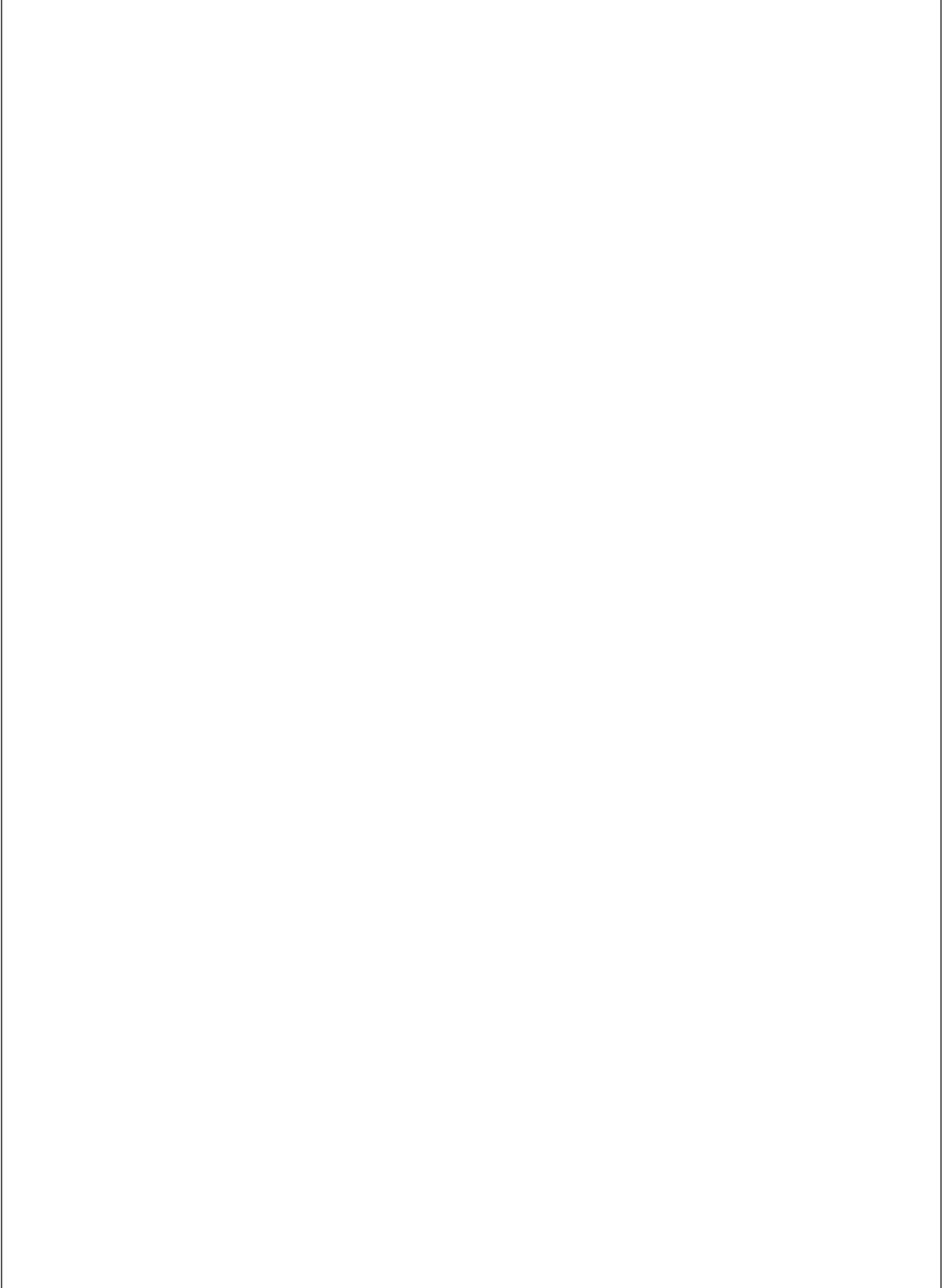
**PRE-DEFINED FORMAT FOR WATER AUDIT REPORT**

