



Capco 青山發電有限公司
Castle Peak Power Co. Ltd.

Installation of One Additional Gas-fired Generation Unit (CCGT Unit No. 1) at the Black Point Power Station

Effluent Discharge Plan

19 March 2020

Environmental Resources Management

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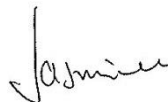


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Client: Castle Peak Power Company Limited (CAPCO)		Project No: 0368878			
Summary: This document presents the Vessel Control Plan for the Installation of One Additional Gas-fired Generation Unit (CCGT Unit No. 1) at the Black Point Power Station (EP-507/2016).		Date: 19 March 2020			
		Approved by:  Dr. Jasmine Ng Partner			
3b	Revised as per comments from IEC	NN	JNG	JNG	19/03/20
2b	Revised as per comments from CLP	NN	JNG	JNG	26/02/20
1	Effluent Discharge Plan	NN	JNG	JNG	26/11/19
Revision	Description	By	Checked	Approved	Date
<p>This report has been prepared by Environmental Resources Management the trading name of 'ERM Hong-Kong, Limited', with all reasonable skill, care and diligence within the terms of the Contract with the client, incorporating our General Terms and Conditions of Business and taking account of the resources devoted to it by agreement with the client.</p> <p>We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.</p> <p>This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.</p>		<p>Distribution</p> <p><input checked="" type="checkbox"/> Internal </p> <p><input checked="" type="checkbox"/> Government </p> <p><input type="checkbox"/> Public</p>			

**Installation of One Additional Gas-fired Generation Unit (CCGT Unit No. 1)
at the Black Point Power Station
Environmental Certification Sheet
EP-507/2016**


Reference Document/Plan

Document/Plan to be-Certified/ Verified:	Effluent Discharge Plan
Date of Report:	19 March 2020
Date prepared by ET:	19 March 2020
Date received by IEC:	


Reference EM&A Manual/ EP Requirement

EP Condition:	Condition No. 2.9
Content:	<i>Measures to Mitigate Water Quality Impact</i>
<p>At least one month before the commencement of operation of the Project, the Permit Holder shall deposit an Effluent Discharge Plan to the Director, which shall include the details of the following control measures to be implemented during the operation of the Project to ensure that the total average daily loading of batchwise discharge of effluents will not exceed the maximum allowed level of the existing operation in the BBPS:</p> <ul style="list-style-type: none">(a) Batchwise discharge to allow settlement and removal of part of the pollution load;(b) Laboratory measurements to ensure compliance with the discharge limits before batchwise discharge; and(c) Disposal of effluent from the station effluent treatment plant, oil separator and sewage treatment facility offsite by licensed collector for treatment, if needed. <p>The Effluent Discharge Plan shall be implemented during the operation of the Project.</p>	

ET Certification

I hereby certify that the above referenced document /plan complies with the above referenced condition of EP-507/2016.	
Dr Jasmine Ng, Environmental Team Leader:	Date: 23 March 2020
	

IEC Verification

I hereby verify that the above referenced document /plan complies with the above referenced condition of EP-507/201.	
Mr Thomas Chan, Independent Environmental Checker:	Date: 23 March 2020
	

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*Annex A Confirmation Letter from CLP for Licenced Contractor for
Disposal of Effluent from Effluent Treatment Plant*

1.1

BACKGROUND

CLP Power Hong Kong Limited (CLP) and Castle Peak Power Company Limited (CAPCO) are responsible for providing a safe, highly reliable and clean supply of electricity to over 80% of Hong Kong's population at reasonable cost. Within Hong Kong, CLP operates three power stations, namely the Castle Peak Power Station (CPPS), Black Point Power Station (BPPS) and Penny's Bay Power Station (PBPS), all owned by CAPCO, a joint venture between CLP and China Southern Power Grid Company Limited, in which CLP holds a 70% interest.

To support the HKSAR Government's objective of improving air quality and environmental performance in Hong Kong, and consistent with the HKSAR Government's medium-term strategy of increasing the use of natural gas for local power generation, and reducing carbon intensity of local electricity generation, CAPCO propose to install one additional 600 MW class gas-fired generation unit at the BPPS to both increase local gas-fired electricity generating capacity and accommodate growth in electricity demand. The proposed additional gas-fired generation unit will adopt combined cycle gas turbine (CCGT) configuration using natural gas as the primary fuel. Such configuration is aimed at reducing emissions as compared with coal-fired generation, thereby providing a relatively clean source of electricity for Hong Kong. The construction and operation of this additional gas-fired generation unit is hereafter referred to as "the Project". The proposed location for the Project is within the existing boundaries of the BPPS site. The location plan of key Project components is shown in *Figure 1.1*.

An Environmental Impact Assessment (EIA) Report of the Additional Gas-fired Generation Units Project (Register No. AEIAR-197/2016) was approved in June 2016. An Environmental Permit (EP-507/2016) (EP) for CCGT Unit No. 1 had been issued in June 2016. The EP had been varied and a varied EP was issued in November 2018.

1.2

PURPOSE OF THIS EFFLUENT DISCHARGE PLAN

This *Effluent Discharge Plan* is prepared for the Project for deposition to the Director of Environmental Protection in accordance with *Condition 2.9 of Environmental Permit (EP-507/2016/B)* which details the control measures to be implemented during the operation of the Project to ensure that the total average daily loading of batchwise discharge of effluents will not exceed the maximum allowed level of the existing operation in the BPPS.

- Batchwise discharge to allow settlement and removal of part of the pollution load;

