# ACWA Power Sirdarya 1,500MW CCGT Power Plant (IPP)

## Republic of Uzbekistan

## Environmental and Social Impact Assessment

### Volume 4 – Appendices

Prepared for:

October 2020

# Document Information

| | |
|---|---|
| **Project Name** | ACWA Power Syrdarya 1,500MW CCGT Power Plant (IPP), Republic of Uzbekistan |
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| **Client** | ACWA Power |
| **5Cs Project Manager** | Eva Muthoni Kimonye |
| **5Cs Project Director** | Ken Wade |

# Document Control

| Version | Version Date | Description | Author | Reviewer | Approver |
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| 1 | 18/08/2020 | ESIA – Volume 4 | EMK | MKB | KRW |
| 2 | 11/10/2020 | Update following LTA ESDD Report Feedback | EFO/EMK | MKB | KRW |
| 2.1 | 14/10/2020 | | EMK | MKB | KRW |

| | |
|---|---|
| 1 | Financial Capital |
| 2 | Social Capital |
| 3 | Natural Capital |
| 4 | Manufactured Capital |
| 5 | Human Capital |

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# Appendix A – Ministry of Energy Communication on Decommissioning of 4 Units at Syrdarya TPP

"ТАСДИҚЛАЙМАН"
Ўзбекистон Республикаси
Энергетика вазири
_________ А. Султанов
2020 йил "____" май

**2020-2030 йилларда иссиқлик электр станцияларда эскирган қурилмаларни фойдаланишдан чиқариш ДАСТУРИ**

*(Ўзбекистон Республикаси Президенти Ш.М.Мирзиёев ҳузурида 2020 йил 4 май куни ўтказилган йиғилиш 27-сон (06.05.2020й., 02-1037 хдфу-сон) баёни 10-банди)*

| № | Станция номи | Фойдаланишдан чиқариладиган | | | Амалга ошириладиган чора тадбирлар | Масъул |
|---|---|---|---|---|---|---|
| | | қурилма рақами | қувват, *МВт* | муддат | | |
| 1 | "Сирдарё ИЭС" АЖ | энергоблок № 7,8 | 520 | 2023й. | 1. Қурилмаларни республикада амал қиладиган қоидаларга ва ҳужжатларга асосан ўрнатилган тартибда технологик консервацияга чиқариш.<br>2. Асосий ва ёрдамчи ускуналарни ҳатловдан ўтказиш ва сақланишини таъминлаш. | Энергетика вазирлиги *(Ходжаев),* "ИЭС" АЖ *(Мубаракшин)* |
| | | энергоблок № 1,2 | 650 | 2024й. | | |
| 2 | "Тошкент ИЭС" АЖ | энергоблок № 7 | 145 | 2021й. | 1. Ўрнатилган тартибда қурилмаларни босқичма-босқич фойдаланишдан чиқариш.<br>2. Асосий ва ёрдамчи ускуналарни ҳатловдан ўтказиш. | Энергетика вазирлиги *(Ходжаев),* "ИЭС" АЖ *(Мубаракшин)* |
| | | энергоблок № 5,6 | 275 | 2022й. | | |
| | | энергоблок № 1,2,8,9 | 525 | 2023й. | | |

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|---|---|---|---|---|---|---|
| | | энергоблок № 10,11 | 280 | 2024й. | 1. Қурилмаларни республикада амал қиладиган қоидаларга ва ҳужжатларга асосан ўрнатилган тартибда технологик консервацияга чиқариш.<br>2. Асосий ва ёрдамчи ускуналарни хатловдан ўтказиш ва сақланишини таъминлаш. | |
| | | энергоблок № 3,4,12 | 405 | 2025й. | | |
| 3 | "Навоий ИЭС" АЖ | энергоблок № 3,8 | 250 | 2021й. | 1. Ўрнатилган тартибда қурилмаларни фойдаланишдан чиқариш.<br>2. Асосий ва ёрдамчи ускуналарни хатловдан ўтказиш. | Энергетика вазирлиги *(Ходжаев)*, "ИЭС" АЖ *(Мубаракшин)* |
| | | энергоблок № 4,9 | 260 | 2023й. | 1. Ўрнатилган тартибда қурилмаларни республикада амал қиладиган қоидаларга ва ҳужжатларга асосан технологик консервацияга чиқариш.<br>2. Асосий ва ёрдамчи ускуналарни хатловдан ўтказиш ва сақланишини таъминлаш. | |
| | | энергоблок № 11,12; турбоагрегат № 5,7 | 350 | 2024й. | | |
| 4 | "Талимаржон ИЭС" АЖ | энергоблок № 1 | 780 | 2025й. | 1. Ўрнатилган тартибда қурилмани республикада амал қиладиган қоидаларга ва ҳужжатларга асосан технологик консервацияга чиқариш.<br>2. Асосий ва ёрдамчи ускуналарни хатловдан ўтказиш ва сақланишини таъминлаш. | Энергетика вазирлиги *(Ходжаев)*, "ИЭС" АЖ *(Мубаракшин)* |
| 5 | "Тахиатош ИЭС" | турбоагрегат № 1,3 | 170 | 2020й. | 1. Ўрнатилган тартибда қурилмаларни республикада амал қиладиган қоидаларга ва ҳужжатларга асосан технологик консервацияга чиқариш. | Энергетика вазирлиги *(Ходжаев)*, "ИЭС" АЖ *(Мубаракшин)* |
| | | энергоблок № 7 | 170 | 2023й. | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | энергоблок № 8 | 180 | 2024й. | 2. Қурилманинг асосий ва қўшимча ускуналарини сакланишини таъминлаш. | |
| 6 | "Фарғона ИЭМ" АЖ | турбоагрегат № 1 | 0 | 2020й. | 1. Ўрнатилган тартибда қурилмани фойдаланишдан чиқариш. | Энергетика вазирлиги *(Ходжаев)*, "ИЭС" АЖ *(Мубаракшин)* |
| 7 | "Янги-Ангрен ИЭС" АЖ | энергоблок № 6,7 | 480 | 2023й. | 1. Ўрнатилган тартибда қурилмаларни республикада амал қиладиган қоидаларга ва ҳужжатларга асосан технологик консервацияга чиқариш.<br>2. Асосий ва ёрдамчи ускуналарни ҳатловдан ўтказиш ва сақланишини таъминлаш. | Энергетика вазирлиги *(Ходжаев)*, "Янги-Ангрен ИЭС" АЖ *(Свамбаев)* |
| 8 | "Ангрен ИЭС" АЖ | турбоагрегат № 1,2,5,6 | 100 | 2023й. | 1. Ўрнатилган тартибда қурилмаларни фойдаланишдан чиқариш.<br>2. Асосий ва ёрдамчи ускуналарни ҳатловдан ўтказиш. | Энергетика вазирлиги *(Ходжаев)*, "Ангрен ИЭС" АЖ *(Макеев)* |

**Изоҳ:** Фойдаланишдан чиқариладиган энергетик қурилмаларнинг жадвали 1 иловада келтирилган.

**"Иссиқлик электр станциялари" АЖ**
**Бошқарув раиси**

**__________ Р. Мубаракшин**
**2020 йил "____" май**

**Энергетика вазирининг**
**ўринбосари**

**__________ Ш. Ходжаев**
**2020 йил "____" май**

2020-2030 йилларда иссиқлик электр станцияларда эскирган қурилмаларни фойдаланишдан чиқариш дастурига
1-ИЛОВА

## 2020-2030 йилларда иссиқлик электр станцияларда эскирган қурилмаларни фойдаланишдан чиқариш ЖАДВАЛИ

*МВт*

| № | Номи | 2020й. | 2021й. | 2022й. | 2023й. | 2024й. | 2025й. | 2026-2030й. |
|---|---|---|---|---|---|---|---|---|
| | **ЖАМИ** | 170 | 565 | 840 | 2 895 | 4 355 | 5 540 | 5 540 |
| 1 | "Сирдарё ИЭС" АЖ | | | | -520<br>*ЭБ-7,8* | -650<br>*ЭБ-1,2* | | |
| 2 | "Тошкент ИЭС" АЖ | | -145<br>*ЭБ-7* | -275<br>*ЭБ-5,6* | -525<br>*ЭБ-1,2,8,9* | -280<br>*ЭБ-10,11* | -405<br>*ЭБ-3,4,12* | |
| 3 | "Навоий ИЭС" АЖ | | -250<br>*ЭБ-3,8* | | -260<br>*ЭБ-4,9* | -350<br>*ЭБ-11,12 ТГ-5,7* | | |
| 4 | "Талимаржон ИЭС" АЖ | | | | | | -780<br>*ЭБ - 1* | |
| 5 | "Тахиатош ИЭС" АЖ | -170<br>*ТГ-1,3* | | | -170<br>*ЭБ-7* | -180<br>*ЭБ-8* | | |
| 6 | "Фарғона ИЭМ" АЖ | *0*<br>*ТГ-1* | | | | | | |
| 7 | "Янги-Ангрен ИЭС" АЖ | | | | -480<br>*ЭБ-6,7* | | | |
| 8 | "Ангрен ИЭС" АЖ | | | | -100<br>*ТГ-1,2,5,6* | | | |

***Шундан, технологик консервацияга чиқариладиган қувватлар***

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **ЖАМИ** | 170 | 170 | 170 | 1 600 | 3 060 | 4 245 | 4 245 |
| 1 | "Сирдарё ИЭС" АЖ | | | | 520 | 650 | | |
| 2 | "Навоий ИЭС" АЖ | | | | 260 | 350 | | |
| 3 | "Янги-Ангрен ИЭС" АЖ | | | | 480 | | | |
| 4 | "Тахиатош ИЭС" АЖ | 170 | | | 170 | 180 | | |
| 5 | "Тошкент ИЭС" АЖ | | | | | 280 | 405 | |
| 6 | "Талимаржон ИЭС" АЖ | | | | | | 780 | |

***Изоҳ:*** *Фойдаланишдан чиқариладиган энергетик қурилмаларнинг тартиб рақами ва муддати энергетика тизимининг ҳолатига кўра ўзгариши мумкин.*

# Appendix B- Letter & Conclusions from State Committee on Ecology & Environmental Protection

**STATE COMMITTEE OF THE REPUBLIC OF UZBEKISTAN ON ECOLOGY AND ENVIRONMENTAL PROTECTION**

**2a Toytepa street, Yashnabad district, Tashkent city, 100047. Tel.: 71 207-11-03, fax: 71 236-02-32, website:http://www.eco.gov.uz, email: info@uznature.uz**

"4" April 2020 №01-01/10-525 Tashkent city

**"Juru Energy"**

*In response to the letter №20/20/13*

*Dated on 19th of March, 2020*

The State Committee of the Republic of Uzbekistan for ecology and environmental protection has studied your request on regarding the official confirmation on the following procedures of national EIA for the construction of CCGT with a total capacity of 1,500 MW in Shirin town, Syrdarya region. We hereby to confirm the followings.

The company received a positive conclusion from the State ecological expertise No. 01-01 / 10-08-815 dated on 05.05.2019. for the construction of **4 CCGT with a total capacity of 2600 MW** for JSC "SYRDARYA TPP". One of the requirements of this conclusion was submission of Statement of Environmental Consequences Prior to commissioning the CCGT.

Considering the above stated, and in accordance with the Articles 13 and 15 of the law "On environmental expertise" you need to develop a Preliminary Statement of the Environmental Impact and submit it in the manner prescribed by law for the construction of a new CCGT with a total capacity of 1,500 MW in Syrdarya region.

**Chairman**

**Sh. Abdurazakov**

**ЎЗБЕКИСТОН РЕСПУБЛИКАСИ ЭКОЛОГИЯ ВА АТРОФ-МУҲИТНИ МУҲОФАЗА ҚИЛИШ ДАВЛАТ ҚЎМИТАСИ**

100047, Тошкент ш., Яшнобод т., Той-тепа кўчаси, 2а-уй. тел.:71 207-11-03, факс:71 236-02-32
веб-саҳифа:http://www.eco.gov.uz, электрон почта:info@uznature.uz

"4" апрел 2020й. № 01-01/10-525 Тошкент ш.

**«Juru Energy»**

*На письмо №20/20/13*
*от 19 марта 2020 года*

Госкомэкологии Республики Узбекистан, рассмотрев Ваше обращение касательно в получении информации относительно дальнейшей процедуры прохождения процесса оценки воздействия на окружающую среду для строительства парогазовой установки мощностью 1500 МВт на территории Сырдарьинской ТЭС, расположенной в Сырдарьинской области, сообщает следующее.

Вашим предприятием было получено положительное заключение государственной экологической экспертизы №01-01/10-08-815 от 3.05.2019г. для **строительства 4-х парогазовых установок общей мощностью 2600 МВт** на АО "СЫРДАРЬИНСКАЯ ТЭС". Одним из требований данного заключения, предъявляемых к заказчику экологической экспертизы было, до ввода в эксплуатацию разработать и представить на государственную экологическую экспертизу проекта ЗЭП.

Учитывая вышеизложенное Вам необходимо для строительства новой парогазовой установки мощностью 1500 МВт на территории Сырдарьинской ТЭС в соответствии со статьями 13 и 15 Закона Республики Узбекистан «Об экологической экспертизе» разработать проект заявления о воздействии на окружающую среду (ПЗВОС) и представить в управление по экологии и охране окружающей среды в установленном законодательством порядке с целью проведения государственной экологической экспертизы.

**Председатель** **Ш. Абдуразаков**

Исп.:Ш.Рихсиев
тел: 207-07-70 (2020#)

**ЎЗБЕКИСТОН РЕСПУБЛИКАСИ ЭКОЛОГИЯ ВА АТРОФ-МУҲИТНИ МУҲОФАЗА ҚИЛИШ ДАВЛАТ ҚЎМИТАСИ**

100047, Тошкент ш., Яшнобод т., Той-тепа кўчаси, 2а-уй. тел.:71 207-11-03, факс:71 236-02-32
веб-саҳифа:http://www.eco.gov.uz, электрон почта:info@uznature.uz

"4" апреля 2020й. №01-01/10-525 Тошкент ш.

**«Juru Energy»**

*На письмо №20/20/13*
*от 19 марта 2020 года*

Госкомэкологии Республики Узбекистан, рассмотрев Ваше обращение касательно в получении информации относительно дальнейшей процедуры прохождения процесса оценки воздействия на окружающую среду для строительства парогазовой установки мощностью 1500 МВт на территории Сырдарьинской ТЭС, расположенной в Сырдарьинской области, сообщает следующее.

Вашим предприятием было получено положительное заключение государственной экологической экспертизы №01-01/10-08-815 от 3.05.2019г. для **строительства 4-х парогазовых установок общей мощностью 2600 МВт** на АО "СЫРДАРЬИНСКАЯ ТЭС". Одним из требований данного заключения, предъявляемых к заказчику экологической экспертизы было, до ввода в эксплуатацию разработать и представить на государственную экологическую экспертизу проекта ЗЭП.

Учитывая вышеизложенное Вам необходимо для строительства новой парогазовой установки мощностью 1500 МВт на территории Сырдарьинской ТЭС в соответствии со статьями 13 и 15 Закона Республики Узбекистан «Об экологической экспертизе» разработать проект заявления о воздействии на окружающую среду (ПЗВОС) и представить в управление по экологии и охране окружающей среды в установленном законодательством порядке с целью проведения государственной экологической экспертизы.

**Председатель** **Ш. Абдуразаков**

Исп.:Ш.Рихсиев
тел: 207-07-70 (2020#)

ЎЗБЕКИСТОН РЕСПУБЛИКАСИ ЭКОЛОГИЯ ВА АТРОФ-МУҲИТНИ МУҲОФАЗА ҚИЛИШ ДАВЛАТ ҚЎМИТАСИ

100047, Тошкент ш., Яшнобод т., Той-тепа кўчаси, 2а-уй. тел.:71 207-11-03, факс:71 236-02-32
веб-саҳифа:http://www.eco.gov.uz, электрон почта:info@uznature.uz

"13" июль 2020й. №01-01/10-08-969 Тошкент ш.

# ЗАКЛЮЧЕНИЕ

Государственной экологической экспертизы

| | |
|---|---|
| **По объекту:** | Оценка воздействия на окружающую среду на строительства двух парогазовых установок (ПГУ) ACWA POWER SIRDARYA общей мощностью 1500 МВт в Сырдарьинской области (Проект ЗВОС). |
| **Заказчик:** | ООО «JURU ENERGI CONSALTING». |
| **ИНН:** | 303454532 |
| **Категория:** | 1, п. 35, ПКМ РУз. №949 от 21.11.2018 г. |
| **Разработчик:** | ООО «JURU ENERGI CONSALTING». |
| **Эксперт:** | Рудовой О.А. |

Директору
ООО «JURU ENERGI CONSALTING»
Ж.У. Якубову

копия: Управлению по экологии
и охране окружающей среды Сырдарьинской
области.

На государственную экологическую экспертизу представлены материалы первого этапа оценки воздействия на окружающую среду строительства двух парогазовых установок (ПГУ) ACWA POWER SIRDARYA общей мощностью 1500МВт в Сырдарьинской области.

Строительство двух ПГУ и находящейся на с ними на одной площадке ОРУ-500/220 кВ предназначено для замены, находящейся 4-х энергоблоков по 300 МВт Сырдарьинской ТЭС.

Ранее для Сырдарьинской ТЭС был разработан проект ЗВОС строительства 4-х парогазовых установок общей мощностью 2600 МВт и было получено положительное заключение Государственной экологической экспертизы №01-01-8-815 от 03.05.2019г. Но на земельном участке, где ранее планировалось строительство 4-х парогазовых установок общей мощностью 2600 МВт и будет размещены две парогазовых установок (ПГУ) ACWA POWER SIRDARYA общей мощностью 1500 и ОРУ- 500/220 кВ.

Площадка строительства 2-х ПГУ общей мощностью 1500 МВт и ОРУ-500/220 кВ намечена с северо-западной стороны существующей Сырдарьинской ТЭС, на правом берегу Южно-Голодностепского канала (ЮГК).

Координаты угловых точек площади рассматриваемого участка 2-х ПГУ: 1)40$^0$14'8.04"СШ 69$^0$6'15.63"ВД; 2)40$^0$14'31.50"СШ; 69$^0$6'50.28"ВД; 3)40$^0$14'24.10"СШ 69$^0$7'13.63"ВД; 4)40$^0$13'54.67"СШ 69$^0$6'37.89"ВД, координаты угловых точек площади рассматриваемого участка размещения ОРУ-500/220 кВ: 1)40$^0$14'32.06" СВ 69$^0$6'50.80"ВД; 2)40$^0$14'36.06"СШ 69$^0$6'53.72"ВД; 3) 40$^0$14'46.75" СШ 69$^0$6'40.10" ВД; 4)40$^0$14'54.28" СШ 69$^0$6'48.44"ВД; 5)40$^0$14'37.25" СШ 69$^0$7'13.06"ВД; 6)40$^0$14'24.97" СШ 65$^0$7'3.06"ВД.

Для размещения 2-х ПГУ общей мощностью 1500 МВт со вспомогательными зданиями и сооружениями потребуется отвод участка земли площадью 85,0 га. Под строительство отводятся земли сельскохозяйственного назначения, принадлежащие Баяутскому району и городу Ширин Сырдарьинской области.

**Следует отметить, что рассматриваемый участок находиться на орошаемых землях, которые согласно Статьи 44 Земельного кодекса Республики Узбекистан, подлежат особой охране и перевод этих земель в неорошаемые угодья производится в исключительных случаях с учетом почвенно-мелиоративных и экономических условий, водообеспеченности земель, наличия водных ресурсов и лимитов на них, решением хокима области в соответствии с Заключением Министерства сельского хозяйства Республики Узбекистан, по земельным ресурсам, геодезии, картографии и государственному кадастру по согласованию с Кабинетом Министров Республики Узбекистан.**

Границами участка строительства являются: с севера – пахотные земли; с востока – ВЛ-220 кВ, далее пашня и на расстоянии 400 м жилая застройка г.Ширин; с юга – ВЛ-220 кВ, выходящие с существующей Сырдарьинской ТЭС, автодорога, ЮГК, за каналом железная дорога Джизак-Хаваст-Коканд; с юго-запада и запада – дачный поселок, за ним две нитки газопровода, которые соединяют существующую Сырдарьинскую ТЭС и ГРС, автодорога, ЮГК, за ним территория Сырдарьинской ТЭС.

Размер водоохраной зоны ЮГК, в районе строительства дополнительных ПГУ, согласно ПКМ № 981от 11.12.2019 г. «Положение о водоохранных зонах водохранилищ и других водоемов, рек и магистральных каналов и коллекторов, а также источников питьевого и бытового водоснабжения, лечебного и культурно-оздоровительного назначения в Республике Узбекистан» установлен 300 м, исходя из расхода воды в канале 350 м$^3$/с. Площадка под строительство 2-х дополнительных ПГУ выделена с учетом соблюдения водоохраной зоны канала ЮГК.

Ближайшая частная жилая застройка ширкатного хозяйства «Ширин» Баяутского района расположена в 320 м к северу от участка строительства и на расстоянии 1,1 км от дымовых труб проектируемых ПГУ.

Район расположения электростанции характеризуется сейсмичностью до 8 баллов, сильными ветрами до 40-45 м/с, высоким стоянием (1,5 м) и высокой агрессивностью грунтовых вод, высокой минерализацией и повышенной жесткостью воды поверхностных водотоков. В поверхностных водотоках отмечается повышенное солесодержание уже до сбросов ТЭС, увеличивающееся после сбросов станции. Состояние поверхностных вод характеризуется III классом умеренно загрязненных вод.

На участке, выделяемом под строительство, имеются зеленые насаждения подлежащие вырубке в процессе подготовительных к строительству работ. Согласно обследования участка строительства вырубке подлежат 1231 ед. деревьев (5 шт. тутовник, 55 шт. джида, 250 шт. туранга, 129 шт. акация, 6 шт. тополь, 786шт. тамариск).

**В связи с этим сообщаем, что вырубка деревьев, кустарников, уничтожение растительности оказывает отрицательное влияние на баланс экосистемы (изменение климата, связанное с увеличением содержания углекислого газа в атмосферном воздухе и перепадами температур, как суточных, так и годовых, исчезновению плодородного слоя почвы, потерей биоценоза и т.д.). При организации добычных работ следует руководствоваться требованиями ПКМ РУз №290 от 20.10.2014г. «Об урегулировании использования биологических ресурсов и о порядке прохождения разрешительных процедур в сфере природопользования», ПКМ РУз №43 от 17.01.2019г. «О мерах по дальнейшему совершенствованию порядка упорядочения использования деревьев и кустарников, не входящих в государственный лесной фонд, а также выдачи разрешений в сфере их использования» и Указом Президента Республики Узбекистан № 5863 от 30.10.2019г. «Об утверждении Концепции охраны окружающей среды Республики Узбекистан до 2030 года» в установленном порядке.**

**Проектом необходимо предусмотреть выкорчевывание и пересадку имеющейся растительности на использованные земли после добычных работ, без осуществления вырубки. Следует отметить, что современные технологии позволяют переместить древесные посадки с применением специальных машин без вреда корневой системе. Производить вырубку растительности на территории отведенного земельного участка категорически запрещается.**

Ввод в эксплуатацию двух ПГУ по 750 МВт с применением передовых технологий сжигания топлива в дополнение к преимуществам за счет реализации программы модернизации позволит: увеличить КПД выработки электроэнергии – КПД ПГУ класса J мощностью 750 МВт выше 60%; снизить расход условного топлива на отпуск электроэнергии на на 25-30г/кВт*ч, достичь ежегодной экономии природного газа; улучшить экологическую обстановку в зоне воздействия станции путем снижения валовых выбросов ТЭС и уровня загрязнения атмосферного воздуха в зоне воздействия ТЭС, при этом эмиссия оксидов азота ПГУ составит 50 мг/нм$^3$, что в 8,8 раза ниже их максимальных концентраций в дымовых газах существующих энергоблоков ТЭС; значительно снизить эмиссию парниковых газов $CO_2$ и $CH_4$.

Вместе с двумя парогазовыми установками мощностью 1500 МВт также будет построена ОРУ 550/220 кВ, предназначенная для подачи электроэнергии потребителям. ОРУ 55/220 кВ запроектирована в составе: трансформаторы, резервуары хранения трансформаторного масла, операторская пульта управления, механическая мастерская.

Каждый из двух энергетических блоков дополнительных ПГУ ACWA POWER SIRDARYA 1500 МВт будет иметь мощность 750 МВт. ПГУ-750 является моноблочной парогазовой установкой, предназначенной для производства электроэнергии в базовом режиме работы, при одновременном покрытии теплового графика производственных и отопительных нагрузок.

В состав ПГУ-750 МВт входят: газотурбинная установка с электрогенератором – 2 ед.; котел-утилизатор – 2 ед.; паротурбинная установка с электрогенератором; деаэраторная установка; газодожимная компрессорная станция с газодожимными компрессорами; компрессорная сжатого воздуха, азотогенераторная, электролизная с ресиверами, резервный дизель-генератор, ХВО подпитки блока, теплосети и системы оборотного техводоснабжения, комплекс очистки производственных стоков, баковое хозяйство; градирни с насосной станцией водоснабжения ПГУ; склад масла в таре.

Количество работающих после пуска в эксплуатацию ПГУ и ОРУ-500/220кВ – 80 человек, режим работы – 8255 ч/год.

Предполагается работа блоков ПГУ с использованием в качестве топлива природного газа. Подача газа на территорию участка 2-х ПГУ общей мощностью 1750 МВт будет осуществляться по вновь построенным магистралям.

Ожидается, что КПД новых ПГУ составит более 60%. Годовой расход природного газа на одну ПГУ составит 789600 т/год, потребление природного газа двумя ПГУ – 1579200 т/год.

Проектируемые энергоблоки являются парогазовыми, то есть объединяют два цикла паровой и газовый – тепловая энергия, имеющаяся в газах, образующихся в процессе сгорания топлива, используется для производства пара с энергией, достаточной для использования в паротурбине. Каждая ПГУ состоит из одной газотурбины, котла-утилизатора (КУ) и одной паротурбины. Первый цикл представлен газотурбиной, в которой вращение ротора осуществляется газами, образующимися в процессе сгорания топлива. Электрогенератор газотурбины вырабатывает около 2/3 электричества. Второй цикл – газы, образовавшиеся в первом цикле, подаются в котел-утилизатор, в котором тепловая энергия дымовых газов передается воде для производства пара при высоком давлении, пар используется для приведения в действие паротурбины. Электрогенератор паротурбины вырабатывает около 1/3 электричества. Отработанный пар, сразу после расширения в паротурбине, направляется в конденсатор, где между паром и охлаждающей водой происходит теплообмен. Конденсат откачивается в КУ, где повторно преобразовывается в пар, замыкая паровой цикл.

Использование комбинированных парогазовых установок позволяет применять энергию, имеющуюся в газах, образующихся в результате сгорания топлива, что существенно снижает затраты энергоносителей и соответственно отрицательное воздействие на окружающую среду.

Для отвода дымовых газов вновь строящиеся ПГУ планируется оснастить индивидуальными дымовыми трубами высотой по 60 м и диаметром устья 9,18 м. Параметры газовоздушной смеси составят: объем дымовых газов 82,2 $м^3$/сек, скорость выхода отходящих газов 14,88 м/с, температура отходящих газов 82,2$^0$С.

В результате проведения модернизации имеющихся блоков СД ТЭС и строительства дополнительных блоков ПГУ качественный состав выбросов в атмосферу предприятия не изменится, в атмосферный воздух выбрасываются вещества 23-х наименований, количество источников выброса останется прежним.

Количество выбросов, ожидаемых после проведения модернизации имеющихся блоков Сырдарьинской ТЭС, ориентировочно составит 20961,49910т/год.

Выброс загрязняющих веществ, после ввода в эксплуатацию блоков ПГУ ACWA PAWER SIRDARYA 1500 МВт, ориентировочно составит 2915,533978т/год, выбросы от эксплуатации ОРУ-500/220 кВ – 4,594402 т/год.

Ввод в эксплуатацию двух блоков ПГУ мощностью по 750 МВт, с учетом проведенной модернизации существующих энергоблоков АО «Сырдарьинская ТЭС» приведет к улучшению экологической обстановки в зоне влияния станции путем снижения валовых выбросов ТЭС.

Общий валовой выброс при проведении строительных и монтажно-наладочных работ по ПГУ 1500 МВт и ОРУ 200/500 составит 22,866 т.

Начало строительства ПГУ 1500 МВт – сентябрь/октябрь 2020 г., ОРУ-500/220 – 2020г.

На промплощадке новых ПГУ предусматривается устройство двух раздельных водопроводных систем: хозяйственно-питьевой водопровод, обеспечивающий питьевые нужды промплощадки ПГУ и для подпитки теплосети; производственно-противопожарный водопровод, обеспечивающий технические-противопожарные нужды промплощадки ПГУ.

Вода для хозпитьевых целей работников будет подаваться из хозпитевого водопровода Сырдарьинской ТЭС, которая в свою очередь подается из водозаборных сооружения «Навои», которые имеют расчетный расход забора воды 711 тыс.м$^3$/мес. или 987,5 м$^3$/час, что покрывает потребности Сырдарьинской ТЭС и г.Ширин. Для обеспечения хозпитьевой водой ПГУ в объеме 3 м$^3$/час производительности водозабора «Навои» вполне достаточно. Для доставки питьевой воды будет проложен новый водовод. Питьевая вода, подаваемая с водозаборных сооружений, будет поступать на промплощадку ПГУ в проектируемые резервуары чистой воды.

Подаваемая на площадку ПГУ питьевая вода также используется для подпитки теплосети. В качестве резервуаров противопожарного водопровода предполагается использовать бассейн градирен системы оборотного водоснабжения, противопожарный запас воды принят согласно п.9.4 КМК 2.04.02.