*EXECUTIVE SUMMARY (1-2 page only as per instruction)*

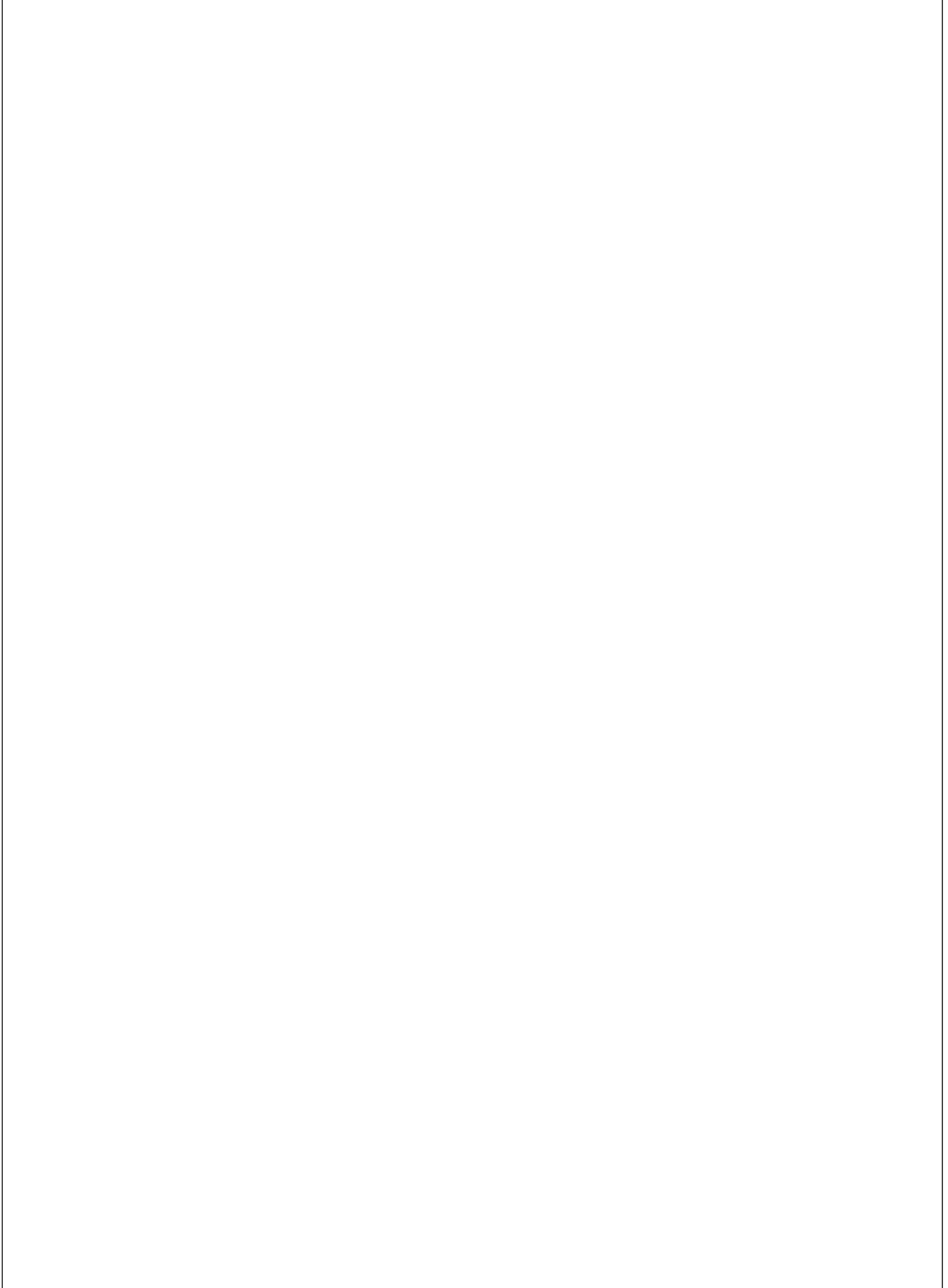


**Chapters**

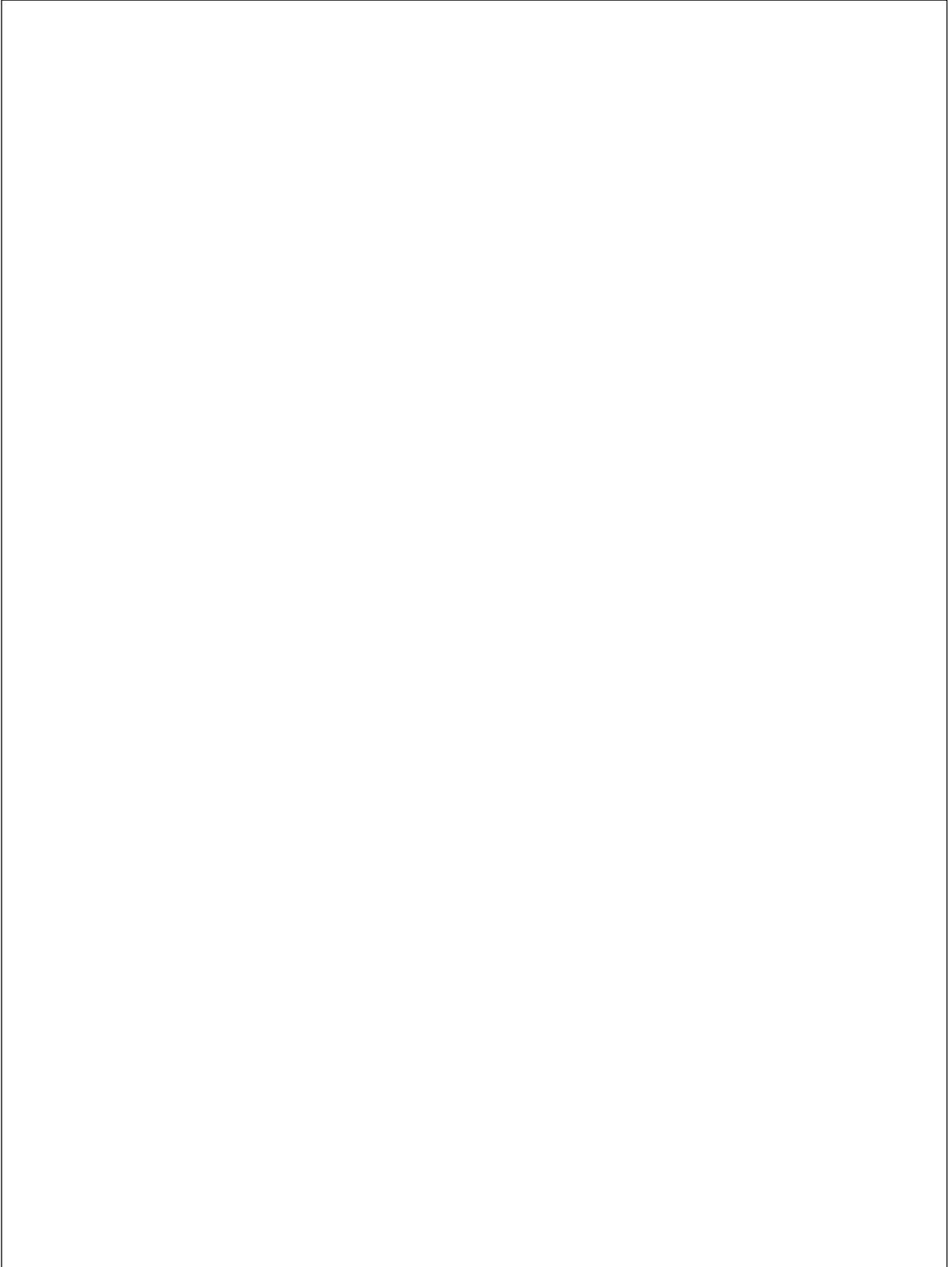
**Chapter 1: Background and Introduction (1-2 page)**



