


資料 6.3 河川からの取水許可に関する資料

MRC からの承認レター



ព្រះរាជាណាចក្រកម្ពុជា
ជាតិ សាសនា ព្រះមហាក្សត្រ

ROYAL GOVERNMENT OF CAMBODIA
Ministry of the Royal Palace

PHNOM PENH WATER SUPPLY AUTHORITY
Planning and Project Department

13 SEP 2019
BY: ៣៤៧ PMU

គណៈកម្មាធិការជាតិរៀបចំផែនការស្តុកទឹក
លេខ: ០២០ គ.ជ.ទ.ម.ក

ថ្ងៃចេញ: ១២/០៩/២០១៩ ខែ: ០៩/២០១៩ ឆ្នាំ: ២០១៩
រាជធានីភ្នំពេញ ថ្ងៃទី: ១១ ខែ: ០៩ ឆ្នាំ ២០១៩

រដ្ឋាករទឹកស្វយ័តក្រុងភ្នំពេញ	
លេខអាជ្ញាប័ណ្ណ	
លេខ:	2815
ថ្ងៃចេញ:	12/09/2019
បញ្ជូនទៅ:	06/11/19

ប្រធានគណៈកម្មាធិការជាតិរៀបចំផែនការស្តុកទឹក
សូមជម្រាបជូន

ឯកឧត្តម អគ្គនាយករដ្ឋាករទឹកស្វយ័តក្រុងភ្នំពេញ

រដ្ឋាករទឹកស្វយ័តក្រុងភ្នំពេញ	
ការិយាល័យ រដ្ឋបាល	
លេខ:	218
ថ្ងៃទី:	12/09/2019
បញ្ជូនទៅ:	12/09/2019

កម្មវត្ថុ: ករណីសុំអនុញ្ញាតឱ្យរដ្ឋាករទឹកស្វយ័តក្រុងភ្នំពេញ យកទឹកទន្លេបាសាក់ ត្រង់ចំណុចទីតាំងសាខា ចែកចាយទឹកតាខ្មៅ ទៅធ្វើប្រព្រឹត្តិកម្មទឹកស្អាត នៅរោងចក្រផលិតទឹកស្អាតតាខ្មៅ សង្កាត់ដើមមៀន ក្រុងតាខ្មៅ ខេត្តកណ្តាល ។

យោង: លិខិតលេខ ៦៨៣ លស ចុះថ្ងៃទី២៨ ខែសីហា ឆ្នាំ២០១៩ របស់រដ្ឋាករទឹកស្វយ័តក្រុងភ្នំពេញ។

សេចក្តីដូចមានចែងក្នុងកម្មវត្ថុ និងយោងខាងលើ ខ្ញុំសូមជម្រាបជូន **ឯកឧត្តម អគ្គនាយក** ជ្រាបថា គណៈកម្មាធិការជាតិរៀបចំផែនការស្តុកទឹក ពុំជំទាស់ទៅនឹងសំណើខាងលើនេះទេ ដោយផ្អែកលើចំណុចមួយចំនួន ដូចខាងក្រោម៖


- គម្រោងនេះមានការឯកភាពពីប្រមុខរាជរដ្ឋាភិបាលកម្ពុជា និងមានភ្ជាប់មកជាមួយនូវផែនទីបច្ចេកទេស នៃការសិក្សាត្រង់ចំណុចទីតាំង
- គម្រោងនេះសម្របសម្រួលដល់ការប្រើប្រាស់ទឹកទន្លេបាសាក់ នៅតំបន់គោលដៅដែលមានក្នុងផែនការមេ សម្រាប់ការផ្គត់ផ្គង់ទឹកស្អាត ក្នុងការសម្រេចឱ្យបាននូវគោលនយោបាយទឹកស្អាត របស់រាជរដ្ឋាភិបាល
- លទ្ធផលនៃការសិក្សាបានបង្ហាញថា ពុំមានផលប៉ះពាល់ដល់លំហូរទឹកគិតជាមធ្យមប្រចាំឆ្នាំ និងលំហូរ ទឹកអប្បបរមានៅរដូវប្រាំង និងបរិស្ថានទន្លេបាសាក់ និងពុំរំខានដល់ការធ្វើនាវាចរណ៍តាមដងទន្លេបាសាក់ ព្រម ទាំងជួយកាត់បន្ថយ ឬទប់ស្កាត់ការបាក់បែកទន្លេបាសាក់ដោយសារទឹកជំនន់ទន្លេ
- ដូចការវិភាគ ក្នុងចំណុចទី៤ នៃលិខិតយោងខាងលើ និងស្របតាមស្មារតីនៃកិច្ចព្រមព្រៀងមេកង្កឆ្នាំ១៩៩៥ បរិមាណទឹកដែលត្រូវយកមកធ្វើប្រព្រឹត្តិកម្មទឹកស្អាត មានតិចតួចដែលមិនមានឥទ្ធិពលប៉ះពាល់ដល់ ដល់ការទឹក នៃទន្លេបាសាក់ ឬ ទន្លេមេគង្គឡើយ។

សូម **ឯកឧត្តមអគ្គនាយក** ទទួលនូវការរាប់អានពីខ្ញុំ។

បង្គាប់ជម្រាបជូន:

- ក្រសួងធនធានទឹក និងឧតុនិយម
- ឯកសារ-កាលប្បវត្តិ

ស៊ឹម គាន់ហោ



លេខ: 218
ថ្ងៃទី: 12/09/2019
បញ្ជូនទៅ: 12/09/2019

អត្រាលេខ 576, ផ្លូវជាតិលេខ២ សង្កាត់ចាក់អង្ករក្រោម ខណ្ឌមានជ័យ រាជធានីភ្នំពេញ កម្ពុជា ទូរស័ព្ទ: (855-23) 216 514 ទូរសារ: (855-23) 218 506 អ៊ីម៉ែល: cnmcs@cnmc.gov.kh Website: www.cnmc.gov.kh



ព្រះរាជាណាចក្រកម្ពុជា
ជាតិ សាសនា ព្រះមហាក្សត្រ
នាគា ៖ ១៩៧៥

រដ្ឋាករទឹកស្វយ័តក្រុងភ្នំពេញ
លេខាធិការដ្ឋាន
លេខ: ៣៦៣
ថ្ងៃទី ២៨ ខែ ១០ ឆ្នាំ ២០១៥
បញ្ជូនទៅ: ០៦

ក្រសួងធនធានទឹក និងឧតុនិយម

លេខ ២៩០៤ ធនធាន

ROYAL WATER SUPPLY AUTHORITY
ព្រះរាជាណាចក្រកម្ពុជា

30 OCT 2015

BY: ៤៣១ PMU

ថ្ងៃត្រូវបានប្រើ ១១ លានខែ ៧ លាន ៣០ លាន ២៥៦៣
រាជធានីភ្នំពេញ ថ្ងៃទី ២៤ ខែ ១០ ឆ្នាំ ២០១៥

រដ្ឋមន្ត្រីក្រសួងធនធានទឹក និងឧតុនិយម

ជម្រាបជូន

ឯកឧត្តម អគ្គនាយករដ្ឋាករទឹកស្វយ័តក្រុងភ្នំពេញ

រដ្ឋាករទឹកស្វយ័តក្រុងភ្នំពេញ
ការិយាល័យ រដ្ឋបាល
លេខ: ៩៩៩
ថ្ងៃទី ២៨ ខែ ១០ ឆ្នាំ ២០១៥
បញ្ជូនទៅ: ៤៣១

អង្គបុគ្គល៖ សំណើសុំលិខិតអនុញ្ញាត សម្រាប់ដកយកទឹកទន្លេបាសាក់ ត្រង់ចំណុចទីតាំងសាខា
ចែកចាយទឹកស្អាតតាខ្មៅ ទៅធ្វើប្រព្រឹត្តិកម្មទឹកស្អាតនៅរោងចក្រផលិតទឹកស្អាតតាខ្មៅ
សង្កាត់ដើមមៀន ក្រុងតាខ្មៅ ខេត្តកណ្តាល ។

យោង ៖ លិខិតលេខ ៧៦៧ ល.ស ចុះថ្ងៃទី ២៥ ខែ កញ្ញា ឆ្នាំ ២០១៥ របស់រដ្ឋាករទឹកស្វយ័តក្រុងភ្នំពេញ

និងដូចមានចែងក្នុងកម្មវត្ថុ និងយោងខាងលើ សូមជម្រាបឯកឧត្តម អគ្គនាយករដ្ឋាករទឹក
ស្វយ័តក្រុងភ្នំពេញ ជ្រាបថា ក្រសួងធនធានទឹក និងឧតុនិយម អនុញ្ញាតឲ្យទាញយកទឹកដើម្បីផលិត
ទឹកស្អាតចំនួន ៣០,០០០ម^៣/ថ្ងៃ តាមសំណើសុំខាងលើ ដោយផ្អែកលើចំណុចមួយចំនួនដូចខាងក្រោម ៖

- គម្រោងនេះមានការឯកភាពពីប្រមុខរាជរដ្ឋាភិបាលកម្ពុជា និងមានភ្ជាប់មកជាមួយនូវ
ផែនទីបច្ចេកទេស នៃការសិក្សាត្រង់ចំណុចទីតាំង
- គម្រោងនេះសម្រួលដល់ការប្រើប្រាស់ទឹកទន្លេបាសាក់ នៅតំបន់គោលដៅដែលមាន
ក្នុងផែនការមេសម្រាប់ផ្គត់ផ្គង់ទឹកស្អាត ក្នុងការសម្រេចឲ្យបាននូវគោលនយោបាយ
ទឹកស្អាត របស់រាជរដ្ឋាភិបាល
- លទ្ធផលនៃការសិក្សាបានបង្ហាញថា ពុំមានផលប៉ះពាល់ដល់លំហូរទឹកគិតជាមធ្យម
ប្រចាំឆ្នាំ និងលំហូរទឹកអប្បបរមានៅរដូវប្រាំង និងបរិស្ថានទន្លេបាសាក់ និងពុំខាន
ដល់ការធ្វើនាវាចរណ៍តាមដងទន្លេបាសាក់
- ដូចការវិភាគ ក្នុងចំណុចទី៤ នៃលិខិតលេខ ៦៨៣ ល.ស ចុះថ្ងៃទី ២៨ ខែ សីហា ឆ្នាំ ២០១៥
និងស្របតាមស្មារតីនៃកិច្ចព្រមព្រៀង មេគង្គឆ្នាំ ១៩៩៥ បរិមាណទឹកដែលត្រូវយកមក
ធ្វើប្រព្រឹត្តិកម្មទឹកស្អាត មានតិចតួចដែលមិនមានឥទ្ធិពលប៉ះពាល់ធំដុំដល់ការទឹក
នៃទន្លេបាសាក់ ឬ ទន្លេមេគង្គឡើយ ។

សូមឯកឧត្តមអគ្គនាយកទទួលនូវការរាប់អានដ៏ស្មោះត្រង់ ។

- ចម្លងជូន៖**
- ថ្នាក់ដឹកនាំក្រសួងធនធានទឹក និងឧតុនិយម
 - អគ្គនាយកក្រសួង
 - អគ្គាធិការ
 - ខុទ្ទកាល័យឯកឧត្តមរដ្ឋមន្ត្រី
"ដើម្បីជូនជ្រាប"
 - ឯកសារ-កាលប្បវត្តិ



資料 6.4 モニタリング フォーム

モニタリング フォーム (案) (工事中)

The latest results of the below monitoring items should be submitted to JICA Cambodia Office as part of Quarterly Progress Report throughout the construction phase.