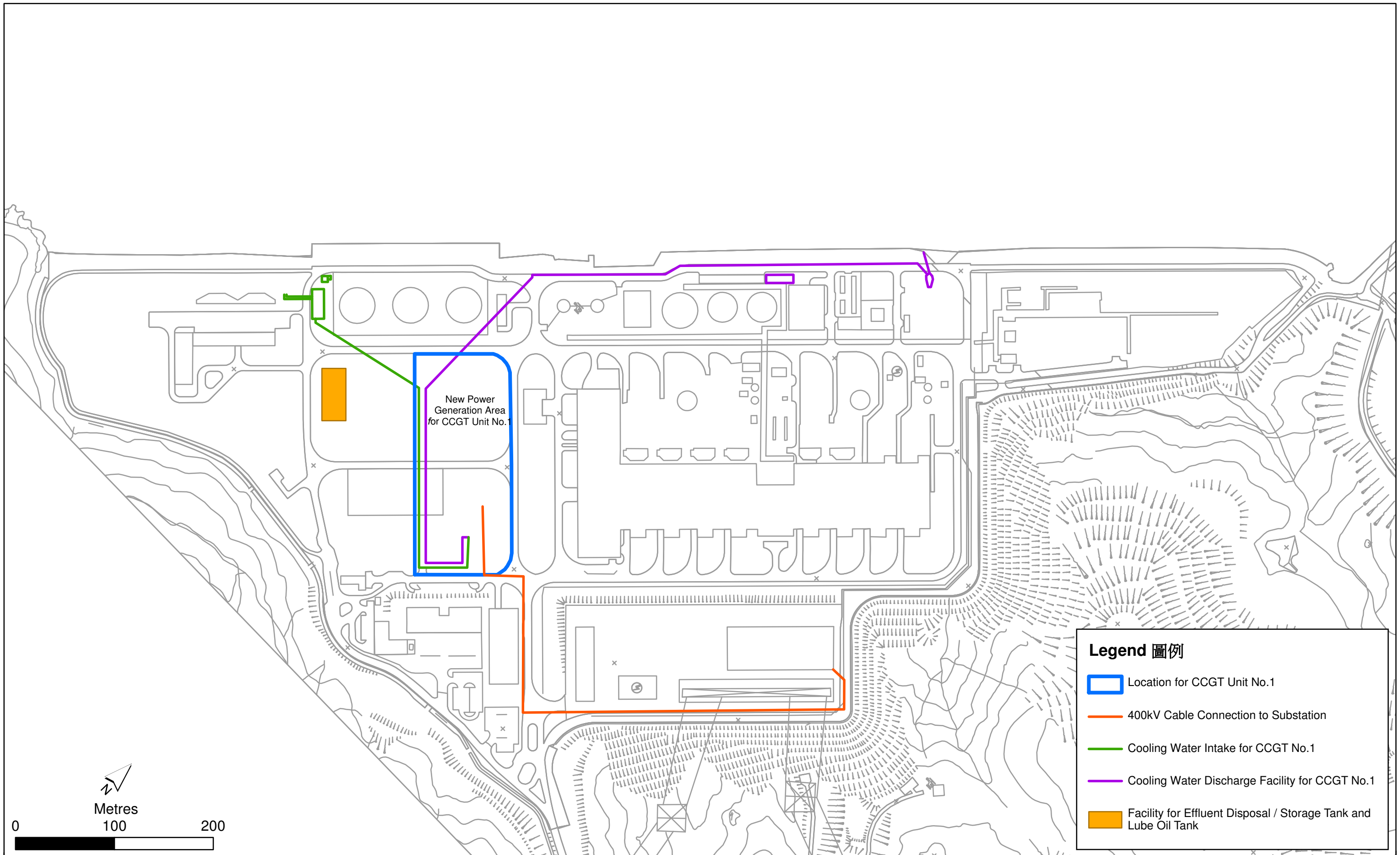


Figure 1.1

Location Plan of Key Project Components for CCGT Unit No.1

- Laboratory measurements to ensure compliance with the discharge limits before batchwise discharge; and
- Disposal of effluent from the station effluent treatment plant, oil separator and sewage treatment facility offsite by licensed collector for treatment, if needed.

1.3

STRUCTURE OF THIS PLAN

Section 1 : **Introduction**

It details the purpose and structure of the Plan.

Section 2 : **EIA and EP Requirements**

It summarises the relevant EP condition and EIA requirements for CCGT Unit No.1.

Section 3 : **Arrangements at the BPPS**

It summarises the relevant arrangements on collection, disposal and, if necessary, treatment of effluents from the operation of the BPPS controlled under the latest Water Pollution Control Ordinance (WPCO) licence.

Section 4 : **Proposed Arrangements for Future Operation with CCGT Unit No.1**

It stipulates the relevant arrangements on collection, disposal and, treatment of operation effluent in future operation when CCGT Unit No.1 is in operation. Measures to ensure compliance with relevant EP condition will be outlined.

2.1 EIA REQUIREMENTS

Effluent from the BPPS and the CCGT Unit No.1 will be discharged into marine waters of the Deep Bay Water Control Zone. Under *TPB PG-No. 12C*, any development within the Wetland Conservation Area (WCA) or Wetland Buffer Area (WBA) stipulated under this guideline “should not add to the pollution load of the Deep Bay Area”. It is known as the “No Net Increase in Pollution Load in Deep Bay” policy and would be observed for the operation phase of CCGT Unit No.1. The same requirement is stipulated under *Section 4(xi)* of the EIA Study Brief for this Project. As such, the requirement has been observed in the approved EIA Report and the additional CCGT units would be designed and operated such that there would be no net increase in pollution load to the Deep Bay waters during the operation phase.

Based on the maximum daily discharge rate and effluent concentrations stated in the WPCO Discharge Licence of the BPPS available at the time of preparing the EIA Report, a pollution loading cap has been established for the BPPS. The combined discharge in the future with the operation of additional CCGT unit(s) should not exceed this loading cap. The allowed maximum loading provided in *Table 7.21* of the approved EIA Report is reproduced in *Table 2.1*.

Table 2.1 Maximum Allowed Effluent Concentration and Loading for the BPPS

Effluent Stream	WPCO Discharge Licence ID	Flow m ³ per day	BOD mg L ⁻¹	TP mg L ⁻¹	TN mg L ⁻¹
Concentration					
Station Effluent Treatment Plant Effluent	(3)	1,000	20	10	100
Station Effluent Treatment Plant Effluent	(4)	1,000	20	10	100
Oil Separator No. 1 Effluent	(5)	800	20	10	100
Oil Separator No. 2 Effluent	(6)	800	20	10	100
Oil Separator No. 3 Effluent	(7)	500	20	10	100
Oil Separator No. 4 Effluent	(8)	50	20	10	100
Oil Separator No. 5 Effluent	(9)	600	20	10	100
Oil Separator No. 9 Effluent	(10)	150	20	10	100
Permanent Sewage Treatment Plant Effluent	(11)	420	20	10	100
Effluent Treatment Facility Effluent	(12)	1,000	20	10	100
Effluent Stream	WPCO Discharge Licence ID	Flow m ³ per day	BOD kg per day	TP kg per day	TN kg per day
Loading					
Station Effluent Treatment Plant Effluent	(3)	1,000	20.0	10.0	100.0
Station Effluent Treatment Plant Effluent	(4)	1,000	20.0	10.0	100.0
Oil Separator No. 1 Effluent	(5)	800	16.0	8.0	80.0
Oil Separator No. 2 Effluent	(6)	800	16.0	8.0	80.0
Oil Separator No. 3 Effluent	(7)	500	10.0	5.0	50.0
Oil Separator No. 4 Effluent	(8)	50	1.0	0.5	5.0
Oil Separator No. 5 Effluent	(9)	600	12.0	6.0	60.0
Oil Separator No. 9 Effluent	(10)	150	3.0	1.5	15.0
Permanent Sewage Treatment Plant Effluent	(11)	420	8.4	4.2	42.0

Effluent Stream	WPCO Discharge Licence ID	Flow	BOD	TP	TN
Effluent Treatment Facility Effluent	(12)	1,000	20.0	10.0	100.0
Total		6,320	126.4	63.2	632.0

Note: Cooling water effluent (ID (1) & (2)) is not included because there is no specification on pollution load associated with those effluents.