## **Chapter 2: Scope of Work and Objectives (1page)**

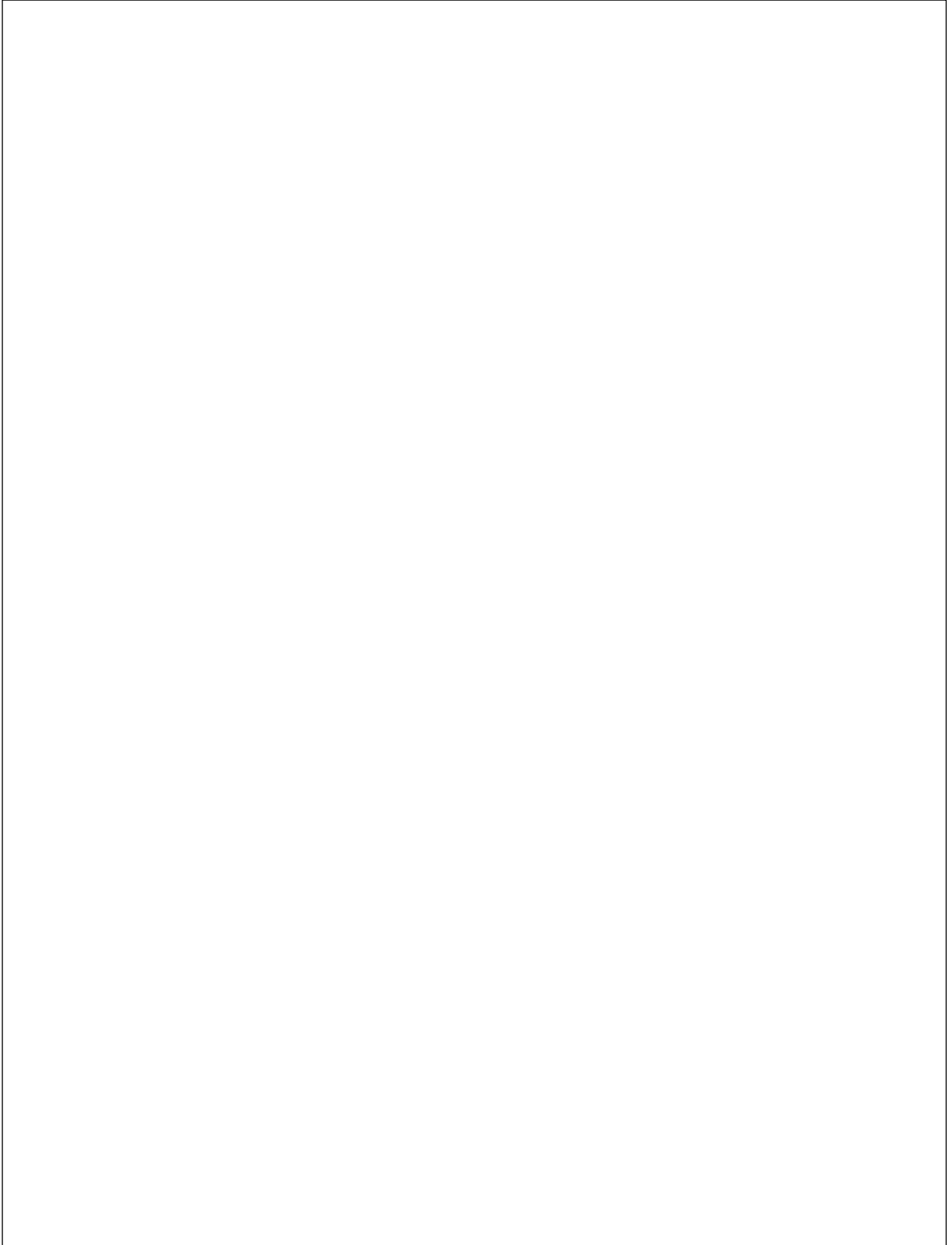


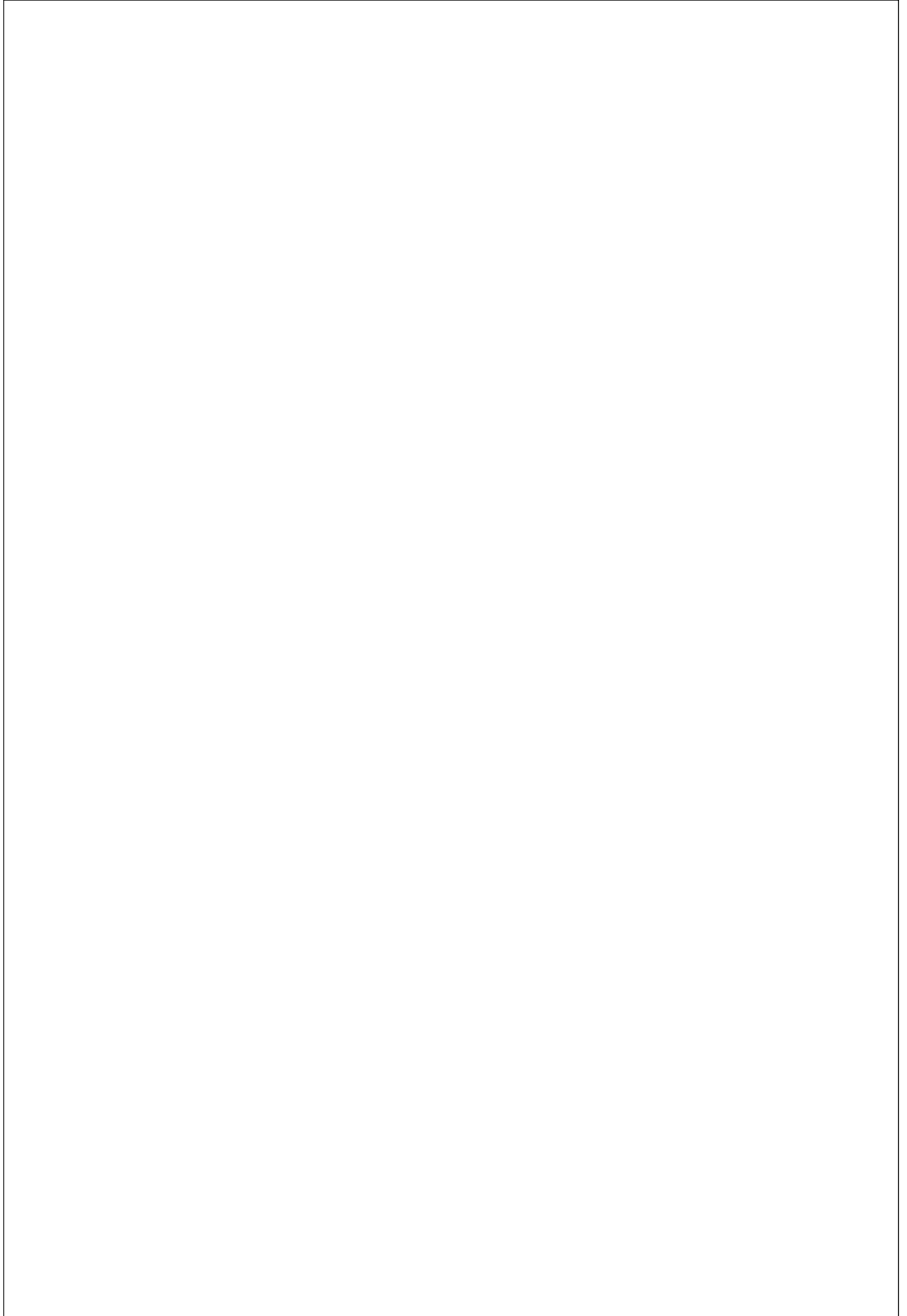
### **Chapter 3: Methodology of the Study (1page)**