На проектируемой промышленной площадке планируется организация следующих канализационных систем: хозяйственно-бытовая, дождевая, аварийных маслостоков, производственной канализации. Хозяйственно-бытовые стоки предполагается без предварительной очистки перекачивать на городскую хозяйственно-фекальную станцию г. Ширин, дождевые стоки планируется сбрасывать в канал ЮГК, стоки, загрязненные нефтепродуктами, предполагается очищать при помощи нефтеловушек, и далее подавать на испарение в пруды-испарители.

Согласно закону Республики Узбекистан №837-XII от 06.09.1993 г. «О воде и водопользовании», система технического водоснабжения двух дополнительных ПГУ предусматривается оборотная. К установке принимаются вентиляторные градирни, технические характеристики которых будут уточняться при детальном проектировании. Восполнение потерь в оборотной системе (капельный унос, испарение, продувка) предусматривается подачей воды из ЮГК.

Для обеспечения работы 2-х новых ПГУ предусматривается строительство: отстойника добавочной воды; шламоотвалов КОПС; пруда-испарителя кислотной промывки котлов; шламоотвала для временного складирования замазученного ила; шламоотвала сбросных вод ХВО; шламоотвала продувки осветлителей ХВО.

Для восполнения потерь в цикле ПГУ и в системе оборотного водоснабжения предусматривается строительство новой водоподготовительной установки. Производительность ХВО по обессоленной воде для подпитки пароводяного цикла энергоблоков ПГУ будет уточняться при детальном проектировании. В качестве предварительной обработки воды предполагается применить процесс содо-известкования с последующей коагуляцией в осветлителе. Для глубокого обессоливания подпиточной воды основного цикла ПГУ предполагается применение двухступенчатого умягчения осветленной воды на Na-катионитовых фильтрах с последующей обработкой воды на установке обратного осмоса и фильтрах смешанного действия (ФСД).

Сточные регенерационные воды от водоподготовительных установок планируется подавать в дренажную насосную станцию ХВО и далее на установку КОПС (Комплексной очистки производственных стоков), включающую в себя узел нейтрализации кислых и щелочных стоков ВПУ подпитки пароводяного цикла и узел обработки соляных стоков обеих водоподготовительных установок. Обработку соленых стоков планируется осуществлять по следующей схеме: дозирование соды в баки-усреднители, фильтрация отстоянной воды на механических фильтрах с последующей обработкой на установке обратного осмоса. Соленые стоки (рассол), после установки обратного осмоса, будут направляться в пруд-испаритель, очищенная вода будет возвращаться в цикл ВПУ подпитки циркуляционной системы и пароводяного цикла.

Ориентировочный расход технической воды из ЮГК на нужды двух ПГУ составит 1965 $м^3$/час или 16352,73 тыс. $м^3$/год, ожидаемый расход водопроводной воды на хозяйственно-питьевые нужды двух ПГУ – 3 $м^3$/час, 24,765 тыс.$м^3$/год, всего водопотребление на нужды 2-х ПГУ составит 16377,495 тыс. $м^3$/год. Сброс продувочных вод градирен в ЮГК прогнозируется на уровне 340 $м^3$/час (2829,48тыс.$м^3$/год).

Согласно представленного на экспертизу проекта после ввода в эксплуатацию 2-х ПГУ будут образовываться следующие виды отходов: черный металлолом (не опасные V класс), отход шлама от очистки котлов (малоопасные IV класс) (малоопасные IV класс), отход шлама от ХВО (малоопасные IV класс), отход шлама от очистки сточных вод (малоопасные IV класс), отход замасленного ила (умеренно опасный III класс), отход полиэтиленовых мешков из под хим. реагентов (малоопасные IV класс), отход бумажных мешков из под хим. реагентов (малоопасные IV класс), ветошь промасленная (умеренно опасный III класс); отходы электродов (не опасные V класс), макулатура (не опасные V класс), ТБО (малоопасные IV класс), пищевые отходы (не опасные V класс).

До ввода рассматриваемого объекта в эксплуатацию следует представить на рассмотрение **заявление об экологических последствиях**, в котором **следует разработать экологические нормативы для всех видов воздействия намечаемой деятельности на окружающую среду.**

Государственный комитет Республики Узбекистан по экологии и охране окружающей среды **согласовывает** проект Заявления о воздействии на окружающую среду строительства двух парогазовых установок общей мощностью 1500 МВт.

**Управлению по экологии и охране окружающей среды Сырдарьинской области** – необходимо взять под контроль выполнение требований природоохранного законодательства в период проведения строительных работ.

Не следует допускать ввода в эксплуатацию объекта без положительного заключения на Заявление об экологических последствиях.

**Председатель** **Ш. Абдуразаков**

Unofficial translation

**State Committee of the Republic of Uzbekistan on Ecology and Environmental Protection**

website: http://www.eco.gov.uz; email: info@uznature.uz

Reference No.01-01/10-08-969

Date: 5 May 2020

**CONCLUSION**
of the State Environmental Expertise

| | |
|---|---|
| Project: | Environmental Impact Assessment (EIA) for the construction of 2 CCGTs ACWA POWER SYRDARYA with a total capacity of 1500 MW located in Syrdarya Region (Preliminary EIA project) |
| Client: | Juru Energy Consulting LLC |
| Category: | I, p. 35, Decree of the Cabinet of Ministers of the Republic of Uzbekistan, № 949, 21.11.2018 |
| Developer: | Juru Energy Consulting LLC |
| Expert: | O.A. Rudovoy |

To the director of
Juru Energy Consulting LLC
J.U. Yakubov

Copy: Department of Ecology and Environmental Protection of the Syrdarya region

Project documentation for the first stage of environmental impact assessment for the construction of 2 CCGTs ACWA POWER SYRDARYA with a total capacity of 1500 MW in Syrdarya region were submitted for state environmental expertise.

The construction of two CCGTs including a 500/220kV switchgear station located on the same site is aimed at replacement of the existing 4 power units of 300MW each at Syrdarya TPP.

Previously, an EIA for the construction of 4 CCGTs with a total capacity of 2600 MW was developed for Syrdarya TPP and a positive conclusion of the State environmental expertise №01-01-8-815 (03.05.2019) was issued. However, instead of the previously planned 4 CCGTs with a total capacity of 2600 MW, the land plot will be allocated for 2 CCGTs ACWA POWER SYRDARYA with a total capacity of 1500 MW including a 500/220 kV switchgear.

The construction site for 2 CCGTs with a total capacity of 1500 MW and 500/220kV switchgear station will be located at the north-western side of the existing Syrdarya TPP, on the right bank of the Yuzhny-Golodnostepsky (YG) canal.

Coordinates of 2 CCGTs site:

| Latitude | Longitude |
|---|---|
| 40°14’8.04”N | 69°6’15.63"E |
| 40°14’31.50”N | 69°6’50.28,”E |

| | |
|---|---|
| 40°14’24.10”N | 69°7’13.63”E |
| 40°13’54.67”N | 69°6’37.89”E |

Coordinates of the 500/220 kV switchgear station:

| Latitude | Longitude |
|---|---|
| 40°14’32.06”N | 69°6’50.80”E |
| 40°14’36.06”N | 69°6’53.72”E |
| 40°14’46.75”N | 69°6’40.10”E |
| 40° 14’54.28”N | 69°6’48.44”E |
| 40°14’37.25”N | 69°7’13.06”E |
| 40°14’24.97”N | 65°7’3.06"E |

Allocation of 2 CCGTs with a total capacity of 1500 MW with auxiliary buildings and structures will require a land acquisition of 85.0 hectares. Agricultural lands belonging to Bayavut district and Shirin town of Syrdarya region will be acquired for construction.

**It should be noted that the planned construction site is in an irrigated land, which in accordance with Article 44 the Land Code of the Republic of Uzbekistan, are subject to special protection, under which conversion of these lands to non-irrigated land is made in exceptional cases, taking into account land development and economic conditions, level of water supply, availability of water resources and restrictions, and by the decision of the khokim[1] of the region in accordance with the Conclusion of the Ministry of Agriculture of the Republic of Uzbekistan, Geodesy, Cartography and State Cadastre, and in agreement with the Cabinet of Ministers of the Republic of Uzbekistan.**

The boundaries of the construction site are: from North – arable land; from the East - 220kV overhead power lines, arable land, and a Shirin town residential development at a 400m distance; from South – 220kV overhead power line exiting the existing Syrdarya TPP, a highway, YG canal, with the canal railroad Jizzakh-Khavast-Kokand; from southwest and West – country village, followed by two gas pipelines that connect existing Syrdarya TPP and GDS (gas distribution station), a highway, YG canal, followed by the territory of the Syrdarya TPP.

In accordance with the Decree of Cabinet of Ministers No. 981 dated 11.12.2019 “The regulation on water protection zones of reservoirs and other reservoirs, rivers and main channels, as well as sources of drinking and domestic water supply, medicinal and cultural-recreational purposes in the Republic of Uzbekistan”, and based on the flow of water in the channel 350 $m^3/s$, a 300m water protection zone of YG canal at the construction area of additional CCGTs has been established. The site for the construction of 2 additional CCGTs was allocated in accordance with the water protection zone of YG canal.

Nearest private residential development of “Shirin” cooperative farm in Bayavut district is located 320m to the North of the construction site and 1.1 km from the exhaust stack of the projected CCGT.

The area of the power plant is characterized by seismicity of up to 8 points, strong winds of up to 40-45 m/s, high level (1.5 m) and high aggressivity of ground water, high salinity and increased water hardness of surface watercourses. There is increased salt content in surface watercourses existent before the TPP discharges,

[1] Mayor

with salinity increasing more after the discharges. The state of surface waters is characterized as Class III – moderately polluted waters.

Allocated area for construction has green spaces to be cut down in the process of preparatory work for construction. According to the survey at the construction site, 1231 units of trees are subject to felling (5 mulberry trees, 55 Russian olive (Elaeagnus angustifolia), 250 Euphrates poplars, 129 acacias, 6 poplars, 786 tamarisk).

**In this regard, we inform you that the cutting down of trees, shrubs, and vegetation poses a negative impact on the balance of the ecosystem (climate change associated with an increase in the content of carbon dioxide in atmospheric air and temperature changes, both daily and annually, the disappearance of the fertile soil layer, loss of biocenosis, etc). When organizing mining operations, works should be guided by and in the established order as required by the Decree of the Cabinet of Ministers of the Republic of Uzbekistan No. 290 dated 20.10.2014 "On the regulation of the use of biological resources and the procedure for passing licensing procedures in the field of nature management", the Decree of the Cabinet of Ministers of the Republic of Uzbekistan No. 43 dated 17.01.2019 "On measures to further improve the procedure for regulating the use of trees and shrubs that are not part of the state forest fund, as well as issuing permits for their use", and the Decree of the President of the Republic of Uzbekistan No. 5863 dated 30.10.2019 "On approval of the Concept of environmental protection of the Republic of Uzbekistan until 2030".**

**The project should provide for uprooting and replanting of existing vegetation on used land after mining operations, without felling. It should be noted that modern technologies allow to move tree plantings using special machines without harming the root system. It is strictly forbidden to cut down vegetation on the territory of the designated land plot.**

The commissioning of two CCGTs with a capacity of 750 MW each using advanced fuel combustion technologies, in addition to the advantages of the modernization program, will allow: to increase the efficiency of power generation – the efficiency of CCGTs J class with a capacity of 750 MW above 60%; to reduce the consumption of conventional fuel for electricity supply by 25-30 g/kWh, to achieve annual savings of natural gas; to improve the environmental situation in the plant's impact zone by reducing the total TPP emissions and the level of atmospheric air pollution at the TPP impact zone, while the emission of nitrogen oxides by the CCGT will be 50 mg/Nm$^3$, which is 8.8 times lower than their maximum concentrations in the flue gases of existing TPP power units; and significantly reduce the emission of greenhouse gases – $CO_2$ and $CH_4$.

A 500/220 kV switchgear station will also be built in addition to the two CCGTs with a capacity of 1500 MW, which is designed to supply electricity to consumers. As part of its design, the 500/220 kV switchgear station will include transformers, storage tanks for transformer oil, operator's control panel, technical workshop.

Each of the two additional 1500 MW ACWA POWER SYRDARYA CCGT power units will have a capacity of 750 MW. CCGT-750 is a single block combined-cycle gas power plant designed to produce electricity in basic operating mode, while simultaneously covering the thermal schedule of production and heating loads.

The components of the CCGT 750 MW are: gas turbine unit with an electric generator

– 2 units; waste-heat boiler – 2 units, steam turbine with an electric generator; deaerator plant; gas booster plant with gas compressors; air compressor utility house, gas generator, electrolysis plant with receivers, backup diesel generator, water chemical treatment recharge unit, heating and circulating water supply systems, industrial wastewater treatment complex, tank farm; cooling towers with a pumping station for water supply to the CCGT; oil storage in containers.

The number of employees after commissioning of CCGT and 500/220 kV switchgear station – 80 employees, working hours – 8255 hours/year.

It is planned to operate CCGT units using natural gas as fuel. Gas supply to the site of 2 CCGTs with a total capacity of 1500 MWt will be carried out via newly built gas main line.

It is expected that the efficiency of the new CCGTs will be higher than 60%. The annual consumption of natural gas for one CCGT will be 789,600 t/year, and the consumption of natural gas for two CCGTs will be 1,579,200 t/year.

The designed power units are steam-gas, that combine the steam and gas cycles, i.e. the thermal energy, generated during fuel (gas) combustion, is used to produce steam with energy sufficient for use in a steam turbine. Each CCGT consists of one gas turbine, waste-heat boiler and one steam turbine. The first cycle is represented by a gas turbine, in which the rotor rotation is carried out by gases formed during fuel combustion. The gas turbine generator generates about 2 /3 of electricity. The second cycle – gases formed in the first cycle are fed to the waste-heat boiler, in which the thermal energy of the flue gases is transferred to the water to produce steam at high pressure, which is then used to power the steam turbine. The steam turbine generator generates about 1/3 of electricity. The exhaust steam, immediately after expansion in the steam turbine, is sent to the condenser, where heat exchange occurs between the steam and the cooling water. Condensate is pumped to the condensate unit, where it is re-converted to steam, closing the steam cycle.

The use of combined steam and gas installations allows to use the energy available in the gases formed as a result of fuel combustion, which significantly reduces the fuel expenses and, consequently, the negative impact on the environment.

To remove flue gases, it is planned to equip the new CCGTs with individual chimneys with a height of 60m and a diameter of 9.18m at the mouth. The parameters of the gas-air mixture will be: the volume of flue gases – 82.2 m/s, exit speed of the exhaust gases – 14.88 m/s, the temperature of the exhaust gases – 82.2°C.

As a result of the modernisation of the power units at the existing TPP and the construction of additional CCGTs the qualitative composition of the emissions will not change with 23 air pollutants emitted, and the number of emission sources will remain the same. The amount of emissions expected after the modernization of the existing units of Syrdarya TPP is approximately 20961,49910 t/year.

The emission of pollutants, after commissioning CCGT ACWA POWER SYRDARYA 1500 MW, will amount to approx. 2915,53978 t/year, and the emissions from the operation of 500/220 kV switchgear station – 4,594402 t/year.

Commissioning of two CCGTs with a capacity of 750 MW, taking into account the modernization of existing JSC "Syrdarya TPP" will improve the environmental situation in the zone of influence of the station by reducing the gross emissions of TPP.

The total gross emission during construction and installation and commissioning of

1500 MW CCGT and 500/220 kV switchgear station will be 22,866 tons.

Commencement of construction for 1500 MW CCGT – September/October 2020; for the 500/220 kV switchgear station – 2020.

Two separate water supply systems will be installed at the CCGT industrial site – the utility and drinking water pipeline, which provides for the drinking needs of the CCGT industrial site and for feeding the heating system; and the industrial and fire-fighting water main, which provides for the technical fire-fighting needs of the CCGT industrial site.

Water for the employees' household purposes will be supplied from the Syrdarya TPP water supply pipeline, which in turn is supplied from the Navoi water intake facilities, which have an estimated water intake flow of 711 thousand $m^3$/month or 987.5 $m^3$/hour, which covers the needs of the Syrdarya TPP and Shirin town. The Navoi water intake capacity is sufficient to provide the CCGT with drinking water in the volume of 3 $m^3$/hour. A new water duct will be built to supply drinking water. Drinking water supplied from water intake facilities will be delivered to the CCGT industrial site to the designed clean water reservoirs.

Drinking water supplied to the CCGT site is also used to feed the heating system. Tanks of the of the cooling tower circulating water system are intended to be used as fire main reservoirs, where the fire water-supply is adopted in accordance with the article 9.4 of KMK 2.04.02.

The sewage systems planned to be installed at the planned industrial site include: domestic, rainwater, emergency oil drains, industrial sewage. Domestic wastewater is envisaged to be pumped to the city's fecal sewage station in Shirin town without preliminary treatment, rainwater is planned to be discharged into the YG canal, wastewater contaminated with oil products is planned to be cleaned using oil traps, and then fed to evaporation ponds.

In accordance with the Law "on Water and Water Use" of the Republic of Uzbekistan No. 837-XII dated 06.09.1993, the circulating type of technical water supply system is planned for the two additional CCGTs. Mechanical-draft towers are accepted for installation, the technical specifications of which will be specified during detailed design. Compensation of the losses in the circulating system (droplet entrainment, evaporation, purging) is provided for by the supply of water from the YG canal.

To ensure the operation of 2 new CCGTs, it is planned to build the following – a sump for make-up water; a waste disposal site (for waste resulting from use of well flushing equipment); a pond-evaporator for acid washing of boilers; a waste disposal site for temporarily stored oiled silt; a disposal site for waste water resulting from chemical water treatment; a disposal site for purging clarifiers post chemical water treatment.

To compensate losses in the CCGT cycle and in the circulating water supply system, it is planned to build a new water treatment plant. The productivity of chemical water treatment for desalinated water to feed the CCGT steam-water cycle will be specified during detailed design. For pre-treatment of water, it is planned to apply the lime-soda water softening process followed by coagulation in the clarifier. For deep desalination of make-up water of the main CCGT cycle, it is planned to use two-stage softening of clarified water on Na-cationic filters, followed by water treatment on a reverse osmosis system and mixed-bed filters.

Waste regeneration water from water treatment plants is planned to be supplied to the drainage pumping station of the chemical water treatment plant and further to the integrated wastewater treatment unit, which includes a unit for neutralizing acid and alkaline wastewater from the water treatment plant for feeding the steam-water cycle and a unit for processing saline run-off of both water treatment plants. Treatment of saline run-off is planned to be carried out according to the following scheme: dosing of soda into averaging tanks, filtration of settled water on mechanical filters with subsequent treatment at the reverse osmosis system. Saline run-off (salt water), after reverse osmosis is installed, will be sent to the evaporator pond, and the treated water will be returned to the cycle of water treatment plants for making up the circulation system and the steam-water cycle.

Approximate industrial water consumption from YG canal for the needs of the two CCGTs will be 1965 $m^3$/h or 16352,73 thousand $m^3$/year, the expected consumption of water for drinking and sanitary needs of 2 CCGTs – 3 $m^3$/hour, 24,765 thousand $m^3$/year, total water consumption for the needs of the 2 CCGTs will be 16377,495 thousand $m^3$/year. The discharge of purge water from the cooling towers into YG canal is projected at the level of 340 $m^3$/hour (2829,48 thousand $m^3$/year).

Based on the submitted EIA, the following types of waste will be generated: black metal scrap (non-hazardous V class), sludge waste from boiler cleaning (low-hazardous IV class), sludge waste from waste water treatment (low-hazardous IV class), sludge waste from oiled sludge (moderately dangerous class III), plastic bags waste from chemical reagents (low-hazardous class IV), waste paper bags from chemical reagents (low-hazardous class IV), oiled rags (moderately dangerous class III); waste of electrodes (non-hazardous class V), waste paper (non-hazardous class V), solid waste (low-hazard class IV), food waste (non-hazardous class V).

Prior to commissioning the facility, a **statement on environmental consequences** should be submitted for review, which should specify **environmental standards to be developed for all types of environmental impacts from the proposed activity**.

State Committee of the Republic of Uzbekistan on Ecology and Environmental Protection **agrees** with the draft Statement on Environmental Impact Assessment for the construction of two combined cycle gas turbines with a total capacity of 1500 MW.

To the attention of **the Department of Ecology and Environmental Protection of the Syrdarya region** – should follow up and establish control over adherence to the requirements of environmental legislation during the construction period.

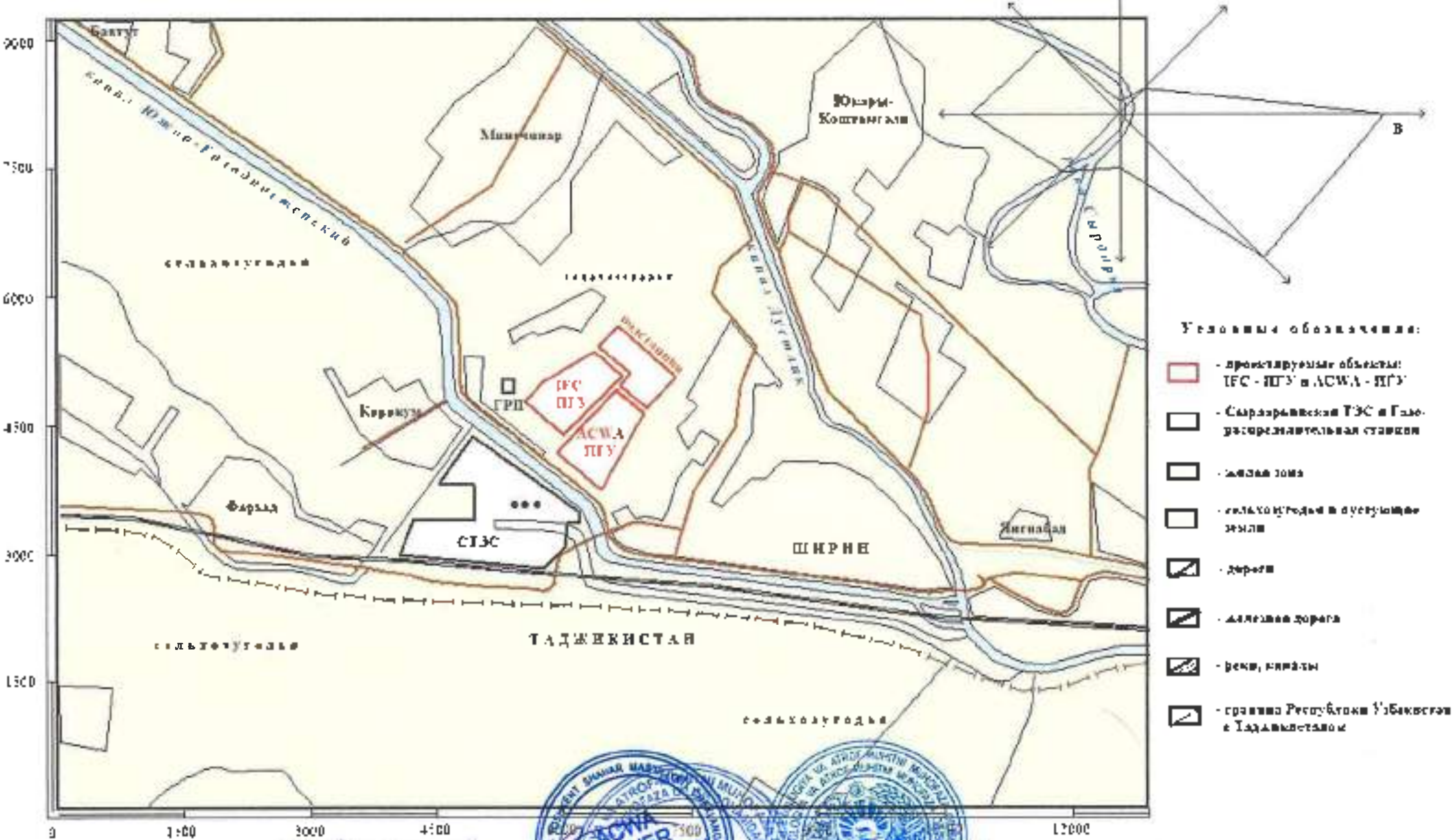
Commissioning of the facility should not be granted without a positive conclusion to the Statement on environmental consequences.

Signed and stamped
Abdurazakov Sh.
Chairman

# APPENDIX C – PROJECT APPROVED OFFICIAL PLAN

**СИТУАЦИОННЫЙ ПЛАН РАСПОЛОЖЕНИЯ IFC-ПГУ И ACWA-ПГУ**

масштаб 1 : 60 000




Руководитель предприятия Ш. Опаркулов

Государственный инспектор У. Нурдинов

Подпись подтверждаю ____________

... IFC-ПГУ 40 14 29.09 С 68 о 21.80 В

... ACWA ПГУ: 40 14 12.67 С 68 о 39.57 В

# APPENDIX D– TERMINATION OF LAND LEASE AGREEMENTS

**REPUBLIC OF UZBEKISTAN**

**KHOKIMIYAT (ADMINISTRATION) OF BOYAVUT DISTRICT OF SYRDARYA REGION**

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**ORDER**

*12th of February, 2020* *№96* *Boyavut district*

***Order on the reduction (change) of land area of the farm "Janiqul" which is located on the territory of "T. Latipov" Water Consumers Association.***

Based on the application of the head of the farm "Joniqul" K.Rustamov operating in the Bayavut district, and part 1 of Article 32 of the Law of the Republic of Uzbekistan "On Farming"

**KHOKIMIYAT DECIDES:**

1. To satisfy the application of K.Rustamov, the head of the farm "Joniqul" operating in the territory of T. Latipov WCA.

2. To return the land total of 10.0 hectares to the reserve fund, including 10.0 hectares of irrigated land, from the contour No. 254 of the farm "Joniqul" operating on the territory of T.Latipov WCA.

3. To lease a land of total 101,1 hectares for 48 years to the farm "Joniqul" from the territory of T. Latipov WCA as it indicated on the contour map according to contours number 239, 241, 254. The land total 101.0 hectares, includes irrigated lands 96.0 hectares, mulberry 2.0 hectares, lands occupied by ditches and ditches 2.7 hectares of land occupied by roads, 0.3 hectares of land.

4. District department Land Resources and State Cadastre should register the new long-term lease agreement of the farm "Joniqul" with the Bayavut district khokimiyat for a total of 101.0 hectares as per the documents submitted by the director of the "Joniqul" farm.

5. To instruct the State Tax Inspectorate of the district, the district statistics department: to make appropriate changes to the reports in accordance with the changes in the land of the farm "Joniqul".

6. To ask the district Council of People's Representatives to approve this order[1].

7. Control for implementation of this order is assigned to the deputy khokim (mayor) of the area concerning agriculture and water economy O.Turdiev.

**Khokim (mayor) of district** **O. Madaminov**

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[1] Please note that according to the current legislation (Resolution of the Council of the Senate of the Oliy Majlis of the Republic of Uzbekistan No.154-II, dated on December 30, 2010) order of Khokim (mayor) will enter into force after approval of district Council of People's Representatives

**REPUBLIC OF UZBEKISTAN**

**KHOKIMIYAT (ADMINISTRATION) OF SHIRIN TOWN OF SYRDARYA REGION**

**ORDER**

30th of January, 2020 №20 Shirin town

**Order on the return of the land plot temporarily attached to "Sarvinoz Servis Jaloliddin" Ltd by the decision of the khokim (mayor) of Shirin city dated September 19, 2018 No 470 to the reserve land fund of the city Khokimiyat (administration).**

Considering the official request of the Ministry of Energy of the Republic of Uzbekistan dated January 16, 2020 No. 03-10-271 on the allocation of land for the construction of CCGT in Shirin, Syrdarya region; and in accordance with paragraph 3 of Resolution No. 470 of September 19, 2020 and the legal opinion of the Chief Legal Adviser of the Shirin city khokimiyat (administration) of January 29, 2020; in accordance with Article 25 of the Law "On local government"

**KHOKIMIYAT DECIDES**

1. To accept as the basis the warning letter No. ZA-4 / 03-83 sent by "Shirin city khokimiyat" to "Sarvinos Servis Jaloliddin" LLC on January 27, 2020 and the legal conclusions of the chief legal adviser of Shirin city khokimiyat (administration) on January 29, 2020.

2. To return the land territory which was temporary allocated to “Sarvinos Servis Jaloliddin” Ltd on the territory of V.Ulugbek makhalla of Shirin city with total area 17.0 hectares for cultivation of agricultural products by the decision of the khokim (mayor) of Shirin town on September 19, 2018 No. 470 to the reserve land fund of the city khokimiyat (administration) .

3. To cancel the decision of the khokim (mayor) of the city from September 19, 2018 of No. 470 due to the return of the land area to the reserve land fund of the city khokimiyat (administration).

4. To B.Akhmadov, the leading specialist of the city administration, should :

-Instruct the head of "Sarvinos Servis Jaloliddin" Ltd Muminov Bakhtiyor and relevant organizations about termination of the decision of the khokim (mayor) of the city dated September 19, 2018, No 470.