The additional flow of the new streams of pollution load carrying effluent based on the design assumptions in the approved EIA Report is provided in Table 7.22 of the approved EIA Report and is reproduced in Table 2.2.

Table 2.2 Stream of Pollution Loads for the Additional CCGT Unit No.1 (Unit D1) at the BPPS

Effluent Stream	ID	Discharge Point denoted under WPCO Discharge Licence	Flow m ³ per day
Additional CCGT Unit No.1 (Unit D1)			
Cooling Water Effluent	(13)	DP1	950,400
Station Effluent Treatment Plant Effluent	(14)	New discharge point	500
Oil Interceptor A Effluent	(15)	New discharge point	800
Oil Interceptor B Effluent	(16)	New discharge point	500
Oil Interceptor C Effluent	(17)	New discharge point	150
Sum of (14) to (17)			1,950

It is noted that there were three streams of oil interceptor effluent in the design assumptions in the approved EIA Report, with a total flow of 1,450 m³ per day. Based on the latest design, this has been updated to four streams of oil interceptor effluent with a total flow of also 1,450 m³ per day. As there is no change in the total flow from the operation of CCGT Unit No.1, the same consideration in the approved EIA Report still applies.

2.2 EP CONDITION

Following the recommendation in the approved EIA Report, EP Condition 2.9 stipulates the requirements for the submission of Effluent Discharge Plan as mentioned in Section 1.2:

At least one month before the commencement of operation of the Project, the Permit Holder shall deposit an Effluent Discharge Plan to the Director, which shall include the details of the following control measures to be implemented during the operation of the Project to ensure that the total average daily loading of batchwise discharge of effluents will not exceed the maximum allowed level of the existing operation in the BPPS:

- (a) *Batchwise discharge to allow settlement and removal of part of the pollution load;*
- (b) *Laboratory measurements to ensure compliance with the discharge limits before batchwise discharge; and*
- (c) *Disposal of effluent from the station effluent treatment plant, oil separator and sewage treatment facility offsite by licensed collector for treatment, if needed.*

3.1 EFFLUENT GENERATION

According to the approved EIA Report (which itself was based on the WPCO discharge licence granted to CAPCO for the operation of BPPS when the EIA Report was prepared), the following streams of effluent were considered to carry pollution load:

- Two streams of Station Effluent Treatment Plant Effluent (Effluents (3) & (4))
- Six streams of Oil Separator No. 1/2/3/4/5/9 Effluent (Effluents (5) - (10))
- Permanent Sewage Treatment Plant Effluent (Effluent (11))
- Effluent Treatment Facility Effluent (Effluent (12))

The locations where these streams of effluent is generated are shown in *Figure 3.1*. The total loading from these streams (summarised in *Table 2.1* above) are 126.4 kg of BOD per day, 63.2 kg of TP per day and 632 kg of TN per day.

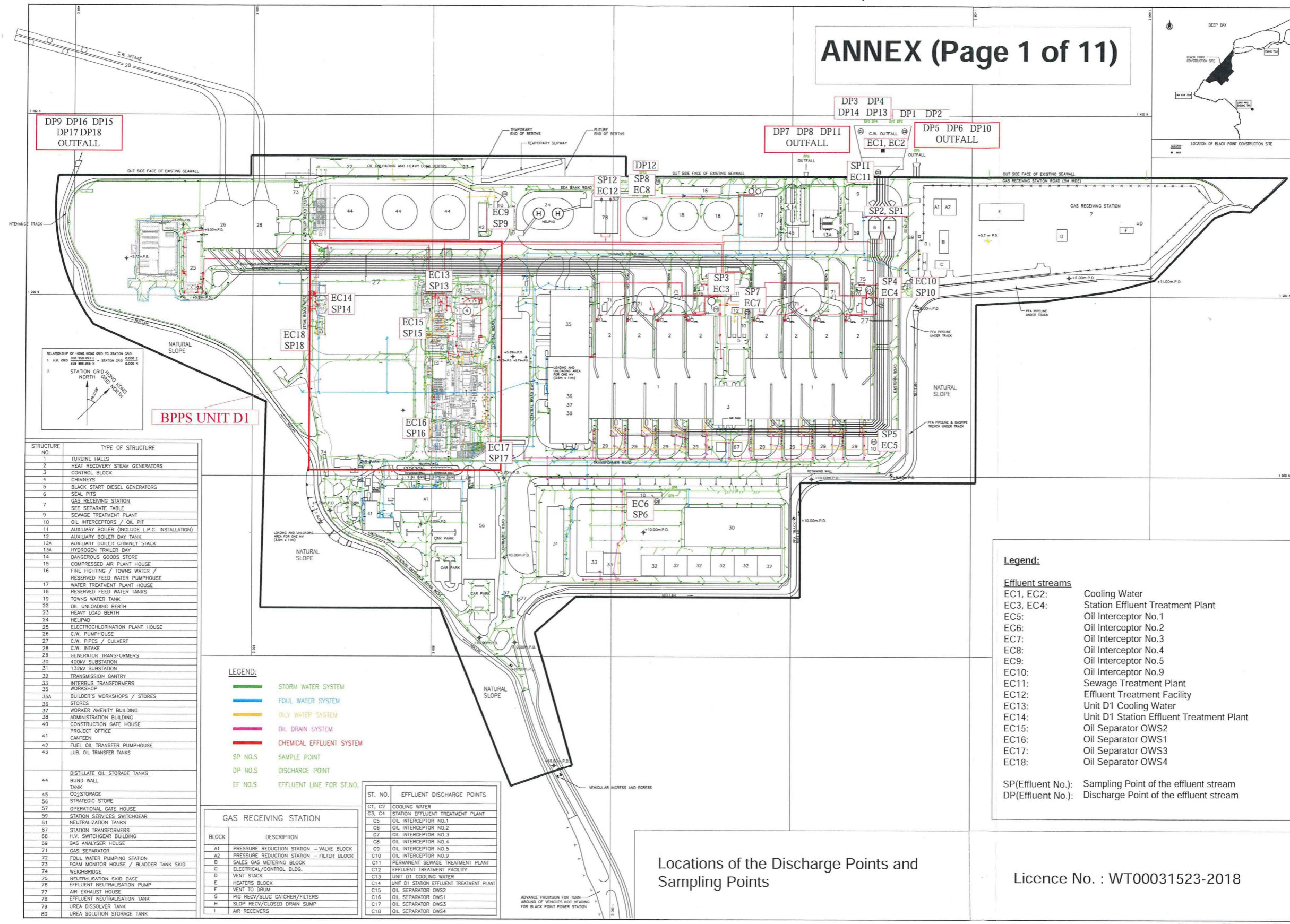
Additional streams of effluent that could carry pollution load have been introduced into the latest WPCO discharge licence for the operation of the additional CCGT Unit No.1 (Unit D1) after the approval of the EIA Report. These streams of effluent include:

- Unit D1 Station Effluent Treatment Plant Effluent (Effluent (14))
- Four streams of Oil Separator OWS1/ OWS2/ OWS3/ OWS4 Effluent (Effluents (15) - (18))

3.2 SAMPLING AND TESTING

There are specific procedures regarding effluent sampling and testing to ensure compliance with the corresponding WPCO licence conditions. There is a HOKLAS-accredited laboratory in the CPPS which will carry out the required regular sampling and testing under the existing WPCO licence requirements. Sampling locations for different streams of effluents are shown in *Figure 3.1*. As the sampling and testing is part of the exercise to ensure compliance with the corresponding WPCO licence conditions, effluent samples are therefore analysed according to the reference methods stated in *Annex 1 of Chapter: 358AK Technical Memorandum Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters*. The corresponding testing methods and detection limits are provided in *Table 3.2* below. Detailed procedures followed by BPPS staff for conducting the sampling are provided in *Table 3.1* and the details parameters to be analysed are provided in *Table 3.3* and *Table 3.4*.

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STRUCTURE NO.	TYPE OF STRUCTURE
1	TURBINE HALLS
2	HEAT RECOVERY STEAM GENERATORS
3	CONTROL BLOCK
4	CHIMNEYS
5	BLACK START DIESEL GENERATORS
6	SEAL PITS
7	GAS RECEIVING STATION SEE SEPARATE TABLE
9	SEWAGE TREATMENT PLANT
10	OIL INTERCEPTORS / OIL PIT
11	AUXILIARY BOILER (INCLUDE L.P.G. INSTALLATION)
12	AUXILIARY BOILER DAY TANK
12A	AUXILIARY BOILER CHIMNEY STACK
13A	HYDROGEN TRAILER BAY
14	DANGEROUS GOODS STORE
15	COMPRESSED AIR PLANT HOUSE
16	FIRE FIGHTING / TOWNS WATER / RESERVED FEED WATER PUMPHOUSE
17	WATER TREATMENT PLANT HOUSE
18	RESERVED FEED WATER TANKS
19	TOWNS WATER TANK
22	OIL UNLOADING BERTH
23	HEAVY LOAD BERTH
24	HELIPAD
25	ELECTROCHLORINATION PLANT HOUSE
26	C.W. PUMPHOUSE
27	C.W. PIPES / CULVERT
28	C.W. INTAKE
29	GENERATOR TRANSFORMERS
30	400KV SUBSTATION
31	132KV SUBSTATION
32	TRANSMISSION GANTRY
33	INTERBUS TRANSFORMERS
35	WORKSHOP
35A	BUILDER'S WORKSHOPS / STORES
36	STORES
37	WORKER AMENITY BUILDING
38	ADMINISTRATION BUILDING
40	CONSTRUCTION GATE HOUSE
41	PROJECT OFFICE CANTEEN
42	FUEL OIL TRANSFER PUMPHOUSE
43	LUB. OIL TRANSFER TANKS
44	DISTILLATE OIL STORAGE TANKS BUND WALL TANK
45	CO2 STORAGE
56	STRATEGIC STORE
57	OPERATIONAL GATE HOUSE
59	STATION SERVICES SWITCHGEAR
61	NEUTRALIZATION TANKS
67	STATION TRANSFORMERS
68	H.V. SWITCHGEAR BUILDING
69	GAS ANALYSER HOUSE
71	GAS SEPARATOR
72	FOUL WATER PUMPING STATION
73	FOAM MONITOR HOUSE / BLADDER TANK SKID
74	WEIGHBRIDGE
75	NEUTRALISATION SKID BASE
76	EFFLUENT NEUTRALISATION PUMP
77	AIR EXHAUST HOUSE
78	EFFLUENT NEUTRALISATION TANK
79	UREA DISSOLVER TANK
80	UREA SOLUTION STORAGE TANK

LEGEND:

- STORM WATER SYSTEM
- FOUL WATER SYSTEM
- ONLY WATER SYSTEM
- OIL DRAIN SYSTEM
- CHEMICAL EFFLUENT SYSTEM
- SP NO.S SAMPLE POINT
- DP NO.S DISCHARGE POINT
- EF NO.S EFFLUENT LINE FOR ST.NO.

GAS RECEIVING STATION

BLOCK	DESCRIPTION
A1	PRESSURE REDUCTION STATION - VALVE BLOCK
A2	PRESSURE REDUCTION STATION - FILTER BLOCK
B	SALES GAS METERING BLOCK
C	ELECTRICAL/CONTROL BLDG.
D	VENT STACK
E	HEATERS BLOCK
F	VENT TO DRUM
G	PIG RECV/SLUG CATCHER/FILTERS
H	SLOP RECV/CLOSED DRAIN SUMP
I	AIR RECEIVERS

ST. NO. EFFLUENT DISCHARGE POINTS

C1, C2	COOLING WATER
C3, C4	STATION EFFLUENT TREATMENT PLANT
C5	OIL INTERCEPTOR NO.1
C6	OIL INTERCEPTOR NO.2
C7	OIL INTERCEPTOR NO.3
C8	OIL INTERCEPTOR NO.4
C9	OIL INTERCEPTOR NO.5
C10	OIL INTERCEPTOR NO.9
C11	PERMANENT SEWAGE TREATMENT PLANT
C12	EFFLUENT TREATMENT FACILITY
C13	UNIT D1 COOLING WATER
C14	UNIT D1 STATION EFFLUENT TREATMENT PLANT
C15	OIL SEPARATOR OWS2
C16	OIL SEPARATOR OWS1
C17	OIL SEPARATOR OWS3
C18	OIL SEPARATOR OWS4