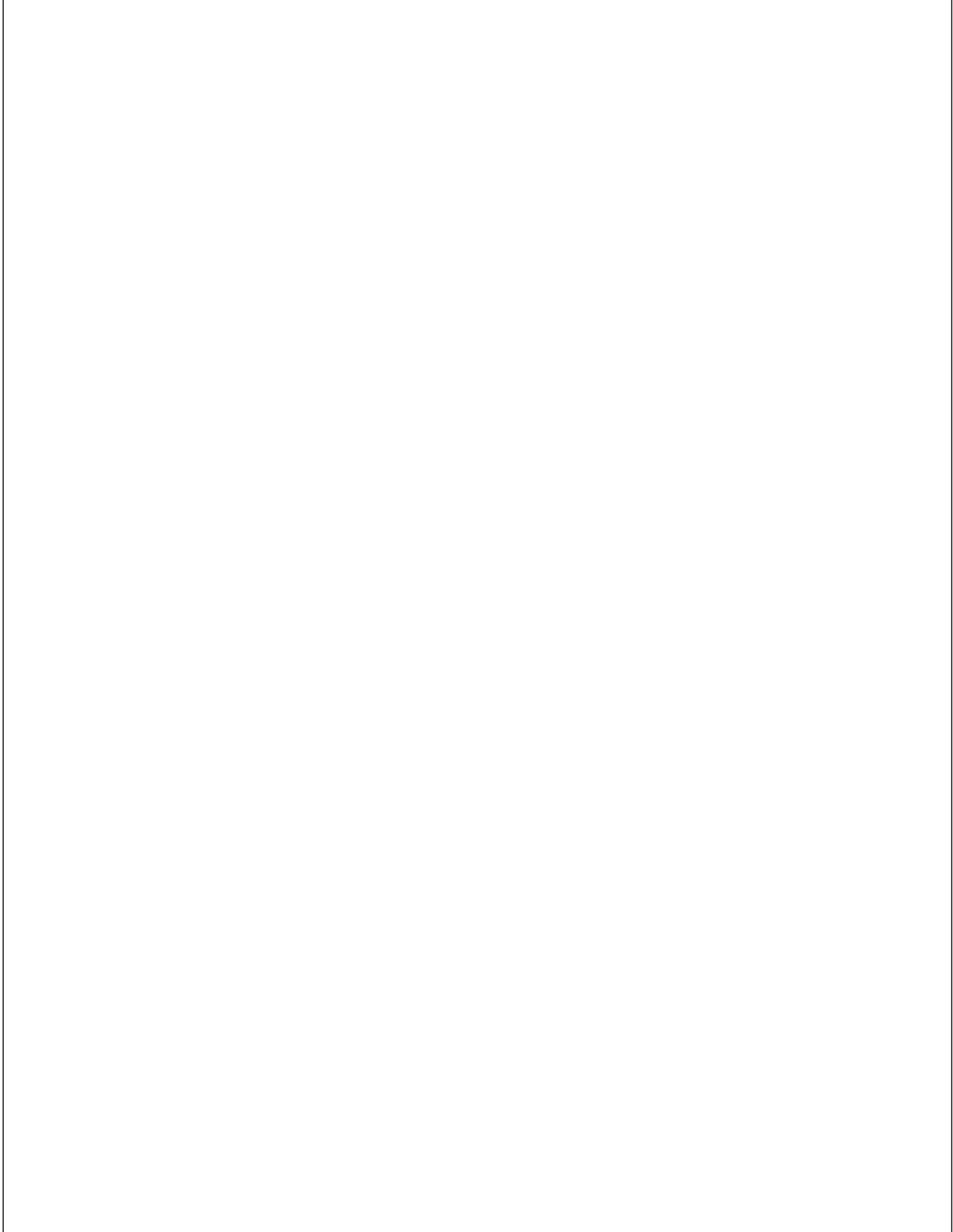


**Chapter 4: Industry process study (product, Process and process flow diagram including Utilities) (1-2 page)**





**Chapter 5: Assessment of Present Water Usage including recycling (1-2 page)**



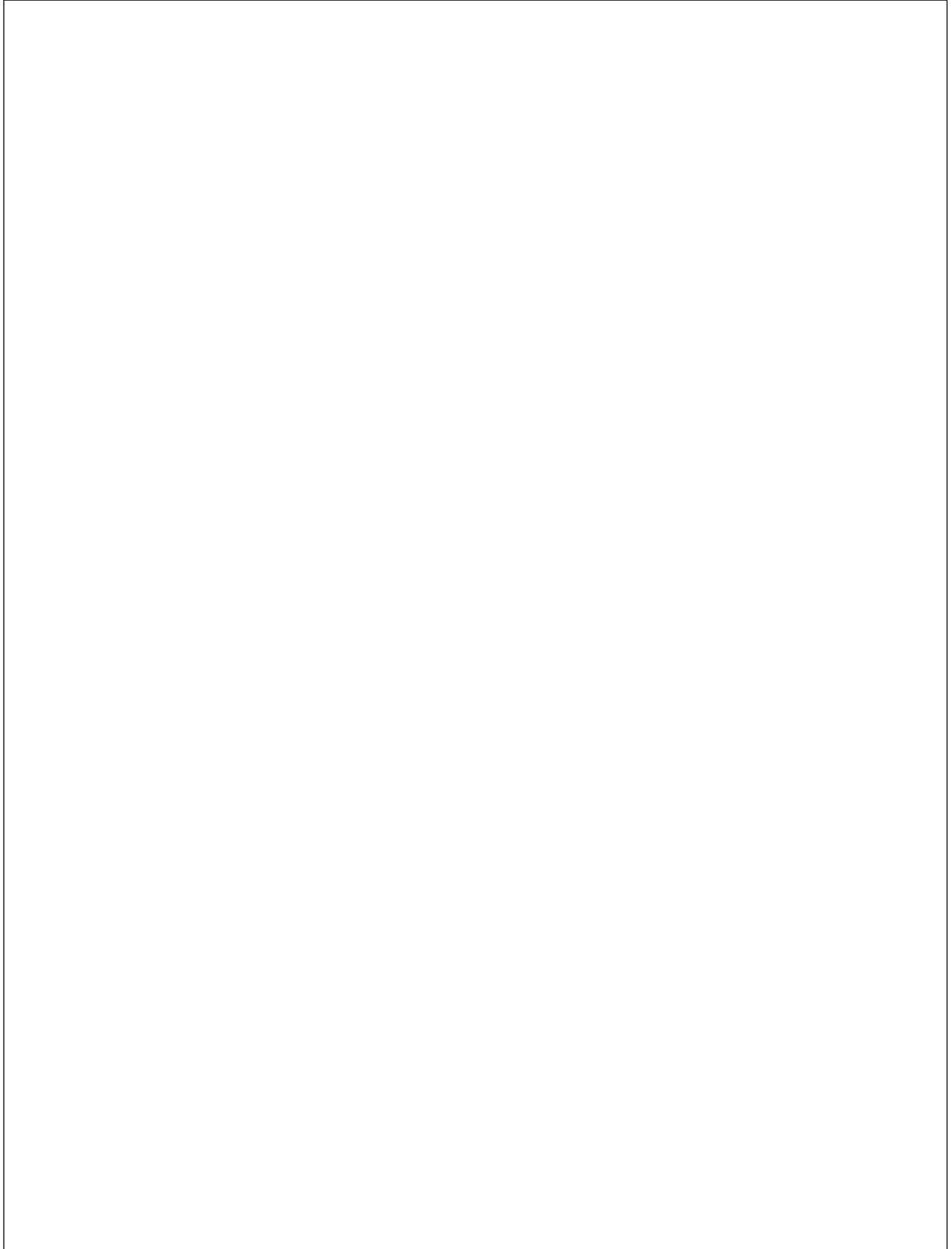
**Chapter 6: Assessing use of Technologies and Best practices (1 page)**