1. Response/Actions to Comments and Guidance from Government Authorities and the Public

Monitoring Item		Monitoring Results during Report Period
Number and contents of formal comments made by the public		
Number and contents of responses from government agencies (such as MoE etc.)		

2. Pollution

2.1 Water Quality

Parameter	Unit	Measures Value (Average)	Measures Value (Max.)	Cambodian Standards	Japanese Standards	To be meet the requirements instructed by PPWSA	Measurement Point	Frequency
pH	-					To be confirmed	2 points (1 at upstream of WTP intake, 1 at downstream of the WTP intake) for intake construction	Preconstruction: 1 time/point Construction: 1 time/point
SS	mg/L					To be confirmed		
Turbidity	mg/L					To be confirmed		
COD	mg/L					To be confirmed		
NH ₄ -N	mg/L					To be confirmed		
Coliform	MPN/100mL					To be confirmed		
SS	mg/L			120	80	120	1 point (at the discharge point to existing sewerage system) for sewerage management in construction site	1 time/point/month
BOD	mg/L			80	40	80		
COD	mg/L			100	40	100		

2.2 Air Quality

Parameter	Unit	Measures Value (Average)	Measures Value (Max.)	Cambodian Standards	Japanese Standards	Standards for Contract	Measurement Point	Frequency
CO	mg/m ³			20	20	20	1 point (1 at the WTP site)	Preconstruction: 1 time/point Construction: 1 time/point
NO ₂				0.1	0.04	0.1		
SO ₂				0.3	0.04	0.3		

Parameter	Unit	Measures Value (Average)	Measures Value (Max.)	Cambodian Standards	Japanese Standards	Standards for Contract	Measurement Point	Frequency
O ₃				0.2	0.06	0.2		1 time/point/6 months
Pb				0.005	-	0.005		
TSP				0.33	0.1	0.33		
PM ₁₀				0.005	-	0.005		
PM _{2.5}				0.025	0.015	0.025		

2.3 Noise and Vibration and Solid Waste

Parameter	Unit	Measures Value (Average)	Measures Value (Max.)	Waste Disposal Method	Cambodian Standards	Japanese Standards	Standards for Contract	Measurement Point	Frequency
Equivalent continuous A sound level (L _{aeq} , 10)	dB(A)			-	75 (6:00-18:00)	70	75	2 points (1 at the WTP, 1 at western boundary of the WTP)	Preconstruction: 1 time/point Construction: 1 time/point/6 months
Vibration level (L _v 10)	dB(A)			-	-	65 (8:00-19:00)	65	2 points (1 at the WTP, 1 at western boundary of the WTP)	Preconstruction: 1 time/point Construction: 1 time/point/6 months
Volume of wastes (waste soil)	m ³				-	-	-	2 points (1 at Gate of the WTP, 1 at Boeng Tompun Lagoon)	1 time (24 hr)/month
Volume of wastes (other construction wastes)	m ³				-	-	-	2 points (1 at Gate of the WTP, 1 at existing Dangkor landfill site by 2021 or new landfill sit after 2021)	1 time (24 hr)/month

モニタリング フォーム (案) (供与時)

3.1 Water Quality

Parameter	Unit	Measures Value (Average)	Measures Value (Max.)	Cambodian Standards	Japanese Standards	Standards for Contract	Measurement Point	Frequency
SS	mg/L			120	80	120	1 point (at the discharge point to existing sewerage system)	1 time/point/month
BOD	mg/L			80	40	80		
COD	mg/L			100	40	100		

3.2 Air Quality

Parameter	Unit	Measures Value (Average)	Measures Value (Max.)	Cambodian Standards	Japanese Standards	Standards for Contract	Measurement Point	Frequency
CO				20	20	20		
NO ₂				0.1	0.04	0.1		
SO ₂				0.3	0.04	0.3		
O ₃				0.2	0.06	0.2		
Pb				0.005	-	0.005		
TSP				0.33	0.1	0.33		
PM ₁₀				0.005	-	0.005		
PM _{2.5}				0.025	0.015	0.025		
	mg/m ³						1 point (1 at the WTP site)	Preconstruction : 1 time/point Construction: 1 time/point/6 months

3.3 Solid Waste

Parameter	Unit	Measures Value (Average)	Measures Value (Max.)	Sludge Disposal Method	Cambodian Standards	Standards for Contract	Measurement Point	Frequency
Volume of sludge	m ³			[1] Landfill [2] Reuse for backfilling [3] Other	-	-	2 points (1 at Gate of the WTP, 1 at new landfill site or reuse site)	1 time (24 hr)/6 months

資料 6.5 環境チェックリスト

環境チェックリスト

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
1. Permits and Explanation	(1) EIA and Environmental Permits	(a) Have EIA reports been already prepared in official process?	Y	(a) Initial Environmental Impact Assessment (IEIA) report has been prepared and submitted to Ministry of Environment (MoE) in the end of August, 2019.
		(b) Have EIA reports been approved by authorities of the host country's government?	N	(b) The IEIA report is currently under review by MoE. It is expected that MoE will issue approval letter on the IEIA report by the end of November, 2019.
		(c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied?	N	(c) The IEIA report is currently under review by MoE.
		(d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	N	(d) In addition to the above approvals, a permit for water intake is required. On Sep. 12, 2019, approval letter for the water extraction right was issued by Cambodia National Mekong Committee (CNMC) signed by Chief of Committee, H.E. LIM Kean Hor (Minister of Water Resources and Meteorology).
	(2) Explanation to the Public	(a) Have contents of the project and the potential impacts been adequately explained to the Local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the local stakeholders?	Y	(a) Stakeholder consultation meetings were held in Derm Mien Village on June 22, 2019 and in Kandal Provincial Department of Environment (DoE) on July 18, 2019. During the meetings, the project contents and the potential impacts are explained to the local stakeholders. Understanding was obtained from the local stakeholders considering the discussion and comments collected from them during the meetings. In addition, information disclosure has been also carried out through local authorities and NGOs.
		(b) Have the comment from the stakeholders (such as local residents) been reflected to the project design?	Y	(b) Local residents required to increase house connection, regular water supply, appropriate water tariff and lower price of house connection. These comments and requirements have been reflected in the project design (increasing service population from current 48,000 to 120,000, providing 24 hours water supply, providing subsidized connections and tariff for low income households.
	(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	Y	(a) Three alternative studies (without project, conventional treatment and advanced treatment) have been examined. In order to avoid land acquisition and resettlement, conventional treatment method is selected.
		(a) Is there a possibility that chlorine from chlorine storage facilities and chlorine injection facilities will cause air pollution?	N	(a) On-site sodium hypochlorite generation system with high safety will be applied. Therefore, chlorine gas will not be used in the WTP and leakage of chlorine is not expected.
2. Mitigation Measure	(1) Air Quality	(b) Do chlorine concentrations within the working environments comply with the country's occupational health and safety standards?	Y	(b) In the on-site sodium hypochlorite generation system, the disinfectant is produced and stored in liquid form. Therefore, there is no danger of gas leaks from high-pressure chlorine cylinders. In addition, in Cambodia there are no regulations on chlorine concentrations within working environments..

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
	(2) Water Quality	(a) Do pollutants, such as SS, BOD, COD contained in effluents discharged by the facility operations comply with the country's effluent standards?	Y	(a) During construction period: Domestic wastewater generated from construction site at Ta Khmau WTP will be discharged into existing sewerage system. During operation period: Wastewater from the WTP administration building will be treated at wastewater treatment facility before being discharged into existing sewerage system. SS, BOD, COD of effluents discharged from the WTP will comply with Cambodia effluent standards to sewerage system (Sub-decree No. 27 on the Water Pollution Control; SS<120 mg/L, BOD<80 mg/L and COD<100 mg/L).
	(3) Wastes	(a) Are wastes, such as sludge generated by the facility operations properly treated and disposed in accordance with the country's regulations?	N	(a) In Cambodia, there are no laws or regulations on WTP sludge disposal. During construction phase: part of construction waste soil (app. 1,000 m ³) will be reused for backfilling at construction site. The remaining waste soil (app. 1,000 m ³) will be reused for backfilling of Boeng Tompun lagoon, 3 km far from the WTP). During operation period: WTP sludge will be collected and transported to new landfill site by PPWSA who is conducting a detailed survey on the reuse of sludge for backfilling. In addition, the amount of the sludge is limited (app. 3 tDS/day).
	(4) Noise and Vibration	(a) Do noise and vibrations generated from the facilities, such as pumping stations comply with the country's standards?	Y	(a) During construction period: Current noise levels around the WTP are 57 to 69 dB(A). During construction, the noise level at boundary of the WTP is estimated to be 78-87 dB(A) due to construction equipment and vehicles operation, which exceeds the standard (75 dB) slightly. However, no sensitive facilities have been identified around the WTP site. In addition, EMP has been prepared and contractor will follow the EMP to minimize noise and vibration during construction period. Current vibration levels (equivalent levels) at the project area are 17 to 26 dB, which are much lower than that of Japanese standards (65 dB). Therefore, it is estimated that vibration levels during construction period will comply with Japanese standards (no vibration standards in Cambodia). During operation period: All pumps will be installed within pump stations, therefore, the noise and vibration level in outside of pump stations is considered to be same as the background level of the site.
	(5) Subsidence	(a) In the case of extraction of a large volume of groundwater, is there a possibility that the extraction of groundwater will cause subsidence?	N	(a) During construction period and operation period, no groundwater will be extracted. Therefore, the impacts of subsidence are not expected.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
3. Natural Environment	(1) Protected Areas	(a) Is the project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	N	(a) The project sites are not located in protected area or environmentally sensitive areas designated by Cambodia laws or international treaties. In addition, all proposed treatment facilities will be located within the existing WTP site. Therefore, there is no possibility that the project will affect the protected areas.
	(2) Ecosystem and Biota	(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)?	N	(a) The project site doesn't encompass primeval forests, tropical rain forests, and ecologically valuable habitats.
		(b) Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions?	N	(b) Within the project site, there are no protected habitats of endangered species designated by Cambodia laws or international treaties and conventions.
		(c) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem?	N	(c) It is not anticipated to cause significant ecological impacts because there are no protected habitats in the area of the WTP site.
4. Social Environment	(3) Hydrology	(d) Is there a possibility that the amount of water (e.g., surface water, groundwater) used by the project will adversely affect aquatic environments, such as rivers? Are adequate measures taken to reduce the impacts on aquatic environments, such as aquatic organisms?	Y	(d) Raw water of 0.38 m ³ /s will be intaken from Bassac River, which is much less than low flow (40 m ³ /s) of the River. Therefore, the impacts of the project on aquatic environments of Bassac River are considered to be not significant. In addition, an approval letter has been obtained from Cambodia National Mekong Committee. PPWSA will prepare water supply plan during dry period in cooperation with MoE in order to ensure suitable environmental flow of Bassac River in the future.
		a) Is there a possibility that the amount of water used (e.g., surface water, groundwater) by the project will adversely affect surface water and groundwater flows?	N	(a) Compared with low flow (40 m ³ /s) of Bassac River, intake volume (33,000 m ³ /d or 0.38 m ³ /s) will not have significant impacts on surface water and groundwater flow. In addition, an approval letter has been obtained from Cambodia National Mekong Committee.
		a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement?	N	(a) Because the considerations for avoiding resettlement are made and the WTP will be constructed within existing WTP site of PPWSA, there is no resettlement caused by the project.
	(b) Is adequate explanation on compensation and resettlement given to affected people prior to resettlement?	N	(b) For the proposed project, no resettlement will take place.	