5. Control of implementation of this resolution to assign to the deputy khokim (mayor) Z.Abduvahidov.

**Khokim (mayor) of the city** **A.Khojimatov**

# APPENDIX E – OVERALL PROJECT LAYOUT

厂区建构筑物一览表

BUILDING AND STRUCTURE LIST

| 编号 NO. | KKS | 名称 NAME |
|---|---|---|
| J01 | UMA | 汽机房 STEAM TURBINE HALL |
| J02 | UMB | 燃机房 GAS TURBINE HALL |
| J03 | UMX | 余热锅炉 H.R.S.G. |
| J04 | UCB | 集中控制楼 CENTRAL CONTROL BUILDING |
| J05 | UEN01 | 天然气供应及增压站 FUEL GAS SUPPLY AND BOOSTER STATION |
| J06 | UTF | 空压机房 AIR COMPRESS STATION |
| J07 | UEH | 油泵房 FUEL OIL PUMP HOUSE |
| J08 | UTA | 供热站 HEAT SUPPLY STATION |
| J09 | UEN02 | 天然气缓冲系统 NATURAL GAS BUFFER PIPE AREA |
| J10 | UTH | 辅助锅炉 AUXILIARY BOILER |
| J11 | UWD | 综合管架 PIPE RACK |
| D01 | UBF | 主变 STEP-UP TRANSFORMER |
| D02 | UBE | 高压厂变 UNIT AUXILIARY TRANSFORMER |
| D03 | UAB | 500/220kV 变电站 500/220kV SUBSTATION |
| H01 | UGD | 化废水处理区域 CHEMICAL WATER AND WASTEWATER TREATMENT PLANT |
| H02 | UTM | 制氢站 HYDROGEN STATION |
| H03 | UTN | 制氯间 CHLORINATION BUILDING |
| H04 | UGU | 废水浓缩区 WASTE WATER CONCENTRATION AREA |
| S01 | URA | 机力通风冷却塔 MECHANICAL DRAFT COOLING TOWER |
| S02 | UQA | 循环水泵房 CIRCULATING WATER PUMP HOUSE |
| S03 | UGB | 原水处理区域 RAW WATER TREATMENT PLANT |
| S04 | UGH | 雨水泵房 RAIN WATER PUMP HOUSE |
| S05 | UGA | 取水泵房 WATER INTAKE PUMP HOUSE |
| S06 | UGV | 生活污水处理站 SEWAGE WASTE TREATMENT STATION |
| S07 | UQM | 蒸发池 EVAPORATION POND |
| S08 | UGV01 | 综合管理站 INTEGRATED MANAGEMENT STATION |
| S09 | UGV02 | 机修车间 MACHINE REPAIR SHOP |
| S10 | UGB | 澄清水池 CLARIFIED WATER STORAGE POND |
| S11 | UPE | 冷却塔污水排水储存池 COOLING BLOWDOWN WATER STORAGE POND |
| U01 | USU | 材料库 MATERIAL STORAGE BUILDING |
| U02 | UST | 检修间 WORKSHOP BUILDING |
| U03 | UTS | 危化学品仓库 HAZARDOUS CHEMICALS STROAGE BUILDING |
| U04 | UYC | 管理办公楼 ADMINISTRATION BUILDING |
| U05 | UYP | 消防站 FIRE BRIGADE STATION |
| U06 | UYE | 警卫传达室 GATEHOUSE |
| U07 | UZD | 停车场 PARKING AREA |
| U08 | UYA | 生活建筑 SOCIAL BUILDING |

LEGEND

BUILDING

PERIMETER WALL

FENCE

ROAD

0m 10m 50m 100m

SCALE

| NO. | NAME |
|---|---|
| TP-01 | NATURAL GAS SUPPLY |
| TP-02 | DIESEL OIL SUPPLY |
| TP-03 | RIVER WATER INTAKE POINT |
| TP-04 | CLEAN STORM WATER DISCHARGE POINT |
| TP-05 | MAIN ACCESS ROAD |

NOTE:

1. THE AREA OF POWER PLANT WHTIN THE BOUNDARY WALL IS 33.1ha.
2. THE AREA OF SUBSTATION WHTIN THE BOUNDARY WALL IS 5.5ha.
3. ALL UNITS ARE IN METERS.
4. THE FGL FOR SUBSTATION AREA IS 310.8m.
5. THE FGL FOR POWER PLANT AREA IS 311.8m AND 310.8m;

ACWA Power

UZBEKISTAN COMBINED CYCLE POWER PROJECT

CGGC

CGGC INTERNATIONAL LTD

CHINA ENERGY ENGINEERING GROUP
ZHEJIANG ELECTRIC POWER DESGIN INSTITUTE CO., LTD.

TITLE

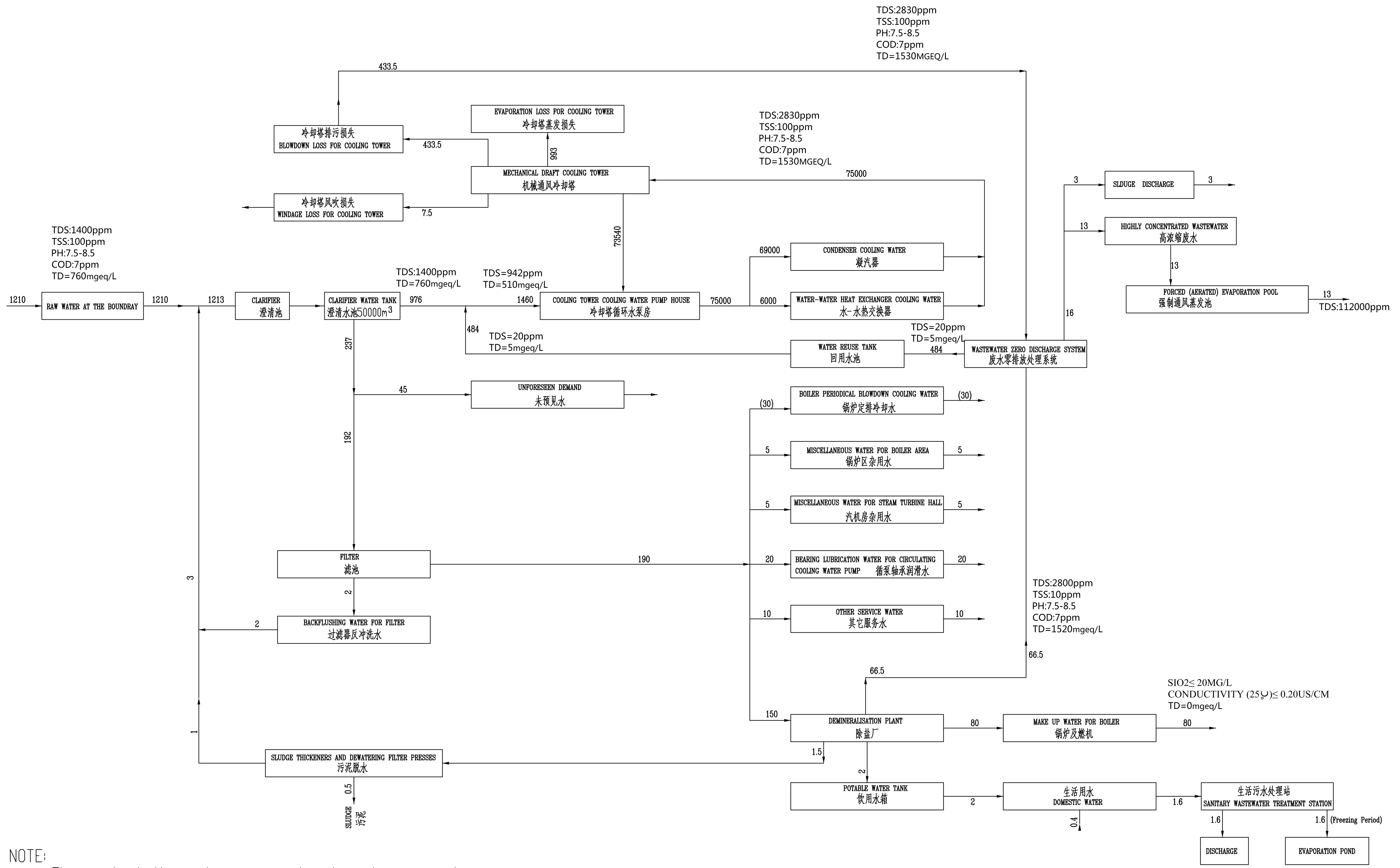
GENERAL LAYOUT OF POWER PLANT
OPTION 5

| | | | |
|---|---|---|---|
| APP'D BY | | DSN'D BY | |
| REV'D BY | | SCALE | |
| CHK'D BY | | DATE | 2020.09 |

DWG NO Z-01

REV D

# APPENDIX F– WATER BALANCE DIAGRAM




NOTE:

The content the water consumption based on operation of natural gas condition during 15℃,60%RH，977hpa

TD REFERS TO TOTAL HARDNESS

说明:

该水量平衡图基于15℃,60%RH，977hpa燃气工况时计算。

FOR REFERENCE

**ACWA Power**

UZBEKISTAN COMBINED CYCLE POWER PROJECT

CGGC INTERNATIONAL LTD

CGGC

CHINA ENERGY ENGINEERING GROUP
ZHEJIANG ELECTRIC POWER DESGIN INSTITUTE CO., LTD

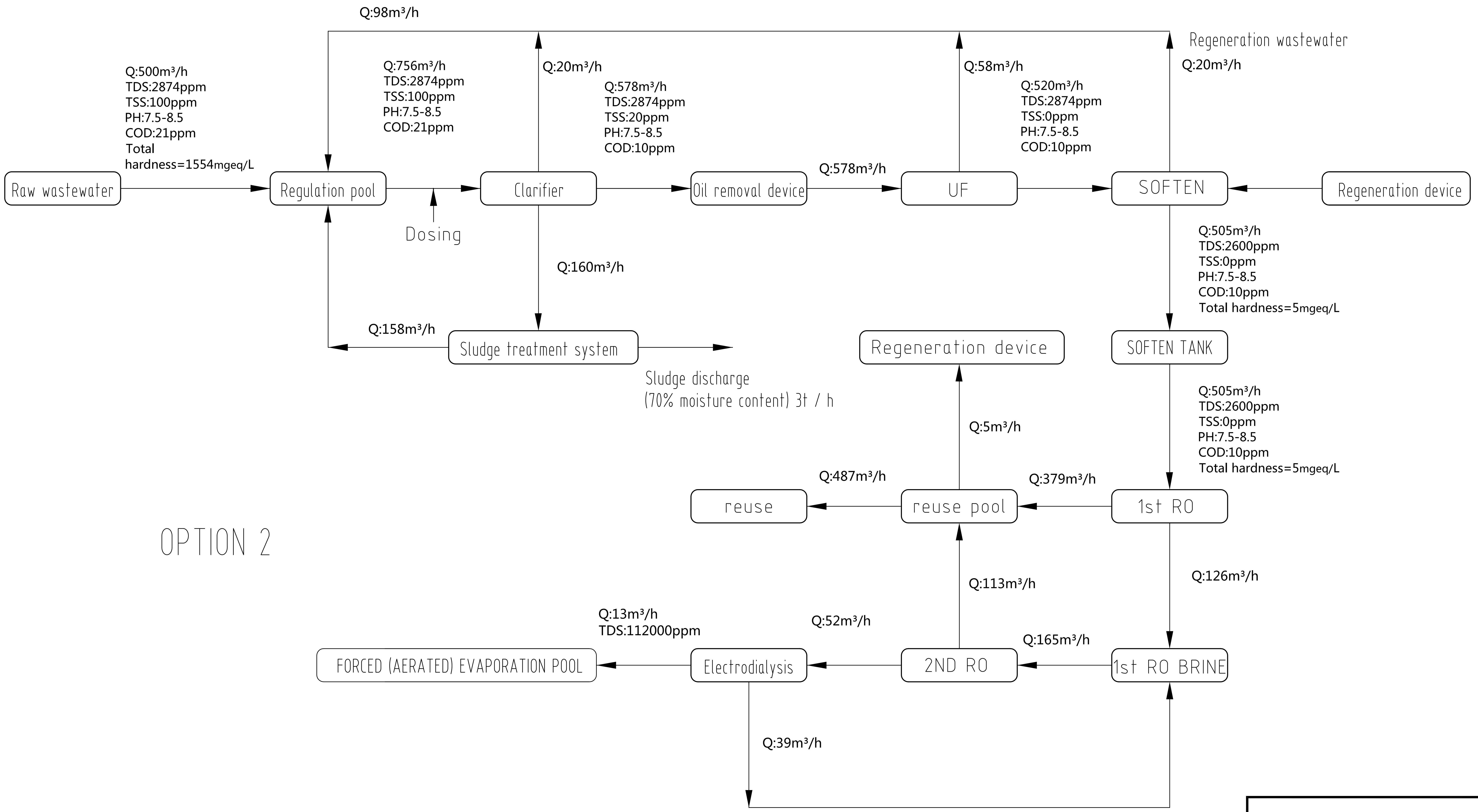
| | | | | | |
|---|---|---|---|---|---|
| APP'D BY | | DSN'D BY | | TITLE | WATER BALANCE DIAGRAM IN THE WHOLE PLANT |
| REV'D BY | | SCALE | / | | |
| CHK'D BY | | DATE | | DWG NO | S-01 |

REV C

CERTIFICATE OF DESIGN & EXPLORATION A133007109 B133007109

SIZE A1

# MASS FLOW(ZERO DISCHARGE SYSTEM)




OPTION 2

FOR REFERNCE

**ACWA Power**

UZBEKISTAN COMBINED CYCLE POWER PROJECT

**CGGC INTERNATIONAL LTD**

CGGC

CHINA ENERGY ENGINEERING GROUP
ZHEJIANG ELECTRIC POWER DESGIN INSTITUTE CO., LTD

| | | | |
|---|---|---|---|
| APP'D BY | | DSN'D BY | |
| REV'D BY | | SCALE | / |
| CHK'D BY | | DATE | |

TITLE: MASS FLOW(ZERO DISCHARGE SYSTEM)

DWG NO: S-05

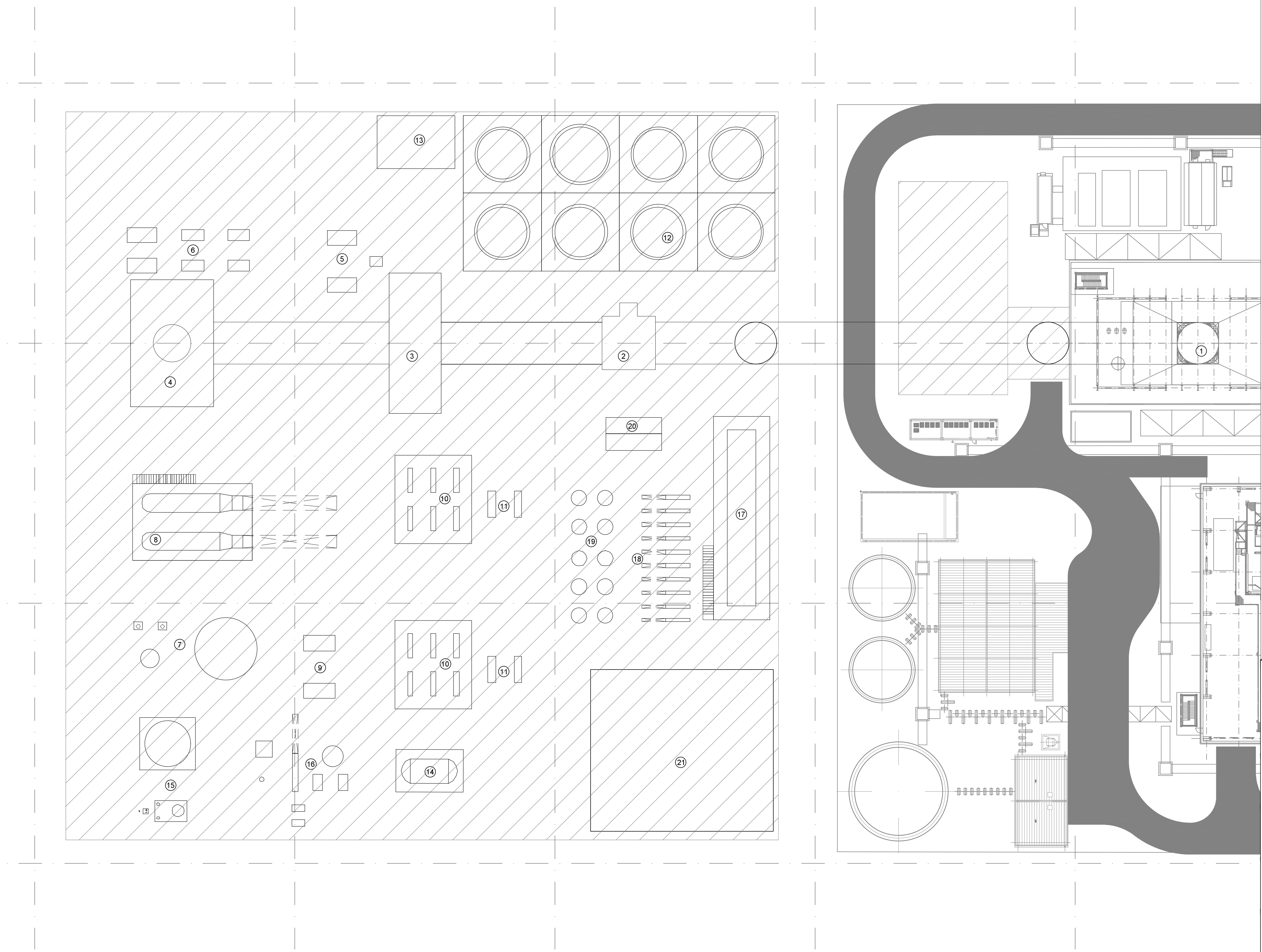
REV: 0

SIZE: A2

CERTIFICATE OF DESIGN & EXPLORATION

A133007109
B133007109
工勘甲212007004

# APPENDIX G - PROJECT CARBON CAPTURE STORAGE LAYOUT



GENERAL NOTES:

PRELIMINARY ARRANGEMENT OF MAIN CARBON CAPTURE EQUIPMENT IS SHOWN IN THIS DRAWING. REQUIRED RESERVE SPACE FOR CARBON CAPTURE PLANT SHALL BE RE-EVALUATED DURING DETAILED ENGINEERING PHASE.

REFERENCE DOCUMENTS:

BENGIE_V-IDO-RG-0855_00 Power Plant Carbon Capture Readiness

| ID | DESCRIPTION |
|---|---|
| 1 | HRSG STACK |
| 2 | EXHAUST GAS FAN |
| 3 | DIRECT CONTACT COOLER (DCC) |
| 4 | ABSORBER COLUMN |
| 5 | DCC PUMPS AND COOLERS |
| 6 | ABSORBER COLUMN PUMPS (RICH SOLVENT PUMPS) AND COOLERS |
| 7 | STRIPPER COLUMN |
| 8 | REBOILER |
| 9 | LEAN SOLVENT PUMPS |
| 10 | REGENERATIVE HEAT EXCHANGER |
| 11 | LEAN SOLVENT COOLERS |
| 12 | COOLING TOWER |
| 13 | COOLING TOWER PUMPS |
| 14 | RECLAIMER SYSTEM |
| 15 | SOLVENT STORAGE TANK |
| 16 | SOLVENT STORAGE PUMPS |
| 17 | CO2 COMPRESSOR BUILDING |
| 18 | COMPRESSOR INTERSTAGE COOLERS |
| 19 | KNOCKOUT DRAINS |
| 20 | CO2 PURIFICATION SYSTEM |
| 21 | WATER TREATMENT PLANT |

DIN A-1 SIZE (841x594)

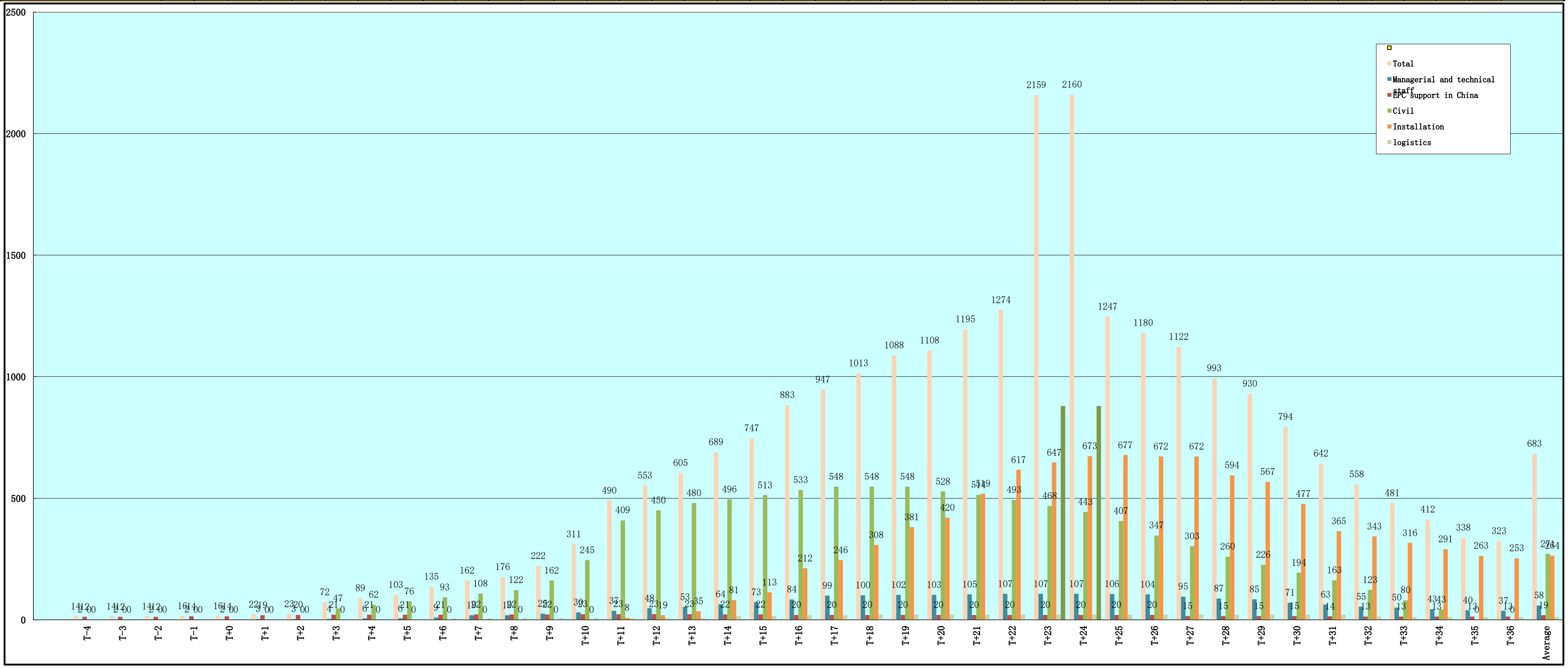
# APPENDIX H– PROJECT MANPOWER HISTOGRAM

# Uzbekistan Syrdarya Project Manpower Schedule

28.25%

| Type | T-4 | T-3 | T-2 | T-1 | T+0 | T+1 | T+2 | T+3 | T+4 | T+5 | T+6 | T+7 | T+8 | T+9 | T+10 | T+11 | T+12 | T+13 | T+14 | T+15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total | 14 | 14 | 14 | 16 | 16 | 22 | 23 | 72 | 89 | 103 | 135 | 162 | 176 | 222 | 311 | 490 | 553 | 605 | 689 | 747 |
| Chinese | 14 | 14 | 14 | 16 | 16 | 22 | 23 | 42 | 54 | 64 | 81 | 97 | 105 | 132 | 193 | 308 | 341 | 386 | 450 | 503 |
| Local | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 30 | 35 | 39 | 54 | 65 | 71 | 90 | 118 | 182 | 212 | 219 | 239 | 244 |
| Managerial and technical staff | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 4 | 6 | 6 | 9 | 19 | 19 | 25 | 30 | 37 | 48 | 53 | 64 | 73 |
| Chinses | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 4 | 6 | 6 | 9 | 18 | 18 | 23 | 28 | 32 | 43 | 48 | 56 | 65 |
| Local | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 2 | 5 | 5 | 5 | 8 | 8 |
| EPC support in China | 12 | 12 | 12 | 14 | 14 | 19 | 20 | 21 | 21 | 21 | 21 | 22 | 22 | 22 | 23 | 23 | 23 | 23 | 22 | 22 |
| Civil | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 47 | 62 | 76 | 93 | 108 | 122 | 162 | 245 | 409 | 450 | 480 | 496 | 513 |
| Chinese | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | 27 | 37 | 46 | 51 | 59 | 81 | 136 | 239 | 251 | 277 | 287 | 300 |
| Local | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 30 | 35 | 39 | 47 | 57 | 63 | 81 | 109 | 170 | 199 | 203 | 209 | 213 |
| Installation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 19 | 35 | 81 | 113 |
| Chinese | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 18 | 31 | 74 | 105 |
| Local | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 7 | 8 |
| local laborers | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| logistics | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 15 | 15 |
| Chinese | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 6 | 6 | 6 | 6 | 6 | 6 | 7 | 11 | 11 |
| Local | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 15 | 15 |

| Type | T+16 | T+17 | T+18 | T+19 | T+20 | T+21 | T+22 | T+23 | T+24 | T+25 | T+26 | T+27 | T+28 | T+29 | T+30 | T+31 | | | | | | verage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total | 883 | 947 | 1013 | 1088 | 1108 | 1195 | 1274 | 2159 | 2160 | 1247 | 1180 | 1122 | 993 | 930 | 794 | 642 | | | | | | 683 |
| Chinese | 620 | 686 | 734 | 810 | 839 | 940 | 1024 | 1037 | 1043 | 1026 | 980 | 946 | 822 | 771 | 654 | 518 | | | | | | 489 |
| Local | 263 | 261 | 279 | 278 | 269 | 255 | 250 | 1122 | 1117 | 221 | 200 | 176 | 171 | 159 | 140 | 124 | | | | | | 193 |
| Managerial and technical staff | 84 | 99 | 100 | 102 | 103 | 105 | 107 | 107 | 107 | 106 | 104 | 95 | 87 | 85 | 71 | 63 | 55 | 50 | 43 | 40 | 37 | 58 |
| Chinses | 74 | 89 | 90 | 92 | 93 | 95 | 97 | 97 | 97 | 96 | 94 | 85 | 77 | 75 | 64 | 56 | 48 | 43 | 41 | 38 | 35 | 52 |
| Local | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 7 | 7 | 7 | 7 | 2 | 2 | 2 | 6 |
| EPC support in China | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 15 | 15 | 15 | 15 | 14 | 13 | 13 | 13 | 13 | 13 | 19 |
| Civil | 533 | 548 | 548 | 548 | 528 | 514 | 493 | 468 | 443 | 407 | 347 | 303 | 260 | 226 | 194 | 163 | 123 | 80 | 43 | 0 | 0 | 271 |
| Chinese | 311 | 329 | 329 | 332 | 323 | 329 | 318 | 303 | 283 | 263 | 224 | 204 | 168 | 144 | 122 | 100 | 73 | 51 | 28 | 0 | 0 | 163 |
| Local | 222 | 219 | 219 | 216 | 205 | 185 | 175 | 165 | 160 | 144 | 123 | 99 | 92 | 82 | 72 | 63 | 50 | 29 | 15 | 0 | 0 | 108 |
| Installation | 212 | 246 | 308 | 381 | 420 | 519 | 617 | 647 | 673 | 677 | 672 | 672 | 594 | 567 | 477 | 365 | 343 | 316 | 291 | 263 | 253 | 264 |
| Chinese | 200 | 233 | 279 | 350 | 387 | 480 | 573 | 601 | 627 | 631 | 626 | 626 | 546 | 521 | 437 | 332 | 312 | 292 | 275 | 249 | 239 | 245 |
| Local | 12 | 13 | 29 | 31 | 33 | 39 | 44 | 46 | 46 | 46 | 46 | 46 | 48 | 46 | 40 | 33 | 31 | 24 | 16 | 14 | 14 | 19 |
| local laborers | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 880 | 880 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 48 |
| logistics | 19 | 19 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 13 | 11 | 11 | 11 | 11 | 13 |
| Chinese | 15 | 15 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 11 | 11 | 11 | 11 | 9 | 10 |
| Local | 19 | 19 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 13 | 11 | 11 | 11 | 11 | 13 |



# APPENDIX I– STAKEHOLDER CONSULTATION LETTERS

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**№ UZB-ACWA-CCGT-20/20/32**

**22.06.2020**

**АО «Национальные электрические сети Узбекистана»**

Компания ACWA Power при помощи ООО «ACWA Power Sirdarya» (Ташкент) заключила 25-летнее соглашение о покупке электроэнергии с АО «Национальные электрические сети Узбекистана» на разработку газовой турбины с комбинированным циклом мощностью 1500 МВт (ПГУ). Общая площадь, выделенная для проекта, составляет 75 гектаров. Проект будет расположен примерно в 0.3 км к северо-востоку от города Ширин, напротив существующей нефтегазовой теплоэлектростанции мощностью 3000 МВт (Сырдарьинская ТЭС).

Исходя из требований, установленных действующим законодательством, ACWA Power должна сдать в Государственный комитет Республики Узбекистан по экологии и охране окружающей среды (регулирующий орган) отчет об оценке воздействии на окружающую среду (ОВОС), и получить экологическую лицензию до начала проекта. Вследствие этого, в рамках ОВОС корпоративные экологические и социальные консультанты ACWA Power «5 Capitals Environmental & Management Consulting» (Дубай, ОАЭ) назначили Juru Energy (Ташкент, Узбекистан) для проведения необходимых экологических и социальных исследований, а также сбор данных, включая представление ОВОС регулирующему органу.

Учитывая вышеизложенное, Juru Energy, просит АО «Национальные электрические сети Узбекистана» оказать содействие в предоставлении информации, которая может быть необходима для включения в процесс ОВОС, а также любые другие комментарии, которые могут быть необходимы на этапах строительства и эксплуатации ACWA Power Syrdarya 1500 МВ ПГУ.

Ваши предложения и комментарии могут быть направлены координатору проекта Умиде Розумбетовой через электронную почту u.rozumbeova@juruenergy.com, а также по телефону +99871 202-04-40.

Благодарим Вас за сотрудничество.

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Juru Energy

**Приложение к письму №**
**UZB-ACWA-CCGT-20/20/32**
**22.06.2020**

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**№ UZB-ACWA-CCGT-20/20/31**

**22.06.2020**

**АО «Сырдарьинская ТЭС»**

Компания ACWA Power при помощи ООО «ACWA Power Sirdarya» (Ташкент) заключила 25-летнее соглашение о покупке электроэнергии с АО «Национальные электрические сети Узбекистана» на разработку газовой турбины с комбинированным циклом мощностью 1500 МВт (ПГУ). Общая площадь, выделенная для проекта, составляет 75 гектаров. Проект будет расположен примерно в 0.3 км к северо-востоку от города Ширин, напротив существующей нефтегазовой теплоэлектростанции мощностью 3000 МВт (Сырдарьинская ТЭС).