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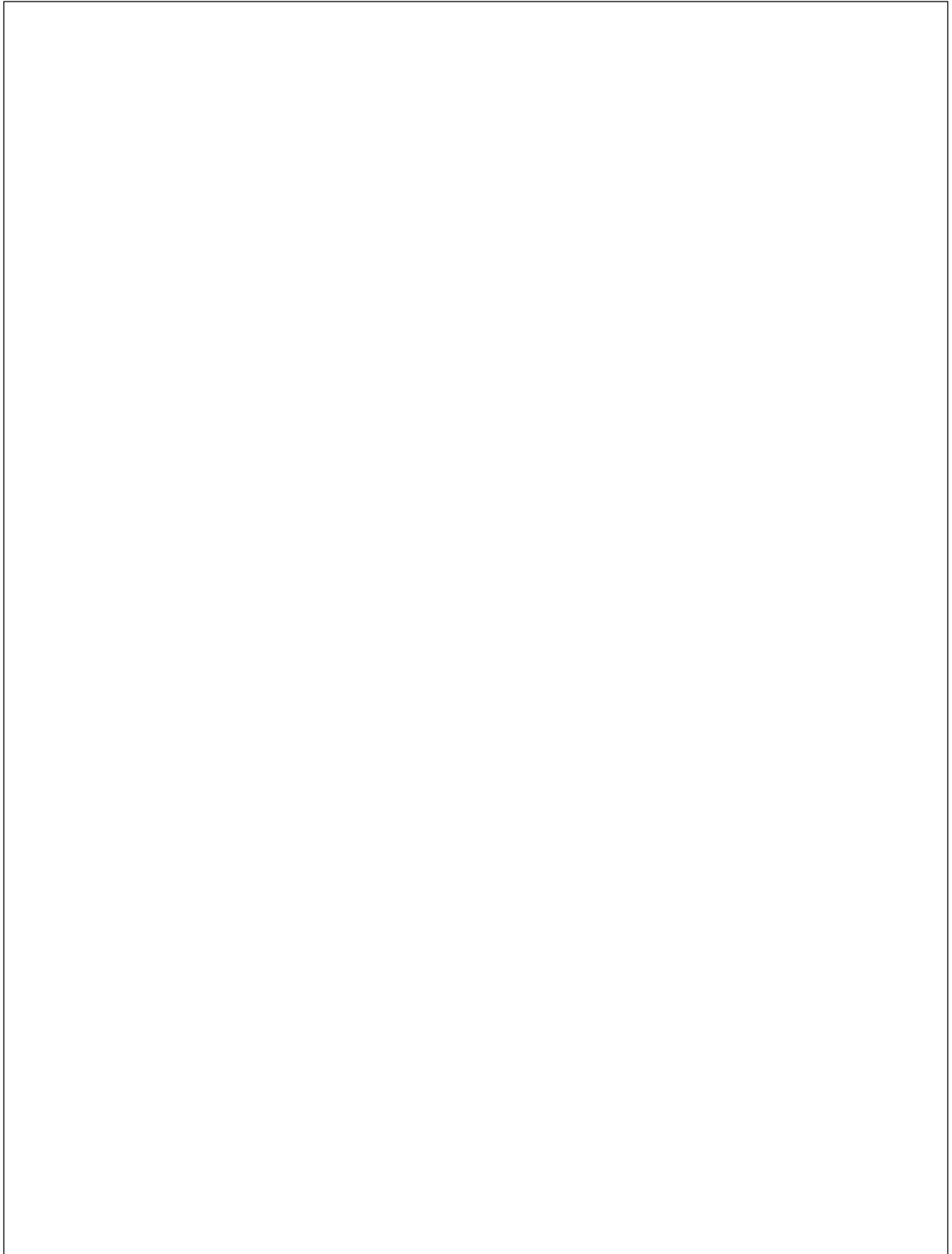
**All photographs must be enclosed in these blocks**

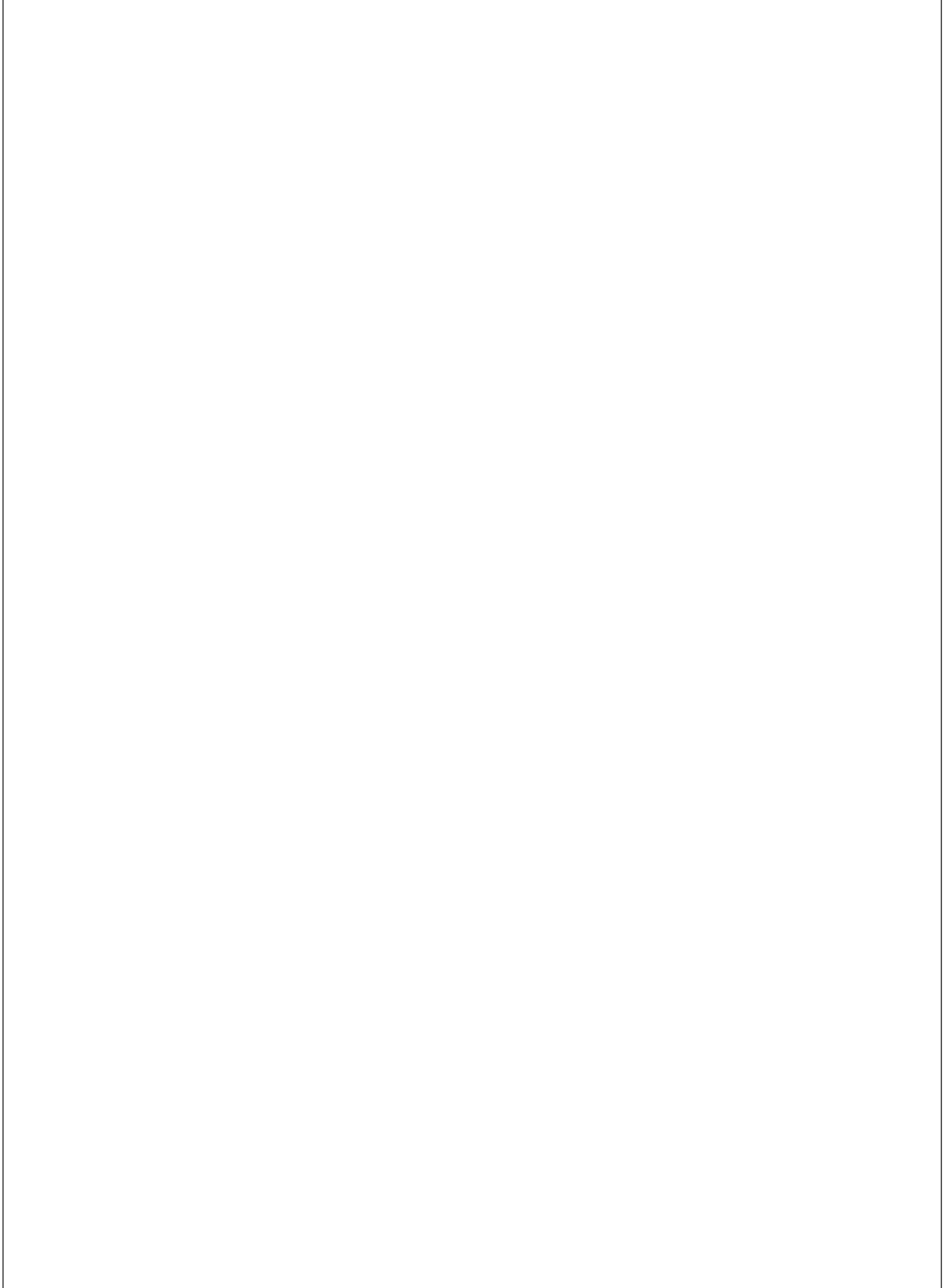
Geotagged photographs of ETP	Geotagged photographs of STP
Geotagged photograph of flow meters at outlet and inlet of treatment plan	Geotagged photograph of flow meters at outlet and inlet of treatment plan