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		<p>(c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement?</p> <p>(d) Is the compensations going to be paid prior to the resettlement?</p> <p>(e) Is the compensation policies prepared in document?</p> <p>(f) Does the resettlement plan pay particular attention to vulnerable groups or people, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples?</p> <p>(g) Are agreements with the affected people obtained prior to resettlement?</p> <p>(h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan?</p> <p>(i) Are any plans developed to monitor the impacts of resettlement?</p> <p>(j) Is the grievance redress mechanism established?</p>	<p>N</p> <p>N</p> <p>N</p> <p>N</p> <p>N</p> <p>N</p> <p>N</p> <p>N</p> <p>N</p> <p>N</p>	<p>(c) For the proposed project, neither resettlement nor land acquisition will take place. Therefore, preparation of resettlement plan including compensation is not needed.</p> <p>(d) For the proposed project, neither resettlement nor land acquisition will take place. Therefore, no compensations will be necessary for the resettlement.</p> <p>(e) For the proposed project, neither resettlement nor land acquisition will take place. Therefore, preparation of compensation policies is not expected.</p> <p>(f) For the proposed project, there is no resettlement or land acquisition.</p> <p>(g) For the proposed project, there is no resettlement and land acquisition. Therefore, it is not necessary to get agreement with the affected people.</p> <p>(h) For the proposed project, there is no resettlement and land acquisition.</p> <p>(i) For the proposed project, alternative studies have been carried out to avoid resettlement. As the results, there is no resettlement or land acquisition will be required. Therefore, it is not necessary to monitor the impacts of resettlement.</p> <p>(j) For the proposed project, there is no resettlement or land acquisition. Thus, it is not necessary to establish grievance redress mechanism.</p>
	(2) Living and Livelihood	<p>(a) Is there a possibility that the project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impacts, if necessary?</p>	<p>N</p>	<p>(a) All proposed facilities will be located within the existing WTP site and will not affect the living environment of the land other than the construction site. The project is expected to improve the living environment as the water supply rate increases. Fishing activity is prohibited from July 1 to November 30 each year because this is the breeding season for all kinds of fish. Therefore, the impacts of the construction on fishing activity are not expected during this period. During fishing season, the construction of the WTP may create impacts on fishing activity. However, fishing activity can be conducted at upstream or downstream (500m or more) of intake construction site. Therefore, the impacts on fishing activity are low and mitigable</p>

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		(b) Is there a possibility that the amount of water used (e.g., surface water, groundwater) by the project will adversely affect the existing water uses and water area uses?	N	(a) Comparing with low flow (40 m ³ /s) of Bassac River, intake amount (33,000 m ³ /d or 0.38 m ³ /s) will not have significant impacts on the existing water uses and water area uses. In addition, an approval letter has been obtained from Cambodia National Mekong Committee.
	(3) Heritage	(a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?	N	(a) Ta Khmau WTP site is located within existing WTP site. Thus, the impact is considered to be negligible.
	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	N	(a) The WTP is located within the existing WTP site, and area is small (0.45 ha). In addition, tree planting will be conducted in the WTP.
	(5) Ethnic Minorities and Indigenous Peoples	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples? (b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources respected?	Y	(a) There is no ethnic minority or indigenous group in the project area. In addition, water service rate will be increased up to 100%.
		(a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project?	Y	(b) Ditto
	(6) Working Conditions	(b) Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety equipment which prevents industrial accidents, and management of hazardous materials? (c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.?	Y	(a) Cambodian laws and ordinances (such as Labor Law 1997 and amendment Law 2018, the Law on Social Security, Sub-Decree 11/16, on Health Care Scheme etc.) associated with working conditions (such as wage and hours of work etc.) will be followed by the project proponent during construction works and operation of the project based on Environmental Management Plan (EMP). (b) Safety considerations will be taken during construction works and operation of the project based on the EMP prepared (such as ear protection equipment must be provided to workers when a noise level exceeds 80 dB(A) in the WTP construction site or within pump station). In addition, inspections of PPWSA and other authorities on safety will be conducted. (c) Safety and health program and safety training for workers will be planned and implemented during construction works and operation of the project based on EMP prepared. (such as wearing safety shoes and elements during construction, following Standard Operation Procedures for the works during operation)

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
5. Others		(d) Are appropriate measures taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents?	Y	(d) Appropriate measures will be taken based on EMP prepared. (such as specific security guards will be assigned by contractor and PPWSA will conduct regular inspection during construction and operation)
		(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)?	Y	(a) Mitigation measures on utilization of local resources (fishing), water usage/water right, traffic control, poor households, accidents (such as safety plan preparation, O/M manual etc.), air pollution (such as covering trucks and spraying exposed areas with water etc.), water pollution, wastes (sludge reuse methods etc.), noise and vibrations (such as application of reasonable construction schedule and methods etc.) have been proposed.
	(1) Impacts during Construction	(b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts?	Y	(b) All construction works of Ta Khmau WTP will be carried out within the existing WTP site. Therefore, the impacts on the natural environment (ecosystem) will be very limited.
		(c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?	Y	(c) Before construction starts, information will be delivered to fisherman via commune and village chiefs in advance. A detailed traffic control plan will be prepared. In addition, proper construction schedule and methods to reduce traffic disruption and traffic accident. Education of staff/workers on the safety and fire will also be conducted to reduce impacts.
		(d) If the construction activities might cause traffic congestion, are adequate measures considered to reduce such impacts?	Y	(d) Proper construction plan of the WTP and traffic control plan will be prepared before construction,
		(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts?	Y	(a) Environmental monitoring program has been prepared in the IEIA report based on the recommendations from the JICA Survey Team.
	(2) Monitoring	(b) What are the items, methods and frequencies of the monitoring program?	Y	(b) The items, methods and frequencies of the monitoring program have been proposed and presented in Preparatory Survey Report. Basically, air quality (CO, NO ₂ , SO ₂ , O ₃ , Pb TSP PM ₁₀ and PM _{2.5}): time/6 months; basin water quality (pH, temperature, TDS, TSS, DO, BOD, COD, Oil and Grease, NO ₃ , T-N, T-P, As, Hg, Total Coliform etc. 17 parameters): time/two weeks, noise and vibration: time/6 months, traffic (along National Highway 102): regularly.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		<p>(c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)?</p> <p>(d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?</p>	Y	<p>(c) Monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework) has been prepared.</p> <p>(d) Monitoring format has been proposed.</p>
6 Note	Reference to Checklist of Other Sectors	(a) Where necessary, pertinent items described in the Dam and River Projects checklist should also be checked.	N	(a) Not necessary.
	Note on Using Environmental Checklist	(a) If necessary, the impacts to transboundary or global issues should be confirmed (e.g., the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	Y	(b) Not necessary.

資料 6.6 環境管理計画

環境管理計畫 (案)

Impacts	Mitigation Measures	Implementing Organization	Responsible Organization	Cost
Before / During Construction				
Traffic	<ol style="list-style-type: none"> 1) Prepare a detailed traffic control plan and to coordinate with local government. 2) Prepare proper construction schedule and methods to reduce traffic disruption and traffic accident. 3) Assign traffic control person at the entrance of the WTP while construction is taking place. 	Contractor	PPWSA	Included in the construction cost
Air Pollution	<ol style="list-style-type: none"> 1) Cover stored materials with plastic or other materials. 2) Cover trucks, and to spray exposed areas with water. 3) Wash vehicles before going out the construction site. 4) Minimize traffic over freshly exposed surfaces. 5) Install barrier walls for limiting wind dispersing if necessary. 6) Prepare air quality monitoring plan and carry out it during construction. 7) Update the Environmental Monitoring Plan during Detailed Design 	Contractor	PPWSA	2,000 USD/year (Included in the construction cost)
Waste	<ol style="list-style-type: none"> 1) Prepare reasonable plan for solid waste disposal, especially for excavated soil. 2) Install temporary toilet at the construction site for workers, and set sanitary bins for domestic wastes. 3) PPWSA has a plan to sell the surplus waste soil to buyer as backfilling materials. 4) Dispose solid wastes appropriately 	Contractor	PPWSA	Included in the construction cost
Noise	<ol style="list-style-type: none"> 1) Prepare a detailed plan for noise control and coordinate with local government. 2) Prepare proper construction schedule and methods. 3) Set speed limits for vehicles and train workers on mitigation measures for environmental impacts. 4) Use low noise level equipment, if necessary. 5) Prepare noise monitoring plan and carrying out monitoring during construction. 	Contractor	PPWSA	1,000 USD/year (Included in the construction cost)
Water Pollution	<ol style="list-style-type: none"> 1) The embankment will be constructed to prevent land erosion during the rainfall. 2) Carry out water quality monitoring. 3) Install wastewater treatment system within the WTP to treat domestic wastewater during construction and operation. 	Contractor	PPWSA	1,000 USD/year (Included in the construction cost)
During Operation				
Air quality	<ol style="list-style-type: none"> 1) Preparing air quality monitoring plan. 2) Implementation of air quality monitoring. 	Operator	PPWSA	1,000 USD/year (Included in the O&M cost)
Waste	<ol style="list-style-type: none"> 1) Monitoring on volume of sludge and solid wastes from the WTP. 2) Implementation of EMP for operation of the WTP. 	Operator	PPWSA	Included in the O&M cost
Water pollution	<ol style="list-style-type: none"> 1) Preparing water quality monitoring plan. 2) Implementation of water quality monitoring at downstream of the WTP. 	Operator	PPWSA	2,000 USD/year (Included in the O&M cost)

資料 6.7 各浄水場の月次生産量及び生産要素データ

(1) 2014 年の各浄水場の月次生産量及び生産要素データ

សរុបការប្រើប្រាស់វត្ថុធាតុដើម និងថាមពលអគ្គិសនីតាមរោងចក្រទាំងបួន
TOTAL OF RAW MAETRIAL AND POWER CONSUMPTION FOR THE FOURTH WTPS

