付属資料-7：

CWASA とのワークショップ／ミーティングの
プレゼンテーション資料と議事録

Advisor on Urban Sanitation Improvement

Draft Work Plan

September 2021

Japan International Cooperation Agency (JICA)
Nippon Koei Co., Ltd (NK)

Contents

Introduction

Background

- CWASA has developed Sanitation master plan in 2017 in accordance with national strategy of Bangladesh; Started survey and design in STP-1 Catchment that covers a part of central city area.
- CWASA is to construct and manage sewerage system; Necessary organization structure, financial scheme and capacity of staff should be developed.
- JICA has agreed to assist CWASA in strengthening capacity through dispatch of experts, for smooth sewerage construction and its proper O&M and the management of sewerage service.

Objective of the project

i. Identify challenges in sewerage sector in Chattogram.
ii. Assist capacity development for sewerage construction in accordance with Sanitation Master Plan.
iii. Contribute to the sustainable improvement of sanitary living environment in Chattogram.

Related organizations

- Counterpart organization (C/P): CWASA
- Relevant organization: Chattogram City Corporation (CCC)

1. Current Situation and Challenges

Target Year：2030

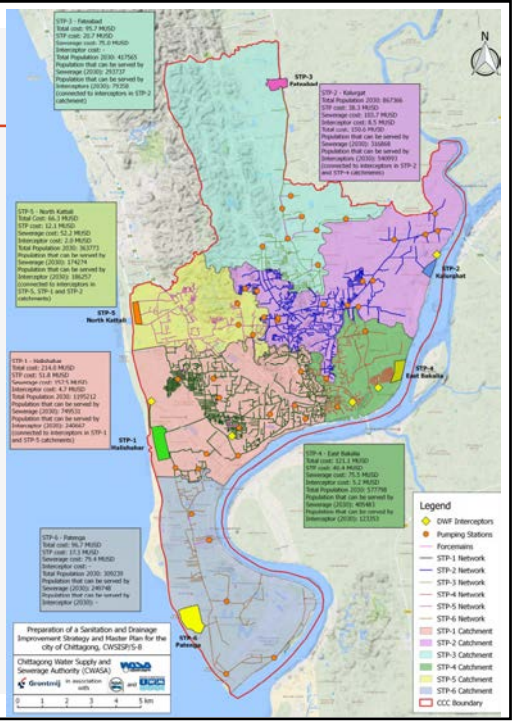
Category	Target Area /Facilities	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Sewerage Construction	STP-1 Catchment															
	STP-2 Catchment															
	Other Catchments											*To be completed by 2065*				
On-Site Facilities and Faecal Sludge Management	Faecal Sludge Treatment Plant															
	Rehabilitation of Septic Tanks															

Sewerage development plan for each catchment

- STP-1: CWASA
- STP-3: KOICA
- STP-5: AFD (CDIA)
- STP-2,4,6 : still pending?

Organization structure of CWASA

- Has focused on water supply for 58 years.
- Has more than 1,000 employees.
- Only 3 persons in charge of sewerage (this project) as of Aug 2021
- No budget has been secured for sewerage service as of April 2021



2.1 Expected Outcomes and Planned Activities of the Project

Outcome-1: CWASA's capacity is strengthened for policy setting and planning of sewerage project, thereby the planning of new sewerage projects is accelerated.

Activity 1-1: Review Sanitation Master Plan and Ongoing Sewerage Project

Activity 1-2: Assist organizational setup to promote the planning of sewerage projects

Activity 1-3: Assist in identifying challenges to establish financial scheme for sewerage service

Activity 1-4: Assist in updating sewerage development plan

Outcome-2: CWASA's capacity is strengthened, for design and construction supervision of sewerage facilities including understanding of appropriate technology which is suitable in the project area.

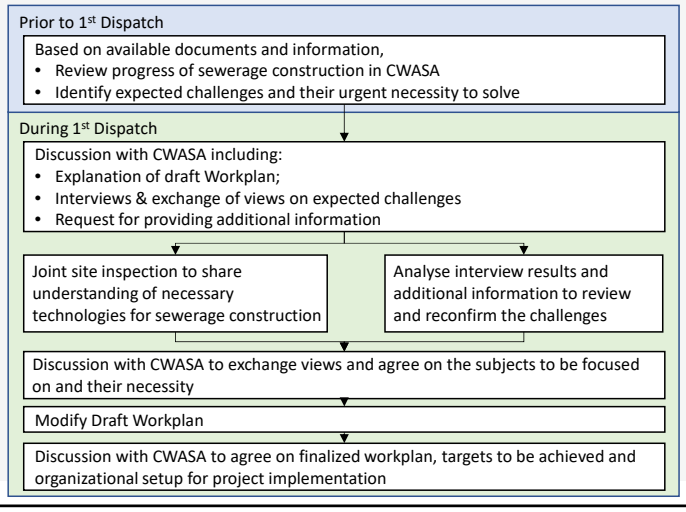
Activity 2-1: Assist in identifying challenges in CWASA's management on design and construction of Ongoing Sewerage Project

Activity 2-2: Assist in capacity development of CWASA for design and construction supervision of sewerage projects through creating solutions to the above challenges

Activity 2-3: Assist in developing design guidelines, technical standards and manuals for sewage works

2.2 Approach to Project Implementation (1/3)

(1) Identify challenges and evaluate capacity of CWASA at initial stage of project and agree on Workplan



Points to note:

Identify challenges from wide range of perspectives, including
- Design and construction management capabilities,
- Organizational and financial structure,
- Capacity for O&M,
- Capacity to develop infrastructure planning after STP-1 Project

Capacity development and organizational structure, utilizing experience and knowledge in water supply sector

Opinions of CWASA to be respected at maximum in identifying key subjects to be focused on and finalizing Workplan

2.2 Approach to Project Implementation (2/3)

(2) Organize regular workshops and seminars on the initiative of CWASA

- **Regular internal workshops** will be held in each visit of JICA Expert Team (JET) to CWASA; CWASA will give presentation and participants will discuss the progress and results of each activity.
- CWASA is requested in the workshops:
  i. To develop agenda, prepare for presentation, invite participants, arrange the venue and do other necessary coordination and arrangement.
  ii. To invite relevant personnel including the management in addition to PIU members, in order to disseminate progress and result of each activity.
  iii. To present '**achievement rate**' of targets set up in Workplan, to raise willingness and sense of unity to achieve the target in whole CWASA.
  iv. To share sufficient time for the participants to discuss and exchange opinions in addition to presenting the progress. Particularly, to collect such comments that may lead long years' experience in water sector to be utilized in sewerage sector.
  v. To include **site visits to STP-1 Project** in the program, to deepen common understanding of the challenges.
- JET will introduce **Japanese experiences, knowledge and applicable technologies** in sewerage sector.

2.2 Approach to Project Implementation (3/3)

(3) Capacity development of CWASA through on-going sewerage project

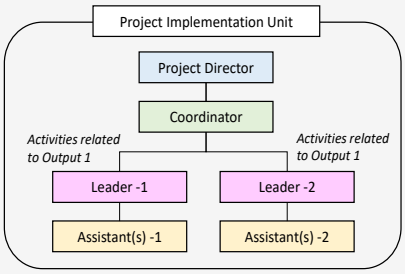
On-the-job training, including confirmation of reason for infrastructure system planning, construction methods etc., suggestions for improvement of Ongoing Sewerage Project, etc.

(4) Organize PIU as a prototype of specific department for sewerage service

(5) Review activities at the end of 1st year and modify Workplan for the 2nd Year

(6) Continue support for activities of CWASA through on-line intervention

No.	Items to be Confirmed/ Discussed	Purpose
1	Progress of activities	Grasp the capacity and motivation to carry out activities
2	Challenges that PIU is facing	Provide PIU with advice to solve challenges
3	Plan of actions up to next meeting	Share short-term action schedule
4	Progress of STP-1 Project	Understand latest local situation and identify pressing needs
5	Requests to the Team	Share information to improve/optimize project activities



2.3 Methodology of Project Implementation

(1) Collect, review and analyze existing documents

Document/Information	Method of Collection	Perspective for analysis
Sanitation Master Plan	Collected except Annexes	Reconfirm assumptions such as facility plan and implementation schedule
Design report in STP-1 Project	To be collected by JICA or by national staff	Confirm progress status; Assumed challenges on the construction of sewage works; Necessary technologies and knowledge
Latest organization of CWASA	Through website or hearing by national staff	Current organization structure and points to be improved for launching sewerage service
Latest water and wastewater tariff scheme in Bangladesh		Confirm challenges if any for tariff scheme
Guidelines and standards of sewage works in Bangladesh	Hearing by national staff	Comparison with those of neighbouring nations

(2) Prepare draft Workplan to discuss with JICA

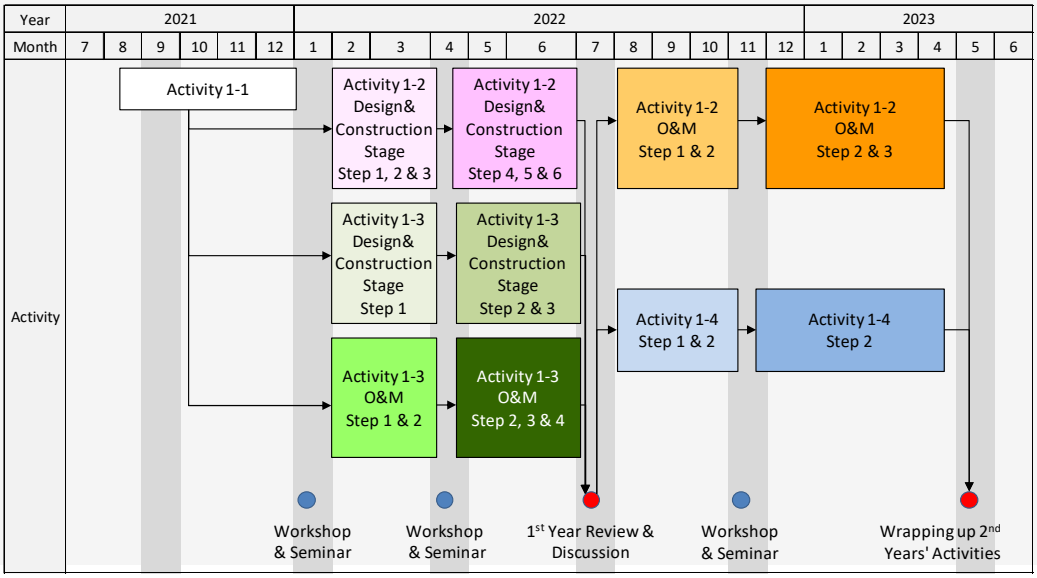
- Project Objective
- Expected outcomes (Outcome 1 and 2)
- Subjects and challenges to be focused on to achieve outcomes
- Target to be achieved for each subject at project completion
- Concrete activities and milestone for each subject
- Organization structure and staff to implement the project (CWASA and JET)
- Schedule of activities

2.3 Methodology of Project Implementation

(3) Discuss draft Workplan, identify challenges and finalize Workplan and targets

- Agree on workplan after modification incorporating CWASA's intentions
- Share Japanese experience in implementing sewerage projects, e.g., challenges and solutions
- Confirm with CWASA:
  - ✓ Challenges with high priority, e.g., organization structure, financial scheme, capacity for infrastructure planning and O&M;
  - ✓ Target to achieve;
  - ✓ Activities to be carried out;
  - ✓ Rough schedule;
  - ✓ Experience in water supply service and its applicability to sewerage service
- Request to CWASA:
  - ✓ Provision of unavailable information;
  - ✓ Nomination of PIU members (Coordinator, Leaders and Assistants)
- Interview with CWASA on human resource development (technical and administrative divisions)

2.3 Methodology of Project Implementation (Activity-1)



2.3 Methodology of Project Implementation (Activity-1)

Activity 1-1: Review sanitation Master Plan and STP-1 Project

Activity 1-2: Assist organizational setup to promote the planning of sewerage projects

Design & Construction	Step 1	In KWSP-2, structure, number of staff and allocated tasks of PIU; problems and challenges if any in the project management.
	Step 2	Management structure, allocated tasks and workload, problems and challenges if any in other previous water supply infrastructure projects.
	Step 3	Identify challenges and necessity to improve in organization setup for sewerage development
	Step 4	Based on facts, problems and challenges in the management of past water supply infrastructure projects and in ongoing sewerage project as identified in Steps 1, 2& 3, develop the most suited organization structure for sewerage development.
	Step 5	Establish the organization structure to manage the construction in ongoing sewerage project.
	Step 6	Develop a schedule to establish the organization structure in the subsequent sewerage project, based on the result of Steps 1, 2, 3& 4.
Operation & Maintenance	Step 1	• Confirm organization structure for the O&M of current water supply service i.e. O&M of WTP and pipeline network, customer service, public relations, tariff collection, budget management etc. and the number of staff and allocated tasks in each circle/ division. • Problems and challenges if any for smooth implementation of O&M of water supply service.
	Step 2	Based on facts, problems and challenges in the O&M of current water supply service identified in Step 1, develop organization structure with allocated tasks to each circle/ division in the O&M phase after the completion of STP-1 Project.
	Step 3	Develop a schedule to establish the organization structure for O&M of sewerage service as planned in Step 2.

2.3 Methodology of Project Implementation (Activity-1)

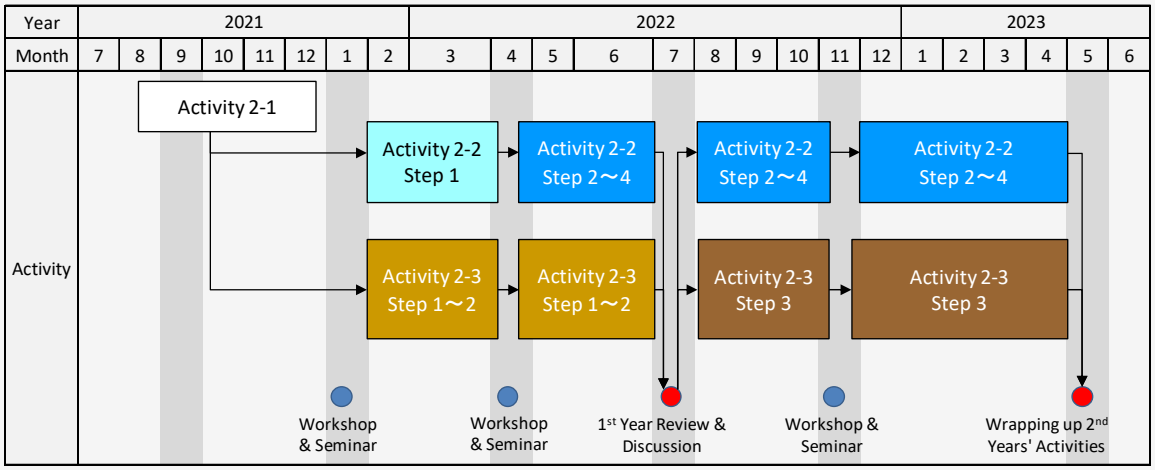
Activity 1-3: Assist in identifying challenges to establish financial scheme for sewerage service

Design & Construction	Step 1	Confirm estimated cost and schedule for the construction of sewerage system in the Catchments 2 - 6 and the sanitation system outside of sewerage service area.
	Step 2	Identify possible funding resource & the way of fund-raising, targeted schedule and assumed challenges.
	Step 3	Develop solutions for the challenges.
Operation & Maintenance	Step 1	Confirm estimated O&M cost after completion of STP-1 Project.
	Step 2	Review necessary tariff revenue based on financial analysis in Sanitation Master Plan.
	Step 3	Scrutinize the level of fees that can actually be collected, based on water and wastewater tariff scheme in Bangladesh.
	Step 4	Develop measures to fill the gap between affordable tariff and necessary tariff e.g. cross subsidy from water tariff and new subsidy scheme from GoB or CCC.

Activity 1-4: Assist in updating a new sewerage development plan

Step 1	Select one catchment where sewerage system shall be constructed after STP-1 Project (STP-2 Catchment has been selected in Sanitation Master Plan).
Step 2	Based on Activities 1-1, 1-2 and 1-3, draft TOR necessary for the procurement of engineering consultant to carry out F/S on sewerage construction in the selected catchment.

2.3 Methodology of Project Implementation (Activity-2)



2.3 Methodology of Project Implementation (Activity-2)

Activity 2-1: Assist in identifying challenges in design and construction phase

Activity 2-2: Assist in capacity development on design & construction supervision

Step 1	Develop a manual on standard management procedure, based on challenges in past water supply infrastructure projects, where- • Existing documents are utilized that are in practical use for the management in water supply sector. • A simple checklist is allowed as a first trial, instead of jumping at a perfect and comprehensive manual.
Step 2	Carry out OJT on construction management in ongoing sewerage project, utilizing the manual prepared in Step 1.
Step 3	Record the challenges and solutions experienced in the OJT above, and present it in workshop and seminar as a feedback to CWASA personnel.
Step 4	Update/ revise the manual based on Step 2 and 3; Repeat the process of Step 2, 3 &4 to establish the PDS cycle in this activity.

Activity 2-3: Assist in developing design guidelines, technical standards and manuals for sewage works

Step 1	Collect technical standards in neighbouring nations.
Step 2	• Confirm the design standards applied in ongoing sewerage project. • Identify and develop what should be improved in the next designing opportunities.
Step 3	Develop draft design guideline and technical standards for sewage works in Chattogram

2.3 Methodology of Project Implementation

(6) Prepare, explain and submit **Reports on Field Activities**

Contents	Description
Main Part	
Summary of the project	Background and objectives
Activities to be carried out	Same as agreed Workplan.
Challenges, innovations and lessons learnt in implementing the project	Record and update each time the challenges faced in achieving targets; the innovations for solving the challenges; and the lessons learnt for the activities during next dispatch.
Milestone for activities and status of achievement	Record and update work schedule chart with bars of scheduled/ implemented activities (from 1-1 up to 2-3) according to the timeline.
Appendix	
Flowchart	Corresponding chart in the Workplan.
Detailed plan of activities/ actions	Refer to agreed Workplan.
Dispatch record	Updated plan/ actual dispatch schedule in the Monthly Report submitted to JICA.

2.3 Methodology of Project Implementation

(7) Review activities in 1st year and discuss & agree on activities in 2nd year

Step	Tasks
Step 1	Wrap up activities in 1st year
Step 2	Review activities in 1st year from 5 angles below: • Progress and achieved status of each activity; • Consistency of each activity with the subjects to focus on and the necessity of CWASA; and whether there is any change of necessity; • Problems in terms of difficulty of each activity; • Whether to keep/ change PIU; and • Motivation level of each member of PIU: kept/ improved/ lowered
Step 3	Self-evaluation by CWASA and evaluation by JET
Step 4	Summarize achievements and challenges in the activities in 1st year and identify the way to solve the challenges; Hold discussion meetings with CWASA and JET.
Step 5	Incorporate the result of Step 4 in Workplan for 2nd year.
Step 6	Agree on the result of the review and revised Workplan.

2.3 Methodology of Project Implementation

(8)&(9) Activities related to Outcome 1 & Outcome 2 (in the 2nd Year)

(10) Sum up all activities and assist in developing Action Plan for further capacity strengthening

The draft contents of the Action Plan :

i. Achieved status of each activity as of the completion date of the project
ii. Short- & long-term targets, to draw a clear picture to be aimed
iii. Objectives and specific actions of each activity; Continued activities in the project are assumed but can be changed appropriately
iv. Implementation schedule in short- & long-term of each activity: Year and month to achieve the activity should be specified
v. Organization structure and personnel in-charge to implement each activity

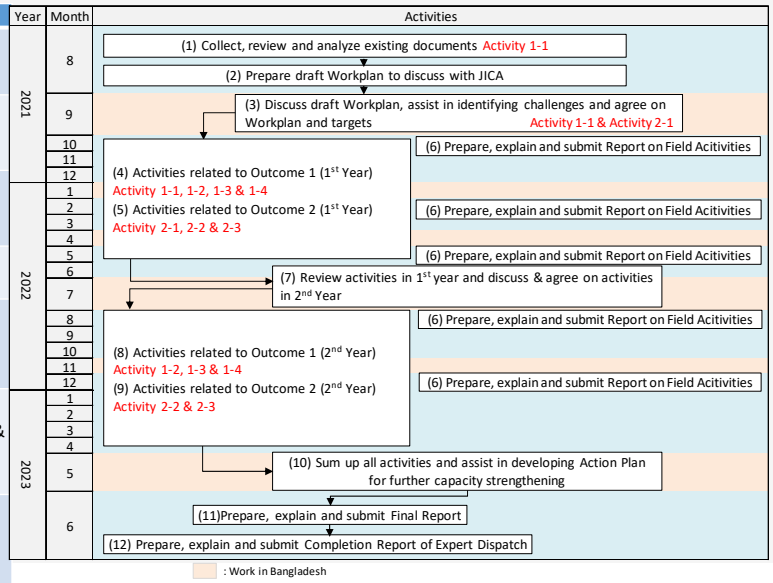
(11) Prepare, explain and submit Final Report

(12) Prepare, explain and submit Completion Report of Expert Dispatch

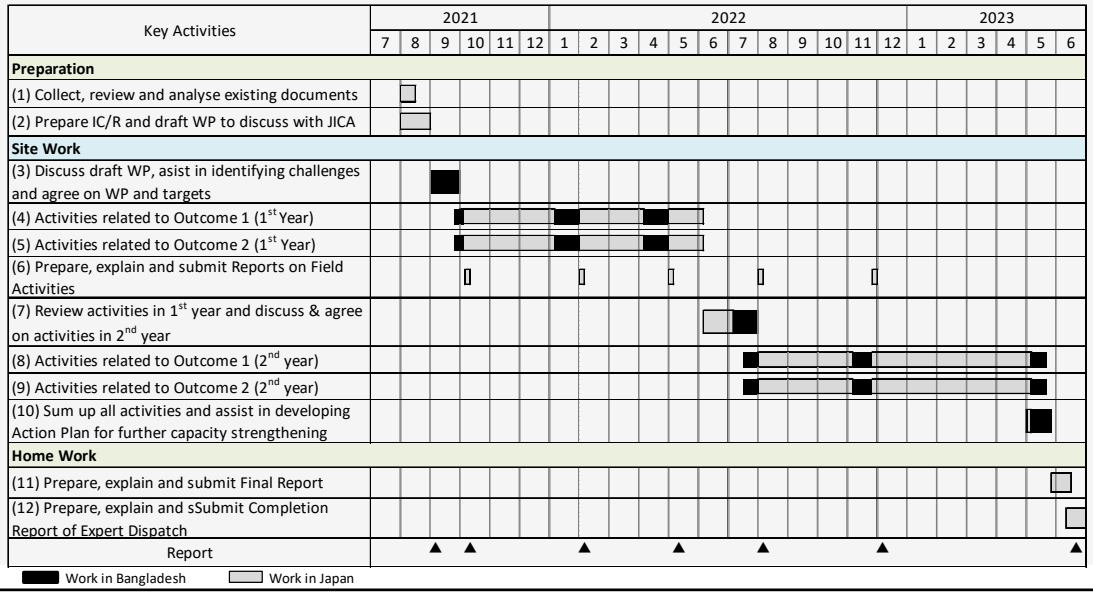
Appendix-7
1) Kick-off meeting on September 20, 2021

2.4 Workflow

Outcome	Activities
Outcome 1: CWASA's capacity is strengthened for policy setting and planning of sewerage project, thereby the planning of new sewerage projects is accelerated	**Activity 1-1:** Review of Sanitation Master Plan and ongoing sewerage project
	Activity 1-2: Assist organizational setup to promote the planning of sewerage projects
	Activity 1-3: Assist in identifying challenges to establish financial scheme for sewerage service
	Activity 1-4: Assist in updating new sewerage development plan
Outcome 2: CWASA's capacity is strengthened for design and construction supervision of sewerage facilities, including understanding of appropriate technology suitable in the project area	**Activity 2-1:** Assist in identifying challenges in design and construction of ongoing sewerage project
	Activity 2-2: Assist in capacity development of CWASA for design & construction supervision through creating solutions to the challenges
	Activity 2-3: Assist in Developing Design Guidelines, Technical Standards and Manuals for Sewage Works



2.5 Work Schedule



2.6 Staff Assignment Schedule

Position	Name	2021						2022												2023					
		7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6
Chief Advisor/ Sewage Treatment Planning	Mr. Takamasa Nishikawa			■	■	■		■	■		■	■		■	■	■		■	■					■	
Organization Structure/ Financial Scheme	Mr. Toshihiko Tamama			■	■						■			■										■	
Design/ Construction Supervision/ Maintenance of Sewage Works	Mr. Hidehisa Tamura			■	■	■		■			■	■		■	■	■		■	■					■	
Communication & Reporting Officer (hired by NK Bangladesh Office)	Ms. Nazia Nur			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	

2.7 Others (Reports to be submitted to JICA)

No.	Type of Report	Time of Submission	Number of Copies	Contents
1	Inception Report	Early July 2021	Japanese: 2	• Project implementation plan • Methodology • Work program • Assignment schedule
2	Report on Field Activities	Submit within 10 working days after each field activity. Total: 5 reports	English: Data	1. Project summary 2. Activities implemented 3. Challenges, innovations and lessons learnt in implementing the project 4. Status of achievements 5. Appendix - Workflow (Flowchart) - Detailed plan of activities - Dispatch of expert
3	Final Report	Middle June 2023	Japanese: 3 English: 3 CD-R (English & Japanese): 3	Summary of Reports on Field Activities
4	Completion Report of Expert Dispatch	Middle June 2023	CD-R (Japanese): 1	All required information on specific format provided by JICA

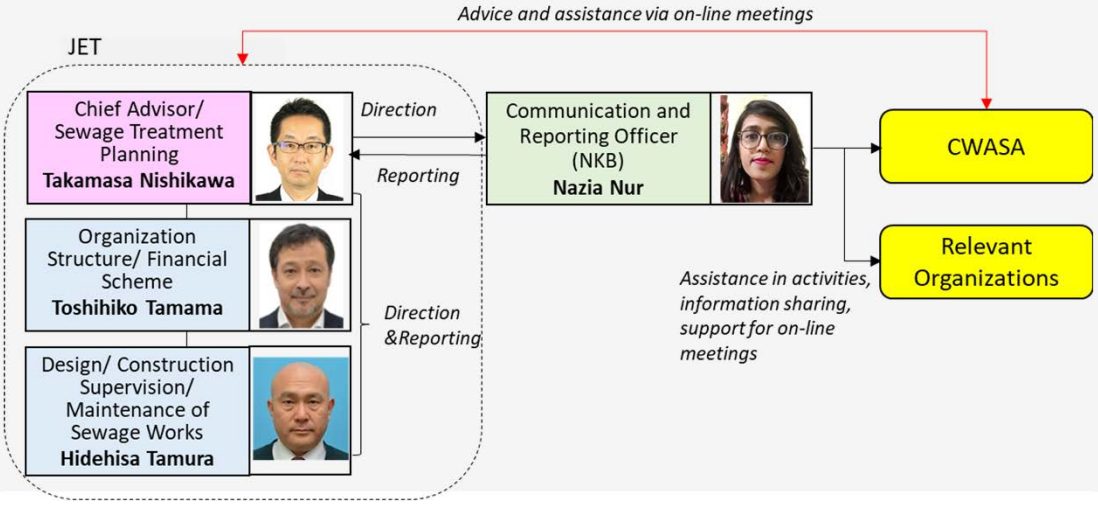
2.7 Others (Requests for Support)

Expected Support from Government of Bangladesh

1. Assignment of counterpart CWASA staff
2. Provision of data and information related to the service
3. Provide cooperation in obtaining appointments with related organizations that necessary
4. Provide sufficient office space and necessary equipment such as desks and chairs, and cover utility expense used in the office
5. Provide permits and approvals that are needed for field survey
6. Provision of information related to local safety and safety assurance of JET
7. Provision of information of medical service when necessary
8. Provide necessary support for the movement of JET in Bangladesh
9. Handling complaints that may arise during the service

3. Project Implementation Structure

Communication system assisted by national staff is as follows:



Appendix-7
1) Kick-off meeting on September 20, 2021

Schedule in this Assignment (tentative)

Date & Day		Nishikawa	Tamama	Tamura	Activities	Remarks
19-Sep	Sun				Visit JICA office, NK office, Flight to Chattogram	
20-Sep	Mon	○	△	△	Kick off meeting (AM), Site Visit (PM)	Online, Projector
21-Sep	Tue	○	△	△	Site Visit, Interview of current status including onsite treatment	capacity dev. In water supply
22-Sep	Wed	○	△	△	Interview of current status including onsite treatment/ Data request	
23-Sep	Thu	○	△	△	MP review	
24-Sep	Fri	–	–	–	review/preparation of documents	
25-Sep	Sat	–	–	–	review/preparation of documents	
26-Sep	Sun	○	△	△	MP review	
27-Sep	Mon	○	△	○	MP review	
28-Sep	Tue	○	△	○	Review of ongoing and planned project	
29-Sep	Wed	○	△	○	Review of ongoing and planned project	
30-Sep	Thu	○	△	○	Site Visit	
1-Oct	Fri	–	–	–	review/preparation of documents	
2-Oct	Sat	–	–	–	review/preparation of documents	
3-Oct	Sun	○	△	○	Identify challenges: Sewerage Development Plan	
4-Oct	Mon	○	△	○	Identify challenges: Technical Issue (design, OM)	
5-Oct	Tue	○	△	○	Identify challenges: Organization and Staffing	
6-Oct	Wed	○	△	○	Identify challenges: Financial Issue and others	
7-Oct	Thu	○	△	○	Setting the target and timeline of organization strengthening, Establishment of WP	
8-Oct	Fri	–	–	–	review/preparation of documents	
9-Oct	Sat	–	–	–	review/preparation of documents	
10-Oct	Sun	○	△	○	Preparation of PPT(CP)	
11-Oct	Mon	○	△	○	Workshop (Wrap-up), Flight to Dhaka	Online, Projector
12-Oct	Tue				RCR Test, JICA Bangladesh Office	
13-Oct	Wed				Flight to Japan	

Note: ○ : onsite, △online

Advisor on Urban Sanitation Improvement

Progress Meeting

October 2021

Japan International Cooperation Agency (JICA)
Nippon Koei Co., Ltd (NK)

Contents

Findings through the Review of MP and PESSCM-1

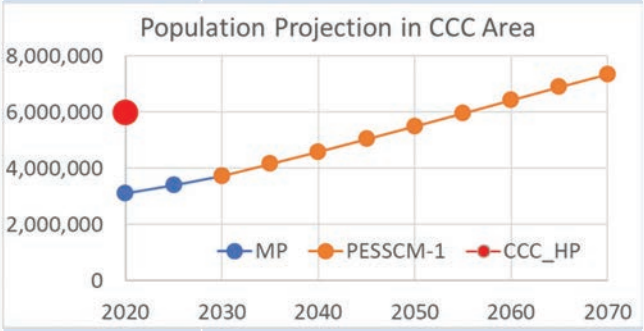
(1) Findings through M/P Review

Item	MP/Current	JET Findings
1) Target year of sewerage development	Much advanced from the MP ● MP: -2030 (Phase 3: short term), -2065 (long horizon) ● Current target: 2026 (PDPP), 2030 (SDGs)	● Sewerage development is critical issue in Chattogram city, so the CWASA's positive action is reasonable. ● Since many sewerage developments will be implemented in parallel:, i) establishment of organization and regulations for sewerage management, ii) capacity development of CWASA, and iii) financial capability of CWASA are critical issue. ● If the target year is far future, the projection is unforeseeable, so 30 years is recommendable to avoid excess investment. <to be discussed>

4

(1) Findings through M/P Review

Item	MP/Current	JET Findings
2) Population in CCC area	● MP: - Based on BBS (Census) targeting for 2030 ● PESSCM-1: - Based on projection targeting for 2070	● Population in BBS and population in CCC information are much different: ✓ Population will be increased according to urbanization, however the increase rate in the maturated area will be much lower and city area will be expanded to peri-urban area. ✓ Due to the migration from rural area, the population of Chattogram will be increased. ✓ Due to aging, growth rate is normally decreased. ● Since no reliable population data for verification is available at this moment, the population projection at **next CENSUS** is needed. ● Population projection shall be consistent with **City development M/P.** CDA will start preparation soon. • According to the BBS, next CENSUS will be published on Dec.22, 2021.



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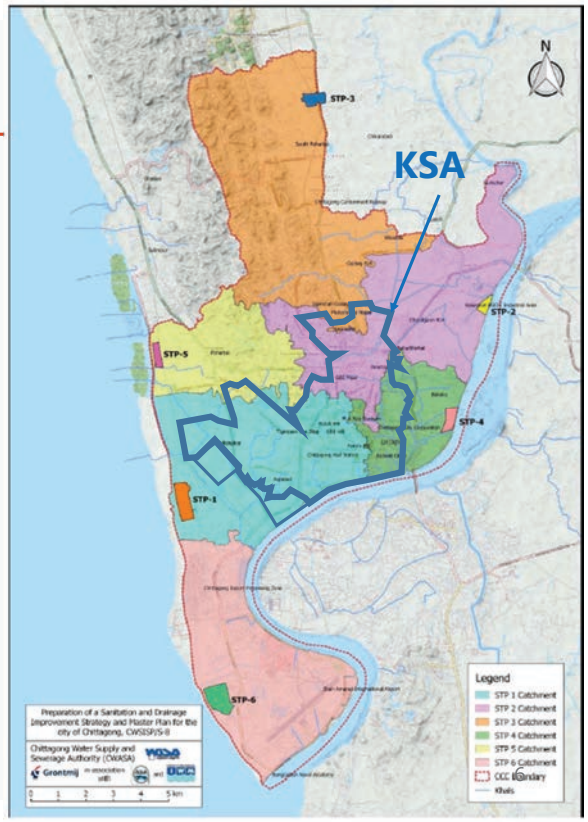
(1) Findings through M/P Review

Item	MP/Current	JET Findings
3) Priority of sewerage develop ment	● MP: -2023 (Catchment-1), -2030 (Catchment-2)	● KSA is the most priority area since this area is with high population and enough sewage generation. (Catchment-1, 2, 4) ● Distribution network will be developed entire CCC area in the CWSISP-II, so surrounding catchments are next priority. (Catchment- 3,5,6)



(1) Findings through M/P Review

Item	MP/Current	JET Findings
4) Wastewater Generation	● Domestic+non-D: 103lpcd ● Large non-D: +α (industrial)	● Domestic + Small non-domestic (commercial): seemed to be reasonable. ● Industrial WW (Large non- domestic): ✓ It shall be collected only when the ETP of each industry is fully functioned. ✓ Wastewater from industrial zone shall be considered. ● Inflow and Infiltration shall be minimized. ● If the separated sewer system is applied: ✓ Sewage volume is limited especially in initial stage. ✓ At the initial stage, sewage is diluted due to I/I and limited sewage. It cause the difficulties of sewage treatment. ✓ HH connection shall be increased to increase sewage flow.

Table 7-7: Domestic and Small Non-Domestic Wastewater Production

Per capita domestic water consumption (lcd)	Wastewater return rate (%)	Per capita Domestic wastewater generation (lcd)	Small Non-domestic Wastewater generation (lcd)	Total wastewater generation (lcd)
115	80%	92	11	103

Table 7-8: Wastewater flows to be discharged to Sewerage System in 2030 (assuming full implementat

STP	Population (capita)	Average Wastewater Generation: Domestic (m³/day)	Small Non-domestic (m3/d)	Large Non-domestic (m3/d)	Total (m³/d)	Infiltration (m³/d)	Total Average flow (m³/d)	Stormwater Inflows (m³/d)
STP 1	749531	68957	8275	5052	82283	18132	100416	18132
STP 2	316868	29152	3498	7858	40508	12130	52638	12130
STP 3	234990	21619	2594	3929	28143	5585	33728	5585
STP 4	405483	37304	4477	2245	44026	6292	50318	6292
STP 5	174274	16033	1924	6736	24693	5448	30141	5448
STP 6	199798	18381	2206	37870	58457	5781	64238	5781
Total	2080945	191447	22974	63690	278111	53368	331479	53368
% of Total Average Flow		57.8%	6.9%	19.2%	83.9%	16.1%	100.0%	
% of Total Peak Flow						10.4%	64.4%	10.4%

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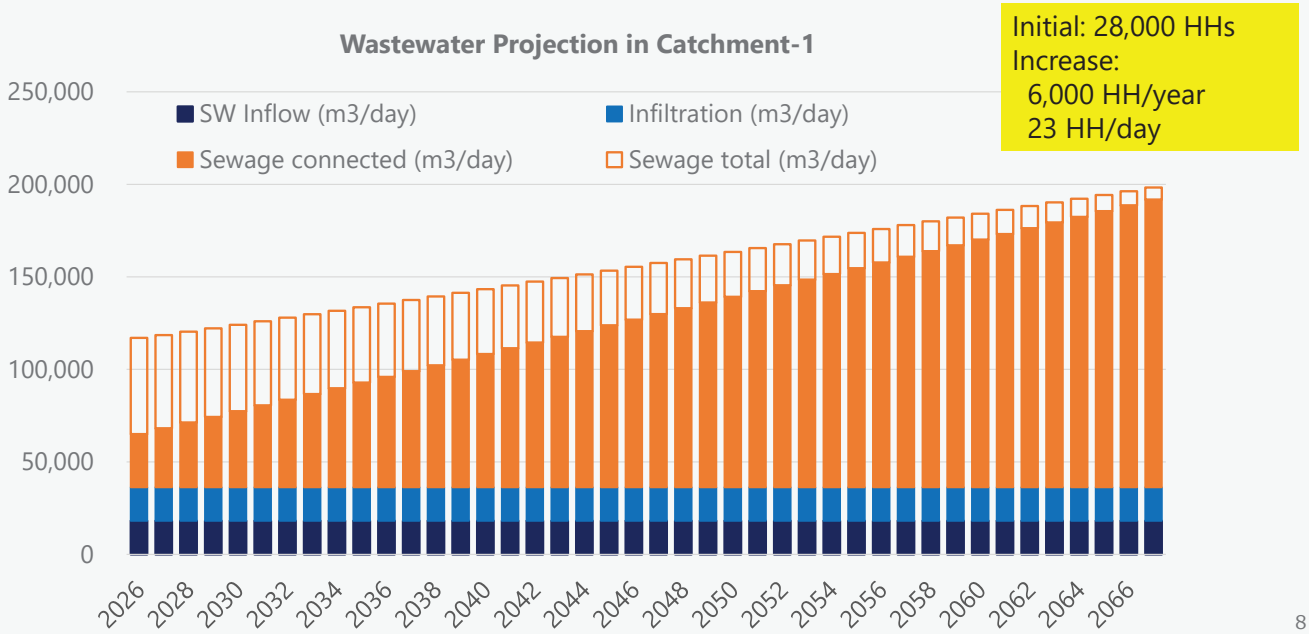
(1) Findings through M/P Review



Initial: 28,000 HHs
Increase:
6,000 HH/year
23 HH/day

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(1) Findings through M/P Review

Item	MP/Current		JET Findings
5) Sewage collection system	● MP - Separated sewer system - Interceptor system ● Current - Separated sewer system		● Separated sewer system is ideal collection system theoretically, but it is a big challenge to construction of house connection. ● Interceptor system was not applied in Catchment-1 considering: ✓ Toxic industrial wastewater is flow in the khal, ✓ Sea water/river water backflow is expected, and ✓ Drainage system is under CCC's management. ● To increase the initial wastewater, interceptor system is conditionally reasonable where: no industrial WW and no backwater such as upstream of khal.
6) Capacity of Wastewater Treatment	● PDPP STP-1:100MLD STP-2: 90MLD STP-3: 60MLD	STP-4: 80MLD STP-5: 60MLD STP-6:100MLD	● Currently, the capacity of STPs were estimated based on the MP. ● Setting the target year and population projection, the capacity of STPs will be determined.

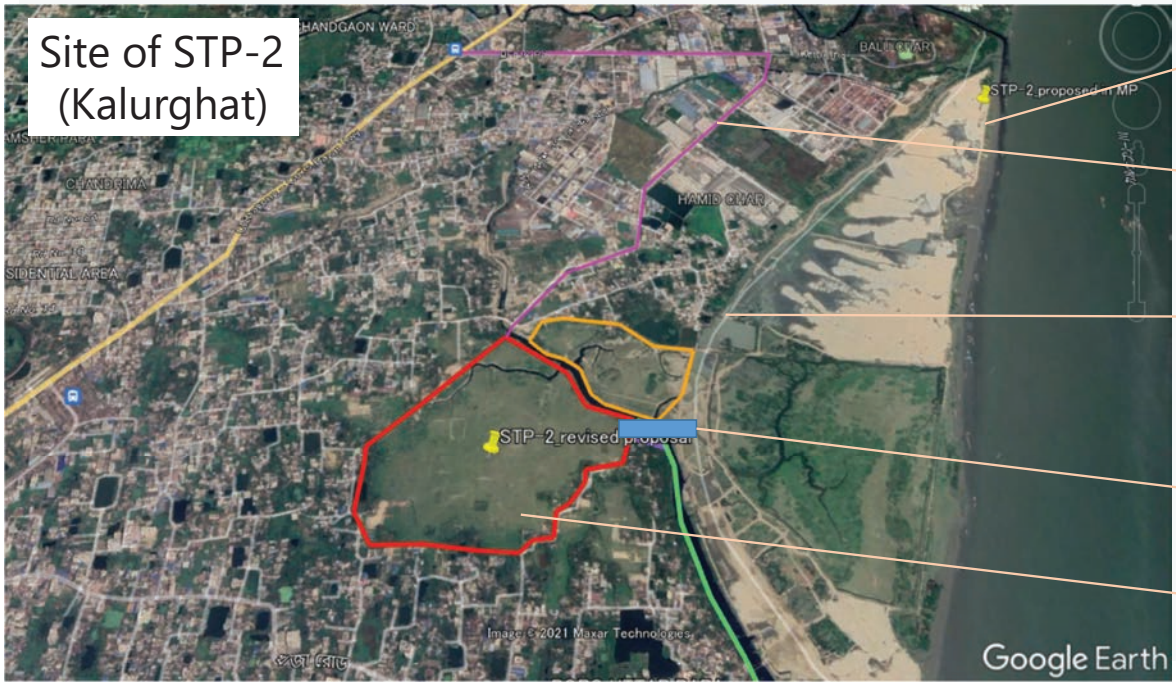
9

(1) Findings through M/P Review

Item	MP/Current	JET Findings
7) Site of STPs	● MP - 6 STPs are planned to be developed independently ● Current - STP-1, 5, 6 will be combined. - STP-3 site is owned by CWASA. - STP-2 site has been developed for university (no land). - STP-4 site is partially used as construction site of ring road.	● Site of STP-2 - Alternative land for STP-2 with area of 30ha is confirmed to be available near previous site. ● Site of STP-4 - Currently, the site is used for construction site of ring road, reserved area for residential development. - CDA has plan to utilize the land, if CWASA requests to utilize the land, high-level discussion is required. - The alternative site CDA recommended is used as fish pond and dry fish industry. Considering the LARAP, this site is seemed to be unreasonable. ➔Tentatively, the integration of STP-2 and 4 will be a solution. Required area of STPs shall be investigated at first.

10

(1) Findings through M/P Review



Initial site of STP-2 (developed for University)

Access road

Ring Road
*Its construction will be completed by June 2023. We can utilize ring road for construction.

Access road for construction (tentative)

Alternative site of STP-2 (30ha)

11

(1) Findings through M/P Review

Bakaria residential development

Original site of STP-4 (12ha)
- Private land and reserved area for residential use
- CDA has plan to utilize this area.

Original site of STP-4 (8-9ha)
- Private land and used for construction site for ring road.
- CDA has plan to utilize this area.

Alternative site of STP-4 proposed by CDA (25ha)
* Fish pond and dry fish industry

12

(1) Findings through M/P Review

Item	MP/Current	JET Findings
8) Effluent quality standard	● MP, Current - BOD: 40 mg/L - Nitrate: 250 mg/L - Phosphate: 35 mg/L - SS: 100 mg/L - Temperature: 30 ℃ - Coliform: 1000 MPN/100mL	● The effluent quality standard stipulates the maximum allowable effluent quality. ● Each value is not so strict, and nitrate and phosphate treatment is not always required.

13

(1) Findings through M/P Review

Item	MP/Current	JET Findings
9) Treatment Process	● MP - Trickling filter process was proposed ● PESSCM-1: - A2O was applied for STP-1.	● Trickling filter process is advantages in low operation cost, but this system is normally applied for small-middle STPs. ● A2O process is reasonable for nitrate and phosphorous treatment. ● The JET tentatively observed that - the STP-1 will be operated as "OD process (without N nor P treatment)" at the initial stage (when inflow is diluted: with low pollution load), then - it will be converted to A2O process (with N and P treatment) after inflow volume is increased (at that time, inflow quality is expected to be enough polluted) to satisfy the effluent quality standard. Because: - N treatment requires nutrient (BOD), however it is seemed to be difficult to provide enough nutrient due to diluted sewage inflow at the beginning. - A2O requires skill and know-how compared with OD.

14

(1) Findings through M/P Review

Item	MP/Current	JET Findings
9) Sanitation and Fecal Sludge Management	● MP/ Current - Septage collection is CCC's jurisdiction - CWASA will construct fecal sludge treatment facility in PESSCM-1.	● The allocation sewage treatment system will be studied in CWSISP-II coming WB project. The basic policy is as follows: - CCC area: centralized sewerage system - Outskirts: septic tank and DEWATS ● CWASA will construct additional fecal sludge treatment facility at north part of CCC area (tentatively proposed at Arefin Nagar.
10) Project Cost	● MP - MP proposes project cost for sewerage development	● The project cost shall be updated based on the change of capacity and treatment process of STPs. ● Financial capability of CWASA shall be studied to ensure sustainable management of sewerage system.

15

(1) Findings through M/P Review

Item	MP/Current	JET Findings
11) Organization	● MP/ Current - Organogram for sewerage development/management are proposed	● Property connections by the contractor should be carefully inspected by PIU to avoid misconnections; Plumbers of MODs should be involved in this process for OJT in operation phase ● CWASA shall strengthen the organization of sewerage development especially for the huge amount of house connection works.

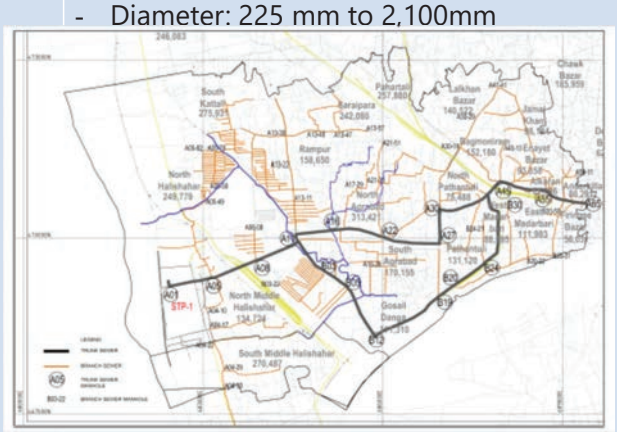
16

(2) Findings through PESSCM-1 Review (Final Design Report)

Item	Main Points	JET Findings
1) General	● Target Year: 2070 ● Separate collection type is applied for sewage collection.	- It is recommended that "Environmental Clearance Certificate" be obtained by CWASA. On the contrary, EIA is included in the scope of Package W1.
2) Sewerage Network Design	● Terrain Modelling - Google Earth® and Open Street Map® - Auto CAD Civil 3D ● Preliminary Design - DWF : 120 l/c/d, 90% sewage generation, 10% for stormwater inflow and groundwater infiltration - Peak factor = 5/(p/1000)^0.167, where P = population Velocity: 0.8 - 4.0 m/s	- The design manual that summarizes the design methodology should be prepared for utilization of CWASA for future expansion of the sewer network after completion of the construction packages. - "Overflow Pipe to Khal" is designed in the Trunk Main. It means the Trunk main will be full filled and internal pressure will act in the pipe. => JET would like to see the flow/hydraulic calculation of the conceptual design.

17

(2) Findings through PESSCM-1 Review (Final Design Report)

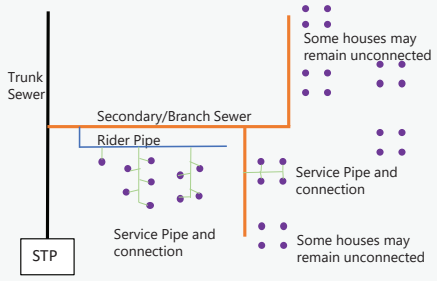
Item	Main Points	JET Findings
2) Sewerage Network Design	● Main Feature of Sewer Network - 113 km (trunk + branch + rider sewer) - Diameter: 225 mm to 2,100mm  ● The Concept of Sewage Collection is shown in the next page.	● Main Feature of Sewer Network - The sewer with diameter of 1500 mm to 2100mm is to be constructed by trenchless method. <u>The longest tunneling span is more than 700m</u>. - Several manholes will be constructed in the congested road. => Well experienced contractor needs to be appointed. ● As shown in the next page, CWASA is required to expand the sewerage network as well as property connection after completion of the construction package. =>Capacity development of CWASA is essential.

18

(2) Findings through PESSCM-1 Review (Final Design Report)

Concept of Sewage Collection ***"Interim Property Connection" is not included in the scope of construction packages.***

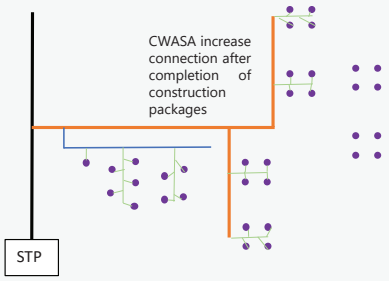
2025 (after construction)



Population served by sewer (2025): 150,000
(Connection: W1: 11,000 nos., W2: 11,000 nos., W3: 6,000 nos., totaling 28,000 connections ≒ 150,000 people)

Total wastewater flow: 18,000 m3/day
(150,000 x 120 l/c/d = 18,000m3/day)

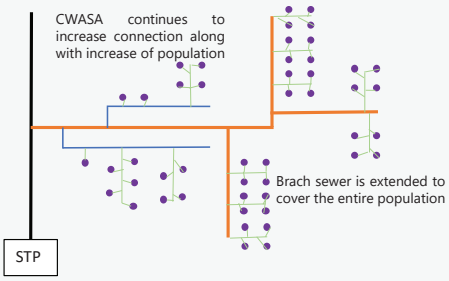
2030



Population served by sewer (2030): 800,000
(Connection work is to be continued after the construction package)

Total wastewater flow: 96,000 m3/day

2070



Population served by sewer (2070): 2,600,000
(Extension and connection work is to be continued)
Total wastewater flow: 312,000 m3/day
Trunk Sewer and Secondary Sewer is designed for 2070 flow.
(End of Trunk Sewer: D2100, I=1/2000)

19

(2) Findings through PESSCM-1 Review (Final Design Report)

Item	Main Points	JET Findings
3) Wastewater Treatment	● Design Inflow - The planned wastewater inflow is as shown below. - Year 2025 (At the completion of the construction package): Approximately 18,000 m3/day (18 MLD) - Design Annual Average Flow of STP: 100 MLD ● Requirements for Treated Effluent Quality - BOD5: 20 mg/L, TSS: 30 mg/L	- The served population needs to be increased by 150,000 per year (28,000 connections/year≒100connections/day) after completion of the construction package. - The commissioning test needs to be carefully planned, since the expected inflow is 18 % of design capacity at the time of completion of the construction. - Training on how to deal with influent water quality fluctuations is needed.

WASTEWATER SOURCES	PESSCM-1 IMPLEMENTATION					
	2025	2026	2027	2028	2029	2030
Avg Wastewater Flow (L/cap-d)	120	120	120	120	120	120
CATCHMENT 1						
Total Population	1,331,406	1,357,105	1,383,346	1,410,142	1,437,506	1,465,451
Population Served by Sewers (%)	11.3%	22.1%	32.5%	42.5%	52.2%	54.6%
Population Served by Sewers (no.)	150,000	300,000	450,000	600,000	750,000	**800,000**
Population Served by FSM Only (no.)	1,181,406	1,057,105	933,346	810,142	687,506	**665,451**
Total Wastewater Flow (m3/day)	**18,000**	**36,000**	**54,000**	**72,000**	**90,000**	**96,000**

20

(2) Findings through PESSCM-1 Review (Final Design Report)

Item	Main Points	JET Findings
3) Wastewater Treatment	● Selection of Treatment Process - MLE Activated sludge with anaerobic selector was selected for secondary biological treatment	- According to FS report, the cost of STP is estimated at BDT 123,685 Lakh, which seems to be higher than the market price in South Asia. - The Conventional Activated Sludge process may also be applied.
	● It was decided that STPs for wastewater from Catchment 5&6 are to be constructed at STP-1 site. The ultimate design capacity including Catchment 5&6 would be 550 MLD.	- The earthworks, civil works needs to be designed for the future expansion.

21

(3) Findings through PESSCM-1 Review (Tender Document)

Item	Main Points	JET Findings
1) Composition of Tender Documents	Section 1. Instructions to Tenderers Section 2. Tender Data Sheet Section 3. General Conditions of Contract Section 4. Particular Conditions of Contract Section 5. Tender and Contract Forms Section 6. Employer's Requirements Scope of Supply (SS) Particular Specification (PS) Technical Specification - Civil Technical Specification - M&E Supplementary Information ? Section 7. Drawings	● The Tender documents is for the Design-Build Contract. ● The data for the detailed design should be attached to Section 6. Employer's Requirement as "Supplementary Information" ● Following data would be necessary for design of sewerage network: - Geotechnical survey data - Conceptual design data of sewer network as a reference: ✓ Flow/hydraulic computations ✓ Bill of quantity (length of sewer by diameter and depth)

22

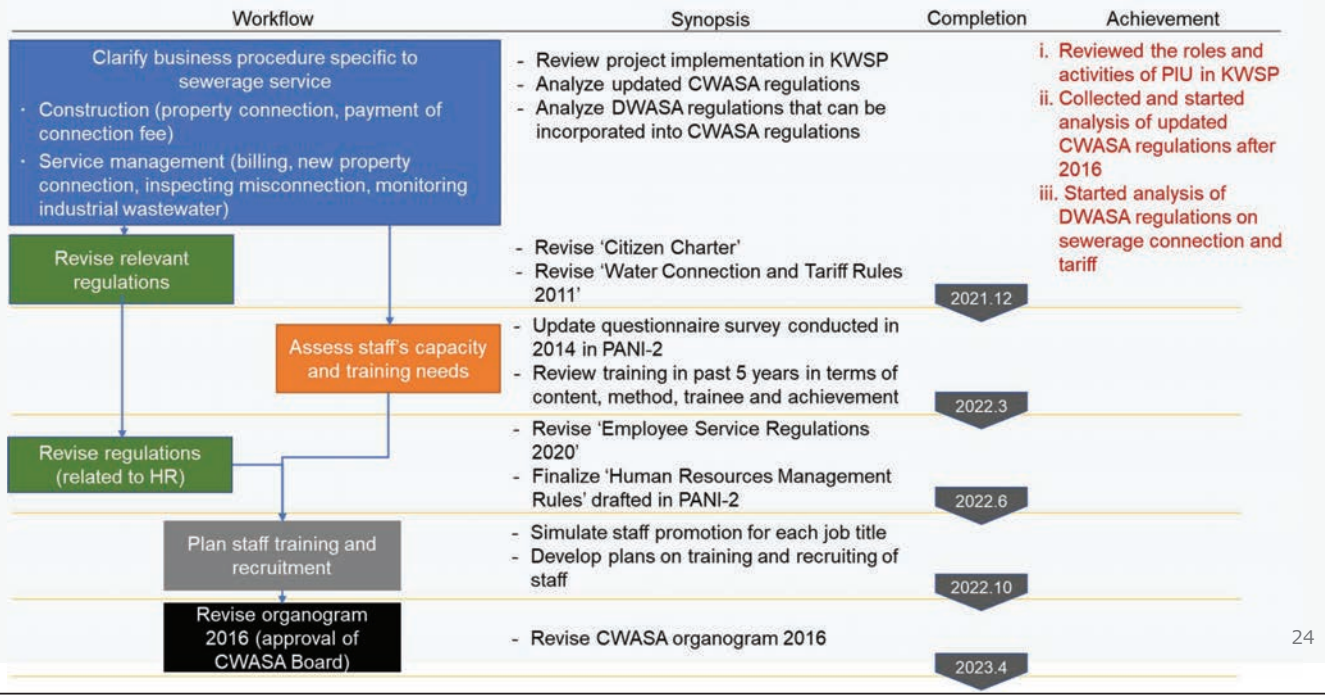
(3) Findings through PESSCM-1 Review (Tender Document)

Item	Main Points	JET Findings
2) Design of Trunk Main	● In SS.2.2 of "Scope of Supply" of the Tender Documents, the invert levels of connection manholes between W1 and W2 and W3 package are stipulated:	● This means the flow rate of Trunk Main should be given as the design condition.
3) Estimate of Risk	● The bidder is required to prepare the bidding design and submit their own BOQ based on his bidding design. ● The contract is lump-sum basis based on the agreed priced BOQ.	● The bidder needs to estimate the risk, which often leads to higher bid prices.

Manhole Ref. No.	Northing (m)	Easting (m)	Invert Level (m) MSL	Ground Level (m) MSL	Depth (m)
A10	469907	684545	-9.177	5.102	14.279
A15	470127	685156	-5.788	4.544	10.332
B01	469718	684738	-8.955	5.192	14.147

23

(4) Achievement on Institutional Issues (Activity 1-2)



24

Updated Work Plan

Expected Outcomes and Planned Activities of the Project

Outcome-1: CWASA's capacity is strengthened for policy setting and planning of sewerage project, thereby the planning of new sewerage projects is accelerated.

- **Activity 1-1:** Review Sanitation Master Plan and Ongoing Sewerage Project
- **Activity 1-2:** Assist organizational setup to promote the planning of sewerage projects
- **Activity 1-3:** Assist in identifying challenges to establish financial scheme for sewerage service
- **Activity 1-4:** Assist in updating sewerage development plan

Outcome-2: CWASA's capacity is strengthened, for design and construction supervision of sewerage facilities including understanding of appropriate technology which is suitable in the project area.

- **Activity 2-1:** Assist in identifying challenges in CWASA's management on design and construction of Ongoing Sewerage Project
- **Activity 2-2:** Assist in capacity development of CWASA for design and construction supervision of sewerage projects through creating solutions to the above challenges
- **Activity 2-3:** Assist in developing design guidelines, technical standards and manuals for sewage works

26

Outcome-1: Capacity Development in Planning of Sewerage Project

Activity 1-1: Review Sanitation Master Plan and Ongoing Sewerage Project

Output Document 1-1 (1): Review of Sanitation Master Plan

Main Contents of Output Document

1. Confirmation of city development plan and land use plan
2. Confirmation of necessity to update based on updated population projection in Catchment-1 project
3. Confirmation of availability of STP site (STP-2, 4)
4. Setting the location of STPs for each catchment
5. Setting the implementation schedule
    1. Checking of development schedule of water supply network
    2. Study of Priority of sewerage development after Catchment-1 (Catchment-2-6)
    3. Setting the implementation schedule
6. Update of preliminary cost estimation based on the change of sewerage development plan and treatment process

27

Outcome-1: Capacity Development in Planning of Sewerage Project

Activity 1-1: Review Sanitation Master Plan and Ongoing Sewerage Project

Output Document 1-1 (2): Review of On-going Sewerage Project (Catchment-1)

Main Contents of Output Document

1. Confirmation of Planning Framework
2. Sewerage Network Design
    2.1 Design Condition
    2.2 Terrain Modelling and Sewer Network Configuration
    2.3 Preliminary Design
    2.4 Concept of Sewage Collection
3. Wastewater Treatment
    3.1 Design Inflow and Water Quality
    3.2 Treatment Process Selection
    3.3 Preliminary Design
4. Fecal Sludge Management

28

Outcome-1: Capacity Development in Planning of Sewerage Project

Activity 1-2: Organizational Setup to Promote the Planning of Sewerage Projects

Output Document 1-2:

Main Contents of Output Document

1. Review of PIU structure and activities in KWSP, and organization structure planned in Sanitation Master Plan and PPS for Catchment-1 project
2. Workflow specific to sewerage service
3. Revision of CWASA regulations
   3.1 CWASA Citizen Charter
   3.2 CWASA Water Connection and Tariff Rules 2011
   3.2 CWASA Employee Service Regulations 2020
4. Revision of CWASA organogram for sewerage service

29

Outcome-1: Capacity Development in Planning of Sewerage Project

Activity 1-3: Identifying Challenges to Establish Financial Scheme for Sewerage Service

Output Document 1-3:

Main Contents of Output Document

1. Review of estimated cost and cost-recovery plan in Sanitation Masterplan and Catchment-1 project
2. Funding resource & fundraising, schedule and challenges in Catchments 2- 6
3. Necessary tariff for cost recovery
4. Measures to fill the gap between regulated tariff and necessary tariff

30

Outcome-1: Capacity Development in Planning of Sewerage Project
Activity 1-4: Updating Sewerage Development Plan

Output Document 1-4: Sewerage Development Plan in Catchment 2&4 (Pre-FS and DPP for land acquisition)

Main Contents of Output Document

1. Setting the site of STP
2. Setting the target year (tentatively 2050 or 2070?)
3. Population projection (based on Catchment-1 project)
4. Sewage flow forecast and setting the capacity of STP
5. Sewage treatment process (tentatively same as Catchment-1)
6. Layout plan of STP (tentatively same as Catchment-1)

DPP for land acquisition will be prepared based on the above information.

31

Outcome-2: Capacity Development in Management of Design and Construction Supervision
Activity 2-1: Identifying Challenges in Design and Construction Supervision of On-going Project

Output Document 2-1: Identified Challenges in Design and Construction Supervision of On-going Project

Main Contents of Output Document

1. Confirmation of the Contents of Tender document of PESSCM-1

2. Present organization of PIU of PESSCM-1

3. Lesson Learned From Past Project (KWSP-1&2, PANI-1&2)

4. Conceivable/Identified Challenges in Design and Construction Supervision of PESSCM-1
   4.1 Challenges in Contract Administration
   - Arrangement of the work on the congested road
   - Arrangement of property connection, etc.

   4.2 Challenges in Design Approval
   - Design of property connection, etc.

   4.3 Challenges in Construction Supervision
   - Inspection of property connection, etc.

32

Outcome-2: Capacity Development in Management of Design and Construction Supervision

Activity 2-2: Creating Solutions to the Identified Challenges

Output Document 2-2: Proposed Solutions to the Identified Challenges

Main Contents of Output Document

1. Contract Administration
   - Work permission on the congested road
   - Procedure of administration of property connection
   - etc.

2. Approval of Design
   - Appropriate design of property connection
   - etc.

3. Construction Supervision
   - Procedure of inspection of property connections
   - etc.

33

Outcome-2: Capacity Development in Management of Design and Construction Supervision

Activity 2-3: Developing Design Guidelines, Technical Standards and Manuals for Sewage Works

Output Document 2-3: Draft Manual on Sewage Works of CWASA

Main Contents of Output Document

1. Design Guideline of Sewerage Network
   - Methodology of planning and preliminary design
   - Selection of pipe material

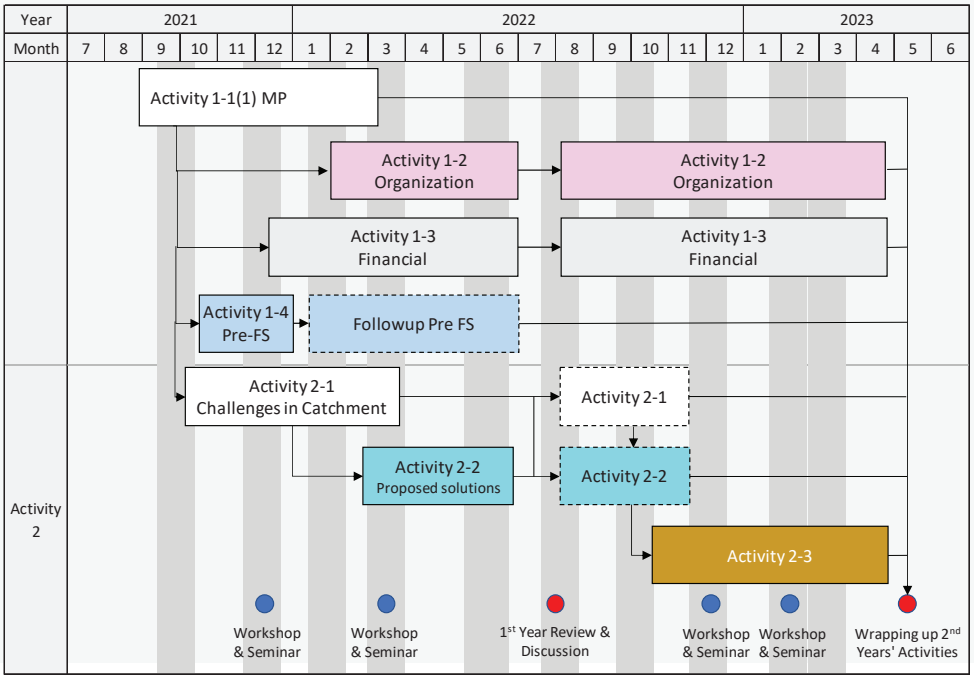
2. Standard Design of Property Connection

3. Design Guideline of STP
   - Design of Control System

4. Management Guideline of Design- Build Contract
   - Appropriate Tender/Contract Documents to prevent the delay of the work

34

Updated Schedule



Updated Schedule

	Position	Name	Rank	2021: 6 7 8 9 10 11 12	2022: 1 2 3 4 5 6 7 8 9 10 11 12	2023: 1 2 3 4 5 6	Man Month Total BD	Man Month Total JP
Work in Bangladesh	1) **Chief Advisor/ Sewage Treatment Planning**	Takamasa Nishikawa	2	28, 21	21, 21, 21	21, 14	4.20	
	2) Organization structure/ Financial Scheme	Toshihiko Tamama	4		21	21	1.40	
	3) Design/Construction supervision/ Maintenance of	Hidehisa Tamura	4	21	21, 21	21	2.80	
					Ramadan & Eid	Ramadan & Eid	Sub-Total	8.40
Work in Japan	1) **Chief Advisor/ Sewage Treatment Planning**	Takamasa Nishikawa	2	2, 6, 1, 1	1, 1, 1, 1, 1, 1, 1, 1	1, 1, 1, 1		1.00
	2) Organization structure/ Financial Scheme	Toshihiko Tamama	4	1, 2, 3, 2, 2, 2	2, 2, 2, 1, 2, 2, 2, 1, 2, 2, 2	2, 1, 1, 2		1.90
	3) Design/Construction supervision/ Maintenance of	Hidehisa Tamura	4	3, 1	1, 2, 1	2		0.50
							Sub-Total	3.40

Minutes of Meeting		
Progress Meeting		
Date/Time	Monday, October 10, 2021	4:45PM-6:45PM
Venue	Board Room, CWASA Building, Dampara, Chattogram	
	CWASA: 1. Mr. Makshud Alam (CE), 2. Mr. Muhammad Nurul Amin (PD), 3. Mr. Mohammed Ariful Islam (SE), 4. Mr. Mohammed Mahbubul Alam (SE), 5. Mr. Shajib Barua (DPD and XEN, MOD-2), 6. Abdur Rouf (XEN, MOD-1 and PESSCM-1), 7. S.M. Rubaiyatul Kader (XEN, PESSCM-1), 8. Abdullah Muhammad Shaker (XEN, PESSCM-1), 9. Mohd. Iftekhar Ullah Mamun (XEN, PESSCM-1), 10. Md. Abu Bakkar Sidik (AE, KWSP-2)	
	JICA Expert Team (JET): 1. Mr. Takamasa Nishikawa (Team Leader), 2. Mr. Toshihiko Tamama (Expert of Organizational Structure/Financial Scheme), 3. Mr. Hidehisa Tamura (Expert of Design/Construction Supervision/ Maintenance of Sewerage Works) 4. Ms. Nazia Nur (Communication and Reporting Officer, NKB)	
Documents	i. Findings through the review of MP and PESSCM-1 ii. Updated workplan of the Project of "Advisor on Urban Sanitation Improvement"	

Main Points Discussed/ Agreed	
The followings subjects were discussed or agreed:	
1.	Financial capability of CWASA
	JET expressed their concern about the financial capability of CWASA to ensure sustainable management of sewerage system because CWASA is running many big projects simultaneously. Mr. Arif replied that CWASA has already paid back the loan of one WB project. Moreover, since the Gov. of Bangladesh will repay the main part of loan, CWASA only needs to repay several percentage of loan and owe the O&M cost by own resource (such as by sewage bill). Therefore, financial issue is not so critical for CWASA.
2.	Findings through the Review of MP and PESSCM-1
2.1.	JET suggested that target year for the sewerage projects should be adjusted and CWASA agreed on this issue. Moreover, JET recommended CWASA to set the target year of 30 years to avoid excess investment. This issue will be discussed in the next assignment.
2.2.	JET explained that the population projection in Master Plan (based on census 2011) is half of the population in CCC website. As there is no reliable data for population projection now JET proposed to wait the next census for the verification and projection of population in CCC area. According to the Bangladesh Bureau of Statistics (BBS), next CENSUS is expected to be published on December 22, 2021.
2.3.	JET proposed that the priority area for sewerage development is STP 1, 2 and 4 where high population and high water consumption by KWSP. Mr. Arif suggested to set the priority area based on the land availability. According to him STP 1, 5 and 6 should be the priority as CWASA already acquired the land for these STPs.
2.4.	JET confirmed whether CWASA can collect sewerage tariff from the HHs with house connection or from HHs inside the sewered area even it does not have house connection. CWASA replied that CWASA can collect sewerage tariff only from HH with house connection. Both parties understand it important to promote house connection even from the financial aspect.
2.5.	JET suggested CWASA about the importance of the collaboration of MOD, CWASA and contractor to provide HH connection. CWASA agreed on this issue and explained the CWASA's action to promote: the project will bear the expenses of HH connections and the users do not need to pay for connection fee initially.