Исходя из требований, установленных действующим законодательством, ACWA Power должна сдать в Государственный комитет Республики Узбекистан по экологии и охране окружающей среды (регулирующий орган) отчет об оценке воздействии на окружающую среду (ОВОС), и получить экологическую лицензию до начала проекта. Вследствие этого, в рамках ОВОС корпоративные экологические и социальные консультанты ACWA Power «5 Capitals Environmental & Management Consulting» (Дубай, ОАЭ) назначили Juru Energy (Ташкент, Узбекистан) для проведения необходимых экологических и социальных исследований, а также сбор данных, включая представление ОВОС регулирующему органу.

Учитывая вышеизложенное, Juru Energy, просит АО «Сырдарьинская ТЭС» оказать содействие в предоставлении информации, которая может быть необходима для включения в процесс ОВОС, а также любые другие комментарии, которые могут быть необходимы на этапах строительства и эксплуатации ACWA Power Syrdarya 1500 МВ ПГУ.

Ваши предложения и комментарии могут быть направлены координатору проекта Умиде Розумбетовой через электронную почту u.rozumbeova@juruenergy.com, а также по телефону +99871 202-04-40.

Благодарим Вас за сотрудничество

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**UZB-ACWA-CCGT-20/20/31**
**22.06.2020**

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**№ UZB-ACWA-CCGT-20/20/30**

**22.06.2020**

**АО «Узтрансгаз»**

Компания ACWA Power при помощи ООО «ACWA Power Sirdarya» (Ташкент) заключила 25-летнее соглашение о покупке электроэнергии с АО «Национальные электрические сети Узбекистана» на разработку газовой турбины с комбинированным циклом мощностью 1500 МВт (ПГУ). Общая площадь выделенная для проекта, составляет 75 гектаров. Проект будет расположен примерно в 0,3 км к северо-востоку от города Ширин, напротив существующей нефтегазовой теплоэлектростанции мощностью 3000 МВт (Сырдарьинская ТЭС)

Исходя из требований, установленных действующим законодательством, ACWA Power должна сдать в Государственный комитет Республики Узбекистан по экологии и охране окружающей среды (регулирующий орган) отчет об оценке воздействии на окружающую среду (ОВОС), и получить экологическую лицензию до начала проекта. Вследствие этого, в рамках ОВОС корпоративные экологические и социальные консультанты ACWA Power «5 Capitals Environmental & Management Consulting» (Дубай, ОАЭ) назначили Juru Energy (Ташкент, Узбекистан) для проведения необходимых экологических и социальных исследований, а также сбор данных, включая представление ОВОС регулирующему органу.

Учитывая вышеизложенное, Juru Energy, просит АО «Узтрансгаз» оказать содействие в предоставлении информации, которая может быть необходима для включения в процесс ОВОС, а также любые другие комментарии, которые могут быть необходимы на этапах строительства и эксплуатации ACWA Power Syrdarya 1500 МВ ПГУ.

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Благодарим Вас за сотрудничество.

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**22.06.2020**

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**№ UZB-ACWA-CCGT-20/20/33**

**22.06.2020**

**Государственный комитет Республики Узбекистан по земельным ресурсам, геодезии, картографии и государственному кадастру**

Компания ACWA Power при помощи ООО «ACWA Power Sirdarya» (Ташкент) заключила 25-летнее соглашение о покупке электроэнергии с АО «Национальные электрические сети Узбекистана» на разработку газовой турбины с комбинированным циклом мощностью 1500 МВт (ПГУ). Общая площадь, выделенная для проекта, составляет 75 гектаров. Проект будет расположен примерно в 0,3 км к северо-востоку от города Ширин, напротив существующей нефтегазовой теплоэлектростанции мощностью 3000 МВт (Сырдарьинская ТЭС).

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Учитывая вышеизложенное, Juru Energy, просит Государственный комитет Республики Узбекистан по земельным ресурсам, геодезии, картографии и государственному кадастру оказать содействие в предоставлении информации, которая может быть необходима для включения в процесс ОВОС, а также любые другие комментарии, которые могут быть необходимы на этапах строительства и эксплуатации ACWA Power Syrdarya 1500 МВ ПГУ.

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Благодарим Вас за сотрудничество,

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Juru Energy

**Приложение к письму №**
**UZB-ACWA-CCGT-20/20/33**
**22.06.2020**


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**№ UZB-ACWA-CCGT-20/20/36**

**22.06.2020**

**Министерство внутренних дел Республики Узбекистан**

Компания ACWA Power при помощи ООО «ACWA Power Sirdarya» (Ташкент) заключила 25-летнее соглашение о покупке электроэнергии с АО «Национальные электрические сети Узбекистана» на разработку газовой турбины с комбинированным циклом мощностью 1500 МВт (ПГУ). Общая площадь, выделенная для проекта, составляет 75 гектаров. Проект будет расположен примерно в 0.3 км к северо-востоку от города Ширин, напротив существующей нефтегазовой теплоэлектростанции мощностью 3000 МВт (Сырдарьинская ТЭС).

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Благодарим Вас за сотрудничество.

**Хушнуджон Рахимберганов**

Hushnud R. Rahiberganov

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**Приложение к письму №**
**UZB-ACWA-CCGT-20/20/36**
**22.06.2020**

# Juru Energy

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info@juruenergy.com

**№ UZB-ACWA-CCGT-20/20/39**

**22.06.2020**

**Министерство сельского хозяйства
Республики Узбекистан**

Компания ACWA Power при помощи ООО «ACWA Power Sirdarya» (Ташкент) заключила 25-летнее соглашение о покупке электроэнергии с АО «Национальные электрические сети Узбекистана» на разработку газовой турбины с комбинированным циклом мощностью 1500 МВт (ПГУ). Общая площадь, выделенная для проекта, составляет 75 гектаров. Проект будет расположен примерно в 0.3 км к северо-востоку от города Ширин, напротив существующей нефтегазовой теплоэлектростанции мощностью 3000 МВт (Сырдарьинская ТЭС).

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**Хушнуджон Рахимберганов**

Hushnud R. Rahiberganov

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**Приложение к письму №**
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**22.06.2020**

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**№ UZB-ACWA-CCGT-20/20/37**

**22.06.2020**

**Министерство здравоохранения Республики Узбекистан**

Компания ACWA Power при помощи ООО «ACWA Power Sirdarya» (Ташкент) заключила 25-летнее соглашение о покупке электроэнергии с АО «Национальные электрические сети Узбекистана» на разработку газовой турбины с комбинированным циклом мощностью 1500 МВт (ПГУ). Общая площадь, выделенная для проекта, составляет 75 гектаров. Проект будет расположен примерно в 0,3 км к северо-востоку от города Ширин, напротив существующей нефтегазовой теплоэлектростанции мощностью 3000 МВт (Сырдарьинская ТЭС).

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Hushnud R. Rahibergenov

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**Приложение к письму №**
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**№ UZB-ACWA-CCGT-20/20/40**

**22.06.2020**

**Министерство водного хозяйства Республики Узбекистан**

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**Приложение к письму №**
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**22.06.2020**

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**№ UZB-ACWA-CCGT-20/20/34**

**22.06.2020**

**Министерство занятости и трудовых отношений Республики Узбекистан**

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Juru Energy

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**№ UZB-ACWA-CCGT-20/20/38**

**22.06.2020**

**Министерство транспорта**
**Республики Узбекистан**

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**Приложение к письму №**
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**22.06.2020**

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№ UZB-ACWA-CCGT-20/20/35

22.06.2020

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Juru Energy

**Приложение к письму №**
**UZB-ACWA-CCGT-20/20/35**
**22.05.2020**

# APPENDIX J– AMBIENT AIR QUALITY MONITORING RESULTS

Служба мониторинга загрязнения природной среды Узгидромета (СМЗ)
Лаборатория мониторинга загрязнения атмосферного воздуха (ЛМЗАВ)
г.Ташкент, ул. Бодомзор йули 1-й проезд, 72, тел 237-15-47, 150-85-02

«Утверждаю»
Начальник СМЗ
М.А. Плачев
28 мая 2020 г.

**Протокол № 7**
**лабораторного анализа проб атмосферного воздуха.**

Протокол лабораторного анализа проб атмосферного воздуха, отобранных при экологическом мониторинге качества воздуха в Сырдарьинской области

*Результаты анализов приведены в таблице.*

| Дата отбора | Время отбора | $NO_2$ мг/м$^3$ | $SO_2$ мг/м$^3$ | CO мг/м$^3$ | Пыль мг/м$^3$ |
|---|---|---|---|---|---|
| 21.05.20 | 10:20 | 0,00 | 0,001 | 3,3 | 0,33 |
| | 13:00 | 0,00 | 0,001 | 2,7 | |
| | 16:00 | 0,00 | 0,000 | 2,3 | |
| | ***Ср.с.*** | ***0,00*** | ***0,001*** | ***2,8*** | |
| 22.05.20 | 09:20 | 0,02 | 0,001 | 3,9 | 0,30 |
| | 13:00 | 0,01 | 0,007 | 3,7 | |
| | 16:00 | 0,01 | 0,002 | 3,5 | |
| | ***Ср.с.*** | ***0,01*** | ***0,003*** | ***3,4*** | |
| 23.05.20 | 09:45 | 0,00 | 0,001 | 3,9 | 0,35 |
| | 13:45 | 0,01 | 0,003 | 4,8 | |
| | 15:45 | 0,00 | 0,001 | 3,2 | |
| | ***Ср.с.*** | ***0,00*** | ***0,002*** | ***4,0*** | |
| 24.05.20 | 10:00 | 0,00 | 0,003 | 5,0 | 0,30 |
| | 13:00 | 0,00 | 0,008 | 3,0 | |
| | 15:50 | 0,00 | 0,004 | 3,2 | |
| | ***Ср.с.*** | ***0,00*** | ***0,005*** | ***3,7*** | |
| 25.05.20 | 09:40 | 0,00 | 0,002 | 2,3 | 0,20 |
| | 12:40 | 0,00 | 0,000 | 2,3 | |
| | 16:10 | 0,00 | 0,003 | 1,3 | |
| | ***Ср.с.*** | ***0,00*** | ***0,002*** | ***2,0*** | |
| 26.05.20 | 10:55 | 0,00 | 0,001 | 4,2 | 0,23 |
| | 13:00 | 0,00 | 0,001 | 3,4 | |
| | 15:50 | 0,00 | 0,003 | 3,9 | |
| | ***Ср.с.*** | ***0,00*** | ***0,002*** | ***3,8*** | |
| 27.05.20 | 09:30 | 0,01 | 0,003 | 3,7 | 0,13 |
| | 12:30 | 0,00 | 0,002 | 3,5 | |
| | 15:30 | 0,00 | 0,005 | 3,5 | |
| | ***Ср.с.*** | ***0,00*** | ***0,003*** | ***3,6*** | |
| **ПДК ср.с., мг/м$^3$** | | **0,06** | **0,2** | **4** | **0,35** |

P.S.: *Во время отбора проб атмосферного воздуха превышение среднесуточных предельно допустимых значений по определяемым ингредиентам не наблюдалось.*

Начальник ЛМЗАВ Г.Н. Гранкина

Инженер 1 кат. ЛМЗАВ Н.К.Теряева

Uzhydromet Environmental Monitoring Service (EMS)
Laboratory for Monitoring Air Pollution (LMAP)
Tashkent city, Bodomzor street, 72, tel. 237-15-47, 150-85-02

## Protocol of sampling atmospheric air №7

Protocol of laboratory analysis of atmospheric air samples taken during environmental monitoring of air quality in the Syrdarya region

*The results of the analyzes are shown in the table.*

| Measurement date | Measurement time | $NO_2$, mg/m$^3$ | SO, mg/m$^3$ | CO, mg/m$^3$ | Total suspended particles mg/m$^3$ |
|---|---|---|---|---|---|
| 05/21/20 | 10:20 | 0.00 | 0.001 | 3.3 | 0.33 |
| | 13:00 | 0.00 | 0.001 | 2.7 | |
| | 16:00 | 0.00 | 0,000 | 2,3 | |
| | *Daily average* | *0.00* | *0.001* | *2,8* | |
| 05/22/20 | 09:20 | 0.02 | 0.001 | 3.9 | 0.30 |
| | 13:00 | 0.01 | 0.007 | 3,7 | |
| | 16:00 | 0.01 | 0.002 | 3,5 | |
| | *Daily average* | *0.01* | *0.003* | *3.4* | |
| 05/23/20 | 09:45 | 0.00 | 0.001 | 3.9 | 0.35 |
| | 13:45 | 0.01 | 0.003 | 4.8 | |
| | 15:45 | 0.00 | 0.001 | 3.2 | |
| | *Daily average* | *0.00* | *0.002* | *4.0* | |
| 05/24/20 | 10 a.m. | 0.00 | 0.003 | 5,0 | 0.30 |
| | 13:00 | 0.00 | 0.008 | 3.0 | |
| | 15:50 | 0.00 | 0.004 | 3.2 | |
| | *Daily average.* | *0.00* | *0.005* | *3,7* | |
| 05/25/20 | 09:40 | 0.00 | 0.002 | 2,3 | 0.20 |
| | 12:40 | 0.00 | 0,000 | 2,3 | |
| | 16:10 | 0.00 | 0.003 | 1.3 | |
| | *Daily average* | *0.00* | *0.002* | *2.0* | |
| 05/26/20 | 10:55 | 0.00 | 0.001 | 4.2 | 0.23 |
| | 13:00 | 0.00 | 0.001 | 3.4 | |
| | 15:50 | 0.00 | 0.003 | 3.9 | |
| | *Daily average* | *0.00* | *0.002* | *3.8* | |
| 05/27/20 | 09:30 | 0.01 | 0.003 | 3,7 | 0.13 |
| | 12:30 | 0.00 | 0.002 | 3,5 | |
| | 15:30 | 0.00 | 0.005 | 3,5 | |
| | *Dailyaverage* | *0.00* | 0.003 | *3.6* | |
| **MPC , mg/m$^3$** | | **0.06** | **0.2** | **4** | **0.35** |

PS: *During sampling of atmospheric air, the excess of daily average maximum allowable values for the determined ingredients was not observed.*

Head of LAMP T.N. Grankina

1st category Engineer LAMP N.K. Teryaeva

Служба мониторинга загрязнения природной среды Узгидромета (СМЗ)

Лаборатория мониторинга загрязнения атмосферного воздуха (ЛМЗАВ)
г.Ташкент, ул. 1-й проезд Бодомзор йули, 72, тел 237-15-47, 150-85-02

Утверждаю
Начальник СМЗ
М.М. Плоцен
28 мая 2020 г.

## Акт отбора проб атмосферного воздуха № 6

Лабораторные испытания объекта: Сырдарьинская область. Сырдарьинская ТЭС
Полное наименование Заказчика его адрес: Juru Energy Consulting
Цель, задачи испытаний (измерений): Экологический мониторинг
НД на объекты испытаний (измерений): СанПиН 0293-11
Описание и идентификация образцов: Диоксид азота, диоксид серы, оксид углерода, пыль
Дата отбора образцов: 21-27 мая 2020 г.
Использованное оборудование:
1.Аспиратор АПВ-4 (диоксид азота, диоксид серы)
2.Аспиратор АВА-3 (пыль)
3.Барометр-анероид М-67 (атмосферное давление)
4.Психрометр ВМ-4м (температура)
5.Анемометр (скорость ветра)
6.Оксид углерода отбирался в камеры и анализировался в лаборатории на ЭЛАН-СО-50

Проведение испытаний (измерений)

| Дата отбора | Время отбора | Тем-ра, $^0$C | Давление, мм.рт.ст. | Скорость ветра, м/с | Направление ветра |
|---|---|---|---|---|---|
| 21.05.2020 | 10:20<br>13:00<br>16:00 | + 22<br>+ 28<br>+ 29 | 735<br>734<br>734 | 1,4<br>1,1<br>1,4 | З<br>С<br>СВ |
| 22.05.2020 | 09:20<br>13:00<br>16:00 | + 27<br>+ 30<br>+ 32 | 734<br>733<br>732 | 0,8<br>0.5<br>3,0 | В, ЮВ<br>В, ЮВ<br>С, СЗ |
| 23.05.2020 | 09:45<br>13:45<br>15:45 | + 26<br>+ 32<br>+ 34 | 730<br>731<br>730 | 2,0<br>1,0<br>2,0 | В<br>С<br>З |
| 24.05.2020 | 10:00<br>13:00<br>15:50 | + 31<br>+ 36<br>+ 35 | 730<br>729<br>729 | 0,3<br>0,3<br>1,0 | В, СВ<br>Ю, ЮВ<br>Ю |
| 25.05.2020 | 09:40<br>12:40<br>16:10 | + 33<br>+ 36<br>+ 36 | 730<br>730<br>730 | 0,5<br>штиль<br>1,5 | В<br>-<br>С, СЗ |
| 26.05.2020 | 10:55<br>13:00<br>15:50 | + 34<br>+ 37<br>+ 36 | 729<br>728<br>728 | 2,8<br>штиль<br>0,3 | ЮВ<br>-<br>Ю |
| 27.05.2020 | 09:30<br>12:30<br>15:30 | + 33<br>+ 37<br>+ 37 | 729<br>728<br>728 | 1,3<br>1,7<br>0,5 | ЮВ<br>З, ЮЗ<br>ЮВ |

Измерения проводил:
Начальник ЛМЗАВ (подпись) Г.Н. Гранкина

Инженер 1 кат. ЛМЗАВ (подпись) Н.К. Теряева

Uzhydromet Environmental Monitoring Service (EMS)
Laboratory for Monitoring Air Pollution (LMAP)
Tashkent city, Bodomzor street, 72, tel. 237-15-47, 150-85-02

# Act of sampling atmospheric air №6

Laboratory tests of the object: Syrdarya region.
Purpose, tasks of tests (measurements): AQ monitoring
Regulator documents on the objects of tests (measurements): SanPiN 0293-11
Description and identification of samples: Nitrogen dioxide, sulfur dioxide, carbon monoxide, TSP.
Date of sampling: May 21-27, 2020.
Used equipment:

1. Aspirator APV-4 (nitrogen dioxide, sulfur dioxide)
2. AspiAVA-3 radiator (TSP)
3. Aneroid barometer M-67 (Atmosphere pressure)
4. Psychrometer VM-4m (temperature)
5. Anemometer (wind speed)
6. Carbon monoxide was taken into chambers and analyzed in a laboratory at ELAN-CO-50

Spot monitoring (measureements)

| Measurement date | Measurement time | ° C | Pressure, mmHg. | Wind speed, m / s | Direction of the wind |
|---|---|---|---|---|---|
| 05/21/2020 | 10:20 | + | 735 | .1,4 | West |
| | 13:00 | + | 734 | 1,1 | North |
| | 16:00 | + | 734 | 1.4 | North-East |
| | 09:20 | + | 734 | 0.8 | East, South-East |
| | 13:00 | + | 733 | 0.5 | East, South-East |
| 05/22/2020 | 16:00 | + | 732 | 3.0 | North, North-West |
| 05/23/2020 | 09:45 | + | 730 | 2.0 | East |
| | 13:45 | + | 731 | 1,0 | North |
| | 15:45 | + | 730 | 2.0 | West |
| 05/24/2020 | 10:00 | + | 730 | 0.3 | East, North-East |
| | 13:00 | + | 729 | 0.3 | South, South-East |
| | 15:50 | + | 729 | 1,0 | South |
| 05/25/2020 | 09:40 | + | 730 | 0.5 | East |
| | 12:40 | + | 730 | calm | - |
| | 16:10 | + | 730 | 1,5 | North, North-West |
| 05/26/2020 | 10:55 | + | 729 | 2,8 | South-East |
| | 13:00 | + | 728 | calm | - |
| | 15:50 | + | 728 | 0.3 | South |
| 05/27/2020 | 09:30 | + | 729 | 1.3 | South-East |
| | 12:30 | + | 728 | 1.7 | West, South-West |
| | 15:30 | + | 728 | 0.5 | South-East |

Measurements were carried out:

Head of LAMP (подпись) G.N. Grankina

1st category Engineer LAMP (подпись) N.K. Teryaeva

gradko environmental
(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 e-mail:diffusion@gradko.co.uk

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# LABORATORY ANALYSIS REPORT

## DETERMINATION OF OZONE IN DIFFUSION TUBES BY ION CHROMATOGRAPHY

**REPORT NUMBER** O03404R

**BOOKING IN REFERENCE No** O03404

**DESPATCH NOTE No** 78688

**CUSTOMER** Juru Energy Ltd Attn: Oleg Khegay
Suite 1 Lower Ground Floor
1 George Yard
London
EC3V 9DF

**DATE SAMPLES RECEIVED** 16/06/2020

**JOB NUMBER**

| Location | Sample Number | Date Exposed* | Date Finished* | Exposure Hours* | $NO_3^-$ µg/ml | µg/ml $NO_3^-$ - Blank | $O_3$ µg/m$^3$* | $O_3$ ppb* |
|---|---|---|---|---|---|---|---|---|
| DT6 | 1576600 | 20/05/2020 | 11/06/2020 | 529.00 | 1.06 | 1.05 | 114.76 | 57.38 |
| DT6 | 1576601 | 20/05/2020 | 11/06/2020 | 529.00 | 1.04 | 1.03 | 112.64 | 56.32 |
| DT5 | 1576602 | 20/05/2020 | 11/06/2020 | 529.00 | 0.95 | 0.94 | 102.78 | 51.39 |
| DT5 | 1576603 | 20/05/2020 | 11/06/2020 | 529.00 | 0.89 | 0.88 | 96.23 | 48.12 |
| DT1 | 1576604 | 20/05/2020 | 11/06/2020 | 529.00 | 0.88 | 0.87 | 94.86 | 47.43 |
| DT1 | 1576605 | 20/05/2020 | 11/06/2020 | 529.00 | 0.99 | 0.98 | 107.17 | 53.59 |
| DT4 | 1576607 | 20/05/2020 | 11/06/2020 | 529.00 | 0.88 | 0.87 | 95.39 | 47.69 |
| DT4 | 1576608 | 20/05/2020 | 11/06/2020 | 529.00 | 0.88 | 0.87 | 94.99 | 47.49 |
| DT3 | 1576609 | 20/05/2020 | 11/06/2020 | 529.50 | 0.85 | 0.84 | 91.29 | 45.65 |
| DT3 | 1576610 | 20/05/2020 | 11/06/2020 | 529.50 | 0.94 | 0.92 | 100.97 | 50.48 |
| DT2 | 1576611 | 20/05/2020 | 11/06/2020 | 529.50 | 1.24 | 1.23 | 134.49 | 67.25 |
| DT2 | 1576612 | 20/05/2020 | 11/06/2020 | 529.50 | 1.34 | 1.33 | 144.72 | 72.36 |
| Laboratory Blank | | | | | 0.01 | | | |

**Comment: Results are blank subtracted**

**Exposure times were calculated from start and finish times given on the exposure sheet.**

**Tubes 1576605, 1576609 & 1576612 were dirty when received. Results may be compromised.**

**Overall M.U.** ±12.0% **Reporting Limit** 0.05µg/ml $NO_3^-$

The reported expanded uncertainty is based on a standard uncertainty multiplied by a factor of *k*=2, providing a level of confidence of approximately 95%. Uncertainty of measurement has not been applied to the reported results.

Analysed on Dionex ICS1100 ICU11

**Analyst Name** Michael Battram **Report Checked By** Andrew Poole

**Date of Analysis** 20/06/2020 **Date of Report** 04/07/2020

**Analysis has been carried out in accordance with in-house method GLM 2**





REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed.............
L. Gates, Laboratory Manager

gradko environmental
(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 e-mail:diffusion@gradko.co.uk

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# LABORATORY ANALYSIS REPORT

## DETERMINATION OF SULPHUR DIOXIDE IN DIFFUSION TUBES BY ION CHROMATOGRAPHY

**REPORT NUMBER** O003406R
**BOOKING IN REFERENCE No** O003406
**DESPATCH NOTE No** 78688
**CUSTOMER** Juru Energy Ltd Attn: Oleg Khegay
Suite 1 Lower Ground Floor
1 George Yard
London
EC3V 9DF

**DATE SAMPLES RECEIVED** 16/06/2020

**JOB NUMBER**

| Location | Sample Number | Date Exposed* | Date Finished* | Exposure Hours* | $SO_4^{2-}$ µg/ml | µg$SO_4^{2-}$ - Blank | $SO_2$ µg/m$^3$* | $SO_2$ ppb* |
|---|---|---|---|---|---|---|---|---|
| DT6 | 1576587 | 20/05/2020 | 11/06/2020 | 529.00 | 0.11 | 0.10 | 2.33 | 0.87 |
| DT6 | 1576588 | 20/05/2020 | 11/06/2020 | 529.00 | 0.11 | 0.11 | 2.45 | 0.92 |
| DT5 | 1576589 | 20/05/2020 | 11/06/2020 | 529.00 | 0.10 | 0.09 | 2.10 | 0.79 |
| DT5 | 1576590 | 20/05/2020 | 11/06/2020 | 529.00 | 0.11 | 0.10 | 2.29 | 0.86 |
| DT1 | 1576591 | 20/05/2020 | 11/06/2020 | 529.00 | 0.12 | 0.11 | 2.50 | 0.94 |
| DT1 | 1576592 | 20/05/2020 | 11/06/2020 | 529.00 | 0.10 | 0.10 | 2.21 | 0.83 |
| DT4 | 1576594 | 20/05/2020 | 11/06/2020 | 529.50 | 0.14 | 0.13 | 2.92 | 1.10 |
| DT4 | 1576595 | 20/05/2020 | 11/06/2020 | 529.00 | 0.11 | 0.10 | 2.40 | 0.90 |
| DT3 | 1576596 | 20/05/2020 | 11/06/2020 | 529.50 | 0.25 | 0.25 | 5.65 | 2.12 |
| DT3 | 1576597 | 20/05/2020 | 11/06/2020 | 529.50 | 0.18 | 0.17 | 3.85 | 1.44 |
| DT2 | 1576598 | 20/05/2020 | 11/06/2020 | 529.50 | 0.40 | 0.39 | 9.02 | 3.38 |
| DT2 | 1576599 | 20/05/2020 | 11/06/2020 | 529.50 | 0.10 | 0.09 | 2.11 | 0.79 |
| Laboratory Blank | | | | | 0.01 | | | |

**Comment: Results are blank subtracted**
**Exposure times were calculated from start and finish times given on the exposure sheet.**
**Tubes 1576587 & 1576596-1576599 were dirty when received. Results may be compromised.**

**Overall M.U.** ±9.6% **Reporting Limit** 0.09µg $SO_4^{2-}$
The reported expanded uncertainty is based on a standard uncertainty multiplied by a factor of *k*=2, providing a level of confidence of approximately 95%. Uncertainty of measurement has not been applied to the reported results.