Legend:

Effluent streams

- EC1, EC2: Cooling Water
- EC3, EC4: Station Effluent Treatment Plant
- EC5: Oil Interceptor No.1
- EC6: Oil Interceptor No.2
- EC7: Oil Interceptor No.3
- EC8: Oil Interceptor No.4
- EC9: Oil Interceptor No.5
- EC10: Oil Interceptor No.9
- EC11: Sewage Treatment Plant
- EC12: Effluent Treatment Facility
- EC13: Unit D1 Cooling Water
- EC14: Unit D1 Station Effluent Treatment Plant
- EC15: Oil Separator OWS2
- EC16: Oil Separator OWS1
- EC17: Oil Separator OWS3
- EC18: Oil Separator OWS4

SP(Effluent No.): Sampling Point of the effluent stream
 DP(Effluent No.): Discharge Point of the effluent stream

Locations of the Discharge Points and Sampling Points

Licence No. : WT00031523-2018

Figure 3.1

Designated Effluent Designated Effluent Designated Effluent Sampling Stations BPPS (including the Additional CCGT Unit No.1 (Unit D1)) (Extracted from the WPCO Licence)

Date: 25/11/2019

Environmental Resources Management



Table 3.1 Sampling Procedures for Effluent Streams in the BPPS

Preparation Procedures before Sampling		
Items	Actions	Responsible Party / Parties
Sampling Location, Parameter and Frequency	<p>Samples Required under WPCO Licence</p> <ul style="list-style-type: none"> • When collecting a licence sample, it shall be taken at designated sampling points as agreed with Environmental Protection Department (EPD) which are stated in the WPCO Licence. • The sampling locations of the effluent stream, the required testing frequency and parameters should be based on the specifications in the WPCO licence (provided in Table 3.3 and Table 3.4). If there are uncertainties on the location of the sampling point, testing frequency and parameters, BPPS Operation Environment Team or Station Chemist should be consulted. 	Sampling Personnel of BPPS Operation Environment Team / Station Chemist
Sampling Plan, Apparatus and Bottle Preparation	<ul style="list-style-type: none"> • Plan the sampling route. <ul style="list-style-type: none"> ○ Raw sewage sample (before disinfection with high <i>E.coli</i> content) and STP (after disinfection with low <i>E.coli</i> content) shall be collected separately to avoid the possibility of cross contamination. • Estimate the number and types of bottles required. • All sampling apparatus and bottles should be properly cleaned before use. • Standard sample handling requirements including appropriate sample containers, sample preservation and maximum storage time for delivery to Generation Central Laboratory to be followed. 	Sampling Personnel of BPPS Operation Generation Central Laboratory Manager
		Sampling Personnel of BPPS Operation Generation Central Laboratory
Sampling Procedures		
Steps	Actions	Responsible Party / Parties
1	<ul style="list-style-type: none"> • Follow the general safety precautions 	Sampling Personnel of BPPS Operation
2	<ul style="list-style-type: none"> • Conduct visual check of the effluent condition before sampling. If there is any abnormality, such as sample turbidity or abnormal effluent color is identified, the sampling personnel should take a check sample from the stream for analysis and report the observation to on-duty Senior Shift Manager and Environment Team immediately for investigation. 	Sampling Personnel of BPPS Operation
3	<ul style="list-style-type: none"> • Label the sampling bottles. Sampling bottles should be clearly labelled to indicate the sampling location, date and time. 	
4	<ul style="list-style-type: none"> • Rinse the sampler and sampling bottles with the effluent to be sampled (except sampling bottle containing some necessary chemical e.g. the bottle for oil and grease or <i>E.coli</i> test). 	

5	<ul style="list-style-type: none"> • Fill the sampling bottle with the effluent at designated sampling points and follow the associated requirements for effluent samples stated in WPCO Licence. • Take the following precautionary steps during sampling: <ul style="list-style-type: none"> ○ Avoid surface scum when taken sample from reservoirs. ○ If grab sample is to be collected from a stream, the sampling personnel shall take it in the middle of the stream and at mid-depth of the tank containing the effluent.
6	<ul style="list-style-type: none"> • After finishing sample collection, on-site analysis (e.g. temperature measurement of cooling water) should be carried out immediately if necessary.
7	<ul style="list-style-type: none"> • Fill the Test Request Form and deliver the sample to BPPS Generation Central Laboratory. Standard sample handling requirements including appropriate maximum storage time for delivery to Generation Central Laboratory should be observed.

Table 3.2 Reference Method and Detection Limits for WPCO Reporting

Determinands	Reference Methods	Detection Limits
Temperature	Temperature sensor	N/A
pH	APHA 17ed 4500-H+B	N/A
Total Residual Chlorine	APHA 17ed 4500-Cl G	0.1 mg/L
S.S.	APHA 17ed 2540 D	5 mg/L
BOD ₅	BS 6068: Section 2.14: 1984	5 mg/L
COD	ASTM D 1252-88 Test Method B or APHA 17ed 5220 C & D	5 mg/L
Total Nitrogen	APHA 17ed 4500-NO ₃ APHA 17ed 4500-NO ₂ ASTM D 3590-89	10 mg/L
Total Phosphorus	ASTM D 515-88	0.02 mg/L
O&G	APHA 17ed 5520 C	5 mg/L
Iron	APHA 17ed 3111, 3113 and 3120	0.1 mg/L
<i>E.coli</i>	DoE(1983): The Bacteriological Examination of Drinking Water Supplies 1982, Sec. 7.8 & 7.9. Membrane lauryl sulphate method with in situ urease test for <i>E. coli</i>	N/A
Colour	Lovibond Tintometer, 25mm cell	N/A
Ammonia Nitrogen	APHA 17ed 4500-NH ₃	0.04 mg/L

Table 3.3 *Sampling & Monitoring Requirement for Regulatory Requirements for Operation with Existing BPPS Generation Plants*

Monitoring Location (WPCO Licence ID)	Frequency	Determinants / Inspection Items	Responsible Party	Reporting
Cooling Water Effluents (Effluents (1), (2))	Daily	pH, temperature, total residual chlorine	BPPS Operation / GED Lab / Environment Team	Results submit to Authority on a monthly basis within 15 days following the period being reported upon
Station Effluent Treatment Plant Effluents (Effluents (3), (4))	Daily whenever there is a discharge	pH, temperature, S.S., BOD ₅ , COD, total nitrogen, total phosphorus, O&G, total residual chlorine		
Oil Separator No.1 to No. 9 Effluent (Effluents (5) - (10))	Daily whenever there is a discharge	BOD ₅ , total nitrogen, total phosphorus, COD, O&G, iron		
Permanent Sewage Treatment Plant Effluent (Effluent (11))	Daily	total residual chlorine, pH		
Effluent Treatment Facility Effluent (Effluent (12))	Weekly	BOD ₅ , total nitrogen, total phosphorus, <i>E.coli</i>		
	One sample before discharge and one during discharge process	BOD ₅ , total nitrogen, total phosphorus, pH, colour, S.S., COD, O&G, iron, ammonia nitrogen		