2.6.	JET explained that they had meetings with concerned CDA officers for the land use plan of the proposed site of STP 2 and 4. CDA explained that the original site of STP 4 (12hactor) has not been used so far but they have plan to develop the area of 8-9 hectors (private land) in future which JET wanted to include with the original site of 12 hectors for STP construction of STP 4. Instead, the PD of Metropolitan Master Plan proposed JET about another land of 25 hector but JET found fishpond, dry fish industry and slums in that area which will be under A category according to JICA.
2.7.	JET explained that the proposed site area of STP 2 in the PDPP is suitable for constructing STP 2 and 4. JET also mentioned that CDA has no plan in that area. Mr. Mahbub suggested JET to consider the integration or separation of the STPs carefully as there shall be both residential and industrial sewage.
2.8.	JET suggested CWASA that nitrate and phosphate treatment is not always required because it is costly and its OM is not easy. Mr. Arif explained that the applied treatment system requires simple operation. Moreover, he will provide a video to JET in this regard for better understanding.
2.9.	JET suggested that Hydraulic calculation should be mentioned in the contract document of PESSCM-1. Mr. Arif replied that in design report hydraulic calculation is mentioned. He also mentioned that "overflow Pipe to Khal" is designed in the Trunk main for emergency purpose only.
2.10.	JET suggested CWASA to appoint well experienced contractor as the longest tunneling span is 950m. JET also shared their concern about the manholes in the congested road. Mr. Arif mentioned that the manholes shall be constructed based on the site condition and also ensured that CWASA is well experienced for such type of works with safety measures.
2.11.	JET suggested that the commissioning test needs to be carefully planned. Mr. Arif mentioned that the expected wastewater inflow is at least 25MLD.
2.12.	JET mentioned that the estimated cost of STP 1 seems to be higher than the market price in South Asia. Mr. Arif replied that they have added the cost of FSM, head works, big pump station etc. within the estimated cost. He also requested the assistance of JET for Fecal Sludge Management (FSM).
2.13.	JET suggested that bidder is required to prepare the bidding design and submit their own BOQ based on bidding design with the estimation of risk. Mr. Arif replied that equipment manufacturer included the risk factor in the price.
2.14.	JET mentioned that they want to proceed for institutional development through online meetings. CWASA agreed in this regard.
3.	Updated Work Plan
3.1.	JET commented that they shall basically carry out the planned activities of the project according to the ToR of JICA but some scope is adjusted based on the review of the situation.
3.2.	JET proposed to assist preparing the DPP for land acquisition of STP-2 form technical point of view.
3.3.	JET proposed to review the documents of PESSCM-1 to find out the conceivable issues and study their solutions together with CWASA's staff.

Advisor on Urban Sanitation Improvement

Progress Meeting

December 2021

Japan International Cooperation Agency (JICA)
Nippon Koei Co., Ltd (NK)

Contents

2

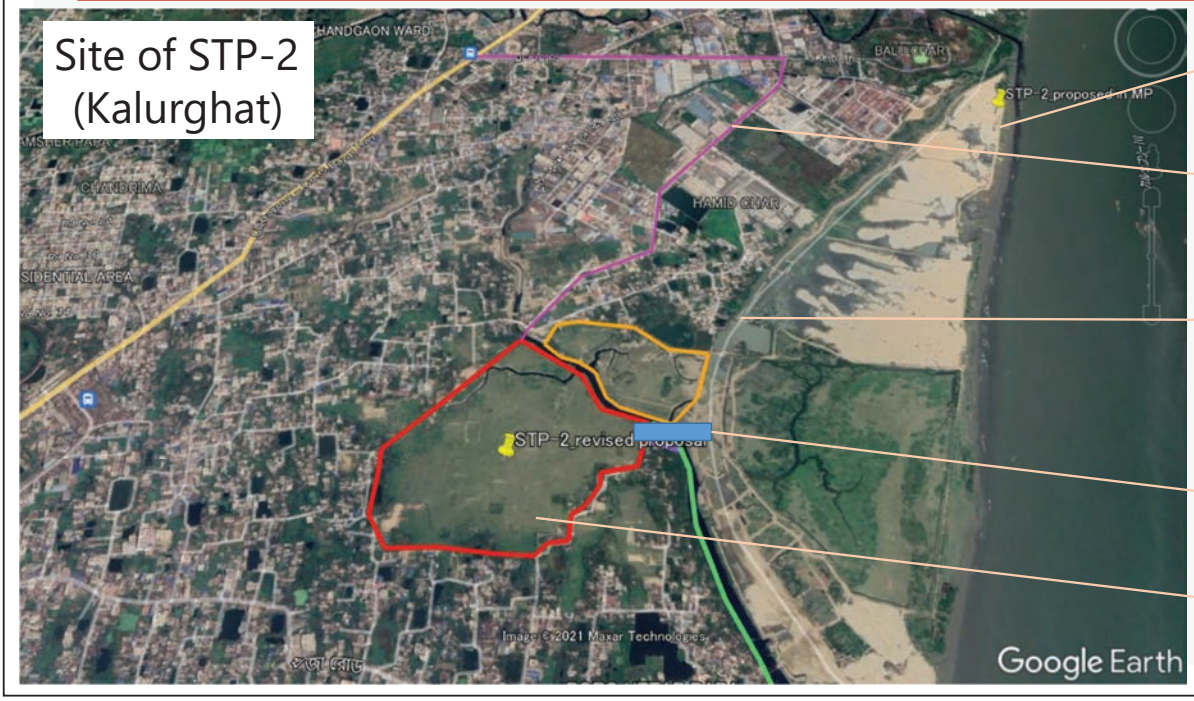
1. Condition of DPP for land acquisition

1. Setting the site of STP: Site of STP-2 (30ha)
2. Setting the target year: 2070 for DPP
3. Population projection

   ➔ Annual average population increase ratio in CCC area will be applied because there is no reliable population data in CCC. After publishing new CENSUS in Jan.2022, population projection will be updated.
4. Sewage flow forecast and setting the capacity of STP
5. Sewage treatment process

   ➔ Same treatment process will be tentatively proposed for land acquisition. Preliminary process calculation (based on detention time) will be prepared in this stage.
6. Layout plan of STP
7. DPP for land acquisition

2. Site of STP



Initial site of STP-2 (developed for University)

Access road

Ring Road
*Its construction will be completed by June 2023. We can utilize ring road for construction.

Access road for construction (tentative)

Alternative site of STP-2 (30ha)

2. Site of STP

3. Population Projection

Population (Capita)

Year	Catchment-2	Catchment-4	Total
2021	269thousands	344thousands	613thousands
2050	467thousands	597thousands	1,064thousands
2070	624thousands	799thousands	1,423thousands

Annual Population Increase (%/year)

	2025	2030	2035	2040	2045	2050	2055	2060	2065	2070
Population Increase	1.8%	1.9%	2.2%	2.0%	1.9%	1.8%	1.6%	1.5%	1.4%	1.3%

6

4. Wastewater Generation

Item	Domestic			Non domestic	WW Generation	Industrial	Inflow/ Infiltration
	Unit Water Consumption	WW return Rate	WW generation	Unit Consumption			
Unit	lpcd	%	lpcd	lpcd	lpcd	M3/day	%
Figure	120	80	96	11.5	107.5	7,858 (Catchment-2) 2,245 (Catchment-4)	15% of daily max WW in 2050
Source	KWSP-2 (2030)	MP	-	12% (KWSP-2)	-	MP	Design guideline in Japan

7

5. Capacity of STP

Daily Average (including SW inflow)						
	STP-2		STP-4		STP-2+4	
2030	50,964	51,000	57,405	58,000	**108,369**	**109,000**
2050	67,094	68,000	78,047	79,000	**145,140**	**146,000**
2070	83,989	84,000	99,668	100,000	**183,657**	**184,000**
⇩ F=1.2 to convert from Daily Ave. to Daily Max						
Daily Maximum (including SW inflow)						
	STP-2		STP-4		STP-2+4	
2030	61,156	62,000	68,887	69,000	130,043	131,000
2050	80,512	81,000	93,656	94,000	174,168	175,000
2070	100,787	101,000	119,601	120,000	220,388	**221,000**

＊Capacity of STP: Tentatively 220MLD at DPP stage

8

6. Treatment Process

*** Treatment Process (tentative):**
Carrousel System which is proposed for STP-1

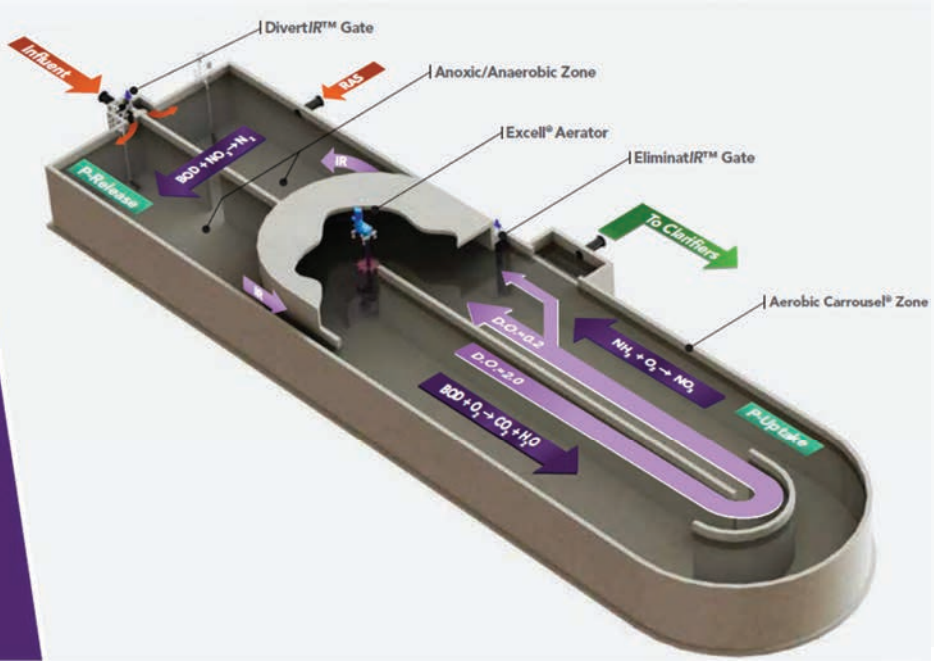
THE CARROUSEL® ALTERNAT*IR*™ SYSTEM

In the denit*IR*® Carrousel® System an integral anoxic basin is added for Total Nitrogen removal without supplemental carbon addition.
The internal recycle (IR) is large (6-15Q) and requires no additional power, taking advantage of the propulsion generated by the Excell® Aerator.

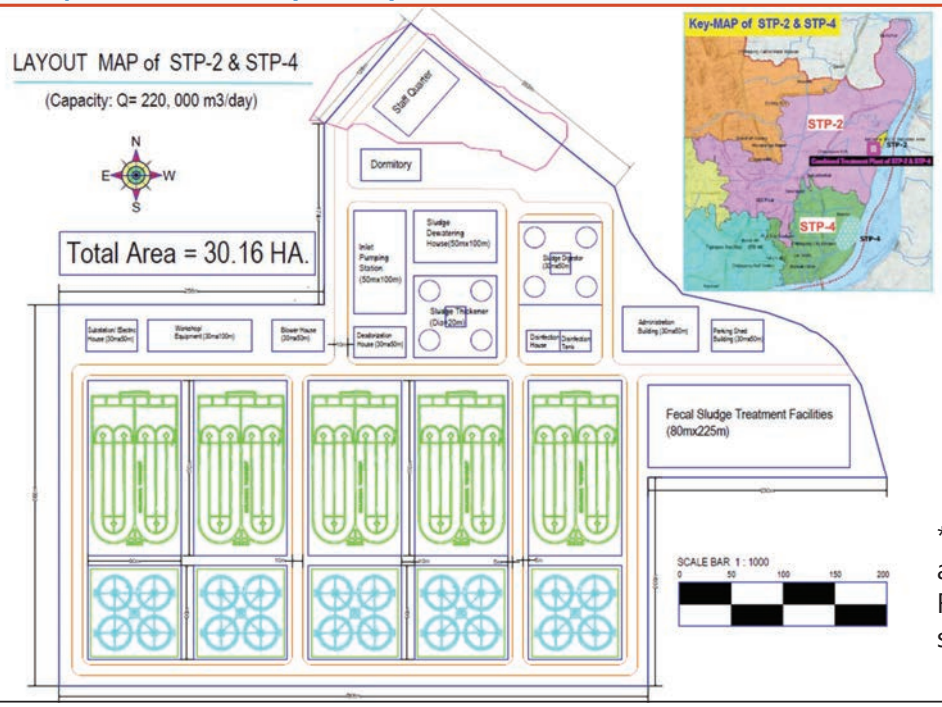
The automatically controlled Eliminat*IR*™ Gate can be used to create anaerobic cycles in the anoxic zone in order to achieve phosphorus removal as well. This is called the Alternat*IR*™ System.

In the aerobic (Carrousel®) stage, BOD and ammonia oxidation (nitrification) proceed to completion. The Excell® Aerator provides all aeration and mixing required for the aerobic stage at all influent loading conditions.

EXCELL® AERATOR | ELIMINAT*IR*™ GATE | MIXING | OCULUS™ CONTROLLER



7. Layout of STP (draft)



* Exact boundary of land acquisition will be determined in F/S stage after the Topographic survey.

10

8. Notice for Land Acquisition, Resettlement, and Compensation (Comments from JICA)

- The acquired land will be utilized for the construction of STP. JICA is the potential donor for the development, but not yet determined officially. The M/D will be after F/S.
- To provide the ODA loan for sewerage development, JICA will confirm the procedure and action for land acquisition for STP, its resettlement, and compensation for Project Affected Persons (PAPs) taken by relevant authorities of Bangladesh.
- The said procedure shall be implemented based on related laws and regulation of Bangladesh, and the environmental and social safeguard policies of World Bank. As a result, the process will satisfy "Guidelines for Environmental and Social Considerations (JICA, April 2010)".
- It is necessary to facilitate DC office to implement necessary compensation for illegal dwellers including costs for housing, relocation, and land registration tax, etc. (Note: There is no critical issue in previous projects in Bangladesh.)
- JICA will check the "resettlement action plan" in the appraisal mission in F/S stage to confirm whether residents and illegal dwellers accept the procedures and actions taken for the involuntary resettlement.

11

Advisor on Urban Sanitation Improvement

Progress Meeting

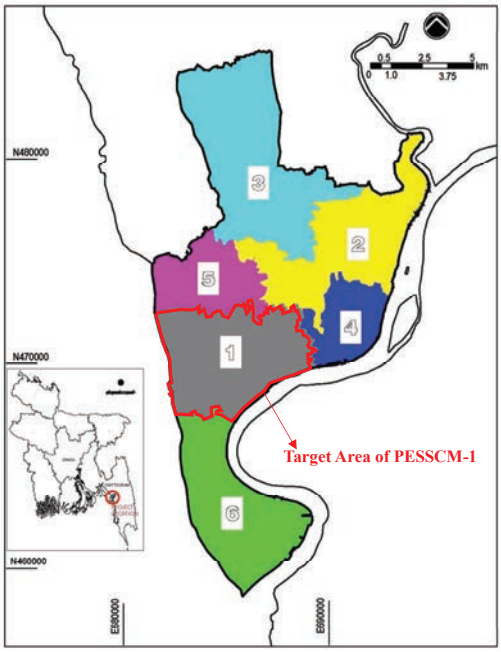
March 2022

Japan International Cooperation Agency (JICA)
Nippon Koei Co., Ltd (NK)

Contents

2

I. Review of Plan of PESSCM-1



1. Planning Framework

Target Area: Catchment-1 (3,562 ha)

Target Year: 2070

- Step wise construction for STP (Phase-1: 100MLD)
- Sewerage network is designed for 2070

Target Population : 897,093 (2011 census)
2,609,175 (2070 projected)

Type of sewerage system: Separate sewerage system
Gravity flow

Location of STP: Near the coast in Halishahar

I. Review of Plan of PESSCM-1

2. Conceptual Design of Sewage Treatment Plant

Design Capacity of STP has been determined to be **100MLD**.

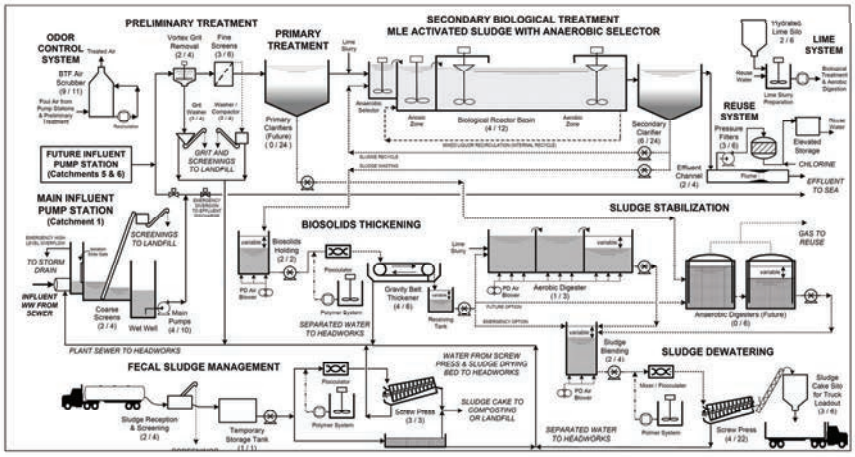
	2025 (after completion of PESSCM-1)	2030	2070
Approx. Planned Served Population	150,000 (28,000 connections installed by PESSCM-1)	800,000 (Connection work shall be continued)	2,600,000 (Total population shall be covered)
Wastewater Inflow	18MLD	96MLD	312 MLD

"Carrousel System", which is a kind of activated sludge system, has been chosen for the treatment process:

- High recirculation rate of MLSS provides dilution to resist variable flows and shock loads
- No blowers, air piping, or submerged diffusers (easier and quicker maintenance)
- Internal recycle of MLSS for Phosphorus & Nitrogen removal can be done without providing piping and pumps

I. Review of Plan of PESSCM-1

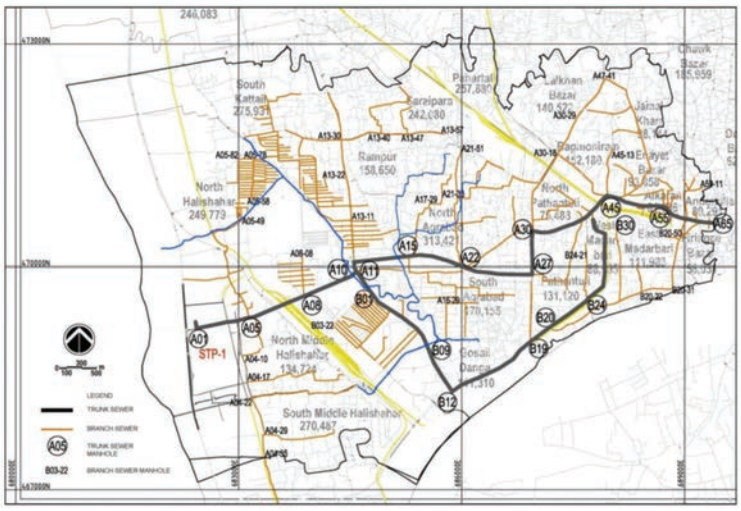
2. Conceptual Design of Sewage Treatment Plant



Design Wastewater Quality	Employer's Requirements for Treated Effluent Quality
BOD: 340 mg/L	BOD: 20 mg/L
COD: 756 mg/L	COD: 100 mg/L
TSS: 454 mg/L	TSS: 30 mg/L
TN: 72 mg/L	TN: 10 mg/L
TP: 14 mg/L	TP: 10 mg/L

I. Review of Plan of PESSCM-1

3. Conceptual Design of Sewerage Network



Main Feature of Sewer Network
- Alignment has been determined based on the GIS topo information.
- 113 km (trunk + branch + rider sewer)
- Diameter: 225 mm to 2,100mm

Hydraulic design conditions
- Per capita wastewater:
120 l/c/d x 0.9 (return) x 1.1 (Inflow + Infiltration) ≒ 120 l/c/d
- Coefficient for Manning's formula: 0.009
- Peak Factor : Based on Babbit's formula
- Minimum velocity: 1.0 m/s
  Maximum velocity: 4.0 m/s

I. Review of Plan of PESSCM-1

3. Conceptual Design of Sewerage Network

Flow estimation and Hydraulic Computation
(Trunk A Sewer in W1 package)

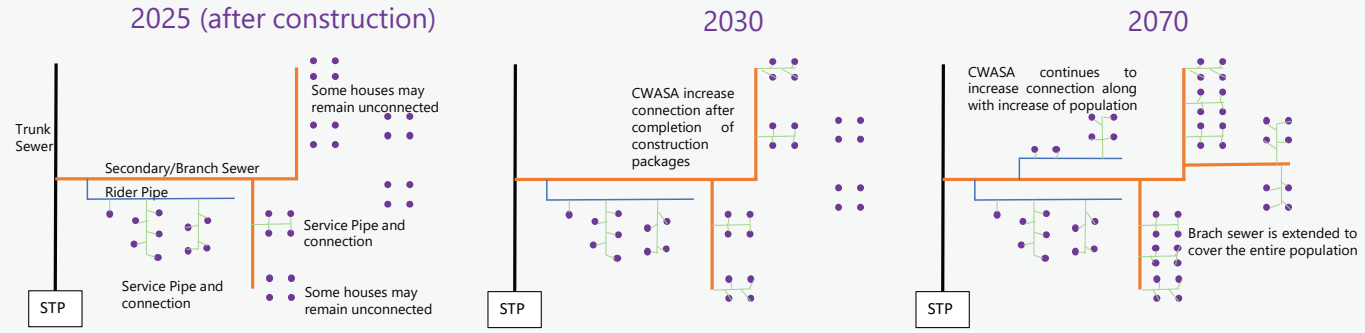
Pipe No.	Manhole No.		GL(m)		L (m)	Served Population (2070)	Average Flow (l/s) (*1)	PF (Babbit's Formula)	Peak Flow (l/s)	Pipe dia (mm)	Slope 1:	Fully filled flow		% of Cap.	Invert Level (m)		Depth(m)		Construction Method
	From	To	From	To								V (m/s) (*2)	Pipe Cap (l/s)		From	To	From	To	
AP15	A15	A14	4.54	3.97	229.4	1,146,891	1,592.9	1.22	1,946.5	1800	2000	1.46	3,710.8	52%	-5.79	-5.90	10.33	9.87	Trenchless
AP14	A14	A13	3.97	4.01	377.5	1,146,891	1,592.9	1.22	1,946.5	1800	2000	1.46	3,710.8	52%	-5.90	-6.09	9.87	10.10	Trenchless
AP13	A13	A12	4.01	4.22	64.1	1,654,699	2,298.2	1.14	2,609.8	2100	2000	1.62	5,597.5	47%	-6.09	-6.12	10.10	10.34	Trenchless
AP12	A12	A11	4.22	4.88	63.3	1,654,699	2,298.2	1.14	2,609.8	2100	2000	1.62	5,597.5	47%	-6.12	-6.16	10.34	11.04	Trenchless
				Inflow from Trunk Line B															
AP11	A11	A10	4.88	5.10	55.1	2,282,135	3,169.6	1.06	3,375.3	2100	2000	1.62	5,597.5	60%	Drop -9.09	-9.12	13.97	14.22	Trenchless
AP10	A10	A09	5.10	4.89	25.0	2,282,135	3,169.6	1.06	3,375.3	2100	2000	1.62	5,597.5	60%	-9.12	-9.13	14.22	14.02	Trenchless
AP09	A09	A08	4.89	4.00	715.5	2,282,135	3,169.6	1.06	3,375.3	2100	2000	1.62	5,597.5	60%	-9.13	-9.49	14.02	13.49	Trenchless
AP08	A08	A07	4.00	4.19	197.4	2,407,025	3,343.1	1.05	3,522.3	2100	2000	1.62	5,597.5	63%	-9.49	-9.59	13.49	13.78	Trenchless
AP07	A07	A06	4.19	4.34	526.0	2,407,025	3,343.1	1.05	3,522.3	2100	2000	1.62	5,597.5	63%	-9.59	-9.85	13.78	14.19	Trenchless
AP06	A06	A05	4.34	4.72	67.3	2,420,497	3,361.8	1.05	3,538.0	2100	2000	1.62	5,597.5	63%	-9.85	-9.88	14.19	14.60	Trenchless
AP05	A05	A04	4.72	4.51	178.0	2,495,431	3,465.9	1.05	3,625.4	2100	2000	1.62	5,597.5	65%	-9.88	-9.97	14.60	14.48	Trenchless
AP04	A04	A03	4.51	4.50	140.4	2,609,175	3,623.9	1.04	3,757.0	2100	2000	1.62	5,597.5	67%	-9.97	-10.04	14.48	14.54	Trenchless
AP03	A03	A02	4.50	3.43	283.1	2,609,175	3,623.9	1.04	3,757.0	2100	2000	1.62	5,597.5	67%	-10.04	-10.18	14.54	13.61	Trenchless
AP02	A02	A01	3.43	3.57	117.3	2,609,175	3,623.9	1.04	3,757.0	2100	2000	1.62	5,597.5	67%	-10.18	-10.24	13.61	13.81	Trenchless
AP01	A01	A00	3.57	3.23	86.9	2,609,175	3,623.9	1.04	3,757.0	2100	2000	1.62	5,597.5	67%	-10.24	-10.29	13.81	13.52	Trenchless

(*1): Per capita sewage incl. I&I: 120 (l/c/d)
(*2): Roughness Coefficient: 0.009

312 MLD

I. Review of Plan of PESSCM-1

3. Conceptual Design of Sewerage Network **Concept of Sewage Collection**



Population served by sewer (2025): 150,000
(Connection: W1: 11,000 nos., W2: 11,000 nos., W3: 6,000 nos., totaling 28,000 connections ≒ 150,000 people)

Total wastewater flow: 18,000 m3/day
(150,000 x 120 l/c/d = 18,000m3/day)

Population served by sewer (2030): 800,000
(Connection work is to be continued after the construction package)

Total wastewater flow: 96,000 m3/day

Population served by sewer (2070): 2,600,000
(Extension and connection work is to be continued)
Total wastewater flow: 312,000 m3/day
Trunk Sewer and Secondary Sewer is designed for 2070 flow.
(End of Trunk Sewer: D2100, I=1/2000)

I. Review of Plan of PESSCM-1

4. Fecal Sludge Management

Based on the Master Plan findings and assessment of current situation, followings are included in PESSCM-1 as structural interventions to improve on-site sanitation:

Package W1:

+ Construction of 300 m3/day Fecal Sludge Treatment Facility

Package W2:

+ Implementation of sanitation improvement demonstration project
  - Upgrading of 2000 units of sanitary toilets
  - Construction of 1000 units of new sanitary toilets
+ Procurement of sludge collection and transport equipment for FSM for entire CCC area.

9

I. Review of Plan of PESSCM-1

5. Project Implementation Plan

- PESSCM-1 consists of three packages: Package W1 (STP + Sewerage Network), W2 (Sewage Network), and W3 (Sewage Network)
- The concept of "Design-Build Contract" is as follows:

The Contract Documents prescribe:

"The Contract Drawings and Particular Specifications reflect a Concept Design developed for and considered acceptable by the Purchaser. If the Contractor wishes to propose a different network scheme other than the recommended system he shall do this only in an alternative offer that clearly describes the expected benefits to the Purchaser."

=> The Contractor can, with his responsibility, follow the Contract Drawings and Particular Specifications prepared by the Purchaser, after checking and reviewing the Contract Drawings and Particular Specifications.

=> The Contractor shall, with his responsibility, prepare the detailed design based on the Contract Drawings and Particular Specifications prepared by the Purchaser, or based on his own concept design which is approved by the Purchaser.

10

II. Lesson Learnt from KWSP-1&2 [as a part of Activity 2-1&2]

Project Operation Improvement Plan

Operation Item: *Getting Permission for Road Cutting*		
KEEP	**TRY**	**ACTION**
PROBLEM		**REMARKS**

Note:

KEEP:	Effective matters/activities for project operation
PROBLEMS:	Matters hindering the project operation
TRY:	Proposed measures for effective project operation
ACTION:	Action for the proposed measures
REMARKS:	Related matters to be considered, etc.

II. Lesson Learnt from KWSP-1&2 [as a part of Activity 2-1&2]

Project Operation Improvement Plan

Operation Item: *Arrangement for House Connection*		
KEEP	**TRY**	**ACTION**
PROBLEM		**REMARKS**

Note:

KEEP:	Effective matters/activities for project operation
PROBLEMS:	Matters hindering the project operation
TRY:	Proposed measures for effective project operation
ACTION:	Action for the proposed measures
REMARKS:	Related matters to be considered, etc.

II. Lesson Learnt from KWSP-1&2 [as a part of Activity 2-1&2]

Problem Encountered and Its Preventive Measure

Category: **Title:**	
Problem Encountered	**Countermeasure Taken**
Cause of the Problem	**Preventive Measure(Lesson Learnt)**

Advisor on Urban Sanitation Improvement

Progress Meeting

7th August 2022

Japan International Cooperation Agency (JICA)
Nippon Koei Co., Ltd (NK)

Agenda of Progress Meeting

	Item	Person	Note
1	Progress of Advisor Service	Nishikawa	
2	Overlapped Scope - TOR of WASH project (WB)	Nishikawa	
3	Target of Manual - Manual of House connection works	Nishikawa	

2

1. Progress of the Project
1-1 Planned Activities of the Project

Outcome-1: CWASA's capacity is strengthened for policy setting and planning of sewerage project, thereby the planning of new sewerage projects is accelerated.

Activity 1-1: Review Sanitation Master Plan and Ongoing Sewerage Project

Activity 1-2: Assist organizational setup to promote the planning of sewerage projects

Activity 1-3: Assist in identifying challenges to establish financial scheme for sewerage service

Activity 1-4: Assist in updating sewerage development plan

Outcome-2: CWASA's capacity is strengthened, for design and construction supervision of sewerage facilities including understanding of appropriate technology which is suitable in the project area.

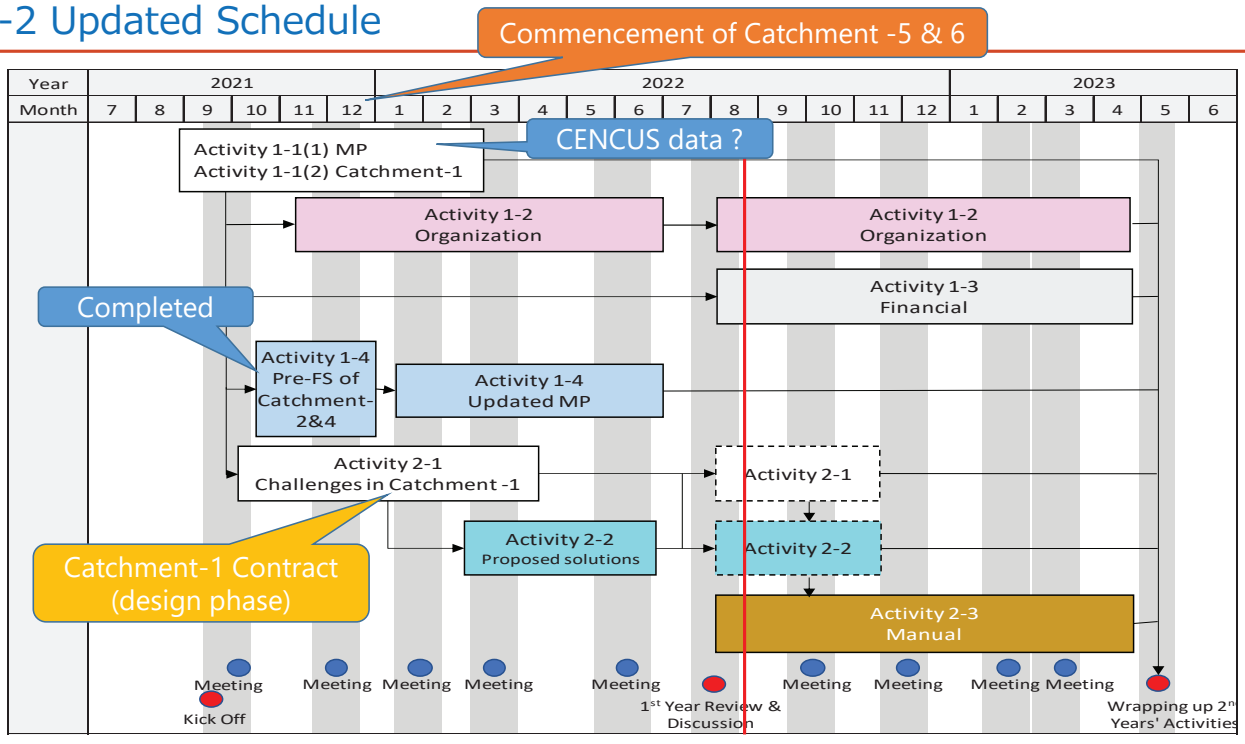
Activity 2-1: Assist in identifying challenges in CWASA's management on design and construction of Ongoing Sewerage Project

Activity 2-2: Assist in capacity development of CWASA for design and construction supervision of sewerage projects through creating solutions to the above challenges

Activity 2-3: Assist in developing design guidelines, technical standards and manuals for sewage works

3

1. Progress of the Project
1-2 Updated Schedule



4

1. Progress of the Project
1-1 Planned Activities of the Project

Activity		Situation
1-1:	Review Sanitation Master Plan and Ongoing Sewerage Project	● Review of MP and PESSCM-1 has been completed. ● CENSUS2021 with ward wised population has not yet been published. ● Final disposal site is the critical issue for sewerage development in CWASA for all catchments. CWASA will utilize CCC's new final disposal site at Nandirhat (north of CCC area). ● Annual fecal sludge volume from slum was estimated and necessity of additional treatment plant will be discussed. ➔ At least, CWASA will request septage collection facility for eastern area.
1-2:	Assist organizational setup to promote the planning of sewerage projects	● Draft of organogram in 2022 was proposed in this assignment. ● Transition from construction phase to OM phase has already been discussed.
1-3:	Assist in identifying challenges to establish financial scheme	● The scope of work is fully overlapped with WASH project (WB).
1-4:	Assist in updating sewerage development plan	● Pre-FS for land acquisition has already been prepared and submitted to line ministry.

1. Progress of the Project
1-1 Planned Activities of the Project

Activity		Situation
2-1:	Assist in identifying challenges in CWASA's management on design and construction of Ongoing Sewerage Project	● Confirmation of challenges for sewerage development based on CWASA's experience in KWSP-II and design o PESSCM-1 have already been completed. ● In PESSCM-1, the contractor of package-2 and -3 has already started their design and survey.
2-2:	Assist in capacity development of CWASA for design and construction supervision of sewerage projects through creating solutions to the above challenges	● The solution of design of lateral sewer (house connection) has already been proposed. ● The design of sewerage system in PESSCM-1 is still under preparation.
2-3:	Assist in developing design guidelines, technical standards and manuals for sewage works	● Design guideline, technical standards, manuals for sewerage works of DWASA is not available. DWASA applied the contractor's proposal in project basis. ● JET propose to prepare design and CS guideline of house connection.

6

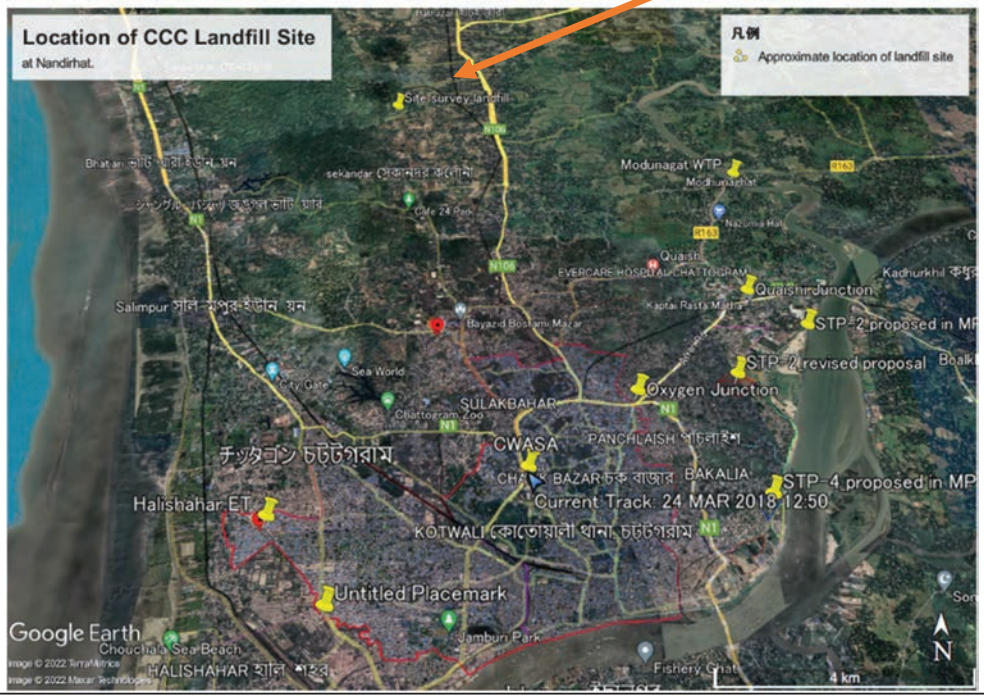
TOR of WASH Project
(Overlapped scope between JICA advisor and WASH)

Task 5: Economic and Financial Analysis

The consultant shall carry out financial analysis of the current situation in terms of the number of service users and payment for water supply (and sanitation) services under CWASA operation and forecast financial situations during the design period considering the growth in users and including the need for water tariffs adjustments. Since sanitation services in certain parts of Chattogram will go on stream in a few years and more in the next decade, the financial analysis shall take *inter alia* the sanitation services, sewer connection projections and sewerage tariffs in the financial analysis. The consultants shall assess the viability (benefit cost ratio, rate of return) of the proposed investments, determine the operational capabilities of the CWASA to return the borrowed capitals, and forecast changes in tariffs for water supply.

7

Landfill Site to be developed by CCC



8

Landfill Site to be developed by CCC

- 26 acre of gov. land + 25 acre of private land (owned by one land owner) are initial site of landfill site. It will be expanded after land acquisition of surrounded area.
- Land is used as agricultural land at present.
- 40 feet (12m) road will be constructed from main road to the site (L= 3.5km).
- Distance from STP site to landfill site: 12km
- CCC tentatively accepted to dispose sewage sludge generated from CWASA's STP. Fund for sludge management (tracks for transportation) and fee for disposal shall be owed by CWASA.
- CCC will prepare the DPP in 3 months and submit it to the LGRD.

Sewage Sludge Management (Bangladesh Standards and Guidelines for Sludge Management)

Item	Measure
1) General Requirement	CWASA shall submit sludge management plan to DOE b. The amount of sludge that is to be expected per year in tonnes dry matter (t DM/yr), d. The origin of the wastewater: Code Number 19 08 05, e. The class of sludge: , f. Planned option for safe disposal or use, g. Documentation on fulfillment of requirements relevant for this option:, h. Company and address of further parties involved in sludge management including collection, transport, recovery and disposal of sludge, including the supervision of such operations and after-care of disposal sites: CWASA and CCC, i. Documentation on suitability of recovery or disposal plant or site, j. Company and address of the laboratory accredited by the appropriate authority k. commissioned to conduct any analysis, if applicable. Evidence of sufficient, qualified and appropriate independent laboratory facilities, if applicable.

Sewage Sludge Management (Bangladesh Standards and Guidelines for Sludge Management)

Item	Measure
2) Category of Sewage Sludge	Category A: Municipal sludge including comparable sludge • If the sludge is produced in a STP treating only domestic or urban wastewater, it may be counted as municipal sludge and classified as Category A. • If the sludge is produced in a STP treating wastewater comparable to domestic or urban wastewaters as described in Annex 3, it may be counted as municipal or comparable sludge and classified as Category A.
3) Sludge Management Option per Waste Class	

Management option	Waste class		
	A	B	C
3.1 Anaerobic digestion (co-fermentation)	X[1]	X[1]	**
3.2 Aerobic digestion (composting)	X[1]		
3.3 Agricultural use	X		
3.4 Controlled landfill *	X	X	X
3.5 Thermal incineration	X[1]	X[1]	X[1]
3.6 Land application (filling material e.g. for flood prevention)	X	X[2]	**
3.7 Recycling in brick, cement or asphalt making	X	X[3]	**

Sewage Sludge Management (Bangladesh Standards and Guidelines for Sludge Management)

Item	Measure
4) Management Options for Category A	Condition for agricultural use

Table 2: Parameter limits of sludge for use as compost/fertilizer[2]

Parameter	in sludge mg/kg dry substance	in soil* mg/kg dry substance
Pb (Lead)	900	100
Cd (Cadmium)	10	1.5
Cr (Chromium)	900	100
Cu (Copper)	800	60
Ni (Nickel)	200	50
Hg (Mercury)	8	1
Zn (Zinc)	2500	200

*Soil of the agricultural land before application of sludge

The quantity is limited:
< 3 t dry substance sewage sludge per ha in 3 years
< 10 t dry substance sludge compost per ha in 3 years

Sewage Sludge Management (Bangladesh Standards and Guidelines for Sludge Management)

Item	Measure
5) Controlled Landfill	Basic requirements for the location of a landfill site: • The over flooding level should be > 2.0 m of the maximum expected water level of the surrounding water bodies • > 500 m distance to populated areas • no construction in protected areas • no construction in flood plains and areas with a high risk of natural disasters • the underground has to resist mechanical stresses, has to hold back or prevent leachate and pollutants • water impermeability • buoyancy safety has to be considered

Estimation of Fecal Sludge from Slum

1) Population in Slum Area in 2019: 1,465,028

2) Unit Fecal Sludge Volume: 0.07m3/capita/year

3) Fecal Sludge Volume in each Catchment

	Fecal Sludge Volume in 2019		Fecal Sludge Treatment
Catchment-1	96.3 m^3/day	(STP-1,5,6) 140.8 m^3/day	FST in STP-1: 300 m^3/day
Catchment-5	26.4 m^3/day		
Catchment-6	18.1 m^3/day		
Catchment-2	59.6 m^3/day	(STP-2,4) 95.0 m^3/day	FST in STP-2,4: 200 m^3/day or Co-treatment with sewage (sludge)
Catchment-4	35.4 m^3/day		
Catchment-3	45.2 m^3/day	(STP-3) 45.2 m^3/day	To be studied
Total	(Total) 281.0 m^3/day		

14

Manual for Design and CS

MANUAL ON SEWERAGE
AND SEWAGE TREATMENT SYSTEMS

PART A: ENGINEERING
THIRD EDITION - REVISED AND UPDATED

MINISTRY OF URBAN DEVELOPMENT, NEW DELHI
http://moud.gov.in

CENTRAL PUBLIC HEALTH AND
ENVIRONMENTAL ENGINEERING ORGANIZATION

IN COLLABORATION WITH

JICA

JAPAN INTERNATIONAL COOPERATION AGENCY

NOVEMBER 2013

MANUAL ON SEWERAGE
AND SEWAGE TREATMENT SYSTEMS

PART B: OPERATION AND MAINTENANCE
FIRST EDITION

MINISTRY OF URBAN DEVELOPMENT, NEW DELHI
http://moud.gov.in

CENTRAL PUBLIC HEALTH AND
ENVIRONMENTAL ENGINEERING ORGANIZATION

IN COLLABORATION WITH

JICA

JAPAN INTERNATIONAL COOPERATION AGENCY

NOVEMBER 2013

15

Advisor on Urban Sanitation Improvement

Progress Meeting

27th September 2022

Japan International Cooperation Agency (JICA)
Nippon Koei Co., Ltd (NK)

Agenda of Progress Meeting

	Item
1	Progress of Advisor in the 1st Phase
	Activity 1-1 (Nishikawa, Tamura)
	Activity 1-2 (Tamama)
	Activity 1-4 (Nishikawa)
	Activity 2-1, 2-2 (Tamura)
2	Proposed Activities of Advisor in the 2nd Phase
	Activity 1-3 (Tamama)
	Activity 1-4 (Nishikawa)
	Activity 2-3 (Tamura)

Chief Advisor/ Sewage Treatment Planning
Takamasa Nishikawa

Organization Structure/ Financial Scheme
Toshihiko Tamama

Design/ Construction Supervision/ Maintenance of Sewage Works
Hidehisa Tamura

Communication and Reporting Officer (NKB)
Nazia Nur

2

1. Progress of the Project
1-1 Planned Activities of the Project

Outcome-1: CWASA's capacity is strengthened for policy setting and planning of sewerage project, thereby the planning of new sewerage projects is accelerated.

Activity 1-1: Review Sanitation Master Plan and Ongoing Sewerage Project

Activity 1-2: Assist organizational setup to promote the planning of sewerage projects

Activity 1-3: Assist in identifying challenges to establish financial scheme for sewerage service

Activity 1-4: Assist in updating sewerage development plan

Outcome-2: CWASA's capacity is strengthened, for design and construction supervision of sewerage facilities including understanding of appropriate technology which is suitable in the project area.

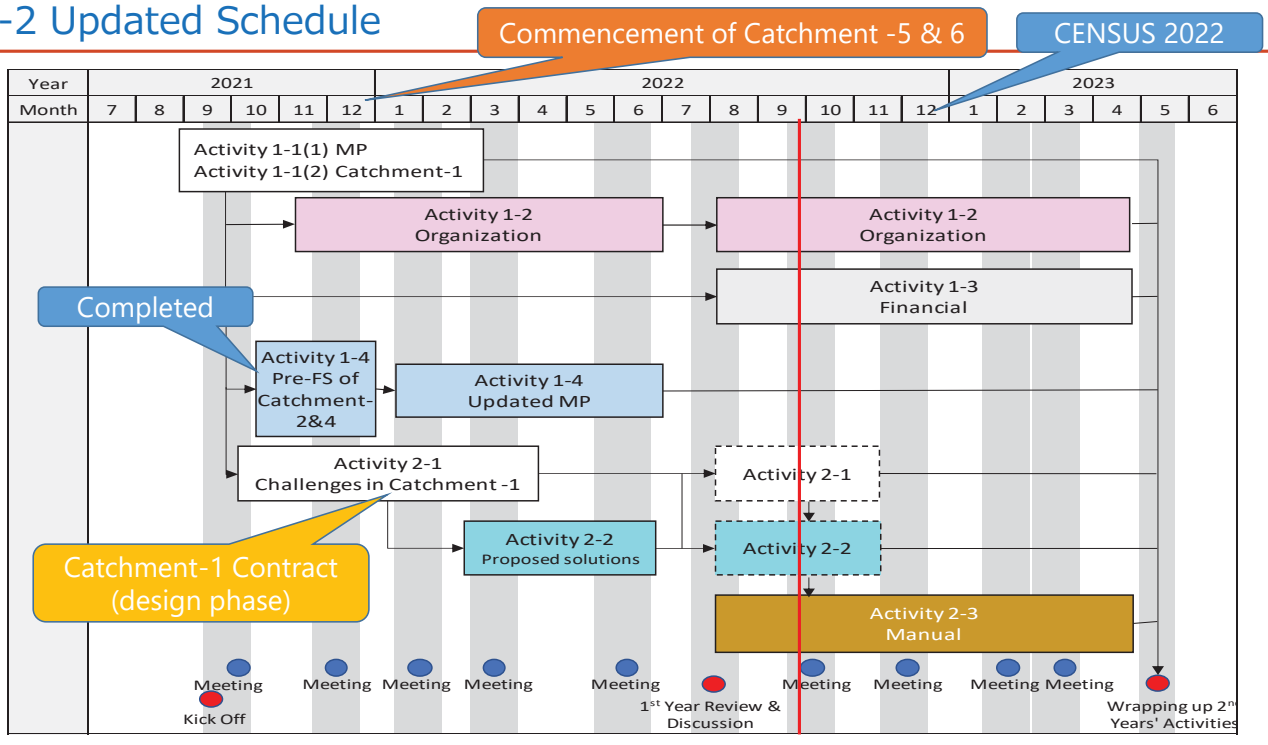
Activity 2-1: Assist in identifying challenges in CWASA's management on design and construction of Ongoing Sewerage Project

Activity 2-2: Assist in capacity development of CWASA for design and construction supervision of sewerage projects through creating solutions to the above challenges

Activity 2-3: Assist in developing design guidelines, technical standards and manuals for sewage works

3

1. Progress of the Project
1-2 Updated Schedule



4

1. Progress of Advisor in the 1st Phase

1. Progress of the Project
1-1 Planned Activities of the Project

Activity		Situation
1-1:	Review Sanitation Master Plan and Ongoing Sewerage Project	● Review of MP and PESSCM-1 has been completed. ● Assistance to formulate Catchment-2 and 4 FS has been completed.
1-2:	Assist organizational setup to promote the planning of sewerage projects	● Water and Sewerage Connection Rules was drafted, under review of CWASA. ● Draft Organogram 2023 was proposed, and it is reviewed by each wing. ● Transition measure from construction phase to OM phase has already been discussed.
1-3:	Assist in identifying challenges to establish financial scheme	Not yet implemented (activity of 2nd phase)
1-4:	Assist in updating sewerage development plan	● Pre-FS for land acquisition has already been prepared and submitted to line ministry. ● Updated MP (investment plan) is under preparation. ➢ Final disposal site is still critical issue for sewerage development in CWASA for all catchments. CWASA will utilize CCC's new final disposal site (reported in progress of FS). ➢ Annual fecal sludge volume from slum was estimated and necessity of additional treatment plant will be discussed.

1. Progress of the Project
1-1 Planned Activities of the Project

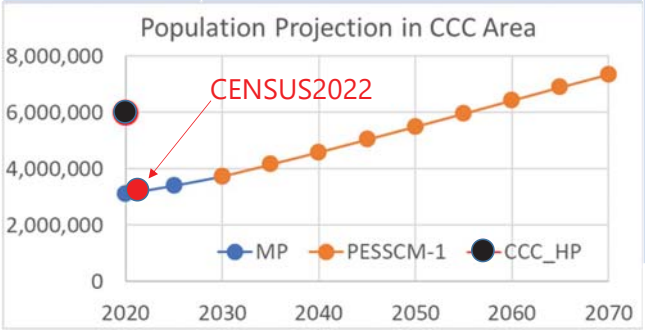
Activity		Situation
2-1:	Assist in identifying challenges in CWASA's management on design and construction of Ongoing Sewerage Project	● Confirmation of challenges for sewerage development based on CWASA's experience in KWSP-II and design o PESSCM-1 have already been completed.
2-2:	Assist in capacity development of CWASA for design and construction supervision of sewerage projects through creating solutions to the above challenges	● The solution of design of lateral sewer (house connection) has already been proposed.
2-3:	Assist in developing design guidelines, technical standards and manuals for sewage works	● Design guideline, technical standards, manuals for sewerage works of DWASA was confirmed not to be available. DWASA applied the contractor's proposal in project basis.

7

Activity 1-1: Review of Sanitation Master Plan and On-going Sewerage Project (PESSCM-1)

(1) Findings through M/P Review

Item	MP/Current	JET Findings
Population in CCC area	● MP: - Based on BBS (Census) targeting for 2030 ● PESSCM-1: - Based on projection targeting for 2070	● Population in BBS and population in CCC information are much different: ✓ Population will be increased according to urbanization, however the increase rate in the maturated area will be much lower and city area will be expanded to peri-urban area. ✓ Due to the migration from rural area, the population of Chattogram will be increased. ✓ Due to aging, growth rate is normally decreased. ● According to CENSUS 2022, population in CCC area is 3.2million, so population projection in the MP was accurate.

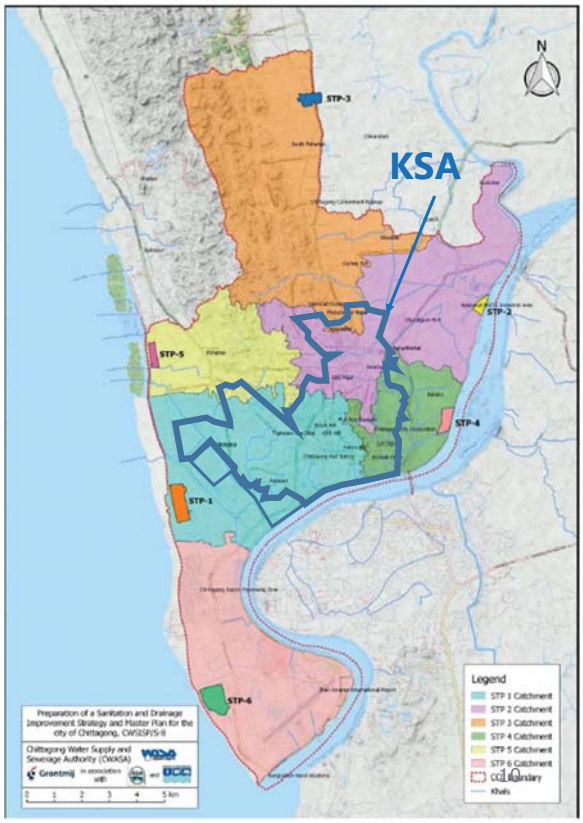


9

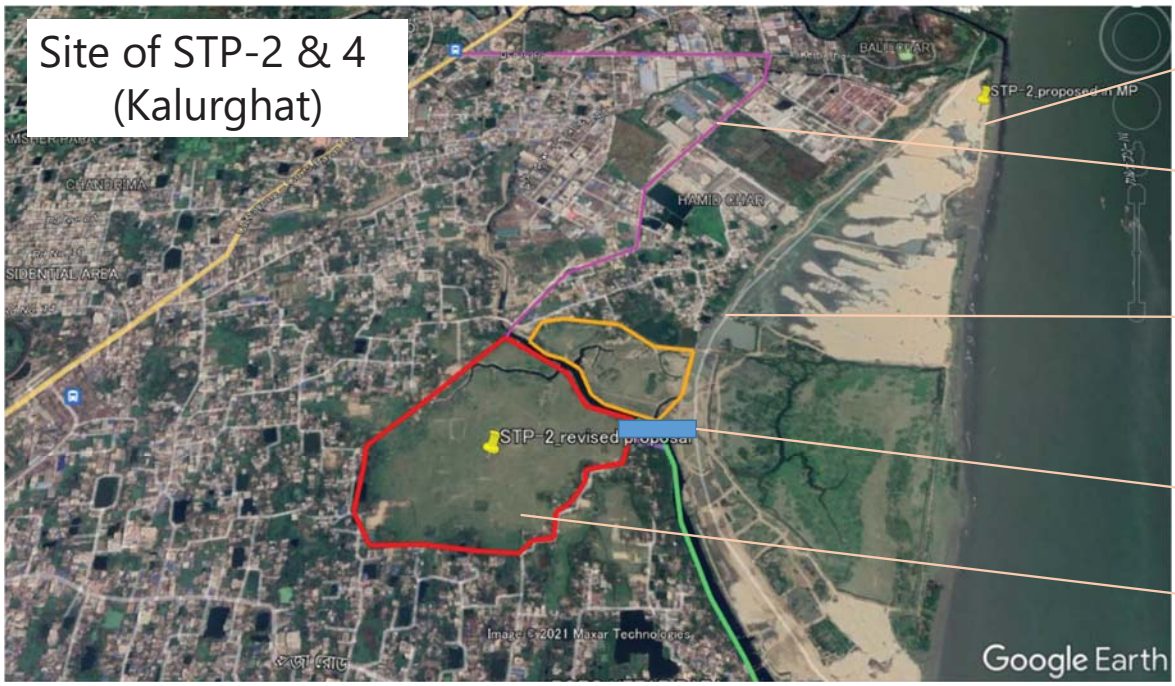
(1) Findings through M/P Review

Item	MP/Current	JET Findings
Priority of sewerage develop ment	● MP: -2023 (Catchment-1), -2030 (Catchment-2)	● KSA is the most priority area since this area is with high population and enough sewage generation. (Catchment-1, 2, 4) ● Distribution network will be developed entire CCC area in the CWSISP-II, so surrounding catchments are next priority. (Catchment- 3,5,6)

Sewerage Development in
Catchment-2 and 4 is urgently needed



(1) Findings through M/P Review



Initial site of STP-2 (developed for University)

Access road

Ring Road
*Its construction will be completed by June 2023. We can utilize ring road for construction.

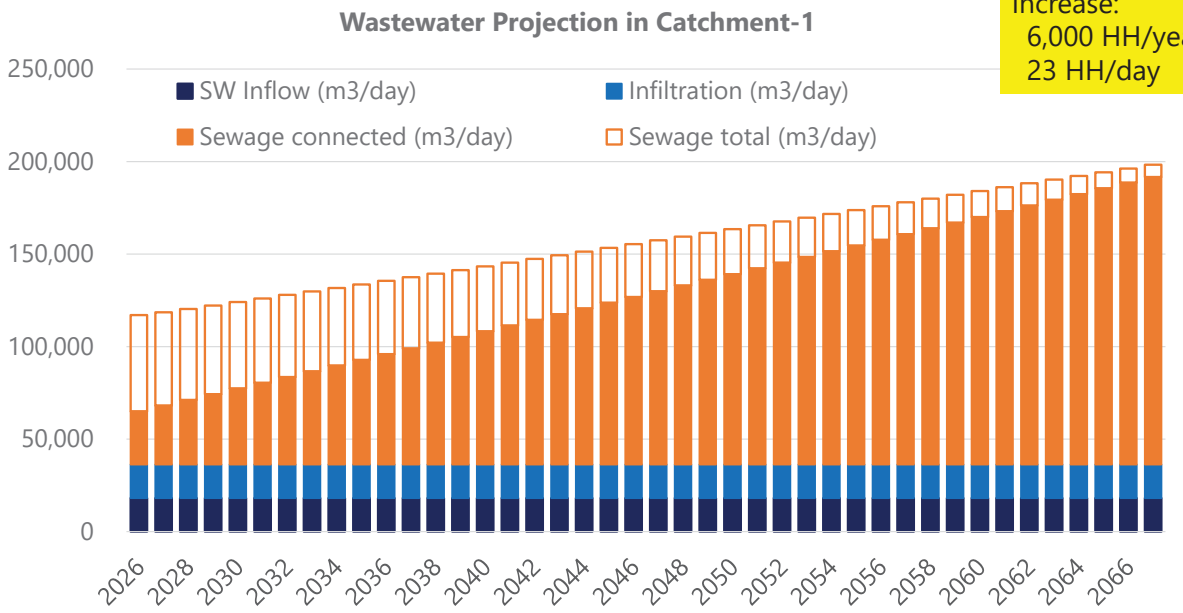
Access road for construction (tentative)

Alternative site of STP-2 (30ha)

11

(1) Findings through M/P Review

Initial: 28,000 HHs
Increase:
6,000 HH/year
23 HH/day



Development of household connection is critical issue to develop separated sewer system.

12

(1) Findings through M/P Review

Item	MP/Current	JET Findings
Project Cost	● MP - MP proposes project cost for sewerage development	● The project cost shall be updated based on the change of capacity and treatment process of STPs, etc. as below:

	MP	Current
Target year	2030	2070
Area	Nearby road	Entire city
Collection system	Interceptor + Separated sewer	Separated sewer
No. of HH connection	Smaller	Huge
Treatment process	Trickling filter system	OD with N,P treatment CAS without N,P treatment
No. of PS	Larger	Smaller (Sewer line will become deeper)

● Financial capability of CWASA shall be studied to ensure sustainable management of sewerage system.

13

(2) Review of On-going Sewerage Project (PESSCM-1)

1. Conceptual Design of Sewage Treatment Plant

Design Capacity of STP has been determined to be **100MLD**.

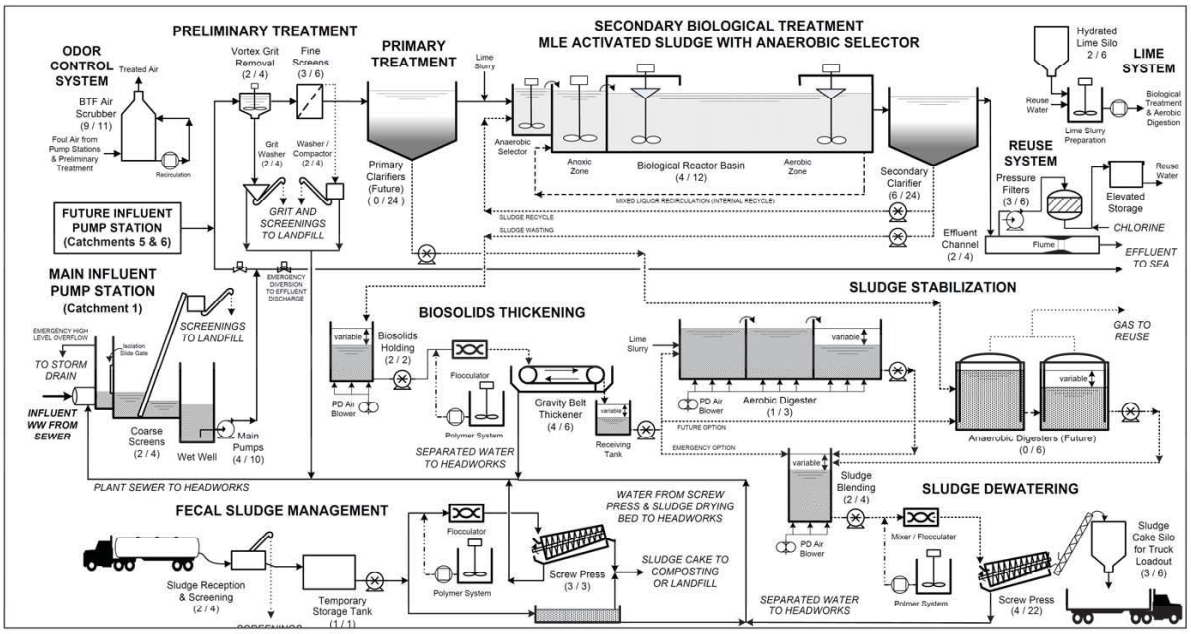
	2025 (after completion of PESSCM-1)	2030	2070
Approx. Planned Served Population	150,000 (28,000 connections installed by PESSCM-1)	800,000 (Connection work shall be continued)	2,600,000 (Total population shall be covered)
Wastewater Inflow	18MLD	96MLD	312 MLD

"Carrousel System", which is a kind of activated sludge system, has been chosen for the treatment process:

- High recirculation rate of MLSS provides dilution to resist variable flows and shock loads
- No blowers, air piping, or submerged diffusers (easier and quicker maintenance)
- Internal recycle of MLSS for Phosphorus & Nitrogen removal can be done without providing piping and pumps

(2) Review of On-going Sewerage Project (PESSCM-1)

1. Conceptual Design of Sewage Treatment Plant



Design Wastewater Quality

BOD: 340 mg/L
COD: 756 mg/L
TSS: 454 mg/L
TN: 72 mg/L
TP: 14 mg/L

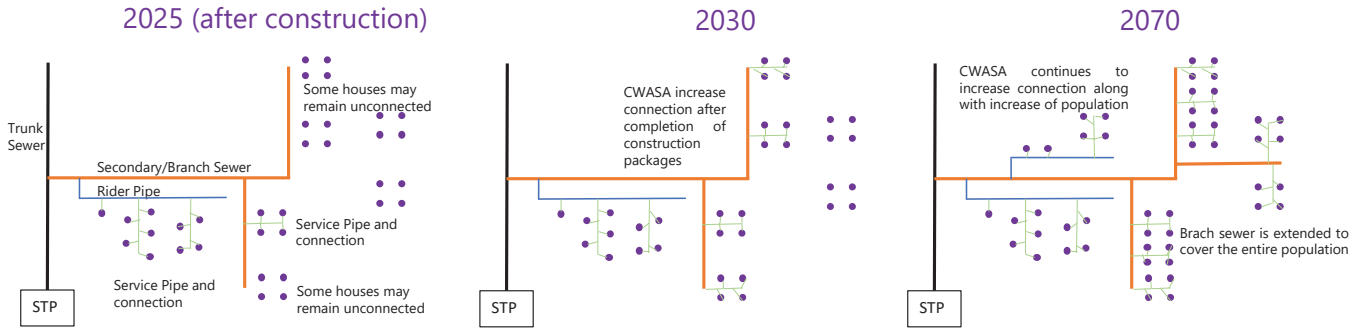
Employer's Requirements for Treated Effluent Quality

BOD: 20 mg/L
COD: 100 mg/L
TSS: 30 mg/L
TN: 10 mg/L
TP: 10 mg/L

(2) Review of On-going Sewerage Project (PESSCM-1)

2. Conceptual Design of Sewerage Network

Concept of Sewage Collection



Population served by sewer (2025): 150,000
(Connection: W1: 11,000 nos., W2: 11,000 nos., W3: 6,000 nos., totaling 28,000 connections ≒ 150,000 people)

Total wastewater flow: 18,000 m3/day
(150,000 x 120 l/c/d = 18,000m3/day)

Population served by sewer (2030): 800,000
(Connection work is to be continued after the construction package)

Total wastewater flow: 96,000 m3/day

Population served by sewer (2070): 2,600,000
(Extension and connection work is to be continued)
Total wastewater flow: 312,000 m3/day
Trunk Sewer and Secondary Sewer is designed for 2070 flow.
(End of Trunk Sewer: D2100, I=1/2000)

16

Activity 1-2: Assist organizational setup to promote the planning of sewerage projects

Action Plan and Progress on Institutional Issues (Activity 1-2)

Red: to be done

Workflow	Synopsis	Scheduled Completion
Clarify business procedure specific to sewerage service ・ Construction (property connection, payment of connection fee) ・ Service management (billing, new property connection, inspecting misconnection, monitoring industrial wastewater)	1. Review project implementation in KWSP. 2. Analyze updated CWASA rules i.e., Citizen Charter, Water Connection and Tariff Rules, Employee Service Regulations. 3. Analyze governmental rules i.e., Water and Sewerage Tariff Rules. 4. Analyze DWASA rules to be incorporated into CWASA rules i.e., 'Water and Sewerage Connection Rules'. 5. Draft CWASA Water and Sewerage Connection Rules.	
Develop connection regulations		Dec 2021
Develop phased organization structure for sewerage service	1. Review organogram 2020. 2. Develop phased organization structure. 3. Finalize CWASA Water and Sewerage Connection Rules.	Mar 2022
Revise regulations (related to HR)		
Develop organogram 2023	1. Develop organogram 2023. 2. Revise CWASA Employee Service Regulations 2020. 3. Finalize CWASA Human Resources Management Rules drafted in PANI-2.	Oct 2022
Support to get approval of organogram 2023	- Get approval of CWASA organogram 2023.	Apr 2023

18

CWASA Water and Sewerage Connection Rules

- Discussed with CWASA on the current/expected workflow of water/sewerage connections.
- Drafted the rules using DWASA's as a prototype and incorporated the discussion results.
- Under review and finalization process of CWASA.

Key points of proposed Organogram 2023 (1/2)

Office of Additional CE (WS)	3
1	Additonal Chief Engineer
1	Stenographer cum C.O.
1	Office Assistant

Office of Additional CE (Sewerage)	3
1	Additional Chief Engineer
1	Stenographer cum C.O.
1	Office Assistant

Project Management (WS)	10
2	Superintending Engineer
2	Executive Engineer
2	Sub Divisional Engineer
2	Assistant Engineer
2	Accountant

Project Management (Sewerage)	25
5	Superintending Engineer
5	Executive Engineer
5	Sub Divisional Engineer
5	Assistant Engineer
5	Accountant

Design & GIS Operation	13
1	Superintending Engineer
1	Executive Engineer
1	Sub- Divisional Engineer
1	Assistant Engineer
2	Sub-Assistant Engineer
1	Computer Operator
4	Data Entry Operator
1	O.A. cum C.T
1	Office Assistant

Sales	27
1	Executive Engineer
1	Sub Divisional Engineer
1	Assistant Engineer
2	Sub-Assistant Engineer
2	Upper Division Assistant
3	Plumbing Mechanic
2	Data Entry Operator
2	Work Assistant
6	Asst. Plumbing Mechanic
3	Helper
2	O.A. cum C.T.
2	Office Assistant

- ❖Create 'Project Management Circle' under Additional CE

  'Project Management (WS)' and 'Project Management (Sewerage)' with maximum number of permanent employees (SE, XEN, SDE, AE, and Accountant) to be assigned to PIUs for coming projects.

- ❖Transfer 'Design' and strengthen & rename it as 'Design & GIS Operation' under the joint management of 2 Additional CEs.

- ❖Transfer 'Sales' from Financial Wing to Engineering Wing under joint management of 2 Additional CEs, to ensure proper house connection work in cooperation with MODs.