Analysed on Dionex ICS1100 ICU11

**Analyst Name** Michael Battram **Report Checked By** Andrew Poole

**Date of Analysis** 25/06/2020 **Date of Report** 04/07/2020

**Analysis has been carried out in accordance with in-house method GLM1**




REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed...
L. Gates, Laboratory Manager

gradko environmental
(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 e-mail:diffusion@gradko.co.uk

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# LABORATORY ANALYSIS REPORT

## NITROGEN DIOXIDE IN DIFFUSION TUBES BY U.V.SPECTROPHOTOMETRY

**REPORT NUMBER** Amendment to O03432R

**BOOKING IN REFERENCE** O03432
**DESPATCH NOTE** 78688
**CUSTOMER** Juru Energy Ltd Attn: Oleg Khegay
Suite 1 Lower Ground Floor
1 George Yard
London
EC3V 9DF

**DATE SAMPLES RECEIVED** 16/06/2020

| Location | Sample Number | Exposure Data Date On* | Date Off* | Time* (hr.) | μg/m$^3$ * | ppb * | μg $NO_2$ on tube |
|---|---|---|---|---|---|---|---|
| DT6 | 1576574 | 20/05/2020 | 11/06/2020 | 529.00 | 5.77 | 3.01 | 0.22 |
| DT6 | 1576575 | 20/05/2020 | 11/06/2020 | 530.00 | 5.53 | 2.89 | 0.21 |
| DT5 | 1576576 | 20/05/2020 | 11/06/2020 | 529.00 | 7.07 | 3.69 | 0.27 |
| DT5 | 1576577 | 20/05/2020 | 11/06/2020 | 529.00 | 6.89 | 3.60 | 0.27 |
| DT1 | 1576578 | 20/05/2020 | 11/06/2020 | 529.00 | 3.56 | 1.86 | 0.14 |
| DT1 | 1576579 | 20/05/2020 | 11/06/2020 | 529.00 | 8.04 | 4.19 | 0.31 |
| DT4 | 1576581 | 20/05/2020 | 11/06/2020 | 528.50 | 6.82 | 3.56 | 0.26 |
| DT4 | 1576582 | 20/05/2020 | 11/06/2020 | 529.00 | 6.76 | 3.53 | 0.26 |
| DT3 | 1576583 | 20/05/2020 | 11/06/2020 | 529.50 | 9.02 | 4.71 | 0.35 |
| DT3 | 1576584 | 20/05/2020 | 11/06/2020 | 529.50 | 9.51 | 4.96 | 0.37 |
| DT2 | 1576585 | 20/05/2020 | 11/06/2020 | 529.50 | 8.13 | 4.24 | 0.31 |
| DT2 | 1576586 | 20/05/2020 | 11/06/2020 | 529.50 | 7.61 | 3.97 | 0.29 |
| Laboratory Blank | | | | 530.00 | 0.03 | 0.01 | 0.001 |

**Comment: Results are not blank subtracted**
**Report amended to remove incorrect comment.**
**Results have been corrected to a temperature of 293 K (20°)**

**Overall M.U.** ±9.7% **Limit of Detection** 0.031μg$NO_2$
The reported expanded uncertainty is based on a standard uncertainty multiplied by a factor of *k*=2, providing a level of confidence of approximately 95%. Uncertainty of measurement has not been applied to the reported results.
Tube Preparation : 20% TEA / Water Analysed on UV CARY2

**Analyst Name** Molly Bevan **Report Checked By** Pedro Gomes

**Date of Analysis** 29/06/2020 **Date of Report** 07/07/2020

**Analysis carried out in accordance with documented in-house Laboratory Method GLM7**




REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed............
L. Gates, Laboratory Manager

(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 e-mail:diffusion@gradko.co.uk

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# LABORATORY ANALYSIS REPORT

| | |
|---|---|
| **Report Number** | **O03467R** |
| **Customer** | **Juru Energy Ltd**<br>**Suite 1 Lower Ground Floor**<br>**1 George Yard**<br>**London**<br>**EC3V 9DF** |
| **Booking In Reference** | **S0599** |
| **Despatch Note Number** | **78688** |
| **Date Samples Received** | **16/06/2020** |
| **Diffusion Tube Type** | **Tenax** |

## Quantitative Analysis of BTEX
## Identification and estimation of ng on tube in accordance with ISO16000-6

| | |
|---|---|
| **Tube Number** | **004183** |
| **Gradko Lab Reference** | **08O0798** |
| **Exposure Time (mins)*** | **30360** |
| **Sample ID** | **DT5 (DT5)** |

| **BTEX** | ng on tube | ppb in air* | µgm-3* |
|---|---|---|---|
| Benzene | 9.6 | 0.4 | 1.4 |
| Toluene | 13.3 | 0.4 | 1.6 |
| Ethylbenzene | <5 | <0.1 | <0.5 |
| m/p-Xylene | 5.7 | 0.1 | 0.5 |
| o-Xylene | <5 | <0.1 | <0.5 |

| **Top 5 VOC** | NIST Library Quality Match | Estimated ng on tube | ppb in air* | µgm-3* |
|---|---|---|---|---|
| Hexanedioic acid, bis(2-ethylhexyl) ester | 98 | 690 | 11.4 | 168 |
| Benzoic acid | 97 | 420 | 6.9 | 34 |
| Several compounds. Identity not confirmed | | 268 | 4.4 | |
| Nonanal** | 91 | 54 | 0.9 | 5.1 |
| Phenylmaleic anhydride | 96 | 54 | 0.9 | 6.2 |





REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed.........
L. Gates, Laboratory Manager

(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 e-mail:diffusion@gradko.co.uk

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# LABORATORY ANALYSIS REPORT

| | |
|---|---|
| **Tube Number** | **GRA11231** |
| **Gradko Lab Reference** | **08O0799** |
| **Exposure Time (mins)*** | **30360** |
| **Sample ID** | **DT5 (DT5(1))** |

| **BTEX** | | **ng on tube** | **ppb in air*** | **µgm$^{-3}$*** |
|---|---|---|---|---|
| Benzene | | 11.5 | 0.5 | 1.7 |
| Toluene | | 8.7 | 0.3 | 1.0 |
| Ethylbenzene | | <5 | <0.1 | <0.5 |
| m/p-Xylene | | 5.6 | 0.1 | 0.5 |
| o-Xylene | | <5 | <0.1 | <0.5 |

| **Top 5 VOC** | NIST Library Quality Match | **Estimated ng on tube** | **ppb in air*** | **µgm$^{-3}$*** |
|---|---|---|---|---|
| Hexanedioic acid, bis(2-ethylhexyl) ester | 98 | 386 | 6.4 | 94 |
| Benzoic acid | 96 | 351 | 5.8 | 28 |
| Several compounds. Identity not confirmed | | 261 | 4.3 | |
| Nonanal** | 90 | 84 | 1.4 | 7.8 |
| Benzaldehyde** | 97 | 48 | 0.8 | 3.3 |

| | |
|---|---|
| **Tube Number** | **GRA09518** |
| **Gradko Lab Reference** | **08O0800** |
| **Exposure Time (mins)*** | **30360** |
| **Sample ID** | **DT6 (DT6)** |

| **BTEX** | | **ng on tube** | **ppb in air*** | **µgm$^{-3}$*** |
|---|---|---|---|---|
| Benzene | | 6.6 | 0.3 | 1.0 |
| Toluene | | 8.8 | 0.3 | 1.0 |
| Ethylbenzene | | <5 | <0.1 | <0.5 |
| m/p-Xylene | | <5 | <0.1 | <0.5 |
| o-Xylene | | <5 | <0.1 | <0.5 |

| **Top 5 VOC** | NIST Library Quality Match | **Estimated ng on tube** | **ppb in air*** | **µgm$^{-3}$*** |
|---|---|---|---|---|
| Benzoic acid | 96 | 321 | 5.3 | 26 |
| Several compounds. Identity not confirmed | | 219 | 3.6 | |
| Benzaldehyde** | 97 | 50 | 0.8 | 3.5 |
| Phenylmaleic anhydride | 96 | 42 | 0.7 | 4.8 |
| Acetophenone** | 94 | 39 | 0.6 | 3.1 |





REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed.............................................
L. Gates, Laboratory Manager

(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 e-mail:diffusion@gradko.co.uk

2187

# LABORATORY ANALYSIS REPORT

| | |
|---|---|
| **Tube Number** | **GRA10026** |
| **Gradko Lab Reference** | **08O0801** |
| **Exposure Time (mins)*** | **30360** |
| **Sample ID** | **DT6 (DT6(1))** |

| **BTEX** | | **ng on tube** | **ppb in air*** | **$\mu gm^{-3*}$** |
|---|---|---|---|---|
| Benzene | | 7.6 | 0.4 | 1.1 |
| Toluene | | 6.8 | 0.2 | 0.8 |
| Ethylbenzene | | <5 | <0.1 | <0.5 |
| m/p-Xylene | | <5 | <0.1 | <0.5 |
| o-Xylene | | <5 | <0.1 | <0.5 |

| **Top 5 VOC** | NIST Library Quality Match | **Estimated ng on tube** | **ppb in air*** | **$\mu gm^{-3*}$** |
|---|---|---|---|---|
| Benzoic acid | 95 | 291 | 4.8 | 23 |
| Several compounds. Identity not confirmed | | 229 | 3.8 | |
| Phenylmaleic anhydride | 93 | 46 | 0.8 | 5.3 |
| Benzaldehyde** | 97 | 43 | 0.7 | 3.0 |
| Acetophenone** | 91 | 42 | 0.7 | 3.4 |

| | |
|---|---|
| **Tube Number** | **GRA06977** |
| **Gradko Lab Reference** | **08O0802** |
| **Exposure Time (mins)*** | **30360** |
| **Sample ID** | **DT4 (DT4)** |

| **BTEX** | | **ng on tube** | **ppb in air*** | **$\mu gm^{-3*}$** |
|---|---|---|---|---|
| Benzene | | 9.2 | 0.4 | 1.4 |
| Toluene | | 6.6 | 0.2 | 0.8 |
| Ethylbenzene | | <5 | <0.1 | <0.5 |
| m/p-Xylene | | <5 | <0.1 | <0.5 |
| o-Xylene | | 7.3 | 0.2 | 0.7 |

| **Top 5 VOC** | NIST Library Quality Match | **Estimated ng on tube** | **ppb in air*** | **$\mu gm^{-3*}$** |
|---|---|---|---|---|
| Benzoic acid | 95 | 518 | 8.5 | 42 |
| Several compounds. Identity not confirmed | | 349 | 5.7 | |
| Hexanedioic acid, bis(2-ethylhexyl) ester | 93 | 299 | 4.9 | 73 |
| Phenylmaleic anhydride | 96 | 61 | 1.0 | 7.0 |
| Benzaldehyde** | 97 | 52 | 0.9 | 3.6 |





REPORT OFFICIALLY CHECKED

Gradko International Ltd
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Signed.......................
L. Gates, Laboratory Manager

(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 e-mail:diffusion@gradko.co.uk

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# LABORATORY ANALYSIS REPORT

| | |
|---|---|
| **Tube Number** | **GRA09872** |
| **Gradko Lab Reference** | **08O0809** |
| **Exposure Time (mins)*** | **30360** |
| **Sample ID** | **DT4 (DT4(1))** |

| **BTEX** | | **ng on tube** | **ppb in air*** | **µgm-3*** |
|---|---|---|---|---|
| Benzene | | 5.6 | 0.3 | 0.8 |
| Toluene | | 6.8 | 0.2 | 0.8 |
| Ethylbenzene | | <5 | <0.1 | <0.5 |
| m/p-Xylene | | <5 | <0.1 | <0.5 |
| o-Xylene | | 7.8 | 0.2 | 0.7 |

| **Top 5 VOC** | NIST Library Quality Match | **Estimated ng on tube** | **ppb in air*** | **µgm-3*** |
|---|---|---|---|---|
| Several compounds. Identity not confirmed | | 322 | 5.3 | |
| Benzoic acid | 96 | 141 | 2.3 | 11 |
| Cyclohexadecane | 98 | 69 | 1.1 | 10.2 |
| Benzaldehyde** | 97 | 35 | 0.6 | 2.4 |
| Acetophenone** | 94 | 30 | 0.5 | 2.4 |

| | |
|---|---|
| **Tube Number** | **GRA09919** |
| **Gradko Lab Reference** | **08O0803** |
| **Exposure Time (mins)*** | **30360** |
| **Sample ID** | **DT1 (DT1)** |

| **BTEX** | | **ng on tube** | **ppb in air*** | **µgm-3*** |
|---|---|---|---|---|
| Benzene | | 7.9 | 0.4 | 1.2 |
| Toluene | | 9.0 | 0.3 | 1.1 |
| Ethylbenzene | | <5 | <0.1 | <0.5 |
| m/p-Xylene | | 7.0 | 0.2 | 0.7 |
| o-Xylene | | <5 | <0.1 | <0.5 |

| **Top 5 VOC** | NIST Library Quality Match | **Estimated ng on tube** | **ppb in air*** | **µgm-3*** |
|---|---|---|---|---|
| Several compounds. Identity not confirmed | | 348 | 5.7 | |
| Benzoic acid | 96 | 277 | 4.6 | 22 |
| Hexanedioic acid, bis(2-ethylhexyl) ester | 93 | 126 | 2.1 | 31 |
| Benzaldehyde** | 91 | 42 | 0.7 | 2.9 |
| Nonanal** | 87 | 39 | 0.6 | 3.7 |





REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed.........
L. Gates, Laboratory Manager

gradko environmental
(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 e-mail:diffusion@gradko.co.uk

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# LABORATORY ANALYSIS REPORT

| | |
|---|---|
| **Tube Number** | **GRA10816** |
| **Gradko Lab Reference** | **08O0804** |
| **Exposure Time (mins)*** | **30360** |
| **Sample ID** | **DT1 (DT(1))** |

| **BTEX** | ng on tube | ppb in air* | $\mu gm^{-3*}$ |
|---|---|---|---|
| Benzene | 10.7 | 0.5 | 1.6 |
| Toluene | 10.7 | 0.3 | 1.3 |
| Ethylbenzene | <5 | <0.1 | <0.5 |
| m/p-Xylene | 7.1 | 0.2 | 0.7 |
| o-Xylene | <5 | <0.1 | <0.5 |

| **Top 5 VOC** | NIST Library Quality Match | Estimated ng on tube | ppb in air* | $\mu gm^{-3*}$ |
|---|---|---|---|---|
| Several compounds. Identity not confirmed | | 392 | 6.5 | |
| Benzoic acid | 95 | 292 | 4.8 | 23 |
| Hexanedioic acid, bis(2-ethylhexyl) ester | 95 | 69 | 1.1 | 17 |
| Benzaldehyde** | 97 | 42 | 0.7 | 2.9 |
| Phenylmaleic anhydride | 95 | 36 | 0.6 | 4.1 |

| | |
|---|---|
| **Tube Number** | **003100** |
| **Gradko Lab Reference** | **08O0805** |
| **Exposure Time (mins)*** | **30390** |
| **Sample ID** | **DT3 (DT3)** |

| **BTEX** | ng on tube | ppb in air* | $\mu gm^{-3*}$ |
|---|---|---|---|
| Benzene | 8.5 | 0.4 | 1.2 |
| Toluene | 8.6 | 0.3 | 1.0 |
| Ethylbenzene | <5 | <0.1 | <0.5 |
| m/p-Xylene | <5 | <0.1 | <0.5 |
| o-Xylene | <5 | <0.1 | <0.5 |

| **Top 5 VOC** | NIST Library Quality Match | Estimated ng on tube | ppb in air* | $\mu gm^{-3*}$ |
|---|---|---|---|---|
| Several compounds. Identity not confirmed | | 433 | 7.1 | |
| Benzoic acid | 96 | 358 | 5.9 | 29 |
| Hexanedioic acid, bis(2-ethylhexyl) ester | 93 | 210 | 3.5 | 51 |
| Phenylmaleic anhydride | 95 | 49 | 0.8 | 5.6 |
| Benzaldehyde** | 97 | 44 | 0.7 | 3.1 |





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Gradko International Ltd
This signature confirms the authenticity of these results
Signed.........................................
L. Gates, Laboratory Manager

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tel.: 01962 860331 fax: 01962 841339 e-mail:diffusion@gradko.co.uk

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# LABORATORY ANALYSIS REPORT

| | |
|---|---|
| **Tube Number** | **003292** |
| **Gradko Lab Reference** | **08O0806** |
| **Exposure Time (mins)*** | **30390** |
| **Sample ID** | **DT3 (DT3(1))** |

| **BTEX** | | **ng on tube** | **ppb in air*** | **µgm$^{-3}$*** |
|---|---|---|---|---|
| Benzene | | 8.0 | 0.4 | 1.2 |
| Toluene | | 7.7 | 0.2 | 0.9 |
| Ethylbenzene | | <5 | <0.1 | <0.5 |
| m/p-Xylene | | <5 | <0.1 | <0.5 |
| o-Xylene | | <5 | <0.1 | <0.5 |

| **Top 5 VOC** | NIST Library Quality Match | **Estimated ng on tube** | **ppb in air*** | **µgm$^{-3}$*** |
|---|---|---|---|---|
| Several compounds. Identity not confirmed | | 538 | 8.9 | |
| Benzoic acid | 96 | 371 | 6.1 | 30 |
| Hexanedioic acid, bis(2-ethylhexyl) ester | 89 | 63 | 1.0 | 15 |
| Benzaldehyde** | 97 | 54 | 0.9 | 3.7 |
| Phenylmaleic anhydride | 96 | 44 | 0.7 | 5.0 |

| | |
|---|---|
| **Tube Number** | **GRA10027** |
| **Gradko Lab Reference** | **08O0807** |
| **Exposure Time (mins)*** | **30390** |
| **Sample ID** | **DT2 (DT2)** |

| **BTEX** | | **ng on tube** | **ppb in air*** | **µgm$^{-3}$*** |
|---|---|---|---|---|
| Benzene | | 8.9 | 0.4 | 1.3 |
| Toluene | | 12.5 | 0.4 | 1.5 |
| Ethylbenzene | | <5 | <0.1 | <0.5 |
| m/p-Xylene | | 7.9 | 0.2 | 0.8 |
| o-Xylene | | <5 | <0.1 | <0.5 |

| **Top 5 VOC** | NIST Library Quality Match | **Estimated ng on tube** | **ppb in air*** | **µgm$^{-3}$*** |
|---|---|---|---|---|
| Benzoic acid | 95 | 199 | 3.3 | 16 |
| Several compounds. Identity not confirmed | | 192 | 3.2 | |
| Hexanedioic acid, bis(2-ethylhexyl) ester | 91 | 148 | 2.4 | 36 |
| Nonanal** | 90 | 74 | 1.2 | 6.9 |
| Benzaldehyde** | 95 | 40 | 0.7 | 2.8 |





REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed.............................
L. Gates, Laboratory Manager

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St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 e-mail:diffusion@gradko.co.uk

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# LABORATORY ANALYSIS REPORT

| | |
|---|---|
| **Tube Number** | **003290** |
| **Gradko Lab Reference** | **08O0808** |
| **Exposure Time (mins)*** | **30390** |
| **Sample ID** | **DT2 (DT2(1))** |

| **BTEX** | | **ng on tube** | **ppb in air*** | **µgm$^{-3}$*** |
|---|---|---|---|---|
| Benzene | | 10.0 | 0.5 | 1.5 |
| Toluene | | 15.8 | 0.5 | 1.9 |
| Ethylbenzene | | 13.5 | 0.3 | 1.3 |
| m/p-Xylene | | 16.9 | 0.4 | 1.6 |
| o-Xylene | | 7.2 | 0.2 | 0.7 |

| **Top 5 VOC** | NIST Library Quality Match | **Estimated ng on tube** | **ppb in air*** | **µgm$^{-3}$*** |
|---|---|---|---|---|
| Benzoic acid | 96 | 535 | 8.8 | 43 |
| Several compounds. Identity not confirmed | | 502 | 8.3 | |
| Phenylmaleic anhydride | 96 | 72 | 1.2 | 8.3 |
| Benzaldehyde** | 97 | 67 | 1.1 | 4.6 |
| Acetophenone** | 94 | 55 | 0.9 | 4.4 |

| | |
|---|---|
| **Tube Number** | **GRA08972** |
| **Gradko Lab Reference** | **200623_TXTABLANK_6** |
| **Sample ID** | **Laboratory Blank** |

| **BTEX** | | **ng on tube** |
|---|---|---|
| Benzene | | <5 |
| Toluene | | <5 |
| Ethylbenzene | | <5 |
| m/p-Xylene | | <5 |
| o-Xylene | | <5 |

| **Top 5 VOC** | NIST Library Quality Match | **Estimated ng on tube** |
|---|---|---|
| | | <5 |

**Uptake rates**

Benzene 0.70 ng.ppm$^{-1}$.min$^{-1}$.

Toluene 1.03 ng.ppm$^{-1}$.min$^{-1}$.

Ethylbenzene 1.46 ng.ppm$^{-1}$.min$^{-1}$.

m/p Xylene 1.46 ng.ppm$^{-1}$.min$^{-1}$.

o-Xylene 1.46 ng.ppm$^{-1}$.min$^{-1}$.

All other compounds: 2.00 ng.ppm$^{-1}$.min$^{-1}$.





REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed.....................................
L. Gates, Laboratory Manager

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St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 e-mail:diffusion@gradko.co.uk

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# LABORATORY ANALYSIS REPORT

Results are not Blank corrected.

A peak was present that contained several compounds which could not be identified.

Tubes from locations "DT1 (DT1)" and "DT2 (DT2(1))" were received with a loose cap. Results may be compromised.

**Compounds may be an artifact due to reaction of ozone with the Tenax sorbent.

**Reporting Limit** 5ng on tube

Results reported as <5ng on tube are below the reporting limit.
Estimated results reported as <5ng on tube are below the reporting limit for the non-specific standard toluene.

**Measurement Uncertainty BTEX compounds** ±16.3%

The reported expanded uncertainty is based on a standard uncertainty multiplied by a factor of *k*=2, providing a level of confidence of approximately 95%. Uncertainty of measurement has not been applied to the reported results.

**Estimated results as ng on tube are calculated by reference to toluene in accordance with ISO 16000-6**

Identification of compounds is carried out by comparison of the mass spectra to the NIST 17 mass spectral library. Compounds with a quality match below 85% are noted as a tentative identity and shown in italics. These compounds are outside of the scope of our UKAS accreditation.

| | | | |
|---|---|---|---|
| **Analysts Name** | Katya Paldamova | **Date of Analysis** | 23/06/2020 |
| **Report Checked By** | Gavin Aikman | **Date of Report** | 03/07/2020 |

**Analysis has been carried out in accordance with in-house method GLM 13**





REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed.....
L. Gates, Laboratory Manager

# APPENDIX J-1– AMBIENT AIR QUALITY LABORATORY CERTIFICATES

ГОСУДАРСТВЕННЫЙ КОМИТЕТ
РЕСПУБЛИКИ УЗБЕКИСТАН
ПО ЭКОЛОГИИ И ОХРАНЕ
ОКРУЖАЮЩЕЙ СРЕДЫ

**СВИДЕТЕЛЬСТВО**

*об аттестации экоаналитической лаборатории*

№ 84 – 28

Настоящее Свидетельство выдано Лаборатория мониторинга загрязнения атмосферного воздуха города Ташкент Узгидромета на основании результатов аттестации (Акт № 28 от 27 декабря 2019 г.) и удостоверяет наличие необходимых условий для выполнения достоверного аналитического контроля атмосферного воздуха на территории города Ташкента

Свидетельство действительно до декабря 2022 года.

Область аттестации приведена в приложении, являющемся неотъемлемой частью свидетельства.

Первый заместитель председателя М.П. — Н. Каримов

Document of accreditation of Uzhydromet (AQ) laboratory

*Translation:*

**Ecoanalytical Laboratory Approval Certificate**

This Certificate was issued to the Laboratory for Monitoring Ambient Air Pollution in the city of Tashkent Uzhydromet based on the results of certification (Act No. 28 of December 27, 2019) and certifies the presence of the necessary conditions for performing reliable analytical control of atmospheric air in the city of Tashkent

The certificate is valid until December 2022.

СИСТЕМА ОБЕСПЕЧЕНИЯ ЕДИНСТВА ИЗМЕРЕНИЙ РЕСПУБЛИКИ УЗБЕКИСТАН

Узбекское агентство стандартизации, метрологии и сертификации (агентство "Узстандарт")

«Узбекский национальный институт метрологии»

СЕРТИФИКАТ ПОВЕРКИ СРЕДСТВА ИЗМЕРЕНИЙ

№ 0901504

Действителен до «20» 02 20 21 г.

Настоящий сертификат удостоверяет, что средство измерений Газоанализатор ЭЛАН – СО- 50 сер № 36 диапазон измерения

с метрологическими характеристиками СО от 0 до 50 mg/m³ Δ= ±(0,5+0,1Cx)

изготовленное (импортированное) НПО «Химавтоматика» Узбекистан

принадлежащее «Узгидромет»

поверенное «УзНИМ»

в соответствии с ГОСТ 8.618-2013

с использованием ПГС

соответствует требованиям ГОСТ 13320-81

и допущено к применению в сфере распространения государственного метрологического контроля и надзора.

Дата поверки «20» 02 20 20 г.

Поверитель Г.С.Гулямова

А 0441309

Certificate for ELAN gas analyzer (CO measurement)

*Translation:*

Verification Certificate

№ 0901504

valid until: 20.02.2021

This certificate justifies that

Gas Analyzer ELAN – 50 series №35 with measurement range CO from 0 to 50 mg/m$^3$

$\Delta = \pm (0.5 + 0{,}1\ C_x)$

manufactured by NPO “Himavtomatika”, Uzbekistan belonging to Uzhydromet and

verified by «UZSTANDARD» agency Standartization, metrology and certification

agency of Uzbekistan

In accordance with GOST 8.618-2013.

with use of PGS

in accordance with GOST 13320-81

**approved for use in the field of dissemination of state metrological control and**

**supervision**

date of verification 20 February 2020

Executor *sign* Gulyamova. G.S


СИСТЕМА ОБЕСПЕЧЕНИЯ ЕДИНСТВА ИЗМЕРЕНИЙ
РЕСПУБЛИКИ УЗБЕКИСТАН
Узбекское агентство стандартизации, метрологии и сертификации
(агентство "Узстандарт")
«Узбекский национальный институт метрологии»

СЕРТИФИКАТ ПОВЕРКИ
СРЕДСТВА ИЗМЕРЕНИЙ
№ 0901504

Действителен до «20» 02 20 21 г.

Настоящий сертификат удостоверяет, что средство измерений
Газоанализатор ЭЛАН - СО- 50 сер № 36
с метрологическими характеристиками Диапазон измерения
СО от 0 до 50 mg/m³ Δ= ±(0,5+0,1С)
изготовленное (импортированное) НПО «Химавтоматика»
Узбекистан
принадлежащее «Узгидромет»
поверенное «УзНИМ»
в соответствии с ГОСТ 8.618-2013
с использованием ПГС
соответствует требованиям ГОСТ 13320-81
и допущено к применению в сфере распространения государственного метрологического контроля и надзора.

Дата поверки «20» 02 20 20 г.

Поверитель Г.С.Гулямова

А 0441309

Certificate for Photometer KFK -3 (for $NO_2$, $SO_2$ measurement)

*Translation:*

Verification Certificate
№ 0901494
Valid until:

20.02.2021

This certificate justifies that Photometer KFK 3 № 0036

with measurement range from 5% to 100% СКО = 0.3 %)

manufactured by JSC “ZOMZ”, Russia

verified by “Uzbekistan Metrological Institute”

in accordance with GOST 8.298-2013

with use of KC 100

**approved for use in the field of dissemination of state metrological control and supervision**

**Date of verification 20.02.2020**

Executor *sign* Gulyamova. G.S

СИСТЕМА ОБЕСПЕЧЕНИЯ ЕДИНСТВА ИЗМЕРЕНИЙ
РЕСПУБЛИКИ УЗБЕКИСТАН
Узбекское агентство стандартизации, метрологии и сертификации
(агентство "Узстандарт")
«Узбекский национальный институт метрологии»

СЕРТИФИКАТ ПОВЕРКИ
СРЕДСТВА ИЗМЕРЕНИЙ
№ 0901494

Действителен до «20» 02 20 21 г.

Настоящий сертификат удостоверяет, что средство измерений Фотометр КФК – 3 № 0036
с метрологическими характеристиками Диапазон измерения от 5% до 100%; СКО = 0,3%
изготовленное (импортированное) ЮОМЗ Россия
принадлежащее «Узгидромет»
поверено «УзНИМ»
в соответствии с ГОСТ 8.298-2013
с использованием КС 100
соответствует требованиям Тех. док. фирмы-изготовителя
и допущено к применению в сфере распространения государственного метрологического контроля и надзора.

Дата поверки «20» 02 20 20

Поверитель Г.С.Гулямова

А 0441299

Photometer KFK – 3 (measurement of $SO_2$, $NO_2$)

**UNIT OF MEASUREMENTS SYSTEM**
**REPUBLIC OF UZBEKISTAN**
**Uzbek Agency for Standardization, Metrology and Certification**
**(agency "Uzdavlatstandart")**
**SE « UZBEK NATIONAL INSTITUTE OF METROLOGY »**

Verification Certificate
№ 8765

Valid until:

24 September 2020

This Certificate Certifies That

Photometer KFK – 3 №0036

with measurement range of 5 % – 100%; SKO = 0.3 %

manufactured by ZOMZ, in Russia

belongs to Uzhydromet

verified by Uzbek National Institute Of Metrology

in accordance with GOST 8.298-2013

with use of KS 100

the equipment corresponds to technical documentation of the manufacture

**approved for use in the field of dissemination of state metrological control and supervision**

date of verification 20 February 2020
Executor *sign* Gulyamova. G.S.

СИСТЕМА ОБЕСПЕЧЕНИЯ ЕДИНСТВА ИЗМЕРЕНИЙ
РЕСПУБЛИКИ УЗБЕКИСТАН
Узбекское агентство стандартизации, метрологии и сертификации
(агентство "Узстандарт")

ГП «Узбекский национальный институт метрологии»

СЕРТИФИКАТ ПОВЕРКИ
СРЕДСТВА ИЗМЕРЕНИЙ

№ 3276/08

Действителен до «10» сентября 2020 г.

Настоящий сертификат удостоверяет, что средство измерений
Электроаспиратор модель «АВА-34» №186
с метрологическими характеристиками
с пределом измерений от 0 до 6 Pa
изготовленное (импортированное)
Россия
принадлежащее O'ZB. RES. FAVQULODDA VAZIYATLAR VAZ. H.G.X.M.
поверенное ГП «УзНИМ» Агентства «Узстандарт»
в соответствии с МИ 09-171-2015
с использованием Газовый счетчик барабанный-400 и секундомера
соответствует требованиям
Технической документации завода изготовителя
и допущено к применению в сфере распространения государственного метрологического контроля и надзора.

Дата поверки «10» сентября 2019 г.

Поверитель А.Б. Ботиров

А 0052710

Aspirator AVA – 34 (measurement of TSP/dust)

**UNIT OF MEASUREMENTS SYSTEM**
**REPUBLIC OF UZBEKISTAN**
**Uzbek Agency for Standardization, Metrology and Certification**
**(agency "Uzdavlatstandart")**
**SE « UZBEK NATIONAL INSTITUTE OF METROLOGY »**

Verification Certificate
№ 3276/08

Valid until:
10 September 2020

This Certificate Certifies That

Aspirator AVA – 34 №186

with measurement range of 0 – 6 Pa;

manufactured in Russia

belongs to Ministry of Emergency Situations RUz

verified by SE “UzStandard”

in accordance with MI 09-171:2015

with use of gas drum counter

the equipment corresponds to technical documentation of the manufacture

**approved for use in the field of dissemination of state metrological control and supervision**

date of verification 10 September 2019

Executor *sign* Botirov. A.B.