Table 3.4 *Sampling & Monitoring Requirement for Regulatory Requirements for Operation with Unit D1*

Monitoring Location (WPCO Licence ID)	Frequency	Determinants / Inspection Items	Responsible Party	Reporting
Cooling Water Effluents (Effluent (13))	Daily	pH, temperature, total residual chlorine	BPPS Operation / GED Lab / Environment Team	Results submit to Authority on a monthly basis within 15 days following the period being reported upon
Unit D1 Station Effluent Treatment Plant Effluent (Effluent (14))	Daily whenever there is a discharge	pH, temperature, S.S., BOD ₅ , COD, total nitrogen, total phosphorus, O&G, total residual chlorine	Team	Results submit to Authority on a monthly basis within 15 days following the period being reported upon
Oil Separator OWS1-4 Effluent (Effluents (15) - (18))	Daily whenever there is a discharge	BOD ₅ , total nitrogen, total phosphorus, COD, O&G, iron		

3.3 DISCHARGE ARRANGEMENT

Streams of effluent, including station effluent treatment plant effluent, oil separator effluent, permanent sewage treatment plant effluent and effluent treatment facility effluent would be temporarily stored for checking, sampling and testing by BPPS staff.

If laboratory analysis results indicate compliance with the applicable licence limits, the whole batch of effluent would be discharged. After complete discharge, the outlet penstock (or equivalent) of the corresponding storage would be closed for the next batch of effluent. Applicable licence limits for various parameters in the effluent is summarised in *Table 3.5*.

If laboratory analysis results indicate non-compliance, corrective actions stipulated in CLP’s GBG Instruction No. 14.6.B3 *Corrective Actions on BPPS Effluent Discharge Abnormalities* will be conducted. These are summarized in *Table 3.6* to *Table 3.9*.

Table 3.5 *Applicable WPCO Licence Limit for Various Parameters for Effluents*

Determinands	Limit
Cooling Water Effluents (Effluents (1), (2))	
Temperature (°C)	40
Total Residual Chlorine (mg/L)	0.5
pH	6-9
Station Effluent Treatment Plant Effluents (Effluents (3), (4))	
pH	6-9

Determinands	Limit
Temperature (°C)	45
S.S. (mg/L)	50
BOD ₅	20
COD (mg/L)	80
TN	100
TP	10
O&G (mg/L)	20
Total Residual Chlorine (mg/L)	1
Oil Separator No.1 to No. 9 Effluent (Effluents (5) - (10))	
BOD ₅	20
TN	100
TP	10
COD (mg/L)	80
O&G (mg/L)	20
Iron (mg/L)	7
Permanent Sewage Treatment Plant Effluent (Effluent (11))	
pH	6-9
Total Residual Chlorine (mg/L)	1
BOD ₅	20
TN	100
TP	10
<i>E.coli</i> (count/100mL)	1000
Effluent Treatment Facility Effluent (Effluent (12))	
BOD ₅	20
TN	100
TP	10
pH	6-9
Colour (Lovibond units)	1
S.S. (mg/L)	50
COD (mg/L)	80
O&G (mg/L)	20
Iron (mg/L)	4
Ammonia Nitrogen (mg/L)	N/A
Cooling Water Effluents (Effluent (13))	
Temperature (°C)	40
Total Residual Chlorine (mg/L)	0.5
pH	6-9
Unit D1 Station Effluent Treatment Plant Effluent (Effluent (14))	
pH	6-9
Temperature (°C)	45
S.S. (mg/L)	50
BOD ₅	20
COD (mg/L)	80
TN	100
TP	10
O&G (mg/L)	20
Total Residual Chlorine (mg/L)	1
Oil Separator OWS1-4 Effluent (Effluents (15) - (18))	
BOD ₅	20
TN	100

Determinands	Limit
TP	10
COD (mg/L)	80
O&G (mg/L)	20
Iron (mg/L)	10 (OWS1, OWS3, OWS4) 5 (OWS2)

Note: Discharge criteria for BOD₅, TN and TP are subjected to further requirements under the approved EIA Report and the additional requirements are stipulated in *Table 4.1*.

For any abnormal effluent in the oil interceptors that they cannot be resumed normal after taken the corrective actions, the abnormal effluent would be disposed by external waste collector. Letter from CLP confirming the company engaged an external waste collector to handle the disposal of abnormal effluent is shown in *Annex A*. For Station Effluent Treatment Plant effluent, abnormal effluent that cannot be resumed to normal after taken the corrective actions, the abnormal effluent will be transferred to Effluent Treatment Facilities.

For the Effluent Treatment Facilities No.1 and No.2, the discharge of effluent is only allowed when all the testing parameters of the sample are under the control level (95% of the licence limit) or complies with the licence limit. A second sample is required to be collected during the discharge process, if any testing parameter of the second sample exceeds the control level, discharge has to be stopped and the following corrective actions are required to be followed to fix the corresponding abnormality.

Table 3.6 *Corrective Actions for Oil Interceptors No.1, No.2, No.3, No.4, No.5, No.9 and OWS1-4*

Abnormality	Actions
Oil and Grease	<p>Oil residue will be removed by the following means:</p> <ul style="list-style-type: none"> Identify and stop the source of oil & grease Oil absorbent External waste oil collector Oil dispersant (Oil dispersant should not be used in the first place except in emergency as it will increase the Chemical Oxygen Demand (COD) level of the effluent which might lead to a breach of the licence limit on COD. Operations Team should transfer this high COD effluent to Effluent Treatment Facility for further treatment.) <p>A check sample will be taken to check the oil level after taking the above corrective actions. Repeat the corrective actions until the oil level is below the control level or complies with the licence limit before discharge.</p>
Iron	<p>Any discharge of rusty water into the drainage system of the oil interceptors will be checked, and immediately stopped once the polluted source is identified.</p>