**Chapter 7: Water and waste water treatment and recycling practices (1-2 pages)**

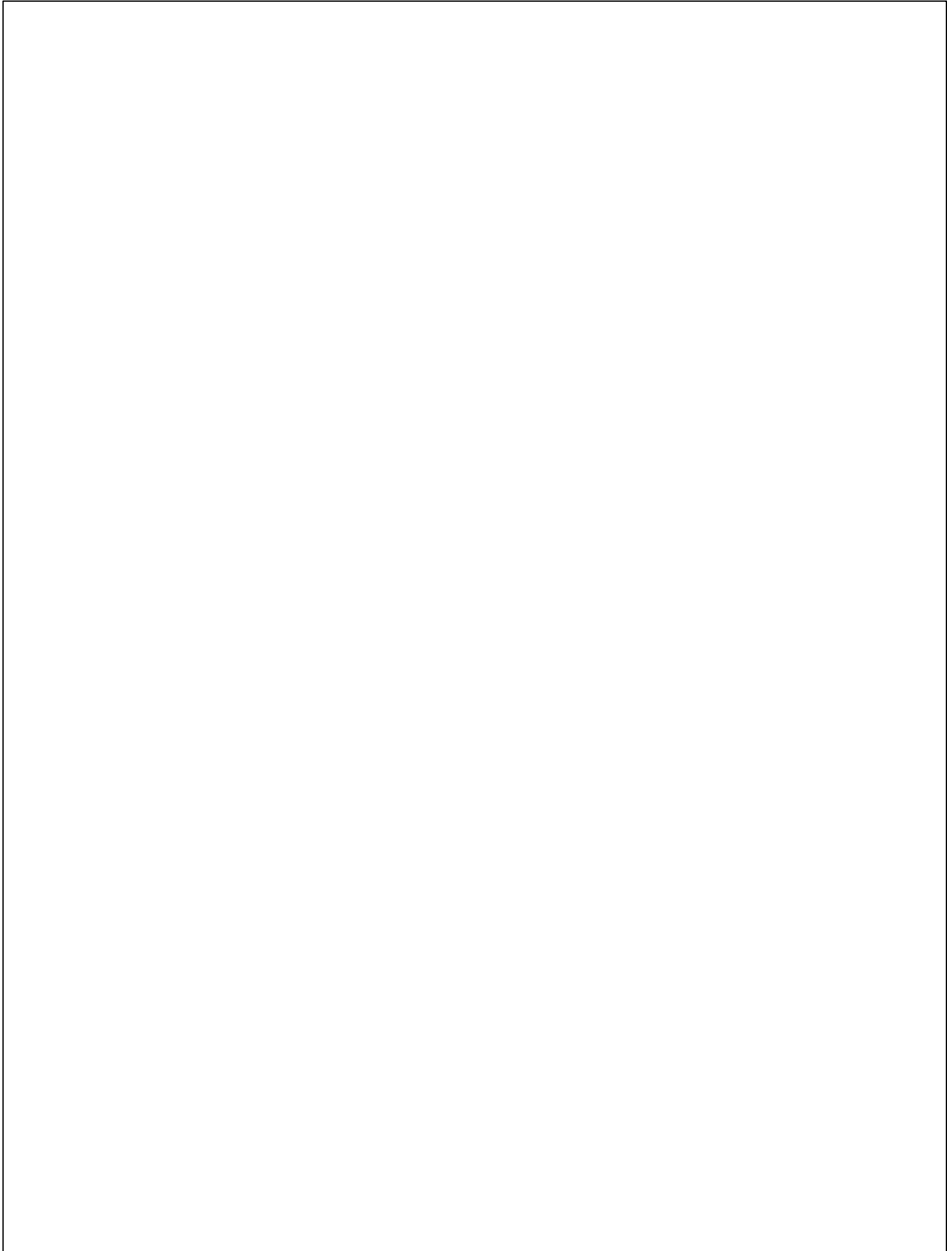


**Chapter 8: Data analysis and Result (1-2 pages)**

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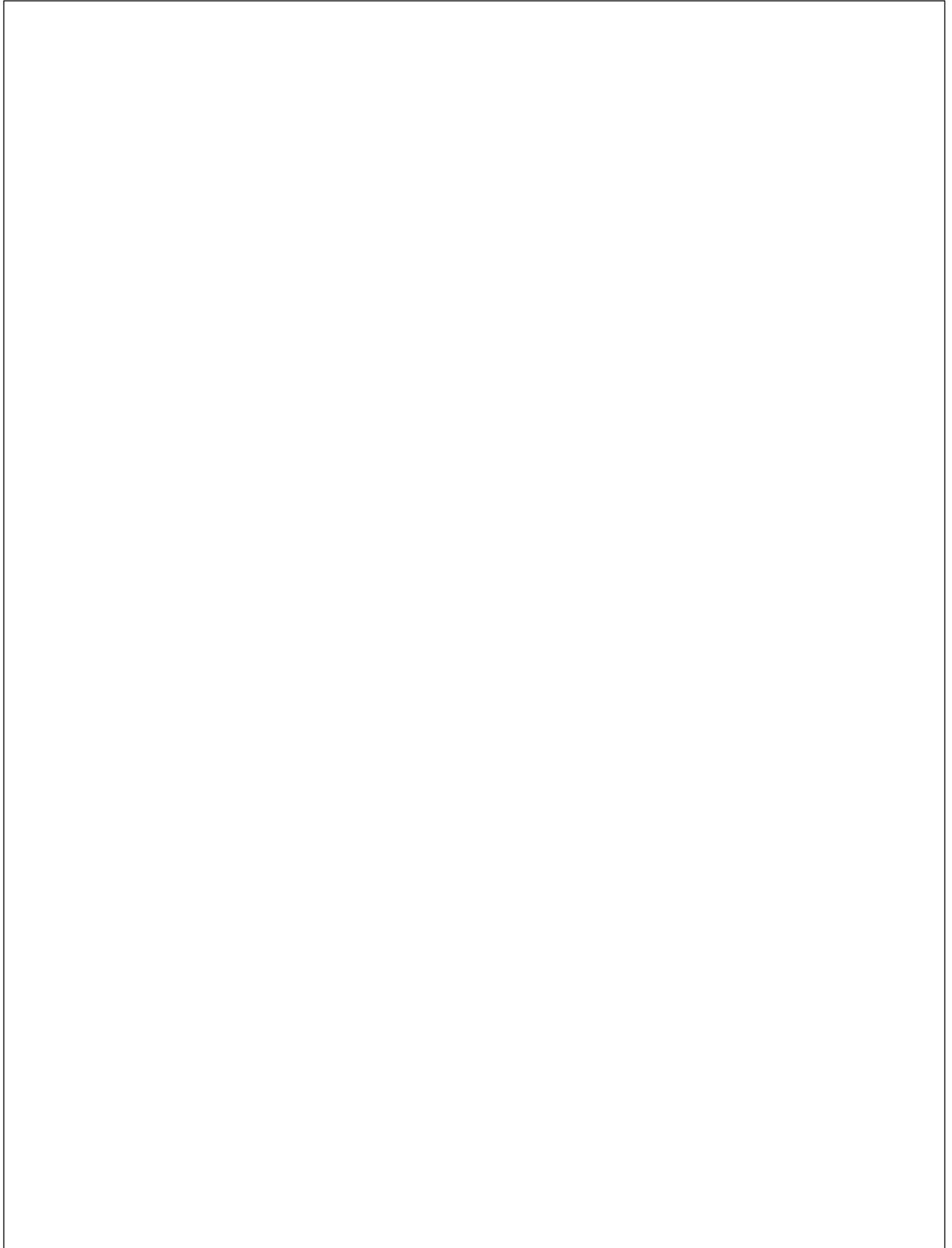


## **Chapter 9: Water Conservation, feasibility and Management plan (1Page)**





## **Chapter 10: Conclusion and Recommendations (1 page)**



Annexure II

**Evaluation sheet and Summary of Water Audit Report**

*(to be submitted by the Water Auditor along with Report)*

S.No	Particular	To be Filled by Water Auditor		Remarks of Water auditor	Remarks of Project Proponent
1	Name of the Project Proponent			(YES/NO)	(YES/NO)
2	NOC validity period			(YES/NO)	(YES/NO)
3	GW requirement as per NOC (KLD and Annual)			(YES/NO)	(YES/NO)
4	Name of Certified Water Auditor			(YES/NO)	(YES/NO)
a	Certificate Number			(YES/NO)	(YES/NO)
b	Water audit period			(YES/NO)	(YES/NO)
5	Is Water Audit Report as per format(Yes/No)			(YES/NO)	(YES/NO)
6	Total water consumption ( <b>KLD and KLY</b> ) at present			Mentioned quantum (KLD/KLY)	Mentioned quantum (KLD/KLY)
7	Water Balance Chart- I and II developed and are part of report? (Yes/No)			(YES/NO)	(YES/NO)
a	Water usage in industrial process (KLD)			(YES/NO)	(YES/NO)
b	Other water usages in KLD <ul style="list-style-type: none"> <li>• Utilities</li> <li>• Domestic use</li> <li>• Green Belt</li> <li>• Dust suppression.</li> <li>• Washing</li> <li>• Other usages (Pl. specify)</li> </ul>			(YES/NO)	(YES/NO)
c	Unaccounted water/water losses if any in KLD			(YES/NO)	(YES/NO)
8	Water Usage per Unit Of Production ( <b>KLD</b> ) - Specific Water Consumption	Indicative with respect to CPCB charter/ other standard technology	Indicative with respect to CPCB charter/ other standard technology	(YES/NO)	(YES/NO)