СИСТЕМА ОБЕСПЕЧЕНИЯ ЕДИНСТВА ИЗМЕРЕНИЙ РЕСПУБЛИКИ УЗБЕКИСТАН
Узбекское агентство стандартизации, метрологии и сертификации (агентство "Узстандарт")
ГП «Узбекский национальный институт метрологии»
СЕРТИФИКАТ ПОВЕРКИ СРЕДСТВА ИЗМЕРЕНИЙ
№ 3275/08
Действителен до «10» сентября 2020 г.
Настоящий сертификат удостоверяет, что средство измерений
с метрологическими характеристиками
изготовленное (импортированное) ОАО «НИКИ МЛТ» Россия
принадлежащее O'ZB. RES. FAVQULODDA VAZIYATLAR VAZ. H.G.X.M.
поверено
в соответствии с МИ 09-171:2015
с использованием
соответствует требованиям
и допущено к применению в сфере распространения государственного метрологического контроля и надзора.
Дата поверки «10» сентября 2019 г.
Поверитель А.Б. Ботиров
А 0052709

Aspirator APV - 4 (measurement for SO2, NO2)

**UNIT OF MEASUREMENTS SYSTEM**
**REPUBLIC OF UZBEKISTAN**
**Uzbek Agency for Standardization, Metrology and Certification**
**(agency "Uzdavlatstandart")**
**SE « UZBEK NATIONAL INSTITUTE OF METROLOGY »**

Verification Certificate
№ 3275/08

Valid until:
10 September 2020

This Certificate Certifies That

Aspirator APV – 4 №297

with measurement range of 0.2 – 1 l/min; 1 - 20 l/min, Δ ± 5%; 7%

manufactured by JSC "NIKI MLT" in Russia

belongs to Hydrometeorological Service center under Ministry of Emergency Situations RUz

verified by SE "UzStandard"

in accordance with MI 09-171:2015

with use of gas drum counter

the equipment corresponds to technical documentation of the manufacture

**approved for use in the field of dissemination of state metrological control and supervision**

date of verification 10 September 2019

Executor *sign* Botirov. A.B.

СИСТЕМА ОБЕСПЕЧЕНИЯ ЕДИНСТВА ИЗМЕРЕНИЙ
РЕСПУБЛИКИ УЗБЕКИСТАН
Узбекское агентство стандартизации, метрологии и сертификации
(агентство "Узстандарт")
ГП «УЗБЕКСКИЙ НАЦИОНАЛЬНЫЙ ИНСТИТУТ МЕТРОЛОГИИ»

СЕРТИФИКАТ ПОВЕРКИ
СРЕДСТВА ИЗМЕРЕНИЙ

№ 8765

Действителен до
«24» сентября 2020 г.

Настоящий сертификат удостоверяет, что средство измерений
AB204-S зав.№ 1122360582
Mettler Toledo
Швейцария
O'z R FVV huzuridagi Gidrometeorologiya XM
ГП «УзНИМ» Агентства «Узстандарт»
ГОСТ 8.520-2005
ГОСТ 24104-2001 п.п. 4.1-4.6
и допущено к применению в сфере распространения государственного метрологического контроля и надзора.

Дата поверки 24 сентябрь 2019 г.
Хакимова Н.Х.

O'T 1334639

Digital balance AB204-S (measurement of TSP/dust)

**UNIT OF MEASUREMENTS SYSTEM**
**REPUBLIC OF UZBEKISTAN**
**Uzbek Agency for Standardization, Metrology and Certification**
**(agency "Uzdavlatstandart")**
**SE « UZBEK NATIONAL INSTITUTE OF METROLOGY »**

Verification Certificate
№ 8765

Valid until:
10 September 2020

This Certificate Certifies That

Digital balance AB 204-S № 1122360582

with measurement range of 10 mg – 220 g; accuracy class 1

manufactured by Mettler Toledo, Switzerland

belongs to Hydrometeorological Service center under Ministry of Emergency Situations RUz

verified by SE "UzStandard"

in accordance with GOST 8.520-2005

the equipment corresponds to GOST 24104-2001, clause 4.1-4.6

**approved for use in the field of dissemination of state metrological control and supervision**

date of verification 24 September 2019
Executor *sign* Hakimova. N.H.

# APPENDIX K– AIR QUALITY MODELLING STUDY

# ACWA Power Sydarya 1,500MW CCGT IPP

# Air Quality Modelling Study

# ACWA Power Sydarya 1,500MW CCGT IPP

# Air Quality Modelling Study

| Revision | Date | Notes | Author | Checked | Approved |
|---|---|---|---|---|---|
| 1.0 | 05/08/2020 | E2799 | AB | ND | Dr N Davey |
| 1.1 | 06/08/2020 | E2799 | AB | ND | Dr N Davey |
| 2.0 | 01/10/2020 | E2799 | AB | ND | Dr N Davey |
| 2.1 | 12/10/2020 | E2799 | AB | ND | Dr N Davey |

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# 1 INTRODUCTION

1.1 Entran Ltd has been commissioned by 5 Capitals Environmental & Management Consulting (5 Capitals) to undertake an assessment of the predicted local air quality impacts arising from the operation of the proposed ACWA Power Sydarya 1,500MW Combined Cycle Gas Turbine (CCGT) at Shirin, Uzbekistan (hereafter known as the 'Project'). The Project is located on a plot of land that has been allocated for the development of two (2) CCGT Power Plant projects. The eastern plot, which is the subject of this assessment, has been granted to ACWA Power. The western plot has yet to be allocated but is understood to be under a tendering process with the IFC, it is anticipated that a similar sized plant will be operated in the future on this land (hereafter known as the 'IFC Project').

1.2 The Project Site is located 0.3km to the northeast of the city of Shirin in Uzbekistan which is located at the border with Tajikistan. The Site is located in close proximity to the Sirdarya Thermal Power Plant (TPP) which currently operates 10 units of 300MW. It is understood there will be a partial decommissioning of the Sirdarya TPP with the operation of the CCGT power plants on the Site (eastern plot) and the adjacent western plot. Figure 1.1 below shows the location of the Site.

**Figure 1.1: Location of the Site**

1.3 The Project would comprise two combined cycle gas turbine (CCGT) generators and one Heat Recovery Steam Generator (HRSG). The CCGT plant will be fired by natural gas and there is no provision for back up supplies of other fuels.

1.4 The plant will operate in combined cycle for normal operations. In case of maintenance on the water/steam cycle there will be the option for the plant to operate in open / simple cycle mode. The plant will have two main stacks for combined cycle emissions and two bypass stacks for open / simple cycle operations.

1.5 The Project will also include a 500/220kV switchgear station to the JSC National Electric Networks of Uzbekistan which will be a common facility between the Project and the IFC Project on the western site.

1.6 A detailed air quality dispersion modelling assessment has been undertaken to determine impacts associated with the proposed Project. Dispersion modelling has been carried out using the United States (US) Environmental Protection Agency (EPA) Breeze AERMOD 7 (version 7.12 and US EPA version 16216) dispersion model, three years of meteorological data from Samarkand (2017 to 2019) and terrain data for the local area.

1.7 The key pollutants considered in this assessment are: oxides of nitrogen ($NO_2$ and NO) and carbon monoxide (CO) as these are the key pollutants emitted from combustion of natural gas that may potentially lead to exceedances of any relevant standards. In addition, emission of ammonia ($NH_3$) are also considered due to the emissions arising from the proposed SCR for the Project. Predicted concentrations are compared with relevant standards and guidelines incorporated into Uzbekistan law and also the European Union (EU) standards, the International Finance Corporation (IFC) guidelines and the World Health Organisation (WHO) Guidelines.

1.8 The proposed plant will be located adjacent to the existing Sirdarya Thermal Power Plant which includes a number of stacks emitting to air.

1.9 A glossary of common air quality terminology is provided in **Appendix A.**

## 2 LEGISLATION, POLICY AND ASSESSMENT CRITERIA

### Uzbekistan Air Quality Standards

2.1 The Uzbekistan air quality standards are Maximum Permissible Concentrations (MPC) set within the SanPiN No. 0293-11 *'Hygienic regulations. List of maximum permissible concentrations (MPC) of contaminants in the atmospheric air of inhabitant areas in the territory of the Republic of Uzbekistan'.* The relevant standards applicable to this project are set out in Table 2.1 below.

**Table 2.1: Uzbekistan Ambient Air Quality Standards**

| Pollutant | Averaging Period | MPC ($\mu g/m^3$) |
|---|---|---|
| $NO_2$ | 1 time | 85 |
| | 24-hour | 60 |
| | Monthly | 50 |
| | Annual | 40 |
| NO | 1 time | 600 |
| | 24-hour | 250 |
| | Monthly | 120 |
| | Annual | 60 |
| CO | 1 time | 5000 |
| | 24-hour | 4000 |
| | Monthly | 3500 |
| | Annual | 3000 |
| $NH_3$ | 1-time | 200 |
| | 24-hour | 120 |
| | Monthly | 60 |
| | Annual | 40 |

### European Bank for Reconstruction and Development (EBRD)

2.2 Performance Requirement PR3 recognises that increased economic activity and urbanisation can generate increased levels of pollution to air, water and land. It acknowledges the importance of using best available techniques (BAT) and good international practice (GIP) to efficiently prevent pollution and control the release of pollutants into the environment.

2.3 PR3 requires projects involving new facilities to meet relevant EU environmental standards. The relevant EU air quality standards are presented in Table 2.2 below.

**Table 2.2: EU Ambient Air Quality Standards**

| Pollutant | Averaging Period | EU Limit Value ($\mu g/m^3$) | Comments |
|---|---|---|---|
| **Nitrogen dioxide ($NO_2$)** | 1-hour | 200 | Not to be exceeded more than 18 times in a calendar year |
| | Annual | 40 | |
| **Carbon monoxide (CO)** | Maximum daily 8 hour mean | 10,000 | |

2.4 PR3 also requires that projects will be required to meet EU Best Available Techniques (BAT) associated emission levels as set out in Table 2.3 below.

**Table 2.3: BAT – Associated Emission Levels (AELs)**

| Pollutant | BAT – AELs ($mg/Nm^3$) | |
|---|---|---|
| | Yearly Average | Daily Average |
| **NOx** | 10 - 30 | 15 -40 |
| **Carbon monoxide (CO)** | 5 - 30 | |
| *For plants with a net electrical efficiency (EE) greater than 55%, a correction factor may be applied to the higher end of the BAT-AEL range corresponding to [higher end] x EE/55, where EE is the net electrical efficiency of the plant determined at ISO baseload conditions. ** dry, 15%$O_2$ | | |

### International Finance Corporation World Bank Group

2.5 The IFC Guidelines[1] recommend the use of national legislated standards, or in their absence, the current World Health Organisation (WHO) Air Quality Guidelines. A summary of the IFC guideline values relevant to this project is provided in Table 2.4.

[1] International Finance Corporation World Bank Group, General EHS Guidelines: Environmental. Air Emissions and Ambient Air Quality, April 2007.

**Table 2.4: IFC and WHO Guideline Values**

| Pollutant | Averaging Period | Guideline Value ($\mu g/m^3$) |
|---|---|---|
| **Nitrogen Dioxide** | 1-year | 40 |
| | 1-hour | 200 |
| **Carbon Monoxide** | 1-hour | 30,000 |
| | 8-hour | 10,000 |

The Equator Principles

2.6 The Equator Principles provides a set of standards for financial investors to assess the social and environmental risk of a project. In air quality terms, a proposed facility satisfies the Equator Principles if compliance with the IFC air quality guideline values is demonstrated.

Degraded Airsheds

2.7 The term 'Airshed' refers to the local area around a facility or complex of facilities that is directly affected by emissions from the facility or complex. There are a number of factors that can potentially affect the size of a relevant airshed, including plant characteristics, stack height, meteorological conditions and topography.

2.8 For new power plants in degraded airsheds, the IFC[2] states that new facilities should minimise incremental impacts by achieving the emission values set out in Table 2.5.

2.9 In addition, the IFC guidance states *that 'emissions from a single project should not contribute more than 25% of the applicable ambient air quality standards to allow additional, future sustainable development in the same airshed'.*

[2] International Finance Corporation World Bank Group (December 2008), Environmental, Health and Safety Guidelines for Thermal Power Plants.

## Table 2.5: World Bank Emission Guidelines for Combustion Turbines (mg/Nm$^3$)

**Note:**

- Guidelines are applicable for new facilities
- EA may justify more stringent or less stringent limits due to ambient environment, technical and economic considerations provided there is compliance with applicable ambient air quality standards and incremental impacts are minimised.
- For projects to rehabilitate existing facilities, case-by-case emission requirements should be established by the EA considering (i) the existing emission levels and impacts on the environment and community health, and (ii) cost and technical feasibility of bringing the existing emission levels to meet these new facilities limits.
- EA should demonstrate that emissions do not contribute a significant portion to the attainment of relevant ambient air quality guidelines or standards, and more stringent limits may be required.

| Combustion Technology/ Fuel | Particulate Matter (PM) | | Sulphur dioxide ($SO_2$) | | Nitrogen oxides (NOx) | | Dry Gas, Excess $O_2$ Content (%) |
|---|---|---|---|---|---|---|---|
| **Boiler** | **NDA** | **DA** | **NDA** | **DA** | **NDA** | **DA** | |
| Natural Gas (all turbine types of Unit >50MWth) | N/A | N/A | N/A | N/A | 51 | 51 | 15% |
| Other Fuels (Unit > 50MWth) | 50 | 30 | Use of 1% or less S fuel | Use of 0.5% or less S fuel | 152 (a) | 152 (a) | 15% |

**General Notes:**

- MWth = Megawatt thermal input on HHV basis; N/A/ = Not applicable; NDA = Non-degraded airshed; DA = Degraded airshed (poor air quality); Airshed should be considered as being degraded if nationally legislated air quality standards are exceeded or, in their absence, if WHO Air Quality Guidelines are exceeded significantly; S = sulphur content (expressed a percent by mass); Nm$^3$ is at one atmosphere pressure, 0 degrees Celsius, MWth category is to apply to the entire facility consisting of multiple units that are reasonably considered to be emitted from a common stack. Guideline limits to apply to facilities operating more than 500 hrs per year. Emission levels should be evaluated on a one hour average basis and be achieved 95% of annual operating hours.
- If supplemental firing is used in a combined cycle gas turbine mode, the relevant guideline limits for combustion turbines should be achieved including emissions from those supplemental firing units (e.g., duct burners).
- (a) Technological differences (for example the use of Aeroderivatives) may require different emissions values which should be evaluated on a cases-by-case basis through the EA process but which should not exceed 200 mg/Nm3.

**Comparison of the Guideline limits with standards of selected countries / region (as of August 2008):**

- Natural Gas-fired Combustion Turbine – NOx
  - o Guideline limits: 51 (25 ppm)
  - o EU: 50 (24 ppm), 75 (37 ppm) (if combined cycle efficiency > 55%), 50*η / 35 (where η = simple cycle efficiency)
  - o US: 25 ppm (> 50 MMBtu/h (≈ 14.6 MWth) and ≤ 850 MMBtu/h (≈ 249MWth)), 15 ppm (> 850 MMBtu/h (≈ 249 MWth))
  - o (Note: further reduced NOx ppm in the range of 2 to 9 ppm is typically required through air permit)
- Liquid Fuel-fired Combustion Turbine – NOx
  - o Guideline limits: 152 (74 ppm) – Heavy Duty Frame Turbines & LFO/HFO, 300 (146 ppm) – Aeroderivatives & HFO, 200 (97 ppm) – Aeroderivatives & LFO
  - o EU: 120 (58 ppm), US: 74 ppm (> 50 MMBtu/h (≈ 14.6 MWth) and ≤ 850 MMBtu/h (≈ 249MWth)), 42 ppm (> 850 MMBtu/h (≈ 249 MWth))
- Liquid Fuel-fired Combustion Turbine – SOx
  - o Guideline limits: Use of 1% or less S fuel
  - o EU: S content of light fuel oil used in gas turbines below 0.1% / US: S content of about 0.05% (continental area) and 0.4% (non-continental area)

Source: EU (LCP Directive 2001/80/EC October 23 2001), EU (Liquid Fuel Quality Directive 1999/32/EC, 2005/33/EC), US (NSPS for Stationary Combustion Turbines, Final Rule – July 6, 2006)

## Adopted Air Quality Standards for the Assessment

2.10 The assessment has used the Uzbekistan MPC, the IFC / WHO guidelines and the EU standards for assessing the impact of the development on local air quality. A summary of the air quality standards adopted for the assessment is provided in Table 2.6.

**Table 2.6: Ambient Air Quality Standards and Guidelines Adopted for the Assessment**

| Pollutant | Averaging Period | Uzbekistan MPC (µg/m³) | IFC/WHO Guidelines (µg/m³) | EU Standards (µg/m³) |
|---|---|---|---|---|
| **Nitrogen dioxide ($NO_2$)** | 1-time(2) | 85 | 200 | 200(1) |
| | 24-hour | 60 | - | - |
| | Monthly | 50 | - | - |
| | Annual | 40 | 40 | 40 |
| **Nitrogen oxide (NO)** | 1-time(2) | 600 | - | - |
| | 24-hour | 250 | - | - |
| | Monthly | 120 | - | - |
| | Annual | 60 | - | - |
| **Carbon monoxide (CO)** | 1-hour | 5000 | 30,000 | - |
| | 8-hour | - | 10,000 | 10,000 |
| | 24-hour | 4000 | - | - |
| | Monthly | 3500 | - | - |
| | Annual | 3000 | - | - |
| **Ammonia ($NH_3$)** | 1-time(2) | 200 | - | - |
| | 24-hour | 120 | - | - |
| | Monthly | 60 | - | - |
| | Annual | 40 | - | - |

[1]includes 18 allowable exceedance of the standard of 200µg/m³ per year.

[2]compared against 1 hour average concentrations

# 3 ASSESSMENT METHODOLOGY

## Scope of Assessment

3.1 The assessment comprises a review of local ambient air quality monitoring data and dispersion modelling of emissions from the proposed plant to predict ground-level concentrations of pollutants at sensitive receptor locations.

3.2 The assessment also included modelling the emissions arising from the existing Sirdarya TPP plant and the TPP plant following the proposed modernisation works.

3.3 Predicted ground level concentrations are compared with relevant air quality standards.

## Dispersion Modelling Parameters

3.4 The potential impact of the facility arising from the proposed plant on local air quality has been assessed using Breeze AERMOD 7, a new generation dispersion model that incorporates the latest understanding of the atmospheric boundary layer.

3.5 The primary emission sources at the Site are as follows:

- In Combined Cycle Mode – two main stacks associated with the HRSG; or
- In Simple Cycle Mode – two bypass stacks

3.6 The key pollutants arising from natural gas combustion and emitted via the main stack / bypass stack will be oxides of nitrogen (NO and $NO_2$) and CO. Ammonia ($NH_3$) will also be emitted from the proposed SCR and therefore is also considered.

3.7 A summary of the emission parameters used in the dispersion modelling are presented in **Appendix B**. These data have been provided by the equipment manufacturer in line with the proposed fuel specifications.

3.8 The results presented in this report are determined assuming the main stacks are at a height of 60m and the bypass stacks are at a height of 45m.

3.9 For the purposes of the assessment it has been assumed that the facility will operate at full load continuously all year. The operational scenarios assessed are detailed in Table 3.1 below.

**Table 3.1: Summary of Scenarios Assessed for the Air Quality Assessment of the Project**

| Operational Scenario | Fuel | Pollutants | Operational Mode | Emissions Via |
|---|---|---|---|---|
| Scenario 1 | Natural gas | $NO_x$, CO, $NH_3$ | Combined | Main Stack |
| Scenario 2 | Natural gas | $NO_x$, CO, $NH_3$ | Simple | Bypass Stacks |

3.10 For each scenario the results are presented as:

- the baseline concentration (including a contribution from the existing plant at the neighbouring Sirdarya TPP and the background concentration in the area;
- the process contribution (PC) from the proposed plant; and
- the overall predicted environmental concentration (PEC) (PC + contribution from upgraded plant at the neighbouring Sirdarya TPP and the background concentration in the area.

3.11 Monitoring of ambient concentrations of ammonia ($NH_3$) is not undertaken, $NH_3$ is also not emitted by the Sirdarya TPP. Therefore, for the assessment of $NH_3$ only the PC arising from the proposed plant is provided.

3.12 It is understood that the existing Sirdarya TPP, will be partially decommissioned with the operation of the CCGT. The baseline scenario assumes that all 10 of the existing units are operational. Following the opening of the Project, it is assumed that 4 units will cease to operate (units 1, 2, 7 & 8) and the remaining 6 units will be modernised. Further details of the emissions from the Sirdarya TPP are provided in **Appendix B.**

3.13 As discussed previously the Project forms part of a wider CCGT development with additional IFC Project proposed for the adjacent land (western plot). Further modelling has been completed to determine the cumulative impact of this plant in addition to the proposed plant. To ensure a worst case assessment, emissions from the proposed IFC Project do not assume NOx abatement.

3.14 The following modelling will be completed:

**Table 3.2: Summary of Modelled Scenarios**

| Scenario | Conditions | Description |
|---|---|---|
| Baseline | Existing | • TPP operating with 10 units |
| Scenario 1 | Opening of Project | • TPP operating with 6 remaining modernised units<br>• Project operating in Combined Cycle Mode |
| Scenario 2 | Opening of Project | • TPP operating with 6 remaining modernised units<br>• Project operating in Simple Cycle Mode |
| Scenario 3 | Opening of Adjacent IFC Project | • TPP operating with 6 remaining modernised units<br>• Project operating in Combined Cycle Mode<br>• IFC Project operating in Combined Cycle Mode |

3.15 It is understood that the proposed Project will only operate on Simple Cycle Mode during maintenance of the HRSG plant. It is therefore considered unlikely that both the Project and the IFC Project will both operate on Simple Cycle Mode at the same time, therefore this scenario has not been modelled.

Local Meteorological Data

3.16 The modelling has been carried out using three years (2017-2019) of hourly sequential meteorological data in order to take account of inter-annual variability and reduce the effect of any atypical conditions. Data from meteorological station at Samarkand has been used for the assessment.

3.17 Wind roses for each of these years are presented in Figures 3.1 to 3.3; these show that the predominant wind direction is from the southeast.

**Figure 3.1: Wind rose for Samarkand (2017)**

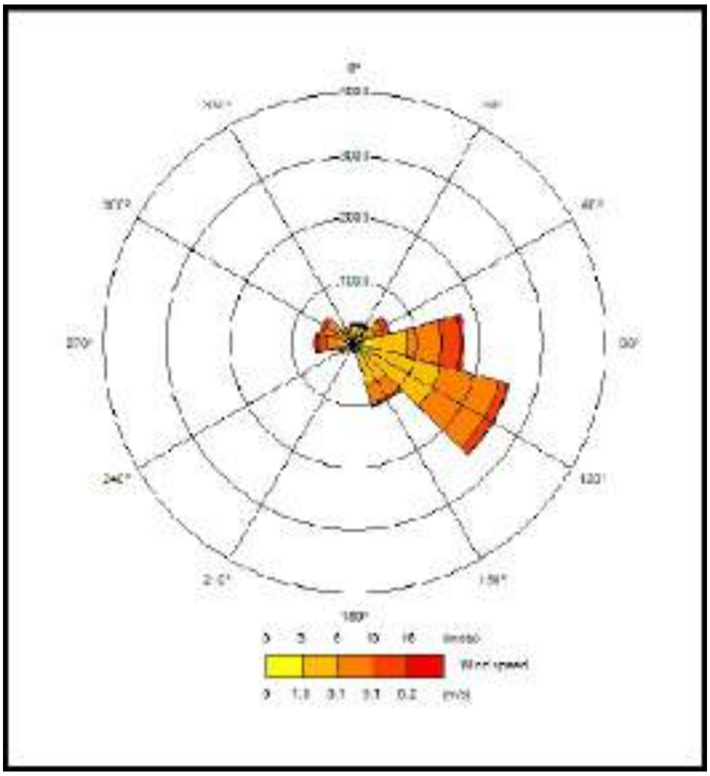


**Figure 3.2: Wind rose for Samarkand (2018)**

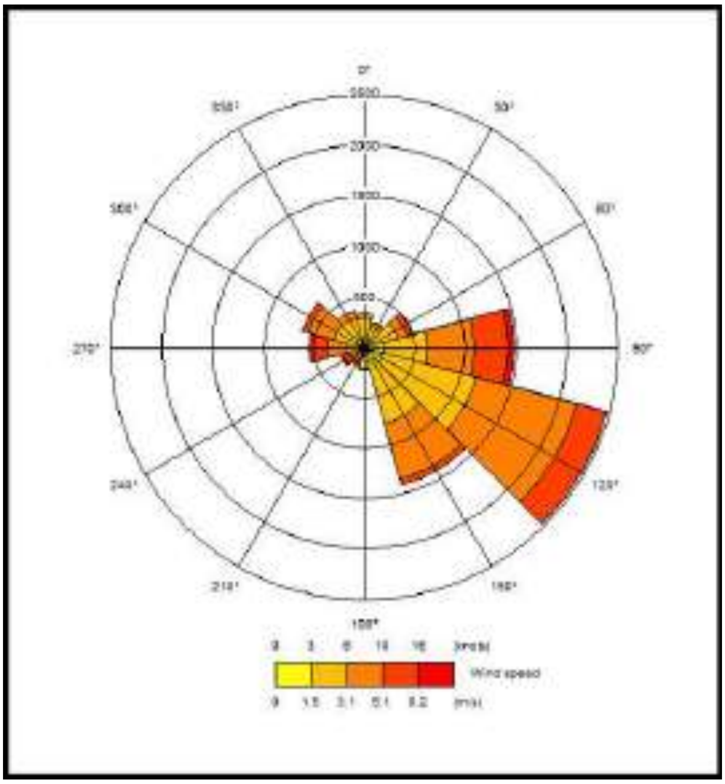
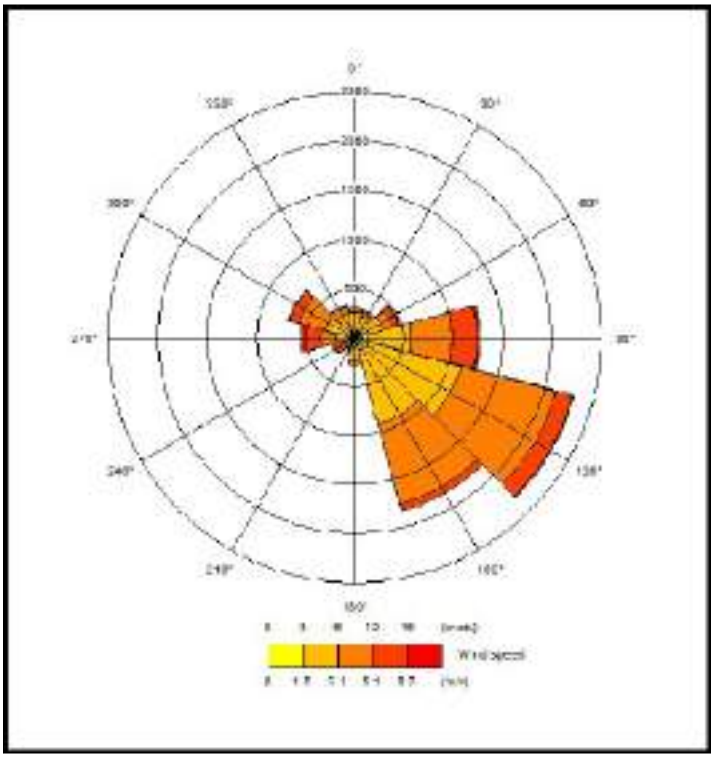


**Figure 3.3: Wind rose for Samarkand (2019)**



3.18 The raw meteorological data was sourced from the National Centres for Environmental Information (NCEI), the data capture rates for the raw data for the key parameters are as follows:

**Table 3.3: Data Capture Rates**

| Year | % Data Capture Rate for raw meteorological data | | | |
|---|---|---|---|---|
| | Temperature | Wind Speed | Wind Direction | Relative Humidity |
| 2017 | 99.8 | 94.7 | 94.7 | 99.8 |
| 2018 | 97.2 | 93.3 | 93.3 | 97.2 |
| 2019 | 99.5 | 94.2 | 94.2 | 99.5 |

3.19 No bias in the collection of data availability was identified.

Building Downwash / Entrainment

3.20 The presence of buildings close to emission sources can significantly affect the dispersion of pollutants by leading to a phenomenon called building downwash. This occurs when a building distorts the wind flow, creating zones of increased turbulence. Increased turbulence causes the plume to come to ground earlier than otherwise would be the case and results in higher ground level concentrations closer to the stack.

3.21 Downwash effects are only significant where building heights are greater than 30 to 40% of the emission release height. The downwash structures also need to be sufficiently close for their influence to be significant.

3.22 A summary of the proposed buildings and structures that have been included in the model are presented in Table 3.4 below, further details are provided in **Appendix B**.

**Table 3.4: Downwash Structures**

| Description | Height (m) |
|---|---|
| Gas Turbine Buildings | 25 |
| Steam Turbine Building | 25 |
| Heat Recovery Steam Generator Buildings | 40 |
| Control Building | 25 |

*Topography*

3.23 The presence of elevated terrain can significantly affect the dispersion of pollutants by increasing turbulence and reducing the distance between the plume centre line and the ground level. Terrain data has been included in the model.

Nitric Oxide to $NO_2$ Conversion

3.24 Oxides of nitrogen ($NO_x$) emitted to atmosphere as a result of combustion will consist largely (around 90%) of nitric oxide (NO), a relatively innocuous substance. Once released into the atmosphere, NO is oxidised to $NO_2$. The proportion of NO converted to $NO_2$ depends on a number of factors including wind speed, distance from the source, solar irradiation and the availability of oxidants, such as ozone ($O_3$). At locations close to the source where highest concentrations are predicted, the rate of oxidation will be relatively small.

3.25 Typical NO:$NO_2$ conversion ratios of 70% for long term predictions and 35% for short term predictions have been assumed for comparison with the air quality standards for $NO_2$. For NO, a worst-case approach has been adopted assuming no conversion to $NO_2$.

Sensitive Receptors

3.26 The Project Site is located on farming land, residential areas are located to the northeast, northwest, east and west. A military barracks is located to the southeast and the Sirdarya TPP is located to the southwest. Due to lack of relevant exposure, only the short-term air quality standards are applicable within the non-residential areas such as the Site itself, the Sirdarya TPP and parts of the barracks.

3.27 Grids have been modelled across the nearest sensitive areas (Residential Areas A to E and Military Barracks) to ensure the worst affected locations within these areas are assessed. In the wider area, specific receptors have been selected to represent areas where people are likely to be regularly exposed for prolonged periods of time (e.g. residential areas). The locations of the residential grids and discrete sensitive receptors in the vicinity of the Site are presented in Table 3.5 and Figures 3.4 and 3.5. Five receptors have also been included within the Site itself representing the areas likely to have relevant exposure for assessment of short-term effects.