20

Key points of proposed Organogram 2023 (2/2)

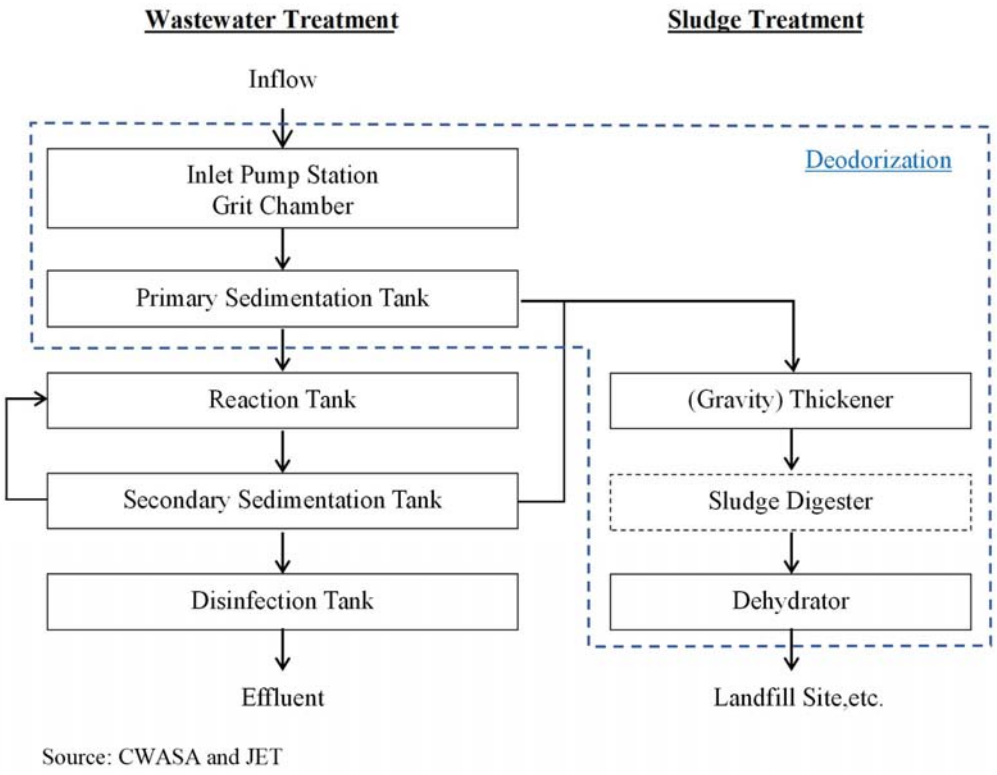
- ❖ Digitization through E-Nothi and GIS and decentralization of data entry/management from ICT Dept.
  - • Strengthen Design and rename it as Design and GIS Operation (as above).
  - • Assign 'Assistant Computer Programmer' to the Offices of CE, CM and GM.
  - • Increase the number of 'Data Entry Operator' in Revenue and MODs (Revenue).
  - • Increase the number of 'Computer Operator' in Secretariat.
- ❖ Create 'MOD 5 (Patenga)', 'MOD 6 (Patiya)', and Bhandaljury WTP.
- ❖ Rename 'Data Management' of ICT Dept. as 'System Maintenance'.
  - • Transfer Data Entry Operator to Revenue and MODs (Revenue).
  - • Create new designation 'Hardware Engineer'.
- ❖ Strengthen Accounts Circle to deal with accounting process of sewerage work.

21

Activity 1-4: Assist in updating sewerage development plan

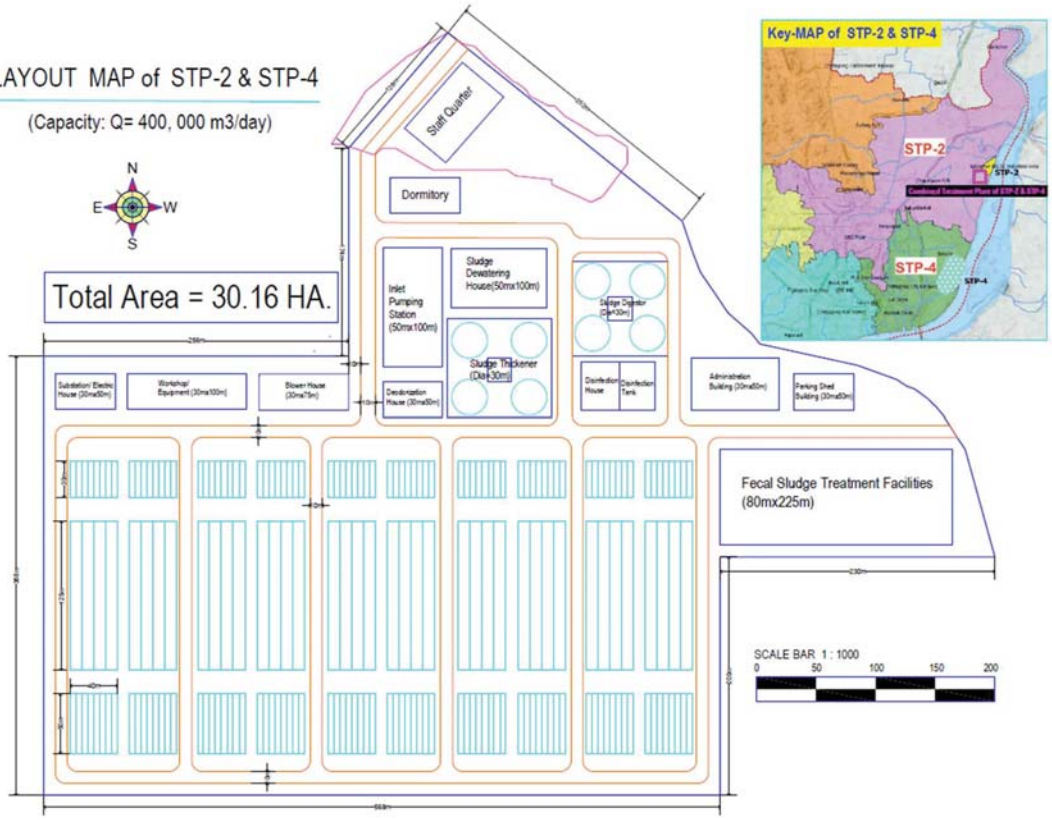
1 . DPP for Lan Acquisition (Pre-FS report)

1. Summary of the Project
2. Population Projection
   (1) Total Population in CCC area
   (2) Population in Catchment-2 and -4: 2.8million in 2070
3. Sewage Generation
4. Setting the Capacity of STP: 385,000m3/day in 2070
5. Selection of Treatment Process
   (1) Discharge Standard
   (2) Selection of Treatment Process
6. Layout of STP
   (1) Site of STP
   (2) Layout of STP
7. Note for Feasibility Study



Source: CWASA and JET

Figure-4 Flow Chart of CAS Process



Estimation of Fecal sludge from Low income community

1) Population in Slum Area in 2019: 1,465,028

2) Unit Fecal Sludge Volume: 0.07m3/capita/year

3) Fecal Sludge Volume in each Catchment

	Fecal Sludge Volume in 2019	
Catchment-1	96.3 m^3/day	(STP-1,5,6) 140.8 m^3/day
Catchment-5	26.4 m^3/day	
Catchment-6	18.1 m^3/day	
Catchment-2	59.6 m^3/day	(STP-2,4) 95.0 m^3/day
Catchment-4	35.4 m^3/day	
Catchment-3	45.2 m^3/day	(STP-3) 45.2 m^3/day
Total	(Total) 281.0 m^3/day	

Fecal Sludge Treatment

- (STP-1,5,6) 140.8 m^3/day → FST in STP-1: 300 m^3/day
- (STP-2,4) 95.0 m^3/day → FST in STP-2,4: 200 m^3/day or Co-treatment with sewage (sludge)
- (STP-3) 45.2 m^3/day → To be studied

26

Activity 2-1&2: Challenges in Design and Construction of On-going Sewerage Project (PESSCM-1) and Proposed Solutions for Them

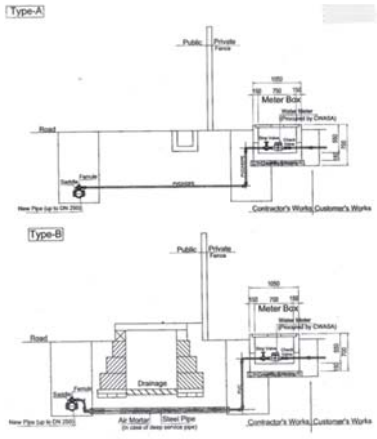
1. Lesson learnt from KWSP-2

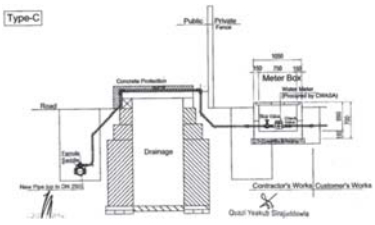
- **Installation of new house connection for replacement of existing house connection**

  <u>Problem: Matters hindering the work / to be improved</u>

  The house connection is not necessarily executed according to the contract drawings.

Contract Drawings





Completion Status (Sample)

Additional standard drawings should be prepared for proper supervision of the work.

2. Lesson learnt from routine work of Sales Division

➢ **Installation of new house connection**

Problem: Matters hindering the work / to be improved

It is desirable that the distribution pipeline be installed on both side of the road to avoid hindering traffic.
The connection pipe crossing the road is installed in very shallow depth.

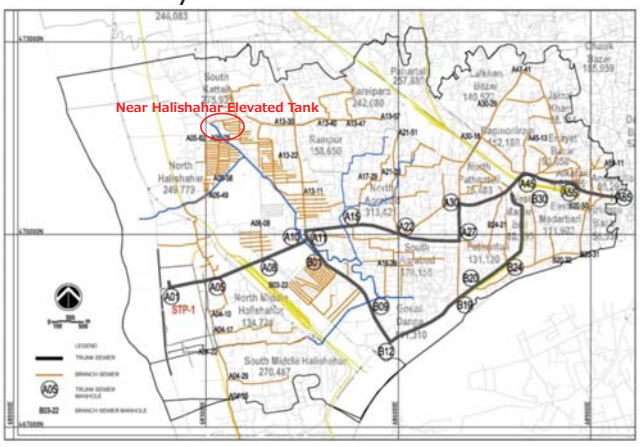
The location and depth of distribution pipeline should be recorded on the database. Sometimes, the distribution pipe is installed in very deep depth due to existing facilities (telecommunication, gas supply, etc.).

3. Conceivable challenges in on-going sewerage project (PESSCM-1) and proposed solutions for them

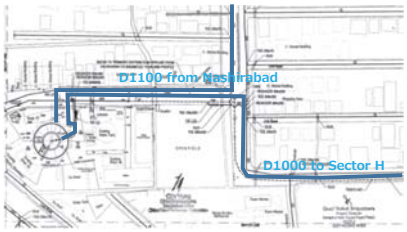
Conceivable Challenges

Various underground facilities

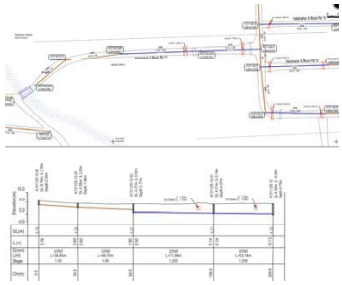
The existing underground facilities located on the pipeline route needs to be checked carefully.



General Plan of PESSCM-1



Drawings of KWSP2



Drawings of PESSCM-1

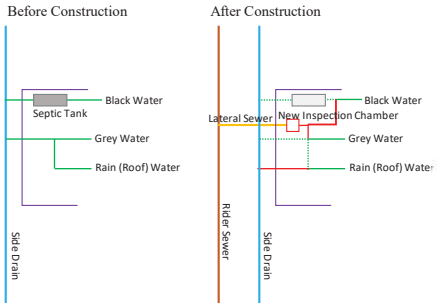
The sewer pipe must be laid avoiding the water supply pipe
As-built drawings of KWSP2 should be shared with PESSCM-1.

3. Conceivable challenges in on-going sewerage project (PESSCM-1) and proposed solutions for them

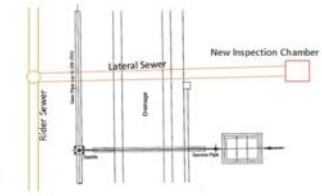
Conceivable Challenges

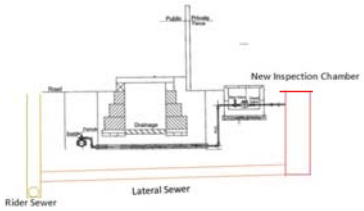
Various patterns of property connections

The layout of drainage facilities varies for each buildings. The detailed pipe arrangement plan needs to be prepared for each buildings. => The pipe arrangement plan should be prepared following the common design criteria.



General Layout of Property Connection





General Drawings of Property Connection

Proposed Design Criteria of Lateral Sewer

Served Population	Pipe Diameter (mm)	Gradient
Less than 150	100 or more	2 : 100 or more
150 to 300	125 or more	1.7 : 100 or more
300 to 500	150 or more	1.5 : 100 or more
More than 500	200 or more	1.2 : 100 or more

The inspection chamber shall be covered so that the rainwater does not enter into the lateral sewer.

3. Conceivable challenges in on-going sewerage project (PESSCM-1) and proposed solutions for them

Proposed Solutions and Actions

- **Establish the underground facility location map in CCC area**

As a first step, as-built drawings of KWSP-1 and KWSP-2 showing the pipeline location should be compiled in the form of CAD/GIS drawing data set and shared with the CWASA staff.

In preparation of the CAD/GIS drawing data set, following should be confirmed:

- Coordinate System: BTM_Everest or UTM WGS84
- Basis(version) of elevation bench mark of Survey of Bangladesh

- **Preparation of implementation manual for property connection**

The design criteria of property connection is not prescribed in the present contract document of PESSCM-1.

It is recommended that an implementation manual (implantation procedure, design criteria, standard design, work supervision, etc.) for property connection be developed.

2. Proposed Activities of Advisor in the 2nd Phase

1. Progress of the Project
1-1 Planned Activities of the Project

Activity		Situation
1-1:	Review Sanitation Master Plan and Ongoing Sewerage Project	Completed in the 1st Phase
1-2:	Assist organizational setup to promote the planning of sewerage projects	● Finalization of Organogram 2023. ● Finalization of CWASA Water and Sewerage Connection Rules. ● Revision of CWASA Employee Service Regulations 2020. ● Finalization of CWASA Human Resources Management Rules drafted in PANI-2 (which includes updated job descriptions).
1-3:	Assist in identifying challenges to establish financial scheme	● Development plans of water supply facilities for entire CCC area and sewerage facility in Catchment-3 are needed. ✓ The scope of work is fully overlapped with WASH project (WB).
1-4:	Assist in updating sewerage development plan	● Updated MP (investment plan) is prepared together with CWASA.

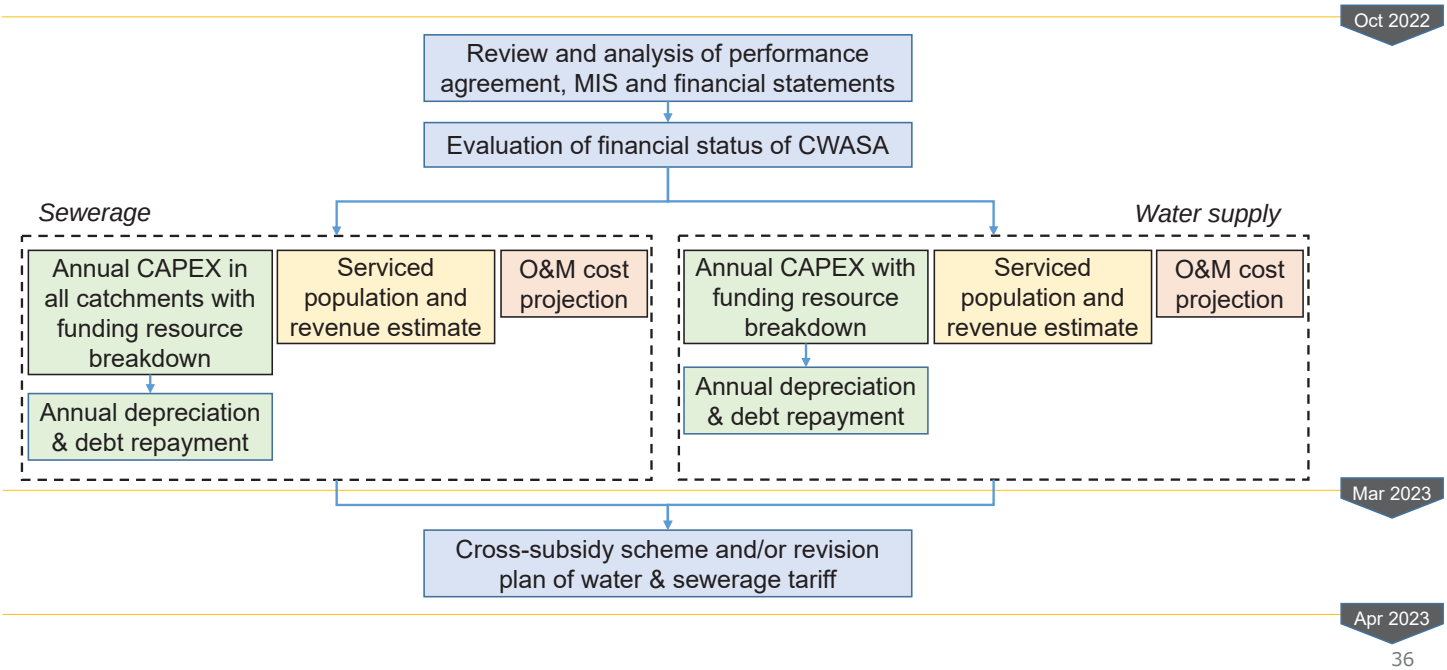
34

1. Progress of the Project
1-1 Planned Activities of the Project

Activity		Situation
2-1:	Assist in identifying challenges in CWASA's management on design and construction of Ongoing Sewerage Project	Completed in the 1st Phase
2-2:	Assist in capacity development of CWASA for design and construction supervision of sewerage projects through creating solutions to the above challenges	Completed in the 1st Phase
2-3:	Assist in developing design guidelines, technical standards and manuals for sewage works	● JET propose to prepare design and CS guideline of "house connection".

35

Activity 1-3: Assist in identifying challenges to establish financial scheme
Action Plan on Financial Management



36

Reference: TOR of WASH Project
(Overlapped scope between JICA advisor and WASH)

Task 5: Economic and Financial Analysis

The consultant shall carry out financial analysis of the current situation in terms of the number of service users and payment for water supply (and sanitation) services under CWASA operation and forecast financial situations during the design period considering the growth in users and including the need for water tariffs adjustments. Since sanitation services in certain parts of Chattogram will go on stream in a few years and more in the next decade, the financial analysis shall take *inter alia* the sanitation services, sewer connection projections and sewerage tariffs in the financial analysis. The consultants shall assess the viability (benefit cost ratio, rate of return) of the proposed investments, determine the operational capabilities of the CWASA to return the borrowed capitals, and forecast changes in tariffs for water supply.

37

Activity 1-4: Update Master Plan (Investment Plan)

- Investment plan is prepared considering the following change of design concepts

	MP	Current
Target year	2030	2070
Area	Nearby road	Entire city
Collection system	Interceptor + Separated sewer	Separated sewer
No. of HH connection	Smaller	Huge
Treatment process	Trickling filter system	OD with N,P treatment CAS without N,P treatment
No. of PS	Larger	Smaller (Sewer line will become deeper)

38

Activity 2-3: Developing Implementation Manuals for Property Connection
(Draft Table of Contents)

39

Thank you very much !

40

Minutes of Meeting		
Joint Progress meeting of Advisor on Urban Sanitation Improvement Project and Preparatory Survey on Chattogram Sewerage System Development Project (JICA's Feasibility Study for Catchment 2 & 4)		
Date/Time	Tuesday, September 27, 2022	11:00AM- 01:15PM
	CWASA: 1. Managing Director, 2. Deputy Managing Directors, 3. Secretary, 4. Superintending Engineers, 5. System Analyst, 6. Executive Engineers.	
	JICA Expert Team (JET): 1. Mr. Takamasa Nishikawa (Chief Advisor), 2. Mr. Toshihiko Tamama (Expert of Organizational Structure/Financial Scheme), 3. Mr. Hidehisa Tamura (Expert of Design/Construction Supervision/ Maintenance of Sewerage Works), 4. Ms. Nazia Nur, Communication and Reporting Officer.	
	JICA Survey Team (JST): 1. Mr. Takeki Kajiura, Team Leader, 2. Mr. Katoro Kikuchi, Survey of Natural Condition, 3. Mr. Shafiul Islam Shahi, Junior Civil Engineer, 4. Mr. Rayhan Sarkar, Junior Civil Engineer, 5. Mrs. Shahria Sharmin, Office Admin.	
Documents	i. Meeting Materials	

Main Points Discussed/ Agreed	
The followings subjects were discussed or agreed:	
1.	JET explained their completed and ongoing activities of advisory service in 1st phase and proposed activities in 2nd phase with the presentation material.
2.	JET explained their draft of the Chattogram Water Supply and Sewerage (Water and Sewerage Connection) Regulations which is under review of CWASA. Chief Engineer instructed all Executive Engineers to check the Regulations within 2nd October, 2022 and provide their comments to finalize the Chattogram Water Supply and Sewerage (Water and Sewerage Connection) Regulations. ➔ JET provided soft copy of related documents to XENs. JET will have meeting on 3rd October 2022 to discuss the comments from XENs for the finalization of the draft.
3.	JET explained the key points of organogram, 2023. CWASA said they need to have another meeting with JET to finalize the organogram, 2023. JET requested CWASA to send their proposed organogram of Administration and ICT circle. CWASA agreed to pursue the administration division to send their organogram and request the DMD(F) to finalize the organogram of ICT circle. ➔ JET will incorporate the feedbacks from DMD (A) and DMD (F) before finalizing the draft.
4.	JET explained the conceivable challenges for sewerage development based on CWASA's experience in KWSP-2 and design of PESSCM-1. CWASA requested JET to submit a report on the findings of challenges. In addition, JET explained that the solution of design of lateral sewer (house connection) has already been proposed. CWASA replied that they are not clear to whom JET submitted the report and who is responsible to check. ➔ According to the TOR of advisor, we are requested to support PESSCM-1 in terms of design and construction supervision. However, due to delay of the commencement of PESSCM-1, JET reviewed the report and drawings of PESSCM-1 and find out the establishment of property connection is the key issue to success the sewerage development. Furthermore, to assess the construction work, JET check the construction site of KWSP-II to find challenges in the construction of sewer system. The findings were reported in the progress meeting with the counterpart members. JET will submit the reports which have already been submitted to JICA.

5.	JET explained the findings of master plan review and also explained that the population projection in sanitation master plan seems quite reasonable as it matches with the preliminary census, 2022.
6.	JET showed the draft table of contents of "Developing Implementation Manuals for Property Connection". CWASA requested to rename it to simplify to "Manuals for Property Connections" and JET agreed it.
7.	CWASA requested JET to arrange in house training and foreign trainings. CWASA also requested JET to prepare training module for each position so that their people can continue to work in the upcoming sewerage projects efficiently. ➔ JET will prepare a syllabus for each key designation in cooperation with the F/S team for catchment 2&4 and incorporate it in the mid-term action plan of CWASA to be proposed in the F/S.

Workshop on CWASA Water and Sewerage Connection Regulations, CWASA Property Connection Manual and Organogram, 2023

Date: February 22, 2022

In the meeting, the following draft documents were explained by JET and discussed with CWASA:

- CWASA Water and Sewerage Connection Regulations,
- CWASA Property Connection Manual, and
- Organogram, 2023

The final documents were attached in Appendix-2 and 6. In this Appendix, only MoM is attached.

Minutes of Meeting on CWASA Water and Sewerage Connection Regulations, CWASA Property Connection Manual and Organogram, 2023		
Date/Time	Wednesday, February 22, 2022	10:00AM- 12:30AM
	CWASA: 1. CE 2. SEs (T&P, P&C, MODs) 3. XEN (MOD-1, 2, 3, 4) 4. XEN (Sales) 5. XEN (Nasirabad Booster, SRWTP) 6. XEN (CD-2) 7. XEN (Procurement, Store, Design) 8. XEN (SHWTP-1 & 2) 9. XEN (Transport, NWMCB) 10. AE (Design, KWSP-2) 11. SAE (Transport)	
	JICA Expert Team (JET): 1. Mr. Takamasa Nishikawa (Chief Advisor), 2. Mr. Toshihiko Tamama (Expert of Organizational Structure/Financial Scheme), 3. Ms. Nazia Nur (Communication and Reporting Officer, NKB)	
Documents	i. CWASA Water and Sewerage Connection Regulations ii. CWASA Property Connection Manual iii. Organogram, 2023.	
Main Points Discussed/ Agreed		
The followings subjects were discussed or agreed:		
CWASA Water and Sewerage Connection Regulations:		
1.	JET explained that they prepared the final draft of CWASA Water and Sewerage Connection Regulations based on DWASA regulations incorporating CWASA's suggestion and current practices after meetings with the XENs and Amin san.	
2.	JET proposed that the CE shall be authorized to approve sewer connection like DWASA Regulations. Despite being agreed about the importance of technical knowledge to provide sewerage connection emphasizing on the CE's approval to provide connection, CWASA needs to discuss more internally to take the decision in this regard.	
3.	CWASA discussed internally regarding the distance between water line and sewer line and agreed to follow DWASA Regulations, i.e., vertically 1 foot and horizontally 10 feet, while allowing vertically 2 feet and horizontally less than 10 feet in unavoidable circumstances.	
4.	CWASA requested to include a clause that the maximum distance of house connection work that CWASA installs from distribution line to inside of the house should be decided by the Engineering Wing. According to the SEs the maximum length should be 30 m and if it is more than that the CE shall decide whether it shall be approved or not. But the matter was not decided finally as there was difference of opinions among CWASA officers.	
5.	JET deleted the portion related to industrial effluent as currently CWASA has no plan to collect the sewage from industrial lines. But CWASA suggested that industrial wastewater provision should be kept as DWASA Regulations.	
6.	CWASA requested to highlight the changes from DWASA Regulations so that they can decide whether they shall follow the DWASA regulations or proceed to the approval of the draft that JET prepared for CWASA.	
CWASA Property Connection Manual:		
1.	JET explained the draft of CWASA property connection manual is the simplified version of manual of the Bureau of Sewerage, Tokyo Metropolitan Government with the integration of technical information of PESSCM-1.	
2.	JET explained that JICA is very keen on property connection as CWASA requested JICA to provide loan for property connection in catchment 2 and 4 project. JICA wants to determine which part of the catchment 2 and 4 project shall be financed by JICA and CWASA. JET also	

	explained if JICA provides loan they want CWASA to maintain the property connection in well condition approximately for 10 years.
3.	JET emphasized on JICA's interest on property connection. JET also explained that the inspection chamber shall function as boundary between CWASA and customers. If any problem occurs based on the complaints of the customer CWASA will dispatch staff and whether the payment will be made by CWASA or customer will depend on whose boundary the problem occurred.
4.	CWASA wanted to confirm whether JET has any different opinion than technical information of PESSCM-1. JET explained that JET used the same concept as PESSCM-1 and added some technical terms, design conditions and application procedures in the property connection manual.
5.	JET asked CWASA whether there is oil separator in the restaurants of Bangladesh so that fat and oil can be separated before coming into sewerage system. CWASA replied that they rely on the oil and grease removal system in the FSM plant. JET suggested to introduce high-pressure pipe cleaning trucks especially in commercial areas to prevent clogging by grease and oil solidified in the pipe.
6.	CWASA requested to submit the property connection manual showing the portion integrated from technical information of PESSCM-1. JET agreed to send as per CWASA's suggestion.
Organogram, 2023	
1.	JET briefly explained the key points of Organogram 2023 and that it was for the construction stage of the sewerage works. CWASA disagreed to split the two organograms at construction stage and O&M stage of the sewerage works and requested JET to integrate both. CWASA also suggested the portion to be activated at O&M stage should be marked in a dotted box with a note that it is for the next O&M stage. JET agreed to provide an integrated organogram for both stages as per the suggestion of the JET.
2.	CWASA agreed with JET that Sales Division shall be abolished, and the works of sales will be shifted to the MODs.

Advisor on Urban Sanitation Improvement

Meeting on Organogram 2023, Connection Regulations, and Property Connection Manual

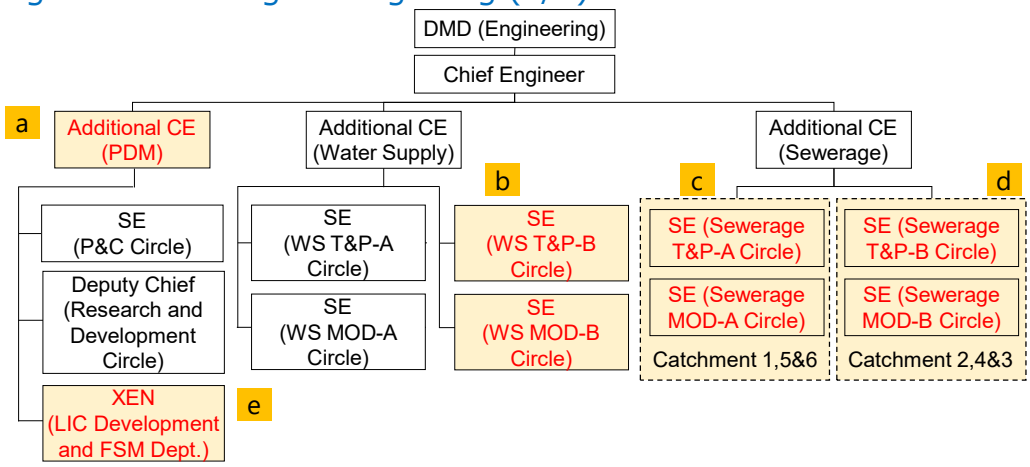
15th June 2023

Japan International Cooperation Agency (JICA)
Nippon Koei Co., Ltd (NK)

Agenda of Meeting

1. Organogram 2023
2. CWASA Water and Sewerage Regulations
3. CWASA Property Connection Manual

Organogram 2023: Engineering Wing (1/5)



a Additional CE (Planning, Development, and Monitoring): new

b T&P Circle (Treatment & Production) and MOD Circle (Maintenance & Distribution): split into two

c Sewerage T&P-A Circle and Sewerage MOD-A Circle: new (from 2026)

d Sewerage T&P-B Circle and Sewerage MOD-B Circle: new (from 2030)

e LIC Development and FSM Department: new (from 2026)

3

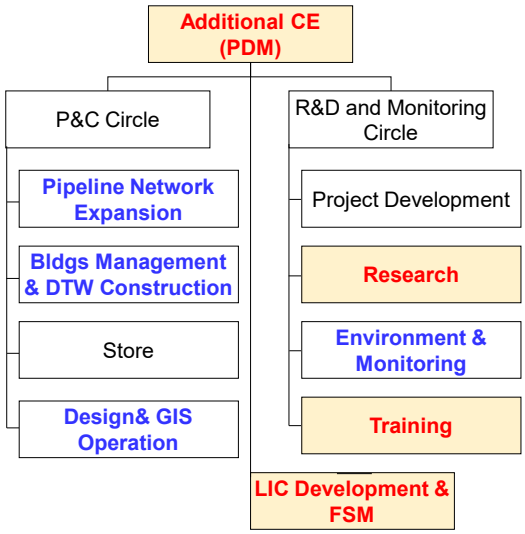
Organogram 2023: Engineering Wing (2/5)

Pipeline Network Expansion (currently CD-1): constructing water distribution pipeline & branch sewer network after completion of projects.

Bldgs Management and DTW Construction (currently CD-2): digging of DTWs and other construction works (such as CWASA HQs building, boundary/ retaining walls) and maintenance of CWASA buildings.

Design & GIS Operation (currently Design): archiving as-built drawing of all types of construction and installation works in CAD/GIS, with house/ property connections, meter installation linked to customer database.

Research: developing and updating technical guidelines/ standards, SOPs, and business plans, and functioning as **Central Water Control Center**.



Legend: **Red**: new; **Blue**: renamed

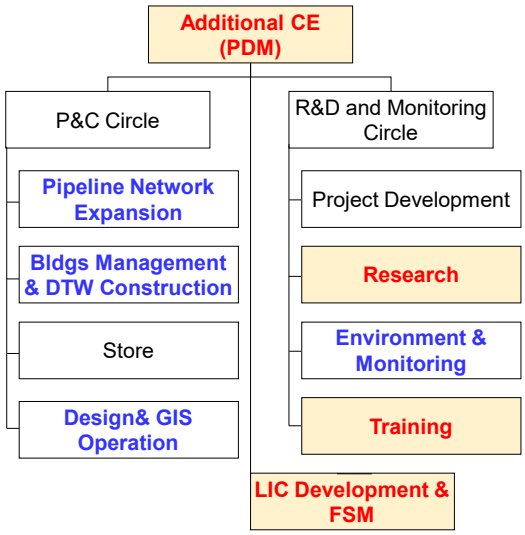
4

Organogram 2023: Engineering Wing (3/5)

Environment & Monitoring (Quality Control in organogram 2020): environmental monitoring of construction sites, WTPs, and WWTPs; and functioning as **Central Laboratory**.

Training: assessing capacity and training needs and developing training programs for technical employees; requesting to Training Center of Secretariat to arrange the implementation of training programs.

LIC Development & FSM: managing collection and transfer service of fecal sludge that will start operation after Catchment 1 STP starts operation presumably in 2026.



Legend: Red: new; Blue: renamed

5

Organogram 2023: Engineering Wing (4/5)

- During construction stage, PIUs will work on D/D and S/V, and Additional CE (Sewerage) will work as the supervisor of assigned P/Ds (SEs) or act the role of P/D in some projects.
- After completion of a sewerage project, remaining branch sewers will be constructed by P&C Circle under Additional CE (PDM), while property connection will be handled by responsible sewerage MOD.
- WS (Water Supply) MOD-5 (Patenga), MOD-6 (Patiya) and MOD-7 (Anwara & Boalkhali): new
- Sewerage MOD-1, MOD-4 and MOD-5: new (from 2026)
- Sewerage MOD-2 and MOD-3: new (from 2030)

WS T&P -A
- SH WTP-1
- SH WTP-2
- SR WTP

WS T&P -B
- Mohara WTP
- Bhandaljury WTP
- KIRP and Booster
- Nasirabad Control and Booster

WS MOD -A
- MOD-1 (Agrabad)
- MOD-4 (Jubilee Road)
- MOD-5 (Patenga)

WS MOD -B
- MOD-2 (Dampara)
- MOD-3 (Kalurghat)
- MOD-6 (Patiya)
- MOD-7 (Anwara&Boalkhali)

Sewerage T&P -A
- Catchment 1
- Catchment 5
- Catchment 6

Sewerage T&P -B
- Catchment 2
- Catchment 3
- Catchment 4

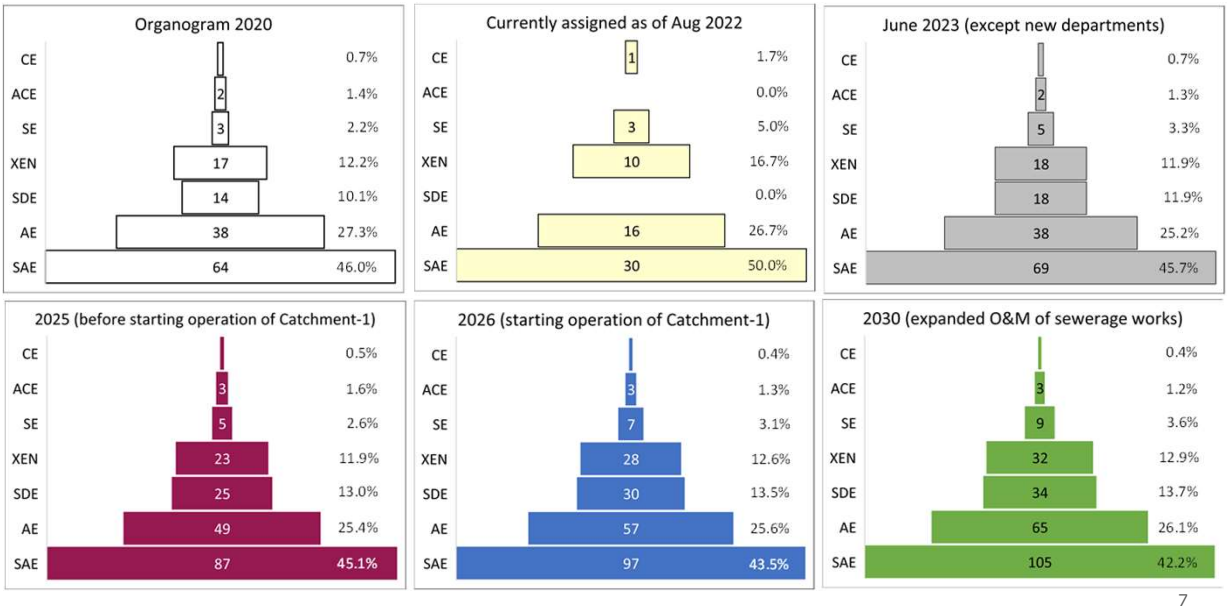
Sewerage MOD -A
- MOD-1 (Agrabad)
- MOD-4 (Jubilee Road)
- MOD-5 (Patenga)

Sewerage MOD -B
- MOD-2 (Dampara)
- MOD-3 (Kalurghat)

6

Organogram 2023: Engineering Wing (5/5)

- Number of key officers (from CE to SAE)



7

Organogram 2023: MD's Office, Administration Wing and Commercial Wing

- MD's Office: 1 XEN is newly assigned.
- Legal Section: new under General Manager.
- Sales: abolished and its function is decentralized to MODs.
- System Maintenance of ICT Circle: renamed from Data Management; data management function is decentralized to enhance digitalization in each department:
  - Data Entry Operators are transferred to Revenue, Design & GIS Operation, and MODs (Revenue).
  - Assistant Programmer is assigned in GM office, Accounts (Finance), Revenue Billing, and Design & GIS Operation.
  - Computer Operator is assigned in Admin-1, Admin-2, Accounts (Finance), Design & GIS Operation, MODs (WS) and MODs (Sewerage)
- Requests from Administration Wing and Commercial Wing to increase necessary personnel have been mostly incorporated, except the creation of 2 Additional Chief Accounts Officer (Revenue & Management, Finance and Pension)

Office of Managing Director	6
1	Managing Director
1	Executive Engineer
1	Assistant Engineer
1	Personal Assistant
2	Office Assistant

8

Organogram 2023: Increase of total number of staff

Approved in Organogram 2020

Sl	Grade	Approved in 2016 (a)	Increase (b)	Decrease (c)	Approved (d)=(a)+(b)-(c)
1	Grade 1-9	85	41		126
2	Grade 10	46	22		68
3	Grade 11-16	454	13		467
4	Grade 17-20	463		5	458
TOTAL		1,048	76	5	1,119

In June 2023 except new departments (bordered in black)

Sl	Grade	Approved in 2020 (a)	Increase (b)	Increase (c)=(b)/(a)	In May 2023 (d)=(a)+(b)
1	Grade 1-9	126	20	15.9%	146
2	Grade 10	68	3	4.4%	71
3	Grade 11-16	467	56	12.0%	523
4	Grade 17-20	458	62	13.5%	520
TOTAL		1,119	141	12.6%	1,260

In 2025 before starting O&M of sewerage works (addition bordered in purple)

Sl	Grade	In May 2023 (a)	Increase (b)	Increase (c)=(b)/(a)	In 2025 (d)=(a)+(b)
1	Grade 1-9	146	29	19.9%	175
2	Grade 10	71	18	25.4%	89
3	Grade 11-16	523	116	22.2%	639
4	Grade 17-20	520	103	19.8%	623
TOTAL		1,260	266	21.1%	1,526

In 2026 when O&M of sewerage works starts (addition bordered in blue)

Sl	Grade	In 2025 (a)	Increase (b)	Increase (c)=(b)/(a)	In 2026 (d)=(a)+(b)
1	Grade 1-9	175	22	12.6%	197
2	Grade 10	89	10	11.2%	99
3	Grade 11-16	639	55	8.6%	694
4	Grade 17-20	623	92	14.8%	715
TOTAL		1,526	179	11.7%	1,705

In 2030 with expanded O&M of sewerage works (addition bordered in green)

Sl	Grade	In 2026 (a)	Increase (b)	Increase (c)=(b)/(a)	In 2030 (d)=(a)+(b)
1	Grade 1-9	197	22	11.2%	219
2	Grade 10	99	8	8.1%	107
3	Grade 11-16	694	65	9.4%	759
4	Grade 17-20	715	103	14.4%	818
TOTAL		1,705	198	11.6%	1,903

9

Organogram 2023: Employees Service Regulations and Job Descriptions

- Schedule of Employees Service Regulations was reviewed and updated with Secretariat and the draft has been finished.
- Designation in red is new; grade in red is tentative (to be determined).

Sl.	Grade	Designation	Note
1	2	Chief Engineer	Proposed to be changed from Grade 3 to Grade 2
3	3	Additional Chief Engineer	
8	4	Senior System Analyst	
11	5	Executive Engineer	Proposed to be changed from Grade 6 to Grade 5
13	6	Programmer	renamed from Computer Programmer
15	6	Deputy Chief Revenue Officer	
18	6	Sub Divisional Engineer	
19	6	Senior Chemist	
20	6	Senior Estate Officer	
21	6	Senior Medical Officer	
22	6	Senior PR Officer	
23	6	Law Officer	

10

Organogram 2023: Employees Service Regulations and Job Descriptions

Sl.	Grade	Designation	Note
29	9	Microbiologist	
34	9	Audit Officer	
39	9	Assistant Programmer	Renamed from Assistant Computer Programmer
40	9	Assistant Maintenance Engineer	
43	11	Training Assistant	renamed from Trainer
52	13	Data Entry Supervisor	
53	13	Instrumentation Technician	
61	14	Senior Data Entry Operator	
66	16	Photographer	
92	18	Chainman	

- Revised/ updated job descriptions are under review by each wing; review by Commercial Wing finished; Engineering Wing and Administration Wing on-going.
- Tasks of each department has been prepared; review will be requested to each wing soon.

11

Water and Sewerage Connection Regulations: gist of property connection

- Prepared based on the equivalent regulations of DWASA and adjusted according to the current practice of CWASA.
- Article 26 (1) Owner of holding connects to sewer within 6 months of the completion of sewerage system in an area constructed by CWASA, as per Article 9 (1) of Water and Sewerage Tariff Rules, 2011.
- Article 26 (5): In industrial holding, domestic wastewater can be discharged to public sewer; Effluent treatment plant (ETP) should be installed for industrial wastewater to satisfy environmental standards; and treated water of ETP should not be discharged to public sewer.
- Article 29: Owner of holding pays 1) sewerage connection fee, 2) security deposit, 3) cost of purchasing pipes and other materials, and **4) cost of construction/ replumbing work**; 4) is exempted if the connection is applied a) in parallel to sewerage construction by CWASA in the area where the holding is located or b) within six months of the completion of sewerage system in the area.

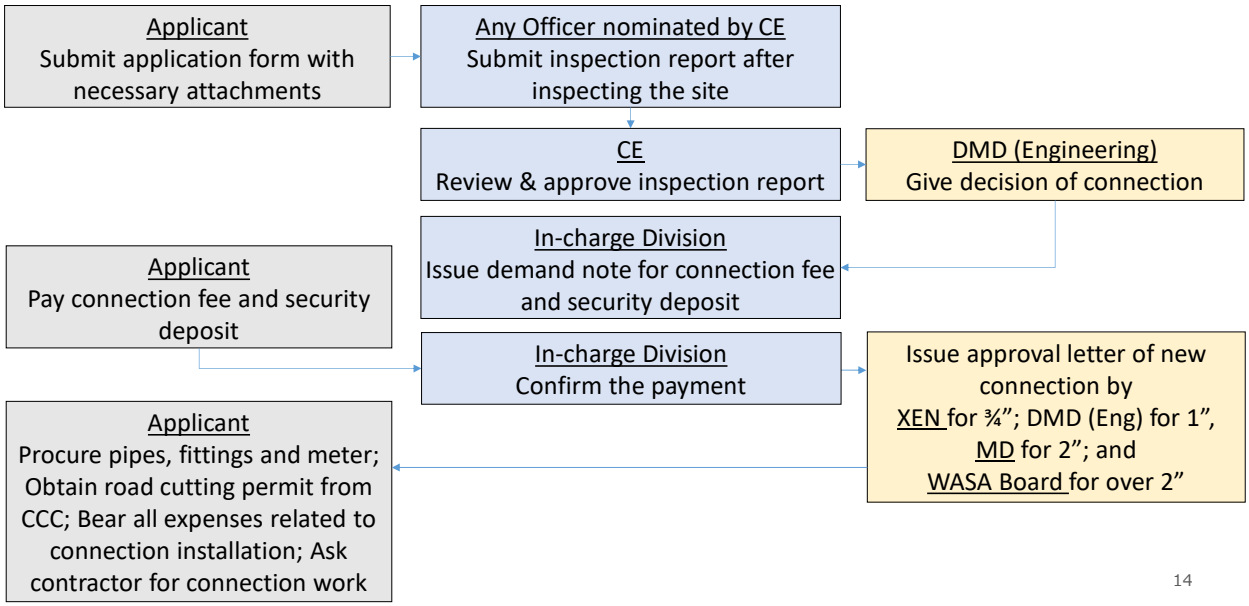
12

Water and Sewerage Connection Regulations: gist of property connection

- Water/ sewerage tariff and water/ sewerage connection fee and security deposit should be determined **in a separate decision**.
- Article 31 (3): **CWASA or its delegated contractor** constructs lateral sewer from branch sewer/ service pipe to public inspection chamber for the holding, as well as the installation of outdoor drainage facility and its connection to public inspection chamber and the closure of septic tank.
- Article 31 (4): Lateral sewer and public inspection chamber are owned and maintained by CWASA; Property connection (outdoor drainage facility) is maintained by and at the expense of owner of holding, after starting operation of sewerage system in the area, or otherwise after the expiry of the period that CWASA specifies.

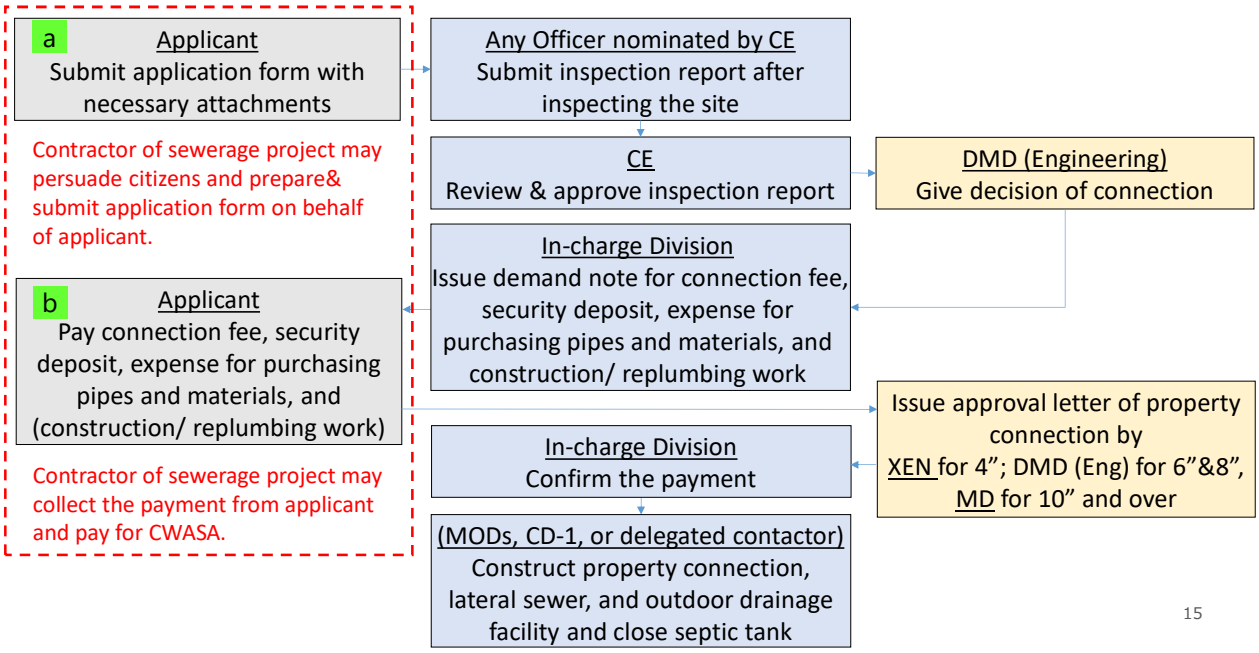
13

Water and Sewerage Connection Regulations: flowchart of water connection



14

Water and Sewerage Connection Regulations: flowchart of property connection



15

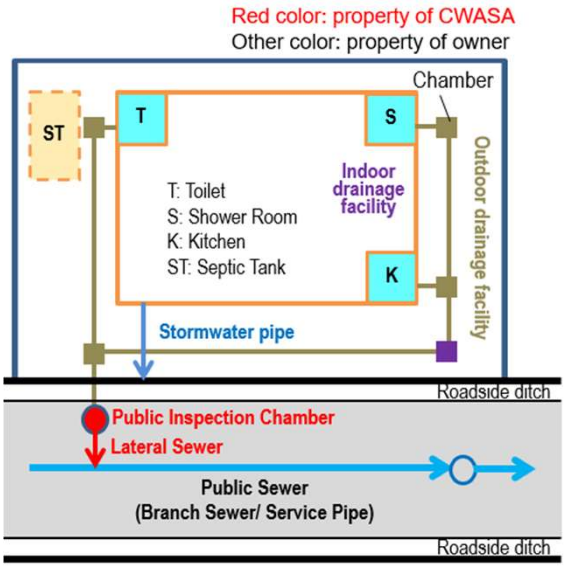
CWASA Property Connection Manual

- The manual was prepared based on i) Property connection manual of Sewerage Bureau of Tokyo Metropolitan Government, ii) Bangladesh National Building Code (BNBC) 2020, iii) Water and Sewerage Connection Regulation, and adjusted based on the comments from CWASA and JICA.
- CWASA is developing centralized sewerage system in CCC with 6 catchment areas. This property connection manual is applied for entire CCC area.
- Technical requirements were proposed based on the requirements of BNBC and the manual of Tokyo Metropolitan Government.

16

CWASA Property Connection Manual

- **Catchment- 1,3,5:** Public inspection chamber and lateral sewer will be the property of CWASA, and property connection upstream of the public inspection chamber (outdoor drainage facility) will be owned by owner of holdings.
- **Catchment- 2,4:** Public inspection chamber and lateral sewer will be the property of CWASA, and property connection upstream of the public inspection chamber (outdoor drainage facility) will be owned by CWASA for 10 years after starting operation, then it will be transferred to owner of holdings.



17

CWASA Property Connection Manual

JICA proposed the measures below:

- 87 Owner of holdings is responsible to keep property connection in good condition and is obliged to bear cost of its maintenance works such as desludging, cleaning or declogging, etc. even during CWASA's ownership. CWASA will request and instruct the owner of holdings not to damage and clog the drainpipes in households/buildings with solid wastes and other materials. And CWASA will receive the notifications and settle the problems in case of troubles, the necessary costs for troubleshooting will be borne by owner of holdings.
- 88 CWASA will prepare the document recording at least i) name of owner of holdings, ii) type and extent of damage, iii) description of repair and iv) situation of payment for repair as part of structure to implement the acceptance of order, repair and demand for payment appropriately and smoothly.

18

CWASA Property Connection Manual

TOC	Outline
1. General Provisions	
1.1 Scope of the Manual	General explanation of the manual
1.2 Definitions	Definitions related to property connection
1.3 Obligations of the Owner of the Holdings	Owner of holdings shall discharge sewage (black water and gray water) to public sewerage system
1.4 Type of Sewage	Separate sewer system is applied
1.5 Design and Construction	Requirements and technical standard
2. Application Procedure	
2.1 Property Connection	Application procedure of property connection
2.1.1 General	Owner of holdings shall submit application form of property connection to CWASA MOD office shall assess the application form and inspect the construction work
2.1.2 Application Form	Required information in application form
2.1.3 Preparation of Construction Drawings	Procedures to prepare construction drawing
2.1.4 Standards for Construction Drawings	Requirements of construction drawing

CWASA Property Connection Manual

TOC	Outline
2.2 Public Inspection Chamber	CWASA is responsible to construct public inspection chamber
3. Indoor Drainage Facilities	Technical requirements of indoor drainage facilities. Note: The detail will be referred in BNBC2020
4. Outdoor Drainage Facilities, Public Inspection Chamber, and Lateral Sewer	
4.1 General	Definition, Notes for installation
4.2 Design	Process of design What to confirm in site investigation Topographic Survey and Preparation of Plan Drawing Setting of Pipe Alignment Design of property connection Design of chambers
4.3 Construction Work	Discharge pipe Chambers Notes for Connection to Public Inspection Chamber
4.4 Measures for Existing Septic Tank	Demolished or filled with sand
4.5 Testing	Requirement in BNBC2020
5. Ownership and management of Property Connection	Requirements from JICA

Minutes of Meeting		
Date/Time	Thursday, June 15, 2023	1:00PM-2:30 PM
Venue	Board Room, CWASA Building, Dampara, Chattogram	
	CWASA: 1. Mr. Visnu Kumar Sarkar, DMD (E) 2. Mr. Makshud Alam (CE) 3. Shahida Fatema Chowdhury, GM 4. Mr. Muhammad Nurul Amin (PD) 5. Soumit Paul (XEN, SRPS) 6. Azizur Rahman (XEN, MOD-4) 7. Md. Rejaul Ahsan Chowdhury (XEN, CD-2) 8. Ms. Keya Chowdhury (XEN, Procurement) 9. Md. Monirul Islam, [XEN (Additional Charge), Sales] 10. Mr. Richard Nelson Penheiro, XEN (Design) 11. Abdullah Muhammad Shaker (XEN, PESSCM-1), 12. Mohd. Iftekhar Ullah Mamun (XEN, PESSCM-1), 13. Md. Nazim Uddin, DGM 14. Al Mehedi Showkat Azam, CAO 15. Md. Abu Bakkar Sidik (AE, KWSP-2) 16. Anwarul Kayum Chowdhury, SAE	
	JICA Expert Team (JET): 1. Mr. Takamasa Nishikawa (Team Leader), 2. Mr. Toshihiko Tamama (Expert of Organizational Structure/Financial Scheme), 3. Ms. Nazia Nur (Communication and Reporting Officer, NKB)	
Documents	i. Organogram ii. CWASA Property Connection Manual iii. CWASA Water and Sewerage Connection Regulations	
Main Points Discussed/ Agreed		
The followings subjects were discussed or agreed:		
Organogram		
1.	CWASA agreed on the organogram suggesting some simple changes as follows: i. Name of the organogram will be Organogram from 2023 to 2023 instead of Organogram, 2023 ii. Sewerage (MOD) will be Sewerage (MOC) that means Maintenance, Operation and Collection. iii. Sewerage (T&P) will be Sewerage (Treatment).	
Job Description		
2.	JET explained that they submitted the job descriptions for all wings and review by the commercial wing was completed while administration and engineering wings are reviewing the job descriptions.	
CWASA Water and Sewerage Connection Regulations		
3.1	JET explained that they prepared the CWASA Connection Regulations based on DWASA Connection Regulations considering the current practices of CWASA and based on the comments of CWASA.	
3.2	CWASA suggested making the application system online where all necessary documents can be uploaded on the website. JET agreed with CWASA in this regard.	
Property Connection Manual		
4.1	JET explained that the Property Connection Manual is prepared based on the Property Connection Manual of Sewerage Bureau of Tokyo Metropolitan Government and Bangladesh National Building Code. CWASA agreed on the Property Connection manual.	

The Advisor on Urban Sanitation Improvement Project

The Agendas of the Final Workshop		
1.	Opening remarks by honorable Managing Director of CWASA	10:00-10:05
2.	Opening remarks by Ms. Miura Mari, Senior Representative of JICA Bangladesh.	10:05-10:10
3.	Overview of the Advisory Work - Mr. Muhammad Nurul Amin, Project Director - Mr. Takamasa Nishikawa, JICA Expert Team (JET)	10:10-10:30
4.	Result of the activities:	
	a. Organogram 2023-2030 - Ms. Keya Chowdhury, Executive Engineer (Procurement)	10:30-10:50
	b. The Chattogram Water Supply and Sewerage Authority (Water and Sewerage Connection) Regulations, 2023. - Mr. Sajib Barua, DPD and Executive Engineer (MOD-2)	10:50-11:10
	c. CWASA Property Connection Manual. - Mr. Md. Abu Bakkar Sidik, Assistant Engineer (KWSP-2)	11:10-11:30
	d. Chittagong Water Supply & Sewerage Authority (CWASA) Employee Service Regulations. - Mr. Nazim Uddin, Deputy Secretary	11:30-11:50
5.	Closing remarks by DMD (F)	11:50-12:00

Attachment
1. Overview of Advisory Work

Advisor on Urban Sanitation Improvement

Final Workshop

28th August 2023

Japan International Cooperation Agency (JICA)
Nippon Koei Co., Ltd (NK)

Agenda of Meeting

1. **Overview of Advisory Work**
2. Result of Activities

(1) CWASA Organogram 2023-2030

(2) CWASA Water and Sewerage Connection Regulations

(3) CWASA Property Connection Manual

(4) CWASA Employees Service Regulations

2

Attachment

1. Overview of Advisory Work

Overview of Advisory Work

1. Introduction of Project Member

2. Entire Schedule

3. Activities with Advisor

Outcome-1: CWASA's capacity is strengthened for policy setting and planning of sewerage project, thereby the planning of new sewerage projects is accelerated.

Activity 1-1: Review Sanitation Master Plan and Ongoing Sewerage Project

Activity 1-2: Assist organizational setup to promote the planning of sewerage projects

Activity 1-3: Assist in identifying challenges to establish financial scheme for sewerage service

Activity 1-4: Assist in updating sewerage development plan

Outcome-2: CWASA's capacity is strengthened, for design and construction supervision of sewerage facilities including understanding of appropriate technology which is suitable in the project area.

Activity 2-1: Assist in identifying challenges in CWASA's management on design and construction of Ongoing Sewerage Project

Activity 2-2: Assist in capacity development of CWASA for design and construction supervision of sewerage projects through creating solutions to the above challenges

Activity 2-3: Assist in developing design guidelines, technical standards and manuals for sewage works

3

1. Introduction of Project Members

CWASA PIU Member

Mr. Muhammad Nurul Amin
Superintending Engineer (MOD) and PD of the Advisor on Urban Sanitation Improvement Project.

Mr. Sajib Barua
Executive Engineer, MOD-2
and **DPD of the Advisor on Urban Sanitation Improvement**

Ms. Tanjin Mahmud
Assistant Engineer, KWSP-2, CWASA.

Ms. Keya Chowdhury
Executive Engineer, Procurement, CWASA.

Mr. Md. Abu Bakkar Sidik
Assistant Engineer, KWSP-2, CWASA.

Mr. Richard Nelson Penheiro
Executive Engineer (AC), Design, CWASA.

Mr. Anwarul Kayum Chowdhury
Sub Assistant Engineer, Transport, CWASA.

JICA Expert Team

Chief Advisor/ Sewage Treatment Planning
Takamasa Nishikawa

Organization Structure/ Financial Scheme
Toshihiko Tamama

Design/ Construction Supervision/ Maintenance of Sewage Works
Hidehisa Tamura

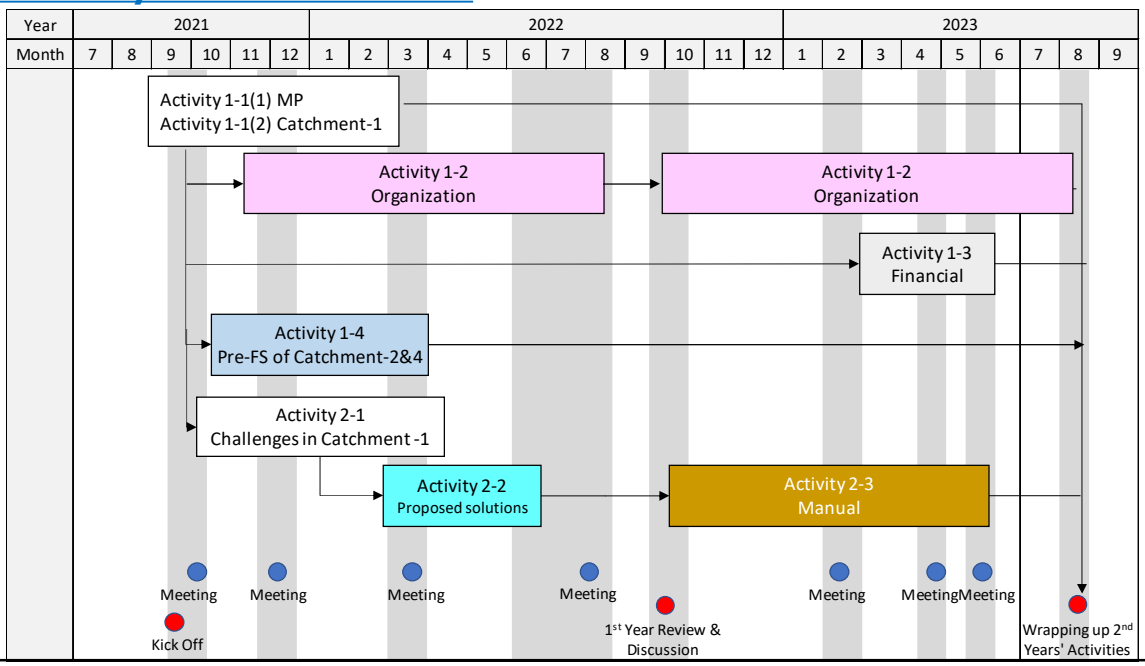
Communication and Reporting Officer (NKB)
Nazia Nur

4

Attachment

1. Overview of Advisory Work

2. History of the Activities



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3. Overall Activities

Outcome-1: CWASA's capacity is strengthened for <u>policy setting</u> and <u>planning of sewerage project</u>, thereby the planning of new sewerage projects is accelerated.

Activity		Outcome
1-1:	Review Sanitation Master Plan and Ongoing Sewerage Project	● Review of MP and PESSCM-1 ● Assistance to formulate Catchment-2 and 4 FS
1-2:	Assist organizational setup to promote the planning of sewerage projects	● Organogram 2023-2030 (to be approved by Board soon) ✓ Updated job descriptions (under review) ✓ Assigned tasks of each department (under review) ● CWASA Water and Sewerage Connection Regulations (to be approved) ● CWASA Employees Service Regulations 2023 (update of 2020; under review) ✓ Schedule (Recruitment and promotion conditions)
1-3:	Assist in identifying challenges to establish financial scheme	● Review of Financial prospect (to be continued in the coming JICA TA)
1-4:	Assist in updating sewerage development plan	● Pre-FS for land acquisition

6

Attachment

1. Overview of Advisory Work

3. Overall Activities

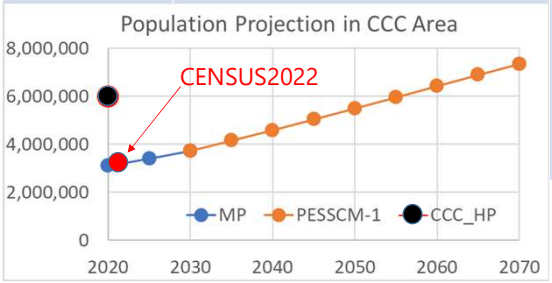
Outcome-2: CWASA's capacity is strengthened, for design and construction supervision of sewerage facilities including understanding of appropriate technology which is suitable in the project area.

Activity		Outcome
2-1:	Assist in identifying challenges in CWASA's management on design and construction of Ongoing Sewerage Project	● Confirmation of challenges for sewerage development based on CWASA's experience in KWSP-II and design
2-2:	Assist in capacity development of CWASA for design and construction supervision of sewerage projects through creating solutions to the above challenges	● The solution of design of lateral sewer (property connection) has already been proposed.
2-3:	Assist in developing design guidelines, technical standards and manuals for sewage works	● Property Connection Manual

7

Activity 1-1: Review of Sanitation Master Plan and On-going Sewerage Project

Item	MP/Current	JET Findings
Population in CCC area	● MP: - Based on BBS (Census) targeting for 2030 ● PESSCM-1: - Based on projection targeting for 2070	● Population in BBS and population in CCC information are much different: ✓ Population will be increased according to urbanization, however the increase rate in the maturated area will be much lower and city area will be expanded to peri-urban area. ✓ Due to the migration from rural area, the population of Chattogram will be increased. ✓ Due to aging, growth rate is normally decreased. ● According to CENSUS 2022, population in CCC area is 3.2million, so population projection in the MP was accurate.



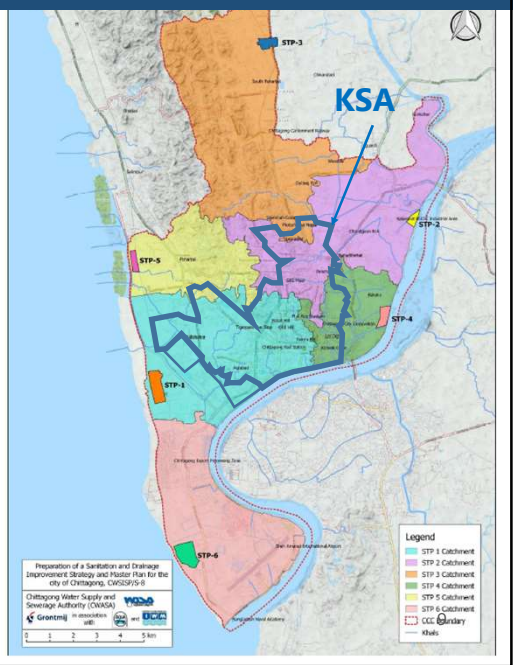
8

Attachment
1. Overview of Advisory Work

Activity 1-1: Review of Sanitation Master Plan and On-going Sewerage Project

Item	MP/Current	JET Findings
Priority of sewerage development	● MP: -2023 (Catchment-1), -2030 (Catchment-2)	● KSA is the most priority area since this area is with high population and enough sewage generation. (Catchment-1, 2, 4) ● Distribution network will be developed entire CCC area in the CWSISP-II, so surrounding catchments are next priority. (Catchment- 3,5,6)

Sewerage Development in Catchment-2 & 4 is urgently needed



Activity 1-1: Review of Sanitation Master Plan and On-going Sewerage Project

Item	MP/Current	JET Findings
Project Cost	● MP - MP proposes project cost for sewerage development	● The project cost shall be updated based on the change of capacity and treatment process of STPs, etc. as below:

	MP	Current
Target year	2030	2070
Area	Nearby road	Entire city
Collection system	Interceptor + Separated sewer	Separated sewer
No. of connections	Smaller	Huge
Treatment process	Trickling filter system	OD without N,P treatment CAS with N,P treatment
No. of PS	Larger	Smaller (Sewer line will become deeper)

● Financial capability of CWASA shall be studied to ensure sustainable management of sewerage system.