Month	រោងចក្រស្រះស្រីព្រៃ Phum Prek WTP		រោងចក្រស្រះចេងជ្រាវ Chrouy Chang War WTP		រោងចក្រស្រះចមន Cham Car Morn WTP		រោងចក្រស្រះនិរោធ Niroth WTP		សរុប Total	
	150,000 m ³ /day		130,000 m ³ /day		20,000 m ³ /day		130,000 m ³ /day		430,000 m ³ /day	
	ទឹកស្រក់ M ³ Raw water	ទឹកស្រក់ M ³ Treated water	ទឹកស្រក់ M ³ Raw water	ទឹកស្រក់ M ³ Treated water	ទឹកស្រក់ M ³ Raw water	ទឹកស្រក់ M ³ Treated water	ទឹកស្រក់ M ³ Raw water	ទឹកស្រក់ M ³ Treated water	ទឹកស្រក់ M ³ Raw water	ទឹកស្រក់ M ³ Treated water
1	4,889,105	4,644,650	3,735,430	3,660,670	66,608	63,152	3,218,754	3,118,172	11,909,897	11,486,644
2	4,392,031	4,172,428	3,719,260	3,638,060	38,819	39,026	2,965,998	2,877,592	11,116,108	10,727,106
3	5,034,693	4,782,960	4,604,290	4,491,770	292,178	284,034	3,223,174	3,111,673	13,154,335	12,670,437
4	4,818,431	4,577,511	4,082,120	3,986,860	295,495	283,914	2,907,946	2,804,014	12,103,992	11,652,299
5	5,391,261	5,121,699	4,719,890	4,610,330	345,661	329,815	3,277,651	3,209,035	13,734,463	13,270,879
6	4,921,961	4,675,862	4,440,790	4,329,060	346,570	328,155	3,741,662	3,663,442	13,450,983	12,996,519
7	4,418,604	4,205,752	3,985,980	3,886,440	406,116	393,317	4,863,949	4,701,050	13,674,649	13,186,559
8	4,434,160	4,223,007	4,163,840	4,041,700	431,962	419,618	4,706,760	4,519,509	13,736,722	13,203,834
9	3,895,602	3,700,818	3,716,980	3,605,010	357,689	355,315	4,257,365	4,111,350	12,227,636	11,772,493
10	4,453,437	4,230,762	4,005,610	3,915,890	416,311	406,531	4,612,314	4,516,030	13,487,672	13,069,213
11	4,224,289	4,013,411	4,020,400	3,929,410	408,715	395,125	4,277,910	4,201,560	12,931,314	12,539,506
12	4,407,892	4,187,497	4,121,050	4,030,970	422,586	402,147	4,457,639	4,355,992	13,409,167	12,976,606
សរុប Total	55,281,466	52,536,357	49,315,640	48,126,170	3,828,710	3,700,149	46,511,122	45,189,419	154,936,938	149,552,095
មធ្យម AVG		4,378,030		4,010,514		308,346		3,765,785		12,462,675
អតិបរមា MAX		5,121,699		4,610,330		419,618		4,701,050		13,270,879

សរុបការប្រើប្រាស់វត្ថុធាតុដើម និងចរន្តអគ្គិសនីតាមរោងចក្រទាំងបួន
TOTAL OF RAW MAETRIAL AND POWER CONSUMPTION FOR THE FOURTH WTPS

Month	PAC		ស ធុជ្ឈរ Alum		ក ប រ ង ា Lime		ក្លរ ី វ រ Chlorine (Cl ₂)		ថ ម ព ល អ គ្គិ ស នី Electricity	
	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kwh)	(wh)
1	80,675	7.02	-	-	-	-	33,055	2.9	3,029,686	264
2	71,300	6.65	-	-	-	-	30,448	2.8	2,917,099	272
3	88,625	6.99	-	-	540.000	0.0	37,642	3.0	3,512,135	277
4	79,800	6.85	-	-	-	-	30,569	2.6	3,263,394	280
5	107,650	8.11	-	-	-	-	31,686	2.4	3,813,178	287
6	64,150	4.94	-	-	-	-	30,055	2.3	3,613,740	278
7	130,950	9.93	-	-	-	-	29,904	2.3	3,273,347	248
8	96,950	7.34	-	-	-	-	27,859	2.1	3,139,008	238
9	62,600	5.32	5,550	0.471	-	-	24,503	2.1	2,718,870	231
10	63,825	4.88	5,250	0.402	-	-	28,824	2.2	3,121,149	239
11	56,000	4.47	-	-	-	-	28,497	2.3	3,141,935	251
12	58,150	4.48	-	-	-	-	31,521	2.4	3,374,510	260
សរុបរួម Total	960,675	6.42	10,800	0.07	540.000	0.00	364,563	2.4	38,918,051	260.2
មធ្យម AVG	80,056	6.42	-	-	-	-	30,380	2.45	3,243,171	260
អតិបរមា MAX	130,950	9.93	-	-	-	-	37,642	2.97	3,813,178	287

ការប្រើប្រាស់វត្ថុធាតុដើម និងចរន្តអគ្គិសនីរោងចក្រភូមិព្រែក
RAW MAETRIAL AND POWER CONSUMPTION FOR PHUM PREK WTP

Month	PAC		ស ធុជ្ឈរ Alum		ក ប រ ង ា Lime		ក្លរ ី វ រ Chlorine (Cl ₂)		ថ ម ព ល អ គ្គិ ស នី Electricity	
	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kwh)	(wh)
1	43,200	9.3	-	-	-	-	14,620	3.1	1,203,019	259
2	41,600	10.0	-	-	-	-	13,557	3.2	1,121,864	269
3	60,000	12.5	-	-	-	-	17,418	3.6	1,308,693	274
4	63,200	13.8	-	-	-	-	15,139	3.3	1,299,120	284
5	90,800	17.7	-	-	-	-	14,610	2.9	1,519,066	297
6	31,200	6.7	-	-	-	-	12,914	2.8	1,340,299	287
7	48,000	11.4	-	-	-	-	9,053	2.2	1,053,787	251
8	30,400	7.2	-	-	-	-	7,839	1.9	1,010,989	239
9	17,600	4.8	-	-	-	-	8,290	2.2	854,827	231
10	19,200	4.5	-	-	-	-	9,199	2.2	1,008,397	238
11	20,000	5.0	-	-	-	-	9,188	2.3	996,430	248
12	22,400	5.3	-	-	-	-	10,164	2.4	1,086,757	260
សរុបរួម Total	487,600	9.28	-	-	-	-	141,991	2.70	13,803,248	263
មធ្យម AVG	40,633	9.02	-	-	-	-	11,833	2.67	1,150,271	261
អតិបរមា MAX	90,800	17.73	-	-	-	-	17,418	3.64	1,519,066	297

ការប្រើប្រាស់វត្ថុធាតុដើម និងចរន្តអគ្គិសនីរវាងចក្រប្រាយចម្រុះ
RAW MAETRIAL AND POWER CONSUMPTION FOR CHROY CHANG WA WTP

Month	PAC		ស ័ ច្រូ រ Alum		ក ប រ ា Lime		ក្លរ ី វ Chlorine (Cl ₂)		ថ ា ម ព ា ល អ គ្គិ ស នី Electricity	
	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kwh)	(wh)
1	11,575	3.2	-	-	-	-	6,530	1.8	968,230	264.5
2	7,000	1.9	-	-	-	-	6,670	1.8	1,002,380	275.5
3	6,500	1.4	-	-	-	-	7,850	1.7	1,263,690	281.3
4	5,500	1.4	-	-	-	-	7,210	1.8	1,112,930	279.1
5	9,050	2.0	-	-	-	-	8,730	1.9	1,319,140	286.1
6	17,075	3.9	-	-	-	-	8,250	1.9	1,208,130	279.1
7	36,000	9.3	-	-	-	-	8,600	2.2	973,750	250.6
8	28,225	7.0	-	-	-	-	8,670	2.1	974,030	241.0
9	19,100	5.3	-	-	-	-	7,180	2.0	836,640	232.1
10	17,650	4.5	-	-	-	-	7,400	1.9	934,090	238.5
11	13,950	3.6	-	-	-	-	7,490	1.9	976,960	248.6
12	12,150	3.0	-	-	-	-	7,330	1.8	1,035,270	256.8
សរុបរួម Total	183,775	3.82	-	-	-	-	91,910	1.91	12,605,240	262
មធ្យម AVG	15,315	3.87	-	-	-	-	7,659	1.91	1,050,437	261
អតិបរមា MAX	36,000	9.26	-	-	-	-	8,730	2.21	1,319,140	286

ការប្រើប្រាស់វត្ថុធាតុដើម និងថាមពលអគ្គិសនីរវាងច្រកចំការមន
RAW MAETRIAL AND POWER CONSUMPTION FOR CHAMCAR MORN WTP

Month	PAC		ស ័ ជ ្រ វ Alum		ក ប រ ោ Lime		ក្លរីន Chlorine (Cl ₂)		ថាមពលអគ្គិសនី Electricity	
	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kwh)	(wh)
1	400	6.3	-	-	-	-	137	2.2	24,150	382
2	200	5.1	-	-	-	-	113	2.9	16,350	419
3	1,875	6.6	-	-	-	-	765	2.7	88,270	311
4	1,725	6.1	-	-	-	-	588	2.1	88,546	312
5	1,800	5.5	-	-	-	-	650	2.0	103,802	315
6	3,000	9.1	-	-	-	-	598	1.8	102,196	311
7	5,200	13.2	-	-	-	-	661	1.7	112,600	286
8	4,325	10.3	-	-	-	-	703	1.7	115,940	276
9	900	2.5	5,550	15.6	-	-	645	1.8	97,685	275
10	975	2.4	5,250	12.9	-	-	891	2.2	112,337	276
11	2,300	5.8	-	-	-	-	872	2.2	113,128	286
12	2,600	6.5	-	-	-	-	901	2.2	119,144	296
សរុបរួម Total	25,300	6.84	10,800	2.9	-	-	7,524	2.03	1,094,148	296
មធ្យម AVG	2,108	6.62	-	-	-	-	627	2.12	91,179	312
អតិបរមា MAX	5,200	13.22	-	-	-	-	901	2.90	119,144	419

ការប្រើប្រាស់វត្ថុធាតុដើម និងចរន្តអគ្គិសនីរវាងចក្រសីបាធ
RAW MAETRIAL AND POWER CONSUMPTION FOR NIROTH WTP

Month	PAC		ស ័ ជ្ជ វ រ Alum		ក ប រ ោ Lime		ក្ល រ ី Chlorine (Cl ₂)		ថា ម ពា ល អ គ្គិ ស ី ន Electricity	
	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kwh)	(wh)
1	25,500	8.2	-	-	-	-	11,768	3.8	834,287	268
2	22,500	7.8	-	-	-	-	10,108	3.5	776,505	270
3	20,250	6.5	-	-	540	0.2	11,609	3.7	851,482	274
4	9,375	3.3	-	-	-	-	7,632	-	762,798	272
5	6,000	1.9	-	-	-	-	7,696	2.4	871,170	271
6	12,875	3.5	-	-	-	-	8,293	2.3	963,115	263
7	41,750	8.9	-	-	-	-	11,590	2.5	1,133,210	241
8	34,000	7.5	-	-	-	-	10,647	2.4	1,038,049	230
9	25,000	6.1	-	-	-	-	8,388	2.0	929,718	226
10	26,000	5.8	-	-	-	-	11,334	2.5	1,066,325	236
11	19,750	4.7	-	-	-	-	10,947	2.6	1,055,417	251
12	21,000	4.8	-	-	-	-	13,126	3.0	1,133,339	260
សរុប Total	264,000	5.84	-	-	540	0.01	123,138	2.72	11,415,415	253
មធ្យម AVG	22,000	5.75	-	-	-	-	10,262	2.56	951,285	255
អតិបរមា MAX	41,750	8.88	-	-	-	-	13,126	3.77	1,133,339	274