**Table 3.5: Location of Sensitive Receptors**

| ID (Plan 3.5 below) | Receptor Type | Ground-Level Elevation (m) |
|---|---|---|
| H3 | Residential Grid Area A (to northwest of Site) | 324.2 – 342.9 |
| H1 | Residential Grid Area B (to west of Site including Farmers Homes) | 323.0 – 332.9 |
| H5 | Residential Grid Area C (to east of Site including Kindergarten and Sports Centre) | 286.1 – 373.8 |
| H5 | Residential Grid Area D (new homes to east of Site) | 286.9 – 291.7 |
| H7 | Residential Grid Area E (accommodation blocks to southeast of Site) | 285.2 – 292.1 |
| H8 | Military Barracks (short-term) | 285.1 – 292.2 |
| H2 | Sirdarya TPP | 332.3 / 295.2 |
| H4 | Residential | 325.8 |
| H6 | Residential | 293.4 |
| H7 | Residential | 290.4 |
| H9 | Residential | 359.9 |
| H10 | Residential | 369.2 |
| H11 | Residential | 301.8 |
| H12 | Residential | 307.6 |

| | | |
|---|---|---|
| H13 | Residential | 367.8 |
| H14 | Residential | 338.5 |
| H15 | Residential | 339.8 |
| H16 | Residential | 360.4 |
| H17 | Residential | 363.6 |
| H18 | Residential | 477.8 |
| H19 | Residential | 479.6 |
| H20 | Residential | 395.0 |
| H21 | Residential | 410.4 |
| H22 | Residential | 317.4 |
| H23 | Residential | 286.9 |
| H24 | Residential | 283.3 |
| H25 | Residential | 282.7 |
| H26 | Residential | 279.3 |
| H27 | Residential | 325.2 |
| H28 | Residential | 323.1 |
| H29 | Residential | 307.0 |
| H30 | Residential | 281.8 |
| H31 | Residential | 282.1 |
| H32 | Residential | 280.7 |
| H33 | Residential | 279.7 |
| H34 | Residential | 307.1 |
| H35 | Residential | 291.7 |
| H36 | Residential | 311.5 |
| H37 | Residential | 304.2 |
| H38 | Residential | 313.5 |
| H39 | Residential | 302.3 |
| H40 | Residential | 284.1 |
| D1 | Proposed On-site receptor (Central Control Building) (short-term exposure) | 317.2 |
| D2 | Proposed On-site receptor (Workshop Area) (short-term exposure) | 292.8 |
| D3 | Proposed On-site receptor (Admin Building) (short-term exposure) | 292.3 |
| D4 | Proposed On-site receptor (Social Building) (short-term exposure) | 294.9 |
| D5 | Proposed On-site receptor (Gatehouse) (short-term exposure) | 292.0 |

**Figure 3.4: Sensitive Receptor Locations within 2km radius of Site**


**Figure 3.5: Sensitive Receptor Locations within 10km radius of Site**

3.28 Ground-level pollutant concentrations have been predicted at both the receptor locations above and over a coarse grid of size 10km by 10km Cartesian grid of 250m resolution and a fine grid 2km by 2km of 50m resolution both centred on the Site.

**Significance Criteria**

3.29 There are no local planning policies that provide criteria for acceptable impacts from proposed facilities in Uzbekistan. The UK Environment Agency has developed criteria for assessing the significance of an impact compared with relevant air quality standards and background air quality. A process contribution (PC) is considered significant if:

- The long-term PC > 1% of the long-term air quality standard;
- The short-term PC > 10% of the short-term air quality standard.

3.30 At 1% of the long-term air quality standard, the impact of a development is unlikely to be significant compared with background air quality. Both the short-and long-term criteria are also designed to ensure that there is a substantial safety margin to protect public health and the environment.

3.31 If the screening criteria are not met, the process contribution should be considered in combination with relevant ambient background pollutant concentrations. The impact is considered to be insignificant if:

- The long-term PC + background concentration < 70% of the air quality standard;
- The short-term PC < 20% (air quality standard – short-term background concentration), where the short-term background concentration is assumed to be twice the long-term background concentration.

# 4 BASELINE CONDITIONS

4.1 Ambient air quality data at two monitoring locations (Bekobad and Gulistan) has been reviewed to establish the baseline conditions in the vicinity of the Site.

Bekobad

4.2 The monitoring station at Bekobad is location approximately 12km to the east of the Site. The monitoring site at Bekobad is a more industrial setting than the Site with the main industries being cement and steel industries, therefore the ambient concentrations measured at this location are likely to be an overestimation of the background concentrations at the Project Site.

4.3 Five years of monthly monitoring data for concentrations of nitrogen dioxide ($NO_2$), nitrogen oxide (NO) and carbon monoxide (CO) have been reviewed, and are summarised in Table 4.1.

**Table 4.1: Results of Monitoring at Bekobad ($\mu g/m^3$)**

| Year | Concentration ($\mu g/m^3$) | | |
|---|---|---|---|
| | $NO_2$ | NO | CO |
| 2015 | 35.8 | 26.7 | 1000.0 |
| 2016 | 41.7 | 30.0 | 1000.0 |
| 2017 | 47.5 | 30.8 | 1000.0 |
| 2018 | 47.5 | 33.3 | 1000.0 |
| 2019 | 47.5 | - | 1000.0 |

4.4 Daily spot measurements at 07:00, 13:00 and 19:00 at the Bekobad monitoring station were reviewed for the year 2019. A summary of this data is provided in Tables 4.2 to 4.4 below.

**Table 4.2: Results of $NO_2$ Monitoring at Bekobad in 2019 (µg/m³)**

| Month | Concentration (µg/m³) | | | |
|---|---|---|---|---|
| | $NO_2$ | | | |
| | 07:00 | 13:00 | 19:00 | Average |
| January | 43.2 | 44.8 | 41.6 | 43.2 |
| February | 42.8 | 46.3 | 52.1 | 46.9 |
| March | 41.7 | 47.8 | 43.5 | 44.3 |
| April | 59.6 | 50.8 | 53.5 | 54.6 |
| May | 51.2 | 55.8 | 60.8 | 55.9 |
| June | 55.0 | 50.8 | 55.4 | 53.8 |
| July | 42.2 | 46.3 | 48.1 | 45.6 |
| August | 49.3 | 52.6 | 53.0 | 51.6 |
| September | 37.1 | 37.5 | 41.7 | 38.8 |
| October | 52.3 | 50.4 | 52.7 | 51.8 |
| November | 45.8 | 38.1 | 36.5 | 40.1 |
| December | 43.2 | 43.6 | 44.4 | 43.7 |
| **Average** | **47.0** | **47.1** | **48.6** | **47.5** |

**Table 4.3: Results of NO Monitoring at Bekobad in 2019 (µg/m³)**

| Month | Concentration (µg/m³) | | | |
|---|---|---|---|---|
| | NO | | | |
| | 07:00 | 13:00 | 19:00 | Average |
| January | 22.7 | 22.7 | 23.6 | 23.0 |
| February | 22.3 | 23.2 | 25.9 | 23.8 |
| March | 24.3 | 25.7 | 27.4 | 25.8 |
| April | 26.2 | 30.0 | 28.8 | 28.3 |
| May | 28.1 | 33.1 | 30.0 | 30.4 |
| June | 29.6 | 26.7 | 29.1 | 28.4 |
| July | 26.5 | 27.0 | 24.8 | 26.1 |
| August | 25.6 | 31.1 | 28.1 | 28.3 |
| September | 26.5 | 25.7 | 23.8 | 25.3 |
| October | 33.5 | 38.5 | 36.2 | 36.0 |
| November | 28.5 | 22.0 | 27.2 | 25.9 |

| Month | Concentration (µg/m³) | | | |
|---|---|---|---|---|
| | NO | | | |
| | 07:00 | 13:00 | 19:00 | Average |
| December | 30.8 | 31.2 | 37.2 | 33.1 |
| **Average** | **27.0** | **28.1** | **28.5** | **27.9** |

**Table 4.4: Results of CO Monitoring at Bekobad in 2019 (µg/m³)**

| Month | Concentration (µg/m³) | | | |
|---|---|---|---|---|
| | CO | | | |
| | 07:00 | 13:00 | 19:00 | Average |
| January | 1181.8 | 818.2 | 909.1 | 969.7 |
| February | 1363.6 | 1000.0 | 909.1 | 1090.9 |
| March | 1739.1 | 739.1 | 869.6 | 1115.9 |
| April | 1307.7 | 1230.8 | 1384.6 | 1307.7 |
| May | 1230.8 | 1038.5 | 1076.9 | 1115.4 |
| June | 1041.7 | 625.0 | 791.7 | 819.4 |
| July | 1259.3 | 703.7 | 1037.0 | 1000.0 |
| August | 1444.1 | 1777.8 | 851.9 | 1358.0 |
| September | 913.0 | 1000.0 | 1000.0 | 971.0 |
| October | 1076.9 | 1269.2 | 1192.3 | 1179.5 |
| November | 730.8 | 1153.8 | 1153.8 | 1012.8 |
| December | 1120.0 | 880.0 | 1000.0 | 1000.0 |
| **Average** | **1200.7** | **1019.7** | **1014.7** | **1078.4** |

Gulistan

4.5 The monitoring station at Gulistan is located approximately 41km to the northeast of the Site. The monitoring site at Gulistan is a rural/agricultural area with similar land use and wind patterns to the proposed Project site. The ambient concentrations measured at this location are likely therefore likely to be similar to the background concentrations at the Project in the absence of the influence of the Sirdarya TPP.

4.6 Five years of monthly monitoring data for concentrations of nitrogen dioxide ($NO_2$) and carbon monoxide (CO) have been reviewed, and are summarised in Table 4.5.

**Table 4.5: Results of Monitoring at Gulistan (µg/m³)**

| Year | Concentration (µg/m³) | |
|---|---|---|
| | $NO_2$ | CO |
| 2015 | 16.7 | 1250.0 |
| 2016 | 19.2 | 1916.7 |
| 2017 | 19.2 | 1916.7 |
| 2018 | 20.0 | 2000.0 |
| 2019 | 20.0 | 2000.0 |

4.7 Daily spot measurements at 07:00, 13:00 and 19:00 at the Gulistan monitoring station were reviewed for the year 2019. A summary of this data is provided below.

**Table 4.6: Results of $NO_2$ Monitoring at Gulistan in 2019 (µg/m³)**

| Month | Concentration (µg/m³) | | | |
|---|---|---|---|---|
| | $NO_2$ | | | |
| | 07:00 | 13:00 | 19:00 | Average |
| January | 18.3 | 20.8 | 23.5 | 20.9 |
| February | 19.1 | 21.3 | 22.4 | 20.9 |
| March | 19.1 | 22.0 | 23.0 | 21.4 |
| April | 18.1 | 21.7 | 26.5 | 22.1 |
| May | 18.2 | 22.2 | 26.0 | 22.1 |
| June | 18.7 | 20.0 | 24.6 | 21.1 |
| July | 17.2 | 21.3 | 24.6 | 21.0 |
| August | 18.9 | 22.6 | 22.0 | 21.2 |
| September | 18.9 | 22.6 | 22.0 | 21.2 |
| October | 17.3 | 19.8 | 24.0 | 20.4 |
| November | 16.0 | 21.4 | 27.2 | 21.5 |
| December | 16.4 | 20.8 | 24.8 | 20.7 |
| **Average** | **18.0** | **21.4** | **24.2** | **21.2** |

**Table 4.7: Results of NO Monitoring at Gulistan in 2019 ($\mu g/m^3$)**

| Month | Concentration ($\mu g/m^3$) | | | |
|---|---|---|---|---|
| | NO | | | |
| | 07:00 | 13:00 | 19:00 | Average |
| January | 13.8 | 17.1 | 16.3 | 15.7 |
| February | 13.3 | 13.8 | 18.3 | 15.1 |
| March | 12.3 | 18.2 | 21.8 | 17.4 |
| April | 13.8 | 16.9 | 21.2 | 17.3 |
| May | 12.8 | 14.8 | 18.8 | 15.5 |
| June | 12.2 | 16.1 | 18.7 | 15.7 |
| July | 12.6 | 17.4 | 20.7 | 16.9 |
| August | 17.0 | 22.6 | 24.8 | 21.5 |
| September | 17.0 | 22.6 | 24.8 | 21.5 |
| October | 13.8 | 16.5 | 18.5 | 16.3 |
| November | 14.0 | 16.0 | 19.6 | 16.5 |
| December | 12.8 | 17.6 | 21.2 | 17.2 |
| **Average** | **13.8** | **17.5** | **20.4** | **17.2** |

**Table 4.8: Results of CO Monitoring at Gulistan in 2019 ($\mu g/m^3$)**

| Month | Concentration ($\mu g/m^3$) | | | |
|---|---|---|---|---|
| | CO | | | |
| | 07:00 | 13:00 | 19:00 | Average |
| January | 2208.3 | 2166.7 | 2500.0 | 2291.7 |
| February | 2000.0 | 2000.0 | 2291.7 | 2097.2 |
| March | 1891.3 | 2239.1 | 2260.9 | 2130.4 |
| April | 2038.5 | 2307.7 | 2346.2 | 2230.8 |
| May | 2200.0 | 2060.0 | 2440.0 | 2233.3 |
| June | 2043.5 | 2065.2 | 2478.3 | 2195.7 |
| July | 2000.0 | 2314.8 | 2166.7 | 2160.5 |
| August | 2333.3 | 2314.8 | 2240.7 | 2296.3 |
| September | 2333.3 | 2314.8 | 2240.7 | 2296.3 |
| October | 2057.7 | 2096.2 | 2192.3 | 2115.4 |
| November | 2080.0 | 2000.0 | 2120.0 | 2066.7 |
| December | 2160.0 | 1920.0 | 2160.0 | 2080.0 |
| **Average** | **2112.2** | **2149.9** | **2286.5** | **2182.9** |

Local Monitoring

4.8 Monitoring was undertaken at a central location within the Project site itself, three measurements were taken per day for a period of 7 consecutive days between the 21st to 27th May 2020. Concentrations of $NO_2$, $SO_2$, CO and Total suspended particles were measured. Of relevance to this assessment are concentrations of $NO_2$ and CO. The monitoring data provided is presented in Table 4.9 below.

**Table 4.9: Results of Monitoring at the Site (µg/m³)**

| Date | Concentration (µg/m³) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | $NO_2$ | | | | CO | | | |
| | 1 | 2 | 3 | Average | 1 | 2 | 3 | Average |
| 21/05/20 | 0 | 0 | 0 | 0 | 3300 | 2700 | 2300 | 2767 |
| 22/05/20 | 20 | 10 | 10 | 13 | 3900 | 3700 | 3500 | 3700 |
| 23/05/20 | 0 | 10 | 0 | 3 | 3900 | 4800 | 3200 | 3967 |
| 24/05/20 | 0 | 0 | 0 | 0 | 5000 | 3000 | 3200 | 3733 |
| 25/05/20 | 0 | 0 | 0 | 0 | 2300 | 2300 | 1300 | 1937 |
| 26/05/20 | 0 | 0 | 0 | 0 | 4200 | 3400 | 3900 | 3833 |
| 27/05/20 | 10 | 0 | 0 | 3 | 3700 | 3500 | 3500 | 3567 |

4.9 Monitoring of ambient pollutant concentrations of $NO_2$, ozone ($O_3$), volatile organic compounds (VOCs) and sulphur dioxide ($SO_2$) using diffusion tubes has also been undertaken at 6 locations within the vicinity of the Site. Of relevance to this assessment are concentrations of $NO_2$. The monitoring locations are illustrated in Figure 4.1 below.

**Figure 4.1: Diffusion Tube Survey Monitoring Locations**

4.10 Monitoring data had been provided for the period from the 20th May to 11th June 2020. The results at each monitoring location are presented in Table 4.10 below.

**Table 4.10: Results of Ambient $NO_2$ Diffusion Tube Survey ($\mu g/m^3$)**

| Monitoring Locations | Concentration ($\mu g/m^3$) |
|---|---|
| DT1 | 5.8 |
| DT2 | 7.9 |
| DT3 | 9.3 |
| DT4 | 6.8 |
| DT5 | 7.0 |
| DT6 | 5.7 |

4.11 In order to establish a representative background concentration, continuous measurements over a period of at least 3 months are required. The results from the onsite spot readings and diffusion tube survey were taken over a short time period and were not continuous measurements. They are therefore not considered suitable for use in establishing the background concentration.

4.12 For the purposes of this assessment the background concentrations are assumed to be similar to the concentrations measured at the Guilstan monitoring site. The background concentrations used for this assessment are 21$\mu g/m^3$ for $NO_2$, 17$\mu g/m^3$ for NO and 2200$\mu g/m^3$ for CO.

4.13 As monitoring data measured at some distance from the Project site has been used to establish a background concentration, further modelling was completed to determine the effects of the emissions arising from the Sirdarya TPP that is located adjacent to the Project site.

4.14 The background concentrations used in this assessment are likely to be higher than those likely to be experienced in the vicinity of the Site, therefore the assessment can be considered to be worst case. As there is some uncertainty regarding the background concentrations, the background concentrations and PECs presented in this report should be considered to be indicative only.

# 5 ASSESSMENT OF IMPACTS

## Introduction

5.1 The maximum predicted concentrations of $NO_2$, NO and CO as a result of the proposals have been predicted by dispersion modelling using three years of meteorological data.

5.2 The impact of the proposals i.e. process contribution (PC) is considered as a proportion of the relevant air quality standards to determine the significance of the impact. Where more than one standard exists for the same pollutant and averaging period, the most stringent standard has been used in this assessment.

5.3 In order to predict the long-term predicted environmental concentration (PEC) the background concentrations as summarised in Section 4 have been combined with the long-term PC. To predict the short-term PECs, the predicted short-term PC is added to the short-term background concentrations, usual practice is to assume to be twice that of the long-term background concentration as recommended by the UK EA. Hourly, 8-hour, 24-hour and monthly concentrations are all considered as short-term concentrations.

## Scenario One (Combined Cycle)

Nitrogen Dioxide ($NO_2$)

5.4 The maximum predicted ground-level annual $NO_2$ concentrations at the nearest identified sensitive receptor locations are presented in Table 5.1. For ease of reading only the concentrations at the closest receptor locations and those that are showing elevated concentrations are presented in the table, full results are presented in **Appendix C**. The results are presented for the baseline scenario which includes the existing emissions arising from the neighbouring Sirdarya TPP and the likely local background concentration; the process contribution (PC) for emissions from the proposed plant and as a percentage of the relevant standard and the predicted environmental concentration (PEC) which includes the emissions from the retained plant at the neighbouring Sirdarya TPP following the upgrading and closure of some of the current units.

**Table 5.1: Maximum Predicted Long Term (Annual) $NO_2$ Concentrations – Combined Cycle ($\mu g/m^3$)**

| Receptor | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including modernised TPP) | Overall Impact (PEC – Baseline) |
|---|---|---|---|---|---|
| Residential Area A (H3) | 21.2 | 0.5 | 1.3 | 21.6 | 0.4 |
| Residential Area B (H1) | 21.2 | 0.7 | 1.7 | 21.8 | 0.6 |
| Residential Area C (H5) | 21.5 | 0.5 | 1.2 | 21.7 | 0.2 |
| Residential Area D (new homes) | 21.8 | 0.2 | 0.5 | 21.6 | -0.2 |
| Residential Area E (accommodation blocks (H8) | 21.8 | 0.4 | 0.9 | 21.7 | -0.1 |
| H4 | 21.2 | 0.3 | 0.7 | 21.4 | 0.2 |
| H6 | 21.9 | 0.3 | 0.8 | 21.7 | -0.1 |
| H7 | 21.8 | 0.4 | 0.9 | 21.7 | -0.1 |
| H9 | 21.3 | 0.0 | 0.1 | 21.2 | -0.1 |
| H10 | 21.4 | 0.1 | 0.1 | 21.3 | -0.1 |
| H11 | 21.5 | 0.1 | 0.2 | 21.3 | -0.1 |
| H12 | 21.6 | 0.2 | 0.4 | 21.5 | -0.1 |
| H18 | 22.0 | 0.3 | 0.8 | 21.8 | -0.2 |
| H19 | 22.1 | 0.3 | 0.9 | 21.9 | -0.2 |
| H27 | 21.4 | 0.6 | 1.4 | 21.7 | 0.3 |
| H34 | 22.2 | 0.2 | 0.4 | 21.8 | -0.4 |
| H35 | 21.8 | 0.1 | 0.3 | 21.5 | -0.2 |
| H36 | 22.1 | 0.1 | 0.4 | 21.7 | -0.4 |
| **Standard** | 40 | | | | |

5.5 The results indicate that there will be no exceedances of the relevant annual mean $NO_2$ standard (which is the Uzbekistan MPC, the EU standard and WHO guideline concentration of 40$\mu g/m^3$) within the nearby residential areas.

5.6 The greatest impact in annual mean $NO_2$ concentrations as a result of the proposed plant when operating in combined cycle mode is predicted to be a PC of 0.7$\mu g/m^3$ predicted at Residential Area B which is located close to the west boundary of the Site. At this and three other nearby sensitive receptors (Residential Areas A, C and H27) the impact is greater than 1% of the standard. However, at all the selected locations within the study area, the predicted PEC is less than 70% of the relevant standard, therefore the impact is considered to be insignificant in accordance with the significance criteria.

5.7 The greatest change in the overall annual mean $NO_2$ concentrations as a result of the changes (proposed plant plus changes to emissions from neighbouring Sirdarya TPP) is an increase of 0.6$\mu$g/m$^3$ also predicted at Residential Area B. The results also indicate that at a number of other nearby sensitive receptors, the predicted concentrations will be reduced from the current levels. The impact at these locations is considered to be beneficial.

5.8 A contour plot showing the annual mean $NO_2$ PC across the study area is shown in Figure 5.1 below.

**Figure 5.1: Predicted Maximum Annual Mean $NO_2$ PC Concentrations ($\mu$g m$^{-3}$)**

5.9 The maximum predicted ground-level short-term $NO_2$ concentrations at the identified sensitive receptor locations are presented in Table 5.2.

**Table 5.2: Maximum Predicted Short-Term (1 Hour, 24 Hour and Monthly) $NO_2$ Concentrations – Combined Cycle ($\mu g/m^3$)**

| Receptor | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Overall Impact (PEC – Baseline) |
|---|---|---|---|---|---|
| **1-Hour** | | | | | |
| Residential Area A (H3) | 82.8 | 14.1 | 16.6 | 67.9 | -14.8 |
| Residential Area B (H1) | 83.1 | 14.6 | 17.1 | 73.2 | -9.9 |
| Residential Area C (H5) | 84.2 | 24.0 | 28.3 | 69.1 | -15.1 |
| Residential Area D (new homes) | 91.0 | 6.6 | 7.8 | 72.8 | -18.3 |
| Residential Area E (accommodation blocks (H8) | 87.6 | 7.0 | 8.3 | 70.5 | -17.1 |
| Military Barracks | 95.0 | 11.3 | 13.3 | 75.9 | -19.2 |
| Sirdarya TPP (H2) | 42.7 | 7.1 | 8.3 | 49.1 | 6.3 |
| H4 | 80.5 | 5.3 | 6.3 | 65.7 | -14.8 |
| H6 | 85.5 | 5.9 | 7.0 | 67.1 | -18.4 |
| H7 | 81.1 | 5.6 | 6.6 | 65.3 | -15.8 |
| H9 | 79.3 | 5.5 | 6.5 | 68.9 | -10.4 |
| H10 | 76.0 | 5.5 | 6.4 | 66.8 | -9.2 |
| H11 | 73.1 | 6.5 | 7.7 | 63.9 | -9.2 |
| H12 | 80.8 | 6.9 | 8.1 | 68.1 | -12.7 |
| H18 | 74.3 | 33.7 | 39.7 | 75.7 | 1.4 |
| H19 | 73.4 | 33.5 | 39.4 | 75.5 | 2.2 |
| H27 | 92.3 | 8.3 | 9.7 | 77.4 | -14.9 |
| H34 | 87.8 | 4.5 | 5.2 | 72.8 | -14.9 |
| H35 | 84.8 | 6.7 | 7.9 | 67.1 | -17.7 |
| H36 | 84.9 | 5.7 | 6.8 | 70.0 | -14.9 |
| **24-Hour** | | | | | |
| Residential Area A (H3) | 44.6 | 2.0 | 3.4 | 44.2 | -0.4 |
| Residential Area B (H1) | 43.8 | 4.5 | 7.4 | 46.5 | 2.7 |
| Residential Area C (H5) | 46.4 | 4.8 | 8.1 | 46.8 | 0.4 |
| Residential Area D (new homes) | 48.6 | 1.2 | 2.0 | 45.4 | -3.2 |
| Residential Area E (accommodation blocks | 48.6 | 1.9 | 3.2 | 45.6 | -3.0 |

| Receptor | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Overall Impact (PEC – Baseline) |
|---|---|---|---|---|---|
| (H8) | | | | | |
| Military Barracks | 46.3 | 1.2 | 1.9 | 44.2 | -2.1 |
| Sirdarya TPP (H2) | 42.1 | 2.4 | 4.0 | 44.4 | 2.3 |
| H4 | 44.5 | 1.1 | 1.8 | 44.1 | -0.5 |
| H6 | 48.0 | 1.3 | 2.2 | 45.7 | -2.3 |
| H7 | 48.0 | 1.6 | 2.7 | 45.5 | -2.5 |
| H9 | 46.0 | 0.5 | 0.8 | 44.6 | -1.4 |
| H10 | 45.4 | 0.7 | 1.1 | 44.4 | -1.0 |
| H11 | 46.5 | 0.9 | 1.5 | 45.1 | -1.4 |
| H12 | 47.3 | 1.5 | 2.5 | 45.8 | -1.5 |
| H18 | 47.6 | 3.3 | 5.6 | 46.3 | -1.3 |
| H19 | 47.8 | 4.6 | 7.7 | 47.6 | -0.2 |
| H27 | 45.0 | 2.1 | 3.5 | 44.1 | -0.9 |
| H34 | 48.1 | 0.5 | 0.8 | 45.6 | -2.4 |
| H35 | 46.4 | 0.6 | 1.0 | 44.6 | -1.8 |
| H36 | 46.5 | 0.6 | 1.0 | 44.9 | -1.6 |
| **Monthly** | | | | | |
| Residential Area A (H3) | 42.3 | 0.5 | 1.0 | 42.5 | 0.2 |
| Residential Area B (H1) | 42.2 | 1.3 | 2.5 | 43.3 | 1.1 |
| Residential Area C (H5) | 42.7 | 0.6 | 1.2 | 43.0 | 0.3 |
| Residential Area D (new homes) | 43.5 | 0.2 | 0.5 | 43.0 | -0.5 |
| Residential Area E (accommodation blocks (H8) | 43.4 | 0.4 | 0.8 | 43.0 | -0.4 |
| Military Barracks | 42.7 | 0.3 | 0.7 | 42.5 | -0.1 |
| Sirdarya TPP (H2) | 42.0 | 0.6 | 1.1 | 42.6 | 0.6 |
| H4 | 42.3 | 0.3 | 0.5 | 42.4 | 0.1 |
| H6 | 43.3 | 0.3 | 0.5 | 43.0 | -0.4 |
| H7 | 43.2 | 0.3 | 0.7 | 43.0 | -0.2 |
| H9 | 42.5 | 0.1 | 0.1 | 42.3 | -0.2 |
| H10 | 42.6 | 0.1 | 0.2 | 42.4 | -0.2 |
| H11 | 42.5 | 0.1 | 0.2 | 42.4 | -0.2 |
| H12 | 42.7 | 0.2 | 0.4 | 42.6 | -0.2 |
| H18 | 42.9 | 0.4 | 0.8 | 42.7 | -0.3 |

| Receptor | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Overall Impact (PEC – Baseline) |
|---|---|---|---|---|---|
| H19 | 43.0 | 0.5 | 0.9 | 42.8 | -0.2 |
| H27 | 42.5 | 0.7 | 1.5 | 42.8 | 0.4 |
| H34 | 44.1 | 0.2 | 0.3 | 43.2 | -0.8 |
| H35 | 43.1 | 0.1 | 0.3 | 42.7 | -0.4 |
| H36 | 43.0 | 0.2 | 0.3 | 42.6 | -0.4 |
| **1-Hour Standard** | 85 | | | | |
| **24-Hour Standard** | 60 | | | | |
| **Monthly Standard** | 50 | | | | |

5.10 The results indicate that there will be no exceedances of the most stringent hourly, 24-hour or monthly mean $NO_2$ standards which are the Uzbekistan MPC standards of 85, 60 and 50$\mu$g/m$^3$ respectively within the nearby sensitive areas when the proposed plant is operational.

5.11 The greatest impacts on hourly mean $NO_2$ concentrations are 33.7 and 33.5$\mu$g/m$^3$ predicted at receptors H18 and H19 which are located in Bekobad over 8km to the east of the Site. The terrain at these locations is approximately 130m higher than at the location of the Site. The elevated terrain may account for the higher concentrations. At the remaining receptors the greatest impact is predicted to be 24.0$\mu$g/m$^3$ at Residential Area C which is located to the east of the Site. At six of the nearby sensitive receptors (Residential Areas A, B and C, the Military Barracks and receptors H18 and H19) the impact on hourly mean $NO_2$ concentrations is greater than 10% of the relevant standard and therefore cannot be considered to be an insignificant impact. It should be noted however that the results indicate that at all of the nearby sensitive residential receptors and at the Military Barracks, the overall predicted PECs will be reduced compared to current levels and therefore the overall impact will be beneficial.