10

Attachment
1. Overview of Advisory Work

Activity 1-1: Review of Sanitation Master Plan and On-going Sewerage Project

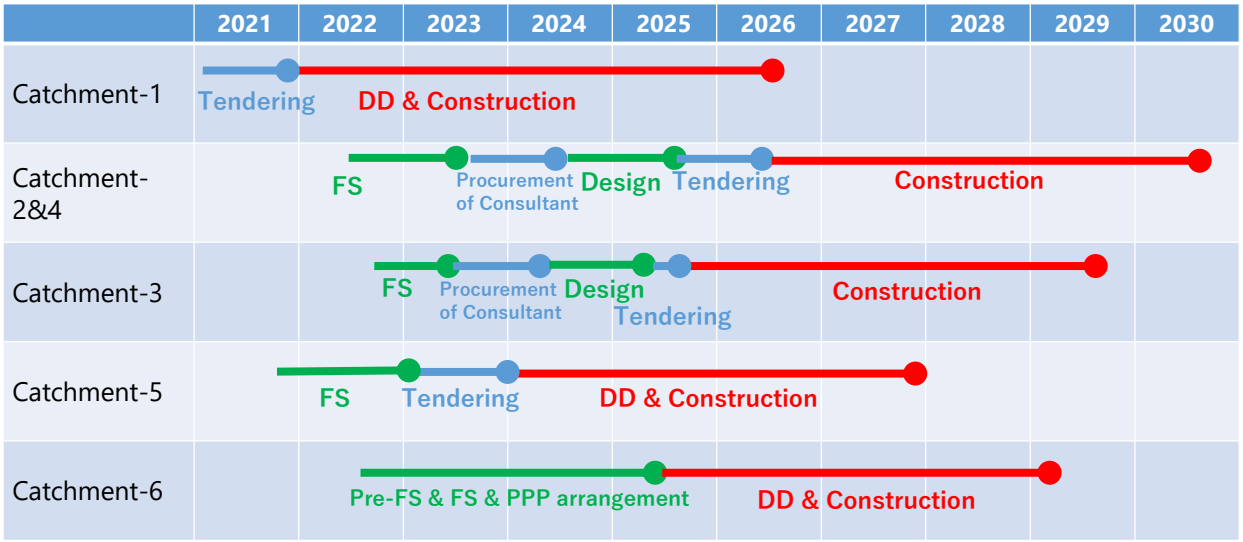
Updated Project Cost (based on FS)

Project	Donor	Construction			Cost in million USD in Phase I		
		STP Capacity		STP Process	Construction	Other	Total
		Phase I	Final				
Catchment-1	BD fund	100MLD	300MLD	CAS	404.0	78.8	482.8
Catchment-5	AFD	50MLD	100MLD	CAS	146.9	79.5	226.4
Catchment-6	PPP	50MLD	100MLD	CAS	214.3	15.3	229.6
Subtotal (West)		**200MLD**	**500MLD**		**765.2**	**173.6**	**938.8**
Catchment-2&4	JICA ODA	60MLD	300MLD	A2O	373.6	404.9	778.5
Catchment-3	EDCF	60MLD	120MLD	A2O	176.3	99.3	275.6
Subtotal (East)		**120MLD**	**420MLD**		**549.9**	**504.2**	**1054.1**
Total in CCC		**320MLD**	**920MLD**		**1,315.1**	**677.8**	**1,992.9**

* Investment cost proposed in the Sanitation M/P: USD 271.8M (-2030) and USD 1,032M (-2065)

Activity 1-1: Review of Sanitation Master Plan and On-going Sewerage Project

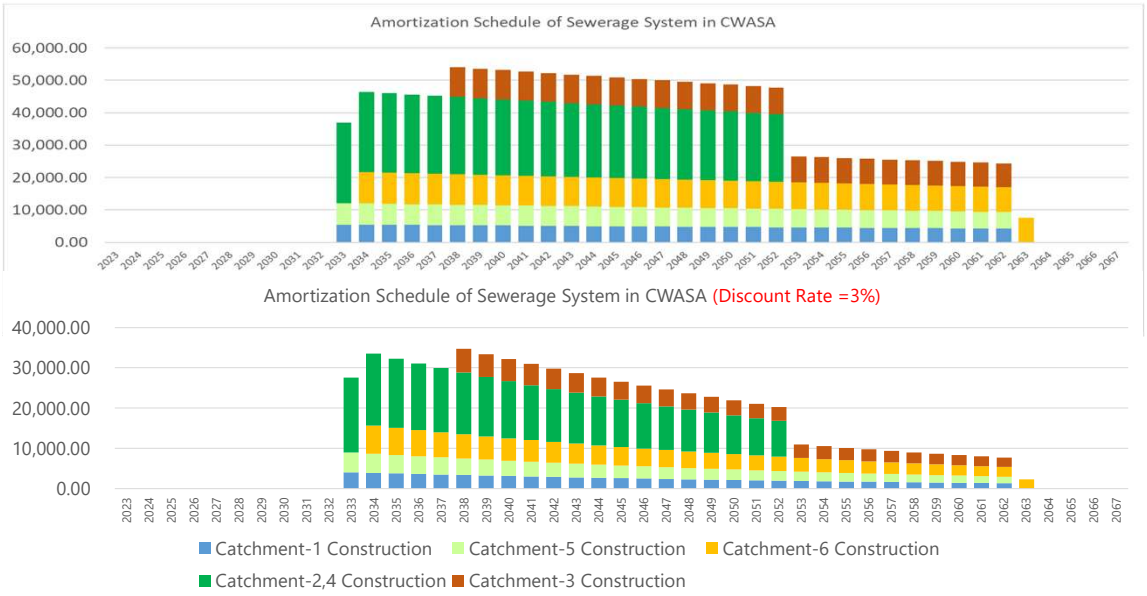
Updated Implementation plan (based on FS)



Attachment
1. Overview of Advisory Work

Activity 1-1: Review of Sanitation Master Plan and On-going Sewerage Project

Amortization Schedule for Sewerage Development (tentative)



Activity 1-2: Assist organizational setup to promote the sewerage projects

Action Plan and Progress on Institutional Issues

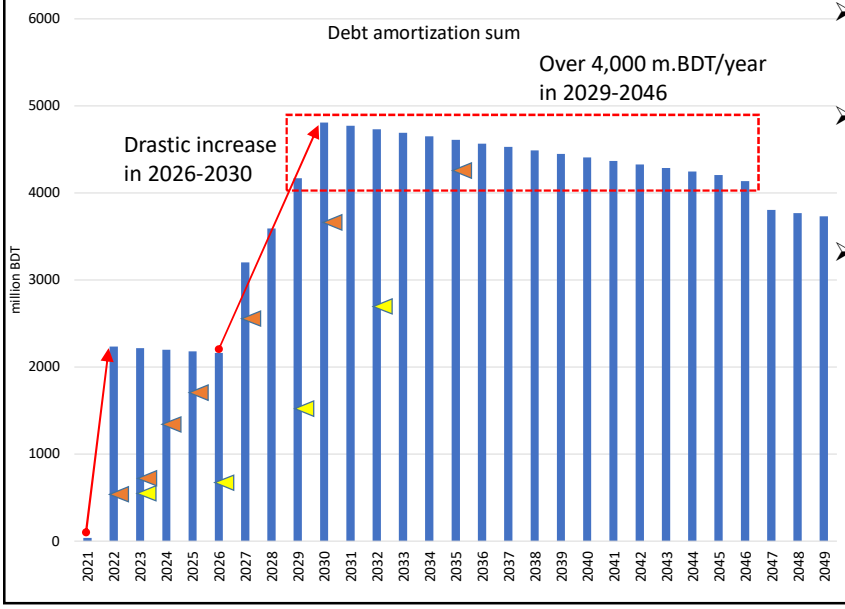
Workflow	Synopsis	Scheduled Completion
Clarify business procedure specific to sewerage service • Construction (property connection, payment of connection fee) • Service management (billing, new property connection, inspecting misconnection, monitoring industrial wastewater)	1. Review project implementation in KWSP. 2. Analyze updated CWASA rules, i.e., Citizen Charter, Water Connection and Tariff Rules, Employee Service Regulations. 3. Analyze governmental rules, i.e., Water and Sewerage Tariff Rules. 4. Analyze DWASA rules to be incorporated into CWASA rules, i.e., 'Water and Sewerage Connection Regulations'. 5. Draft CWASA Water and Sewerage Connection Rules.	
Develop connection regulations		Dec 2021
Develop phased organization structure for sewerage service	1. Review organogram 2020. 2. Develop phased organization structure. 3. Finalize CWASA Water and Sewerage Connection Regulations.	Mar 2022
Revise regulations (related to HR)		
Develop organogram 2023-2030	1. Develop organogram 2023-2030. 2. Revise CWASA Employees Service Regulations 2020.	Oct 2022
Support to get approval of organogram and regulations	- Get approval of Organogram 2023-2030, Water and Sewerage Connection Regulations, and Employees Service Regulations from Board.	Sep 2023

14

Attachment
1. Overview of Advisory Work

Activity 1-3: Assist in identifying challenges to establish financial scheme

(3) Financial Estimation Highlight by JICA 2&4 F/S team and WB



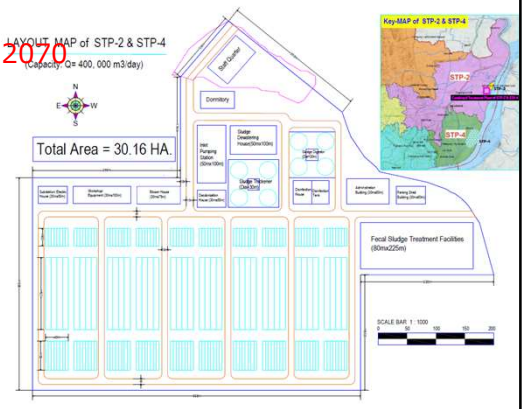
- Net profit before tax and depreciation as of 2016, 2017, and 2018 was only 22, 85, and -10 million BDT.
- Net profit before tax and depreciation estimated by JICA (◁) and by WB (◀) is far less/ less than the debt amortization sum.
- Even rather optimistic estimation by WB cannot cover debt amortization cost for years; there is a risk of running out of cash.

Note:
1. Debt amortization for KWSP-1&2, CWSISP-1&2, Bhandaljury, IWSRP-1&3, and Catchment 2,3,4,5,&6.
2. Annual tariff increase: 9.8% for JICA and 8% for WB.
3. STP is presumed to start operation in 2023 (WB) and 2026 (JICA).

Activity 1-4: Assist in updating sewerage development plan

1. DPP for Land Acquisition (Pre-FS report)

1. Summary of the Project
2. Population Projection
   (1) Total Population in CCC area
   (2) Population in Catchment-2 and -4: 2.8million in 2070
3. Sewage Generation
4. Setting the Capacity of STP: 385,000m3/day in 2070
5. Selection of Treatment Process
   (1) Discharge Standard
   (2) Selection of Treatment Process
6. Layout of STP
   (1) Site of STP
   (2) Layout of STP
7. Note for Feasibility Study



2. DPP for Catchment-2,4 Project (Drafted!)

Attachment

1. Overview of Advisory Work

Activity 2-1&2: Challenges in Design and Construction of On-going Sewerage Project (PESSCM-1) and Proposed Solutions for Them

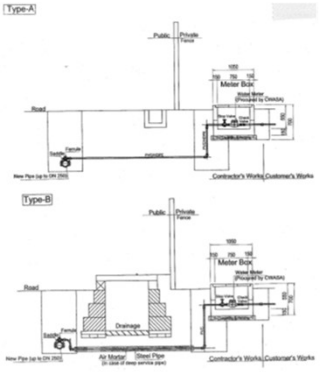
1. Lesson learnt from KWSP-2

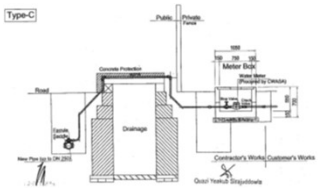
➢ **Installation of new house connection for replacement of existing house connection**

Problem: Matters hindering the work / to be improved

The house connection is not necessarily executed according to the contract drawings.

Contract Drawings





Completion Status (Sample)

Additional standard drawings should be prepared for proper supervision of the work.

Activity 2-1&2: Challenges in Design and Construction of On-going Sewerage Project (PESSCM-1) and Proposed Solutions for Them

2. Lesson learnt from routine work of Sales Division

➢ **Installation of new house connection**

Problem: Matters hindering the work / to be improved

It is desirable that the distribution pipeline be installed on both side of the road to avoid hindering traffic.
The connection pipe crossing the road is installed in very shallow depth.

The location and depth of distribution pipeline should be recorded on the database. Sometimes, the distribution pipe is installed in very deep depth due to existing facilities (telecommunication, gas supply, etc.).

Attachment
1. Overview of Advisory Work

Activity 2-1&2: Challenges in Design and Construction of On-going Sewerage Project (PESSCM-1) and Proposed Solutions for Them

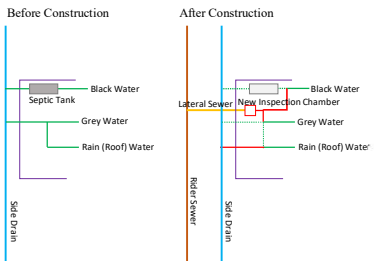
3. Conceivable challenges in on-going sewerage project and proposed solutions

Conceivable Challenges

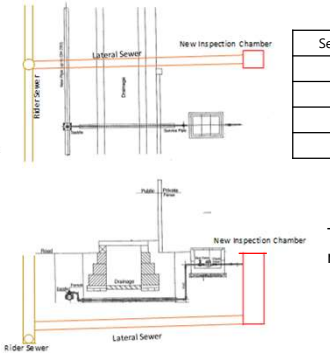
Various patterns of property connections

The layout of drainage facilities varies for each buildings. The detailed pipe arrangement plan needs to be prepared for each buildings.

➔ The pipe arrangement plan should be prepared following the common design criteria.



General Layout of Property Connection



General Drawings of Property Connection

Proposed Design Criteria of Lateral Sewer

Served Population	Pipe Diameter (mm)	Gradient
Less than 150	100 or more	2 : 100 or more
150 to 300	125 or more	1.7 : 100 or more
300 to 500	150 or more	1.5 : 100 or more
More than 500	200 or more	1.2 : 100 or more

The inspection chamber shall be covered so that the rainwater does not enter into the lateral sewer.

Activity 2-1&2: Challenges in Design and Construction of On-going Sewerage Project (PESSCM-1) and Proposed Solutions for Them

3. Conceivable challenges in on-going sewerage project and proposed solutions

Proposed Solutions and Actions

➢ **Establish the underground facility location map in CCC area**

As a first step, as-built drawings of KWSP-1 and KWSP-2 showing the pipeline location should be compiled in the form of CAD/GIS drawing data set and shared with the CWASA staff.

In preparation of the CAD/GIS drawing data set, following should be confirmed:

- Coordinate System: BTM_Everest or UTM WGS84
- Basis(version) of elevation bench mark of Survey of Bangladesh

➢ **Preparation of implementation manual for property connection**

The design criteria of property connection is not prescribed in the present contract document of PESSCM-1.

It is recommended that an implementation manual (implantation procedure, design criteria, standard design, work supervision, etc.) for property connection be developed.

Activity 2-3: Property Connection Manual

Contents of Property Connection Manual

1. General Provisions
   - Scope of the Manual/ Definitions/ Obligations of the Owner of the Holdings
   - Type of Sewage/ Design and Construction
2. Application Procedure
   - Property Connection/ Public Inspection Chamber
3. Indoor Drainage Facilities
4. Outdoor Drainage Facilities, Public Inspection Chamber, and Lateral Sewer
   - General/ Design/ Construction Work/
   - Measures for Existing Septic Tank/ Testing
5. Ownership and management of Property Connection

21

To be explained by Bakkar-san

Thank you very much for

CWASA's active action in Advisor!

22

Attachment
2-1_CWASA Organogram

Advisor on Urban Sanitation Improvement

Final Workshop

28th August 2023

Japan International Cooperation Agency (JICA)
Nippon Koei Co., Ltd (NK)

Agenda of Meeting

1. Overview of Advisory Work
2. Result of Activities

(1) CWASA Organogram 2023-2030

(2) CWASA Water and Sewerage Connection Regulations

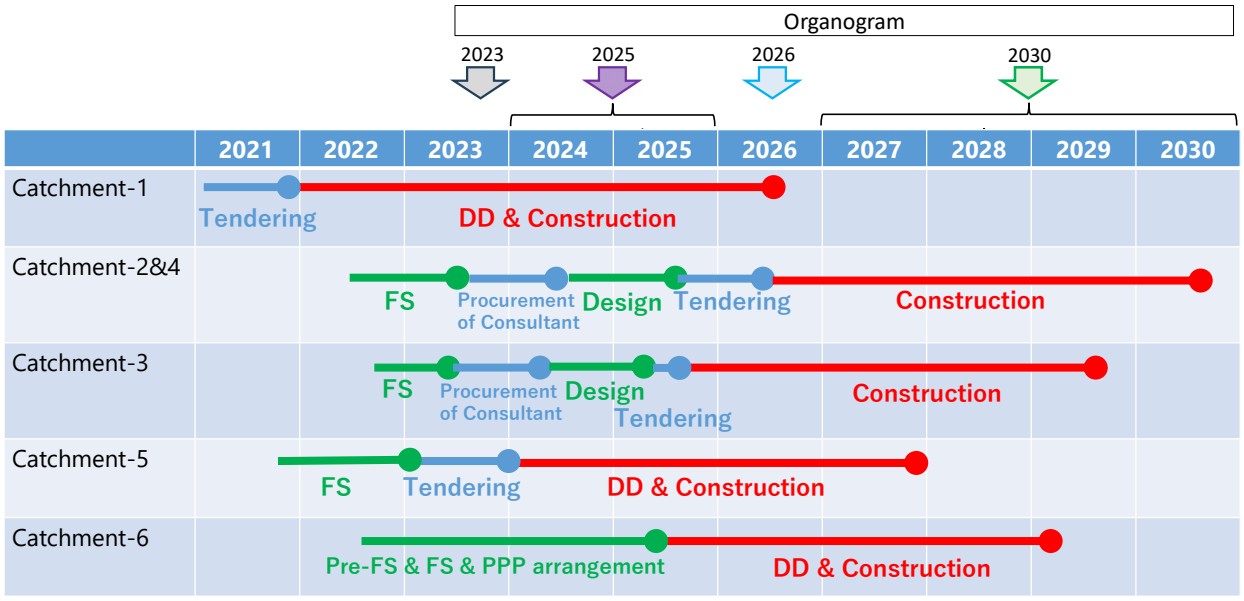
(3) CWASA Property Connection Manual

(4) CWASA Employees Service Regulations

2

Attachment
2-1_CWASA Organogram

Construction of Sewerage Works and Application of Organogram 2023-2030



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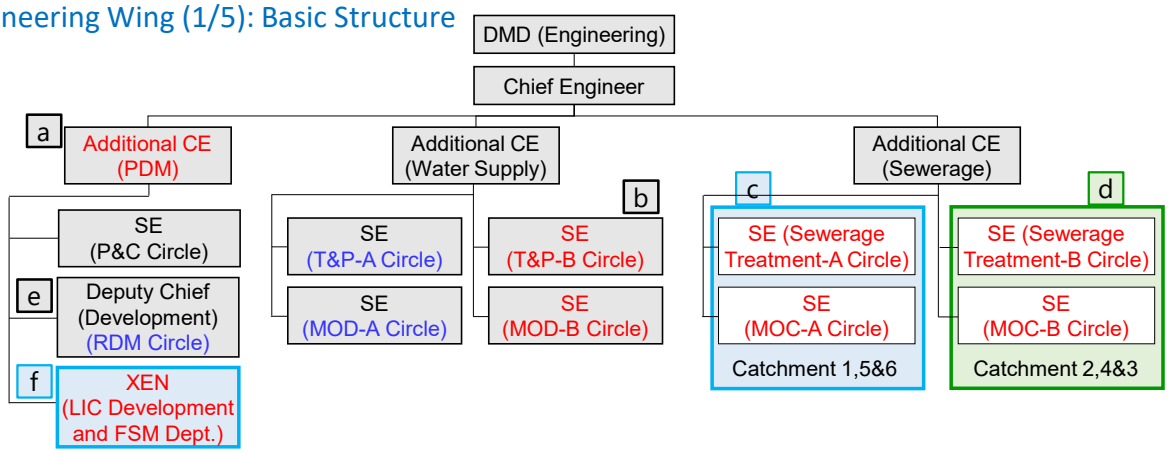
Engineering Wing (1/5): Basic Structure



a Additional CE (PDM: Planning, Development, and Monitoring): new
b T&P Circle (Treatment & Production) and MOD Circle: split into two
c Sewerage Treatment-A Circle and MOC (Maintenance, Operation & Connection)-A Circle: added in 2026
d Sewerage Treatment-B Circle and MOC-B Circle: added in 2030
e RDM (Research, Development and Monitoring) Circle: ex-P&D Circle under Deputy Chief (Development)
f LIC Development and FSM Department: added in 2026

4

Attachment
2-1_CWASA Organogram

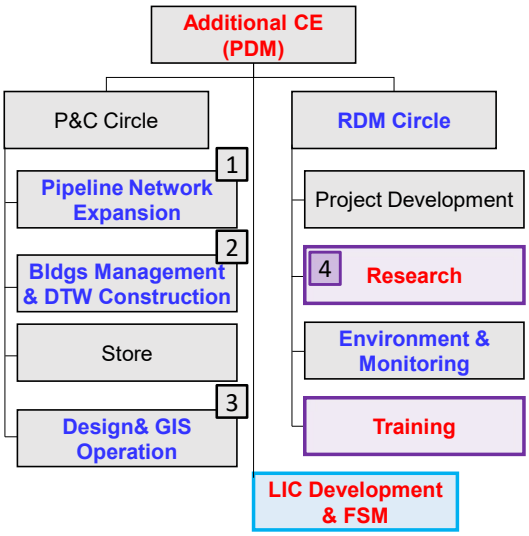
Engineering Wing (2/5): P&C Circle and RDM Circle (1/2)

1 **Pipeline Network Expansion** (renamed from CD-1): construct water distribution pipeline & branch sewer after completion of projects.

2 **Buildings Management and DTW Construction** (renamed from CD-2): DTWs and other construction (such as CWASA HQs building, boundary/ retaining walls) and maintenance of CWASA buildings.

3 **Design & GIS Operation** (renamed from Design): archive as built drawing of all types of construction and installation works in CAD/GIS, with house/ property connections and meter installation linked to customer database.

4 **Research**: develop and update technical guidelines/ standards, SOPs, and business plans, and function as **Central Water Control Center** (added in 2025).



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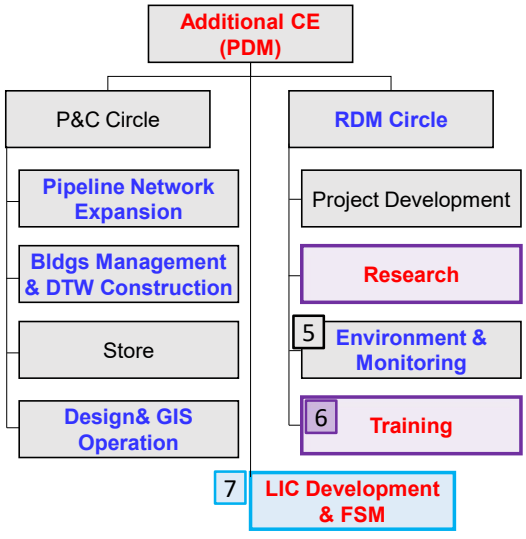
Engineering Wing (3/5): P&C Circle and RDM Circle (2/2)

5 **Environment & Monitoring** (renamed from Quality Control): conduct environmental monitoring of construction sites, WTPs, and WWTPs; and function as **Central Laboratory**.

6 **Training**: assess capacity and training needs and develop training programs for technical employees; request to Training Center of Secretariat to arrange the implementation of training programs (added in 2025).

7 **Low Income Community (LIC) Development & Fecal Sludge Management (FSM)**: manage collection and transfer service of fecal sludge that will start after Catchment-1 STP starts operation presumably in 2026.



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Attachment
2-1_CWASA Organogram

Engineering Wing (4/5): T&P, MOD, Sewerage Treatment, and MOC Circles

- PIUs will work on sewerage construction, and Additional CE (Sewerage) will supervise assigned P/Ds (SEs) or act the role of P/D in some projects.
- After completion of a sewerage project, P&C Circle will construct remaining branch sewers under Additional CE (PDM), while property connection will be handled by responsible MOC.
- **MOD-5 (Patenga)**, **MOD-6 (Patiya)** and **MOD-7 (Anwara & Boalkhali)**: added in 2025
- **Sewerage Treatment-A Circle** and **MOC-A Circle**: added in 2026
- **Sewerage Treatment-B Circle** and **MOC-B Circle**: added in 2030

T&P -A
- SH WTP-1
- SH WTP-2
- SR WTP

T&P -B
- Mohara WTP
- Bhandaljury WTP
- KIRP and Booster
- Nasirabad Control and Booster

MOD -A
- MOD-1 (Agrabad)
- MOD-4 (Jubilee Road)
- MOD-5 (Patenga)

MOD -B
- MOD-2 (Dampara)
- MOD-3 (Kalurghat)
- MOD-6 (Patiya)
- MOD-7 (Anwara&Boalkhali)

Sewerage Treatment -A
- Catchment 1
- Catchment 5
- Catchment 6

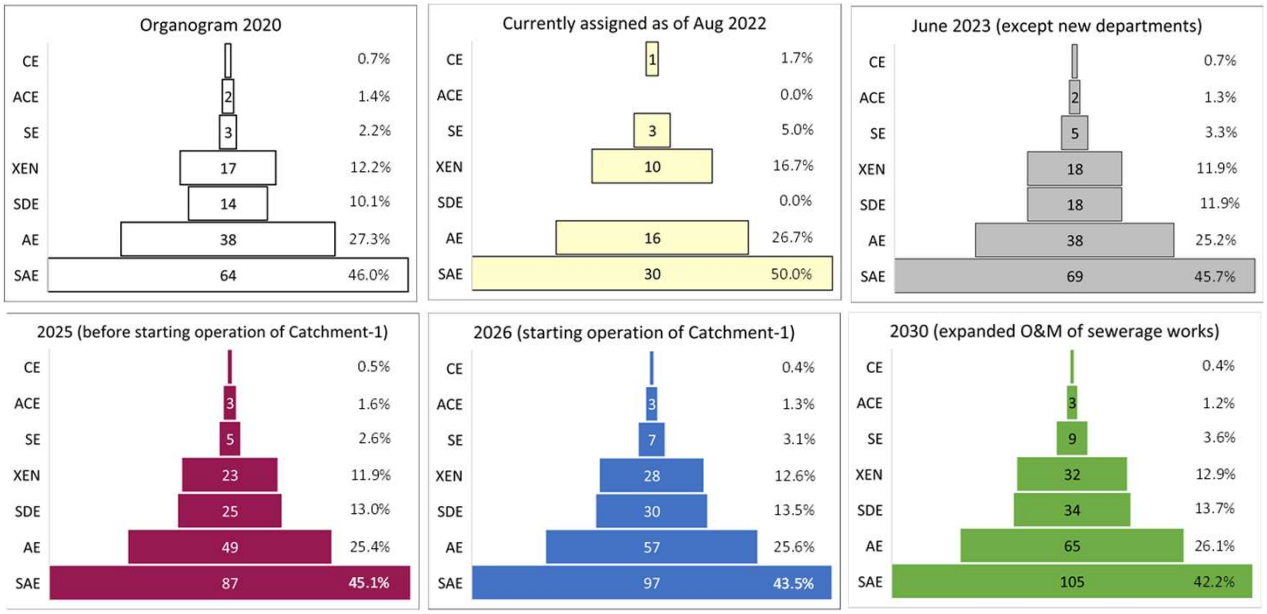
Sewerage Treatment -B
- Catchment 2
- Catchment 3
- Catchment 4

MOC -A
- MOC-1 (Agrabad)
- MOC-4 (Jubilee Road)
- MOC-5 (Patenga)

MOC -B
- MOC-2 (Dampara)
- MOC-3 (Kalurghat)

7

Engineering Wing (5/5): Number of Key Officers (from CE to SAE)

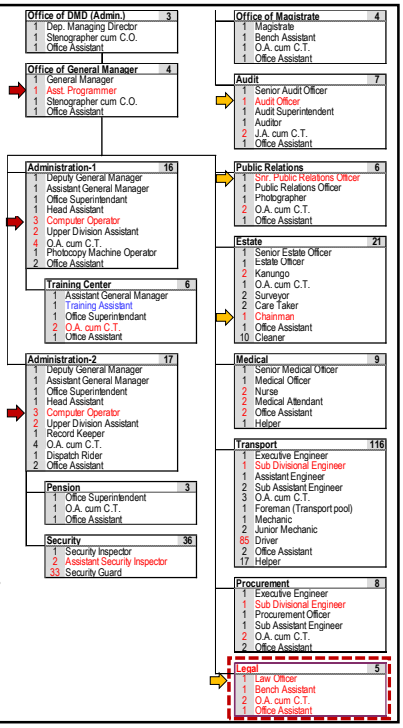


8

Attachment
2-1_CWASA Organogram

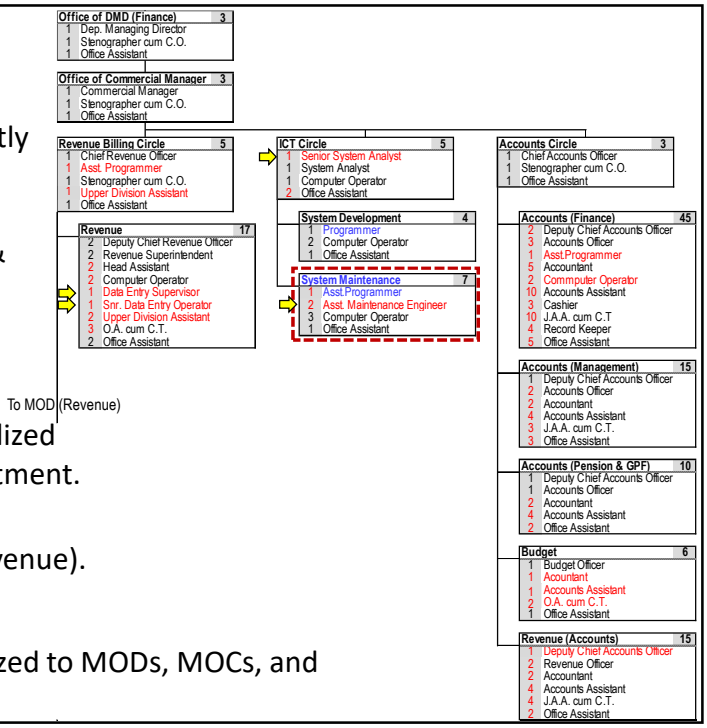
MD's Office and Administration Wing

- MD's Office: 1 XEN is newly assigned.
- Legal Section: new under General Manager.
- To enhance digitalization(➡)
  - Asst. Programmer is assigned to GM's office, Accounts (Finance), Revenue Billing, and Design & GIS Operation.
  - Computer Operator is assigned to Admin-1, Admin-2, Accounts (Finance), Design & GIS Operation, MODs, and MOCs.
- New designations in Administration Wing (➡) and Commercial Wing (➡ on next slide)
  - Audit Officer
  - Snr. Public Relations Officer
  - Chainman
  - Law Officer
  - Snr. System Analyst
  - Asst. Maintenance Engineer
  - Data Entry Supervisor
  - Snr. Data Entry Operator



Commercial Wing

- Requests from Commercial Wing to increase necessary personnel were mostly incorporated, except the creation of 2 Additional Chief Accounts Officer (Revenue & Management and Finance & Pension).
- System Maintenance of ICT Circle
  - Renamed from Data Management.
  - Data management function is decentralized to enhance digitalization in each department.
  - Data Entry Operators are transferred to Design & GIS Operation and MODs (Revenue).
- Sales
  - Abolished and its function is decentralized to MODs, MOCs, and MOD (Revenue).



Attachment
2-1_CWASA Organogram

Increase of Total Number of Staff

Approved in Organogram 2020

Sl	Grade	Approved in 2016 (a)	Increase (b)	Decrease (c)	Approved (d)=(a)+(b)-(c)
1	Grade 1-9	85	41		126
2	Grade 10	46	22		68
3	Grade 11-16	454	13		467
4	Grade 17-20	463		5	458
TOTAL		1,048	76	5	1,119

In 2023 except new departments (bordered in black)

Sl	Grade	Approved in 2020 (a)	Increase (b)	Increase (c)=(b)/(a)	In 2023 (d)=(a)+(b)
1	Grade 1-9	126	20	15.9%	146
2	Grade 10	68	3	4.4%	71
3	Grade 11-16	467	58	12.4%	525
4	Grade 17-20	458	62	13.5%	520
TOTAL		1,119	143	12.8%	1,262

In 2025 before starting O&M of sewerage works (addition bordered in purple)

Sl	Grade	In June 2023 (a)	Increase (b)	Increase (c)=(b)/(a)	In 2025 (d)=(a)+(b)
1	Grade 1-9	146	29	19.9%	175
2	Grade 10	71	18	25.4%	89
3	Grade 11-16	525	116	22.1%	641
4	Grade 17-20	520	103	19.8%	623
TOTAL		1,262	266	21.1%	1,528

In 2026 when O&M of sewerage works starts (addition bordered in blue)

Sl	Grade	In 2025 (a)	Increase (b)	Increase (c)=(b)/(a)	In 2026 (d)=(a)+(b)
1	Grade 1-9	175	22	12.6%	197
2	Grade 10	89	10	11.2%	99
3	Grade 11-16	641	55	8.6%	696
4	Grade 17-20	623	92	14.8%	715
TOTAL		1,528	179	11.7%	1,707

In 2030 with expanded O&M of sewerage works (addition bordered in green)

Sl	Grade	In 2026 (a)	Increase (b)	Increase (c)=(b)/(a)	In 2030 (d)=(a)+(b)
1	Grade 1-9	197	22	11.2%	219
2	Grade 10	99	8	8.1%	107
3	Grade 11-16	696	65	9.3%	761
4	Grade 17-20	715	103	14.4%	818
TOTAL		1,707	198	11.6%	1,905

11

Advisor on Urban Sanitation Improvement

Final Workshop

28th August 2023

Japan International Cooperation Agency (JICA)
Nippon Koei Co., Ltd (NK)

Agenda of Meeting

1. Overview of Advisory Work
2. Result of Activities

(1) CWASA Organogram 2023-2030

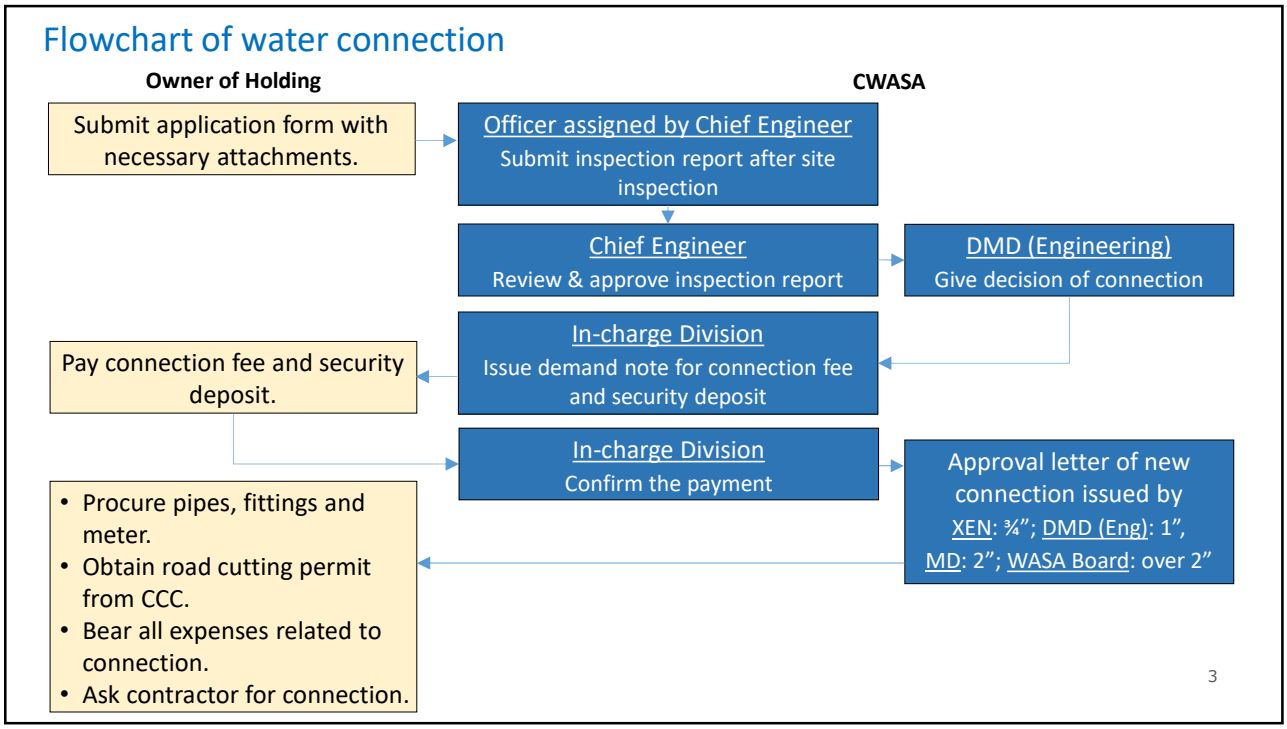
(2) CWASA Water and Sewerage Connection Regulations

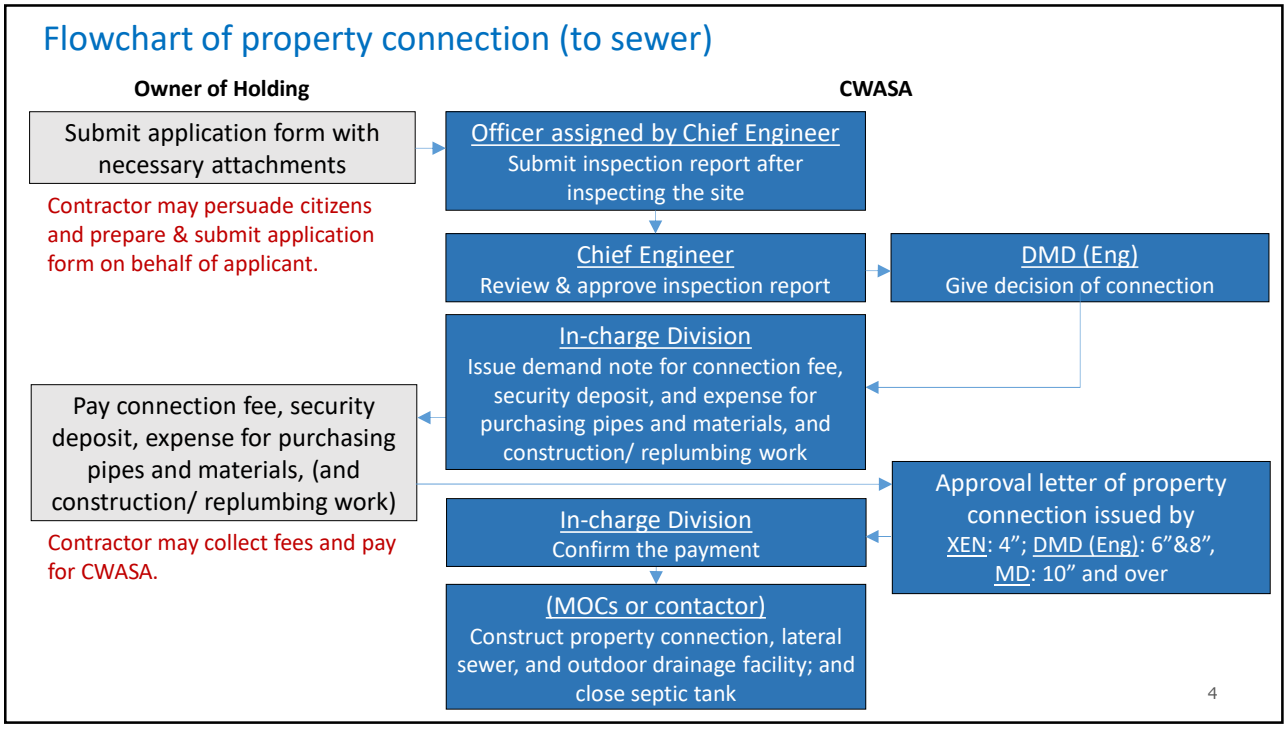
(3) CWASA Property Connection Manual

(4) CWASA Employees Service Regulations

2

Attachment
2-2_Connection Regulations

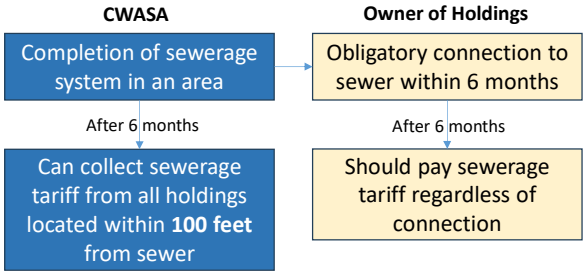




Property Connection (1/3)

Prepared based on equivalent regulations of DWASA and adjusted according to current practice of CWASA.

- Article 26 (1): Owner of holdings should connect to sewer within 6 months after the completion of sewerage system in an area constructed by CWASA. (Article 9 (1) of Water and Sewerage Tariff Rules, 2011).

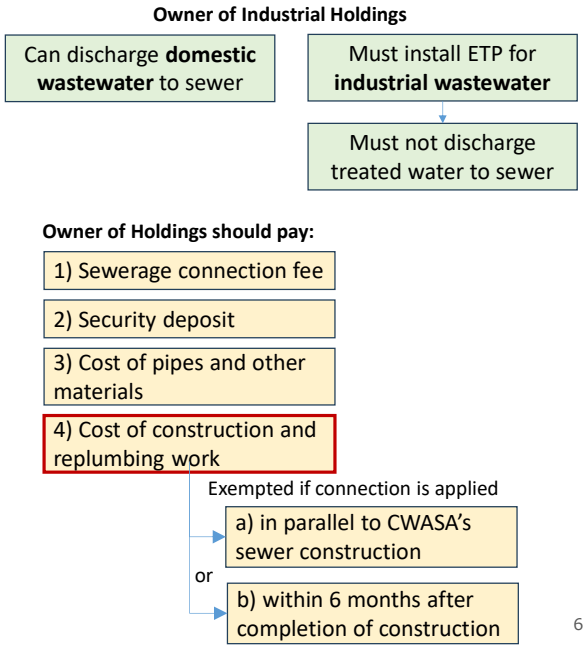


- CWASA can collect sewerage tariff from all holdings located within 100 feet from sewer. (Article 9 (1) of Tariff Rules above)
- In case CWASA cannot provide sewerage service due to area condition, CWASA will provide collection and transfer service of fecal sludge in septic tanks instead. (Clause 1, Terms and Conditions, Form B)

5

Property Connection (2/3)

- Article 26 (5): Industrial users can discharge domestic wastewater to public sewer; Should install effluent treatment plant (ETP) for industrial wastewater to satisfy environmental standards; and Should not discharge treated water of ETP to public sewer.
- Article 29: Owner of holding should pay 1) sewerage connection fee, 2) security deposit, 3) cost of purchasing pipes and other materials, and 4) cost for construction.
- 4) is exempted if the connection is applied a) in parallel to sewerage construction by CWASA in the area where the holding is located, or b) within 6 months after the completion of sewerage system in the area.

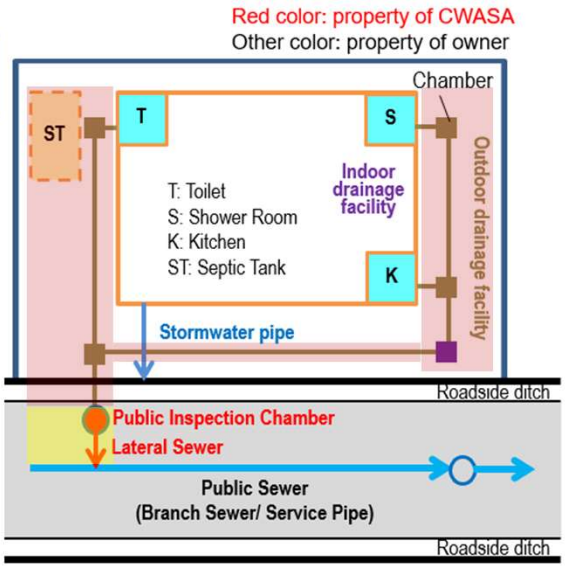


6

Attachment
2-2_Connection Regulations

Property Connection (3/3)

- Article 31 (3): **CWASA or its delegated contractor** constructs lateral sewer from branch sewer/ service pipe to public inspection chamber for the holding, as well as the installation of outdoor drainage facility and its connection to public inspection chamber and the closure of septic tank.
- Article 31 (4): Lateral sewer and public inspection chamber are owned and maintained by CWASA; Outdoor drainage facility is maintained by and at the expense of owner of holding, or otherwise after the expiry of the period that CWASA specifies.



7

Advisor on Urban Sanitation Improvement

Connection Manual

28th August 2023

Japan International Cooperation Agency (JICA)
Nippon Koei Co., Ltd (NK)

Agenda of Meeting

1. Overview of Advisory Work
2. Result of Activities

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(4) CWASA Employees Service Regulations

2

Objectives to Prepare the Property Connection Manual

1. CWASA is developing sewerage system in CCC area.
2. CWASA applied separated sewer system for all catchments. Construction of property connection is big challenge. (more than 100,000 connections in total)
3. The property connection manual was prepared to ensure the quality of property connection works based on uniform criteria.
4. For its preparation, followings were referred:
   - Property connection manual of Sewerage Bureau of Tokyo Metropolitan Government (Japan)
   - Bangladesh National Building Code (BNBC) 2020
     * Construction work shall satisfy the requirements specified in BNBC 2020.
5. After the experience of property connection works several years, please update the manual to be suitable for CWASA.

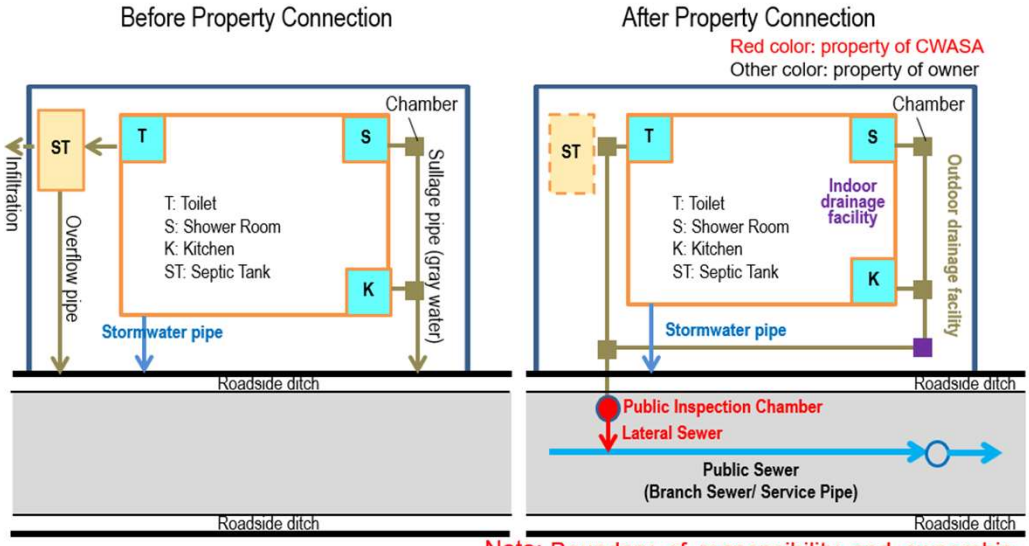
3

Contents of Property Connection Manual

1. General Provisions
   Scope of the Manual/ Definitions/ Obligations of the Owner of the Holdings
   Type of Sewage/ Design and Construction
2. Application Procedure
   Property Connection/ Public Inspection Chamber
3. Indoor Drainage Facilities
4. Outdoor Drainage Facilities, Public Inspection Chamber, and Lateral Sewer
   General/ Design/ Construction Work/
   Measures for Existing Septic Tank/ Testing
5. Ownership and management of Property Connection

4

Definitions



Note: Boundary of responsibility and ownership is Public Inspection Chamber which can be installed inside private property if there is no space on public road.

5

Obligations of the Owner of the Holdings

- The owner of the holdings in the sewered area is responsible to install property connection connecting to public sewer system. The sewerage fee shall be owed by user after half year passed since the holdings are included in the sewered area or since new buildings/households are newly developed in the sewered area.
- If there is no existing building in the property in the sewered area, CWASA will install public inspection chamber on the road in parallel with the construction of public sewer. The owner of the holdings is obliged to install property connection connecting to public inspection chamber after the construction of building.

6

Attachment
2-3_Property Connection Manual

Design and Construction (Pipe)

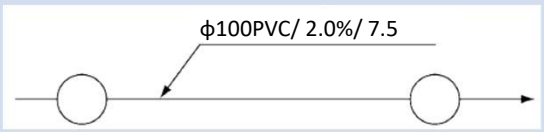
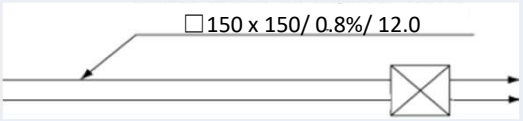
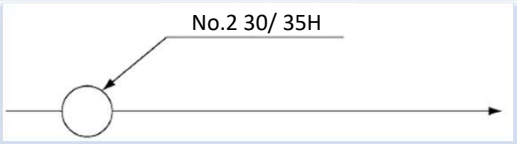
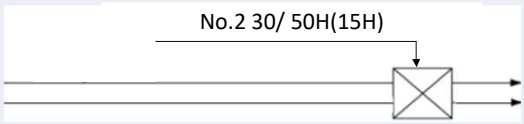
Item (example)	Contents
General	- Sewage, industrial waste, and stormwater shall be separately collected. - Sewage shall be connected to public sewer via public inspection chamber. Stormwater pipe shall be connected roadside drain or channel. - Existing septic tank shall be demolished or filled with sand when the public sewer is start operation.
Material	- Indoor pipe: Polyvinyl Chloride (PVC) pipe, High Density Polyethylene (HDPE) or equivalent - Outdoor pipe: HDPE or equivalent - Maintenance chamber: PVC, HDPE or equivalent - Public Inspection chamber: Brick or Reinforced concrete
Minimum diameter and slope	<table><tr><th>Population in the Property</th><th>Minimum inner diameter of pipe</th><th>Minimum slope (to keep minimum velocity)</th></tr><tr><td>User < 150 capita</td><td>100 mm (4 inch)</td><td>2.0%</td></tr><tr><td>150 capita ≦ User < 500 capita</td><td>150 mm (6 inch)</td><td>1.5%</td></tr><tr><td>500 capita ≦ User</td><td>Determined by hydraulic calculation</td><td>Determined by hydraulic calculation when: pipe diameter 200mm (8inch):1.3%</td></tr></table>
Velocity	- Flow velocity shall be 1.0 to 4.0 m/sec to keep its traction force - Maximum velocity recommended in BNBC2020 is 2.5 m/sec.

Design and Construction (Chamber)

Item (example)	Contents
General	- The timing of construction work for downstream of public inspection chamber and its upstream, namely outdoor/indoor drainage facility is different. - The construction of branch sewer and property connection (lateral sewer) up to public inspection chamber will be implemented in same timing, but construction work in property will be sometimes delayed because it will be implemented after the application form is approved by CWASA.
Material	- Maintenance chamber: PVC, HDPE or equivalent - Public Inspection chamber: Brick or Reinforced concrete
Minimum dimensions and cover size	<table><tr><th>Diameter of property connection (pipe)</th><th>Depth (GL to invert) of property connection (pipe)</th><th>Minimum internal dimension of public inspection chamber</th><th>Cover size of public inspection chamber</th></tr><tr><td rowspan="2">D≦150mm</td><td>Depth < 1.0m</td><td>450mm x 450mm or D=450mm</td><td>450mm x 450mm or D=450mm</td></tr><tr><td>1.0m≦ Depth</td><td>1200mm x 750mm or D=1050mm</td><td>600mm x 600mm or D=600mm</td></tr><tr><td rowspan="2">D=200mm</td><td>Depth < 1.0m</td><td>700mm x 700mm or D=600mm</td><td>450mm x 450mm or D=450mm</td></tr><tr><td>1.0m≦ Depth</td><td>1200mm x 750mm or D=1050mm</td><td>600mm x 600mm or D=600mm</td></tr></table>

Attachment
2-3_Property Connection Manual

Drawing format (example)

Type	Unit		Contents
Public Sewer Outdoor drainage facility	Inner diameter Type of pipe Slope Length	100 PVC 2% 7.5	
Stormwater pipe Roadside drain	Inner diameter Height Slope Length	150 150 0.8% 12.0	
Chamber for sewage pipe	Number Inner diameter Depth	No.2 30 35	
Chamber for stormwater pipe	Number Inner diameter Depth Depth of pit	No.2 30 50 15	

9

Procedures of Design

1. Household survey (site investigation)
2. Topographic survey and preparation of plan drawing
3. Confirmation of existing indoor/ outdoor drainage facility in the property
4. Determination of alignment of outdoor drainage facility
5. Design of outdoor pipe (sewage flow, diameter, slope, etc.)
6. Design of chamber (location, dimension, type)
7. Preparation of construction drawing
8. Quantity calculation
9. Cost estimation

10

Ownership and management of Property Connection

1. Basically, CWASA owns the inspection chamber and lateral sewer, and owner of the holdings owns the indoor and outdoor drainage facilities. The owners can alter the indoor/outdoor drainage facilities as they want, however, the owners are obligated to connect their drainage facilities to public sewers appropriately.
2. In the priority area of **Catchment 2 and 4** where the sewerage system will be developed with Japanese ODA, CWASA will continue to keep the ownership of new drainage facilities in household/building for 10 years after the start of operation of STP. Therefore, it is necessary for owner of holdings to get permission from CWASA to alter the drainage facilities.
3. Owner of holdings is responsible to keep property connection in good condition and is obliged to bear cost of its maintenance works such as desludging, cleaning or declogging, etc. even during CWASA's ownership. CWASA will request and instruct the owner of holdings not to damage and clog the drainpipes in households/buildings with solid wastes and other materials. And CWASA will receive the notifications and settle the problems in case of troubles, the necessary costs for troubleshooting will be borne by owner of holdings.
4. CWASA will prepare the document recording at least i) name of owner of holdings, ii) type and extent of damage, iii) description of repair and iv) situation of payment for repair as part of structure to implement the acceptance of order, repair and demand for payment appropriately and smoothly.

11

Attachment
2-4_Employee Service Regulations

Advisor on Urban Sanitation Improvement

Final Workshop

28th August 2023

Japan International Cooperation Agency (JICA)
Nippon Koei Co., Ltd (NK)

Agenda of Meeting

1. Overview of Advisory Work
2. Result of Activities

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(4) CWASA Employees Service Regulations

2

Attachment
2-4_Employee Service Regulations

New/ Renamed Designation and Changed/ Proposed Grade (1/2)

No.	Designation	Grade	Note
1	Chief Engineer	2	Changed from grade 3, due to the creation of Additional Chief Engineer in Organogram 2020.
2	Additional Chief Engineer	3	Created in Organogram 2020 but not included in probidhanmala 2020.
3	Senior System Analyst	4	Created to accelerate and manage digitalization in CWASA in liaison with other departments.
4	Executive Engineer	5	Changed from grade 6, due to the creation of Sub Divisional Engineer in Organogram 2020.
5	Programmer	6	Renamed from Computer Programmer according to Computer Personnel Recruitment Rules, 2019.
6	Deputy Chief Revenue Officer	6	Created in Organogram 2020 but not included in probidhanmala 2020.
7	Sub Divisional Engineer	6	
8	Senior Chemist	6	
9	Senior Estate Officer	6	
10	Senior Medical Officer	6	
11	Senior PR Officer	6	To cope with increased importance and responsibility for public relations activities.
12	Law Officer	6	To handle all legal issues in CWASA.
13	Senior Audit Officer	6	Changed from grade 8, because Audit Officer (Grade 9) is created in new organogram.

New/ Renamed Designation and Changed/ Proposed Grade (2/2)

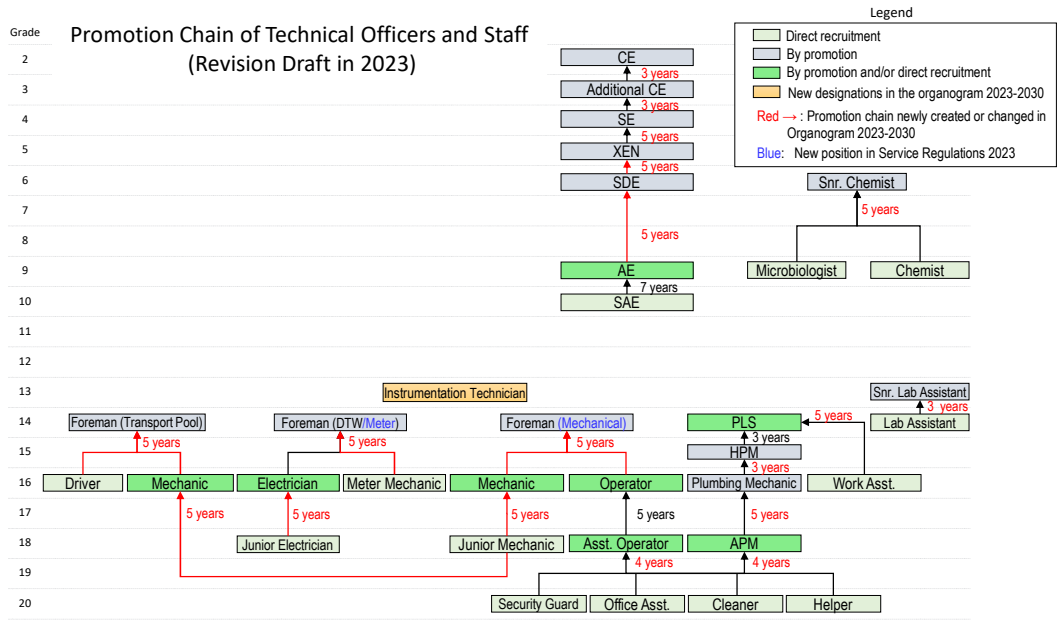
No.	Designation	Grade	Note
14	Microbiologist	9	Created in Organogram 2020 but not included in probidhanmala 2020.
15	Audit Officer	9	To support Senior Audit Officer with increased importance and responsibility for internal auditing after starting sewerage projects.
16	Medical Officer	9	Created before Organogram 2020 but not included in probidhanmala 2020.
17	Assistant Programmer	9	Renamed from Assistant Computer Programmer according to Computer Personnel Recruitment Rules, 2019.
18	Assistant Maintenance Engineer	9	To maintain computer network, hardware, and software.
19	Training Assistant	11	Renamed from Trainer.
20	Data Entry Supervisor	13	To provide technical support through analyzing entered data as requested from relevant departments.
21	Instrumentation Technician	13	To install, calibrate, and maintain mechanical and electronic devices including programmable logic controller (PLC).
22	Senior Data Entry Operator	14	To ensure quality control of data entry activities in line with accelerated digitalization.
23	Photographer	16	Created in Organogram 2020 but not included in probidhanmala 2020.
24	Mechanic	16	Changed from grade 18, because both Mechanic and Junior Mechanic are grade 18.
25	Chainman	18	To assist Surveyor in field survey work.

Attachment
2-4_Employee Service Regulations

Abolished Designation

No.	Designation	Grade	Note	Explanations
1	Assistant Security Officer	-	Created in Organogram 2020 but not included in probidhanmala 2020.	Security Section is changed to be under the control of Deputy GM (Admin-2) instead of GM, thus no need of this designation.
2	Sub Assistant PR Officer	-		Senior PR Officer is created in place of this designation, considering the growing importance and responsibility for PR activities.
3	Sub Assistant Security Officer	-		Security Section is changed to be under the control of Deputy GM (Admin-2), instead of GM, thus no need of this designation.
4	Draftsman	16		Decreasing need of archiving paper-based as-built drawings.

5



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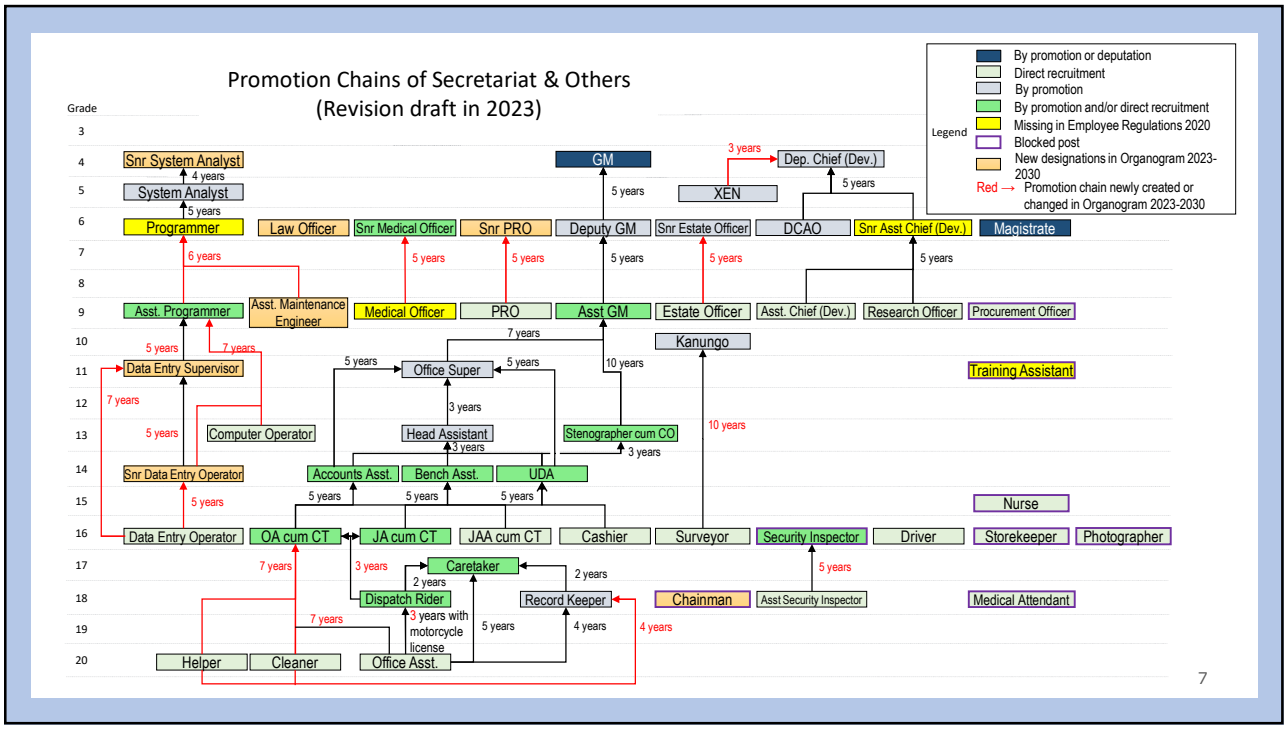
Attachment
2-4_Employee Service Regulations



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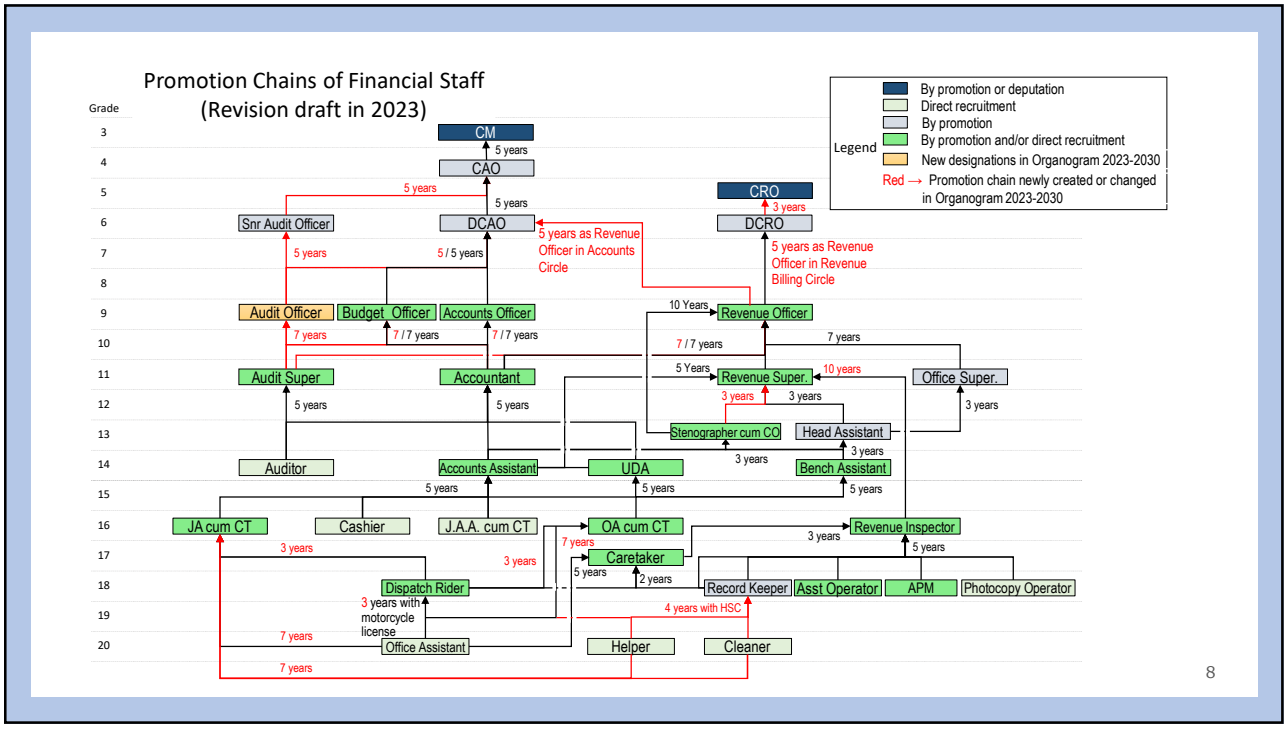


8

Minutes of Meeting		
Final Workshop of the Advisor on Urban Sanitation Improvement Project		
Date/Time	Monday, August 28, 2023	10:00AM- 12:00AM
Participants	CWASA: 1. Managing Director 2. Deputy Managing Director (Engineering, Finance) 3. Superintending Engineers (MOD, P&C) 4. Chief Accounts Officer, Deputy Chief Accounts Officer 5. Deputy Secretary 6. Executive Engineers (Transport, MOD-2, Procurement, Nasirabad Booster, SHPS-1, SHWTP-2, Design, Store, Sales) 7. DPD (PESSCM-1) 8. Assistant Engineers (KWSP-2) 9. Sub Assistant Engineer (Transport)	
	JICA Expert Team (JET): 1. Mr. Takamasa Nishikawa (Chief Advisor) 2. Mr. Toshihiko Tamama (Expert of Organizational Structure/Financial Scheme) 3. Mr. Hidehisa Tamura (Expert of Design/Construction Supervision/ Maintenance: online) 4. Ms. Nazia Nur (Communication and Reporting Officer)	
	JICA Bangladesh Office: 1. Ms. Mari Miura, Senior Representative 2. Mr. Md. Abdullah Bin Hussain, Deputy Program Manager	
Documents	Presentation Materials on: i. Overall activities of the Advisory project ii. Organogram 2023-2030 iii. CWASA Water and Sewerage Connection Regulations. iv. CWASA Property Connection Manual v. CWASA Employee Service Regulations	
Main Points Discussed/ Agreed		
The followings subjects were discussed or agreed:		
1.	The Managing director of CWASA gave opening remarks of the final workshop appreciating JICA's cooperation in CWASA projects for long time. After that, Senior representative of JICA gave a speech.	
2.	The overall activities of the project were presented by the Project Director and JET. JET highly appreciated CWASA for the active participation in the project works.	
3.	CWASA organogram was presented by the XEN (Procurement). The DMD(F) commented that the work of the administration and finance wing should be expanded in the organogram like Engineering wing. JET explained that they prepared the organogram based on the series of meetings with all three wings and most of their requests are incorporated in the organogram.	
4.	CWASA Water and Sewerage Connection Regulations was explained by the DPD of the advisory project.	
5.	CWASA Property connection Manual was presented by the Assistant Engineer (KWSP-2). The MD suggested changing the location of the public inspection chamber from the road to the boundary of the property for avoiding complications arises from the road cutting. JET explained reason to locate it on the road that	

	CWASA can easily inspect it without permission of property owner, which arrangement is also applied in Japan.
6.	The key points of the schedule of the CWASA Service Regulations were explained by the Deputy Secretary mainly focusing on the new, renamed and abolished designations with the grade of national pay scale. Moreover, the new promotion chains for the three wings were separately shown in the presentation material.
7.	CE requested the CWASA officers to share their observations later on the documents submitted by the JET, if any.
8.	The closing remarks were given by the DMD (F) praising Japan's friendship with Bangladesh and continuous support to the development projects.