(2) 2015 年の各浄水場の月次生産量及び生産要素データ

សរុបការប្រើប្រាស់វត្ថុធាតុដើម និងចរន្តអគ្គិសនីតាមរោងចក្រទាំងបួន
TOTAL OF RAW MAETERIAL AND POWER CONSUMPTION FOR THE FOURTH WTPS

Month	រោងចក្រស្រីមព្រៃកែ Phum Prek WTP		រោងចក្រជួររំលេចដារ Chrouy Chang War WTP		រោងចក្រចករមន Cham Car Morn WTP		រោងចក្រនិរទេ Niroth WTP		សរុប Total	
	150,000 m ³ /day		130,000 m ³ /day		20,000 m ³ /day		130,000 m ³ /day		430,000 m ³ /day	
	ទឹកល្អិត M ³ Raw water	ទឹកស្អាត M ³ Treated water	ទឹកល្អិត M ³ Raw water	ទឹកស្អាត M ³ Treated water	ទឹកល្អិត M ³ Raw water	ទឹកស្អាត M ³ Treated water	ទឹកល្អិត M ³ Raw water	ទឹកស្អាត M ³ Treated water	ទឹកល្អិត M ³ Raw water	ទឹកស្អាត M ³ Treated water
1	4,249,549	4,037,072	4,271,650	4,164,180	427,459	408,034	4,320,213	4,239,902	13,268,871	12,849,188
2	4,134,854	3,928,111	3,747,480	3,678,720	382,936	369,722	3,950,521	3,853,475	12,215,791	11,830,028
3	4,733,305	4,496,638	4,447,870	4,358,080	426,838	415,813	4,811,165	4,683,329	14,419,178	13,953,860
4	4,157,193	3,949,334	4,080,600	3,998,580	370,176	360,630	4,281,749	4,172,015	12,889,718	12,480,559
5	4,871,906	4,628,310	4,666,360	4,573,290	457,182	436,693	4,845,710	4,747,404	14,841,158	14,385,697
6	4,707,758	4,472,370	4,734,240	4,657,460	396,870	376,092	4,541,140	4,437,350	14,380,008	13,943,272
7	5,047,070	4,794,719	4,707,280	4,585,810	404,895	384,074	4,709,739	4,548,199	14,868,984	14,312,802
8	5,217,167	4,956,310	4,589,690	4,444,820	390,770	369,121	4,635,860	4,408,290	14,833,487	14,178,541
9	4,985,729	4,736,440	4,536,880	4,375,370	393,515	372,926	4,629,869	4,353,620	14,545,993	13,838,356
10	4,773,497	4,534,821	4,318,410	4,188,560	355,160	335,940	4,325,580	4,151,679	13,772,647	13,211,000
11	4,862,419	4,619,297	4,643,070	4,472,360	345,162	326,649	4,385,439	4,268,500	14,236,090	13,686,806
12	4,915,921	4,670,123	4,910,650	4,796,890	370,982	354,409	4,828,040	4,657,569	15,025,593	14,478,991
សរុប Total	56,656,368	53,823,545	53,654,180	52,294,120	4,721,945	4,510,103	54,265,025	52,521,332	169,297,518	163,149,100
មធ្យម AVG		4,485,295		4,357,843		375,842		4,376,778		13,595,758
អតិបរមា MAX		4,956,310		4,796,890		436,693		4,747,404		14,478,991

សរុបការប្រើប្រាស់វត្ថុធាតុដើម និងចរន្តអគ្គិសនីតាមរោងចក្រទាំងបួន
TOTAL OF RAW MAETRIAL AND POWER CONSUMPTION FOR THE FOURTH WTPS

Month	PAC		ក្លរីន Chlorine (Cl ₂)		ថាមពលអគ្គិសនី Electricity	
	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kwh)	(wh)
1	64,125	4.99	33,927	2.64	3,418,630	266
2	68,575	5.80	34,034	2.88	3,207,459	271
3	68,750	4.93	39,477	2.83	3,769,991	270
4	38,050	3.05	28,602	2.29	3,271,907	262
5	40,150	2.79	33,108	2.30	3,882,382	270
6	48,275	3.46	33,235	2.38	3,663,044	263
7	119,525	8.35	35,063	2.45	3,695,201	258
8	123,975	8.74	31,467	2.22	3,408,921	240
9	106,825	7.72	28,843	2.08	3,270,833	236
10	86,825	6.57	28,012	2.12	3,068,444	232
11	97,275	7.11	33,309	2.43	3,420,200	250
12	104,925	7.25	37,717	2.60	3,795,937	262
សរុបរួម Total	967,275	5.93	396,794	2.43	41,872,949	257
មធ្យម AVG	80,606	5.90	33,066	2.44	3,489,412	257
អតិបរមា MAX	123,975	8.74	39,477	2.88	3,882,382	271

ការប្រើប្រាស់វត្ថុធាតុដើម និងចរន្តអគ្គិសនី រោងចក្រភូមិព្រែក
RAW MAETRIAL AND POWER CONSUMPTION FOR PHUM PREK WTP

Month	PAC		ក្លរីន Chlorine (Cl ₂)		ថាមពលអគ្គិសនី Electricity	
	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kwh)	(wh)
1	28,800	7.1	11,731	2.9	1,068,380	264.6
2	40,800	10.4	14,389	3.7	1,060,344	269.9
3	33,600	7.5	17,872	4.0	1,231,169	273.8
4	11,200	2.8	12,148	3.1	1,051,815	266.3
5	10,400	2.2	12,824	2.8	1,259,000	272.0
6	12,800	2.9	13,328	3.0	1,195,069	267.2
7	29,600	6.2	15,679	3.3	1,256,664	262.1
8	36,800	7.4	12,507	2.5	1,200,456	242.2
9	28,800	6.1	10,576	2.2	1,126,201	237.8
10	19,600	4.3	10,170	2.2	1,039,598	229.2
11	34,400	7.4	11,156	2.4	1,151,105	249.2
12	43,200	9.3	13,078	2.8	1,235,297	264.5
សរុប Total	330,000	6.13	155,458	2.89	13,875,098	258
មធ្យម AVG	27,500	6.14	12,955	2.90	1,156,258	258
អតិបរមា MAX	43,200	10.39	17,872	3.97	1,259,000	274

ការប្រើប្រាស់វត្ថុធាតុដើម និងថាមពលអគ្គិសនីរវាងចក្រជ្រោយចង្វារ
RAW MAETRIAL AND POWER CONSUMPTION FOR CHROY CHANG WA WTP

Month	PAC		ក្លរ រ Chlorine (Cl ₂)		ថាមពលអគ្គិសនី Electricity	
	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kwh)	(wh)
1	8,700	2.1	7,640	1.8	1,105,890	265.6
2	7,100	1.9	7,460	2.0	1,005,360	273.3
3	8,300	1.9	8,940	2.1	1,195,950	274.4
4	6,900	1.7	7,600	1.9	1,071,010	267.8
5	8,700	1.9	9,110	2.0	1,295,500	283.3
6	12,200	2.6	9,320	2.0	1,274,660	273.7
7	46,400	10.1	9,090	2.0	1,221,790	266.4
8	39,500	8.9	8,880	2.0	1,098,470	247.1
9	32,000	7.3	8,410	1.9	1,057,360	241.7
10	27,150	6.5	8,020	1.9	1,009,180	240.9
11	24,550	5.5	8,700	1.9	1,158,960	259.1
12	12,050	2.5	9,490	2.0	1,305,280	272.1
សរុប Total	233,550	4.47	102,660	1.96	13,799,410	264
មធ្យម AVG	19,463	4.41	8,555	1.96	1,149,951	264
អតិបរមា MAX	46,400	10.12	9,490	2.05	1,305,280	283

ការប្រើប្រាស់វត្ថុធាតុដើម និងចរន្តអគ្គិសនីរោងចក្រចំការមន
RAW MAETRIAL AND POWER CONSUMPTION FOR CHAMCAR MORN WTP

Month	PAC		ក្លរីន Chlorine (Cl ₂)		ថាមពលអគ្គិសនី Electricity	
	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kwh)	(wh)
1	3,000	7.4	869	2.1	122,206	299.5
2	2,675	7.2	741	2.0	111,685	302.1
3	2,850	6.9	802	1.9	124,342	299.0
4	1,950	5.4	636	1.8	107,342	298
5	2,300	5.3	858	2.0	130,062	297.8
6	3,025	8.0	759	2.0	110,475	293.7
7	6,150	16.0	753	2.0	111,722	290.9
8	7,675	20.8	710	1.9	103,970	281.7
9	7,775	20.8	665	1.8	103,922	278.7
10	5,200	15.5	625	1.9	93,886	279.5
11	3,450	10.6	655	2.0	93,690	286.8
12	4,525	12.8	706	2.0	103,085	290.9
សរុបរួម Total	50,575	11.21	8,779	1.9	1,316,387	291.9
មធ្យម AVG	4,215	11.39	732	1.94	109,699	292
អតិបរមា MAX	7,775	20.85	869	2.13	130,062	302

ការប្រើប្រាស់វត្ថុធាតុដើម និងចរន្តអគ្គិសនីរោងចក្រនីរោធ
RAW MAETRIAL AND POWER CONSUMPTION FOR NIROTH WTP

Month	PAC		ក្លរីន Chlorine (Cl ₂)		ថាមពលអគ្គិសនី Electricity	
	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kwh)	(wh)
1	23,625	5.6	13,687	3.2	1,122,154	264.7
2	18,000	4.7	11,444	3.0	1,030,070	267.3
3	24,000	5.1	11,863	2.5	1,218,530	260.2
4	18,000	4.3	8,218	2.0	1,041,740	249.7
5	18,750	3.9	10,316	2.2	1,197,820	252.3
6	20,250	4.6	9,828	2.2	1,082,840	244.0
7	37,375	8.2	9,541	2.1	1,105,025	243.0
8	40,000	9.1	9,370	2.1	1,006,025	228.2
9	38,250	8.8	9,192	2.1	983,350	225.9
10	34,875	8.4	9,197	2.2	925,780	223.0
11	34,875	8.2	12,798	3.0	1,016,445	238.1
12	45,150	9.7	14,443	3.1	1,152,275	247.4
សរុប Total	353,150	6.72	129,897	2.47	12,882,054	245
មធ្យម AVG	29,429	6.71	10,825	2.48	1,073,505	245
អតិបរមា MAX	45,150	9.69	14,443	3.23	1,218,530	267