	<p>Leave the effluent inside the interceptor undisturbed to settle down any suspended solids, as the total iron level is mainly contributed from undissolved iron. A check sample will be taken to monitor the total iron level. Discharge of effluent is allowed when the iron level is below the control level or complies with the licence for emergency cases subject to the approval of the duty Senior Shift Manager.</p> <p>Call service from external waste collector to clean up the interceptor in case of serious iron ingress.</p>
Chemical Oxygen Demand (COD)	<p>Oil absorbent will be used to absorb any oil residue as much as possible. Oily residue is usually the source for high COD level in the effluent.</p> <p>A check sample will be taken to monitor the COD level. Discharge of effluent is allowed when the COD level is below the control level or complies with the licence limit licence for emergency cases subject to the approval of the duty Senior Shift Manager.</p>
Others	<p>The effluent will be transferred to the Effluent Treatment Facilities for further treatment if necessary.</p>

Table 3.7 *Corrective Actions for Sewage Treatment Plant*

Abnormality	Actions
Total Residual Chlorine	<p>The effluent discharge valve will be shut down immediately to ensure no discharge of sewage. The following steps for the Effluent Internal Circulation will be taken:</p> <ul style="list-style-type: none"> • Stop the sewage transfer pumps and ensure no effluent fill up the chlorination tank (the sewage will be re-circulated between Equalization Tank, RBC and Final Sedimentation Tank). • Check the hypochlorite dosing pump at local whether it is stopped automatically when the STP high chlorine alarm is initiated at CCR. If the dosing pump is not automatically stopped, the pump needs to be stopped at local. • With advice from the BPPS Chemist, chemical (eg. Sodium bisulphate) will be added to the chlorination tank to remove the chlorine content, and re-circulate the sewage within the tank for thorough mixing. • Take a check sample from the chlorination tank and verify the total residual chlorine level. • Setup a temporary hose to re-circulate the sewage from Chlorination Tank back to the Equalization Tank and only allow for internal re-circulation between Equilization Tank, RBC and Final Sedimentation Tank. <p>Any fault (eg. Fault of the chlorine dosing pump) will be diagnosed and rectified as soon as practicable.</p>

	<p>After fault rectification, a check sample will be taken to verify the total residual chlorine level is below the control level. (No sewage shall be discharged to the sea before the system resume normal).</p>
<i>E.coli</i>	<p>The effluent discharge valve will be shut down immediately to ensure no discharge of sewage.</p> <p>RBC, chlorine dosing system and UV disinfection system will be checked to see if they are functioning correctly and their performance verified.</p> <p>The control system will be checked immediately if any defect found or any doubt on the plant control.</p> <p>To prevent exceedance of <i>E.coli</i>, the following actions shall be taken:</p> <p>The hypochlorite dosing will be monitored and corrective actions taken accordingly if the total residual chlorine is found less than 0.15 mg/L:</p> <ul style="list-style-type: none"> • Stop the sewage transfer pumps of equalization tank immediately at local • Take a check sample for checking total residual chlorine level to ensure it is greater than 0.15 mg/L, otherwise increase the dosing rate as appropriate (should not over the licence limit) • Rectify the fault if the normal hypochlorite dosing operation cannot be resumed <p>A check sample will be taken to check the <i>E.coli</i> level after taking the above corrective actions. Repeat the corrective actions until the <i>E.coli</i> level is below the control level. (No sewage shall be discharged to the sea before the system resume normal).</p> <p>Restart the sewage transfer pumps of equalization tank after the hypochlorite dosing and UV disinfection systems resume normal.</p>
Biochemical Oxygen Demand (BOD)	<p>The effluent discharge valve will be shut down immediately to ensure no discharge of sewage.</p> <p>The steps for Effluent Internal Circulation due to “Abnormality of Total Residual Chlorine” will be followed.</p> <p>Check if there is any abnormal operation of the Rotating Biological Contactor (RBC) and arrange maintenance team to fix the defect immediately.</p> <p>A check sample will be taken at the outlet of the final sedimentation tank to check whether the sewage BOD level is back to normal after recirculation by testing the dissolved oxygen, BOD1 or BOD2, Repeat the corrective action until the BOD level is below the control level.</p>

	<p>After fault rectification and the BOD level resume normal, the Sewage Treatment Plant in normal operation will be resumed.</p>
pH	<p>The effluent discharge valve will be shut down immediately to ensure no discharge of sewage</p> <p>The steps for Effluent Internal Circulation due to "Abnormality of Total Residual Chlorine" will be followed.</p> <p>Check if there is any leakage of chemical, e.g. ammonia solution, hydrazine solution, caustic solution or others entering into the sewage system and fix the leakage immediately.</p> <p>The BPPS Chemist will advise the dosing amount of chemical solution (acid or alkali). The defined quantity of chemical solution is dosed into Equalization Tank to adjust the pH. The target pH shall be between 6-9.</p> <p>A check sample will be taken from the sedimentation tank to check the pH after taking the above corrective actions. Repeat the corrective actions until the pH is below the control level.</p> <p>After fault rectification and the pH resume to normal level, the Sewage Treatment Plant in normal operation will be resumed.</p>
Prolonged Outage of Sewage Treatment Plant (STP)	<p>If any abnormality of the STP is observed, the sewage transfer pumps of equalization tank will be manually stopped and the discharge valve at the discharge point will be shut off.</p> <p>The STP will be checked. If the STP requires suspension for maintenance more than one day, licenced sewage collector will be arranged to remove the sewage if necessary.</p> <p>The plant will be kept in no discharge and re-circulate the sewage back to the Equalization Tank for re-treatment until rectification of the fault and all controls are put back in normal operation.</p> <p>The licenced sewage collector is needed to attend daily for removal of sewage during re-circulation of the sewage.</p> <p>A check sample will be taken from the sedimentation tank after re-circulation for one day.</p> <p>After confirmed all licenced monitored parameters of the check sample are below the control limit, the STP in normal operation will be resumed.</p>

Table 3.8 *Corrective Actions for Station Effluent Treatment Plant No.1, No.2, No.3 and No.4, and Unit D1 Station Effluent Treatment Plant Effluent*

Abnormality	Actions
pH	<p>A check sample will be taken from the licence sampling point to verify the above corrective action. Repeat the corrective action until the abnormal result is below the control level or complies with the licence limit.</p> <p>The effluent will be transferred to the Effluent Treatment Facilities for further treatment if necessary.</p> <p>Acid or alkali will be dosed as appropriate to adjust the pH. The target pH shall be between 6-9.</p>
Temperature	<p>A check sample will be taken from the licence sampling point to verify the above corrective action. Repeat the corrective action until the abnormal result is below the control level or complies with the licence limit.</p> <p>The effluent will be transferred to the Effluent Treatment Facilities for further treatment if necessary.</p> <p>Leave the effluent inside the effluent tank undisturbed for natural cooling purpose. The effluent temperature will be monitored until it is below the control level or complies with the licence limit.</p>
Suspended Solid	<p>A check sample will be taken from the licence sampling point to verify the above corrective action. Repeat the corrective action until the abnormal result is below the control level or complies with the licence limit.</p> <p>The effluent will be transferred to the Effluent Treatment Facilities for further treatment if necessary.</p> <p>Leave the effluent inside the effluent tank undisturbed for sedimentation of any suspended solids.</p>
Others	<p>The effluent will be transferred to the Effluent Treatment Facilities for further treatment if necessary.</p>