付属資料-8：

JICA 協議のプレゼンテーション資料

20211006　JET

バングラデシュ国都市衛生改善アドバイザー
状況報告

１．CWASA の案件実施状況

（1）水道

- 水道事業の予定案件は以下の通り。
  - JICA: KWSP-2 (On-going)
  - WB: Chattogram Water Supply Improvement and Sanitation Project - II (Planned)
  - WB: WASH Project (Planned)

（2）下水道

- 各処理区の状況は以下の通り。

処理区	コンサル（資金）	状況
1	ERINCO（自己資金）	P1：技術評価中（6 社/40 社：韓国×１、中国×５） P2：まだ技術評価が始まっていない（２社） P3：まだ技術評価が始まっていない（３社） ＊契約はデザインビルドで、応札者は自らの実施設計に基づくコスト積算が求められている。支払いはランプサムとなり、契約後の金額変更は困難。応札者は、入札時に膨大な実施設計・積算作業を求められるとともに、特に管路施設についてかなりの建設時のリスクを考慮する必要がある。
5	？（AFD）	まもなくコンサルタントが FS を始める（契約締結済み）
6	丸紅（丸紅）	2022 年 3 月までに Pre-FS を実施し、事業実施判断。 PPP 事業を進めるなら 2022 年内の PPP Authority の事業承認を目指す。
3	？（EDCF？）	韓国と基本合意の中で、本件支援が推奨されているが正式に決まってはいない。（コンサルタント調達中との情報もあったが未だ動きはない模様）
2	－	処理場用地の制約があり案件が進められていなかったが、用地の制約に目途が立ちこの FS の実施が求められている。 上記 WB 案件（Chattogram Water Supply Improvement and Sanitation Project – II）にて 1 処理区（場所未確定）の FS を実施することが決まっている。JICA 側で先行してプレ FS を実施することが要望されている状況（JICA が先に FS をするならどちらでも構わないと言われてはいます）
4	－	

＊2023 年は選挙の為承認事項が進まないため、2022 年内に必要な手続きを済ませるように急いでいる状況

２．想定される課題と対応

- MP と Catchment-1 事業のレビュー・ヒアリング結果による

	課題	必要な対応
1	MP での人口予測は Bangladesh Bureau of Statistics (BBS)に基づいたもので過少。Migration	CWASA が実施した Catchment 1 では上方修正しており、実際は更に多いとのことであるが、過大

	人口を含めると、実際の人口は大幅に多く、Catchment1 で見直した。CCC ホームページでは約 600 万人とのこと（Ariful 氏コメント）。	である可能性もあり、次回センサスが出てから人口予測を再確認する必要がある。そのうえで、以下の事項の見直しを含めた MP の更新が必要 ・目標年度 ・下水処理場容量 （浄水場容量とのギャップのチェック） ・概算事業費
2	MP の目標年度は 2030 年、Catchment1 事業の Design Horizon は 2070 年	2070 年は過剰では？
3	インターセプター方式は Catchment 1 では不採用。CWASA と BUET・CUET と協議のうえで決定。以下の事項を考慮したとのこと。 • 海・河川からの海水の流入 • 工場廃水の下水道への流入 • Drainage は CCC の所管であること	各戸接続を進めるため、 • Public Awareness Activities が必要（世銀対応）。 • 各戸接続を義務化する条例の制定が必要と思われる。
4	分流式を採用する。Catchment-1 の入札図書で示されている接続数は、3Package で、10,000+10,000+6,000 接続。管路建設中に並行して各戸接続を建設する予定。 Catchment-1 事業で枝線を全て整備し、事業後に CWASA 自己資金で残りの House Connection を整備するとのこと	
5	Catchment1,5,6 処理場は統合することで決定。	AFD と丸紅は了解しているのか？ （本件には我々は関与しない予定）
6	Catchment 2,4 の統合の是非を要検討	統合する方針となった場合、JICA が手を上げなければ WB が実施する可能性が高いと思われる。 統合しない場合、片方の Catchment は WB、もう片方は JICA の支援が望ましいと思われる。JICA が準備調査の実施を受け入れられるか否か、ご意見を伺いたい。
7	処理方式は A2O を採用。現地基準よりも厳しい放流水質基準を課している。	• 下水処理場の流入下水が少ない場合の初期対応の検討が必要。 • 処理場の運転管理が困難であり OM トレーニングが必須 （いずれも Catchment-1 コンサルタント）
8	Fecal Sludge 処理施設は Catchment 1 処理場に建設予定。	今後の施設整備、マネジメントは世銀案件で検討する予定。
9	各ドナーが事業実施支援、キャパビルサービス	今後各コンサルタントと調整するためにも、本ア

	を予定しており、重複は避けられない	ドバイザー業務で実施するスコープを決定する。

３．CWASA からの要望

- 現在の MP では現実的でない箇所のアップデート
- Catchment-2,4 のプレ FS・FS：少なくとも 1 処理区の FS は WB が行う予定
  （優先順位は Catchment1→２→４→３の順）
- 水道 MP の策定

４．作業計画案（別紙）

（１）作業内容変更

- **活動 1-4：新たな下水道事業計画の策定支援**：CWASA はコンサルタントの発注経験が豊富であり、かつ Catchment1,5 での下水道 FS でのコンサルタント調達も行っているため、コンサルタント TOR を作成してもあまり能力向上にはつながらない。
  ➔代替案：要望のあった Catchment2,4 のプレ FS を実施する。MP レビューの一環で既に処理場用地の確認作業を実施しているため、その延長線上でプレ FS が求められている。作業量は大幅に増加するが、CWASA が下水道事業を進めるためには必要なスコープと判断し、実施することを提案したい。
- **活動 2-2：CWASA の設計・施工監理能力の向上支援：**Catchment-1 事業の入札は大きく遅れており、現時点では P1 の入札評価状況。Catchment-1 の詳細設計は、入札段階で提案されるものであり、入札評価段階で Bidder の図面の開示ができない状況。コントラクターは選定された後、1 年以内に施工図の作成→コンサルタントによる承認後、建設工事を行うことになる。従って設計をレビューする作業は Catchment-1 コンサルタント（と CWASA 職員）によって実施されるものであり、我々の関与は望まれていない。一方、施工監理も本業務実施機関では造成程度迄となる可能性もあり（現時点ではスケジュール未定）、本スコープが実施できる確証がない。
  ➔代替案：入札図書、図面などをレビューし改善提案を行うにとどめ、Catchment-1 の知見を活用し、かつ先述の改善提案を踏まえた Catchment-2、4 の Pre-FS 策定作業を通じて、下水道計画策定能力向上を図る。

（２）作業実施方法

- 職員は全て複数案件を兼務する体制であり、本件への専従は不可能。従って CWASA 職員主体に作業を進めてもらうことは困難であり、コンサルタントと一緒に活動を行うことで、その経験・ノウハウを移管することに方針転換したい。このため、アサインは極力現地にいられる期間を長くすることとして、複数名の重複アサインを極力減らす方針とする。（単独での現地入りを認めていただきたい）
- アサインが短期間であることから、渡航前後の隔離期間の負担が大きい。可能であれば渡航後隔離期間を短縮する対応が検討できないか。

組織・制度関係の活動報告（1/2）

2021.10.6

1．KWSPの実施状況（Nurul Amin氏ヒアリング）

- 事業スコープは、浄水場、送配水管、配水池、給水管、メーター、宅内配管のすべてを包含。
- PIUはPD、DPD、エンジニア20名（XEN３名、AE5名、SAE12名）、事務2名、庶務2名の計26名で組成、CWASA本部外に独立事務所がある。
- 住民広報について、CWASAのPR課は断水時等のプレス発表のみを担当。他の住民説明はコントラクターが実施。
- 新規接続の申し込み、接続料支払い、許可の一連の手続きは、既存の給水区域と同様にCitizen Charterの手続きに従って申込者の申請に基づき実施。CWASA営業課が窓口。

→下水道はすべて新規接続となるため、営業課がパンクする可能性がある。MODへの分権化の検討余地あり。

- 宅内接続工事（既存給水栓の更新を含む）完了後は、PIUが設計・施工監理コンサルタントとコントラクターとともに現場確認。

→下水道では、プロジェクト完工後の対応能力を涵養するため、MOD配属の配管工を計画的に立ち会わせることが望ましい。

1

組織・制度関係の活動報告（2/2）

2．諸規程の収集

① 「CWASA Employee Service Regulation, 2020」（ベンガル語）について、2014年版（収集・翻訳済み）との比較対照作業中。これをもとに2020年版の英訳を作成予定。

② 「Levy on Water and Sewage Ordinance 2011」（ドラフト版の収集・仮訳済み）について最終版（ベンガル語）を入手、ドラフト版の仮訳と比較し最終版の英訳を作成中。

③ 「CWASA Water Connection and Levy on Water Rate Rules 2011」（ベンガル語、収集済み）
→上記法令②と下記④のDWASA規則との比較対照作業を実施し、英訳を作成予定。

④ 「DWASA Water and Sewerage Connection Regulations 2011」（収集・翻訳済み）の下水道関係部分について、CWASA規則③に移植することを念頭に妥当性を検討中。

⑤ 「CWASA Citizen Charter」（収集・翻訳済み）について、最新版（ベンガル語）を入手。翻訳済みの旧版と比較対照し、最新版の英訳を作成予定。

⑥ 「DWASA Customer's Guideline」（収集・翻訳済み）の下水道関係部分について、CWASA規則⑤に移植することを念頭に妥当性を検討中。

3．人事関連

① 2016-2021年に実施した研修リストを入手。研修プログラム名のみで、期間、参加者等の情報がないため、追加提供を依頼中。

② 職員データベースは、Excelベースでのアップデートが2016年以降行われていないことを確認。

③ 職位別の定員数、実数、空席数のリストを入手。定数1,048に対し実数624、空席424。

2021/9/

2

議　事　録

件　　名	バングラデシュ国都市衛生改善アドバイザー業務				
日　　時	2021 年 10 月 6 日（水）	自 13：30～至 14：30			
出席者	JICA（役職名略）	南アジア部：中丸 地球環境部：保坂			
	日本工営	西川、玉眞、田村			
打ち合わせ場所	Teams	記録作成者	田村	承認	
打合せ事項	現地業務の経過報告、 ワークプラン修正案、スケジュール案				
資料	1. 状況報告 2. 活動成果案、スケジュール案				

打　合　せ　事　項	対　策　・　合　意　事　項　等
1. 現地活動の方針等について	1. CWASA の案件実施状況 (1) 水道 (2) 下水道 Catchment-2 の STP 用地：代替用地のメドが立ちそう Catchment-4 の STP 用地：最新情報を CDA に確認中 *=>打合せ後、MP で提案されている用地は別の開発計画があることが判明し、CDA に代替用地を紹介された。* 西川：CWASA は、Catchment-2 と 4 双方の処理場用地を早期に確定し収用手続きを始めたいと考えており、そのために処理場の規模やレイアウト（事業費は不要）を添付して都市計画部門に申請をあげておきたい意向。この目的のために本業務でプレ FS の実施（2 ヶ月間程度）を打診されている。 2. 想定される課題と対応 西川：MP の見直しにおいて、Catchment-1 の計画時に行った人口予測は過大である可能性もあるため、次回センサスが出てから検証することが必要。次回センサスの時期が未定であるため、Catchment-2,4 の計画では、現状の Catchment-1 の人口予測を用いる予定。 3. CWASA からの要望 CWASA は Catchment-2～6 の Preliminary Development Project Proforma (PDPP)を作成済。 Development Project Proforma (DPP)には FS が必要であり、CWASA は Catchment-2 or 4 の FS を JICA に支援してもらいたい状況である。 中丸氏：世銀の FS のスケジュールは？また、MP における Catchment-2 と 4 の完工時期の目標は？ 西川：世銀の FS は 2023 年第一四半期に着手し、6 ヶ月で終わらせる予定。また MP では Catchment-1 と 2 が優先整備とされ、Catchment-1 は Phase-1 が 2023 年供用開始、Phase-2 が 2030 年供用開始、Catchment-2 は 2030 年供用開始と計画されている。Catchment-4 はそれ以降となる計画。

	4. 作業計画案 保坂氏：JICA としては CWASA の下水整備計画がここまで進捗しているとは把握しておらず、具体的なプロジェクト形成は考えていなかったが、既に各ドナーが競って支援を始めている中で CWASA との関係性を繋ぐという意味で、なんらかのことを考える必要があると思われる。 中丸氏：Catchment-2 or 4 の協力準備調査については、バングラは円借款案件が多く詰まっており何でも出せる状態にはないが、プレ FS と FS の検討内容とスケジュールを明確にした上で CWASA から要望書が提出されれば可能性もなくはない。この際 CWASA のコミットメントが必要となるので、南アジア部が CWASA に出向いて確認することもありうる。一般論として協力準備調査の開始から L/A 締結までには最短で 1 年半は要する。別のオプションとして世銀との協調融資も考えられる。 保坂氏：今回の Work Plan の方向性について課長に報告し、その結果を 8 日（金）に連絡する。 西川：Work Plan の修正案について、10 日（日）もしくは 11 日（月）午前のワークショップで合意する予定 西川：STP-4 の用地確保がクリティカルになっている。その確保が難航している場合、西川は今回の現地業務を延長して対応することも考えている。 保坂、西川：Work Plan の大幅変更（追加）の場合、契約変更（MM 追加等）を考える必要がある。しかし当面必要な対応（Catchment-2,4 の Pre-FS 等）については MM の前倒しで実施する。ただし、インプットとアウトプットが明確な準備調査等とは異なり、アドバイザー業務として内容がふわっとしている中で業務量の増加に伴う MM 追加は、JICA 内部で説明が難しいかもしれない。 保坂：14 日の帰国後、20 日の週に帰国報告・打合せを行いたい。 *＝＞西川：承知した。* 以上

2021/10/26　日本工営株式会社

バングラデシュ国都市衛生改善アドバイザー
状況報告

１．CWASA の案件実施状況

（1）水道

- 水道事業の予定案件は以下の通り。
  - JICA: KWSP-2 (On-going)
  - WB: Chattogram Water Supply Improvement and Sanitation Project - II (Planned)

（2）下水道

- 各処理区の状況は以下の通り。

処理区	コンサル（資金）	状況
1	ERINCO（自己資金）	P1：技術評価中（6 社/40 社：韓国×１、中国×５） P2：まだ技術評価が始まっていない（２社） P3：まだ技術評価が始まっていない（３社） ＊契約はデザインビルドで、応札者は自らの実施設計に基づくコスト積算が求められている。支払いはランプサムとなり、契約後の金額変更は困難。応札者は、入札時に膨大な実施設計・積算作業を求められるとともに、特に管路施設についてかなりの建設時のリスクを考慮する必要がある。
5	？（AFD）	まもなくコンサルタントが FS を始める（契約締結済み）
6	丸紅（丸紅）	2022 年 3 月までに Pre-FS を実施し、事業実施判断。 PPP 事業を進めるなら 2022 年内の PPP Authority の事業承認を目指す。
3	？（EDCF？）	韓国と基本合意の中で、本件支援が推奨されているが正式に決まってはいない。 （コンサルタント調達中との情報もあったが未だ動きはない模様）
2	－	処理場用地の制約があり案件が進められていなかったが、用地の制約に目途が立ちこの FS の実施が求められている。 上記 WB 案件（Chattogram Water Supply Improvement and Sanitation Project – II）にて 1 処理区（場所未確定）の FS を実施することが決まっている。JICA 側で先行してプレ FS を実施することが要望されている状況
4	－	

＊ 2023 年は選挙により承認事項が進まないため、CWASA は 2022 年内に必要な手続きを済ませるように急ぐことを望んでいる状況

２．MP 及び Catchment-1 事業レビュー結果

- MP と Catchment-1 事業のレビュー・ヒアリング結果見直したワークプランを最終のプログレスミーティングで報告した。報告原稿は別紙 PPT のとおり

（レビュー結果抜粋）

- 目標年度：MP は 2030 年、Catchment-1 は 2070 年。30 年後、50 年後のいずれにするか要協議
- 人口予測：現状と乖離しており今回の CENSUS の結果に基づいて見直す
- 事業実施優先度：要検討だが、上述の通り各 Catchment とも事業実施予定（我々は KWSP 地区の優先度は高いと判断）

2021/10/26　日本工営株式会社

- 下水量算定：計算方法に問題ないが、分流式を採用しているため初期の水量少→家屋接続の促進が重要となる＋汚濁濃度低→下水処理（高度処理）への影響が懸念される
- 汚水収集方式：MP ではインターセプター方式＋分流式→段階的に分流式に移行することを提案。Catchment-1 では分流式（インターセプターは不採用）
- 処理場容量：目標年度、人口予測の見直し結果再検討を要する
- 処理場用地：本問題で Catchment-2,4 の事業がすすめられなかったが、Catchment-2 は目途がつき、用地取得申請に移りたいとのこと。JET はプレ FS として処理場のレイアウト作成までを支援して、用地取得手続きを進めることを支援する。（STP-2,4 の統合を前提とする）
- 処理方式：MP では散水ろ床、Catchment-1 事業では A_2O を採用。A_2O は過剰では？
- （セプティックタンク）汚泥処理施設：Catchment-1 事業で建設予定。汚泥収集管理は今後の世銀事業で検討される予定。
- 事業費：計画緒元や処理方式の見直しに伴いアップデートが必要
- 組織：下水組織の立ち上げ段階。世銀も支援予定

３．作業計画案（別紙）

（１）作業内容変更

- **活動 1-4：新たな下水道事業計画の策定支援**：CWASA はコンサルタントの発注経験が豊富であり、かつ Catchment1,5 での下水道 FS でのコンサルタント調達も行っているため、コンサルタント TOR を作成しても能力向上は期待できない。

  ➔代替案：要望のあった Catchment2,4 のプレ FS を実施する。MP レビューの一環で既に処理場用地の確認作業を実施しているため、その用地取得手続き支援が求められている。CWASA 職員を指導しながら進めることから、処理場レイアウトの作成までと判断。
- **活動 2-2：CWASA の設計・施工監理能力の向上支援：**Catchment-1 事業の入札は大きく遅れており、現時点では P1 の入札評価の状況。Catchment-1 の詳細設計は、入札段階で提案されるものであり、入札評価段階で Bidder の図面の開示ができない状況。コントラクター選定後、1 年以内に施工図の作成→コンサルタントによる承認後、建設工事を行うことになる。施工監理も現時点ではスケジュール未定であり、本アドバイザー期間に行われる確証がない。

  ➔代替案：入札図書、図面などをレビューし改善提案を行うにとどめ、Catchment-1 の図書のレビュー→生じうる問題点と改善策の提案とする。また、先述の Catchment-2・4 の Pre-FS 策定、MP アップデート作業を通じて、下水道計画策定能力向上を図る。

４．CWASA からの要望

- 現在の MP では現実的でない箇所のアップデート
- Catchment-2,4 のプレ FS・FS：少なくとも 1 処理区の FS は WB が行う予定
- Catchment-3 事業についてもレビューしてほしい：優先順位の検討迄
- Fecal sludge management についてもアドバイザーを期待する
  （Catchment-1 事業で汚泥処理施設を建設し、汚泥収集管理を行う必要があるため）

議　事　録

件　　名	バングラデシュ国都市衛生改善アドバイザー業務				
日　　時	2021 年 10 月 26 日（火）		自 11：30～至 12：40		
出席者 JICA（役職名略）	地球環境部：松岡、保坂、高橋 南アジア部：中丸、吉田 バングラデシュ事務所：佐伯				
出席者 日本工営	西川、田村、玉眞				
打ち合わせ場所	Teams	記録作成者	玉眞	承認	
打合せ事項	第 1 回現地業務報告				
資料	1. 活動報告資料 2. 現地 progress meeting 資料と M/M				

打合せ事項	対　策　・　合　意　事　項　等
1. 現地業務報告と討議	日本工営から資料を用いて第一回現地活動の要点を説明し、討議を行った。 (1) 地球環境部（松岡課長） • Catchment-2 と 4 のプレ FS を実施するスコープ変更について、専門家派遣の目的は先方の能力強化であり、プレ FS を一緒に作りながら先方の能力を高める点に留意してほしい。 • CWASA では 6 処理区全てについて整備に向けた活動を精力的に開始しているとのことであるが、人員が揃っているのか。これまで上水のみ所掌しており、下水分野の職員は充足されており、専門家の技術移転先が整っていると言えるか。 →人員体制の構築の必要性は CWASA も認識しており、下水組織を立ち上げるため、下水部門の CE（Chief Engineer、additional）の配置について CWASA 理事会の承認済みで国に申請中である。ただし、その下の組織はペンディングでこれから検討するとのこと。（西川主任） →M/P で想定している人員体制は、設計・施工監理段階までは少ないが O&M 段階から一気に増やす計画となっており、CWASA もこれに沿って一気に大きくできると考えている節がある。設計・施工は DB でコントラクターに責任を負わせれば良いという感覚があるようで、中国・韓国のコントラクターで本当に大丈夫か、今後の推移を見守る必要がある。ただし、CWASA はまだ課題に直面していないため、現在指摘しても響かない可能性がある。（西川主任） • 処理場用地の確保は CWASA の責任であるところ、Catchment-4 の用地についてどれ位汗をかいて探そうとしているのか。 →CDA との協議には CWASA 職員を同行させており、専門家として無理やり引っ張り出すよう支援したつもりである。ただ CWASA 単独での技術的検討は難しいため、専門家の支援は必要。CDA の協議後は担当エンジニアと一緒に CE に報告しており、今後は専門家と一緒に活動する C/P 担当者を任命してもらう手筈になっている。（西川主任） • Catchment-1 で高度処理を行う点について、既に入札中で見直しは難しいだろうが、初めての下水で高度処理をやっていけるか疑問。運営が PPP なので大丈夫といった想定か。 →これは現地での Progress Meeting でも指摘した点である。無終端水路の OD 方式で、開度調整で嫌気・無酸素を実現するとのことで、次回図面を見せて

もらう予定となっている。仮に高度処理ができなかったとしても、OD 法と同等と考えれば放流水質基準は満たせ、初期の小水量対策さえ講じれば問題ない可能性もある（初期は流入下水濃度が薄い可能性があり、活性汚泥が保持できるか懸念がある）。（西川主任）

→PPP については、Catchment-6 では O&M は CWASA が引き取ると考えているようであるが詳細は未定であり、次回の宿題とさせてほしい（西川主任）。

→先方がその気になっているものをダメとは言えないが、ウォッチしてほしい。高度処理は電気代も嵩むと認識しており、O&M 費用の増加や財務能力も一緒に考えてほしい。（松岡課長）

- 市内全域の下水道概成はまだまだ先となり、分散型をどう位置付けていくか。重要性はまだまだあるはずで、これを専門家業務の中でどのように位置づけるか。

→M/P では、集合処理区域と Septic Tank による分散型収集処理区域に分割しており、市内に複数のし尿処理場を作る計画となっている（Catchment-1 処理場の中に一か所が含まれる）。（西川主任）

(2) 南アジア部（中丸）

- プレ FS では DPP（ドラフト DPP と思われる）の作成を支援し、CWASA が土地収用の申請を行うとの説明であった。プレ FS という用語は色々なインフラ事業で使われるが、今回はどこまでやるのか。またドラフト DPP に必要な情報は何で、FS 段階でも良い情報とは何か。また、プレ FS の策定支援はいつ頃までを予定するか。

→ドラフト DPP（PDPP）は CWASA で M/P をもとに策定・提出済みであり、今後は土地取得手続きに入るため DPP が必要となる、との CWASA の話であった。側方支援で時間も限られており、あまり欲張っても多くはできないため、①必要な土地の境界、②計画の目標年次、③人口予測、④下水量予測、⑤下水処理場の必要容量、⑥処理方式、⑦レイアウトに絞る予定である。事業費や幹線ルートは M/P を踏襲し、プレ FS で見直しは行わない。（西川主任）

→CWASA の希望は 1～2 ヶ月でプレ FS を仕上げ、2023 年の選挙に備えて 2022 年までに土地収用手続きを終えたいとのことであった。次回 11～12 月の 3 週間の派遣期間で土地のレイアウトプランまでは仕上げたい。広めの土地が良いのは間違いないため、今後の詳細検討を前提として、まずは Catchment-1 の検討をベースに 2070 年の予測値に合わせて境界を決定し、1 回レイアウトを作ってみる考えである。最新センサスの速報データは 12 月の頭に公表される予定であるが、何回か修正されるとのことで、確定値は来年となる見込みである。このため、新しいセンサスに基づいたレビューは M/P レビューとして来年行う。（西川主任）

- 先般バングラでは、ワクチン接種証明あれば現地隔離は不要となった。本業務の現地活動がうまく行くことを願っている。

(3) 南アジア部（吉田）

- CWASA は DPP の提出後に Catchment-2 と 4 の土地取得を進めたい意向と理解した。当該処理区は、JICA の資金協力の候補となりうる一方、世銀も関心を持つ可能性がある。ファイナンスがつく可能性がある一方で、土地取得が進められてしまい、Safeguard 面の検討が不備でドナー資金が得られない可能性がある。世銀の Safeguard Policy の取扱いについて、世銀と既に調整したか、プレ FS で世銀と調整する予定か。

→世銀がこの処理区を狙っているのかも不確定な状況下で、Safeguard 面での調整は考えていなかった。必要であれば世銀側と調整するので指示してほしい。（西川主任）

→特に現時点で調整という話ではないかも知れない。なお、民間の土地の買収手続きを始めるのであれば、少なくとも JICA ガイドラインとの整合は

	取っておくよう、今から考えておくべきである。（吉田） • 課題部では、この点について審査部等とこれまで話をしたか。 →そこまで至っていない。（保坂） • Catchment-2 と 4 の 30ha の処理場予定地は、低地で現在誰も住んでいないのか。実態としてどういう土地なのか。 →現在は誰も住んでおらず、牛が放牧されているような土地である。都市計画上は大学の建設予定地の位置づけであったが、位置が変更され、従来の処理場予定地と入れ替わる形となった。都市計画部門としても反対しないとのことであった。環状道路ができるまでは雨が冠水するような土地だったようで、南側はスラムでアクセスが不便、北側工業団地からはアクセスが可能である。環状道路から分岐してアクセス道路を提案できる可能性もある。CDA も CWASA も私有地と言っていた。（西川主任） • CWASA が下水整備に積極的とのことであるが、Catchment-1 を自己資金でこれから整備、AFD、韓国も資金供与を準備中で、すべて計画どおりに行かないとしても、Catchment-2 と 4 を含めて同時並行で実施することとなり、CWASA 実施能力に疑問がある。これまで下水道の経験がない中で、厳しいのではないか。 →資金面で見ると、Catchment-1 は GoB がグラントで建設資金の全額を拠出することとなっており、CWASA は O&M 費を料金で賄うだけで良い。CWASA は、すべての処理区で GoB が建設費を出すことを前提としているようで、本当に担保されるのか確認は必要と考える。家屋接続を増やす必要もあるが、住民の反発も多いと考えられ、分流式ベースかインターセプターのオプションを認めるかも考えていく必要がある。（西川主任） →CAPEX を含めて CWASA が負担するとなると消極的になる可能性は？また、M/P や中央政府の政策に書かれたものがある訳ではなく、CWASA が主張しているだけか。（吉田） →CWASA は中央政府が面倒を見てくれる前提で話を進めている、今 CWASA と話すだけでは確証は得られない。（西川主任） →次回以降、意見交換の機会があったら教えてほしい。（吉田） →人員面で見ると、KWSP に人員を集めている中で、下水道に必要な体制を作るのは簡単でないと思う。現在の下水道要員は Catchment-1 のプロジェクトチームだけで、どの程度人数が必要かは今後の検討課題である。（西川主任） 以上

バングラデシュ国
都市衛生改善アドバイザー業務

第三回渡航前会議、進捗報告

2022年3月

日本工営株式会社

会議の概要

1．修正ワークプランと現在迄の活動状況

2．各成果における現在までの活動及び第3回渡航での活動内容

（渡航予定：2022年3月5日～4月2日：前半：西川、後半：田村）

3．質疑応答・意見交換

2

１．修正ワークプランと現在迄の活動状況

業務概要

（１）プロジェクト目標

チョットグラム市下水道事業に係る現状の課題の整理に基づき、下水道事業の計画と運用に必要な能力が強化される。

（２）期待される成果

成果１：下水道事業の政策・計画策定に係る能力が向上し、新たな下水道整備事業の計画が促進される

成果２：下水道整備対象区域内の状況に応じた適用可能な技術を理解し、下水道施設の設計・建設に係る能力が向上する。

（３）活動の概要

活動1-1：既存のサニテーションマスタープラン及び実施中のPESSCM- 1事業のレビュー

活動1-2：下水道整備事業の計画促進に向けた組織体制の課題整理を支援

活動1-3：下水道整備事業の計画促進に向けた財務体制の課題整理を支援

活動1-4：新たな下水道整備事業計画の作成に係る支援

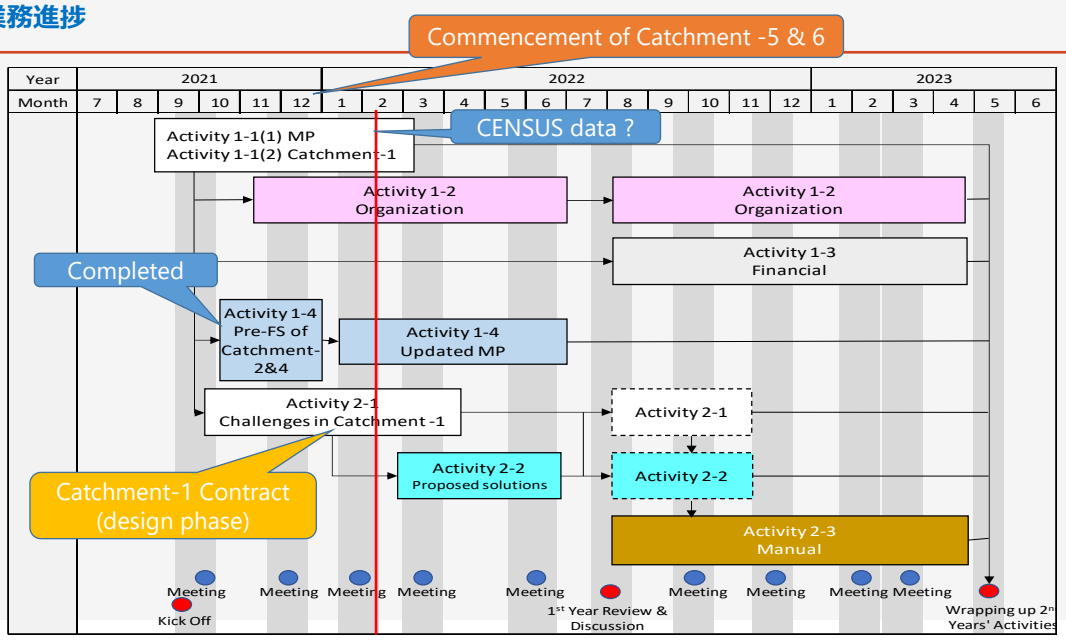
活動2-1：PESSCM- 1事業の計画を基に、設計時や建設時に想定される課題整理を支援

活動2-2：整理された課題の解決策を通じてCWASAの設計・施工監理能力の向上を支援

活動2-3：下水道施設の設計指針、技術基準、マニュアル等の策定に係る支援

4

業務進捗



5

＊会議では説明を省略します

成果-1: 下水道整備の政策・計画策定に係る能力向上、新たな下水道整備事業の計画促進
活動1-1: 既存マスタープラン及びCatchment-1事業計画のレビュー

成果文書 1-1 (1):既存マスタープランのレビュー

1. 都市計画と土地利用計画の確認
2. 人口予測アップデートの必要性確認
3. STP-2, 4処理区の下水処理施設の用地取得可能性の確認
4. 各下水処理施設の位置確認
5. 事業実施スケジュールの策定
6. 改訂された施設計画・下水処理計画に基づく概算事業費の改定

成果文書 1-1 (2):Catchment-1事業計画のレビュー

1. 計画諸元
2. 下水収集計画
   計画条件、地形モデル、下水収集コンセプト、下水収集系統、施設概略設計
3. 下水処理計画
   計画下水量、計画流入水質、処理方法選定、施設概略設計
4. 屎尿・汚泥の収集・処理計画

＊ 赤字: 実施済

6

＊会議では説明を省略します

成果-1: 下水道整備の政策・計画策定に係る能力向上、新たな下水道整備事業の計画促進
活動1-2: 組織体制の課題整理支援、活動1-3：財務体制の課題整理支援

成果文書 1-2:

1. KWSP事業のPIU組織体制及び活動内容のレビュー、及び下水マスタープランで計画されている組織体制、Catchment-1事業におけるPPSのレビュー
2. 下水道事業特有の事業実施フロー
3. CWASA規則の改定案
   3.1 CWASA Citizen Charter
   3.2 CWASA 各戸接続規則及び下水道料金制度(2011)
   3.2 CWASA 従業員の就業規則 (2020)
4. CWASA の下水道実施のための組織図（案）

成果文書 1-3:

1. マスタープランとCatchment-1事業における概算事業費とコスト回収計画
2. Catchments 2- 6事業の資金調達計画と課題
3. 投資コスト回収のための料金検討
4. 補助金案の検討

＊ 赤字: 実施済 7

＊会議では説明を省略します

成果-1: 下水道整備の政策・計画策定に係る能力向上、新たな下水道整備事業の計画促進
活動 1-4: 新たな下水道整備事業計画の作成支援

成果文書 1-4: Catchment 2&4 事業実施計画 (Pre-FS 及び土地収用のためのDPP)

1. 下水処理場用地の確認
2. 計画年次の設定 (2050 or 2070?)
3. 人口予測 (Catchment-1事業計画に準じる)
4. 汚水量予測と処理場能力の設定
5. 下水処理方式 (Catchment-1事業に準じる(暫定))
6. 下水処理場施設レイアウト計画 (Catchment-1事業に準じる(暫定))

＊上記に基づき土地収用のためのDPP（Detailed Project Proforma）が作成されている。
関係省に提出するためにCWASAにて最終化中。
＊ポンプ場の土地取得については未だ含まれていないが、FSにてポンプ場用地が
定まったら、土地取得手続きを進められるよう、この予算を含めている。

＊ 赤字: 実施済 8

*会議では説明を省略します

成果-2: 整備対象区域の状況に応じた下水道施設の設計・建設に係る能力向上
活動 2-1: Catchment-1事業における設計・建設時の課題整理の支援
活動 2-2: 上記課題解決策を通じた設計・施工監理能力向上の支援

成果文書 2-1: Catchment-1事業(PESSCM-1事業)における設計・施工監理上の課題

1. PESSCM-1の入札図書の内容確認
2. PESSCM-1のPIUの現在の組織体制
3. 過去に実施した事業(KWSP-1&2, PANI-1&2)からの教訓
4. PESSCM-1事業の設計・施工監理において想定される/顕在化した課題
   4.1 事業/契約管理における課題
   4.2 設計承認における課題
   4.3 施工監理における課題

成果文書 2-2: 課題への対応策

1. 事業/契約管理
   - 道路上の工事実施許可取得
   - 各戸接続工事の申請手続き等
2. 設計承認
   - 適切な各戸接続工事仕様
3. 施工監理
   - 各戸接続工事の検査手順等

* 赤字: 実施済 9

*会議では説明を省略します

成果-2: 整備対象区域の状況に応じた下水道施設の設計・建設に係る能力向上
活動 2-3: 下水道施設の設計指針、技術基準、マニュアルなどの策定に係る支援

成果文書 2-3: CWASAの下水道設計マニュアル（案）

1. 下水管渠設計ガイドライン
   - 計画及び概略設計手法
   - 管種の選定
2. 各戸接続工事の標準設計
3. 処理場の設計ガイドライン
   - 施設運転管理システムの設計
4. デザインビルド契約の契約管理ガイドライン
   - 適切な入札/契約図書

* 赤字: 実施済 10

全体スケジュール

	Position	Name	Rank	2021 6	7	8	9	10	11	12	2022 1	2	3	4	5	6	7	8	9	10	11	12	2023 1	2	3	4	5	6	Man Month Total BD	JP
Work in Bangladesh	1) Chief Advisor/ Sewage Treatment Planning	Takamasa Nishikawa	2				28		22				22				22				22						10		4.20	
	2) Organization structure/ Financial Scheme	Toshihiko Tamama	4																21										0.70	
	3) Design/Construction supervision/ Maintenance of	Hidehisa Tamura	4				21						22			22							19							2.80	
													Ramadan & Eid												Ramadan & Eid				Sub-Total 7.70	
Work in Japan	1) Chief Advisor/ Sewage Treatment Planning	Takamasa Nishikawa	2	1	2	4	1	0.5			2			0.5	1	1	1		1	1			1	1		1		1		1.00
	2) Organization structure/ Financial Scheme	Toshihiko Tamama	4	1	2	3	4	2	1.5	11.5	2	2	2	2	2	2	2	1	2	2	2	2	1	1		2			2.60
	3) Design/Construction supervision/ Maintenance of	Hidehisa Tamura	4			3		1			1						2		1								2			0.50
																													Sub-Total 4.10	
Report				▲ ①	▲ ②		▲ ③		▲ ③		▲ ③		▲ ③		▲ ③		▲ ③		▲ ③		▲ ③		▲ ③		▲ ③		▲ ④⑤		Total 11.80	

11

2．各成果における現在までの活動及び第3回渡航での活動内容（専門家ごとに説明）

西川（業務主任・下水処理計画）

第1回渡航時(2021年9月～10月）・第2回渡航時(2021年11月～12月)の作業内容

- 全般:本業務の目的・実施計画を説明、ワークプランの修正協議
- 活動1-1に係る作業：Sanitation Master Planのレビュー
- 活動1-4に係る作業：Catchment-2,4に関するPre-FS
  ＊人口・汚水量予測／処理方式検討／処理場レイアウト検討
  ＊処理場用地取得申請書類（DPP）は現在CWASAにて最終化中

（成果は別添「プログレスミーティングPPT」にとりまとめている）

第3回渡航時(2022年3月)の作業予定

全般:　Catchment-1、Catchment-5コンサルタントとのミーティング
（キャパビルに関する作業内容の確認・デマケの提案）
活動1-1に係る作業: CENSUSレビュー、人口予測の修正提案、
MP（下水道整備）への影響検討
活動1-4に係る作業: DPPの要求事項の確認、協力準備調査内容の要求事項に対する提案

13

田村（設計・施工監理・維持管理）

第1回渡航時(2021年9月～10月)の作業内容

全般:キックオフミーティングにて本業務の目的・実施計画を説明
活動1-1に係る作業:
Catchment-1コンサルタントの成果物（設計報告書、入札図書）のクイックレビュー
活動2-1に係る作業:
上記レビューに基づく優先取組み課題の検討：
- 下水管渠計画策定手法の確認
- 各戸接続工事の標準仕様の設定
- デザインビルド契約の契約管理の留意事項

等が想定される。＝＞プログレスミーティングにて発表

第３、４回渡航時(2022年3月～4月、6月(予定))の作業予定

全般:　上記優先取組み課題についてCWASAとの協議
活動1-1に係る作業:　Catchment-1設計のレビュー報告書作成
活動2-1, 2-2に係る作業:　優先取組み課題選定についての協議、対応方針協議、作業実施

14

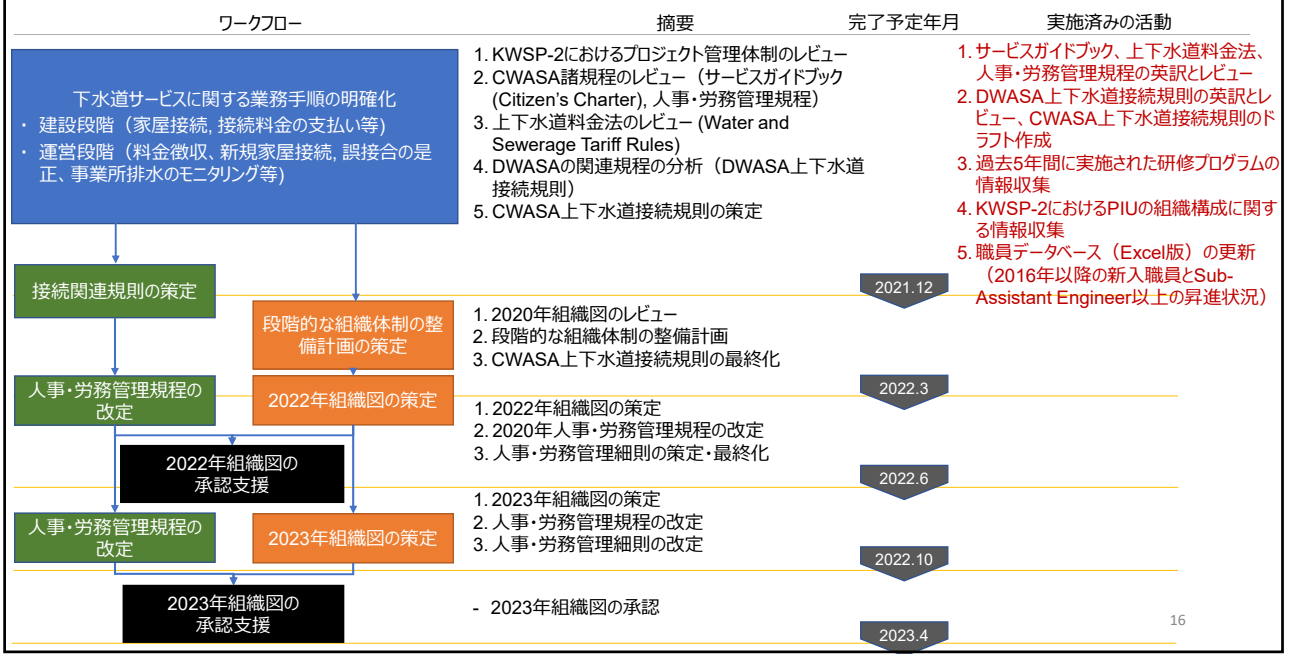
玉貢（組織体制・財務体制）

国内稼働(2021年8月～2022年1月)の作業内容

- コロナ禍の影響もあり、国内稼働にて対応中。
- 隔週のオンラインミーティングは、主に組織体制に関する活動協議
  - 第1回：2021年10月27日
  - 第2回：2021年11月10日
  - 第3回：2022年1月5日
  - 第4回：2022年2月2日
  - 第5回：2022年2月16日
  - 第6回：2022年3月2日
- 現在の活動の中心は、下水道事業実施を考慮した業務実施フロー・組織体制の検討（現在CWASA側も組織改定を急ぎたい模様）
- 次頁以降にこれまでの活動内容、今後の活動計画を詳述。

15

活動1-2（組織体制整備）に関する活動計画と進捗状況



16

CWASA上下水道接続規則（案）：目次

- DWASA接続規則をベースに、CWASAにおける水道・下水道の接続業務フローを確認／議論した結果を盛り込んだ。
- CWASAとの主な議論点は、①接続工事の実施主体、資材調達・費用負担者、②接続申し込み受付・接続料徴収・施工確認部署、③事業所排水の取扱い（除害施設の設置）。

下水マスタープランで提案された組織図

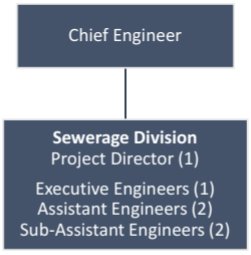


Figure 12-1: Proposed Organogram for CWASA Sewerage Division, Design and Construction Phase

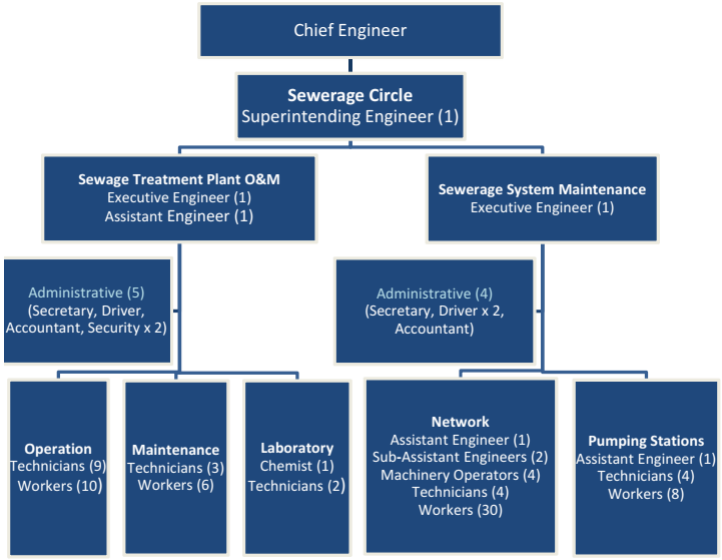
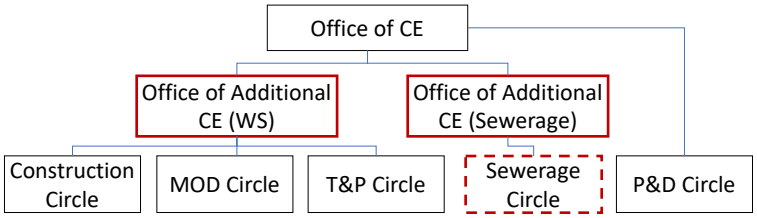


Figure 12-2: Proposed Organogram for CWASA Sewerage Circle, Operations Phase

CWASA2020年組織図

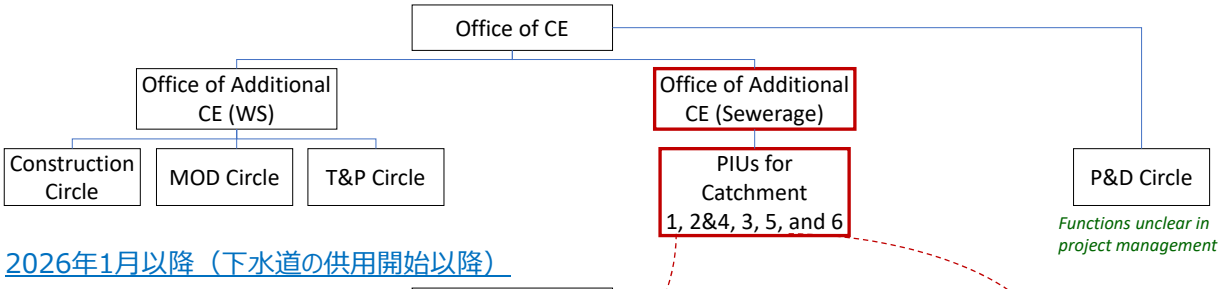
- CWASA理事会の承認済み、政府の承認待ち（現在縦覧中で、近日中に承認が下りる予定）
- 主な改定点：
  ① Chief Engineerの下に水道担当と下水道担当の各Additional Chief Engineerポストを新設。下水道担当部局（Sewerage Circle）の詳細は含まれていない。
  ② 職員の定員は、2016年組織図の1,048名が1,119名とされ、71名増。主に10級以上のキャリア組の人員を増強するもの。なお、2022年1月現在の職員数は607名（2020年組織図の定員に対し512名が空席）。
- KWSP-2のPIUスタッフ26名のうち契約職員21名は、正規職員として継続雇用予定。また人員増強に向けて大規模な新規採用を実施予定。



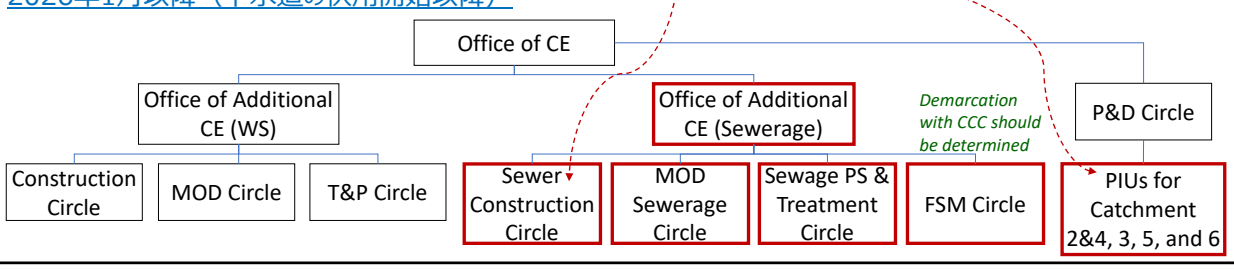
組織体制の２つのオプション（1/3）

❖オプション1：上水道サービスと下水道サービスを別部署で実施

第1処理区事業の完成まで（2025年末予定）



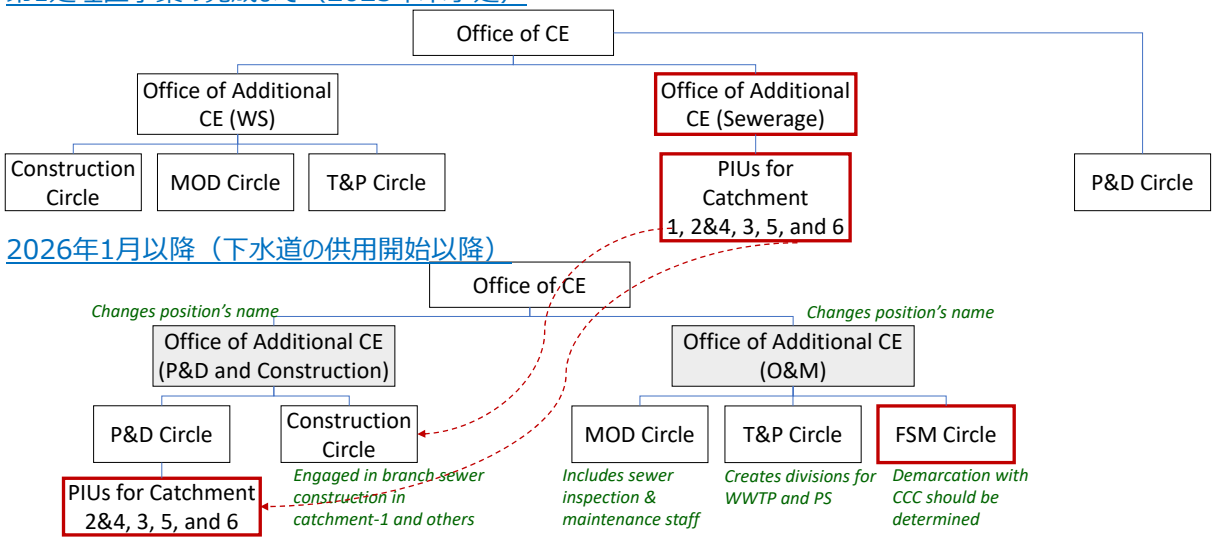
2026年1月以降（下水道の供用開始以降）



組織体制の２つのオプション（2/3）

❖オプション2：上下水道サービスの一体運営

第1処理区事業の完成まで（2025年末予定）

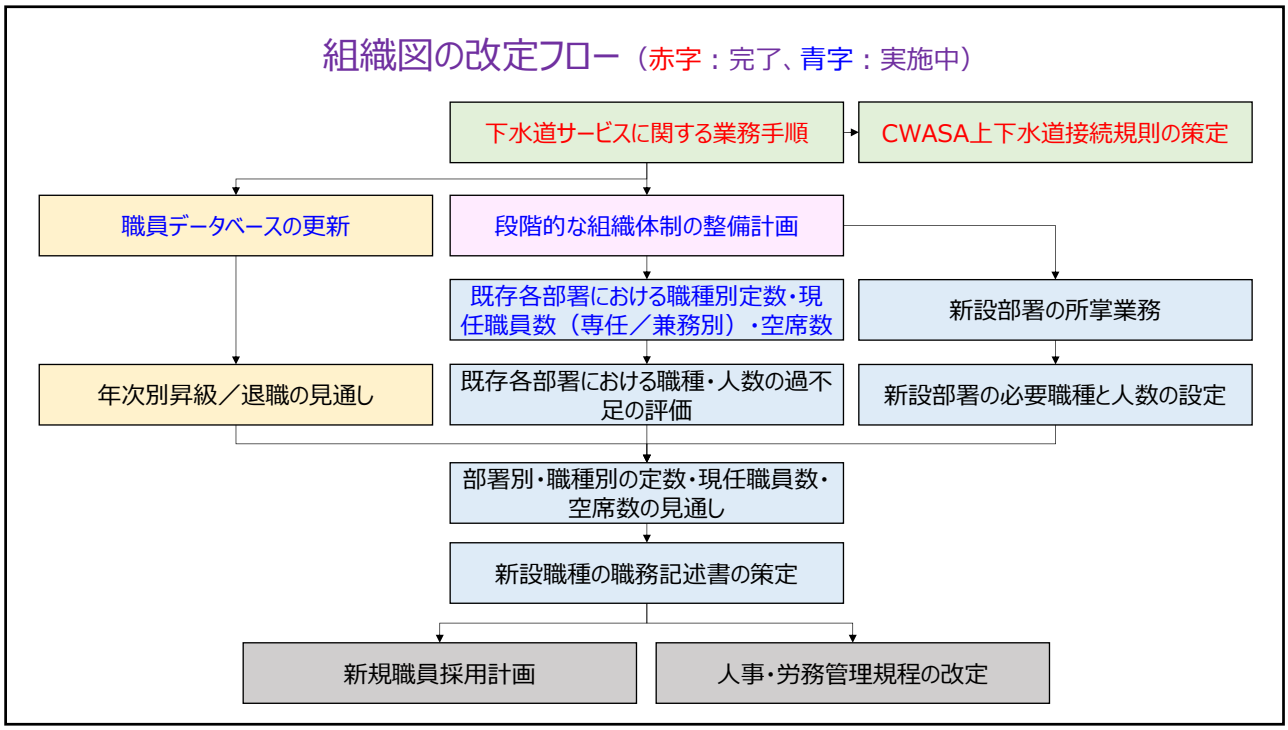


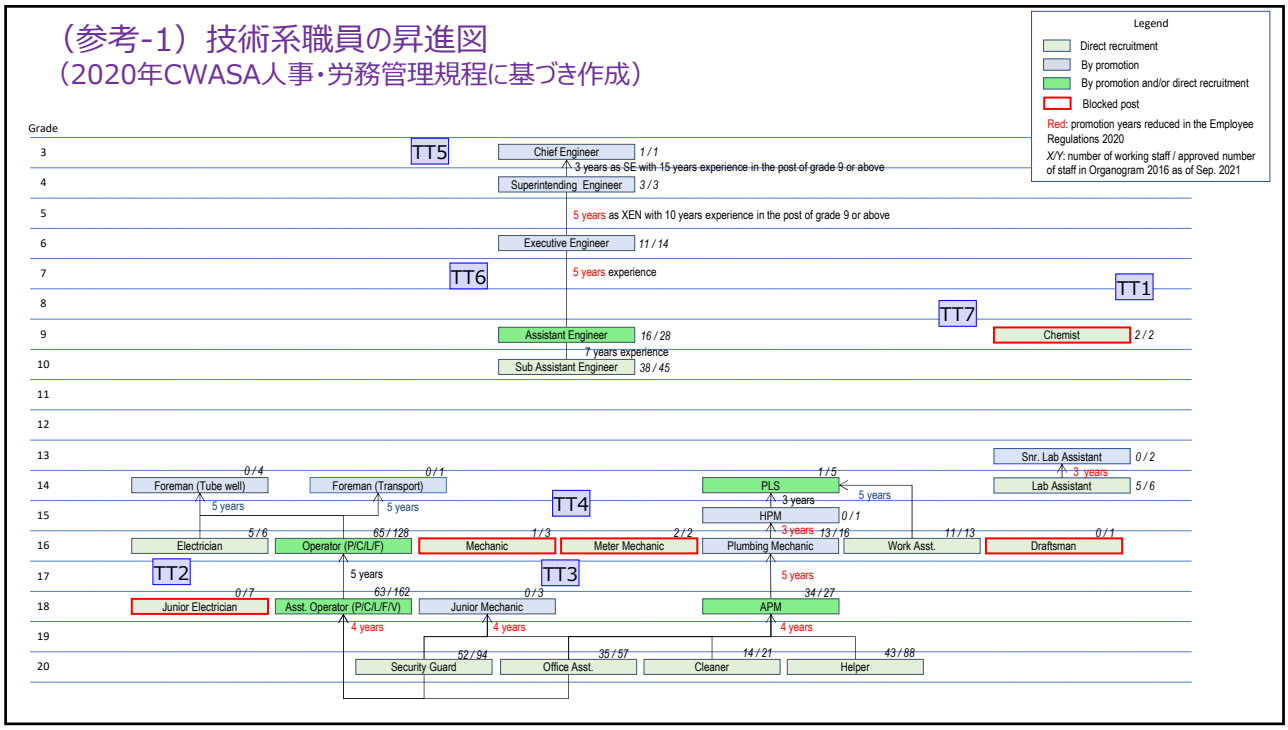
2026年1月以降（下水道の供用開始以降）

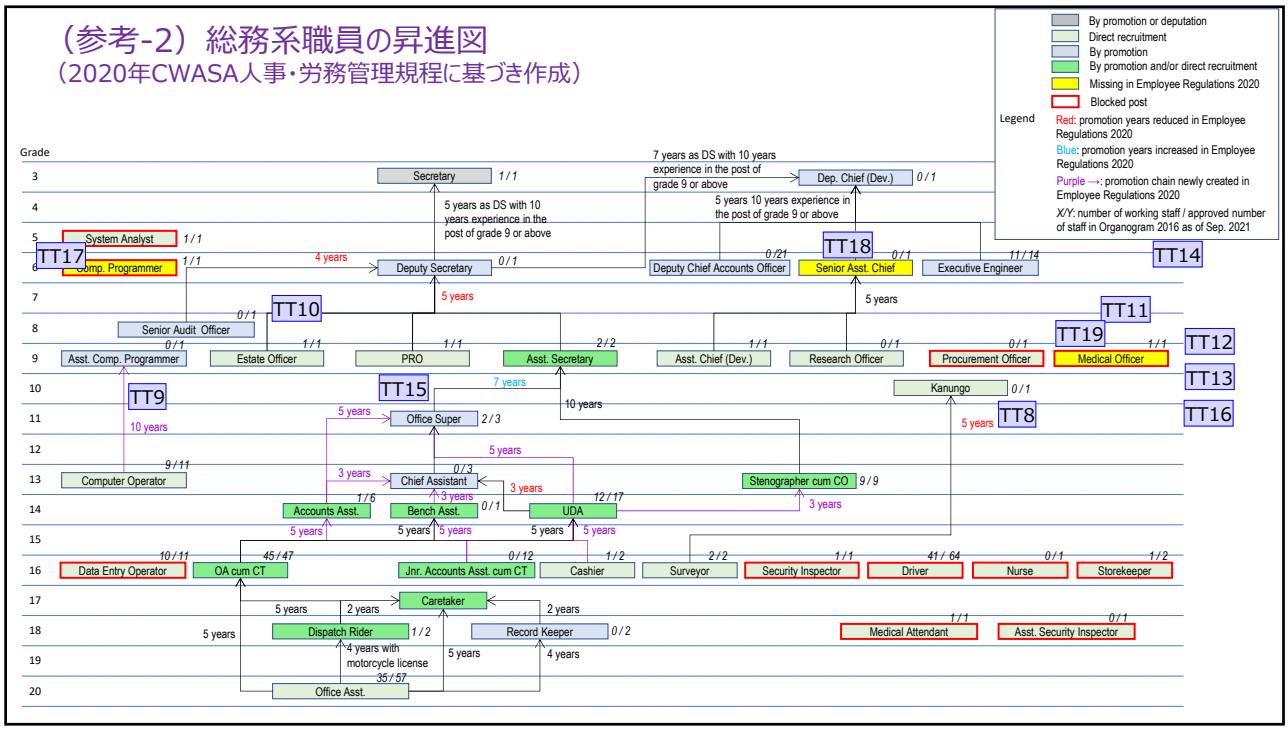
組織体制の２つのオプション（3/3）

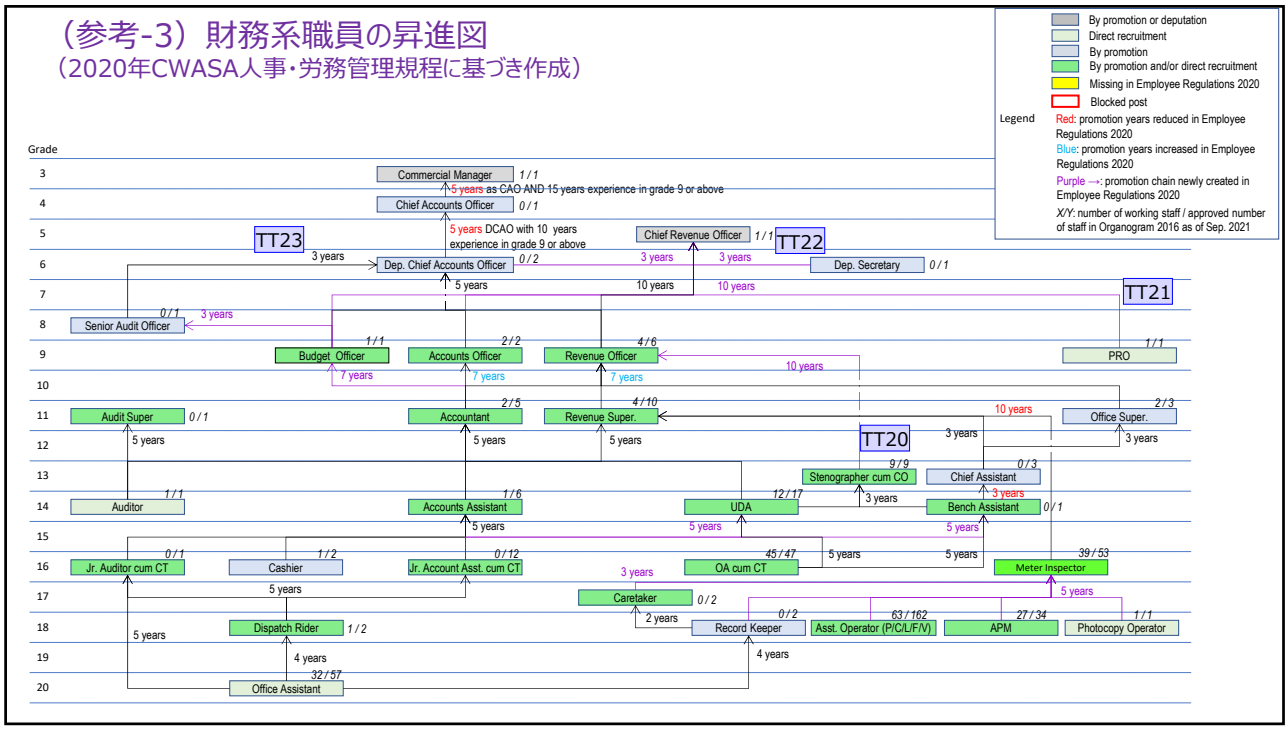
❖各オプションの得失比較（不利な点：赤字）

視点	Option 1	Option 2
運営上の柔軟性	2人のAdditional Chief EngineerがMODを共管するため、指示命令系統の混乱を招くほか、顧客への柔軟なワンストップサービスを提供する上で支障となる可能性あり。	各MODで柔軟な人員配置と車両配備が可能
顧客サービス		各MODで上下水道を統合したワンストップサービスを提供可能。
職能	下水道担当の新部署で新規採用を行うことで、経験のある職員を充当可能（ただし、バングラデシュでは下水道事業の経験を有する技術系職員は多くない可能性あり）。	- 下水道接続や排水設備工事について、既存の配管工のトレーニングが必要。 - 水道施設のO&Mについて、既存の技術職員が新規採用職員にOJTを施すことが可能。
管理職にかかる負担	第1処理区の供用開始後、下水道担当のAdditional Chief Engineerに過大な負担がかかる（供用開始した下水道施設のO&M、第1処理区内の枝線・家屋接続工事の継続等）。	第1処理区の供用開始後、O&M担当のAdditional Chief Engineerに過大な負担がかかる（水道施設と下水道施設のO&Mを一手に受け持つため）。
前例	日本の多くの自治体（総務・財務、顧客サービス窓口を除く）	DWASA


組織図の改定フロー（赤字：完了、青字：実施中）
下水道サービスに関する業務手順
CWASA上下水道接続規則の策定
職員データベースの更新
段階的な組織体制の整備計画
既存各部署における職種別定数・現任職員数（専任／兼務別）・空席数
新設部署の所掌業務
年次別昇級／退職の見通し
既存各部署における職種・人数の過不足の評価
新設部署の必要職種と人数の設定
部署別・職種別の定数・現任職員数・空席数の見通し
新設職種の職務記述書の策定
新規職員採用計画
人事・労務管理規程の改定


（参考-1）技術系職員の昇進図
（2020年CWASA人事・労務管理規程に基づき作成）
Legend
Direct recruitment
By promotion
By promotion and/or direct recruitment
Blocked post
Red: promotion years reduced in the Employee Regulations 2020
X/Y: number of working staff / approved number of staff in Organogram 2016 as of Sep. 2021
Grade
TT5
Chief Engineer 1 / 1
3 years as SE with 15 years experience in the post of grade 9 or above
Superintending Engineer 3 / 3
5 years as XEN with 10 years experience in the post of grade 9 or above
Executive Engineer 11 / 14
TT6
5 years experience
TT1
TT7
Assistant Engineer 16 / 28
Chemist 2 / 2
7 years experience
Sub Assistant Engineer 38 / 45
Snr. Lab Assistant 0 / 2
3 years
Lab Assistant 5 / 6
Foreman (Tube well) 0 / 4
Foreman (Transport) 0 / 1
PLS 1 / 5
5 years
3 years
HPM 0 / 1
TT4
5 years
5 years
3 years
Electrician 5 / 6
Operator (P/C/L/F) 65 / 128
Mechanic 1 / 3
Meter Mechanic 2 / 2
Plumbing Mechanic 13 / 16
Work Asst. 11 / 13
Draftsman 0 / 1
TT2
TT3
5 years
5 years
Junior Electrician 0 / 7
Asst. Operator (P/C/L/F/V) 63 / 162
Junior Mechanic 0 / 3
APM 34 / 27
4 years
4 years
4 years
Security Guard 52 / 94
Office Asst. 35 / 57
Cleaner 14 / 21
Helper 43 / 88


（参考-2）総務系職員の昇進図
（2020年CWASA人事・労務管理規程に基づき作成）
Legend
By promotion or deputation
Direct recruitment
By promotion
By promotion and/or direct recruitment
Missing in Employee Regulations 2020
Blocked post
Red: promotion years reduced in Employee Regulations 2020
Blue: promotion years increased in Employee Regulations 2020
Purple →: promotion chain newly created in Employee Regulations 2020
X/Y: number of working staff / approved number of staff in Organogram 2016 as of Sep. 2021
Grade
TT17
TT18
TT14
TT10
TT11
TT19
TT12
TT13
TT9
TT15
TT8
TT16
Secretary 1 / 1
Dep. Chief (Dev.) 0 / 1
System Analyst 1 / 1
Comp. Programmer 1 / 1
Deputy Secretary 0 / 1
Deputy Chief Accounts Officer 0 / 21
Senior Asst. Chief 0 / 1
Executive Engineer 11 / 14
Senior Audit Officer 0 / 1
Asst. Comp. Programmer 0 / 1
Estate Officer 1 / 1
PRO 1 / 1
Asst. Secretary 2 / 2
Asst. Chief (Dev.) 1 / 1
Research Officer 0 / 1
Procurement Officer 0 / 1
Medical Officer 1 / 1
Kanungo 0 / 1
Office Super 2 / 3
Computer Operator 9 / 11
Chief Assistant 0 / 3
Stenographer cum CO 9 / 9
Accounts Asst. 1 / 6
Bench Asst. 0 / 1
UDA 12 / 17
Data Entry Operator 10 / 11
OA cum CT 45 / 47
Jnr. Accounts Asst. cum CT 0 / 12
Cashier 1 / 2
Surveyor 2 / 2
Security Inspector 1 / 1
Driver 41 / 64
Nurse 0 / 1
Storekeeper 1 / 2
Caretaker
Dispatch Rider 1 / 2
Record Keeper 0 / 2
Medical Attendant 1 / 1
Asst. Security Inspector 0 / 1
Office Asst. 35 / 57
7 years as DS with 10 years experience in the post of grade 9 or above
5 years as DS with 10 years experience in the post of grade 9 or above
5 years 10 years experience in the post of grade 9 or above
4 years
5 years
10 years
7 years
3 years
4 years with motorcycle license


（参考-3）財務系職員の昇進図
（2020年CWASA人事・労務管理規程に基づき作成）
Legend
By promotion or deputation
Direct recruitment
By promotion
By promotion and/or direct recruitment
Missing in Employee Regulations 2020
Blocked post
Red: promotion years reduced in Employee Regulations 2020
Blue: promotion years increased in Employee Regulations 2020
Purple →: promotion chain newly created in Employee Regulations 2020
X/Y: number of working staff / approved number of staff in Organogram 2016 as of Sep. 2021
Grade
TT23
TT22
TT21
TT20
Commercial Manager 1 / 1
Chief Accounts Officer 0 / 1
Chief Revenue Officer 1 / 1
Dep. Chief Accounts Officer 0 / 2
Dep. Secretary 0 / 1
Senior Audit Officer 0 / 1
Budget Officer 1 / 1
Accounts Officer 2 / 2
Revenue Officer 4 / 6
PRO 1 / 1
Audit Super 0 / 1
Accountant 2 / 5
Revenue Super. 4 / 10
Office Super. 2 / 3
Stenographer cum CO 9 / 9
Chief Assistant 0 / 3
Auditor 1 / 1
Accounts Assistant 1 / 6
UDA 12 / 17
Bench Assistant 0 / 1
Jr. Auditor cum CT 0 / 1
Cashier 1 / 2
Jr. Account Asst. cum CT 0 / 12
OA cum CT 45 / 47
Meter Inspector 39 / 53
Caretaker 0 / 2
Dispatch Rider 1 / 2
Record Keeper 0 / 2
Asst. Operator (P/C/L/F/V) 63 / 162
APM 27 / 34
Photocopy Operator 1 / 1
Office Assistant 32 / 57
5 years as CAO AND 15 years experience in grade 9 or above
5 years DCAO with 10 years experience in grade 9 or above
3 years
5 years
10 years
7 years
4 years

活動1-3（財務管理）に関する進捗状況

➢ 第5処理区のAFDプロジェクトで以下の項目がTORに含まれているため、同プロジェクトのCWASA側PDを通じて担当コンサルタントとの協議調整を申し込み中。

財務管理能力アセスメント（FMA）の実施

① バングラデシュ政府からの転貸資金についてCWASAの返済能力の評価（なお、CWASAのAFDプロジェクト担当PD（Mr. Ariful Islam）によれば、CWASAは返済義務を免除されているとのこと）。

② 建設後に施設の適切な運転維持管理を行い、持続的な下水道サービスを提供する財務能力の評価。

補足1）バングラ政府が制定した2011年上下水道料金法では以下を規定。(a)下水道の供用開始後6ヶ月以内の接続義務、(b)下水管から100フィート以内の距離に立地する全ての建造物に対し、供用開始から6ヶ月経過後、下水道料金を賦課、(c)下水道料金は水道料金と同一とし、水道料金と同時に徴収、(d)水道未接続の場合は125L/日/人×世帯人員数（最低500L/日）で下水道料金を計算、(e)工場排水には別個の料金を賦課可能。

補足2）AFDプロジェクトにおける組織・制度関連の活動は、(a)基本情報や先行プロジェクトのレビュー、(b)職員の研修ニーズ・アセスメント、(c)これらに基づき組織・制度強化の短・中・長期ロードマップを作成、となっており、本プロジェクトとの重複はないと理解。AFD（CDIA）では、当該ロードマップを参考に、別枠で技術協力プログラムの組成を計画している模様。

3．質疑応答・意見交換

議　事　録

件　　名	バングラデシュ国都市衛生改善アドバイザー業務				
日　　時	2022 年 3 月 3 日（水）	自 11：00～至 13：00			
出席者 JICA 役職名略 敬称略	地球環境部：松岡、保坂 南アジア部：中丸 インフラ技術業務部：安田				
出席者 日本工営	西川、田村、玉眞				
打ち合わせ場所	Teams	記録作成者	玉眞	承認	
打合せ事項	渡航前会議				
資料	1. 業務進捗報告資料 2. CWASA とのオンライン会議資料（第 1～5 回）				

打合せ事項	対　策　・　合　意　事　項　等
1. 業務進捗報告、今次渡航での活動予定と質疑応答	日本工営から、資料を用いて現在までの業務進捗報告と今次渡航の活動予定内容を説明し、討議を行った。 (1) 地球環境部（松岡課長） • 色々なドナー等の支援下で下水道建設に着手する、かつ CWASA は下水道事業の経験が浅いこともあり、知見も限られる。ドナー、コントラクター、コンサルタントに騙されることのないよう、CWASA のプロジェクト管理・監督能力を高める活動を重視して頂きたいとともに、それが本アドバイザー業務の大きな意義であると考える。入札図書の内容の明確化などは特に重視する。 • 下水道料金は水道料金と同一とすることが定められているところ、下水道の運営に政府から補助金は出るのか。また料金改定に政府の承認が必要か。料金徴収率にもよるが、必要な下水道料金の水準は水道料金よりも高くなる可能性があり、施設の補修等適切な O&M が難しいのでは、という感触を持った。特に高度処理等の採用は慎重に検討する必要があると考え、継続して議論が必要と考える。 →下水道の運営段階で政府からの補助金は基本的にない。また料金は、物価スライドで 5%以内の改定幅であれば WASA 理事会の承認で改定できるが、それを超える改定幅では政府の承認が必要となる（NK）。 • 上下水道の分離／一体の組織構成オプションについては、バングラでやりやすい方法を探ってほしい。上下水道一体による DWASA の運営はうまく行っているのか。 →詳しくは情報収集の必要があるが、それなりの歴史もありうまく行っていると認識している（NK）。 • 分散型の汚水処理について、第 1 処理区の STP に併設するし尿処理施設で全市のどれ位をカバーできるのか。 →第 1 処理区の施設では能力が足りないため、他のエリアに別の施設を建設する必要があると CWASA から聞いた。また、し尿の収集・処理について CCC、CWASA、CDA の責任分掌も確認・協議の必要がある（NK）。 (2) 地球環境部（保坂様） • 第 2･4 処理区のプレ F/S レポートはどのような内容で人工を要するのか。

	→ごく最近 CWASA から要請を受けたもので、現地で確認・協議する。 • 処理場候補用地は民間所有か。 →民間の土地で、細かく地権者が分かれているため、CWASA による確認に時間がかかっている（NK）。 →JICA が円借款事業を検討していることを念頭に、適切な土地収用の手続きとなるよう、十分なフォローをしてほしい（保坂様）。 • 第 1 処理区の入札図書のレビューは今回の渡航で終わりそうか。 →設計・入札図書の問題点の抽出は終わらせる予定。どこからがコントラクターの責任で設計をするのか、よくわからない点が残っている。マレーシアのコンサルタント（ERINCO）が作成した入札図書の図面には管径が指定されており、コントラクターによる変更の余地はほとんどないように見える。ただし、管径別延長の数量表はついていない（NK）。 →コントラクターの裁量範囲について、ERINCO の検討内容がどの程度拘束力があるのか、整理してほしい（保坂様）。 • 接続関連規則や組織については、DWASA 等の事例を参考にしつつバングラにあった内容で進めてほしい。上下水道料金が同一とのことだが、現在の CWASA の財務状況はどうなっているのか。 →昨年 11 月の渡航時に JICA 松本氏が行った水道経営に関するヒアリングでは、現状では水道料金収入で費用を賄えているとのことであった。ただし、欠員となっている職員の補充後も黒字状況か否かは分からない（NK）。 • AFD の第 5 処理区プロジェクトと重複している財務関連の調査内容については、今次現地渡航時にデマケを整理すること。 (3) 南アジア部（中丸様） • 遮集による合流式と分流式とについて、既存の排水路はどのような状況で、現在の CWASA の整備方針はどのようになっているのか。ダッカでは分流式で整備中と聞いている。 →CWASA の整備方針は分流式で、その理由は以下の三点と聞いている。①感潮域のため、遮集式では満潮時に汚水管に海水が侵入する、②既存の排水路は CCC の所管で、それを経由して汚水を遮集するのは良くない。③工場廃水が十分な処理を行われず近傍の排水路に放流されている場合がある。なお、いきなり分流式による整備は容易ではなく、ある程度経験しないと分からないのではないかと懸念している。逆流しない範囲でインターセプター方式が良いのではないか（NK）。 →JICA の他の下水案件では、金銭面からもインターセプター方式が手を付けやすいということで実施することがあるが、一部の国では問題になっている。例えば雨水が混ざって汚水の濃度が薄まり、処理場が機能しないなど。また、地下浸透型腐敗槽もあり、汚水が地下浸透してしまうため、汚水が収集できないという事例もある。このあたり、現状を把握し慎重な判断が重要である（松岡課長）。 →CWASA に雨水排水の義務があるかも要確認（中丸様）。 • DB による調達時にままあるケースとして、コントラクターが改めて地質調査を実施したところ、うまくプラントが造れないことがある。地質調査は F/S 時に ERINCO が実施しているのか。 →処理場予定地については ERINCO が何本もボーリングしており、問題ないと考える。設計のレベルについては、管路施設は積算のために詳細な設計をしている一方で、STP はコントラクターに多くを委ねている。全体としては、DB として必要なレベルの検討はなされていると思う（NK）。 • 第 2･4 処理区ではどのような測量や調査が必要か。本業務で整理するのか。 →案件形成にあたってどの程度支援することが望ましいのか、JET 側もよく理解できていない為、必要な情報提供・提案など依頼していただければ協力する。なお、ポンプ場用地は場所がまだ決まっておらず、全体として広範囲の測量が必要と考えている（NK）。

	→準備調査の公示内容自体を検討してもらうことは考えていない。第 1 処理区の参考情報を提供してもらえればありがたい（中丸様）。 • その他の質問内容はリストにまとめたので、後日で良いので回答をお願いする。（一部を残して 3/4 に回答） (4) インフラ技術業務部（安田様） • 第 2･4 処理区で用地獲得のためのプレ F/S を実施、ということだが、第 1 処理区で計画された高度処理 OD 法を前提としているのか。 →当該高度処理 OD 法は滞留時間が 24 時間以上あり、他の処理方法に変更する場合でも用地確保は可能という観点から、仮決めでこの高度処理 OD 法による施設配置計画を行った。処理法の検討自体は準備調査で行うことを想定している。なお、第 1 処理区はこの高度処理 OD 法によるが、同一用地に建設する第 5・第 6 処理区の施設の処理法はコンサルタントの提案に基づき判断する予定である（NK）。 • 排水基準は下水 M/P に掲載された基準が現在も有効なのか。また今後改定される予定はあるのか。また、この基準をもとにする限り、なぜ高度処理が必要なのか理解できない。 →排水基準は現在も有効で、改定の動きは現在のところはないと聞いている。また、CWASA がこの高度処理 OD 法を採用した理由は、①機器類が故障した場合も放流水質基準を遵守できる点のほか、②政府からのグラントで施設を建設するため、多少オーバースペックでも良いとの判断があったのではないか。なお、第 5･6 処理区のコンサルが現地入りした後に、第 1 処理区の処理方法に合わせなくても良いとの CWASA のコメントがあり、それほど高度処理にこだわっていない可能性もある（NK）。 →M/P では散水ろ床が提案されているものの、どの処理法が現実的かきちんと検討がされてない感を受ける（安田様）。 →CWASA は経験がないので、他の処理技術との比較ができず、ERINCO からの提案を良く分からないまま受け入れている可能性がある。O&M 面や費用を含めて専門家チームからしっかり助言をしてほしい（松岡課長）。 • 汚泥処理・処分については M/P でも触れていないが、どのようなことを考えているのか。特に汚泥の処分先の確保は重要で、現在はどうなっているのか。 →第 1 処理区では将来は消化タンクを導入し、当初は濃縮・脱水処理を計画している。また、第 1 処理区 STP のすぐ南側に最終処分場があるが、容量が足りない可能性があるため、将来は別な場所で処分する計画になっている。第 2･4 処理区は確認が必要（NK）。 • 組織については、定員に対して 607 人の職員しかおらず、今後の人の確保が大変重要と考える。職員の繁忙状況は現状でどうか。また、CWASA 全体として組織はしっかりしているのか。 →管理職を中心に、他のポジションとの兼務を行っている職員が多数おり、多忙を極めていると認識。組織はしっかりしており、専門家チームからの依頼にもしっかり応えてくれるなど、仕事は進めやすい（NK）。 • 上下水道の分離／一体の組織構成オプションについて、上下水道を分離する場合には、総務・財務なども分離するのか。多くの日本の自治体で事例があるが、総務・財務などは共通とした方が効率的であるように思う。 →総務・財務などは一体とすることを考えている（NK）。 • 建設費や赤字になった場合の政府からの補填は。 →借款事業の場合、借款対象となる 85%分については政府が元本返済をし、CWASA の負担はないが、残り 15%の現地資金については確認が必要。赤字になった場合の補填制度は現在のところない（NK）。 以上

Advisor on Urban Sanitation Improvement

Progress Meeting

April 2022

Japan International Cooperation Agency (JICA)
Nippon Koei Co., Ltd (NK)

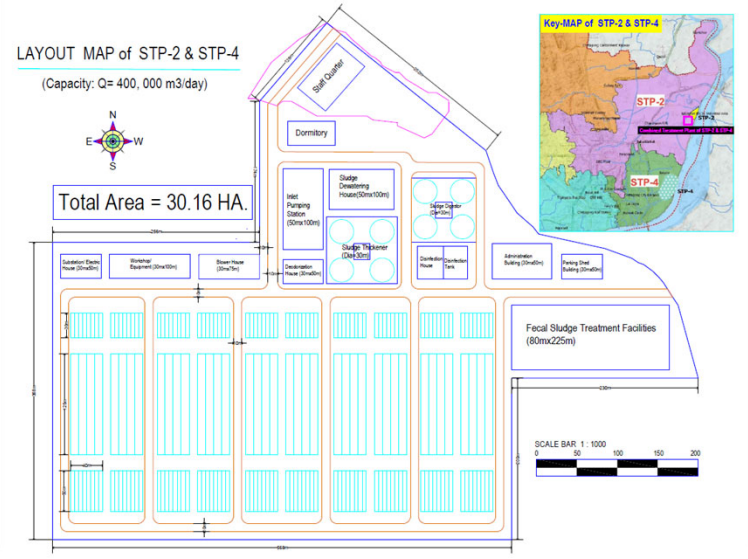
Contents

2

1． DPP for Lan Acquisition (Pre-FS report)

1. Summary of the Project
2. Population Projection
   (1) Total Population in CCC area
   (2) Population in Catchment-2 and -4 ➔updated (2.8million in 2070)
3. Sewage Generation ➔updated (22MLD → 38MLD)
4. Setting the Capacity of STP ➔updated (22MLD → 40MLD)
5. Selection of Treatment Process
   (1) Discharge Standard
   (2) Selection of Treatment Process ➔updated (CAS)
6. Layout of STP
   (1) Site of STP
   (2) Layout of STP ➔updated
7. Note for Feasibility Study

1． DPP for Lan Acquisition (Pre-FS report)



2. Population Projection

Population CENSUS 2021 has not yet published as of March 2022.