(3) 2016 年の各浄水場の月次生産量及び生産要素データ

សរុបការប្រើប្រាស់វត្ថុធាតុដើម និងថាមពលអគ្គិសនីតាមរោងចក្រទាំងបួន
TOTAL OF RAW MAETERIAL AND POWER CONSUMPTION FOR THE FOURTH WTPS

Month	រោងចក្រស្រីមណ្ឌកែ Phum Prek WTP		រោងចក្រជួរវិញចង្វារ Chrouy Chang War WTP		រោងចក្រចករមន Cham Car Morn WTP		រោងចក្រនិរទេ Niroth WTP		សរុប Total	
	150,000 m ³ /day		130,000 m ³ /day		20,000 m ³ /day		260,000 m ³ /day		560,000 m ³ /day	
	ទឹកស្រក់ M ³ Raw water	ទឹកស្អាត M ³ Treated water	ទឹកស្រក់ M ³ Raw water	ទឹកស្អាត M ³ Treated water	ទឹកស្រក់ M ³ Raw water	ទឹកស្អាត M ³ Treated water	ទឹកស្រក់ M ³ Raw water	ទឹកស្អាត M ³ Treated water	ទឹកស្រក់ M ³ Raw water	ទឹកស្អាត M ³ Treated water
1	5,070,463	4,816,940	4,776,660	4,670,860	354,703	333,174	4,897,659	4,733,190	15,099,485	14,554,164
2	4,735,286	4,498,520	4,474,850	4,372,600	284,498	267,053	4,542,620	4,382,719	14,037,254	13,520,892
3	5,274,968	5,011,220	5,166,900	5,027,120	372,596	354,283	4,989,929	4,821,820	15,804,393	15,214,443
4	5,015,430	4,763,707	4,860,280	4,709,020	310,529	296,255	4,498,920	4,366,859	14,685,159	14,135,841
5	5,603,398	5,323,227	5,207,500	5,107,090	467,425	447,421	5,005,859	4,906,040	16,284,182	15,783,778
6	5,158,940	4,900,993	4,939,790	4,840,520	463,819	438,368	4,821,770	4,732,549	15,384,319	14,912,430
7	5,526,306	5,249,990	5,065,190	4,960,680	426,861	399,976	-	4,707,890	11,018,357	15,318,536
8	5,684,534	5,400,305	5,025,320	4,918,050	410,648	385,772	5,049,730	4,825,070	16,170,232	15,529,197
9	5,304,177	5,038,966	4,754,510	4,651,530	383,813	358,413	4,643,849	4,429,690	15,086,349	14,478,599
10	5,323,036	5,056,887	4,573,490	4,441,100	294,951	275,451	5,042,380	4,948,720	15,233,857	14,722,158
11	5,229,221	4,967,760	4,339,139	4,191,190	143,236	135,539	5,644,200	5,495,420	15,355,796	14,789,909
12	5,221,021	4,959,970	4,461,810	4,319,360	156,643	147,922	5,954,230	5,846,840	15,793,704	15,274,092
សរុបរួម Total Year	63,146,780	59,988,485	57,645,439	56,209,120	4,069,722	3,839,627	55,091,146	58,196,807	179,953,087	178,234,039
មធ្យម AVG		4,999,040		4,684,093		319,969		4,849,734		14,852,837
អតិបរមា MAX		5,400,305		5,107,090		447,421		5,846,840		15,783,778

សរុបការប្រើប្រាស់វត្ថុធាតុដើម និងចរន្តអគ្គិសនីតាមរោងចក្រទាំងបួន
TOTAL OF RAW MAETERIAL AND POWER CONSUMPTION FOR THE FOURTH WTPS

Month	PAC		ក្លរីន Chlorine		ក្លរីន រំលាយ Sodium Hypochlorite Solution			ថាមពលអគ្គិសនី Electricity	
	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (L)	ឯកត (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)
1	135,650	9.32	38,068	2.62	-	-	-	3,847,847	264
2	123,600	9.14	35,099	2.60	-	-	-	3,596,639	266
3	77,425	5.09	38,602	2.54	-	-	-	4,046,540	266
4	36,400	2.58	32,533	2.30	-	-	-	3,619,563	256
5	32,575	2.06	36,689	2.32	-	-	-	4,082,603	259
6	63,650	4.27	33,393	2.24	-	-	-	3,887,880	261
7	163,725	10.69	28,861	1.88	41,800	992.35	0.06	3,902,148	255
8	129,750	8.36	22,033	1.42	57,750	1498.04	0.10	3,924,127	253
9	125,900	8.70	19,754	1.36	55,500	1358.40	0.38	3,522,991	243
10	107,550	7.31	27,960	1.90	23,000	475.56	0.03	3,531,386	240
11	110,575	7.48	30,928	2.09	6,000	205.23	0.01	3,709,943	251
12	127,150	8.32	25,012	1.64	65,500	1,876.22	0.12	4,041,298	265
សរុប Total Year	1,233,950	6.92	368,932	2.07	249,550	6,405.81	0.11	45,712,965	256
មធ្យម AVG	102,829	6.94	30,744	2.08	20,796	534	0.06	3,809,414	256
អតិបរមា MAX	163,725	10.69	38,602	2.62	65,500	1,876	0	4,082,603	266

ការប្រើប្រាស់វត្ថុធាតុដើម និងថាមពលគ្រឹះស្ថានសីហនុងចក្រភូមិព្រៃក
RAW MAERIAL AND POWER CONSUMPTION FOR PHUM PREK
WTP

Month	PAC		ក្លរីន Chlorine		ក្លរីន រំលាយ Sodium Hypochlorite Solution			ថាមពលអគ្គិសនី Electricity	
	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (L)	ឯកត (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)
1	72,800	15.1	15,150	3.1	-	-	-	1,254,306	260.4
2	76,000	16.9	16,656	3.7	-	-	-	1,165,706	259.1
3	33,200	6.6	18,692	3.7	-	-	-	1,302,116	259.8
4	8,400	1.8	15,069	3.2	-	-	-	1,174,477	246.5
5	6,800	1.3	15,896	3.0	-	-	-	1,347,116	253.1
6	12,400	2.5	13,374	2.7	-	-	-	1,262,949	257.7
7	56,000	10.7	7,262	1.4	41,800	992.3	0.19	1,329,291	253.2
8	48,000	8.9	1,160	0.2	57,750	1,498.0	0.28	1,382,944	256.1
9	44,800	8.9	0.00	0.00	55,500	1,358.4	0.27	1,221,715	242.5
10	33,600	6.6	6,952	1.4	23,000	475.6	0.09	1,180,206	233.4
11	38,400	7.7	8,700	1.8	6,000	205.2	0.04	1,190,133	239.6
12	41,600	8.4	0.00	0.00	65,500	1,876.2	0.38	1,312,464	264.6
សរុប Total Year	472,000	7.87	118,911	1.98	249,550.0	6,405.8	0.11	15,123,423	252
មធ្យម AVG	39,333	7.95	9,909	2.02	20,795.8	533.8	0.10	1,260,285	252
អតិបរមា MAX	76,000	16.89	18,692	3.73	65,500.0	1,876.2	0.38	1,382,944	265

ការប្រើប្រាស់វត្ថុធាតុដើម និងថាមពលអគ្គិសនីរោងចក្រជ្រោយចង្វារ
RAW MAETRIAL AND POWER CONSUMPTION FOR CHROY CHANG WA WTP

Month	PAC		ក្លរីន Chlorine (Cl ₂)		ថាមពលអគ្គិសនី Electricity	
	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kwh)	(wh)
1	11,050	2.4	9,130	2.0	1,302,530	278.9
2	8,800	2.0	8,530	2.0	1,247,780	285.4
3	9,600	1.9	9,900	2.0	1,431,910	284.8
4	8,400	1.8	9,350	2.0	1,301,960	276.5
5	8,700	1.7	10,040	2.0	1,425,080	279.0
6	28,100	5.8	9,210	1.9	1,358,010	280.6
7	52,450	10.6	9,520	1.9	1,338,070	269.7
8	38,600	7.8	9,540	1.9	1,295,420	263.4
9	34,050	7.3	9,090	2.0	1,172,700	252.1
10	33,250	7.5	8,670	2.0	1,108,450	249.6
11	24,550	5.9	8,680	2.1	1,073,720	256.2
12	25,250	5.8	8,840	2.0	1,163,720	269.4
សរុបរួម Total Year	282,800	5.03	110,500	1.97	15,219,350	270.8
មធ្យម AVG	23,567	5.04	9,208	1.97	1,268,279	
អតិបរមា MAX	52,450	10.57	10,040	2.07	1,431,910	

ការប្រើប្រាស់វត្ថុធាតុដើម និងចរន្តអគ្គិសនីរោងចក្រចំការមន
RAW MAETRIAL AND POWER CONSUMPTION FOR CHAMCAR MORN WTP

Month	PAC		ក្លរីន Chlorine (Cl ₂)		ថាមពលអគ្គិសនី Electricity	
	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kwh)	(wh)
1	4,300	12.9	712	2.1	98,696	296.2
2	4,050	15.2	532	2.0	79,878	299.1
3	3,000	8.5	693	2.0	105,644	298.2
4	1,100	3.7	582	2.0	87,893	297
5	1,700	3.8	909	2.0	132,800	296.8
6	3,275	7.5	897	2.0	131,205	299.3
7	7,400	18.5	806	2.0	117,513	293.8
8	5,150	13.3	764	2.0	109,423	283.6
9	5,175	14.4	705	2.0	99,836	278.6
10	2,475	9.0	595	2.2	77,720	282.2
11	1,250	9.2	372	2.7	40,440	298.4
12	1,300	8.8	447	3.0	44,524	301.0
សរុបរួម Total Year	40,175	10.5	8,014	2.09	1,125,572	293.1
មធ្យម AVG	3,348	10.40	668	2.17	93,798	293.65
អតិបរមា MAX	7,400	18.50	909	3.02	132,800	301.00

ការប្រើប្រាស់វត្ថុធាតុដើម និងចរន្តអគ្គិសនីរោងចក្រសីហាជ
RAW MAETRIAL AND POWER CONSUMPTION FOR NIROTH
WTP

Month	PAC		ក្លរីន Chlorine (Cl ₂)		ថាមពលអគ្គិសនី Electricity	
	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kwh)	(wh)
1	47,500	10.0	13,076	2.8	1,192,315	251.9
2	34,750	7.9	9,381	2.1	1,103,275	251.7
3	31,625	6.6	9,317	1.9	1,206,870	250.3
4	18,500	4.2	7,532	1.7	1,055,233	241.6
5	15,375	3.1	9,844	2.0	1,177,607	240.0
6	19,875	4.2	9,912	2.1	1,135,716	240.0
7	47,875	10.2	11,273	2.4	1,117,274	237.3
8	38,000	7.9	10,569	2.2	1,136,340	235.5
9	41,875	9.5	9,959	2.2	1,028,740	232.2
10	38,225	7.7	11,743	2.4	1,165,010	235.4
11	46,375	8.4	13,176	2.4	1,405,650	255.8
12	59,000	10.1	15,725	2.7	1,520,590	260.1
សរុបរួម Total Year	438,975	7.5	131,507	2.26	14,244,620	245
មធ្យម AVG	36,581	7.5	10,959	2.25	1,187,052	244
អតិបរមា MAX	59,000	10.2	15,725	2.76	1,520,590	260