Table 3.9 *Corrective Actions for Effluent Treatment Facilities No.1 and No.2*

Abnormality	Actions
pH	<p>Acid or alkali will be dosed as appropriate to adjust the pH. The target pH shall be between 6-9.</p>
Color, COD, Total Nitrogen and Ammonia Nitrogen	<p>The effluent will be transferred to another pit for further mixing with other effluent. Collection of the effluent by registered waste collector if necessary.</p>
Suspended Solids and Iron	<p>Leave the effluent undisturbed for sedimentation of any suspended solids. The effluent will be transferred to another pit for further mixing with other effluent. Collect of the effluent by registered waste collector if necessary.</p>

Discharge of effluents is only allowed after the results of laboratory analysis confirmed the quality of effluents comply with the discharge criteria. Before

the laboratory results are available, these effluents are retained within the corresponding storage tanks. There are four storage tanks (each with 500 m³) for Station Effluent Treatment Plant and two storage tanks (each with 1,500 m³) for Effluent Treatment Facility for retaining the effluent before discharge. Typically, the stored effluent would be retained in the storage tank for 2-3 days for laboratory analysis and the application of necessary treatment (if needed). While the generation rate of effluent is variable ⁽¹⁾, the generation rate can typically be handled in half of the available storage capacities. Given the surplus of storage capacities, it is deemed sufficient for the purpose of ensuring compliance.

(1) The rate of generation of effluent depends on the operation status of the generation units and whether there is a need for maintenance, and thus is variable. In general, batchwise discharge is only needed once in a few days.

4 PROPOSED ARRANGEMENTS FOR FUTURE OPERATION WITH CCGT UNIT NO.1

As assessed in the approved EIA Report, the commissioning of the CCGT Unit No.1 would result in an increase in effluent. Proposed arrangements for ensuring compliance for effluent discharge, taking into account the additional effluent streams, remain similar to that in place as stated in *Section 3* above and is further described below.

4.1 EFFLUENT GENERATION

According to the latest WPCO discharge licence of the BPPS, additional effluent generated from the operation of CCGT Unit No.1 include cooling water effluent, station effluent treatment plant effluent as well as oil separator OWS1, OWS2, OWS3, and OWS4 effluent. Cooling water effluent from the Unit D1 is not considered to generate pollution load and is not covered in this Plan. According to the latest WPCO discharge licence, the discharge rate of station effluent treatment plant effluent would be no more than 500 m³ per day. Discharge rates for OWS1, OWS2, OWS3, and OWS4 effluent would be 175, 700, 400 and 175 m³ per day respectively, totalled 1,450 m³ per day. Total increase in effluent for batchwise discharge is thus 1,950 m³ per day, same as the estimate presented in the approved EIA Report.

4.2 SAMPLING AND TESTING

The same sampling and testing arrangements as stated in *Section 3.2* would be conducted by BPPS staff, with updates in sampling locations made to accommodate the additional streams of effluent from the Unit D1. The updated sampling locations are provided in *Figure 3.1*. (new monitoring stations are SP13 for Unit D1 Cooling Water, SP14 for Unit D1 Station Effluent Treatment Plant, SP15-18 for Oil Separator OWS1-4).

4.3 DISCHARGE ARRANGEMENT

The same discharge arrangement as stated in *Section 3.3* would be followed for all streams of existing and new effluent. To accommodate for potential increase in total flow while keeping total pollution loading below the cap, i.e. total loading from these streams would be at or below 126.4 kg of BOD per day, 63.2 kg of TP per day and 632 kg of TN per day, the additional requirement in *Table 4.1* would be observed.

Table 4.1 *Discharge Arrangements for Effluent Streams in the BPPS*

Case	Condition	Arrangement
1	Total daily discharge for all batchwise discharge constituents is not expected to exceed 6,320 m ³ for a specific day (see <i>Table 2.1</i>)	Allowed discharge concentrations for BOD, TP and TN (20, 10 and 100 mg L ⁻¹ respectively) should be the same as those stipulated in the WPCO licence
2	Total daily discharge for all batchwise discharge constituents is expected to exceed 6,320 m ³ per day but remain below 8,270 m ³ for a specific day	Allowed discharge concentrations for BOD, TP and TN should be 23.58% below the corresponding concentrations stipulated in the WPCO licence, which would be 15.28, 7.64 and 76.42 mg L ⁻¹ respectively
3	Effluent generated exceeds the expected daily amount stated in case 1 or 2 above	The exceeded amount should either be stored for discharge in the next day or dispose of by external waste collector.

Cases 1, 2 or 3 above should have covered all possible conditions in terms of compliance with the “No Net Increase in Pollution Load in Deep Bay” policy. As such, compliance with the “No Net Increase in Pollution Load in Deep Bay” policy is anticipated if the proposed arrangement is followed.

Annex A

Confirmation Letter from
CLP for Licenced
Contractor for Disposal of
Effluent from Effluent
Treatment Plant

Date: 10 March 2020

Our Ref.: CCGT-090.35-5551-20-RW

ERM-Hong Kong, Limited
2501, 2507-10, Office Tower One,
The Harbourfront, 18 Tak Fung Street,
Kowloon, Hong Kong

Attn.: Dr Jasmine Ng

Dear madam,

***Installation of One Additional Gas-fired Generation Unit (CCGT Unit No. 1)
at the Black Point Power Station
Environmental Permit EP-507/2016/B
Licensed Contractor for Disposal of Effluent from Effluent Treatment Plant***

To support the preparation of the Effluent Discharge Plan in pursuant to Permit Condition 2.9 of the above captioned EP-507/2016/B, we would like to confirm that M Y Cheng & Co (Engineering) Ltd has been engaged as the licensed contractor for timely disposal of sludge from the effluent treatment plant of the Project.

Should you have any queries please do not hesitate to contact me at 2596 4116.

Yours sincerely,

For and on behalf of
CLP POWER HONG KONG LIMITED



Dr. Helen Chiu
Senior Environmental Manager
Generation/Safety, Health, Environment & Quality-GBG

c.c.: CH Wong, Ryan Wong