- JET is trying to obtain the CENSUS 2001 & 2011, and population projection up to 2021 from BBS.
- JET confirmed that population information in CCC website has no basis and it is not suitable to refer this data for sewerage planning.
- JET confirmed that the center of CCC has been saturated, but there are more area to be developed in CCC. (CCC has more potential to increase population)

3. Fecal Sludge Management

(1) Proposal in the Master Plan

- It is difficult to install sewer lines in more than 40% of CCC area, so on site sanitation system is continuously needed.
- Fecal sludge management and collection is responsible for CCC, which shall be provided to the unsewered area in CCC and surroundings including slums and LICs.
- CCC provide fecal sludge collection service with 2 large vacuum trucks, but they are too big to collect septage from the house along narrow road. MP propose to apply small type collection facilities such as vacuum-tug (0.5-1m3) and semi-manual cleaning with portable pump.
- Anaerobic digestion and co-composting are the treatment technologies in line with National water supply and sanitation strategy (2014) and the national 3R Strategy for Waste Management.
- Locations for feacal sludge treatment in CCC: Halishahar, Arfin Nagar, and Pahartali
- The MP propose “Best Practices Manual for Faecal Sludge Management” and “O&M Manual for On-site Sanitation and Faecal Sludge Management” in its Annex.

3. Fecal Sludge Management

(2) PESSCM-1

- Following facilities are procured in PESSCM-1:
  - **Sludge treatment(pkg-1):** 300m3/day of FSTP at Halishahar
    Reception, screening and grit removal➔ Storage tank ➔ Mechanical sludge thickening ➔ Sludge drying Bed ➔ Dehydrator ➔ cake hopper
  - **Sludge collection(Package-2):**
    Procurement of vacuum tankers, sludge pumps, etc.
    - ✓ Manual rickshaw with 500 litrer drum and manual diaphragm sludge pump
    - ✓ Portable sludge pumps
    - ✓ Vacutug (0.7 m3) mounted on 3-wheeler or power tractor
    - ✓ Vacuum truck (3 m^3, 5 m^3, 7 m^3, 9 m^3)
  - **Onsite Sanitation(Package-2):**
    Construction of 3,000 hygienic latrines in slums and LIC

3. Fecal Sludge Management

(3) FSM Action Plan for Chattogram City Corporation (CCC): ITN-BUET

- CCC is responsible for onsite sanitation, solid waste management, lighting, road cleaning, etc. CWASA is responsible for water supply and sewerage in the city, and CDA is responsible for approving building and structural plans.
- CCC has recently formed a Steering Committee on 'Fecal Sludge Management,' and regular meetings of the committee take place. CCC is now in the process of creating the FSM Monitoring Cell.
- WaterAid Bangladesh (WAB) established an FSTP at Halishahar, and WSUP established another FSTP at Arefin Nagar.
- Four Vacuum Tankers (VTs) are currently operating in the City, but the demand for these mechanical emptying services is more. The CCC has recently received a few new Vacuum Tankers from project support, which will be operated through private operators.

Sl. No.	Activity	Timeframe		
		2021 – 2023	2024 – 2027	2028 – 2030
1	Elimination of open defecation and providing improved/hygienic sanitation facilities (with community septic tank system) in LICs/slums to reach 100% hygienic sanitation coverage. **(see Note 2)**	Provide ≈2,000 hygienic toilets with an adequate water supply and community septic tank systems in slums/LICs.	Provide ≈3,000 hygienic toilets with an adequate water supply and community septic tank systems in slums/LICs.	Provide ≈2,000 hygienic toilets with an adequate water supply and community septic tank systems in slums/LICs.
2	Upgradation and expansion of public toilet facilities	See Table 7.2, 7.3, and 7.4 for details.		
3	Development of IMIS for CCC for keeping records of holding-wise sanitation system, access, etc.	To be implemented under the National Monitoring System, being developed by the DPHE.		
4	Stopping illegal connection of wastewater to drainage system/open environment and ensure/enforce the construction of properly designed septic tanks and soakage pits. This would include inspection for identification of illegal connection and poorly designed septic tanks and those without soakage pits, serving notice to those holdings to construct septic tanks/soakage pits, checking and approving designs, and monitoring construction and finally certification to holdings having properly designed septic tank system.	Phase I: Cover 50% area of CCC.	Phase II: Cover the remaining 50% area of CCC.	Phase III: Monitoring by CCC to ensure properly designed septic tanks/soakage pits for all holdings using septic tank system; and no illegal connection to drainage system/ open environment.
5	Ensure approval of the design of new buildings after checking for properly designed sanitation facilities and monitoring of construction.	To be addressed through "capacity building" programs of the relevant CDA officials (see Section 7.6 for details)		
6	Implementation of DEWATS or other innovative waste management options in selected slums/LICs	--	Carry out a feasibility study in selected slums for possible implementation of DEWATS or other innovative waste management systems	Implementation of selected waste management option(s) in selected slums/LICs, based on the outcome of the feasibility study.

Note 1: The specific "projects/ programs" to be undertaken based on the actions, along with the estimated cost of each, are presented in Chapter 7

Note 2: The ongoing CWASA sanitation project (PESSCM-1) plans to construct 3,000 community latrines (with septic tanks) in slums/LICs. Coordination with CWASA is therefore needed to plan and this intervention.

Table E.2: Action Plan focusing on emptying and transportation of fecal sludge in CCC

Sl. No.	Activity	Timeframe		
		2021 – 2023	2024 – 2027	2028 – 2030
1	Procurement of Vacuum Tankers (VTs) for desludging single pit latrines and septic tanks [in addition to the existing two 4 m^3 and 7 smaller (six 1.5 m^3 and one 2 m^3) Vacuum tankers	5 VTs of 5 m^3, 5 VTs of 3 m^3, 5 VTs of 0.7 m^3, 10 manual rickshaws of 0.5 m^3	5 VTs of 9 m^3, 5 VTs of 7 m^3, 15 VTs of 0.7 m^3, 30 manual rickshaws of 0.5 m^3	5 VTs of 5 m^3, 10 VTs of 4 m^3, 11 VTs of 2 m^3
2	Procurement of desludging system consisting of high capacity pumps and long desludging pipes for emptying of containments in slums. Detail specification of the system would be prepared based on an assessment of the requirements in slums.	10 portable sludge pumps and pumping accessories, including long desludging pipe	30 portable sludge pumps and pumping accessories, including long desludging pipe	--
3	Scheduled desludging of fecal sludge in a selected area/community. The activity would include a study on identifying a suitable area(s)/communities, assessing containment systems and desludging requirements for the area(s)/communities, consultation with residents about the planned service, and setting a detailed plan for scheduled desludging and cost of service.	Undertake a study on "scheduled desludging service."	Commence scheduled desludging service; evaluate, improve and expand the system	Expanding scheduled service in other areas.
4	Maintenance of vacuum tankers and other equipment/ accessories used in desludging	5 VTs of 5 m^3, 2 VTs of 4 m^3, 5 VTs of 3 m^3, 1 VTs of 2 m^3, 6 VTs of 1.5 m^3, 5 VTs of 0.7 m^3, 10 manual rickshaws of 0.5 m^3, 10 portable sludge pumps, 10 diaphragm sludge pumps	5 VTs of 9 m^3, 5 VTs of 7 m^3, 5 VTs of 5 m^3, 2 VTs of 4 m^3, 5 VTs of 3 m^3, 1 VTs of 2 m^3, 6 VTs of 1.5 m^3, 20 VTs of 0.7 m^3, 40 manual rickshaws of 0.5 m^3, 40 portable sludge pumps, 40 diaphragm sludge pumps.	5 VTs of 9 m^3, 5 VTs of 7 m^3, 10 VTs of 5 m^3, 12 VTs of 4 m^3, 5 VTs of 3 m^3, 1 VTs of 2 m^3, 17 VTs of 1.5 m^3, 20 VTs of 0.7 m^3, 40 manual rickshaws of 0.5 m^3, 40 portable sludge pumps, 40 diaphragm sludge pumps.

Table E.3: Action Plan focusing on treatment and disposal of fecal sludge in CCC

Sl. No.	Activity	Timeframe		
		2021 – 2023	2024 – 2027	2028 – 2030
1	Renovation of existing FSTP at Arefin Nagar, focusing on management/processing of dried sludge and effluent disposal	Renovation of existing FSTP at Arefin Nagar	--	
2	Construction of an FSTP with a capacity of 300 m^3/day at the Halishahar site by CWASA under the PESSCM-1 project.	Construction and operation of the Halishahar FSTP (CWASA)	Operation of the FSTP at the Halishahar Site	
3	Construction of another FSTP at the Arefin Nagar Site, based on a detailed feasibility study.	--	Construction/ operation of the FSTP; Estimated capacity: 200 m^3/day	Operation of the FSTP at the new Arefin Nagar Site
4	Construction of another FSTP at the Arefin Nagar Site, based on a detailed feasibility study.	--	Construction/ operation of the FSTP; Estimated capacity: 300 m^3/day	Operation of the FSTP at the new Arefin Nagar Site
5	Identification of new sites for construction of 3 additional FSTPs with an estimated total capacity of 950 m^3/day	Identification of possible sites for construction of FSTPs		
6	Construction of one or two FSTP(s) at the newly identified site(s), preferably on the city's eastern side, is based on a detailed feasibility study.	--		Construction and operation of one or two FSTPs with a total capacity of 500 m^3/day
7	Construction of an FSTP at one of the newly identified sites, preferably at the eastern side of the city, based on a detailed feasibility study	--	--	Construction and operation of the FSTP; Estimated capacity: 450 m^3/day
8	Operation and maintenance of FSTPs	O&M of FSTP at: (a) Arefin Nagar (existing); (b) Halishahar (CWASA)	O&M of FSTP at: (a) Arefin Nagar (existing); (b) Halishahar (CWASA) (c) Arefin Nagar: 200 m^3/day (d) Arefin Nagar: 300 m^3/day	O&M of FSTP at: (a) Arefin Nagar (existing); (b) Halishahar (CWASA) (c) Arefin Nagar: 200 m^3/day (d) Arefin Nagar: 300 m^3/day (e) FSTP: 500 m^3/day (total) (e) FSTP: 450 m^3/day

Table E.4: Breakdown of investment for the implementation of FSM Action Plan for CCC

Major Area	Investment Required (in Lacs)			Total
	2021 - 2023	2024 - 2027	2028 - 2030	
Sanitation and containment system	2,530	7,150	5,070	**14,750**
Emptying and transportation of FS	102	196	1,611	**1,909**
Treatment and disposal of FS	29	5,680	3,375	**9,084**
Awareness campaigns	280	670	320	**1,270**
Capacity building programs	187	453	312	**952**
Institutional/service delivery	100	300	200	**600**
Grand Total:	**3,228**	**14,449**	**10,888**	**28,565**

Note 1: Costs associated with constructing an FSTP at Halishahar (300 m^3/day capacity) and procurement of emptying/transportation equipment under the CWASA PESSCM-1 project have not been included in the budget.
Note 2: Costs do not include the value of existing assets (e.g., existing land, FSTP, vacuum tankers, etc.)

3. Fecal Sludge Management

(4) CWASA's Strategy for FSM

- Sanitation is composed of i) sewerage, ii)FSM, and iii) solid waste management.
- CCC is responsible for ii) FSM and iii) Solid waste management, and CWASA's objectives includes i) sewerage and ii) FSM. In this regard, FSM is the duty for both CCC and CWASA.
- CWASA will develop sewerage with separated sewer system in Catchment-1. It requires very long period to develop house connection, and not all household can be connected to centralized sewerage system due to narrow road.
- CWASA will start FSM to provide FSM for unsewered household, to improve current insufficient FSM activities, and to achieve the SDG target-6 consequently.
- CWASA will construct FSTP with 300m3/day at STP-1 and procure collection facilities.
- Volume of fecal sludge in CCC is 700m3/day, so remaining 400m3/day will be collected and treated by CCC.
- The fecal sludge collection by CWASA will be implemented by sublet works.

4. Responsibility of Drainage Works

- Drainage is the duty for both CCC and CWASA, but during the preparation of Sanitation and drainage master plan, related authorities decided the responsibility as below (page xxxvi in Drainage master plan).

Consequently, it has been **agreed that CCC will be responsible for all aspects of drainage, including storm water drainage, while BWDB will be responsible for flood control aspects. CCC and BWDB already have the required legal mandates for the recommended responsibilities.**

CCC will thus be responsible for construction, operation and maintenance of:

- Road kerbs, drains/channels and associated structures;
- Open drains and khals with associated culverts and structures.

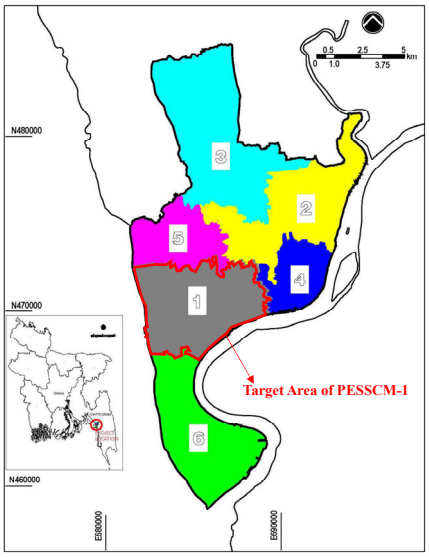
BWDB will be responsible for construction, operation and maintenance of:

- Road cum embankment / flood wall with regulators at outfalls of khals;
- Sea dike along the Bay of Bengal.

CCC will also be responsible for related public awareness activities, including on proper disposal of solid waste and faecal sludge (not to be dumped in drains and khals).

Following the above recommendation, CWASA will not have any direct involvement in drainage.

5. Review of Plan of PESSCM-1



1) Planning Framework

Target Area: Catchment-1 (3,562 ha)

Target Year: 2070

- Step wise construction for STP (Phase-1: 100MLD)
- Sewerage network is designed for 2070

Target Population : 897,093 (2011 census)
2,609,175 (2070 projected)

Type of sewerage system: Separate sewerage system
Gravity flow

Location of STP: Near the coast in Halishahar

5. Review of Plan of PESSCM-1

2) Conceptual Design of Sewage Treatment Plant

Design Capacity of STP has been determined to be **100MLD**.

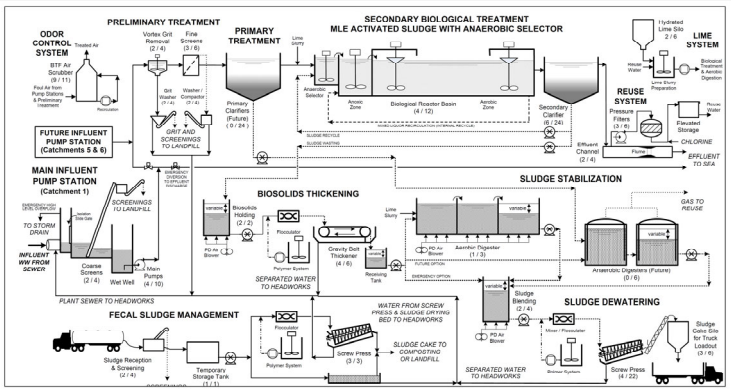
	2025 (after completion of PESSCM-1)	2030	2070
Approx. Planned Served Population	150,000 (28,000 connections installed by PESSCM-1)	800,000 (Connection work shall be continued)	2,600,000 (Total population shall be covered)
Wastewater Inflow	18MLD	96MLD	312 MLD

"Carrousel System", which is a kind of activated sludge system, has been chosen for the treatment process:

- High recirculation rate of MLSS provides dilution to resist variable flows and shock loads
- No blowers, air piping, or submerged diffusers (easier and quicker maintenance)
- Internal recycle of MLSS for Phosphorus & Nitrogen removal can be done without providing piping and pumps

5. Review of Plan of PESSCM-1

2) Conceptual Design of Sewage Treatment Plant



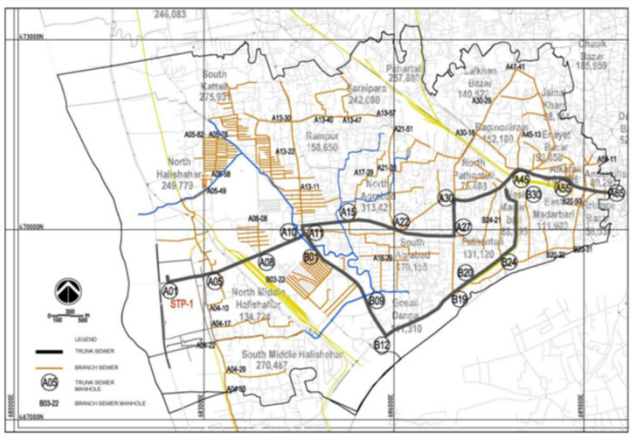
Design Wastewater Quality		Employer's Requirements for Treated Effluent Quality	
BOD:	340 mg/L	BOD:	20 mg/L
COD:	756 mg/L	COD:	100 mg/L
TSS:	454 mg/L	TSS:	30 mg/L
TN:	72 mg/L	TN:	10 mg/L
TP:	14 mg/L	TP:	10 mg/L

5. Review of Plan of PESSCM-1

3) Conceptual Design of Sewerage Network

Main Feature of Sewer Network
- Alignment has been determined based on the GIS topo information.
- 113 km (trunk + branch + rider sewer)
- Diameter: 225 mm to 2,100mm

Hydraulic design conditions
- Per capita wastewater:
120 l/c/d x 0.9 (return) x 1.1 (Inflow + Infiltration) ≒ 120 l/c/d
- Coefficient for Manning's formula: 0.009
- Peak Factor : Based on Babbit's formula
- Minimum velocity: 1.0 m/s
  Maximum velocity: 4.0 m/s



5. Review of Plan of PESSCM-1

3) Conceptual Design of Sewerage Network

Flow estimation and Hydraulic Computation

(Trunk A Sewer in W1 package)

Pipe No.	Manhole No.		GL(m)		L (m)	Served Population (2070)	Average Flow (l/s) (*1)	PF (Babbit's Formula)	Peak Flow (l/s)	Pipe dia (mm)	Slope 1:	Fully filled flow		% of Cap.	Invert Level (m)		Depth(m)		Construction Method
	From	To	From	To								V (m/s) (*2)	Pipe Cap (l/s)		From	To	From	To	
AP15	A15	A14	4.54	3.97	229.4	1,146,891	1,592.9	1.22	1,946.5	1800	2000	1.46	3,710.8	52%	-5.79	-5.90	10.33	9.87	Trenchless
AP14	A14	A13	3.97	4.01	377.5	1,146,891	1,592.9	1.22	1,946.5	1800	2000	1.46	3,710.8	52%	-5.90	-6.09	9.87	10.10	Trenchless
AP13	A13	A12	4.01	4.22	64.1	1,654,699	2,298.2	1.14	2,609.8	2100	2000	1.62	5,597.5	47%	-6.09	-6.12	10.10	10.34	Trenchless
AP12	A12	A11	4.22	4.88	63.3	1,654,699	2,298.2	1.14	2,609.8	2100	2000	1.62	5,597.5	47%	-6.12	-6.16	10.34	11.04	Trenchless
				Inflow from Trunk Line B															
AP11	A11	A10	4.88	5.10	55.1	2,282,135	3,169.6	1.06	3,375.3	2100	2000	1.62	5,597.5	60%	Drop -9.09	-9.12	13.97	14.22	Trenchless
AP10	A10	A09	5.10	4.89	25.0	2,282,135	3,169.6	1.06	3,375.3	2100	2000	1.62	5,597.5	60%	-9.12	-9.13	14.22	14.02	Trenchless
AP09	A09	A08	4.89	4.00	715.5	2,282,135	3,169.6	1.06	3,375.3	2100	2000	1.62	5,597.5	60%	-9.13	-9.49	14.02	13.49	Trenchless
AP08	A08	A07	4.00	4.19	197.4	2,407,025	3,343.1	1.05	3,522.3	2100	2000	1.62	5,597.5	63%	-9.49	-9.59	13.49	13.78	Trenchless
AP07	A07	A06	4.19	4.34	526.0	2,407,025	3,343.1	1.05	3,522.3	2100	2000	1.62	5,597.5	63%	-9.59	-9.85	13.78	14.19	Trenchless
AP06	A06	A05	4.34	4.72	67.3	2,420,497	3,361.8	1.05	3,538.0	2100	2000	1.62	5,597.5	63%	-9.85	-9.88	14.19	14.60	Trenchless
AP05	A05	A04	4.72	4.51	178.0	2,495,431	3,465.9	1.05	3,625.4	2100	2000	1.62	5,597.5	65%	-9.88	-9.97	14.60	14.48	Trenchless
AP04	A04	A03	4.51	4.50	140.4	2,609,175	3,623.9	1.04	3,757.0	2100	2000	1.62	5,597.5	67%	-9.97	-10.04	14.48	14.54	Trenchless
AP03	A03	A02	4.50	3.43	283.1	2,609,175	3,623.9	1.04	3,757.0	2100	2000	1.62	5,597.5	67%	-10.04	-10.18	14.54	13.61	Trenchless
AP02	A02	A01	3.43	3.57	117.3	2,609,175	3,623.9	1.04	3,757.0	2100	2000	1.62	5,597.5	67%	-10.18	-10.24	13.61	13.81	Trenchless
AP01	A01	A00	3.57	3.23	86.9	2,609,175	3,623.9	1.04	3,757.0	2100	2000	1.62	5,597.5	67%	-10.24	-10.29	13.81	13.52	Trenchless

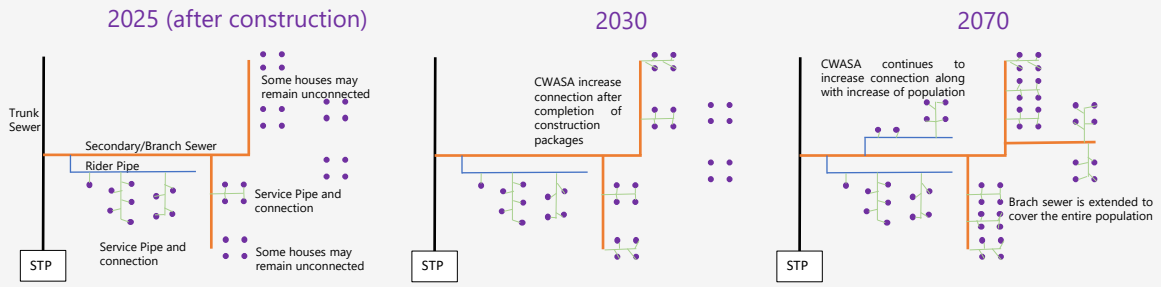
(*1): Per capita sewage incl. I&I: 120 (l/c/d)
(*2): Roughness Coefficient: 0.009

312 MLD

5. Review of Plan of PESSCM-1

3) Conceptual Design of Sewerage Network

Concept of Sewage Collection



Population served by sewer (2025): 150,000
(Connection: W1: 11,000 nos., W2: 11,000 nos., W3: 6,000 nos., totaling 28,000 connections ≒ 150,000 people)

Total wastewater flow: 18,000 m3/day
(150,000 x 120 l/c/d = 18,000m3/day)

Population served by sewer (2030): 800,000
(Connection work is to be continued after the construction package)

Total wastewater flow: 96,000 m3/day

Population served by sewer (2070): 2,600,000
(Extension and connection work is to be continued)
Total wastewater flow: 312,000 m3/day
Trunk Sewer and Secondary Sewer is designed for 2070 flow.
(End of Trunk Sewer: D2100, I=1/2000)

20

5. Review of Plan of PESSCM-1

4) Fecal Sludge Management

Based on the Master Plan findings and assessment of current situation, followings are included in PESSCM-1 as structural interventions to improve on-site sanitation:

Package W1:
+ Construction of 300 m3/day Fecal Sludge Treatment Facility

Package W2:
+ Implementation of sanitation improvement demonstration project
  - Upgrading of 2000 units of sanitary toilets
  - Construction of 1000 units of new sanitary toilets
+ Procurement of sludge collection and transport equipment for FSM for entire CCC area.

21

5. Review of Plan of PESSCM-1

5) Project Implementation Plan

- PESSCM-1 consists of three packages: Package W1 (STP + Sewerage Network), W2 (Sewage Network), and W3 (Sewage Network)
- The concept of "Design-Build Contract" is as follows:

The Contract Documents prescribe:

"The Contract Drawings and Particular Specifications reflect a Concept Design developed for and considered acceptable by the Purchaser. If the Contractor wishes to propose a different network scheme other than the recommended system he shall do this only in an alternative offer that clearly describes the expected benefits to the Purchaser."

=> The Contractor can, with his responsibility, follow the Contract Drawings and Particular Specifications prepared by the Purchaser, after checking and reviewing the Contract Drawings and Particular Specifications.

=> The Contractor shall, with his responsibility, prepare the detailed design based on the Contract Drawings and Particular Specifications prepared by the Purchaser, or based on his own concept design which is approved by the Purchaser.

22

6. Issues to be considered

- Separated sewer system will be applied for Catchment-1, but construction of house connection will require long period.
- Due to difficulty of sewer pipe construction along narrow road, not all household can be connected to sewer system. To cope with this issue, CWASA will implement FSM.
- Pollution load by gray water is more than black water, so untreated gray water shall be treated to improve water environment.

	Black water (from toilet)	Gray water (from kitchen, etc.)
Unit Pollution Load	**BOD 13 gpcd (30%) SS 10 gpcd (25%) T-N 9 gpcd (75%) T-P 0.57 gpcd (41%)**	**BOD 31 gpcd (70%) SS 30 gpcd (75%) T-N 3 gpcd (25%) T-P 0.83 gpcd (59%)**
Sewered household	Treated at STP	Treated at STP
Unsewered household	Treated at FSTP (overflow of septic tank is discharged to drain and khals)	Untreated gray water is discharged to drain and khals

(Source: Planning and Design Guideline for Sewerage System, Japan Sewage Works Association, 1973)

議　事　録

件　　名	バングラデシュ国都市衛生改善アドバイザー業務				
日　　時	2022 年 4 月 7 日（木）	自 13：30～至 15：00			
出席者 JICA 役職名略 敬称略	地球環境部：松岡、保坂 バングラデシュ事務所：佐伯、村上 南アジア部：中丸、吉田 インフラ技術業務部：安田				
出席者 日本工営	西川、田村、玉眞				
打ち合わせ場所	Teams	記録作成者	玉眞	承認	
打合せ事項	現地業務帰国報告会				
資料	1. 報告資料 2. 第 2・4 処理区のプレ F/S 報告書				

打合せ事項	対　策　・　合　意　事　項　等
1. 現地業務報告	日本工営から、資料を用いて現地業務報告を行い、質疑応答を行った。 (1) 地球環境部（保坂様） • 第 2･4 処理区の人口と汚水量を見直した理由は何か。 →2021 年センサスのデータ公表が遅れているため汚水量に余裕を見ておく必要があることと、第 1 処理区の施設計画では管路の流量計算に接続可能人口ではなく区域内人口を用いている点との整合を図ったためである（NK）。 • CCC 域内のし尿量 700m^3/d のうち 300m^3/d は第 1 処理区であり、残り 400m^3/d は第 2･4 処理区を含む他処理区となる。管路の流量計算の考え方と矛盾しないか。 →CCC 域外を含めた数値なのかを確認する。なお、現在 CCC では大学（BUET）を巻き込んで FSM のアクションプランを策定中で、CWASA もメンバーとなっている（NK）。 →700m^3/d はどういう数値か、また数ヶ所の処理施設計画についても整理してほしい（保坂様）。 • 処理場用地取得のための DPP はある程度仕上がり、取得に向けて手続きが進んでいると考えてよいか。 →現地業務で材料は揃えてきたが、DWASA が作成した DPP をもとにしている本文の方が十分できておらず、省には未提出と聞いている。CWASA が懸案としていた経済財務分析の部分も DWASA のやり方に合わせて作成し渡してきた。現状を確認し、念押しする（NK）。 (2) 地球環境部（松岡課長） • 雑排水の BOD 値がし尿の BOD 値よりも高くなっている理由はなぜか。 →我が国の下水道設計指針と解説に負荷量として示されているものである。なお、負荷量であるので濃度ではない（NK）。 • 分流式やインターセプターの採用について、バングラで下水道法や技術指針に方針が示されているか。 →国として定めていないと思うが確認する（NK）。 • 排水基準はあるのか。 →放流水質基準がある。現在環境省で改定中（NK）。

	→JICA 環境政策アドバイザー（NK 長沼氏）からの報告で水質や環境基準の話も出ていた。情報交換して両プロジェクトの相乗効果を高めてほしい（松岡課長）。 (3) バングラデシュ事務所（佐伯次長） • 幹線道路沿いのエリアのみ下水道で収集し、狭い道路沿いのエリアは FSM とする理由は何か。またこれは恒久的なものと想定されているのか。 →エリアが幹線から離れるほど下水管の埋設深が大きくなり、狭い路地では工事が難しくなるためである。M/P では FSM を恒久的と位置付けているが、第 1・6 処理区では下水道に取り込むものとして管径を決めている。CWASA でも考え方が曖昧な状態で、どちらかと言えば暫定、という説明の方が今の施設計画になじむと考える（NK）。 →街中では暫定とした方が良いように思う。なお、FSM はゲーツ財団が BUET と組んで積極的に進めている（佐伯次長） (4) 南アジア部（中丸様） • 各戸接続の配管工事については、事前調査の段階で CWASA が住民にどこまで説明しているのか。住民から合意は取り付け済みか、まだの場合どの段階で説明するのか。 →第 1 処理区の Conceptual Design Report を見る限り、同意取り付けをした形跡はない。コントラクター選定の入札図書では、コントラクターが行うこととなっている。なお、KWSP-2 では各戸調査を事前に行ってから接続工事を行っており、この経験を生かせると思う。この点については次回の現地活動の題材にする予定である（NK）。 →28,000 もの多くの世帯を接続することになるので、遅延発生を防止するためにもリスクシェアを確認してもらいたい（中丸様）。 • 産業廃水は、工場側で事前に処理してから接続、と法規上なっていると思うが、既存の工場にどういう説明をしているのか。 →第 1 処理区には有害排水工場はあまりなく、これの規制は入札図書にも含まれておらず、CWASA も必要性を感じていないのが現状（NK）。 (5) インフラ技術業務部（安田様） • 第 2･4 処理区で処理水量が大幅増ということは事業費も大幅に増えるということで良いか。 →全体事業費は増えるが、当面整備する部分の事業費は変わらない（NK）。 • 第 2･4 処理区の処理場配置図についてかなり余裕を見込んだとのことだが、将来の高度処理に必要な面積はこの中に含まれているか。 →高度処理は含めている。また水処理施設の滞留時間を通常の 8 時間から 12 時間とし、水深も浅く計画しているため、今の敷地で十分対応できる（NK）。 • 第 1 処理区を分流式で整備した場合、雨水排水のことは考えられていないということで良いか。併せて考えていく予定はないのか。 →雨水については考えていない。雨水排水は基本的に CCC と CDA で対応するという整理である（NK）。 • 2070 年まで面整備を続けていくとの話があったが、これを各処理区で実施すると膨大なコストとマンパワーがかかるが本当に大丈夫か。CWASA はこの点きちんと認識しているか。遮集管を入れることも検討すべきでは。 →2070 年は設計の目標年で、2070 年まで面整備が続くという意味ではない。第 1 処理区では、優先的に接続するエリアと家屋を選ぶ裁量はコントラクターに委ねられているが、CWASA もコントロールすべきと考える（NK）。 →面整備は膨大な手間がかかり、複数処理区を同時並行で進めるとなると大変な金とマンパワーが必要となる。本当にできるのか、CWASA に理解してもらった方が良い（安田様）。　以上

バングラデシュ国
都市衛生改善アドバイザー業務

帰国報告会

2023年8月18日

国際協力機構 (JICA)
日本工営株式会社 (NK)

報告会構成

	内容	Person	Note
1	業務進捗	西川	
2	活動報告（活動1-4） 新たな下水道整備事業計画の作成に係る支援（マスタープランアップデート）	西川	
3	活動報告（活動1-2） 下水道整備事業の計画促進に向けた組織体制の課題整理支援	玉眞	
4	活動報告 活動2-1：PESSCM-1の計画を基に、設計時や建設時に想定される課題整理支援 活動2-2：上記課題の解決策の検討を通じた、CWASAの設計・施工監理能力の向上支援	田村	
5	今後の活動	全員	

2

１．業務進捗
1-1．業務概要

成果1：　下水道整備の政策・計画策定能力が向上し、新たな下水道整備事業の計画が促進される

活動 1-1:既存のサニテーションマスタープラン及び実施中のCatchment 1事業のレビュー

活動 1-2:下水道整備事業の計画促進に向けた組織体制の課題整理支援

活動 1-3:下水道整備事業の計画促進に向けた財務体制の課題整理支援

活動 1-4:新たな下水道整備事業計画の作成に係る支援

成果2：　下水道整備対象区域内の状況に応じた適用可能な技術を理解し、下水道施設の設計・建設に係る能力が向上する

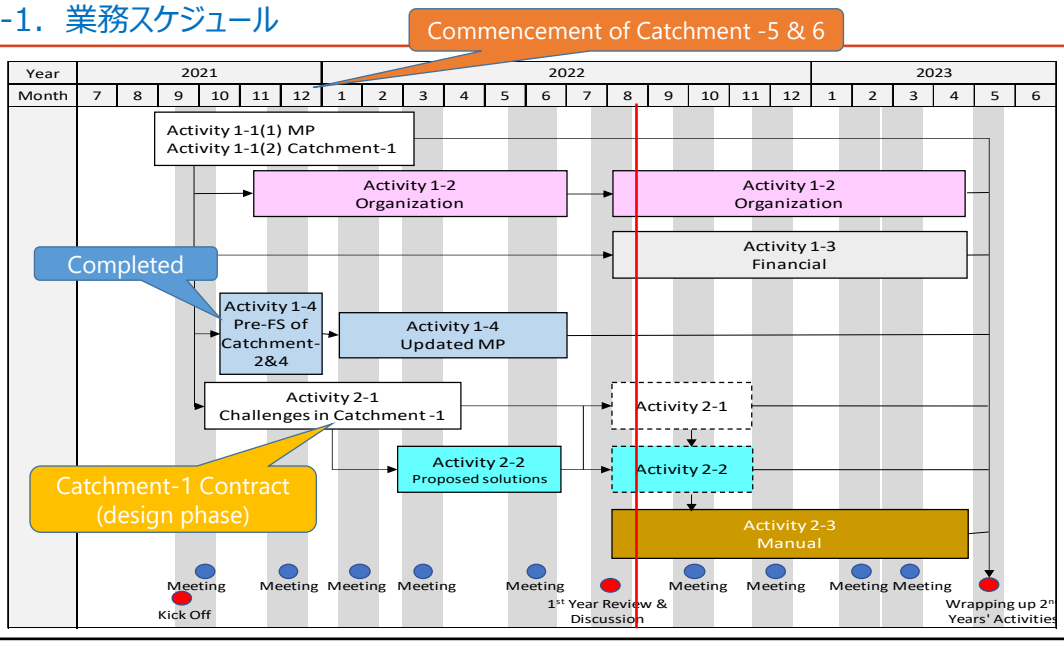
活動 2-1: Catchment 1事業の計画を基に、設計時や建設時に想定される課題整理を支援

活動 2-2: 整理された課題の解決策を通じてCWASAの設計・施工監理能力の向上を支援

活動 2-3: 整理された課題の解決策を通じてCWASAの設計・施工監理能力の向上を支援

3

1. 業務進捗
1-1．業務スケジュール



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1. 業務進捗
1-3 各活動の進捗状況（１）

活動		Situation
1-1:	既存のサニテーションマスタープラン及び実施中のCatchment 1事業のレビュー	● サニテーションMPと PESSCM-1のレビューは完了 ● 第2 ,第4処理区の下水道整備の支援を実施
1-2:	下水道整備事業の計画促進に向けた組織体制の課題整理支援	● 建設段階の組織図のドラフト完成 ● 維持管理段階への移行対応も協議済み
1-3:	下水道整備事業の計画促進に向けた財務体制の課題整理支援	● 予定事業の整理に着手しているが、水道事業・下水道第3処理区事業が確定しない ● スコープが世銀のWASHプロジェクトと重複している (WB).
1-4:	新たな下水道整備事業計画の作成に係る支援	● 土地取得のプレFSは完了し、DPPは提出済み ● センサス2021によるワードレベルの人口は未発行（Thanaレベルを受領） ● 汚泥処分地問題がCWASAの下水道整備の支障になるため、CCCがNandirhatに建設する最終処分場に、全処理区の下水汚泥の処分を提案。 ● スラムからの年間の発生汚泥量を算定し、セプティックタンク汚泥処分施設必要性の協議資料を準備 ➔ CWASAはCCC東部のセプテージの収集施設をJICAに要請する模様

1. 業務進捗
1-3 各活動の進捗状況（２）

活動		Situation
2-1:	Catchment 1事業の計画を基に、設計時や建設時に想定される課題整理を支援	● カルナフリ水道円借款（KQSP-II）やCatchment1事業の設計に基づいた課題整理は完了。 ● Catchment-1事業のパッケージ２と３のコントラクター（いずれも中国企業）はサービスを開始
2-2:	整理された課題の解決策を通じてCWASAの設計・施工監理能力の向上を支援	● 家屋接続の設計策について既に提案済み ● Catchment-1事業の設計は未だ完了していない
2-3:	整理された課題の解決策を通じてCWASAの設計・施工監理能力の向上を支援 (基準・マニュアル)	● 設計ガイドライン、技術基準、下水道設計施工に関するマニュアルをDWASAから入手を試みたものの、DWASAはコントラクターの提案に従い設計しており、上記資料は得られなかった。 ● 家屋接続に関する設計・施工監理ガイドラインの作成を提案した。

6

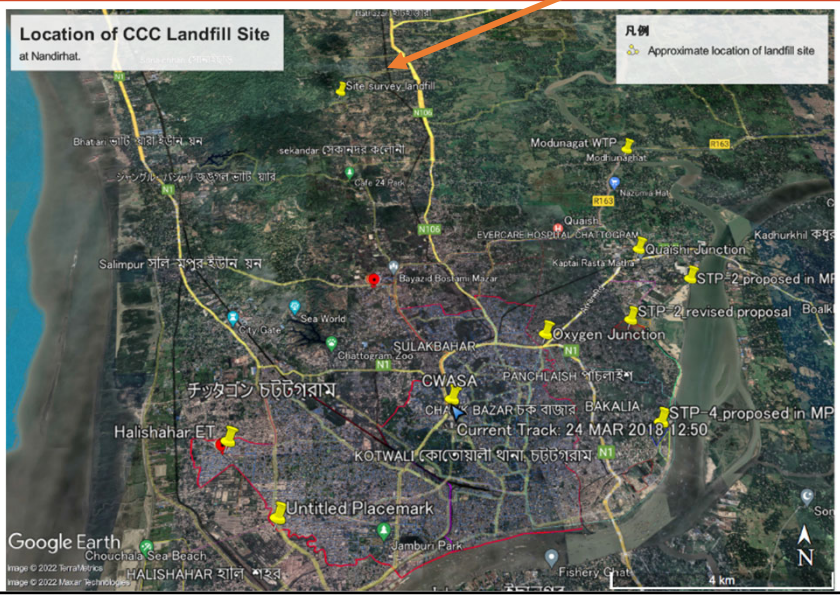
活動報告（西川）

活動1-4：新たな下水道整備事業計画の作成に係る支援
（マスタープランアップデート）

7

CCCが建設する処分場

予定地



8

CCCが建設予定の最終処分場

- 26 ｴｰｶｰの公有地 + 25 ｴｰｶｰの民有地（計約20ha）で処分場の供用を開始し、次第に周囲に拡大していく予定。土地は現在は農地として使用されている。
- 40ﾌｨｰﾄ道路 (12m幅)が主要道からのアクセス道路として建設される予定（L= 3.5km）
- 下水処理場予定地から処分場までの距離は12km
- CWASAの下水処理場からの発生汚泥を処分することについて、CCCは暫定的に了解している。処分料金の調整は今後。また、輸送はCWASA独自に実施することが求められている。
- CCCは3か月以内にDPPを準備し、上位機関（LGRD）に提出予定。

下水汚泥の処理処分
（Bangladesh Standards and Guidelines for Sludge Management）

- 工場廃水を処理しない下水処理場から発生する下水汚泥はCategory Aとなる
- 下水汚泥は右表の処理処分が許されている。基本的にはDigestionにより農緑地利用をすることが前提となっている。
- 最終処分する際にもControlled Landfillが要件であり、浸出水の浸透防止対策及び、浸出水による汚染対策が必要
- 処分場は、住宅から500 m 以上離れており、かつ、保護区には建設できない

（CCCの処分場は条件を満足する）

Table 1: Management options per waste class

Management option	Waste class		
	A	B	C
3.1 Anaerobic digestion (co-fermentation)	X[1]	X[1]	**
3.2 Aerobic digestion (composting)	X[1]		
3.3 Agricultural use	X		
3.4 Controlled landfill *	X	X	X
3.5 Thermal incineration	X[1]	X[1]	X[1]
3.6 Land application (filling material e.g. for flood prevention)	X	X[2]	**
3.7 Recycling in brick, cement or asphalt making	X	X[3]	**

[1]Residues will remain that have to be disposed of, fulfilling the requirements applicable to the category, on an alternative route e.g. by landfill.
[2]Inert material (low organic matter required)
[3]Availability and capacity limited by local conditions. Accepted sludge volume limited due to a loss of compressibility of the product
* Requirements for the landfill class (Chapter 3.3.4) vary depending on category of the sludge.
**As described in Chapter 2, the producer may provide evidence that sludge categorized as category C sludge according to Annex 1A or 1B does not possess any hazardous characteristics; in this case it may be categorized as category B sludge and the management options of anaerobic digestion (co-fermentation), land application (filling material e.g. for flood prevention), recycling in brick, cement or asphalt making are permissible.

スラムから発生する汚泥量

1) 2019年スラム人口: 1,465,028
2) 単位汚泥量: 0.07m3/capita/year
3) 処理区単位の汚泥量

	Fecal Sludge Volume in 2019	
Catchment-1	96.3 m^3/day	(STP-1,5,6) 140.8 m^3/day
Catchment-5	26.4 m^3/day	
Catchment-6	18.1 m^3/day	
Catchment-2	59.6 m^3/day	(STP-2,4) 95.0 m^3/day
Catchment-4	35.4 m^3/day	
Catchment-3	45.2 m^3/day	(STP-3) 45.2 m^3/day
Total	(Total) 281.0 m^3/day	

汚泥処理施設（FST）

- FST in STP-1: 300 m^3/day
- FST in STP-2,4: 200 m^3/day or 下水汚泥との共同処理
- To be studied

11

活動報告（玉眞）

活動1-2：下水道整備事業の計画促進に向けた組織体制の課題整理支援

12

2023年組織図の提案の要点（1/2）

- ❖ 下水道については建設のみに対応
  （O&M体制は次期改定時。その概ねの体制は技術局幹部と合意済み。）
- ❖ プロジェクトマネジメント部をAdditional Chief Engineer (Additional CE) の直下に設置
  - プロジェクト管理体制を組織図上に明確化するため、各PIUへの専任正規職員（幹部職員のみが専任）の最大数（水道は2プロジェクト、下水道は5プロジェクト分）を計上。
- ❖ eファイリングシステム（E-Nothi）やGISを通じたデジタル化の促進、現在ICT部がまとめて行っている料金や給与関連のデータ入力・管理の各部署への移管
  - 現在の設計部（現在Superintending Engineer (P&C)が管轄）を「設計・GIS部」に改称し人員体制を強化、Additional CE（上水・下水）の共管に変更。
  - 「Assistant Computer Programmer」を技術・財務・総務の各局の要所に配置。
  - 料金徴収部門（本庁・MODの各料金徴収部）に「Data Entry Operator」を増員。
  - 総務部に「Computer Operator」を増員。
- ❖ Bhadaljury浄水場の供用開始に向けた必要人員の追加。
- ❖ 現在4ヶ所のMODを、MOD-5 (Patenga)、MOD-6 (Patiya)、MOD-7 (Anwara&Boalkhali)を加えた7支所体制に拡充し、顧客サービス向上を図る。

13

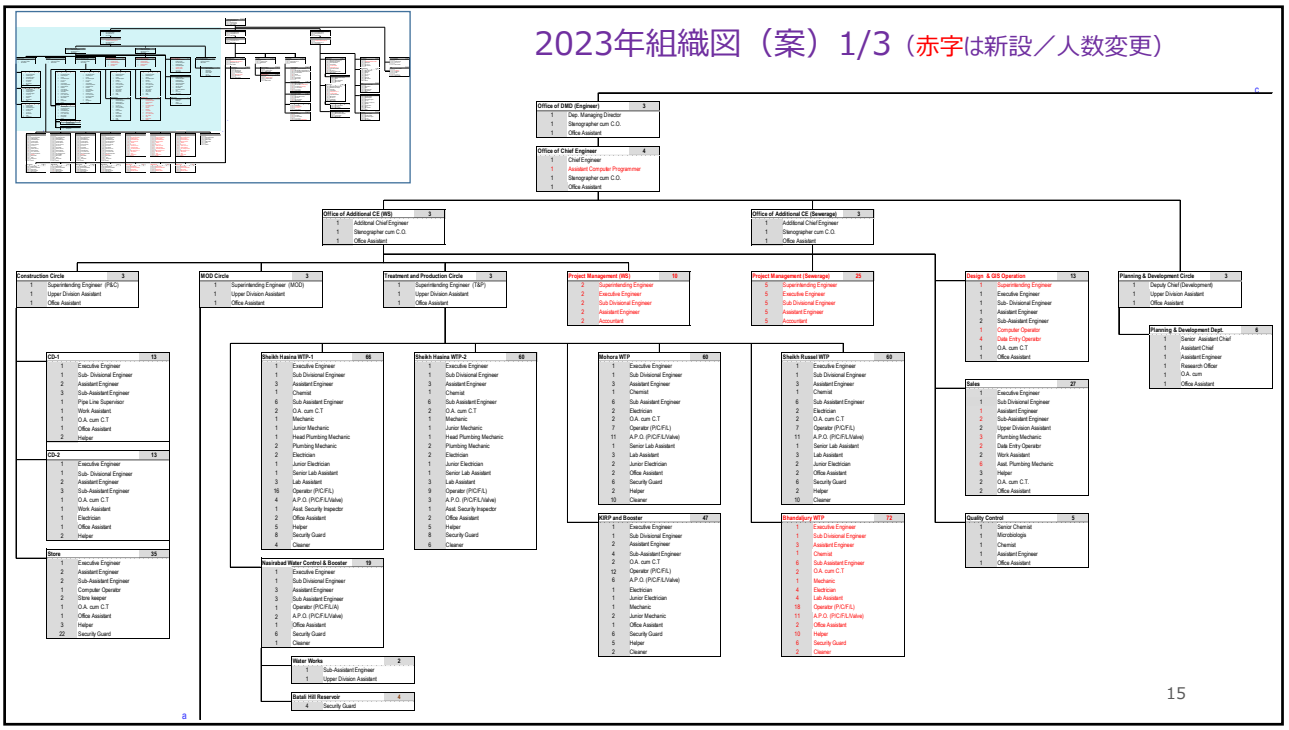
2023年組織図の提案の要点（2/2）

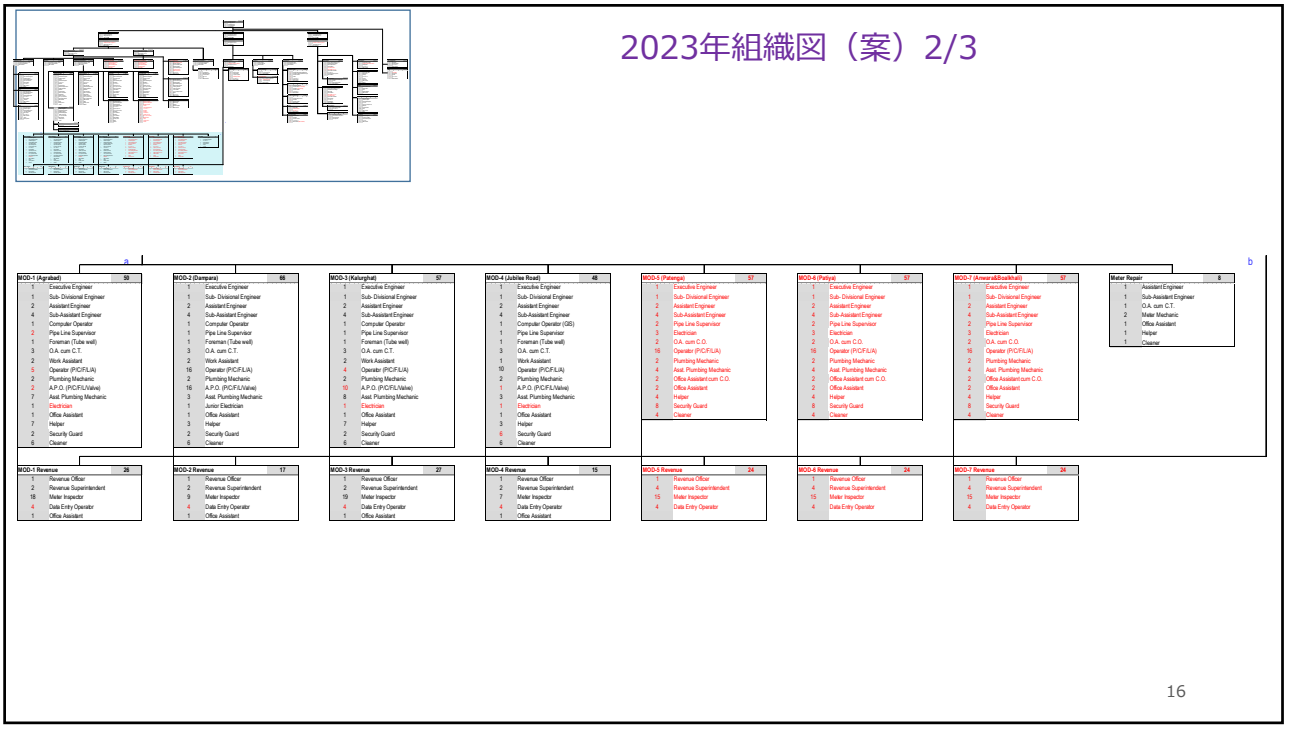
- ❖ 「Sales」部（MODと分担して各戸接続を所管）を財務局から技術局に移管し、両Additional CEの共管下に置く。各戸接続に係る技術審査等手続きの迅速化・品質向上を図る。
- ❖ ICT部の「データマネジメント課」を「システムメンテナンス課」に改称
  - 現在データマネジメント課に所属する8名の「Data Entry Operator」を料金徴収部門に異動。
  - コンピューター、関連機器、ネットワークのハードウェア管理・メンテナンスを担当する新たな職種として「Hardware Engineer」を新設。
- ❖ 下水道の建設に係る会計処理に対応するため、財務局の人員を増強。

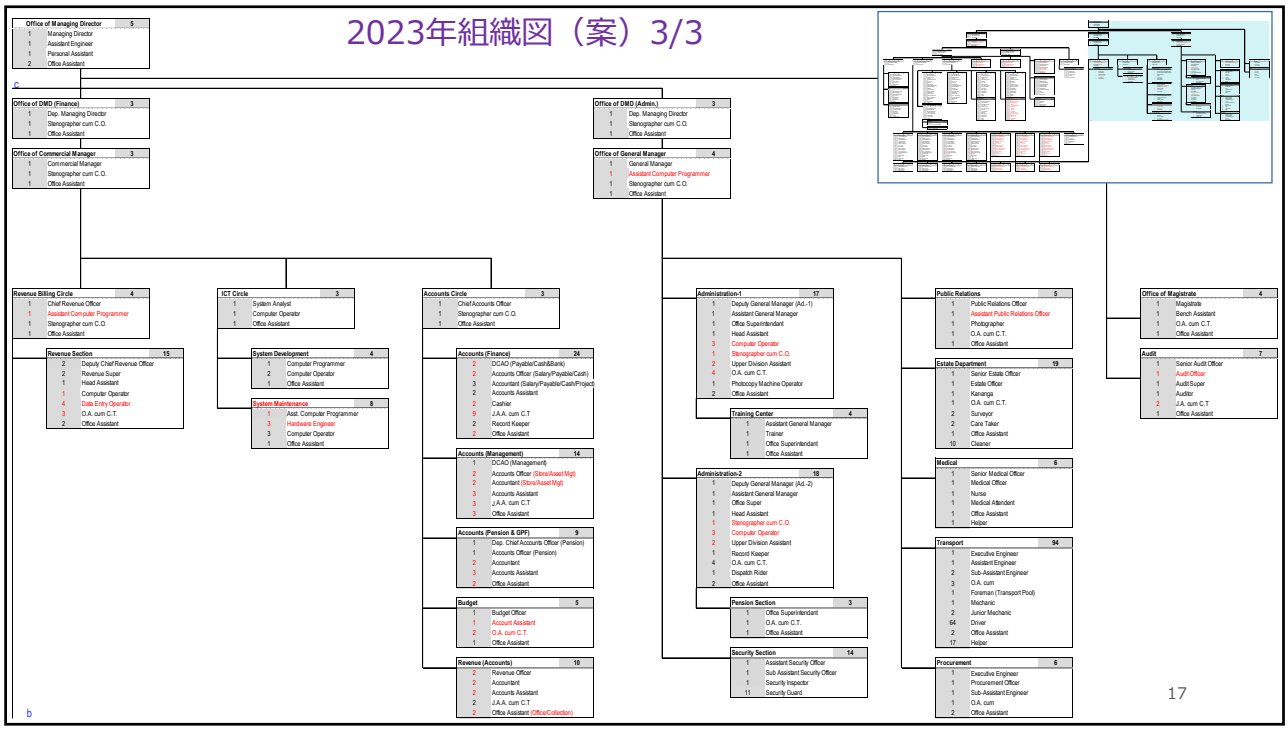
2023年組織図（案）の協議状況と今後の予定

- ❖ 技術・財務・総務各局のDMDに説明済み、各局からのフィードバックを受けて継続協議し最終化を予定。
- ❖ 各職種ごとの現有／計画職員数を明示し、採用が必要な職種と人数を明確化。将来の昇進を見据えて上位・下位職種間のバランスも考慮。
- ❖ 各職種の職務記述書は、原案を各局に配布しレビューを依頼。財務部・監査部・料金徴収部・ICT部からはレビュー後の成案を受領済み。
- ❖ 人事管理規程（Employees Service Regulations 2020）の改訂版に加え、人事管理細則を提案予定。

14


2023年組織図（案）1/3（赤字は新設／人数変更）
15


2023年組織図（案）2/3
16



備考

- 現行の2020年組織図では、職員定員1,119人に対し500人を超える欠員が生じているため、かねてより早期の補充を提言してきたが、今般100人規模の新規採用の公募を行ったとのこと。
- 上下水道接続規則（案）については、2022年1月に原案を提示した後、CWASA内部での議論に委ねているが、内部協議が1回開催されたのみで進捗が乏しい。このため、次回派遣時にテコ入れを予定。また、排水設備マニュアル作成作業との有機的連携を図る。
- CWASA組織運営上の喫緊の課題としては次の4点を認識している。
  - ①新組織図の整備と必要な職員の早期確保
  - ②デジタル化による業務効率化の推進
  - ③職員研修計画の策定と実施（下水道）
  - ④上下水を総合したCWASAの財務見通しの明確化


総務部執務室の状況
（PCの普及が遅れており、昔ながらの紙ばさみ式ファイルが山積みされている）

活動報告（田村）

活動2-1：PESSCM-1の計画を基に、設計時や建設時に想定される課題整理支援

活動2-2：上記課題の解決策の検討を通じた、
CWASAの設計・施工監理能力の向上支援

19

活動2-1&2-2

実施中の下水道事業（第一処理区）の設計・施工における課題の抽出と対応策の策定支援

第一処理区は本年3月にデザインビルド契約がなされ、現在コントラクターによる設計が開始されたばかりである。一方CWASAは現在円借款事業：カルナフリ上水道整備事業(KWSP-2)を実施中である。この事業の工事内容（チョットグラム市内における配管工事等）は下水道事業と類似している。また市内で行われている各戸給水工事も下水道事業での排水設備工事と類似している。そこでこれらの実施状況をレビューし、下水道事業において想定される課題と対応策を検討した。

I. KWSP-2の実施状況のレビュー
II. 新規給水接続工事のレビュー
III. CWASAの下水道事業の設計・施工で想定される課題とその対応策の検討

20

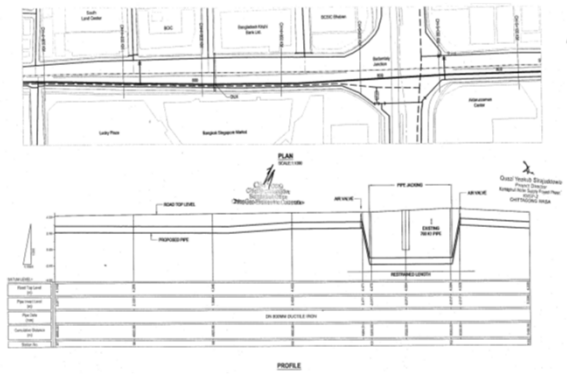
I. KWSPの実施状況のレビュー

- **大口径管の布設**

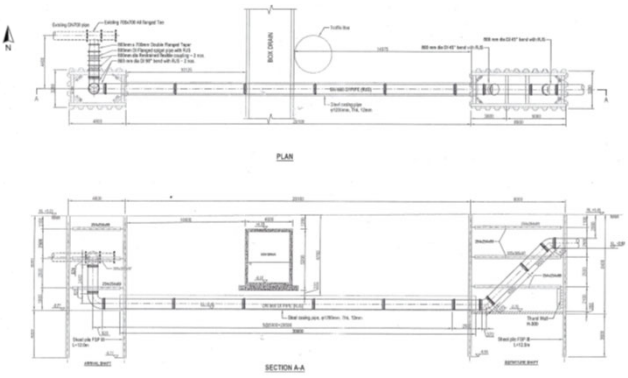
  評価される点

  推進工事区間においては詳細な施工計画、施工図に基づき工事が行われている。

Contract Drawings



Construction Drawings

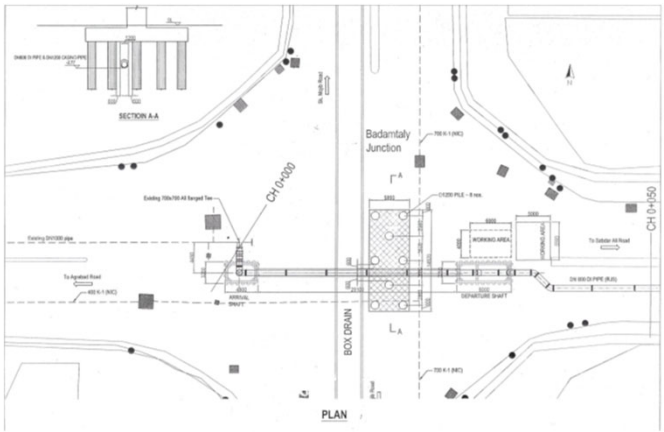


I. KWSP-2の実施状況のレビュー

- **大口径管の布設**

  留意すべき点

  高架道路（橋脚基礎杭がある）付近の管路計画は注意が必要。



既存地下埋設物の存在は管路縦断計画に大きな影響を及ぼす。

地下埋設物（既存及び将来計画）の情報をCCC, CDA, CWASAにて共有すべきである。

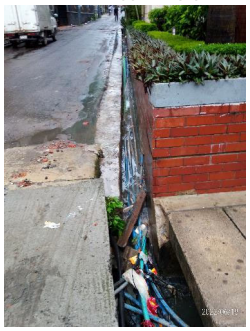
これら情報はGIS形式で整備されるのが望ましい。

I. KWSP-2の実施状況のレビュー

➢ **新設配水管への各戸給水管の接続替え**

評価される点

KWSP-2で設置される配水管路は小さい路地の各戸の家の前にまでにも配管されている。
（既存配水管は路地には布設されておらず、側溝の中に布設された給水管にて各戸に接続している）



既存の給水管は不適切に配管されている（路地の側溝に沿って配管等）

緑: 既存給水管（側溝の中に配管）
黒：新設配水管路からの新規給水管

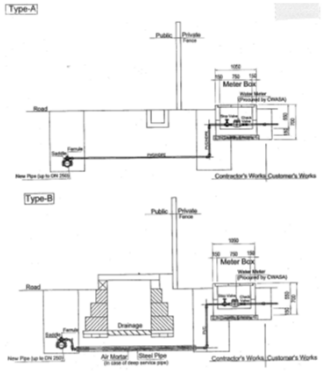
I. KWSP-2の実施状況のレビュー

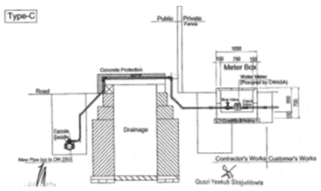
➢ **新設配水管への各戸給水管の接続替え**

問題点

給水管工事が図面通りに適切に実施されていないことがある。

Contract Drawings





Completion Status (Sample)

現地状況合わせた適切な標準設計図を追加し、それに基づく適切な施工監理がおこなわれるべきである。

II. 新規給水接続工事のレビュー

- **新規給水接続工事**

評価される点

Application Form, Inspection Report, Demand Note, Work Order の一連の書類がオンラインの情報システムで作成・管理されている。

Application Form

Inspection Report

Demand Note

Work Order

Water meter
(No. 171471782)

II. 新規給水接続工事のレビュー

- **新規給水接続工事**

留意すべき点、改善すべき点

幅の広い道路では道路を横断する給水管工事を避けるため配水管路は道の両サイドに布設することが望ましい。道路を横断する給水管路を非常に浅い土被りで布設することは避けなければならない。

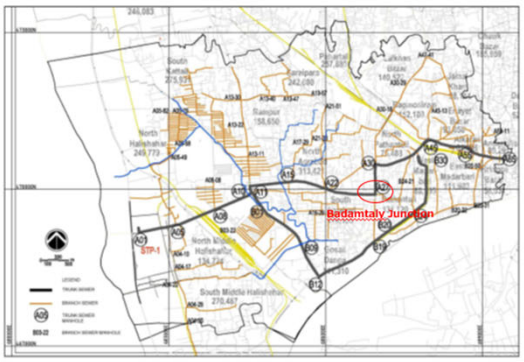
既存管路（通信線、ガス管等）をさけるために配水管路が非常に深い位置に埋設されていることがある。配水管の布設位置や深さを記録したデータベースを整備するべきである。

III. CWASAの下水道事業の設計・施工で想定される課題とその対応策の検討

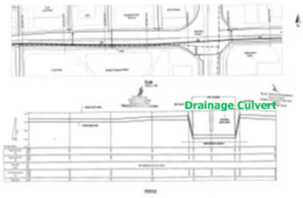
想定される課題

様々な既存埋設物

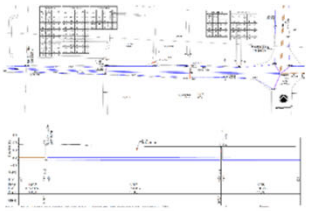
下水管路の縦断設計においては既存埋設物（排水カルバート、高架橋基礎等）の存在を考慮しなければならない。



General Plan of PESSCM-1



Drawings of KWSP2



Drawings of PESSCM-1

対応策

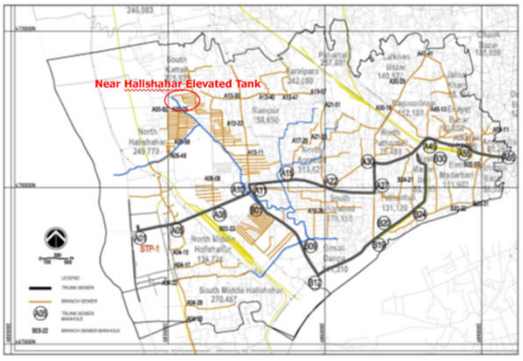
KWSP-2実施時に取得した既存埋設物の情報は下水道建設部署にも共有されるべきである。

III. CWASAの下水道事業の設計・施工で想定される課題とその対応策の検討

想定される課題

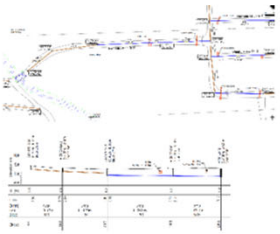
様々な既存埋設物

下水管路計画ルート上の既存埋設物の情報を注意深く確認する必要がある。



General Plan of PESSCM-1

Drawings of KWSP2



Drawings of PESSCM-1

対応策

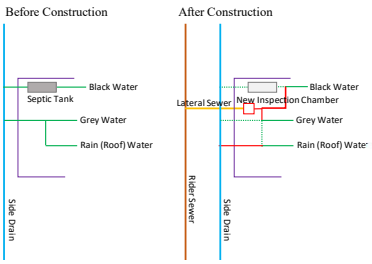
下水管の埋設位置は既存水道管を避けて計画されなければならない。KWSP-2のAs-built drawingsは下水道建設部署にも共有されるべきである。

III. CWASAの下水道事業の設計・施工で想定される課題とその対応策の検討

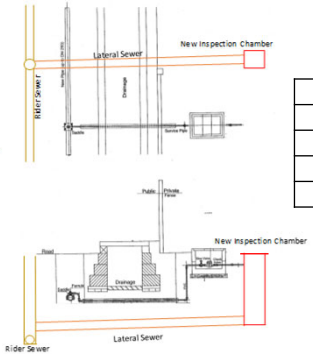
想定される課題

適切な排水設備の設計・施工のための技術基準、マニュアルの必要性

各顧客の建物の排水系統に応じた適切な排水設備の設置が必要である。適切な排水設備の設計・施工のためのマニュアル・基準等が必要である。



General Layout of Property Connection



General Drawings of Property Connection

対応策（技術基準の例）

Proposed Design Criteria of Lateral Sewer

Served Population	Pipe Diameter (mm)	Gradient
Less than 150	100 or more	2 : 100 or more
150 to 300	125 or more	1.7 : 100 or more
300 to 500	150 or more	1.5 : 100 or more
More than 500	200 or more	1.2 : 100 or more

The inspection chamber shall be covered so that the rainwater does not enter into the lateral sewer.