(4) 2017 年の各浄水場の月次生産量及び生産要素データ

ផលិតកម្មទឹកស្អាតសរុបតាមរោងចក្រ
TOTAL PRODUCTION FOR EACH WTPS

Month	រោងចក្រស្រែងជ្រក Phum Prek WTP (150,000m3/day)		រោងចក្រច្រូងច្រាម Chrouy Chang War WTP (130,000m3/day)		រោងចក្រចំការមន Cham Car Morn WTP		រោងចក្រ នីរ៉ូត Niroth WTP		សរុប Total	
	150,000 m3/day		130,000 m3/day		20,000 m3/day		260,000 m3/day		560,000 m3/day	
	ទឹកស្រក់ MP Raw water	ទឹកស្អាត MP Treated water	ទឹកស្រក់ MP Raw water	ទឹកស្អាត MP Treated water	ទឹកស្រក់ MP Raw water	ទឹកស្អាត MP Treated water	ទឹកស្រក់ MP Raw water	ទឹកស្អាត MP Treated water	ទឹកស្រក់ MP Raw water	ទឹកស្អាត MP Treated water
1	5,107,620	4,852,239	4,432,320	4,225,900	180,267	169,588	6,138,570	5,989,039	15,858,777	15,236,766
2	4,697,249	4,462,387	4,142,060	4,025,740	398,309	381,343	5,458,579	5,352,040	14,696,197	14,221,510
3	5,200,286	4,940,272	4,620,870	4,503,470	420,195	402,685	6,758,649	6,589,629	17,000,000	16,436,056
4	4,602,424	4,372,303	4,004,280	3,875,280	330,434	314,794	6,304,700	6,167,740	15,241,838	14,730,117
5	5,285,421	5,021,150	4,383,900	4,231,449	295,158	279,779	7,165,579	6,953,759	17,130,058	16,486,137
6	5,010,717	4,760,181	4,652,030	4,491,510	184,206	174,900	7,097,259	6,840,929	16,944,212	16,267,520
7	4,980,234	4,731,222	4,891,440	4,727,438	188,458	171,940	7,669,940	7,370,240	17,730,072	17,000,840
8	4,999,848	4,749,856	4,761,290	4,619,120	104,235	98,561	8,061,879	7,778,959	17,927,252	17,246,496
9	4,516,125	4,290,319	4,378,300	4,241,920	-	-	7,362,769	7,117,509	16,257,194	15,649,748
10	4,965,708	4,717,423	4,522,650	4,377,800	-	-	8,683,150	8,422,699	18,171,508	17,517,922
11	4,776,216	4,537,407	4,414,480	4,280,520	-	-	7,851,608	7,661,319	17,042,304	16,479,246
12	4,891,574	4,646,995	4,424,120	4,305,000	-	-	8,043,170	7,813,480	17,358,864	16,765,475
សរុប Total	59,033,421	56,081,754	53,627,740	51,905,147	2,101,262	1,993,590	86,595,852	84,057,342	201,358,275	194,037,833
មធ្យម AVG		4,673,480		4,325,429		166,133		7,004,779		16,169,819
អតិបរមា MAX		5,021,150		4,727,438		402,685		8,422,699		17,517,922

សរុបការប្រើប្រាស់វត្ថុធាតុដើម និងថាមពលអគ្គិសនីតាមរោងចក្រទាំងបួន
TOTAL OF RAW MAETERIAL AND POWER CONSUMPTION FOR THE FOURTH WTPS

PAC		ក្របខ្សែ Lime		ក្រប Chlorine		អំបិល Salt	ក្រប រ៉ែក Sodium Hypochlorite Solution			ថាមពលអគ្គិសនី Electricity	
គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	គិតជា (L)	ឯកត (Kg)	ឯកត (g)	គិតជា (Kwh)	(wh)
130,125	8.54	600	0.10	27,982	1.84	64,150	2,200,810	15,405.67	3.17	4,177,576	274
126,800	8.92			26,264	1.85	32,000	1,739,213	12,174.49	2.73	3,969,267	279
112,850	6.87			24,394	1.48	50,000	2,171,242	15,198.69	3.08	4,721,093	287
75,250	5.11			19,926	1.35	45,000	2,117,788	14,824.52	3.39	4,219,971	286
81,500	4.94			22,704	1.38	34,500	1,996,100	13,972.70	2.78	4,788,070	290
183,750	11.30			26,358	1.62	41,750	1,906,834	400.58	0.08	4,560,773	280
191,525	11.27			29,947	1.76	35,000	1,451,753	10,162.27	2.15	4,580,759	269
168,525	9.77			28,851	1.67	25,750	1,379,226	9,654.58	2.03	4,487,384	260
128,550	8.21			24,495	1.57	28,500	1,258,801	8,472.46	1.97	4,009,688	256
122,725	7.01			30,077	1.72	31,000	1,353,687	9,219.67	1.95	4,712,887	269
108,850	6.61			32,725	1.99	37,375	1,525,594	10,679.16	2.35	4,659,482	283
110,575	6.60			31,398	1.87	54,250	1,960,947	13,726.63	2.95	4,819,874	287
1,541,025	7.94	600	0.10	325,121	1.68	479,275	21,061,995	133,891.42	2.39	53,706,824	277
128,419	7.93			27,093	1.67	39,940	1,755,166	11,158	2.39	4,475,569	277
183,750	11.30			27,982	1.85	64,150	2,200,810	15,405.67	3.39	4,788,070	290

ការប្រើប្រាស់វត្ថុធាតុដើម និងចរន្តអគ្គិសនីរវាងច្បារភូមិព្រែក
RAW MAETRIAL AND POWER CONSUMPTION FOR PHUM PREK
WTP

Month	PAC		ក្លរីន Chlorine		អំបិល Salt	ក្លរីន រំទិក Sodium Hypochlorite Solution			ថាមពលអគ្គិសនី Electricity	
	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	គិតជា (L)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kwh)	(wh)
1	52,000	10.72	-	-	64,150	2,200,810	15,406	3.17	1,376,962	284
2	64,000	14.34	2,026	0.45	32,000	1,739,213	12,174	2.73	1,265,369	284
3	68,800	13.93	624	0.13	50,000	2,171,242	15,199	3.08	1,414,888	286
4	39,200	8.97	-	-	45,000	2,117,788	14,825	3.39	1,230,482	281
5	26,000	5.18	258	0.05	34,500	1,996,100	13,973	2.78	1,410,391	281
6	54,400	11.43	277	0.06	41,750	1,906,834	401	0.08	1,307,576	275
7	52,800	11.16	1,726	0.36	35,000	1,451,753	10,162	2.15	1,256,282	266
8	43,200	9.10	995	0.21	25,750	1,379,226	9,655	2.03	1,274,984	268
9	28,800	6.71	-	-	28,500	1,258,801	8,472	1.97	1,128,638	263
10	24,800	5.26	291	0.06	31,000	1,353,687	9,220	1.95	1,292,187	274
11	26,400	5.82	1,979	0.44	37,375	1,525,594	10,679	2.35	1,267,362	279
12	30,000	6.46	-	-	54,250	1,960,947	13,727	2.95	1,296,895	279
សរុប Total	510,400	9.10	8,176	0.15	479,275	21,061,995	133,891	2.39	15,522,016	277
មធ្យម AVG	50,733	10.76	531	0.11	44,567	1,755,166	11,996.11	2.54	1,334,278	282
អតិបរមា MAX	68,800	14.34	2,026	0.45	64,150	2,200,810	15,405.67	3.39	1,414,888	286

ការប្រើប្រាស់វត្ថុធាតុដើម និងចរន្តអគ្គិសនីរវាងចក្រប្រោសចម្ការ
RAW MAETRIAL AND POWER CONSUMPTION FOR CHROY CHANG WA WTP

Month	PAC		ក្លរីន Chlorine (Cl ₂)		ថាមពលអគ្គិសនី Electricity	
	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kwh)	(wh)
1	14,250	3.37	9,370	2.22	1,168,470	277
2	6,800	1.69	8,630	2.14	1,119,830	278
3	5,800	1.29	9,680	2.15	1,297,960	288
4	5,750	1.48	8,560	2.21	1,122,960	290
5	14,450	3.41	9,180	2.17	1,268,900	300
6	47,800	10.64	10,000	2.23	1,261,610	281
7	49,050	10.38	10,400	2.20	1,271,310	269
8	40,700	8.81	10,340	2.24	1,178,540	255
9	27,250	6.42	9,560	2.25	1,066,940	252
10	29,600	6.76	9,890	2.26	1,135,690	259
11	23,800	5.56	9,830	2.30	1,136,250	265
12	17,850	4.15	9,960	2.31	1,189,350	276
សរុបរួម Total	283,100	5.45	115,400	2.22	14,217,810	274
មធ្យម AVG	15,808	5.33	9,617	2.22	1,184,818	274
អតិបរមា MAX	47,800	10.64	10,400	2.31	1,297,960	300

ការប្រើប្រាស់វត្ថុធាតុដើម និងចរន្តអគ្គិសនីរោងចក្រចំការមន
RAW MAETRIAL AND POWER CONSUMPTION FOR CHAMCAR MON
WTP

Month	PAC		ក្លរីន Chlorine		ថាមពលអគ្គិសនី Electricity		
	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kwh)	(wh)	
1	1,750	10.32	549	3.24	50,284	297	
2	4,375	11.47	1,069	2.80	111,158	291	
3	4,125	10.24	1,061	2.63	119,215	296	
4	2,550	8.10	782	2.48	94,039	299	
5	2,675	9.56	636	2.27	83,869	300	
6	3,425	19.58	409	2.34	52,067	298	
7	4,425	25.74	523	3.04	51,417	299	
8	1,625	16.49	262	2.66	29,270	297	
9	ផ្អាកដំណើរការផលិត						
10							
11							
12							
សរុបរួម Total	24,950	12.52	5,291	2.65	591,319	297	
មធ្យម AVG	3,119	13.94	661	2.68	73,915	297	
អតិបរមា MAX	4,425	25.74	1,069	3.24	119,215	300	

ការប្រើប្រាស់វត្ថុធាតុដើម និងចរន្តអគ្គិសនីរវាងចក្រសីតាង
RAW MAETRIAL AND POWER CONSUMPTION FOR NIROTH
WTP