9	Process/stage in which maximum water is used and its quantity ( <b>KLD</b> )			(YES/NO)	(YES/NO)
10	Reduction recommended in Industrial process ( <b>KLD/KLY and Percentage</b> )	Industrial	Other usage	(YES/NO)	(YES/NO)

<b>S.No</b>	<b>Particular</b>	<b>To be Filled by Water Auditor</b>		<b>Remarks of Water auditor</b>	<b>Remarks of Project Proponent</b>
<b>11</b>	Whether industrial process/technology/utilities water efficient? <b>(Yes/No)</b>  If no, identify water efficient technologies for industrial process based on secondary data and discussion with sectoral experts.	Brief about advanced technology		(YES/NO)	(YES/NO)
<b>12</b>	Major water saving measures other than included in No. 13 above (Water Conservation/reuse/recycling/ Leakage plugging etc.)			(YES/NO)	(YES/NO)
<b>13</b>	Treated water quality through ETP and STP (Recommendation with its usages in industry/domestic etc)	Provide options for use/recycling of treated water in industry, infrastructure and domestic purpose based on similar practices in other industries and best practices. 1. 2. 3.		(YES/NO)	(YES/NO)
<b>14</b>	Is recommended reduction in industrial process/other process 20% or more <b>(Y/N)</b>	Percentage reduction in Industrial process (quantify)	Percentage reduction in other usages (quantify) 1. 2. 3.	Final Quantum recommended (KLD/KLY)	Final Quantum recommended (KLD/KLY)
<b>15</b>	Whether the Project Proponent has accepted the water audit findings? <b>(Yes/No)</b>				

**Signature and seal of Water auditor**

**Signature and seal of Project Proponent**

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