III. CWASAの下水道事業の設計・施工で想定される課題とその対応策の検討

提案される活動2-3の内容

➢ **排水設備工事の技術基準・マニュアルの整備**

第一処理区の契約図書には排水設備の技術基準は規定されていない。適切な施工のためには技術基準・マニュアルのもとで設計・施工されるべきであり、CWASAはその整備を図るべきである。

まずDWASA で使用されているマニュアルを参照することが推奨される。

＝＞DWASAには技術基準・マニュアルは整備されていないことが判明。

➢ **チョットグラム市内の地下埋設物マップ**

最初の段階として、KWSP-1&2のAs-built drawingsをCAD/GISデータベース化し、**CWASA内で共有する体制を整備する**ことが提案される。

CAD/GIS データを整備するに際しては以下のことを統一する必要がある。

- 座標系： BTM_Everest or UTM WGS84
- 基準となる標高：Basis(version) of elevation bench mark of Survey of Bangladesh

今後の活動

活動1-3：財務分析

活動1-4：マスタープランアップデート

活動2-3：家屋接続設計施工監理マニュアル

31

活動1-3：財務分析（世銀 WASH Projectとのスコープの重複解消）

- スコープが重複していることが判明したため、CWASAと今後調整する
- 世銀の提案が完了したうえで、JET側で条件を見直して提案することができるか。

＜WASHプロジェクトスコープ＞

Task 5: Economic and Financial Analysis

The consultant shall carry out financial analysis of the current situation in terms of the number of service users and payment for water supply (and sanitation) services under CWASA operation and forecast financial situations during the design period considering the growth in users and including the need for water tariffs adjustments. Since sanitation services in certain parts of Chattogram will go on stream in a few years and more in the next decade, the financial analysis shall take *inter alia* the sanitation services, sewer connection projections and sewerage tariffs in the financial analysis. The consultants shall assess the viability (benefit cost ratio, rate of return) of the proposed investments, determine the operational capabilities of the CWASA to return the borrowed capitals, and forecast changes in tariffs for water supply.

32

活動1-4：マスタープランアップデート（年度別事業計画＋事業費）

- 人口： Thanaレベルの2021年人口を入手済み
- 目標年度： 2030年→2070年
- 水消費量： 原単位120lpcdに固定し、水道使用量を算出（全てPiped Water）
- 下水発生量： 転換率80%に固定
- 下水処理場規模： 人口カバー率100%として算定（スラムを含むか否か要協議）
- 排除方式： 全て分流式に変更
- 管路延長： haあたり管路延長を参照
- CAPEX： m3あたり処理場費用、haあたり管路建設費
- OPEX： 建設費の比率より年あたりOM費を算定
- 事業スケジュール： 現在の計画に基づいて年次別事業費を算定。各戸接続は現実的な数値を提案

＊現在のCatchment-1事業（PESSCM-1）では、全戸の家屋接続は事業対象となっていない。
事業完了後CWASA独自で家屋接続を増強していく必要がある。

33

活動2-3： 家屋接続設計施工監理マニュアル構成案

第１章　総　　則
　1 適用範囲
　2 排水設備の定義
　3 排水設備の設置義務
　4 下水の種類
　5 排除方式
　6 排水設備計画の届出
　7 設計及び施工
　8 材料及び器具
第２章　手　　続
　第１節　排水設備計画届出
　　1 概要
　　2 届出の方法
　　3 設計図の作成
　　4 設計図の記載要領
　第２節　公共ます設置申請
　　1 公共ます設置の申請
　　2 公共ます申請書の記載方法
第３章　屋内排水設備
　第１節　一般事項
　第２節　名称・設計・施工
第４章　屋外排水設備
　第１節　一般事項
　第２節　設　　計
　　1 事前調査
　　2 測量と見取図の作成
　　3 敷地内の排除方式の設定
　　4 配管経路の設定
　　5 排水管の決定
　　6 ます、小型ます及び掃除口の決定
　第３節　施　　工
　　1 排水管
　　2 ます
　　3 公共ますとの接続上の注意
　第4節　その他の施設
　　1 セプティックタンクの処分
　　2 便槽処理

34

議　事　録

件　　名	バングラデシュ国都市衛生改善アドバイザー業務				
日　　時	2022 年 8 月 18 日（木）		自 16：30～至 18：00		
出席者 JICA 役職名略 敬称略	地球環境部：保坂様 南アジア部：吉田様、中丸様				
出席者 日本工営	西川、田村、玉眞				
打ち合わせ場所	Teams	記録作成者	玉眞	承認	
打合せ事項	現地業務帰国報告会				
資料	1. 報告資料				

打合せ事項	対　策　・　合　意　事　項　等
1. 現地業務報告	日本工営から、資料を用いて現地業務報告を行い、質疑応答を行った。 (1) 地球環境部（保坂様） • （活動 1-3）財務関連の検討結果は、JICA が独自の立場から発信することが重要と考えているため、整理しておくべき内容は WASH とのデマケの有無に関わらず整理を進めてほしい。 →承知した。（NK） • （活動 2-3）活動内容として提案された「市内の地下埋設物マップ」は、マップそのものの整備というよりも、地下埋設物に対する CWASA 内部の管理ルールや施工業者から提出される施工図等の記載内容といったことの整理をイメージしていた。内容については随時相談してほしい。 →承知した。（NK） (2) 南アジア部（中丸様） • 人口センサスの「Thana」とはどのようなレベルか。管区、県、市、郡等様々な行政区画があるが、どのレベルのものか。 →Thana は現在は警察管区のこと。CCC では Thana は 11、Ward は 41 に分割されている。（Upazilla＝Sub district,　以前 Upazilla は Thana と言われていました。現在は Thana は警察管区だそうです） • 世銀の WASH プロジェクトでの財務体制の課題整理支援はどこまでやるのか。料金徴収制度のみか、コスト削減の提案や債務の支払計画等についても対応するのか。また、WASH はいつ終了予定で、アドバイザー事業とどの程度時間的な差があるか。 →TOR では全体的な整理を行う内容となっているが、作業計画の詳細については次回派遣時に担当コンサルタントに確認する。また WASH の工期は 2023 年 2 月末で、アドバイザー業務の終了まで約 3 ヶ月ある。（NK） • Septage の収集は CCC が所管だったと記憶しているが、CWASA が実施するということか。また収集施設とは具体的に何か。またセプテージの東部とは第 2・4 処理区を指すのか。加えて、目下、JICA 等が集合型下水道の整備を検討して管路図を引いている中で、平行して分散型処理施設から出る汚泥の収集施設を整備することは可能か（汚泥量がぶれる可能性がある）。 →CCC ではきちんとできていないことから、CWASA が収集・処理までやることにしたもの。収集施設とはバキューム車等の収集車のことである。ま

	た、分散型処理施設については、集合処理と個別処理の区域を明確に分ける場合と、家屋が奥まっている等の理由で下水道による汚水排除が難しい世帯の暫定策としてし尿収集・処理を行う場合がある。（NK） • Catchment-1 のパッケージ 2,3 のうち、特に家屋接続の調査状況について追加情報があれば共有してほしい。 →進捗状況や調査内容等を次回アサイン時に確認します（NK） • O&M 体制は、次期改定時とのことであるが、下水円借款の方では、審査（23 年 2 月頃）において、どのように維持管理をしていくのか（担当組織がどこでどの程度の人員が必要か、またそれを CWASA が用意できるか）を確認し、合意する必要がある。これについて CWASA は十分に理解できているか、スケジュール感の整合を含め教示してほしい。 →第 2・4 処理区の処理場、ポンプ場、管路管理の各組織体制と人員は、準備調査の中で検討し CWASA に提案する。同時にその段階での他処理区における検討結果も取り込んで暫定組織図として CWASA の合意を得る予定。最終的な組織図としての承認は、2024 年以降となる見通し（NK）。 • KWSP-2 のレビュー内容（給水管の土被りが浅く、設計と実際が異なる点）については、CWASA が発注者として対応すべき、コントラクターの品質管理に関わることと思料。可能であれば CWASA 内担当部局にも情報共有してほしい。 →次回渡航時の報告会にて情報共有します。（NK） • マスタープランの見直しで CAPEX を出す際、JICA の円借款事業費との乖離が出てくるはず。なぜ異なるのか、CWASA に照会された際に違いを説明できるよう、CAPEX 積算の前提条件（m3 あたりの概算である点等）をしっかりと CWASA 側に説明してほしい。 →承知した。（NK） (3) 南アジア部（吉田様） • 今回入手できたセンサス速報で、チョットグラム市の人口に従来の想定と大きな違いがあれば教えてほしい。 →CCC 全体人口は、3.1 百万人（2020 年：MP 予想）に対して、3.2 百万人（2022 年：CENSUS）であり、ほぼマスタープランの予測通りであった（NK） • CWASA の組織図や幹部のポジションについて非常に重要な議論だと認識するが、CWASA のみで完結せず政府の承認等も必要になる場合も想定され、場合によっては大きな変革はそもそも困難な場合もあると思料。この点の見立てはどうか。 →組織図は CWASA の MD と理事会の承認があれば施行できるため、内部で事前にしっかり議論し合意形成をはかっておけばそれほど大きな困難はない。ただし、組織図の改定に伴い幹部の新職位を創設したり、人数や採用・昇進条件を変更する場合は、人事管理規程の変更として政府の承認が必要となるため、内容によっては承認に時間がかかる場合がある。（NK） 以上

Advisor on Urban Sanitation Improvement

Progress Meeting

14th October 2022

Japan International Cooperation Agency (JICA)
Nippon Koei Co., Ltd (NK)

Agenda of Progress Meeting

1. Working Record in this assignment
2. Presentation in the meeting (summary)
3. Opinion from CWASA in the workshop and meeting
4. Proposal for 2nd year
   1) Activity 1-2 : Organizational setup
   2) Activity 1-3 : Financial scheme
   3) Activity 1-4 : Implementation plan
   4) Activity 2-3 : Property Connection Manual

2

1 Working Record

Date & Day		Activities		Remarks
		AM	PM	
24-Sep	Sat	Flight to Dhaka		Dhaka
25-Sep	Sun	NKB office	Meeting with JICA, Flight to Chattogram	
26-Sep	Mon	Courtesy call and brief discussion with MD, CE, and SEs	Preparation of Workshop	
27-Sep	Tue	Joint Workshop (FS and Advisor)	JICA meeting, Preparation of workplan of 2nd year	
28-Sep	Wed	JICA-CWASA Meeting Preparation of MoM of Workshop	Preparation of MoM of Workshop	
29-Sep	Thu	Discussion with PD (Mr. Amin) regarding an action to the comments in the Workshop	Preparation of reports which were requested in the workshop	
30-Sep	Fri	-	-	
1-Oct	Sat	Preparation of report	Preparation of report	
2-Oct	Sun	Preparation for the meeting on connection rules	Preparation for the meeting on connection rules	
3-Oct	Mon	Preparation for the meeting on connection rules Meeting with DPD of PESSCM-1 to confirm the definition of property connection	CWASA meeting on Connection rules	
4-Oct	Tue	Collecting information from PESSCM-1 Drafting Property connection manual	Preparing the letter to BBS to request wordwise CENSUS data Drafting Property connection manual	
5-Oct	Wed	-	-	National Holiday
6-Oct	Thu	Drafting Property connection manual	Drafting Property connection manual	
7-Oct	Fri	-	-	
8-Oct	Sat	Preparation of report	Preparation of report	
9-Oct	Sun	Drafting Property connection manual	Drafting Property connection manual	National Holiday
10-Oct	Mon	Drafting Property connection manual	Preparation of the meeting with PESSCM-1 consultant Preparation of field activity report	

3

2. Planned Activities of the Project

Outcome-1: CWASA's capacity is strengthened for policy setting and planning of sewerage project, thereby the planning of new sewerage projects is accelerated.

Activity 1-1: Review Sanitation Master Plan and Ongoing Sewerage Project

Activity 1-2: Assist organizational setup to promote the planning of sewerage projects

Activity 1-3: Assist in identifying challenges to establish financial scheme for sewerage service

Activity 1-4: Assist in updating sewerage development plan

Outcome-2: CWASA's capacity is strengthened, for design and construction supervision of sewerage facilities including understanding of appropriate technology which is suitable in the project area.

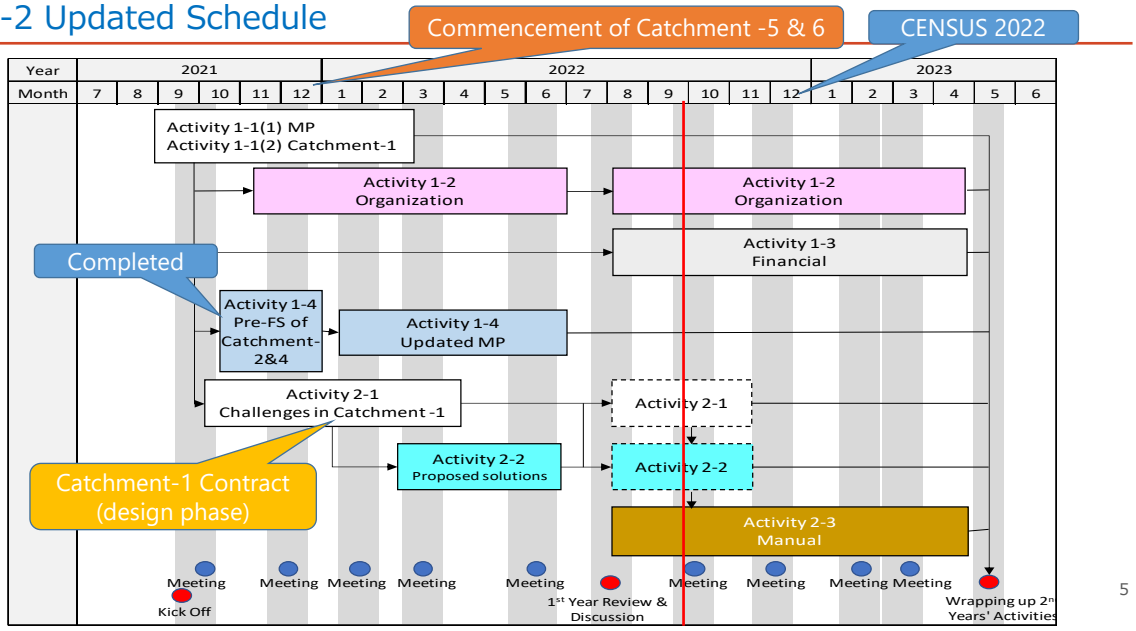
Activity 2-1: Assist in identifying challenges in CWASA's management on design and construction of Ongoing Sewerage Project

Activity 2-2: Assist in capacity development of CWASA for design and construction supervision of sewerage projects through creating solutions to the above challenges

Activity 2-3: Assist in developing design guidelines, technical standards and manuals for sewage works

4

1. Progress of the Project
1-2 Updated Schedule



5

2-1 Planned Activities of the Project **–Current situation-**

Activity		Situation
1-1:	Review Sanitation Master Plan and Ongoing Sewerage Project	● Review of MP and PESSCM-1 has been completed. ● Assistance to formulate Catchment-2 and 4 FS has been completed.
1-2:	Assist organizational setup to promote the planning of sewerage projects	● Water and Sewerage Connection Rules was drafted, under review of CWASA. ● Draft Organogram 2023 was proposed, and it is reviewed by each wing. ● Transition measure from construction phase to OM phase has already been discussed.
1-3:	Assist in identifying challenges to establish financial scheme	Not yet implemented (activity of 2nd phase)
1-4:	Assist in updating sewerage development plan	● Pre-FS for land acquisition has already been prepared and submitted to line ministry. ● Updated MP (investment plan) is under preparation. ➢ Final disposal site is still critical issue for sewerage development in CWASA for all catchments. CWASA will utilize CCC's new final disposal site (reported in progress of FS). ➢ Annual fecal sludge volume from slum was estimated and necessity of additional treatment plant will be discussed.

2-1 Planned Activities of the Project **–Current situation-**

Activity		Situation
2-1:	Assist in identifying challenges in CWASA's management on design and construction of Ongoing Sewerage Project	● Confirmation of challenges for sewerage development based on CWASA's experience in KWSP-II and design o PESSCM-1 have already been completed.
2-2:	Assist in capacity development of CWASA for design and construction supervision of sewerage projects through creating solutions to the above challenges	● The solution of design of lateral sewer (house connection) has already been proposed.
2-3:	Assist in developing design guidelines, technical standards and manuals for sewage works	● Design guideline, technical standards, manuals for sewerage works of DWASA was confirmed not to be available. DWASA applied the contractor's proposal in project basis.

7

2-2 Planned Activities of the Project **–Proposal for 2nd year-**

Activity		Situation
1-1:	Review Sanitation Master Plan and Ongoing Sewerage Project	Completed in the 1st Phase
1-2:	Assist organizational setup to promote the planning of sewerage projects	● Finalization of Organogram 2023. ● Finalization of CWASA Water and Sewerage Connection Rules. ● Revision of CWASA Employee Service Regulations 2020. ● Finalization of CWASA Human Resources Management Rules drafted in PANI-2 (which includes updated job descriptions).
1-3:	Assist in identifying challenges to establish financial scheme	● Development plans of water supply facilities for entire CCC area and sewerage facility in Catchment-3 are needed. ✓ The scope of work is fully overlapped with WASH project (WB).
1-4:	Assist in updating sewerage development plan	● Updated MP (investment plan) is prepared together with CWASA.

8

2-2 Planned Activities of the Project **–Proposal for 2nd year-**

Activity		Situation
2-1:	Assist in identifying challenges in CWASA's management on design and construction of Ongoing Sewerage Project	Completed in the 1st Phase
2-2:	Assist in capacity development of CWASA for design and construction supervision of sewerage projects through creating solutions to the above challenges	Completed in the 1st Phase
2-3:	Assist in developing design guidelines, technical standards and manuals for sewage works	● JET propose to prepare design and CS guideline of "house connection".

9

3. Opinion in the Workshop and subsequent meeting

	CWASA Comment	JET's Action
1-1	No comment	-
1-2	JET explained their draft of the Chattogram Water Supply and Sewerage (Water and Sewerage Connection) Regulations which is under review of CWASA. Chief Engineer instructed all Executive Engineers to check the Regulations within 2nd October, 2022 and provide their comments to finalize the Chattogram Water Supply and Sewerage (Water and Sewerage Connection) Regulations.	JET provided soft copy of related documents to XENs. JET will have meeting on 3rd October 2022 to discuss the comments from XENs for the finalization of the draft.
	JET explained the key points of organogram, 2023. CWASA said they need to have another meeting with JET to finalize the organogram, 2023. JET requested CWASA to send their proposed organogram of Administration and ICT circle. CWASA agreed to pursue the administration division to send their organogram and request the DMD(F) to finalize the organogram of ICT circle.	JET will incorporate the feedbacks from DMD (A) and DMD (F) before finalizing the draft.
1-3	No comment	-
1-4	No comment	-

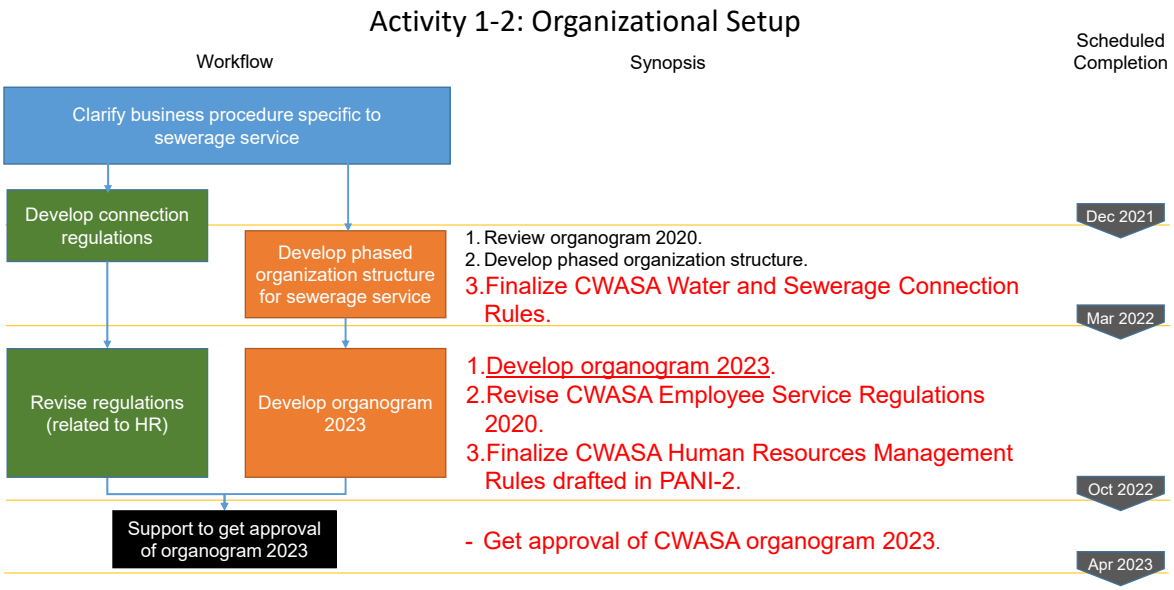
10

3. Opinion in the Workshop and subsequent meeting

	CWASA Comment	JET's Action
2-1 2-2	JET explained the conceivable challenges for sewerage development based on CWASA's experience in KWSP-2 and design of PESSCM-1. CWASA requested JET to submit a report on the findings of challenges. In addition, JET explained that the solution of design of lateral sewer (house connection) has already been proposed. CWASA replied that they are not clear to whom JET submitted the report and who is responsible to check.	According to the TOR of advisor, we are requested to support PESSCM-1 in terms of design and construction supervision. However, due to delay of the commencement of PESSCM-1, JET reviewed the report and drawings of PESSCM-1 and find out the establishment of property connection is the key issue to success the sewerage development. Furthermore, to assess the construction work, JET check the construction site of KWSP-II to find challenges in the construction of sewer system. The findings were reported in the progress meeting with the counterpart members. JET will submit the reports which have already been submitted to JICA.
2-3	Name of manual shall be simplified	Changed to "Manuals for Property Connections"

11

4. Proposal for 2nd year

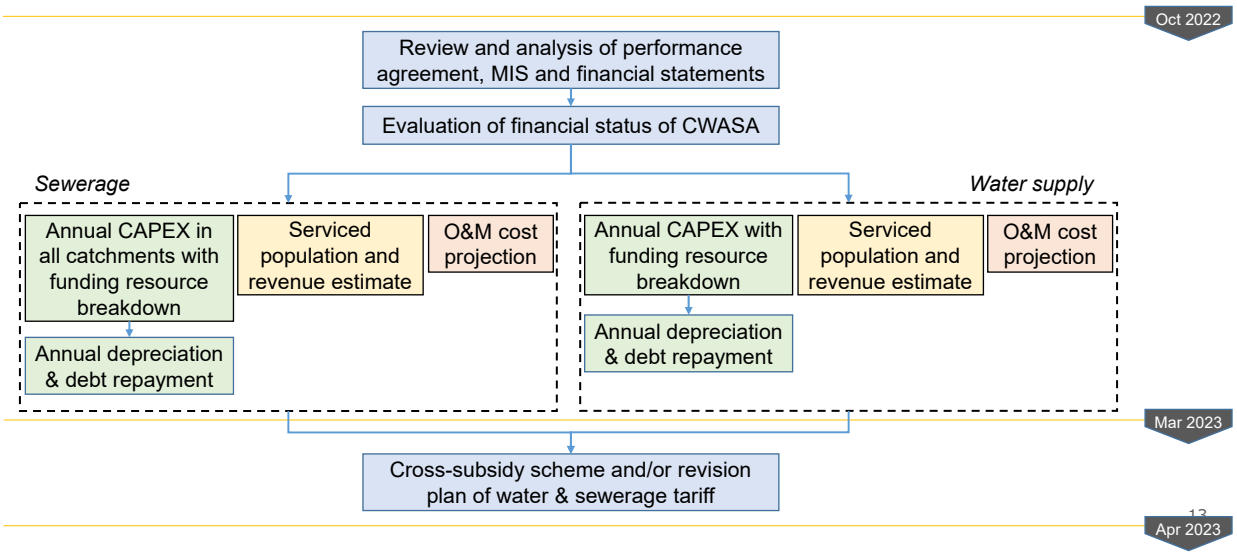


12

4. Proposal for 2nd year

Activity 1-3: Assist in identifying challenges to establish financial scheme

Action Plan on Financial Management



13

4. Proposal for 2nd year

Activity 1-4: Update Master Plan (Investment Plan)

- Investment plan is prepared considering the following change of design concepts

	MP	Current
Target year	2030	2070
Area	Nearby road	Entire city
Collection system	Interceptor + Separated sewer	Separated sewer
No. of HH connection	Smaller	Huge
Treatment process	Trickling filter system	OD with N,P treatment CAS without N,P treatment
No. of PS	Larger	Smaller (Sewer line will become deeper)

14

4. Proposal for 2nd year

Activity 2-3: Developing Implementation Manuals for Property Connection

(Draft Table of Contents: Updated)

1. General Provisions（総則）
   - 1.1 Scope of the Manual（適用範囲）
   - 1.2 Definitions （排水設備の定義）
   - 1.3 Obligations of the Residents（排水設備の設置義務）
   - 1.4 Type of Sewage （下水の種類）
   - ~~1.5 Type of Sewage Collection（排除方式）~~
   - 1.6 Application for Property Connection （排水設備計画の届出）
   - 1.7 Design and Construction（設計及び施工）
   - ~~1.8 Material and Equipment（材料及び器具）~~

2. Application Procedure （手続）
   - 2.1 Application for Property Connection （排水設備計画届出）
     - 2.1.1 General （概要）
     - 2.1.2 Application Method（届出の方法）
     - 2.1.3 Preparation of Design Drawings（設計図の作成）
     - 2.1.4 Standards for Design Drawings （設計図の記載要領）
   - ~~2.2 Application for Inspection Chamber（公共ます設置申請）~~
     - ~~2.2.1 Application for Connection Chamber（公共ます設置の申請）~~
     - ~~2.2.2 Guideline for Application Form（公共ます申請書の記載方法）~~

15

4. Proposal for 2nd year

Activity 2-3: Developing Implementation Manuals for Property Connection

(Draft Table of Contents: Updated)

3. Indoor Drainage Facilities（屋内排水設備）
   - 3.1 General （一般事項）
   - 3.2 Design and Construction （名称・設計・施工）

4. Outdoor Drainage Facilities（屋外排水設備）
   - 4.1 General（一般事項）
   - 4.2 Design（設計）
     - 4.2.1 Process of Design（設計手順）
     - 4.2.2 Site Investigation（事前調査）
     - 4.2.3 Survey and Preparation of Sketch（測量と見取図の作成）
     - ~~4.2.3 Determination of the Type of Sewage Collection（敷地内の排除方式の設定）~~
     - 4.2.4 Setting of Pipe Alignment（配管経路の設定）
     - 4.2.5 Design of property connection for sewer （排水管の決定）
     - 4.2.6 Design of chambers（ます、小型ます及び掃除口の決定）
   - 4.3 Construction Work（施工）
     - 4.3.1 Discharge pipeline（排水管）
     - 4.3.2 Chambers（ます）
     - 4.3.3 Notes for Connection Chamber（公共ますとの接続上の注意）
   - 4.4 Other Works（その他施設）
     - 4.4.1 Demolition of Septic Tank（セプティックタンクの処分）
     - ~~4.4.2 Others（便槽処理）~~

16

Appendix-8
6) Meeting on October 14, 2022

雇用・昇進条件（人事管理規則に記載）、職務記述書（人事管理規定細則に記載）の作成状況

No.	Designation	Salary Scale (Grade)	Note	Recruitment &Promotion Condition	Job Description	
					Revised /Developed	Reviewed by CWASA Officers
1	Managing Director	-			-	-
2	Deputy Managing Director	-			-	-
3	Chief Engineer	3			Done	To be done
4	Commercial Manager	3			Done	To be done
5	Additional Chief Engineer	TBD	New in 2020	TBD	Done	To be done
6	Secretary	4			Done	To be done
7	Superintending Engineer	4			Done	To be done
8	Deputy Chief (Development)	4			Done	To be done
9	Chief Accounts Officer	4			Done	Done
New	Senior System Analyst	TBD	New in 2023	TBD	Not yet	
10	Chief Revenue Officer (CRO)	5			Done	Done
11	System Analyst	5	Blocked post	TBD	Done	Done
12	Magistrate	6			Done	To be done
13	Executive Engineer	6			Done	To be done
14	Computer Programmer	6	Blocked post	TBD	Done	Done
15	Deputy Chief Accounts Officer	6			Done	Done
16	Deputy Chief Accounts Officer (Pension & GPF)	6	New in 2020		Not yet	
17	Deputy CRO	TBD	New in 2020	TBD	Done	Done
18	Deputy Secretary	6			Done	To be done
19	Sub Divisional Engineer	TBD	New in 2020	TBD	Done	To be done
20	Senior Assistant Chief	6			Done	To be done
21	Senior Audit Officer	8			Done	Done
22	Senior Chemist	TBD	New in 2020	TBD	Done	To be done
23	Senior Estate Officer	TBD	New in 2020	TBD	Not yet	
24	Senior Medical Officer	TBD	New in 2020	TBD	Not yet	
25	Assistant Secretary	9			Done	To be done
26	Assistant Chief	9			Done	To be done
27	Research Officer	9	To be abolished		-	-
28	Assistant Engineer	9			Not yet	-
29	Microbiologist	TBD		TBD	Done	To be done
30	Chemist	9	Blocked post	TBD	Done	To be done
31	Accounts Officer (Finance/ (Management)	9			Done	Done
32	Revenue Officer (Billing/ Accounts)	9			Done	Done
33	Budget Officer	9			Done	Done
34	Medical Officer	9	Blocked post	TBD	No need	-
35	Public Relation Officer	9	Jumping promotion to Chief Revenue Officer	TBD	Done	To be done
36	Procurement Officer	9	Blocked post	TBD	Done	To be done
37	Estate Officer	9			Done	To be done
38	Asst. Computer Programmer	9			Done	Done
39	Assistant Security Officer	TBD	New in 2020	TBD	Not yet	
40	Sub Assistant Engineer	10			Not yet	
41	Sub Asst. Security Officer	TBD	New in 2020	TBD	Not yet	
42	Sub Assistant PR Officer	TBD	New in 2020	TBD	Done	To be done
43	Trainer	TBD	New in 2020	TBD	Done	To be done
44	Photographer	TBD	New in 2020	TBD	Not yet	
45	Kanungo	10			No need	
46	Office Superintendent	11			Done	To be done
47	Accountant	11			Done	Done
48	Audit Superintendent	11			Done	Done
49	Revenue Superintendent	11			Done	Done
New	Assistant Maintenance Engineer	TBD	New in 2023	TBD	Done	Done
50	Stenographer cum Computer Operator	13	Jumping promotion to Revenue Officer	TBD	No need of revision	
51	Computer Operator	13	Jumping promotion to Asst. Computer Programmer	TBD	Done	Done
52	Chief Assistant	13			No need of revision	
53	Senior Lab. Assistant	13			Done	To be done
54	Upper Division Assistant	14			No need of revision	

No.	Designation	Salary Scale (Grade)	Note	Recruitment &Promotion Condition	Job Description	
					Revised /Developed	Reviewed by CWASA Officers
55	Bench Assistant	14			Not yet	
56	Accounts Assistant	14			Done	Done
57	Auditor	14			Done	Done
58	Laboratory Assistant	14			Done	To be done
59	Pipeline Supervisor	14			Done	To be done
60	Foreman (Transport Pool)	14			No need	
61	Foreman (Tube Well)	14			No need	
62	Nurse	15	Blocked post	TBD	No need	
63	Head Plumbing Mechanic	15			Not yet	
64	Draftsman	16	Blocked post	TBD	Done	To be done
65	Office Assistant cum Computer Typist	16			No need of revision	
66	Junior Auditor cum Computer Typist	16			No need of revision	
67	Junior Accounts Assistant cum Computer Typist	16			No need of revision	
68	Cashier	16			Done	Done
69	Data Entry Operator	16	Blocked post	TBD	Done	Done
70	Meter Inspector	16	Jumping promotion to Revenue Super	TBD	No need of revision	
71	Electrician	16			Done	To be done
72	Work Assistant	16			Done	To be done
73	Security Inspector	16	Blocked post	TBD	No need of revision	
74	Store Keeper	16	Blocked post	TBD	No need of revision	
75	Driver	16	Blocked post	TBD	No need of revision	
76	Meter Mechanic	16	Blocked post	TBD	No need of revision	
77	Operator (Pump/ Chlorine/ Filter/ Lime/ Alum)	16			No need of revision	
78	Plumbing Mechanic	16			Done	To be done
79	Surveyor	16	Jumping promotion to Kanungo	TBD	No need of revision	
80	Care Taker	17			No need of revision	
81	Photocopy Machine Operator	18			No need of revision	
82	Record Keeper	18			No need of revision	
83	Medical Attendant	18	Blocked post	TBD	No need of revision	
84	Assistant Operator (Pump/ Chlorine/ Filter/ Lime/ Alum)	18			No need of revision	
85	Assistant Plumbing Mechanic	18			No need of revision	
86	Dispatch Rider	18			No need of revision	
87	Mechanic	18	Blocked post	TBD	Done	To be done
88	Junior Electrician	18	Blocked post	TBD	Done	To be done
89	Assistant Security Inspector	18	Blocked post	TBD	Done	To be done
90	Junior Mechanic	18			Done	To be done
91	Office Assistant	20			No need of revision	
92	Security Guard	20			No need of revision	
93	Helper	20			No need of revision	
94	Cleaner	20			No need of revision	
Total				TBD: 35	Not yet: 11	To be done: 33

人事管理規則の目次

Chittagong Water Supply & Sewerage Authority (CWASA)
Employee Service Regulations, 2020

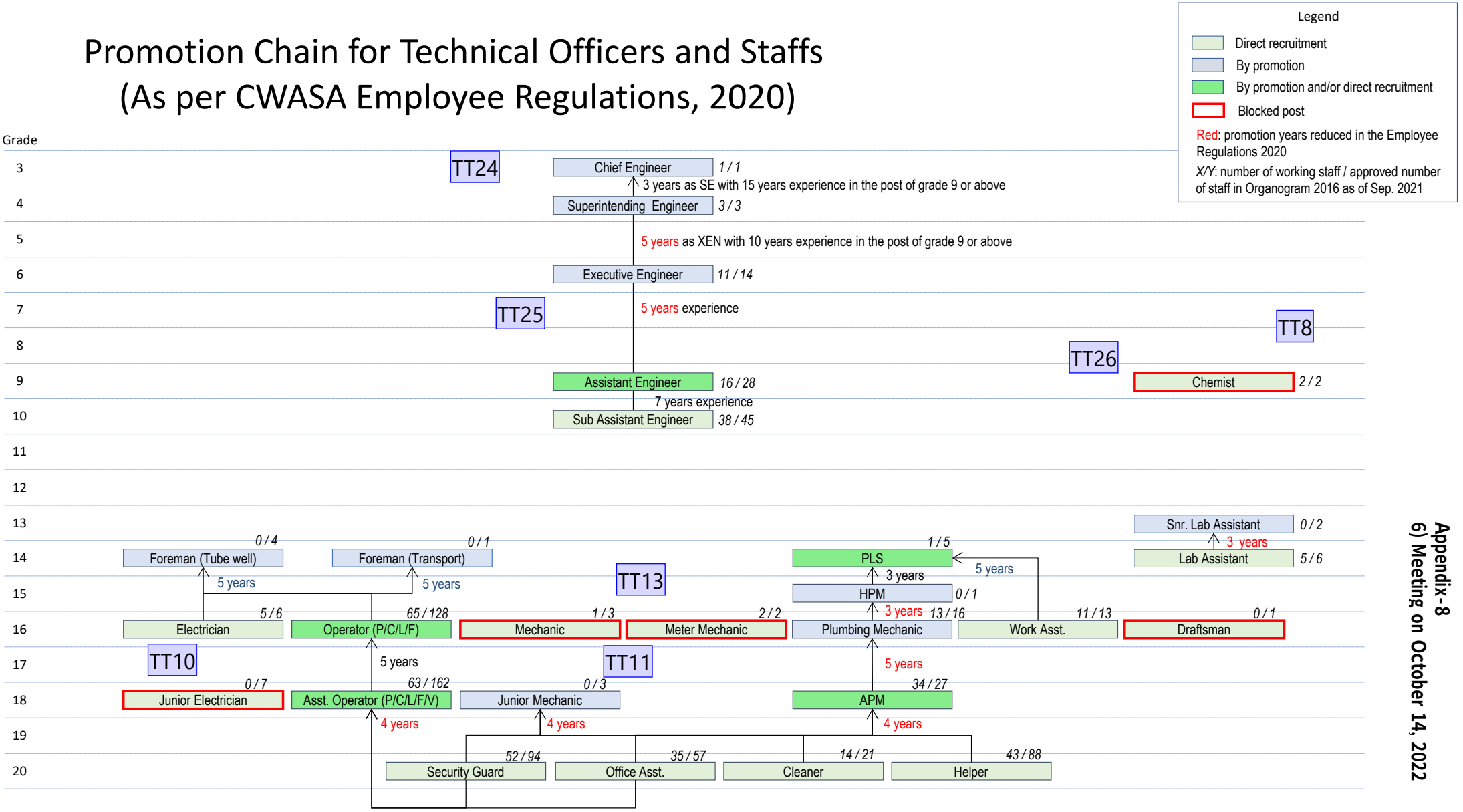
Contents

Schedule

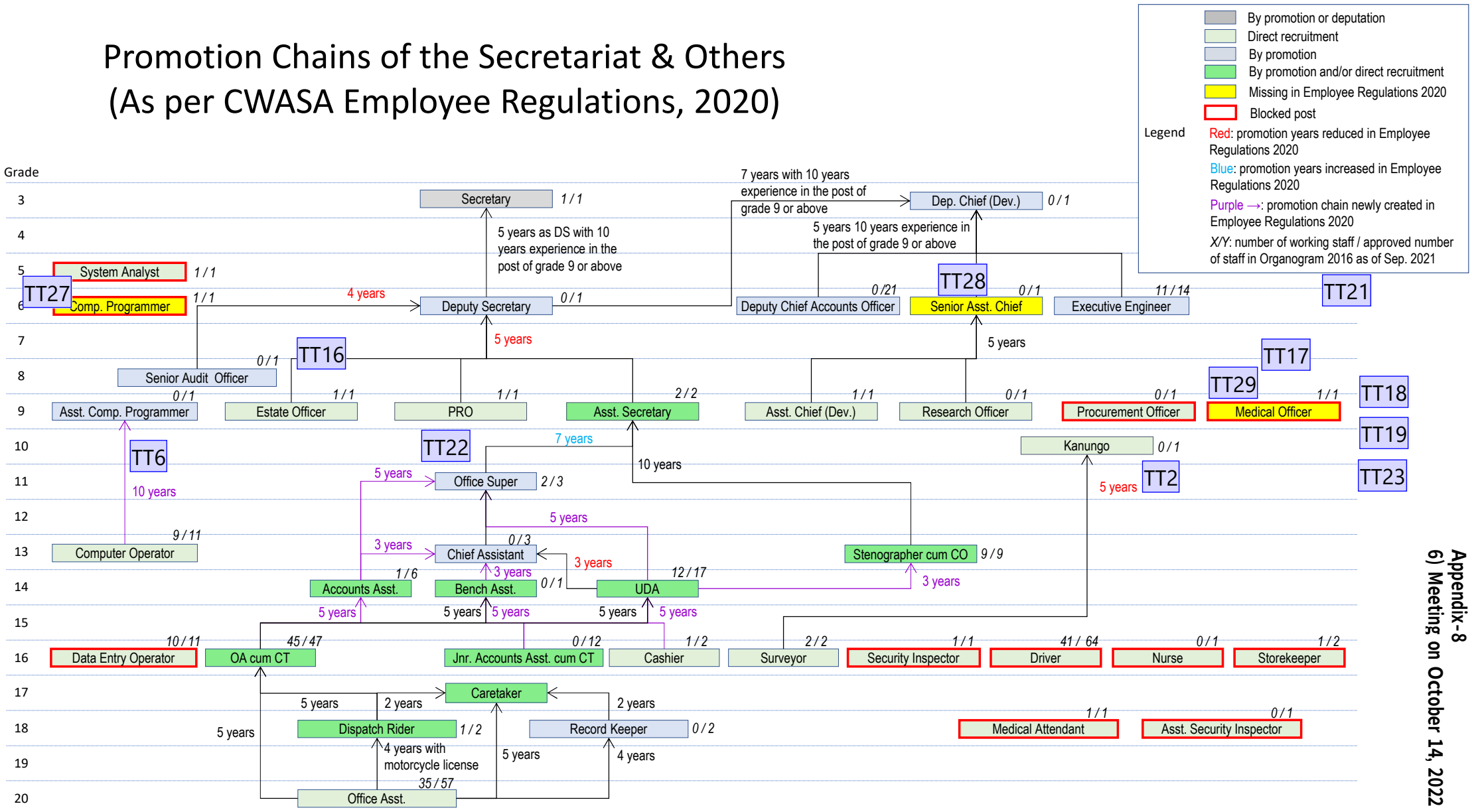
[See Regulation 2(6)]

Sl.	Name of Post	Age Limit for Direct appointment	Recruitment System	Qualification
(1)	(2)	(3)	(4)	(5)
1.	**Chief Engineer**	-	By promotion	a) B.Sc. (Hons) in Engineering or equivalent degree or Associate Membership of Institution of Engineers (AMIE) (part-A & part-B) from any recognized institute or organization with minimum 2nd class or equivalent GPA. b) At least 3 years work experience as Superintending Engineer with 15 years' experience in the post of grade 9 or above.
2.	**Commercial Manager**	-	By promotion; If there is no eligible candidate to be promoted by deputation.	For Promotion: a) At least 5 (five) years' experience as Chief Accounts Officer; and b) At least 15 (fifteen) years' experience in the post of grade 9 or above. For Deputation: Any officer in the post of Deputy Secretary of the Government.
3.	**Additional Chief Engineer**	-		
4.	**Secretary**	-	By promotion; If there is no eligible candidate to be promoted by deputation.	For the persons to be appointed by promotion: a) At least 5 (five) years' experience as Deputy Secretary; and b) At least 10 (ten) years' experience in the post of grade 9 or above. For Deputation: Any officer in the post of Deputy Secretary of the Government.
5.	**Superintending Engineer**	-	By Promotion	a) At least 5 (five) years' experience as Executive Engineer; and b) At least 10 (ten) years' experience in the post of grade 9 or above.
6.	**Deputy Chief (Development)**	-	By Promotion	a) At least 5 (Five) years' experiences as Deputy Chief Accounts Officer or Executive Engineer or Senior Assistant Chief (Development) with 10 (ten) years' experience in the post of grade 9 or above. b) At least 7 (Seven) years' experience as Deputy Secretary with 10 (ten) years' experience in the post of grade 9 or above.
7.	**Chief Accounts Officer**	-	By promotion	At least 5 (five) years' experiences as Deputy Chief Accounts officer with 10 (Ten) years' experience in the post of grade 9 or above.
8.	**Chief Revenue Officer**	-	By promotion;	For Promotion:

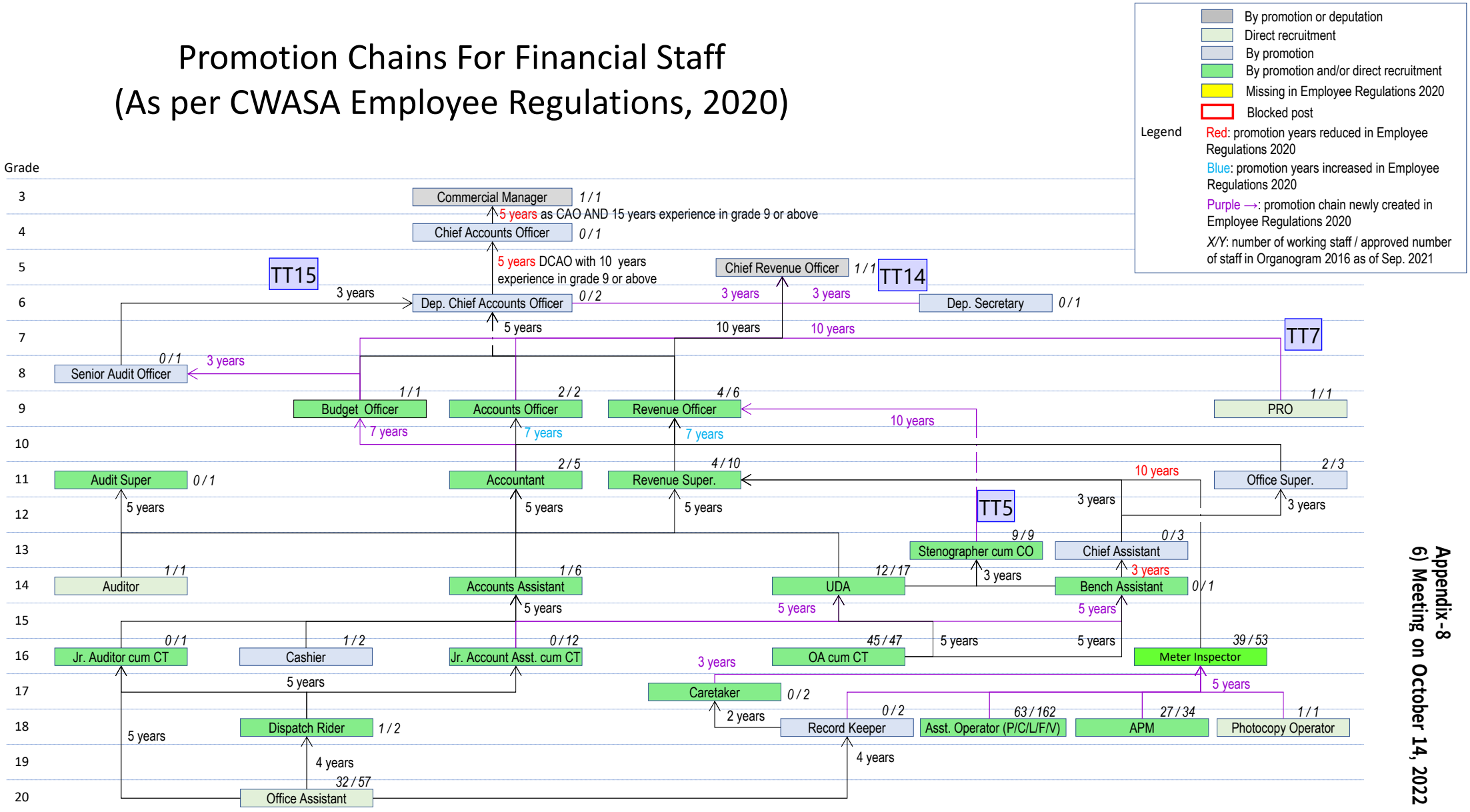
Promotion Chain for Technical Officers and Staffs
(As per CWASA Employee Regulations, 2020)



Promotion Chains of the Secretariat & Others
(As per CWASA Employee Regulations, 2020)



Promotion Chains For Financial Staff
(As per CWASA Employee Regulations, 2020)



Appendix-8
6) Meeting on October 14, 2022

人事管理細則の目次

Chattogram Water Supply and Sewerage Authority Human Resource Management Rules, 2023 (DRAFT)

Contents

Proposal for New/Revised Job Descriptions (CE, Additional CE, SE, XEN and Sub-Divisional Engineer)

Green: JD for new positions; Blue: Revised JD

Sl	Name of Post	Job Descriptions (Revision Proposal)	Job Description (Current)
1	**Chief Engineer**	1. Review the plans of all CWASA construction projects and get the approval of DMD (Engineering). 2. Review the reports submitted by Additional Chief Engineers and ensure the timely and appropriate fixation of identified problems with project and operation& maintenance (O&M) works and also with personnel matters of the Engineering Wing. 3. Advise & assist the Managing Director in all matters of technical aspects and nature. 4. Ensure communication and coordination vertically within Engineering Wing and horizontally with other wings among CWASA. 5. Keep communication with related governmental organizations and international donors. 6. Review annual work program and annual budget & expenditure for both projects and O&M works. 7. Review specific work manuals and standards. 8. Function as a member from Engineering Wing for evaluation of tenders through the nomination by the Chairman.	1. Control all project and operation &maintenance works and ensure efficient functioning of the department 2. Advise &assist the Chairman in all matters of technical aspects, nature 3. Maintain liaison with the consultants on Engineering matters 4. Prepare annual work program &annual budgets for both project &maintenance works 5. Prepare specific work manuals etc. 6. Supervise field activities to maintain progress and ensure completion in conformity with plans &maintenance works 7. Sanction estimates and accept tenders as per Financial Regulations and delegation of powers made from time to time in respect of both project &maintenance works 8. Function as member from Engineering Department for evaluation of tenders for nomination by the Chairman 9. Prepare reports on project and operation &maintenance works and also on personnel matters of the department 10. Keep control over expenditure in consultation with and in conformity with the approved budgets &schemes
3	**Additional Chief Engineer**	**Additional Chief Engineer (Water Supply)** 1. Plan all CWASA projects related to the construction/ rehabilitation and operation& maintenance (O&M) of water works. 2. Organize the preparation of bill of quantity (BOQ) and tender documents to procure design and supervision consultants, contractors, equipment and materials. 3. Prepare annual work program and annual budgets for both project and O&M works. 4. Organize the preparation of specific work manuals and	New designation in Organogram 2020

		standards. 5. Review the reports submitted by the Superintending Engineers and give needed directions for the timely fixation of identified problems on project and O&M works and also on personnel matters in the Circles under his/her control. 6. Keep control over expenditure in consultation with and in conformity with the approved budgets &schemes. 7. Perform the given responsibilities at times. **Additional Chief Engineer (Sewerage)** 1. Plan all CWASA projects related to the construction of sewerage works. 2. Organize the preparation of bill of quantity (BOQ) and tender documents to procure design and supervision consultants, contractors, equipment and materials. 3. Review and compile annual work program and annual budgets for all project works. 4. Organize the preparation of specific work manuals and standards. 5. Ensure liaison with the consultants on key engineering matters. 6. Supervise field activities to maintain progress and ensure completion in conformity with plans. 7. Plan and arrange necessary training in cooperation with the Training Center for the employees/ apprentices of Sewerage Circle. 8. Review the reports submitted by the Superintending Engineer (Project Management (Sewerage)) on each sewerage construction project and give needed directions for the timely fixation of identified problems on project works and also on personnel matters in Sewerage Circle.	

		9. Monitor the expenditure so as to be in conformity with the approved budgets & schemes. 10. Perform the given responsibilities at times.	
5	**Superintending Engineer**	**Superintending Engineer (Project Management)** 1. Assist the Additional Chief Engineer in planning the CWASA construction projects related to the construction of sewerage works. 2. Prepare the draft of bill of quantity (BOQ) and tender documents to procure design and supervision consultants, contractors, equipment and materials. 3. Prepare annual work program and annual budget for the responsible project works. 4. Assist the Additional Chief Engineer in developing specific work manuals and standards. 5. Maintain liaison with the consultants on engineering matters. 6. Organize office and field activities and distribute work to officers and staffs to maintain progress and ensure completion in conformity with plans. 7. Assist the Additional Chief Engineer in planning and arranging necessary training in cooperation with the Training Center for the employees/ apprentices of the Circle. 8. Timely report to the Additional Chief Engineer on the progress, emergency and challenges of responsible projects and organize timely fixation of identified problems, in consultation with the Additional Chief Engineer. 9. Keep control over expenditure of the responsible projects in consultation with and in conformity with the approved budgets &schemes for the in-charge project. 10. Perform the given responsibilities at times.	SE (Project Management) to be created in Organogram 2023.

Advisor on Urban Sanitation Improvement

Progress Meeting

February 2023

Japan International Cooperation Agency (JICA)
Nippon Koei Co., Ltd (NK)

Agenda of Progress Meeting

1. Working Record in this assignment
2. Presentation in the meeting (summary)
3. Opinion from CWASA in the workshop and meeting
4. Proposal for 2nd year
   1) Activity 1-2 : Organizational setup
   2) Activity 1-3 : Financial scheme
   3) Activity 1-4 : Implementation plan
   4) Activity 2-3 : Property Connection Manual

2

2. Planned Activities of the Project

Outcome-1: CWASA's capacity is strengthened for policy setting and planning of sewerage project, thereby the planning of new sewerage projects is accelerated.

Activity 1-1: Review Sanitation Master Plan and Ongoing Sewerage Project

Activity 1-2: Assist organizational setup to promote the planning of sewerage projects

Activity 1-3: Assist in identifying challenges to establish financial scheme for sewerage service

Activity 1-4: Assist in updating sewerage development plan

Outcome-2: CWASA's capacity is strengthened, for design and construction supervision of sewerage facilities including understanding of appropriate technology which is suitable in the project area.

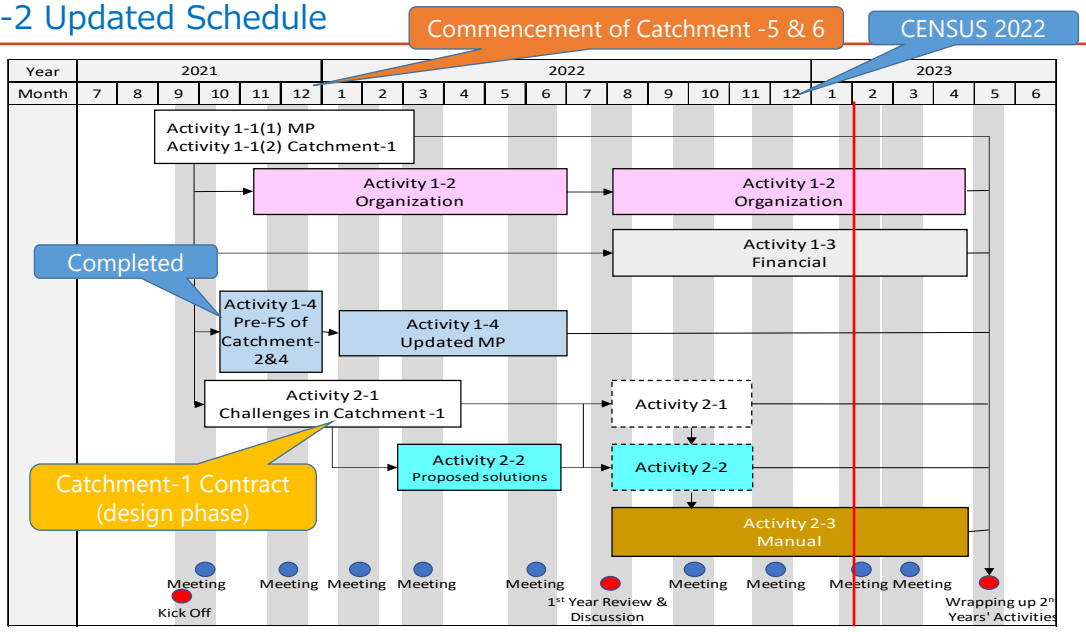
Activity 2-1: Assist in identifying challenges in CWASA's management on design and construction of Ongoing Sewerage Project

Activity 2-2: Assist in capacity development of CWASA for design and construction supervision of sewerage projects through creating solutions to the above challenges

Activity 2-3: Assist in developing design guidelines, technical standards and manuals for sewage works

3

1. Progress of the Project
1-2 Updated Schedule



4

2-1 Planned Activities of the Project **–Activities of 1st Year-**

Activity		Situation
1-1:	Review Sanitation Master Plan and Ongoing Sewerage Project	● Review of MP and PESSCM-1 has been completed. ● Assistance to formulate Catchment-2 and 4 FS has been completed.
1-2:	Assist organizational setup to promote the planning of sewerage projects	● Water and Sewerage Connection Rules was drafted, under review of CWASA. ● Draft Organogram 2023 was proposed, and it is reviewed by each wing. ● Transition measure from construction phase to OM phase has already been discussed.
1-3:	Assist in identifying challenges to establish financial scheme	Not yet implemented (activity of 2nd phase)
1-4:	Assist in updating sewerage development plan	● Pre-FS for land acquisition has already been prepared and submitted to line ministry. ● Updated MP (investment plan) is under preparation. ➢ Final disposal site is still critical issue for sewerage development in CWASA for all catchments. CWASA will utilize CCC's new final disposal site (reported in progress of FS). ➢ Annual fecal sludge volume from slum was estimated and necessity of additional treatment plant will be discussed.

2-1 Planned Activities of the Project **–Activities of 1st Year-**

Activity		Situation
2-1:	Assist in identifying challenges in CWASA's management on design and construction of Ongoing Sewerage Project	● Confirmation of challenges for sewerage development based on CWASA's experience in KWSP-II and design o PESSCM-1 have already been completed.
2-2:	Assist in capacity development of CWASA for design and construction supervision of sewerage projects through creating solutions to the above challenges	● The solution of design of lateral sewer (house connection) has already been proposed.
2-3:	Assist in developing design guidelines, technical standards and manuals for sewage works	● Design guideline, technical standards, manuals for sewerage works of DWASA was confirmed not to be available. DWASA applied the contractor's proposal in project basis.

6

2-2 Planned Activities of the Project **–Situation of 2nd year-**

Activity		Situation
1-1:	Review Sanitation Master Plan and Ongoing Sewerage Project	Completed in the 1st Phase
1-2:	Assist organizational setup to promote the planning of sewerage projects	● Organogram 2023 is under review by CWASA ● CWASA Water and Sewerage Connection Rules is under review by CWASA. ● Revision of CWASA Employee Service Regulations 2020. ● Update of CWASA Human Resources Management Rules drafted in PANI-2 (which includes updated job descriptions).
1-3:	Assist in identifying challenges to establish financial scheme	● Development plans of water supply facilities for entire CCC area and sewerage facility in Catchment-3 are needed. ✓ The scope of work is fully overlapped with WASH project (WB).
1-4:	Assist in updating sewerage development plan	● Updated MP (investment plan) is prepared together with CWASA.

7

2-2 Planned Activities of the Project **–Proposal for 2nd year-**

Activity		Situation
2-1:	Assist in identifying challenges in CWASA's management on design and construction of Ongoing Sewerage Project	Completed in the 1st Phase
2-2:	Assist in capacity development of CWASA for design and construction supervision of sewerage projects through creating solutions to the above challenges	Completed in the 1st Phase
2-3:	Assist in developing design guidelines, technical standards and manuals for sewage works	● "Property connection manual" was drafted and will be discussed in this asignment.