Month	PAC		កំបោស Lime		ក្លរីន Chlorine		ថាមពលអគ្គិសនី Electricity	
	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kwh)	(wh)
1	62,125	10.37	600	0.10	18,063	3.02	1,581,860	264
2	51,625	9.65			14,539	2.72	1,472,910	275
3	34,125	5.18			13,029	1.98	1,889,030	287
4	27,750	4.50			10,584	1.72	1,772,490	287
5	38,375	5.52			12,630	1.82	2,024,910	291
6	78,125	11.42			15,672	2.29	1,939,520	284
7	85,250	11.57			17,298	2.35	2,001,750	272
8	83,000	10.67			17,254	2.22	2,004,590	258
9	72,500	10.19			14,935	2.10	1,814,110	255
10	68,325	8.11			19,896	2.36	2,285,010	271
11	58,650	7.66			20,916	2.73	2,255,870	294
12	62,725	8.03			21,438	2.74	2,333,629	299
សរុបរួម Total	722,575	8.60	600	0.10	196,254	2.33	23,375,679	278
មធ្យម AVG	60,215	8.57			16,355	2.34	1,947,973	278
អតិបរមា MAX	85,250	11.57			21,438	3.02	2,333,629	299

(5) 2018 年の各浄水場の月次生産量及び生産要素データ

ផលិតកម្មទឹកស្អាតសរុបតាមរោងចក្រ
TOTAL PRODUCTION FOR EACH WTPS

Month	រោងចក្រផ្សារព្រៃ Phum Prek WTP (150,000m3/day)		រោងចក្របឹងចាស់ Chrouy Chang War WTP (130,000m3/day)		រោងចក្រចំការម័រ Cham Car Morn WTP		រោងចក្រ និរត្ត Niroth WTP		សរុប Total	
	150,000 m3/day		130,000 m3/day		20,000 m3/day		260,000 m3/day		560,000 m3/day	
	ទឹកស្រក់ M³ Raw water	ទឹកស្អាត M³ Treated water	ទឹកស្រក់ M³ Raw water	ទឹកស្អាត M³ Treated water	ទឹកស្រក់ M³ Raw water	ទឹកស្អាត M³ Treated water	ទឹកស្រក់ M³ Raw water	ទឹកស្អាត M³ Treated water	ទឹកស្រក់ M³ Raw water	ទឹកស្អាត M³ Treated water
1	5,250,093	5,000,088	4,524,040	4,407,600	-	-	7,775,098	7,595,949	17,549,231	17,003,637
2	4,717,122	4,481,266	4,174,400	4,055,270	-	-	6,685,140	6,491,999	15,576,662	15,028,535
3	5,439,983	5,167,984	5,110,750	4,980,660	-	-	7,487,630	7,295,220	18,038,363	17,443,864
4	4,917,283	4,671,419	4,907,240	4,781,270	-	-	7,094,378	6,908,009	16,918,901	16,360,698
5	5,318,096	5,052,191	5,141,820	5,045,699	-	-	7,871,380	7,693,489	18,331,296	17,791,379
6	5,102,323	4,847,207	4,920,820	4,784,110	-	-	8,044,300	7,866,729	18,067,443	17,498,046
7	5,271,664	5,008,081	4,984,790	4,849,320	-	-	8,244,808	8,031,279	18,501,262	17,888,680
8	5,378,461	5,109,538	5,087,420	4,963,480	-	-	8,554,830	8,318,710	19,020,711	18,391,728
9	5,269,909	5,006,414	4,927,590	4,774,590	-	-	8,467,738	8,256,849	18,665,237	18,037,853
10	5,210,659	4,950,126	4,918,410	4,774,400	-	-	7,933,410	7,777,849	18,062,479	17,502,375
11	5,362,680	5,094,546	4,811,570	4,702,700	-	-	8,214,499	8,064,359	18,388,749	17,861,605
12	5,189,816	4,930,325	5,332,919	5,216,720	-	-	8,145,904	7,949,274	18,668,639	18,096,319
សរុប Total	62,428,089	59,319,185	58,841,769	57,335,819			94,519,115	92,249,715	215,788,973	208,904,719
មធ្យម AVG		4,943,265		4,777,985				7,687,476		17,408,727
អតិបរមា MAX		5,167,984		5,216,720				8,318,710		18,391,728

សរុបការប្រើប្រាស់វត្ថុធាតុដើម និងចរន្តអគ្គិសនីតាមរោងចក្រទាំងបួន
TOTAL OF RAW MAETERIAL AND POWER CONSUMPTION FOR THE FOURTH WTPS

Month	PAC		ក្លរីន Chlorine		អំបិល Salt	ក្លរីន រំទិក Sodium Hypochlorite Solution			ថាមពលអគ្គិសនី Electricity	
	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	គិតជា (L)	ឯកត (Kg)	ឯកត (g)	គិតជា (Kwh)	(wh)
1	113,250	6.66	36,042	2.12	45,000	1,341,208	9,388	1.88	4,967,329	292
2	89,925	5.98	30,824	2.05	47,500	2,017,379	14,122	3.15	4,492,937	299
3	103,200	5.92	30,632	1.76	68,750	2,436,304	17,054	3.30	5,152,590	295
4	89,300	5.46	24,419	1.49	52,000	1,854,252	12,980	2.78	4,844,429	296
5	82,700	4.65	25,731	1.45	58,000	1,953,693	13,676	2.71	5,243,876	295
6	121,100	6.92	24,864	1.42	52,750	2,008,185	14,057	2.90	5,057,060	289
7	177,100	9.90	26,897	1.50	48,000	1,725,731	12,080	2.41	4,783,748	267
8	161,100	8.76	30,331	1.65	37,500	1,487,042	10,409	2.04	4,562,617	248
9	142,300	7.89	28,820	1.60	43,000	1,573,041	11,011	2.20	4,294,062	238
10	102,700	5.87	24,231	1.38	46,500	1,672,908	11,710	2.37	4,194,475	240
11	106,225	5.95	31,262	1.75	62,000	1,966,799	13,768	2.70	4,784,755	268
12	127,000	7.02	32,252	1.78	75,000	2,434,442	17,041	3.46	5,048,944	279
សរុប Total	1,415,900	6.78	346,305	1.66	636,000	22,470,984	157,297	2.65	57,426,822	275
មធ្យម AVG	117,992	6.75	28,859	1.66	53,000	1,872,582	13,108	2.66	4,785,569	276
អតិបរមា MAX	177,100	9.90	36,042	2.12	75,000	2,436,304	17,054.13	3.46	5,243,876	299

ការប្រើប្រាស់វត្ថុធាតុដើម និងថាមពលអគ្គិសនីរោងចក្រស្វ័យប្រតិបត្តិ
RAW MAATERIAL AND POWER CONSUMPTION FOR PHUM PREK WTP

Month	PAC		ក្លរីន Chlorine		អំបិល Salt	ក្លរីន រំទិក Sodium Hypochlorite Solution			ថាមពលអគ្គិសនី Electricity	
	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	គិតជា (L)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kwh)	(wh)
1	45,200	9.04	3,408	0.68	45,000	1,341,208	9,388	1.88	1,418,699	284
2	45,600	10.18	3,522	0.79	47,500	2,017,379	14,122	3.15	1,298,177	290
3	65,600	12.69	4,002	0.77	68,750	2,436,304	17,054	3.30	1,448,470	280
4	51,200	10.96	856	-	52,000	1,854,252	12,980	2.78	1,307,429	280
5	27,200	5.38	766	0.15	58,000	1,953,693	13,676	2.71	1,437,666	285
6	32,000	6.60	-	-	52,750	2,008,185	14,057	2.90	1,381,160	285
7	46,400	9.27	-	-	48,000	1,725,731	12,080	2.41	1,339,688	268
8	45,600	8.92	-	-	37,500	1,487,042	10,409	2.04	1,282,547	251
9	32,800	6.55	-	-	43,000	1,573,041	11,011	2.20	1,246,152	249
10	26,400	5.33	-	-	46,500	1,672,908	11,710	2.37	1,230,165	249
11	35,200	6.91	-	-	62,000	1,966,799	13,768	2.70	1,387,926	272
12	45,600	9.25	-	-	75,000	2,434,442	17,041	3.46	1,371,574	278
សរុប Total	498,800	8.41	12,554	0.21	636,000	22,470,984	157,297	2.65	16,149,653	272
មធ្យម AVG	41,567	8.42	1,046	0.20	53,000	1,872,582	13,108.07	2.66	1,345,804	272
អតិបរមា MAX	65,600	12.69	4,002	0.79	75,000	2,436,304	17,054.13	3.46	1,448,470	290

ការប្រើប្រាស់វត្ថុធាតុដើម និងថាមពលអគ្គិសនីរវាងច្រកច្រាំងចង្វារ
RAW MAETRIAL AND POWER CONSUMPTION FOR CHROY CHANG WA WTP

Month	PAC		ក្លរីន Chlorine		អំបិល Salt	ក្លរីន រំទិក Sodium Hypochlorite Solution			ថាមពលអគ្គិសនី Electricity	
	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	គិតជា (L)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kwh)	(wh)
1	12,550	2.85	9,870	2.24					1,266,830	287
2	7,200	1.78	8,940	2.20					1,216,220	300
3	8,400	1.69	10,320	2.07					1,517,220	305
4	8,100	1.69	9,340	1.95					1,460,610	305
5	17,250	3.42	10,180	2.02					1,524,970	302
6	39,350	8.23	9,750	2.04					1,375,960	288
7	55,450	11.43	10,380	2.14					1,289,460	266
8	44,000	8.86	10,910	2.20					1,272,080	256
9	34,250	7.17	10,790	2.26					1,219,540	255
10	26,800	5.61	9,420	1.97					1,205,550	253
11	22,775	4.84	10,510	2.23					1,249,930	266
12	19,850	3.81	4,940	0.95	29,075	949,934	6,533	1.25	1,470,460	282
សរុប Total	295,975	5.16	115,350	2.01					16,068,830	280
មធ្យម AVG	24,665	5.12	9,613	2.02					1,339,069	280
អតិបរមា MAX	55,450	11.43	10,910	2.26					1,524,970	305

ការប្រើប្រាស់វត្ថុធាតុដើម និងចរន្តអគ្គិសនីរោងចក្រនីរោធ
RAW MAETRIAL AND POWER CONSUMPTION FOR NIROTH
WTP

Month	PAC		ក្លរីន Chlorine		ថាមពលអគ្គិសនី Electricity	
	គិតជា (Kg)	ឯកត (g)	គិតជា (Kg)	ឯកត (g)	គិតជា (Kwh)	(wh)
1	55,500	7.31	22,764	3.00	2,281,800	300
2	37,125	5.72	18,362	2.83	1,978,540	305
3	29,200	4.00	16,310	2.24	2,186,900	300
4	30,000	4.34	14,223	2.06	2,076,390	301
5	38,250	4.97	14,785	1.92	2,281,240	297
6	49,750	6.32	15,114	1.92	2,299,940	292
7	75,250	9.37	16,517	2.06	2,154,600	268
8	71,500	8.60	19,421	2.33	2,007,990	241
9	75,250	9.11	18,030	2.18	1,828,370	221
10	49,500	6.36	14,811	1.90	1,758,760	226
11	48,250	5.98	20,752	2.57	2,146,899	266
12	61,550	7.74	27,312	3.44	2,206,910	278
សរុបរួម Total	621,125	6.73	218,401	2.37	25,208,339	273
មធ្យម AVG	51,760	6.65	18,200	2.37	2,100,695	275
អតិបរមា MAX	75,250	9.37	27,312	3.44	2,299,940	305