8

4. Proposal for 2nd year

Activity 1-2: Organizational Setup

Workflow	Synopsis	Scheduled Completion
Clarify business procedure specific to sewerage service		
Develop connection regulations		Dec 2021
Develop phased organization structure for sewerage service	1. Review organogram 2020. 2. Develop phased organization structure. 3.Finalize CWASA Water and Sewerage Connection Rules.	Mar 2022
Revise regulations (related to HR)	1.Develop organogram 2023. 2.Revise CWASA Employee Service Regulations 2020. 3.Finalize CWASA Human Resources Management Rules drafted in PANI-2.	Oct 2022
Develop organogram 2023		
Support to get approval of organogram 2023	- Get approval of CWASA organogram 2023.	Apr 2023

9

4. Proposal for 2nd year

Activity 1-3: Assist in identifying challenges to establish financial scheme

Action Plan on Financial Management

Oct 2022

Review and analysis of performance agreement, MIS and financial statements

Evaluation of financial status of CWASA

Sewerage

- Annual CAPEX in all catchments with funding resource breakdown
- Serviced population and revenue estimate
- O&M cost projection
- Annual depreciation & debt repayment

Water supply

- Annual CAPEX with funding resource breakdown
- Serviced population and revenue estimate
- O&M cost projection
- Annual depreciation & debt repayment

Mar 2023

Cross-subsidy scheme and/or revision plan of water & sewerage tariff

10

Apr 2023

4. Proposal for 2nd year

Activity 1-4: Update Master Plan (Investment Plan)

- Investment plan is prepared considering the following change of design concepts

	MP	Current
Target year	2030	2070
Area	Nearby road	Entire city
Collection system	Interceptor + Separated sewer	Separated sewer
No. of HH connection	Smaller	Huge
Treatment process	Trickling filter system	OD with N,P treatment CAS without N,P treatment
No. of PS	Larger	Smaller (Sewer line will become deeper)

11

4. Proposal for 2nd year

Activity 2-3: Developing Implementation Manuals for Property Connection

1. General Provisions（総則）
   - 1.1 Scope of the Manual（適用範囲）
   - 1.2 Definitions （排水設備の定義）
   - 1.3 Obligations of the Owner of the Building（排水設備の設置義務）
   - 1.4 Type of Sewage （下水の種類）
   - 1.5 Application for Property Connection （排水設備計画の届出）
   - 1.6 Design and Construction（設計及び施工）

2. Application Procedure （手続）
   - 2.1 Application for Property Connection （排水設備計画届出）
     - 2.1.1 General （概要）
     - 2.1.2 Application Method（届出の方法）
     - 2.1.3 Preparation of Construction Drawings（設計図の作成）
     - 2.1.4 Standards for Construction Drawings （設計図の記載要領）
   - 2.2 Application for Public Inspection Chamber（公共ます設置申請）

3. Indoor Drainage Facilities（屋内排水設備）

12

4. Proposal for 2nd year

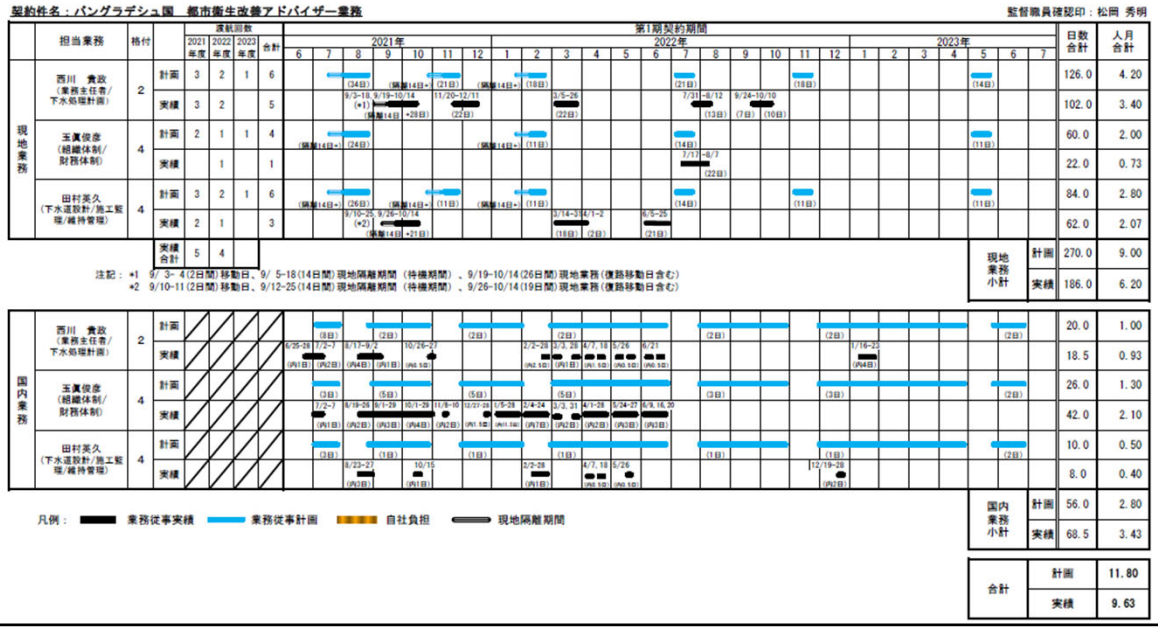
Activity 2-3: Developing Implementation Manuals for Property Connection

4. Outdoor Drainage Facilities, Public Inspection Chamber, and Lateral Sewer（屋外排水設備）
- 4.1 General（一般事項）
  - 4.1.1 Definition
  - 4.1.2 Consideration for Installation
- 4.2 Design（設計）
  - 4.2.1 Process of Design（設計手順）
  - 4.2.2 Site Investigation（事前調査）
  - 4.2.3 Topographic Survey and Preparation of Plan Drawing（測量と見取図の作成）
  - 4.2.4 Setting of Pipe Alignment（配管経路の設定）
  - 4.2.5 Design of property connection （排水管の決定）
  - 4.2.6 Design of chambers（ます、小型ます及び掃除口の決定）
- 4.3 Construction Work（施工）
  - 4.3.1 Discharge pipe（排水管）
  - 4.3.2 Chambers（ます）
  - 4.3.3 Notes for Connection to Public Inspection Chamber（公共ますとの接続上の注意）
- 4.4 Measures for Existing Septic Tank（セプティックタンクの処分）

13

4. Proposal for 2nd year

Activity 2-3: Developing Implementation Manuals for Property Connection



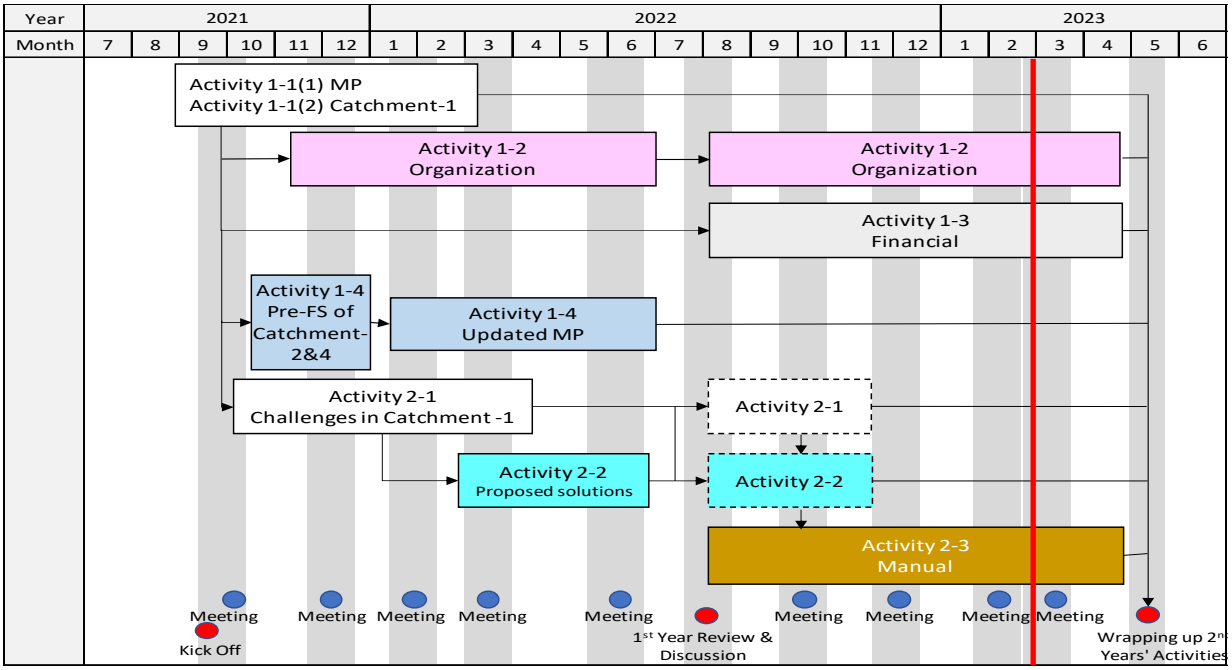
Summary of Activities

Advisor on Urban Sanitation Improvement Project

1. Contract Period

24th June 2021 to 16th June 2023

2. Work Schedule



3. Progress of Each Work Item

No.	Activity	Situation	Status
Outcome-1: CWASA's capacity for policy setting and planning of sewerage project is strengthened, thereby the planning of new sewerage projects is accelerated			
1-1	Review Sanitation Master Plan and Ongoing Sewerage Project	• Review of MP and PESSCM-1 has been completed. • Support to formulate JICA's F/S for Catchment -2 and 4	Competed
1-2	Assist organizational setup to promote the planning of sewerage projects	• Water and Sewerage Connection Rules was drafted, under review of CWASA. • Draft Organogram 2023 was proposed, and it is reviewed by each wing. • Transition measure from construction phase to OM phase has already been discussed.	Competed
1-3	Assist in identifying challenges to establish financial scheme	• Reviewing documents prepared in FS for Catchment-2,4	Ongoing
1-4	Assist in updating sewerage development plan	• Pre-FS for land acquisition has already been prepared and submitted to line ministry.	Ongoing (Pre-FS has been

		• Final disposal site was identified. CWASA will utilize CCC's new final disposal site. • Annual fecal sludge volume from slum was estimated.	completed)
Outcome-2: CWASA's capacity for design and construction supervision of sewerage facilities is strengthened, including understanding of appropriate technology for the project area			
2-1	Assist in identifying challenges in CWASA's management on design and construction of Ongoing Sewerage Project	• Confirmation of challenges for sewerage development based on CWASA's experience in KWSP-II and design o PESSCM-1 have already been completed.	Competed
2-2	Assist in capacity development of CWASA for design and construction supervision of sewerage projects	• The solution of design of lateral sewer (house connection) has already been proposed.	Competed
2-3	Assist in developing design guidelines, technical standards and manuals for sewage works	• Preparation of property connection manual is drafted	Ongoing

4. History of Service

Date	Description
20/06/2021	JICA engaged the consultants on Urban Sanitation Improvement Advisor for Chattogram WASA based on the Note Verbale agreed between the both governments.
01/07/2021	Notification of Arrival of JICA Experts "Advisor on Urban Sanitation Improvement" to Chattogram Water Supply and Sewerage Authority.
20/09/2021	Kick off meeting was held.
07/10/2021	Progress meeting was held.
25/11/2021	CWASA sent a letter to the Senior Secretary of Local Government Division for the administrative approval of land acquisition of STP 2 and 4.
13/01/ 2022	Ministry gave the approval of the land acquisition Kalurghat Catchment (STP 2) and Bakalia Catchment (STP-4).
14/03/2022	JET prepared the pre-FS of Catchment 2 and 4 to be submitted with the land acquisition DPP.
18/04/2022	CWASA submitted the DPP to the ministry for the land acquisition.
27/09/2022	Joint Progress Meeting was held.
11/10/2022	Field Activity Report of 1st to 4th assignment and summary report of activity 2-1 and 2-2 was submitted to MD of CWASA.
30/11/2022	Coordination Meeting among donors on Capacity Building Support of CWASA was held.
18/12/2022	Submission of Organogram, 2023 (draft) and Water and Sewerage Connection Regulations, 2022 (draft) to MD.
20/02/2022	Workshop on CWASA Water and Sewerage Connection Regulations, CWASA Property Connection Manual and Organogram, 2023

(End)

Advisor on Urban Sanitation Improvement

Progress Meeting

1st March 2023

Japan International Cooperation Agency (JICA)
Nippon Koei Co., Ltd (NK)

Agenda of Progress Meeting

1. Planned Activities of the Project
2. Progress of the project
   - 2-1: Updated schedule
   - 2-2: Progress in 1st phase
   - 2-3: Proposal for 2nd phase
     1) Activity 1-2 : Organizational setup
     2) Activity 1-3 : Financial scheme
     3) Activity 1-4 : Implementation plan
     4) Activity 2-3 : Property Connection Manual

2

1. Planned Activities of the Project

Outcome-1: CWASA's capacity is strengthened for policy setting and planning of sewerage project, thereby the planning of new sewerage projects is accelerated.

Activity 1-1: Review Sanitation Master Plan and Ongoing Sewerage Project

Activity 1-2: Assist organizational setup to promote the planning of sewerage projects

Activity 1-3: Assist in identifying challenges to establish financial scheme for sewerage service

Activity 1-4: Assist in updating sewerage development plan

Outcome-2: CWASA's capacity is strengthened, for design and construction supervision of sewerage facilities including understanding of appropriate technology which is suitable in the project area.

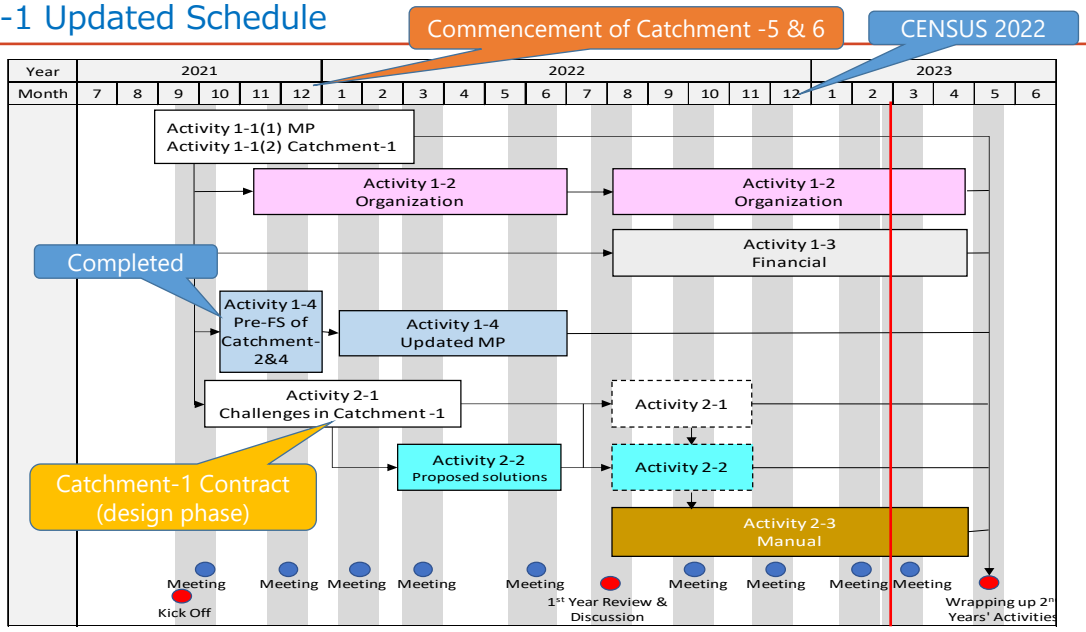
Activity 2-1: Assist in identifying challenges in CWASA's management on design and construction of Ongoing Sewerage Project

Activity 2-2: Assist in capacity development of CWASA for design and construction supervision of sewerage projects through creating solutions to the above challenges

Activity 2-3: Assist in developing design guidelines, technical standards and manuals for sewage works

3

2. Progress of the Project
2-1 Updated Schedule



4

2-2 Planned Activities of the Project **–Progress in 1st Phase-**

Activity		Situation
1-1:	Review Sanitation Master Plan and Ongoing Sewerage Project	● Review of MP and PESSCM-1 has been completed. ● Assistance to formulate Catchment-2 and 4 FS has been completed.
1-2:	Assist organizational setup to promote the planning of sewerage projects	● Water and Sewerage Connection Rules was drafted, under review of CWASA. ● Draft Organogram 2023 was proposed, and it is reviewed by each wing. ● Transition measure from construction phase to OM phase has already been discussed.
1-3:	Assist in identifying challenges to establish financial scheme	Not yet implemented (activity of 2nd phase)
1-4:	Assist in updating sewerage development plan	● Pre-FS for land acquisition has already been prepared and submitted to line ministry. ● Updated MP (investment plan) is under preparation. ➢ Annual fecal sludge volume from slum was estimated and necessity of additional treatment plant will be discussed.

5

2-2 Planned Activities of the Project **–Progress in 1st Phase-**

Activity		Situation
2-1:	Assist in identifying challenges in CWASA's management on design and construction of Ongoing Sewerage Project	● Confirmation of challenges for sewerage development based on CWASA's experience in KWSP-II and design o PESSCM-1 have already been completed.
2-2:	Assist in capacity development of CWASA for design and construction supervision of sewerage projects through creating solutions to the above challenges	● The solution of design of lateral sewer (house connection) has already been proposed.
2-3:	Assist in developing design guidelines, technical standards and manuals for sewage works	● Design guideline, technical standards, manuals for sewerage works of DWASA was confirmed not to be available. DWASA applied the contractor's proposal in project basis.

6

2-3 Planned Activities of the Project **–Proposal for 2nd Phase-**

Activity		Situation
1-1:	Review Sanitation Master Plan and Ongoing Sewerage Project	Completed in the 1st Phase
1-2:	Assist organizational setup to promote the planning of sewerage projects	● Finalization of Organogram 2023 (under review by CWASA) ● Finalization of CWASA Water and Sewerage Connection Rules (under review by CWASA) ● Revision of CWASA Employee Service Regulations 2020. ✓ Promotion chain (drafted) ● Finalization of CWASA Human Resources Management Rules ✓ Updated job descriptions (drafted) ✓ Assigned tasks of each department (nearly drafted)
1-3:	Assist in identifying challenges to establish financial scheme	Ongoing ● Reviewing existing documents
1-4:	Assist in updating sewerage development plan	Not yet started

2-3 Planned Activities of the Project **–Proposal for 2nd Phase-**

Activity		Situation
2-1:	Assist in identifying challenges in CWASA's management on design and construction of Ongoing Sewerage Project	Completed in the 1st Phase
2-2:	Assist in capacity development of CWASA for design and construction supervision of sewerage projects through creating solutions to the above challenges	Completed in the 1st Phase
2-3:	Assist in developing design guidelines, technical standards and manuals for sewage works	● Property Connection Manual was drafted (under review by CWASA)

8

4. Proposal for 2nd year

Activity 1-2: Organizational Setup

Workflow	Synopsis	Scheduled Completion
Clarify business procedure specific to sewerage service		
Develop connection regulations		Dec 2021
Develop phased organization structure for sewerage service	1. Review organogram 2020. 2. Develop phased organization structure. 3.Finalize CWASA Water and Sewerage Connection Rules.	Mar 2022
Revise regulations (related to HR)	1.Develop organogram 2023. 2.Revise CWASA Employee Service Regulations 2020. 3.Finalize CWASA Human Resources Management Rules drafted in PANI-2.	Oct 2022
Develop organogram 2023		
Support to get approval of organogram 2023	- Get approval of CWASA organogram 2023.	Apr 2023

9

4. Proposal for 2nd year

Activity 1-3: Assist in identifying challenges to establish financial scheme

Action Plan on Financial Management

Oct 2022

Review and analysis of performance agreement, MIS and financial statements

Evaluation of financial status of CWASA

Sewerage

- Annual CAPEX in all catchments with funding resource breakdown
- Serviced population and revenue estimate
- O&M cost projection
- Annual depreciation & debt repayment

Water supply

- Annual CAPEX with funding resource breakdown
- Serviced population and revenue estimate
- O&M cost projection
- Annual depreciation & debt repayment

Mar 2023

Cross-subsidy scheme and/or revision plan of water & sewerage tariff

10

Apr 2023

4. Proposal for 2nd year

Activity 1-4: Update Master Plan (Investment Plan)

- Investment plan is prepared considering the following change of design concepts

	MP	Current
Target year	2030	2070
Area	Nearby road	Entire city
Collection system	Interceptor + Separated sewer	Separated sewer
No. of HH connection	Smaller	Huge
Treatment process	Trickling filter system	OD without N,P treatment CAS without N,P treatment
No. of PS	Larger	Smaller (Sewer line will become deeper)

11

バングラデシュ国
都市衛生改善アドバイザー業務

進捗報告

2023年3月22日

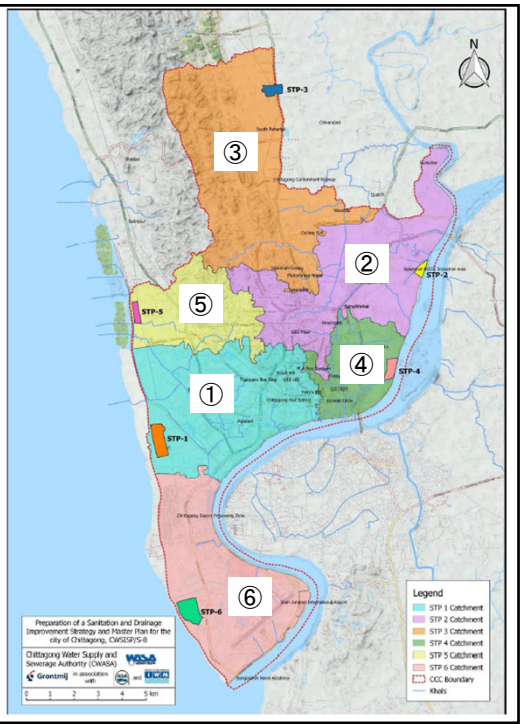
国際協力機構 (JICA)
日本工営株式会社 (NK)

背景（チョットグラムの上下水道整備）

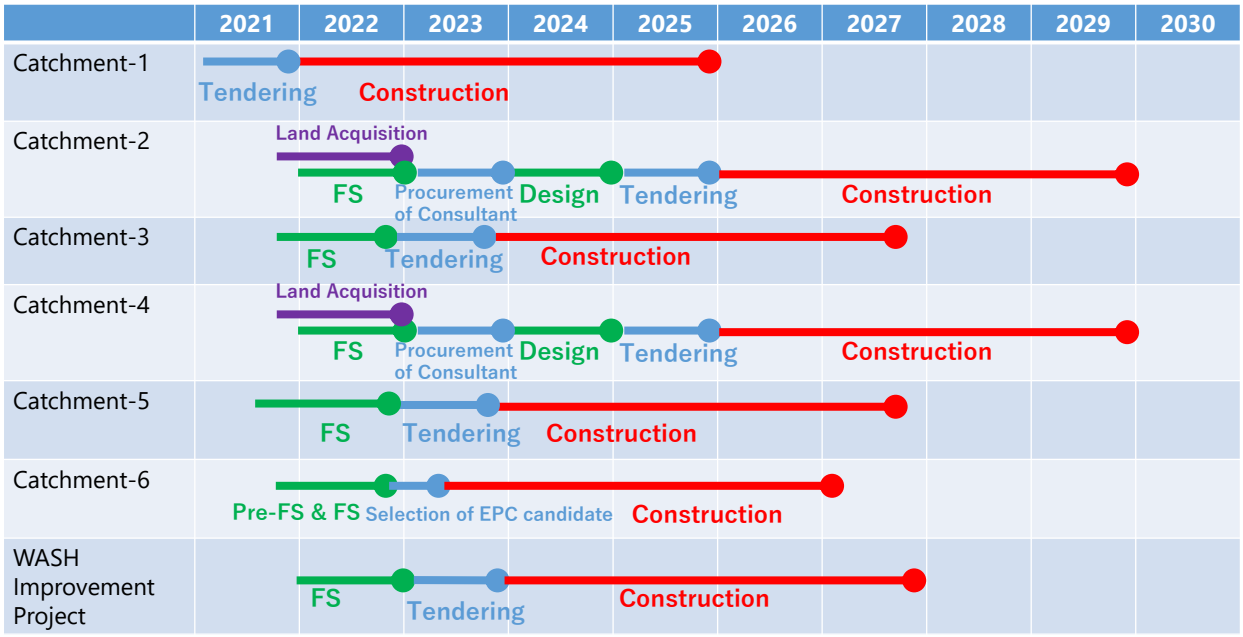
下水道事業	資金源	状況
第1処理区	ﾊﾞﾝｸﾞﾗﾃﾞｼｭ 自己資金	建設中 ・下水処理場：造成・杭工事 ・管渠：今後開始予定
第2･4処理区	日本 （JICA）	FS最終段階 5月アプレイザルミッション
第3処理区	韓国 （EXIM Bank）	FS中 （1月にインテリム）
第5処理区	フランス （AFD）	Project Preparation Study完了 入札図書準備中
第6処理区	PPP・民間 （丸紅等）	FS実施中

水道事業	資金源	案件内容
KWSP-1&2	円借款	CCC中心部への水道供給 本年中に施工完了
WASH 事業	世銀	CCC全体への配水網整備 水道MP整備

＊その他、北部のミルショライ工業団地への給水事業（PPP）
対岸の工業団地への給水事業　等を実施中



Project Implementation Schedule (drafted in 2021)



1. 業務概要

成果1： 下水道整備の政策・計画策定能力が向上し、新たな下水道整備事業の計画が促進される

活動 1-1:既存のサニテーションマスタープラン及び実施中のCatchment 1事業のレビュー

活動 1-2:下水道整備事業の計画促進に向けた組織体制の課題整理支援

活動 1-3:下水道整備事業の計画促進に向けた財務体制の課題整理支援

活動 1-4:新たな下水道整備事業計画の作成に係る支援

成果2： 下水道整備対象区域内の状況に応じた適用可能な技術を理解し、下水道施設の設計・建設に係る能力が向上する

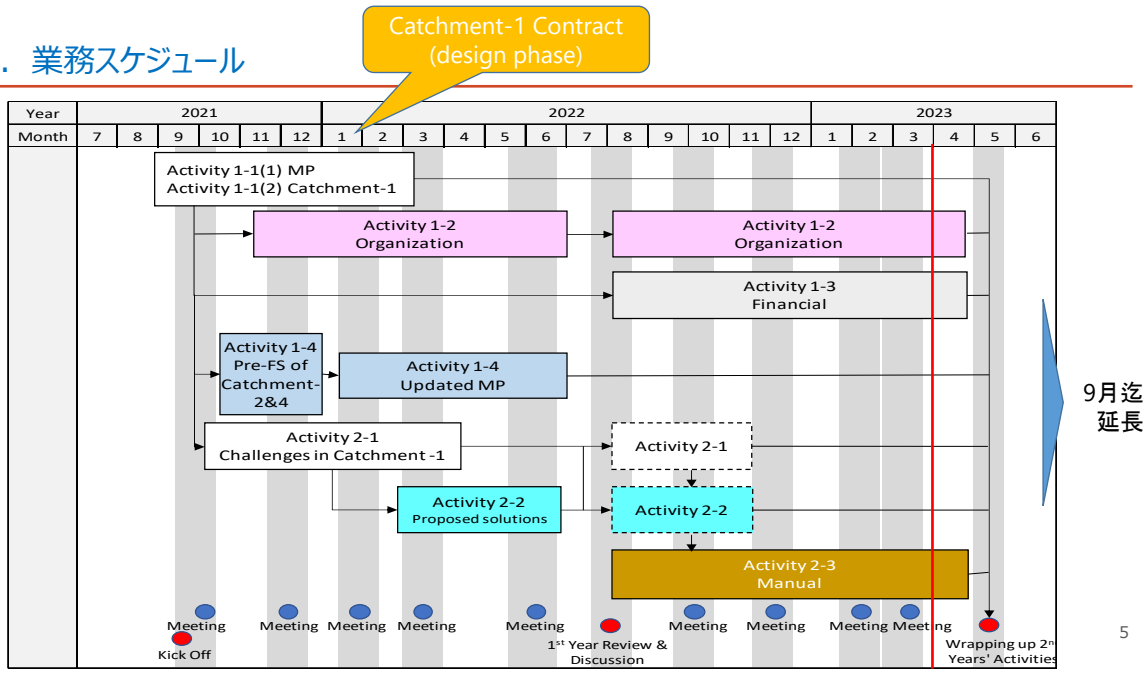
活動 2-1: Catchment 1事業の計画を基に、設計時や建設時に想定される課題整理を支援

活動 2-2: 整理された課題の解決策を通じてCWASAの設計・施工監理能力の向上を支援

活動 2-3: 下水道施設の設計指針、技術基準、マニュアル等の策定に係る支援

4

2. 業務スケジュール



3-1 各活動の進捗状況（１）

活動		Situation
1-1:	既存のサニテーションマスタープラン及び実施中のPESSCM-1のレビュー	● サニテーションMP、PESSCM-1の報告書、図面、入札図書等のレビュー ● 第二、第四処理区下水道事業形成支援
1-2:	下水道整備事業の計画促進に向けた組織体制の課題整理支援	● KWSP事業のPIU組織体制及び活動内容のレビュー、及び下水マスタープランで計画されている組織体制、Catchment-1事業におけるPPSのレビュー ● CWASA規則の改定案 ✓ CWASA Citizen Charter ✓ 各戸接続規則 ✓ 従業員の就業規則 （昇進ルール） ✓ 人事管理規則（職務説明書） ● CWASA の下水道実施のための組織図（案）
1-3:	下水道整備事業の計画促進に向けた財務体制の課題整理支援	● マスタープランとCatchment-1事業における概算事業費とコスト回収計画 ● Catchments 2- 6事業の資金調達計画と課題 ● 投資コスト回収のための料金検討 ● 補助金案の検討

3-2 各活動の進捗状況（２）

活動		Situation
1-4:	新たな下水道整備事業計画の作成に係る支援	● 第２、第４処理区のPre-FSの作成・DPP作成 ● マスタープラン（事業実施計画）アップデート ✓ 想定される事業の実施スケジュール案

活動		Situation
2-1:	Catchment 1事業の計画を基に、設計時や建設時に想定される課題整理を支援	● 過去に実施した事業(KWSP-1&2, PANI-1&2)からの教訓の抽出 ● PESSCM-1事業の設計・施工監理において想定される/顕在化した課題整理
2-2:	整理された課題の解決策を通じてCWASAの設計・施工監理能力の向上を支援	● 家屋接続の設計方針の提案
2-3:	整理された課題の解決策を通じてCWASAの設計・施工監理能力の向上を支援 (基準・マニュアル)	● 家屋接続に関する設計・施工監理ガイドラインの作成

Advisor on Urban Sanitation Improvement

Progress Meeting

March 2023

Japan International Cooperation Agency (JICA)
Nippon Koei Co., Ltd (NK)

Agenda of Progress Meeting

1. Activities of the Project
2. Updated Schedule
3. Activities of the Project
4. Highlight of Activities
5. Planned Activities during the period April-August 2023

2

1. Activities of the Project

Outcome-1: CWASA's capacity is strengthened for policy setting and planning of sewerage project, thereby the planning of new sewerage projects is accelerated.

Activity 1-1: Review Sanitation Master Plan and Ongoing Sewerage Project

Activity 1-2: Assist organizational setup to promote the planning of sewerage projects

Activity 1-3: Assist in identifying challenges to establish financial scheme for sewerage service

Activity 1-4: Assist in updating sewerage development plan

Outcome-2: CWASA's capacity is strengthened, for design and construction supervision of sewerage facilities including understanding of appropriate technology which is suitable in the project area.

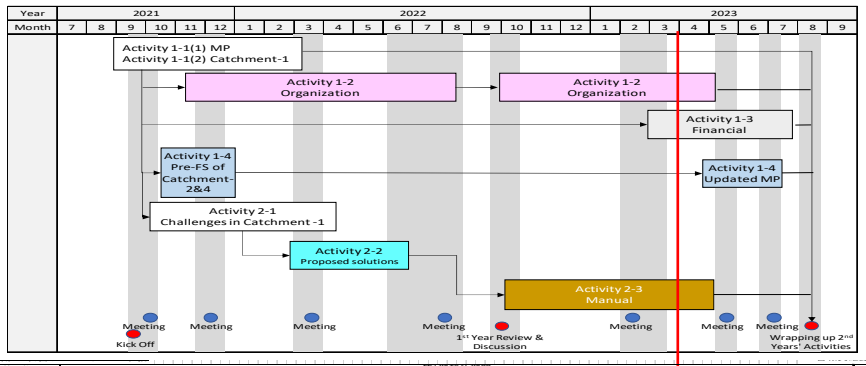
Activity 2-1: Assist in identifying challenges in CWASA's management on design and construction of Ongoing Sewerage Project

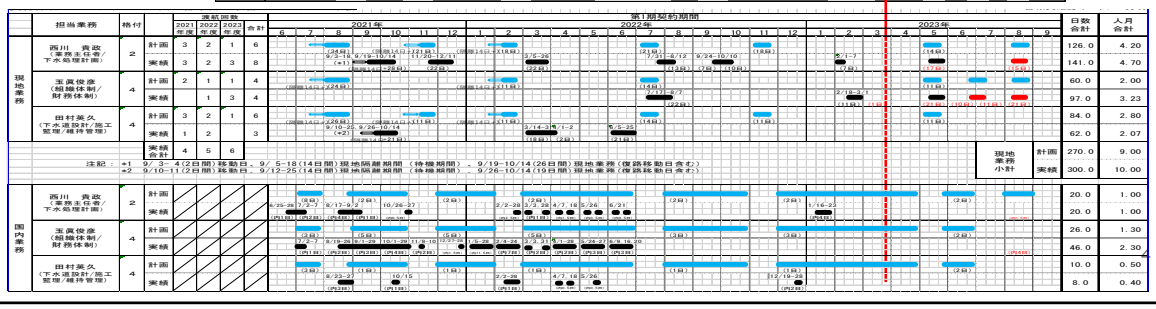
Activity 2-2: Assist in capacity development of CWASA for design and construction supervision of sewerage projects through creating solutions to the above challenges

Activity 2-3: Assist in developing design guidelines, technical standards and manuals for sewage works

3

2. Updated Schedule





3. Activities of the Project

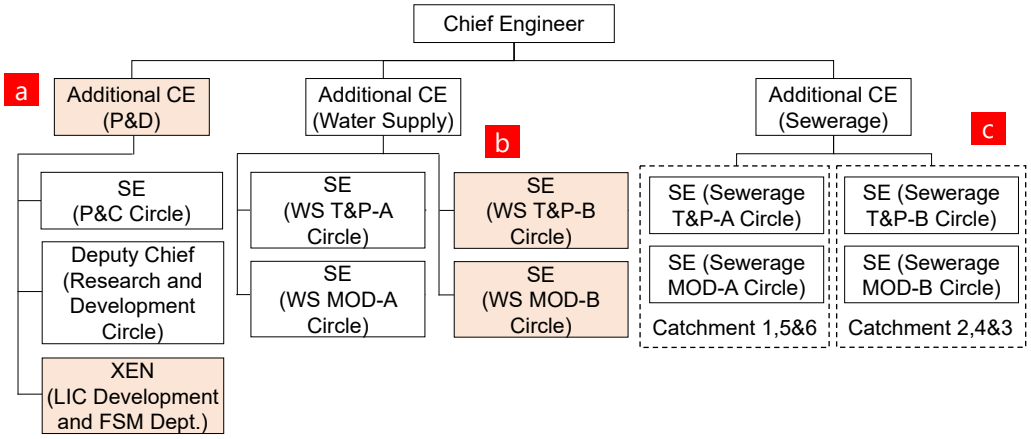
Activity		Situation
1-1:	Review Sanitation Master Plan and Ongoing Sewerage Project	● Review of MP and PESSCM-1 has been completed. ● Assistance to formulate Catchment-2 and 4 FS has been completed.
1-2:	Assist organizational setup to promote the planning of sewerage projects	● Organogram 2023 is under final review by CWASA. ● CWASA Water and Sewerage Connection Rules is under final review by CWASA. ● Recruitment & Promotion Conditions (Schedule of CWASA Employee Service Regulations 2020) is under review by CWASA. ● Updated job descriptions (Schedule of Guideline for Services of CWASA Employees) are under review by CWASA.
1-3:	Assist in identifying challenges to establish financial scheme	● Reviewed the financial prospect prepared in JICA Preparatory Survey and by WB. ● Prepared recommendations to tackle coming financial difficulties. ● Discussed with key personnel of CWASA Commercial Wing on the recommendations above.

3. Activities of the Project

Activity		Situation
1-4:	Assist in updating sewerage development plan	● Pre-FS for land acquisition has already been prepared and submitted to line ministry. ● Updated MP (investment plan) will be prepared together with CWASA.
2-1:	Assist in identifying challenges in CWASA's management on design and construction of Ongoing Sewerage Project	● Confirmation of challenges for sewerage development based on CWASA's experience in KWSP-II and design o PESSCM-1 have already been completed.
2-2:	Assist in capacity development of CWASA for design and construction supervision of sewerage projects through creating solutions to the above challenges	● The solution of design of lateral sewer (house connection) has already been proposed.
2-3:	Assist in developing design guidelines, technical standards and manuals for sewage works	● "Property connection manual" was drafted in this assignment. ● It will be finalized before the JICA Appraisal Mission of JICA FS.

4. Highlight of Activities

(1) New Revisions on Proposed Organogram 2023



a Additional CE (Planning & Development) was added.

b Existing T&P Circle (Treatment & Production) and MOD Circle (Maintenance & Distribution) were split into two.

c Proposed 'Project Management Circle' was cancelled because of its temporary nature.

7

4. Highlight of Activities

(2) Job Descriptions and Recruitment & Promotion System

Job Descriptions

- Job descriptions were updated/ developed for 65 designations among total 94 designations.
- Review by Commercial Wing finished; Review on-going by Engineering Wing and Administration Wing; Initial review will be finished by May 2023.

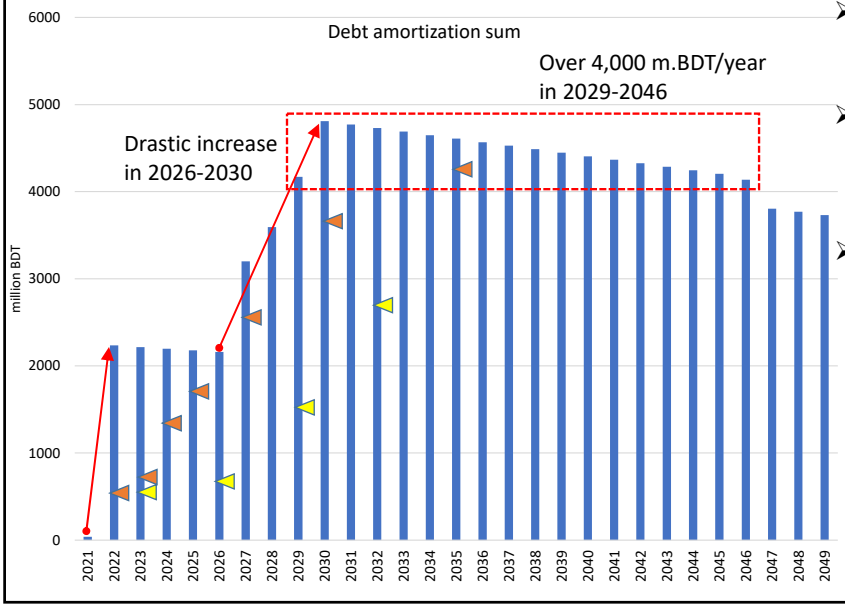
Recruitment and Promotion System

- Recruitment & promotion system and qualification were updated/ developed for 34 among total 94 designations.
- Review by each Wing is on-going; Initial review will be finished by May 2023.

8

4. Highlight of Activities

(3) Financial Estimation Highlight by JICA 2&4 F/S team and WB



- Net profit before tax and depreciation as of 2016, 2017, and 2018 was only 22, 85, and -10 million BDT.
- Net profit before tax and depreciation estimated by JICA (◁) and by WB (◁) is far less/ less than the debt amortization sum.
- Even rather optimistic estimation by WB cannot cover debt amortization cost for years; there is a risk of running out of cash.

Note:
1. Debt amortization for KWSP-1&2, CWSISP-1&2, Bhandaljury, IWSRP-1&3, and Catchment 2,3,4,5,&6.
2. Annual tariff increase: 9.8% for JICA and 8% for WB.
3. STP is presumed to start operation in 2023 (WB) and 2026 (JICA).

4. Highlight of Activities

(4) Recommendations and Discussions with CWASA

- Accelerate property connection to sewer.
- Expand smart billing system to reduce the increase of meter inspectors.
  Bidding of contractor for model smart billing system project for 3000 HHs will be done soon.
- Introduce prepaid water meter system in model areas.
  Chief Revenue Officer showed much interest in this (CWASA has no plan so far).
- Expand digitalization through E-Nothi or other ICT systems for effective business processing to reduce the increase of personnel.
- Enhance collection of arrears.
  Commercial Manager emphasized the importance of this.
- Take out a short-term loan from banks to avoid running out of cash.
  CWASA has/will not do this according to its policy.
- Negotiate with LGD and MOF for postponing repayment or debt write-off.
  Latest audited financial statements are required for the negotiation (currently FY 2018/2019 is the newest available version).

10

5. Planned Activities during the period April-August 2023

Organogram 2023

- Support finalization of draft.
- Support for getting its approval of CWASA Management Board.
- Update and finalize tasks of departments.

Job Descriptions and Recruitment & Promotion System

- Finalization of job descriptions and recruitment & promotion system.
- Compilation and update of 'CWASA Employees Service Regulations' and 'Guideline for Services of CWASA Employees'.
- Support for getting the approval of CWASA Management Board and LGD.

Training Modules (verbally requested by CWASA)

- (to be discussed) Preparation of training modules (components) on sewerage planning, construction, and O&M (can be included in 'Guideline for Services of CWASA Employees')

11

5. Planned Activities during the period April-August 2023

Activity 1-4: Update Master Plan (Investment Plan)

- Investment plan is prepared considering the following change of design concepts

	MP	Current
Target year	2030	2070
Area	Nearby road	Entire city
Collection system	Interceptor + Separated sewer	Separated sewer
No. of HH connection	Smaller	Huge
Treatment process	Trickling filter system	OD with N,P treatment CAS without N,P treatment
No. of PS	Larger	Smaller (Sewer line will become deeper)

Activity 2-3: Finalization of Property connection manual

12

バングラデシュ国
都市衛生改善アドバイザー業務

進捗報告

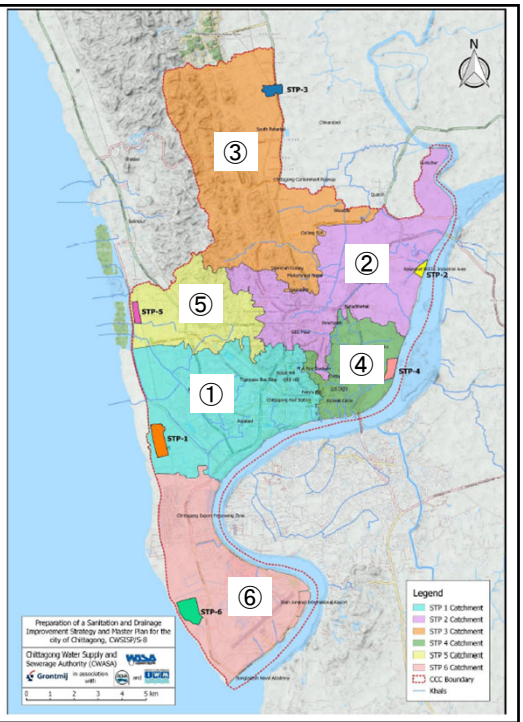
2023年5月9日

国際協力機構 (JICA)
日本工営株式会社 (NK)

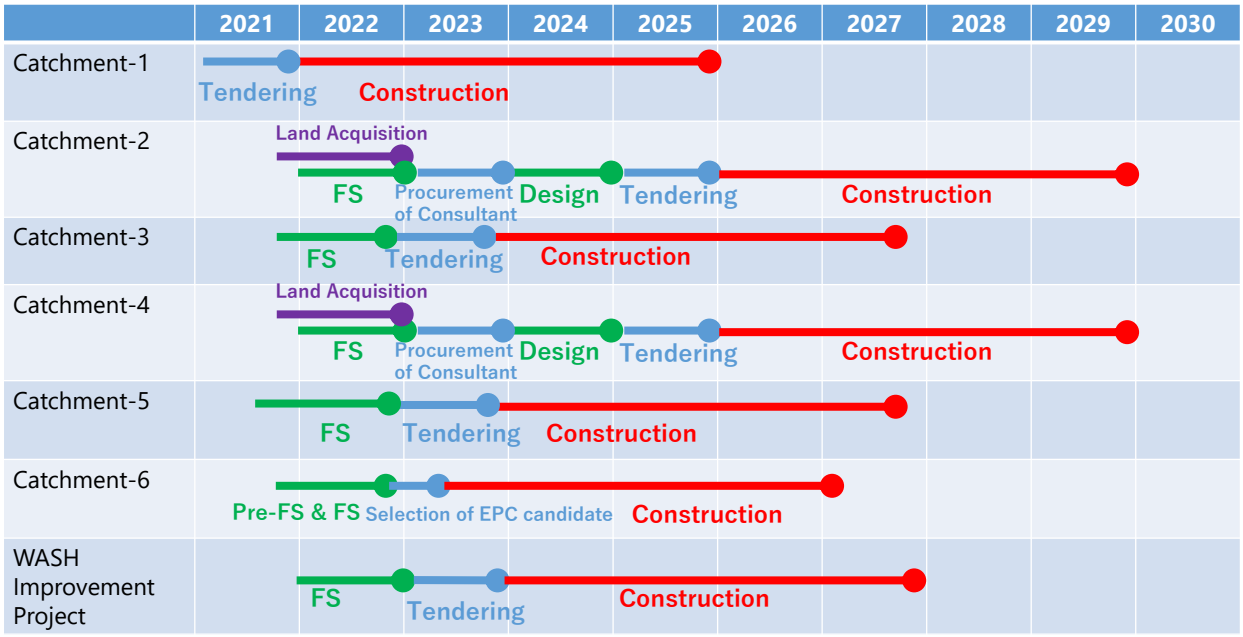
背景（チョットグラムの上下水道整備）

下水道事業	資金源	状況
第1処理区	ﾊﾞﾝｸﾞﾗﾃﾞｼｭ自己資金	建設中 ・下水処理場：造成・杭工事 ・管渠：今後開始予定
第2･4処理区	日本（JICA）	FS最終段階 5月アプレイザルミッション
第3処理区	韓国（EXIM Bank）	FS中 （1月にインテリム）
第5処理区	フランス（AFD）	Project Preparation Study完了 入札図書準備中
第6処理区	PPP・民間（丸紅等）	FS実施中
水道事業	**資金源**	**案件内容**
KWSP-1&2	円借款	CCC中心部への水道供給 本年中に施工完了
WASH 事業	世銀	CCC全体への配水網整備 水道MP整備

＊その他、北部のミルショライ工業団地への給水事業（PPP）
対岸の工業団地への給水事業　等を実施中



Project Implementation Schedule (drafted in 2021)



1. 業務概要

成果1： 下水道整備の政策・計画策定能力が向上し、新たな下水道整備事業の計画が促進される

活動 1-1:既存のサニテーションマスタープラン及び実施中のCatchment 1事業のレビュー

活動 1-2:下水道整備事業の計画促進に向けた組織体制の課題整理支援

活動 1-3:下水道整備事業の計画促進に向けた財務体制の課題整理支援

活動 1-4:新たな下水道整備事業計画の作成に係る支援

成果2： 下水道整備対象区域内の状況に応じた適用可能な技術を理解し、下水道施設の設計・建設に係る能力が向上する

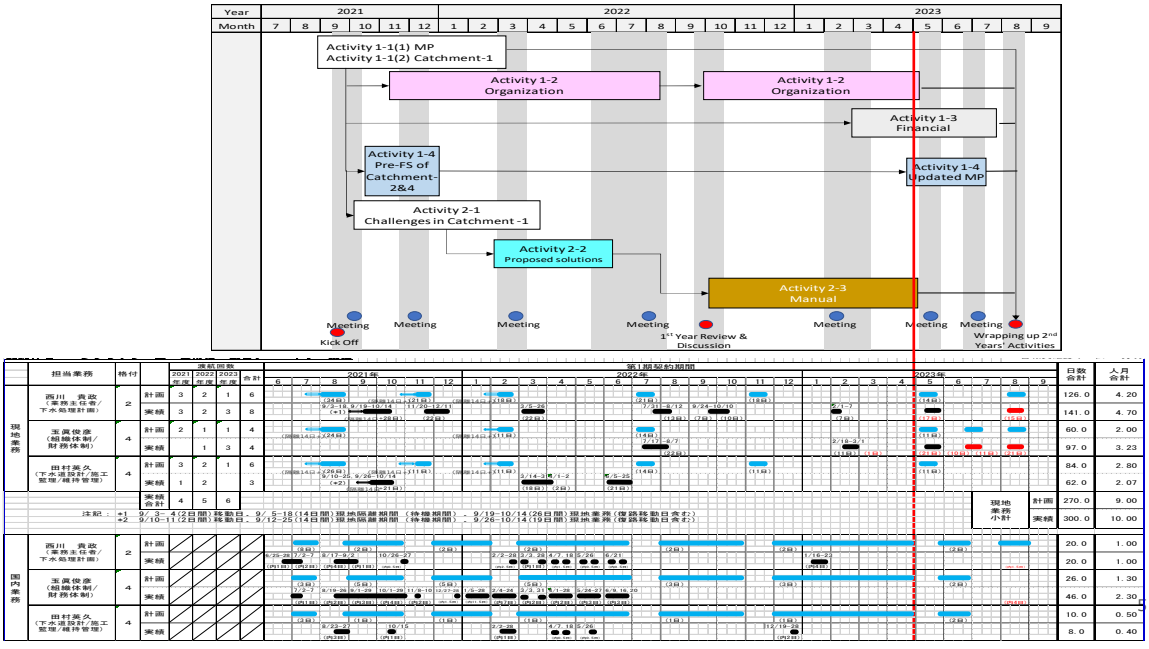
活動 2-1: Catchment 1事業の計画を基に、設計時や建設時に想定される課題整理を支援

活動 2-2: 整理された課題の解決策を通じてCWASAの設計・施工監理能力の向上を支援

活動 2-3: 下水道施設の設計指針、技術基準、マニュアル等の策定に係る支援

4

2. 業務スケジュール（更新版）



3-1 各活動の進捗状況（１）

活動		Situation
1-1:	既存のサニテーションマスタープラン及び実施中のPESSCM-1のレビュー	● サニテーションMP、PESSCM-1の報告書、図面、入札図書等のレビュー ● 第二、第四処理区下水道事業形成支援
1-2:	下水道整備事業の計画促進に向けた組織体制の課題整理支援	● KWSP事業のPIU組織体制及び活動内容のレビュー、及び下水マスタープランで計画されている組織体制、Catchment-1事業におけるPPSのレビュー ● CWASA規則の改定案 ✓ 上下水道接続規則（新規） ✓ 従業員サービス規則 （新規採用・昇進条件（改定）、職務記述書（改定）、各部署の職責（新規）） ● CWASA の下水道実施のための組織図（案）
1-3:	下水道整備事業の計画促進に向けた財務体制の課題整理支援	● JICA準備調査の財務収支計画のレビュー ● 財務改善に向けた対応案の提案（Commercial Wing）
1-4:	新たな下水道整備事業計画の作成に係る支援	● 第２、第４処理区のPre-FSの作成・DPP作成 ● 下水道事業の想定実施スケジュール案作成（マスタープランアップデート）

6

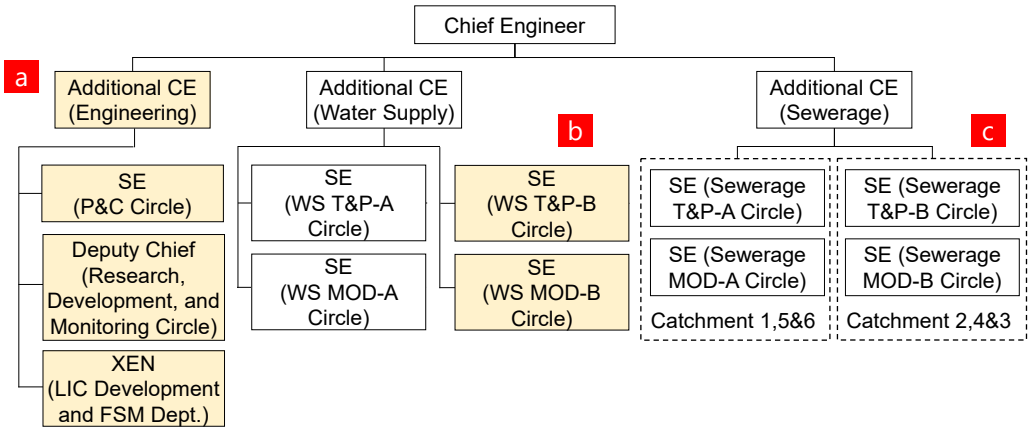
3-2 各活動の進捗状況（２）

活動		Situation
2-1:	Catchment 1事業の計画を基に、設計時や建設時に想定される課題整理を支援	● 過去に実施した事業(KWSP-1&2, PANI-1&2)からの教訓の抽出 ● PESSCM-1事業の設計・施工監理において想定される/顕在化した課題整理
2-2:	整理された課題の解決策を通じてCWASAの設計・施工監理能力の向上を支援	● 家屋接続の設計方針の提案
2-3:	整理された課題の解決策を通じてCWASAの設計・施工監理能力の向上を支援 (基準・マニュアル)	● 家屋接続に関する設計・施工監理ガイドラインの作成

7

3-3 活動1-2（組織体制）の概要（1/3）

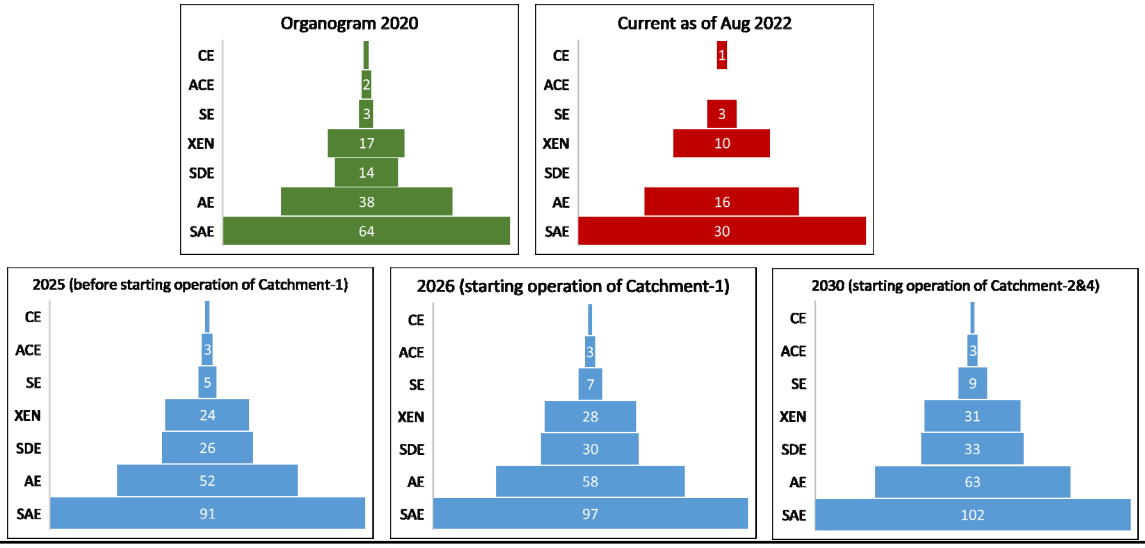
(1)-1 2023年組織図の最終化（2023年2月以降の修正点）



a 上下水道共通の技術分野を所掌するAdditional CE (Engineering) を追加。
b 既存の水処理・生産部 (T&P)と運営維持管理・配水部 (MOD) を各々二つに分割。
c PIUを所掌するプロジェクト管理部は、PIUの一時的な性格を考慮して取り下げ。

3-3 活動1-2（組織体制）の概要（2/3）

(1)-2 2023年組織図の最終化（技術局管理職の人数構成）



3-3 活動1-2（組織体制）の概要（3/3）

(2) CWASA規則の改定

職務記述書（改定）

- 98の職位のうち、下級職の一部を除く職位について職務記述書を改定。
- 財務局によるレビューは完了。技術局と総務局はレビュー中で、第一次レビューは2023年5月に完了予定。

採用・昇進条件（改定）

- 98の職位のうち、41の職位について採用・昇進条件を見直し。
- 各局によるレビュー中。第一次レビューは2023年5月に完了予定。

各部署の所掌事務内容（新規）

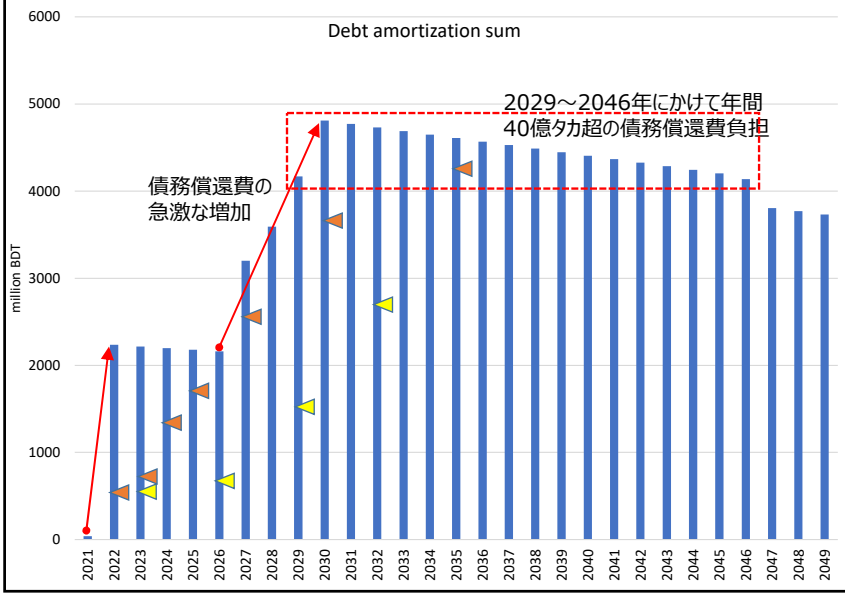
- インタビュー結果に基づき、各部署の所掌事務内容を明文化。

上下水道接続規則（新規）

- 2022年1月のドラフト提出後、数次のCWASA内部協議を経て、2023年3月に最終コメントを受領。4月にすべてのコメントを反映した最終版を提出。

3-4 活動1-3（財務体制）の概要（1/2）

(1) JICA準備調査、世界銀行が行った財務収支予測結果のレビュー



税引き前・減価償却前の純利益は、

- 2016年, 2017年, 2018年で各々0.22, 0.85, -0.1億タカ。
- JICA準備調査での推計（◀）と世銀の推計（◀）は、いずれも債務償還費を大幅に下回り、資金ショートに陥る可能性もある。

（注）
1. 債務償還費は、KWSP-1&2, CWSISP-1&2, Bhandaljury, IWSRP-1&3, 下水道2,3,4,5,6処理区を計上。
2. 毎年の平均料金改定率は、JICA準備調査で9.8%、世銀調査で8%を仮定。
3. 下水処理場の供用開始は、世銀調査では2023年、JICA準備調査では2026年と仮定。

3-4 活動1-3（財務体制）の概要（2/2）

(2) CWASAへの提言と議論

- 下水道への各戸接続の促進
- スマートメーターの導入による検針員の削減
  3000戸を対象としたモデル導入事業を実施予定で、現在、コントラクターを選定中。
- モデル地区におけるプリペイドメーターの導入
  Chief Revenue Officerが大きな関心を表明しており、関連資料を提供した。
- 効率的な事務処理と人員削減のため、業務のデジタル化を推進。
- 滞納債権の回収促進
  Commercial Managerは重要性を認識。
- 資金ショートを防ぐため、銀行から短期借り入れを実施。
  CWASAとしては従来・今後とも実施予定なし。
- LGDや財務省と協議し、債務償還の延期や減免を要請。
  協議のためには、最新年度の監査済み財務諸表を提出する必要あり（現在、至近年度の監査済み財務諸表は2018/2019財務年度）。

4 今後の活動予定

家屋接続マニュアル

- CWASAのコメントを踏まえた修正＋上下水道接続規則の変更・Building Codeとの整合確認

事業計画

- 下水道整備に関する事業計画の整理（情報収集可能な範囲で実施）

2023年組織図

- 財務局・総務局からは承認サインを受領済み。技術局からの承認サイン取り付け（5月）
- CWASA理事会の承認を得るためのサポート（6～8月）

CWASA規則

- 職務記述書、採用・昇進条件：各局のレビュー結果の反映と修正案の提出（5～6月）、CWASA理事会と担当省（LGD）の承認を得るためのサポート（6～8月）
- 各部署の所掌事務内容：CWASAに提出（5月）、フォローアップ（6～8月）
- 上下水道接続規則：CWASA理事会とLGDの承認を得るためのサポート（5～8月）

Advisor on Urban Sanitation Improvement

JICA報告

29th August 2023

Japan International Cooperation Agency (JICA)
Nippon Koei Co., Ltd (NK)

Overview of Advisory Work

1. **Introduction of Project Member**
2. **Entire Schedule**
3. **Activities with Advisor**

Outcome-1: CWASA's capacity is strengthened for policy setting and planning of sewerage project, thereby the planning of new sewerage projects is accelerated.

Activity 1-1: Review Sanitation Master Plan and Ongoing Sewerage Project

Activity 1-2: Assist organizational setup to promote the planning of sewerage projects

Activity 1-3: Assist in identifying challenges to establish financial scheme for sewerage service

Activity 1-4: Assist in updating sewerage development plan

Outcome-2: CWASA's capacity is strengthened, for design and construction supervision of sewerage facilities including understanding of appropriate technology which is suitable in the project area.

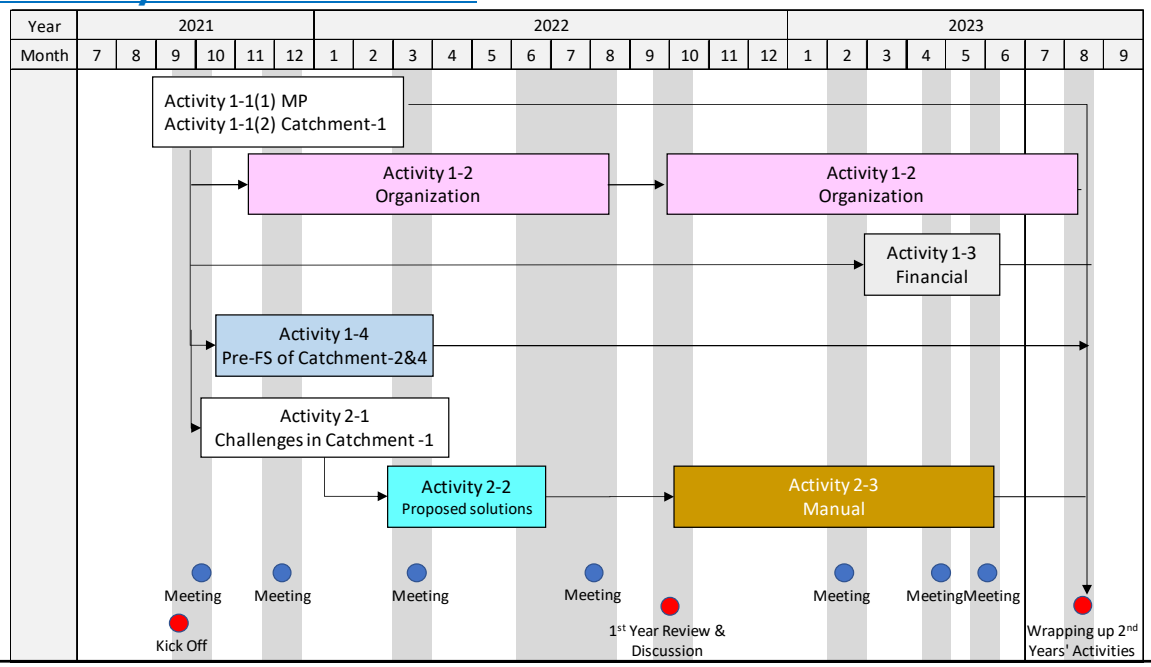
Activity 2-1: Assist in identifying challenges in CWASA's management on design and construction of Ongoing Sewerage Project

Activity 2-2: Assist in capacity development of CWASA for design and construction supervision of sewerage projects through creating solutions to the above challenges

Activity 2-3: Assist in developing design guidelines, technical standards and manuals for sewage works

2

2. History of the Activities



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3. Overall Activities

Outcome-1: CWASA's capacity is strengthened for policy setting and planning of sewerage project, thereby the planning of new sewerage projects is accelerated.

Activity		Outcome
1-1:	Review Sanitation Master Plan and Ongoing Sewerage Project	● Review of MP and PESSCM-1 ● Assistance to formulate Catchment-2 and 4 FS
1-2:	Assist organizational setup to promote the planning of sewerage projects	● Organogram 2023-2030 (to be approved by Board soon) ✓ Updated job descriptions (under review) ✓ Assigned tasks of each department (under review) ● CWASA Water and Sewerage Connection Regulations (to be approved) ● CWASA Employees Service Regulations 2023 (update of 2020; under review) ✓ Schedule (Recruitment and promotion conditions)
1-3:	Assist in identifying challenges to establish financial scheme	● Review of Financial prospect (to be continued in the coming JICA TA)
1-4:	Assist in updating sewerage development plan	● Pre-FS for land acquisition

4

3. Overall Activities

Outcome-2: CWASA's capacity is strengthened, for design and construction supervision of sewerage facilities including understanding of appropriate technology which is suitable in the project area.

Activity		Outcome
2-1:	Assist in identifying challenges in CWASA's management on design and construction of Ongoing Sewerage Project	● Confirmation of challenges for sewerage development based on CWASA's experience in KWSP-II and design
2-2:	Assist in capacity development of CWASA for design and construction supervision of sewerage projects through creating solutions to the above challenges	● The solution of design of lateral sewer (property connection) was proposed.
2-3:	Assist in developing design guidelines, technical standards and manuals for sewage works	● Property Connection Manual

5

Activity 1-1: Review of Sanitation Master Plan and On-going Sewerage Project

Item	MP/Current	JET Findings
Project Cost	● MP - MP proposes project cost for sewerage development	● The project cost shall be updated based on the change of capacity and treatment process of STPs, etc. as below:

	MP	Current
Target year	2030	2070
Area	Nearby road	Entire city
Collection system	Interceptor + Separated sewer	Separated sewer
No. of connections	Smaller	Huge
Treatment process	Trickling filter system	OD without N,P treatment CAS with N,P treatment
No. of PS	Larger	Smaller (Sewer line will become deeper)

● Financial capability of CWASA shall be studied to ensure sustainable management of sewerage system.

6

Activity 1-1: Review of Sanitation Master Plan and On-going Sewerage Project

Updated Project Cost (based on FS)

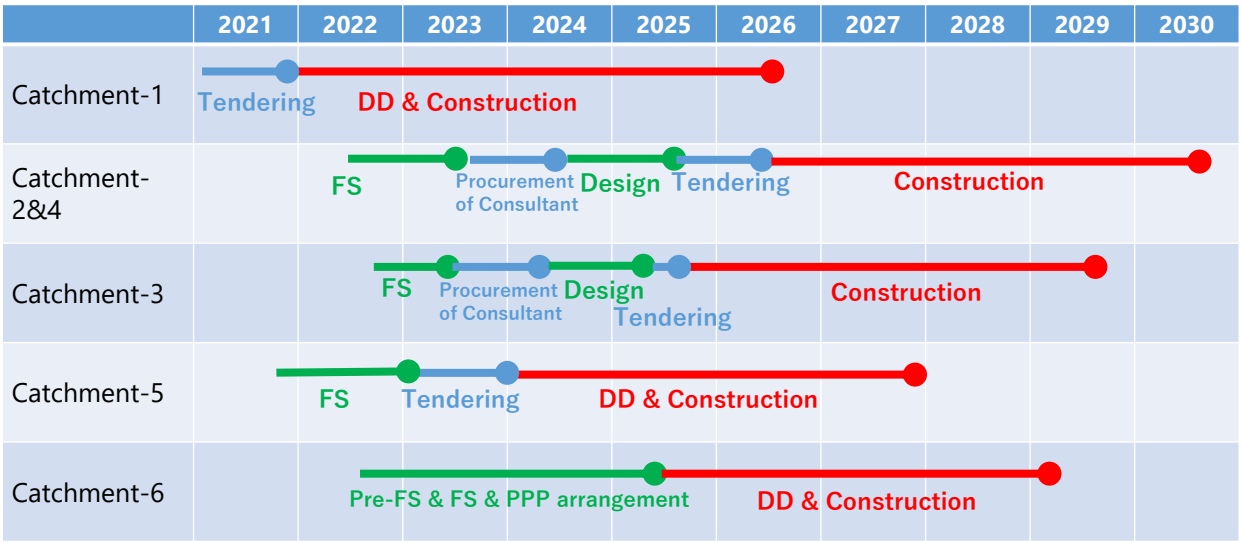
Project	Donor	Construction			Cost in million USD in Phase I		
		STP Capacity		STP Process	Construction	Other	Total
		Phase I	Final				
Catchment-1	BD fund	100MLD	300MLD	CAS	404.0	78.8	482.8
Catchment-5	AFD	50MLD	100MLD	CAS	146.9	79.5	226.4
Catchment-6	PPP	50MLD	100MLD	CAS	214.3	15.3	229.6
Subtotal (West)		**200MLD**	**500MLD**		**765.2**	**173.6**	**938.8**
Catchment-2&4	JICA ODA	60MLD	300MLD	A2O	373.6	404.9	778.5
Catchment-3	EDCF	60MLD	120MLD	A2O	176.3	99.3	275.6
Subtotal (East)		**120MLD**	**420MLD**		**549.9**	**504.2**	**1054.1**
Total in CCC		**320MLD**	**920MLD**		**1,315.1**	**677.8**	**1,992.9**

* Investment cost proposed in the Sanitation M/P: USD 271.8M (-2030) and USD 1,032M (-2065)

7

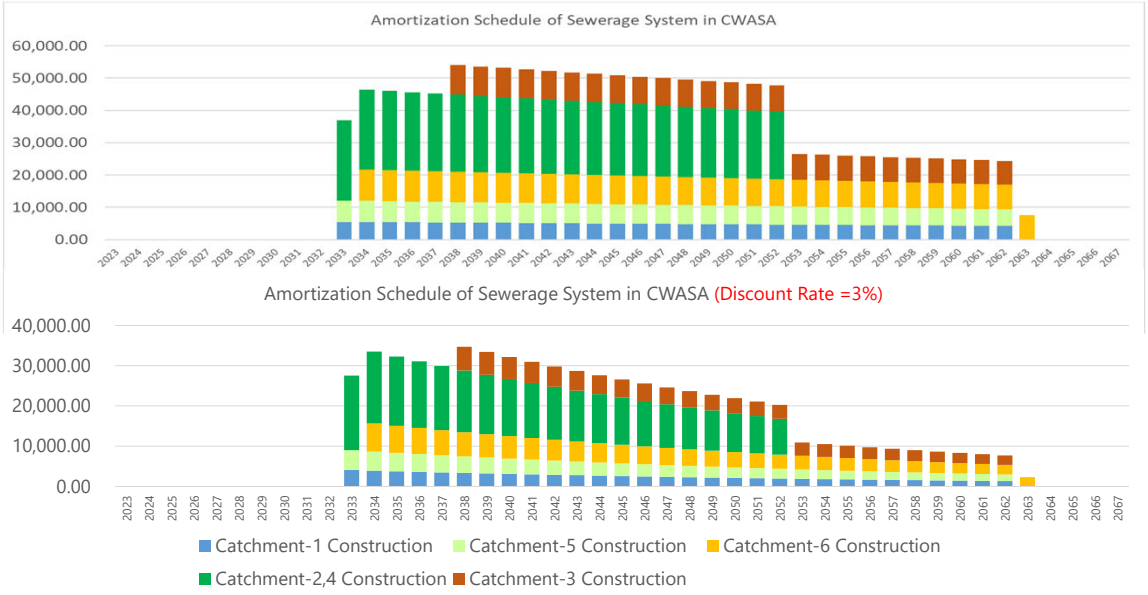
Activity 1-1: Review of Sanitation Master Plan and On-going Sewerage Project

Updated Implementation plan (based on FS)



Activity 1-1: Review of Sanitation Master Plan and On-going Sewerage Project

Amortization Schedule for Sewerage Development (tentative)



Activity 1-2: Assist organizational setup to promote the sewerage projects

Action Plan and Progress on Institutional Issues

Workflow	Synopsis	Scheduled Completion
Clarify business procedure specific to sewerage service ・ Construction (property connection, payment of connection fee) ・ Service management (billing, new property connection, inspecting misconnection, monitoring industrial wastewater)	1. Review project implementation in KWSP. 2. Analyze updated CWASA rules, i.e., Citizen Charter, Water Connection and Tariff Rules, Employee Service Regulations. 3. Analyze governmental rules, i.e., Water and Sewerage Tariff Rules. 4. Analyze DWASA rules to be incorporated into CWASA rules, i.e., 'Water and Sewerage Connection Regulations'. 5. Draft CWASA Water and Sewerage Connection Rules.	
Develop connection regulations		Dec 2021
Develop phased organization structure for sewerage service	1. Review organogram 2020. 2. Develop phased organization structure. 3. Finalize CWASA Water and Sewerage Connection Regulations.	Mar 2022
Revise regulations (related to HR)		
Develop organogram 2023-2030	1. Develop organogram 2023-2030. 2. Revise CWASA Employees Service Regulations 2020.	Oct 2022
Support to get approval of organogram and regulations	- Get approval of Organogram 2023-2030, Water and Sewerage Connection Regulations, and Employees Service Regulations from Board.	Sep 2023

10