5.12 Further modelling has been undertaken to investigate the number of instances in a year that the predicted hourly PCs will exceed the significance criteria of 10% of the relevant standard. At the receptors with the highest PCs (Residential Area C, H18 and H19) the PCs are predicted to exceed 10% of the relevant standard for 23, 31 and 40 hours respectively in the worst-case year which equates to 0.3, 0.4 and 0.5% of the year.

5.13 The greatest impact of 24-hour mean $NO_2$ concentrations as a result of the proposed plant when operating in combined cycle mode are predicted at Residential Area C which is located to the east of the Site. The impact at all of the sensitive receptors is less than 10% of the relevant standard and therefore considered to be insignificant in accordance with the significance criteria. At the majority of sensitive receptors, the overall predicted PECs will be reduced compared to current levels and therefore the overall impact will be beneficial.

5.14 The greatest impact on monthly mean $NO_2$ concentrations is predicted at Residential Area B which is located to the west of the Site. At this and all the other sensitive receptors close to the Site, the impact is less than 10% of the relevant standard and therefore is considered to be insignificant in accordance with the significance criteria.

5.15 With regards to the future exposure within the Site itself, the greatest predicted hourly, 24 hour and monthly mean $NO_2$ PEC concentrations are 78.1, 43.9 and 42.5 $\mu g/m^3$ respectively which are all below the relevant standards.

5.16 Within the Sirdarya TPP site, the predicted concentrations as a result of the emissions from the TPP are low. This is likely to be due to the height of the stacks. The stacks within the TPP are 180 and 320m tall, the emissions arising from theses stacks will therefore be dispersed some distance from the TPP site.

5.1 The predicted short-term $NO_2$ PC concentrations are also presented as contour plots in Figures 5.2, 5.3 and 5.4.

## Figure 5.2: Predicted Maximum 1-Hour Mean $NO_2$ PC Concentrations ($\mu g\ m^{-3}$)

**Figure 5.3: Predicted Maximum 24-Hour Mean $NO_2$ PC Concentrations ($\mu g\ m^{-3}$)**

**Figure 5.4: Predicted Maximum Monthly Mean $NO_2$ PC Concentrations ($\mu g\ m^{-3}$)**


<u>Nitrogen Oxide (NO)</u>

5.2 The maximum predicted ground-level annual NO concentrations at the nearest identified sensitive receptor locations are presented in Table 5.3, full results are presented in **Appendix C**.

**Table 5.3: Maximum Predicted Long Term (Annual) NO Concentrations – Combined Cycle ($\mu g/m^3$)**

| Receptor | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Overall Impact (PEC – Baseline) |
|---|---|---|---|---|---|
| Residential Area A (H3) | 17.2 | 0.5 | 1.2 | 17.6 | 0.4 |
| Residential Area B (H1) | 17.2 | 0.6 | 1.6 | 17.7 | 0.5 |
| Residential Area C (H5) | 17.5 | 0.4 | 1.1 | 17.6 | 0.2 |
| Residential Area D (new homes) | 17.8 | 0.2 | 0.5 | 17.6 | -0.2 |
| Residential Area E (accommodation blocks (H8) | 17.8 | 0.3 | 0.9 | 17.7 | -0.1 |
| H4 | 17.2 | 0.2 | 0.6 | 17.5 | 0.1 |
| H6 | 17.8 | 0.3 | 0.7 | 17.3 | -0.1 |
| H7 | 17.7 | 0.3 | 0.8 | 17.7 | -0.1 |
| H9 | 17.3 | 0.0 | 0.1 | 17.7 | -0.1 |
| H10 | 17.4 | 0.1 | 0.1 | 17.2 | -0.1 |
| H11 | 17.4 | 0.1 | 0.2 | 17.2 | -0.1 |
| H12 | 17.5 | 0.1 | 0.4 | 17.3 | -0.1 |
| H18 | 17.9 | 0.3 | 0.8 | 17.8 | -0.2 |
| H19 | 18.0 | 0.3 | 0.8 | 17.8 | -0.2 |
| H27 | 17.4 | 0.5 | 1.3 | 17.6 | 0.3 |
| H34 | 18.1 | 0.2 | 0.4 | 17.7 | -0.4 |
| H35 | 17.7 | 0.1 | 0.3 | 17.5 | -0.2 |
| H36 | 18.0 | 0.1 | 0.3 | 17.7 | -0.3 |
| **Standard** | 60 | | | | |

5.3 The results indicate that there will be no exceedances of the relevant annual mean NO standard which is the Uzbekistan MPC of 60$\mu g/m^3$ within the nearby residential areas.

5.4 The greatest impact in annual mean NO concentrations as a result of the proposed plant when operating in combined cycle mode will be a PC of 0.6$\mu g/m^3$ predicted at Residential Area B which is located close to the west boundary of the Site. At this and three other nearby sensitive receptors (Residential Areas A, C and H27) the impact is greater than 1% of the standard. However, at all the selected locations within the study area, the predicted PEC is less than 70% of the relevant standard, therefore the impact is considered to be insignificant in accordance with the significance criteria.  It should also be noted that a worst-case assessment has been undertaken with regards to NO assuming no conversion to $NO_2$.

5.5 A contour plot showing the annual mean NO PC across the study area is shown in Figure 5.5 below.

**Figure 5.5: Predicted Maximum Annual Mean NO PC Concentrations ($\mu g\ m^{-3}$)**


5.6 The maximum predicted ground-level short-term NO concentrations at the identified sensitive receptor locations are presented in Table 5.4.

**Table 5.4: Maximum Predicted Short-Term (1 Hour, 24 Hour and Monthly) NO Concentrations – Combined Cycle (μg/m³)**

| Receptor | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Overall Impact (PEC – Baseline) |
|---|---|---|---|---|---|
| **1-Hour** | | | | | |
| Residential Area A (H3) | 110.0 | 26.3 | 4.4 | 82.3 | -27.7 |
| Residential Area B (H1) | 110.6 | 27.2 | 4.5 | 92.2 | -18.4 |
| Residential Area C (H5) | 112.7 | 44.8 | 7.5 | 84.6 | -28.1 |
| Residential Area D (new homes) | 125.4 | 12.4 | 2.1 | 91.4 | -34.0 |
| Residential Area E (accommodation blocks (H8) | 119.0 | 13.1 | 2.2 | 87.1 | -31.9 |
| Military Barracks | 132.8 | 21.0 | 3.5 | 97.1 | -35.7 |
| Sirdarya TPP (H2) | 35.4 | 13.2 | 2.2 | 47.2 | 11.8 |
| H4 | 105.7 | 9.9 | 1.7 | 78.1 | -27.6 |
| H6 | 115.0 | 11.1 | 1.8 | 80.8 | -34.2 |
| H7 | 106.9 | 10.5 | 1.7 | 77.5 | -29.5 |
| H9 | 103.4 | 10.2 | 1.7 | 84.1 | -19.3 |
| H10 | 97.4 | 10.2 | 1.7 | 80.2 | -17.2 |
| H11 | 91.9 | 12.2 | 2.0 | 74.8 | -17.1 |
| H12 | 106.3 | 12.8 | 2.1 | 82.7 | -23.6 |
| H18 | 94.1 | 62.8 | 10.5 | 96.8 | 2.7 |
| H19 | 92.5 | 62.5 | 10.4 | 96.5 | 4.0 |
| H27 | 127.8 | 15.4 | 2.6 | 100.0 | -27.8 |
| H34 | 119.3 | 8.3 | 1.4 | 91.5 | -27.8 |
| H35 | 113.8 | 12.5 | 2.1 | 80.7 | -33.1 |
| H36 | 114.0 | 10.7 | 1.8 | 86.2 | -27.8 |
| **24-Hour** | | | | | |
| Residential Area A (H3) | 38.8 | 3.8 | 1.5 | 38.2 | -0.7 |
| Residential Area B (H1) | 37.4 | 8.3 | 3.3 | 42.3 | 4.9 |
| Residential Area C (H5) | 42.2 | 9.0 | 3.6 | 43.0 | 0.8 |
| Residential Area D (new homes) | 46.3 | 2.2 | 0.9 | 40.3 | -6.0 |
| Residential Area E (accommodation blocks (H8) | 46.3 | 3.6 | 1.4 | 40.6 | -5.7 |
| Military Barracks | 42.0 | 2.1 | 0.9 | 38.1 | -3.9 |
| Sirdarya TPP (H2) | 34.3 | 4.5 | 1.8 | 38.5 | 4.2 |

| Receptor | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Overall Impact (PEC – Baseline) |
|---|---|---|---|---|---|
| H4 | 38.7 | 2.0 | 0.8 | 37.9 | -0.9 |
| H6 | 45.1 | 2.5 | 1.0 | 40.9 | -4.3 |
| H7 | 45.1 | 3.0 | 1.2 | 40.5 | -4.6 |
| H9 | 41.5 | 0.9 | 0.4 | 38.9 | -2.5 |
| H10 | 40.3 | 1.2 | 0.5 | 38.5 | -1.8 |
| H11 | 42.4 | 1.6 | 0.7 | 39.8 | -2.7 |
| H12 | 43.8 | 2.8 | 1.1 | 41.0 | -2.8 |
| H18 | 44.4 | 6.2 | 2.5 | 42.0 | -2.4 |
| H19 | 44.8 | 8.6 | 3.4 | 44.4 | -0.4 |
| H27 | 39.6 | 3.9 | 1.6 | 37.9 | -1.7 |
| H34 | 45.3 | 0.9 | 0.4 | 40.7 | -4.5 |
| H35 | 42.2 | 1.1 | 0.4 | 38.8 | -3.4 |
| H36 | 42.4 | 1.1 | 0.4 | 39.5 | -3.0 |
| **Monthly** | | | | | |
| Residential Area A (H3) | 34.6 | 0.9 | 0.8 | 35.0 | 0.4 |
| Residential Area B (H1) | 34.3 | 2.4 | 2.0 | 36.4 | 2.1 |
| Residential Area C (H5) | 35.3 | 1.1 | 1.0 | 35.8 | 0.6 |
| Residential Area D (new homes) | 36.8 | 0.4 | 0.4 | 35.9 | -0.9 |
| Residential Area E (accommodation blocks (H8) | 36.6 | 0.7 | 0.6 | 35.9 | -0.7 |
| Military Barracks | 35.3 | 0.6 | 0.5 | 35.0 | -0.3 |
| Sirdarya TPP (H2) | 34.0 | 1.0 | 0.9 | 35.0 | 1.0 |
| H4 | 34.6 | 0.5 | 0.4 | 34.7 | 0.1 |
| H6 | 36.5 | 0.5 | 0.4 | 35.8 | -0.7 |
| H7 | 36.3 | 0.6 | 0.5 | 35.8 | -0.5 |
| H9 | 34.9 | 0.1 | 0.1 | 34.6 | -0.3 |
| H10 | 35.1 | 0.2 | 0.1 | 34.7 | -0.3 |
| H11 | 35.0 | 0.2 | 0.1 | 34.7 | -0.3 |
| H12 | 35.4 | 0.3 | 0.3 | 35.1 | -0.3 |
| H18 | 35.7 | 0.7 | 0.6 | 35.3 | -0.5 |
| H19 | 35.8 | 0.8 | 0.7 | 35.4 | -0.4 |
| H27 | 34.8 | 1.4 | 1.1 | 35.5 | 0.7 |
| H34 | 37.9 | 0.3 | 0.2 | 36.3 | -1.6 |

| Receptor | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Overall Impact (PEC – Baseline) |
|---|---|---|---|---|---|
| H35 | 36.0 | 0.3 | 0.2 | 35.3 | -0.7 |
| H36 | 35.8 | 0.3 | 0.3 | 35.2 | -0.7 |
| **1-Hour Standard** | 600 | | | | |
| **24-Hour Standard** | 250 | | | | |
| **Monthly Standard** | 120 | | | | |

5.7 The results indicate that there will be no exceedances of the relevant hourly, 24-hour or monthly mean NO standards which are the Uzbekistan MPC standards of 600, 250 and 120$\mu$g/m$^3$ respectively at the nearby sensitive areas.

5.8 The greatest impacts on hourly mean NO concentrations are 62.8 and 62.5$\mu$g/m$^3$ predicted at receptors H18 and H19 which are located in Bekobad over 8km to the east of the Site. As discussed above for hourly mean $NO_2$, this may to be due to the elevated terrain at these locations. At the remaining receptors the greatest impact is predicted to be 44.8$\mu$g/m$^3$ at Residential Area C which is located to the east of the Site. The impacts at all of the sensitive receptors with the exception of H18 and H19 is less than 10% of the relevant standard and therefore are considered to be insignificant. The impacts at receptors H18 and H19 are only marginally greater than 10% of the relevant standard. It should be noted that in order to assess the NO, no conversion of NO to $NO_2$ is assumed, which provides an overestimation with regards to NO concentrations. It should also be noted that the results indicate that at all of the nearby sensitive residential receptors (except H18 and H19) and at the Military Barracks, the overall predicted PECs will be reduced compared to current levels and therefore the overall impact will be beneficial.

5.9 The greatest impact on 24-hour mean NO concentrations as a result of the proposed plant when operating in combined cycle mode is predicted at Residential Area C which is located to the east of the Site. The impact on 24 hourly mean NO concentrations at all of the sensitive receptors is less than 10% of the relevant standard and therefore considered to be insignificant in accordance with the significance criteria. At the majority of all of the nearby sensitive residential receptors and within the Military Barracks the overall predicted PECs will be reduced compared to current levels and therefore the overall impact will be beneficial.

5.10 The greatest impact on monthly mean NO concentrations is predicted at Residential Area B which is located to the west of the Site. At this and all the other sensitive receptors close to the Site, the impact is less than 10% of the relevant standard and therefore is considered to be insignificant in accordance with the significance criteria. At the majority of sensitive receptors, the overall impact when also considering the impact of the upgraded plant at the Sirdarya TPP will be beneficial.

5.11 With regards to the future exposure within the Site itself, the greatest predicted hourly, 24 hour and monthly mean NO PEC concentrations are 101.3, 37.6 and 34.9 $\mu g/m^3$ respectively which are all below the relevant standards.

5.12 The predicted short-term NO PC concentrations are also presented as contour plots in Figures 5.6, 5.7 and 5.8.

**Figure 5.6: Predicted Maximum 1-Hour Mean NO PC Concentrations ($\mu g\ m^{-3}$)**

**Figure 5.7: Predicted Maximum 24-Hour Mean NO PC Concentrations ($\mu$g m$^{-3}$)**

**Figure 5.8: Predicted Maximum Monthly Mean NO PC Concentrations ($\mu g\ m^{-3}$)**


Carbon Monoxide (CO)

5.13 The maximum predicted ground-level annual CO concentrations at the nearest identified sensitive receptor locations are presented in Table 5.5, full results are presented in **Appendix C**.

**Table 5.5: Maximum Predicted Long Term (Annual) CO Concentrations – Combined Cycle ($\mu g/m^3$)**

| Receptor | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Overall Impact (PEC – Baseline) |
|---|---|---|---|---|---|
| Residential Area A (H3) | 2200.01 | 0.7 | 0.02 | 2200.75 | 0.7 |
| Residential Area B (H1) | 2200.01 | 1.0 | 0.03 | 2200.99 | 1.0 |
| Residential Area C (H5) | 2200.02 | 0.7 | 0.02 | 2200.69 | 0.7 |
| Residential Area D (new homes) | 2200.03 | 0.3 | 0.01 | 2200.33 | 0.3 |
| Residential Area E (accommodation blocks (H8) | 2200.03 | 0.5 | 0.02 | 2200.54 | 0.5 |
| H4 | 2200.01 | 0.4 | 0.01 | 2200.38 | 0.4 |
| H6 | 2200.03 | 0.4 | 0.01 | 2200.45 | 0.4 |
| H7 | 2200.03 | 0.5 | 0.01 | 2200.51 | 0.5 |
| H9 | 2200.01 | 0.1 | 0.02 | 2200.07 | 0.1 |
| H10 | 2200.01 | 0.1 | 0.00 | 2200.09 | 0.1 |
| H11 | 2200.02 | 0.1 | 0.00 | 2200.14 | 0.1 |
| H12 | 2200.02 | 0.2 | 0.00 | 2200.23 | 0.2 |
| H18 | 2200.03 | 0.5 | 0.02 | 2200.48 | 0.4 |
| H19 | 2200.04 | 0.5 | 0.02 | 2200.51 | 0.5 |
| H27 | 2200.01 | 0.8 | 0.03 | 2200.79 | 0.8 |
| H34 | 2200.04 | 0.2 | 0.01 | 2200.25 | 0.2 |
| H35 | 2200.03 | 0.2 | 0.01 | 2200.19 | 0.2 |
| H36 | 2200.04 | 0.2 | 0.01 | 2200.22 | 0.2 |
| **Standard** | 3000 | | | | |

5.14 The results indicate that there will be no exceedances of the relevant annual mean CO standard (which the Uzbekistan MPC of 3000$\mu g/m^3$) within the nearby residential areas.

5.15 The greatest impact in annual mean CO concentrations as a result of the proposed plant when operating in combined cycle mode will be a PC of 1.0$\mu g/m^3$ predicted at Residential Area B which is located close to the west boundary of the Site. This is less than 1% of the standard. Therefore, the impact is considered to be insignificant in accordance with the significance criteria.

5.16 A contour plot showing the annual mean CO PC across the study area is shown in Figure 5.9 below.

**Figure 5.9: Predicted Maximum Annual Mean CO PC Concentrations ($\mu g\ m^{-3}$)**


5.17 The maximum predicted ground-level short term CO concentrations at the identified sensitive receptor locations are presented in Table 5.6.

**Table 5.6: Maximum Predicted Short-Term (Hourly, 8 Hour, 24 Hour and Monthly) CO Concentrations – Combined Cycle ($\mu g/m^3$)**

| Receptor | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Overall Impact (PEC – Baseline) |
|---|---|---|---|---|---|
| 1-Hour | | | | | |

| Receptor | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Overall Impact (PEC – Baseline) |
|---|---|---|---|---|---|
| Residential Area A (H3) | 4402.7 | 40.4 | 0.1 | 4440.4 | 37.6 |
| Residential Area B (H1) | 4402.3 | 41.6 | 0.1 | 4441.7 | 39.4 |
| Residential Area C (H5) | 4402.6 | 68.6 | 0.2 | 4468.6 | 66.0 |
| Residential Area D (new homes) | 4402.8 | 19.0 | 0.1 | 4419.0 | 16.1 |
| Residential Area E (accommodation blocks (H8) | 4402.7 | 20.1 | 0.1 | 4419.6 | 16.9 |
| Military Barracks | 4402.8 | 32.2 | 0.1 | 4432.2 | 29.4 |
| Sirdarya TPP (H2) | 4400.1 | 20.2 | 0.1 | 4420.2 | 20.1 |
| H4 | 4402.4 | 15.2 | 0.1 | 4415.2 | 12.8 |
| H6 | 4403.0 | 16.9 | 0.1 | 4417.0 | 14.0 |
| H7 | 4402.7 | 16.1 | 0.1 | 4416.1 | 13.4 |
| H9 | 4402.6 | 15.7 | 0.1 | 4416.1 | 13.5 |
| H10 | 4402.4 | 15.6 | 0.1 | 4416.0 | 13.6 |
| H11 | 4401.9 | 18.7 | 0.1 | 4418.7 | 16.8 |
| H12 | 4402.7 | 19.6 | 0.1 | 4419.7 | 17.0 |
| H18 | 4402.2 | 96.3 | 0.3 | 4496.3 | 94.1 |
| H19 | 4402.2 | 95.8 | 0.3 | 4495.8 | 93.6 |
| H27 | 4402.7 | 23.6 | 0.1 | 4423.6 | 21.0 |
| H34 | 4403.2 | 12.7 | 0.0 | 4412.8 | 9.6 |
| H35 | 4403.0 | 19.1 | 0.1 | 4419.4 | 16.4 |
| H36 | 4403.0 | 16.4 | 0.1 | 4416.4 | 13.4 |
| **8-Hour** | | | | | |
| Residential Area A (H3) | 4400.5 | 13.8 | 0.1 | 4413.9 | 13.4 |
| Residential Area B (H1) | 4400.4 | 18.7 | 0.2 | 4418.7 | 18.2 |
| Residential Area C (H5) | 4400.7 | 26.7 | 0.3 | 4426.7 | 26.0 |
| Residential Area D (new homes) | 4400.7 | 8.6 | 0.1 | 4408.6 | 7.9 |
| Residential Area E (accommodation blocks (H8) | 4400.9 | 9.5 | 0.1 | 4409.6 | 8.7 |
| Military Barracks | 4400.5 | 7.7 | 0.1 | 4407.7 | 7.2 |
| Sirdarya TPP (H2) | 4400.0 | 11.8 | 0.1 | 4411.8 | 11.8 |
| H4 | 4400.4 | 7.0 | 0.1 | 4407.0 | 6.5 |
| H6 | 4400.8 | 6.3 | 0.1 | 4406.4 | 5.6 |

| Receptor | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Overall Impact (PEC – Baseline) |
|---|---|---|---|---|---|
| H7 | 4400.8 | 7.8 | 0.1 | 4407.8 | 7.0 |
| H9 | 4400.6 | 2.5 | 0.0 | 4402.8 | 2.2 |
| H10 | 4400.6 | 4.0 | 0.0 | 4404.3 | 3.7 |
| H11 | 4400.7 | 5.2 | 0.1 | 4405.6 | 4.8 |
| H12 | 4400.6 | 6.5 | 0.1 | 4406.6 | 6.0 |
| H18 | 4400.7 | 16.4 | 0.2 | 4416.4 | 15.6 |
| H19 | 4400.8 | 24.0 | 0.2 | 4424.0 | 23.2 |
| H27 | 4400.6 | 13.0 | 0.1 | 4413.0 | 12.4 |
| H34 | 4401.1 | 3.5 | 0.0 | 4403.6 | 2.9 |
| H35 | 4401.2 | 3.9 | 0.0 | 4403.9 | 3.3 |
| H36 | 4400.8 | 4.2 | 0.0 | 4404.2 | 3.5 |
| **24-Hour** | | | | | |
| Residential Area A (H3) | 4400.2 | 5.8 | 0.1 | 4404.6 | 4.4 |
| Residential Area B (H1) | 4400.1 | 12.7 | 0.3 | 4412.7 | 12.6 |
| Residential Area C (H5) | 4400.3 | 13.8 | 0.3 | 4413.8 | 13.5 |
| Residential Area D (new homes) | 4400.4 | 3.4 | 0.1 | 4403.4 | 3.0 |
| Residential Area E (accommodation blocks (H8) | 4400.5 | 5.5 | 0.1 | 4405.5 | 5.0 |
| Military Barracks | 4400.3 | 3.3 | 0.1 | 4403.3 | 3.0 |
| Sirdarya TPP (H2) | 4400.0 | 6.9 | 0.2 | 4406.9 | 6.9 |
| H4 | 4400.2 | 3.1 | 0.1 | 4403.1 | 2.9 |
| H6 | 4400.4 | 3.8 | 0.1 | 4403.8 | 3.4 |
| H7 | 4400.4 | 4.6 | 0.1 | 4404.6 | 4.2 |
| H9 | 4400.3 | 1.4 | 0.0 | 4401.6 | 1.3 |
| H10 | 4400.2 | 1.9 | 0.0 | 4402.0 | 1.8 |
| H11 | 4400.3 | 2.5 | 0.1 | 4402.6 | 2.3 |
| H12 | 4400.4 | 4.3 | 0.1 | 4404.4 | 4.1 |
| H18 | 4400.4 | 9.6 | 0.2 | 4409.6 | 9.2 |
| H19 | 4400.4 | 13.1 | 0.3 | 4413.2 | 12.8 |
| H27 | 4400.2 | 6.0 | 0.1 | 4406.0 | 5.7 |
| H34 | 4400.4 | 1.3 | 0.0 | 4401.5 | 1.0 |
| H35 | 4400.3 | 1.7 | 0.0 | 4401.7 | 1.4 |
| H36 | 4400.3 | 1.7 | 0.0 | 4401.8 | 1.5 |

| Receptor | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Overall Impact (PEC – Baseline) |
|---|---|---|---|---|---|
| **Monthly** | | | | | |
| Residential Area A (H3) | 4400.02 | 1.4 | 0.04 | 4401.44 | 1.4 |
| Residential Area B (H1) | 4400.01 | 3.6 | 0.10 | 4403.63 | 3.6 |
| Residential Area C (H5) | 4400.05 | 1.7 | 0.05 | 4401.77 | 1.7 |
| Residential Area D (new homes) | 4400.10 | 0.7 | 0.02 | 4400.73 | 0.6 |
| Residential Area E (accommodation blocks (H8) | 4400.10 | 1.1 | 0.03 | 4401.15 | 1.1 |
| Military Barracks | 4400.05 | 1.0 | 0.03 | 4400.99 | 0.9 |
| Sirdarya TPP (H2) | 4400.00 | 1.6 | 0.05 | 4401.58 | 1.6 |
| H4 | 4400.02 | 0.7 | 0.02 | 4400.74 | 0.7 |
| H6 | 4400.09 | 0.8 | 0.02 | 4400.82 | 0.7 |
| H7 | 4400.09 | 0.9 | 0.03 | 4400.99 | 0.9 |
| H9 | 4400.04 | 0.2 | 0.01 | 4400.20 | 0.2 |
| H10 | 4400.04 | 0.3 | 0.01 | 4400.27 | 0.2 |
| H11 | 4400.04 | 0.3 | 0.01 | 4400.28 | 0.2 |
| H12 | 4400.05 | 0.5 | 0.02 | 4400.55 | 0.5 |
| H18 | 4400.06 | 1.1 | 0.03 | 4401.12 | 1.1 |
| H19 | 4400.07 | 1.3 | 0.04 | 4401.32 | 1.3 |
| H27 | 4400.03 | 2.1 | 0.06 | 4402.08 | 2.1 |
| H34 | 4400.14 | 0.4 | 0.01 | 4400.49 | 0.3 |
| H35 | 4400.07 | 0.4 | 0.01 | 4400.46 | 0.4 |
| H36 | 4400.07 | 0.5 | 0.01 | 4400.49 | 0.4 |
| **1-Hour Standard** | 5000 | | | | |
| **8-Hour Standard** | 10000 | | | | |
| **24-Hour Standard** | 4000 | | | | |
| **Monthly Standard** | 3500 | | | | |

5.18 The most stringent standard for hourly mean CO is the Uzbekistan MPC of 5000$\mu g/m^3$. The results indicate that there will be no exceedances of this standard within the nearby sensitive areas. The impact of the emissions arising from the proposed plant when operating in combined cycle mode will be less than 10% of the relevant standard, therefore the impact on hourly mean CO concentrations is considered to be insignificant.

5.19 The 8 hour mean CO standard is the EU standard and WHO guideline of 10,000μg/m$^3$. The results indicate that there will be no exceedances of this standard and the impact will be less than 10% of the standard, therefore the impact on 8-hour mean CO concentrations is considered to be insignificant.

5.20 The 24-hour mean and monthly mean CO standards are the Uzbekistan MPCs of 4000μg/m$^3$ and 3500μg/m$^3$ respectively. The results indicate that these standards are likely to be breached across the study area, however this is due to the high background concentration assumed for the area. The impact of the emissions from the proposed plant when operating in combined cycle mode will be less than 10% of the respective standards, therefore the impact on 24-hour mean and monthly mean CO concentrations is considered to be insignificant.

5.21 With regards to the future exposure within the Site itself, the greatest predicted hourly and 8 hour mean CO PEC concentrations are 4424.2 and 4407.2 μg/m$^3$ respectively which are below the relevant standards. The greatest predicted 24 hour and monthly mean CO PEC concentrations within the Site itself are predicted to be 4403.2 and 4400.9 μg/m$^3$ respectively which are above the relevant standards. However, it should be noted that a worst-case assessment has been undertaken with regards to the background concentrations used in the assessment. The contribution from the proposed plant is very small in comparison to the background concentration.

5.22 The predicted CO PC concentrations are also presented as contour plots in Figures 5.10, 5.11 5.12 and 5.13.

**Figure 5.10: Predicted Maximum 1-Hour Mean CO PC Concentrations ($\mu g\ m^{-3}$)**

**Figure 5.11: Predicted Maximum 8-Hour Mean CO PC Concentrations ($\mu g\ m^{-3}$)**

**Figure 5.12: Predicted Maximum 24-Hour Mean CO PC Concentrations ($\mu g\ m^{-3}$)**

Figure 5.13: Predicted Maximum Monthly Mean CO PC Concentrations ($\mu g\ m^{-3}$)


Ammonia ($NH_3$)

5.23 The maximum predicted annual $NH_3$ PC concentrations arising from the proposed plant at the nearest identified sensitive receptor locations are presented in Table 5.7, full results are presented in **Appendix C**.

**Table 5.7: Maximum Predicted Long Term (Annual) $NH_3$ PC Concentrations – Combined Cycle ($\mu g/m^3$)**

| Receptor | PC | PC as % of Standard |
|---|---|---|
| Residential Area A (H3) | 0.03 | 0.09 |
| Residential Area B (H1) | 0.05 | 0.12 |
| Residential Area C (H5) | 0.03 | 0.08 |
| Residential Area D (new homes) | 0.01 | 0.04 |
| Residential Area E (accommodation blocks (H8) | 0.02 | 0.06 |
| H4 | 0.02 | 0.04 |
| H6 | 0.02 | 0.05 |
| H7 | 0.02 | 0.06 |
| H9 | 0.00 | 0.01 |
| H10 | 0.00 | 0.01 |
| H11 | 0.01 | 0.02 |
| H12 | 0.01 | 0.03 |
| H18 | 0.02 | 0.05 |
| H19 | 0.02 | 0.06 |
| H27 | 0.04 | 0.09 |
| H34 | 0.01 | 0.03 |
| H35 | 0.01 | 0.02 |
| H36 | 0.01 | 0.02 |
| **Standard** | 40 | |

5.24 The annual mean $NH_3$ standard is the Uzbekistan MPC of 40$\mu g/m^3$. The predicted PC concentrations arising from the proposed plant are well below this standard. Although no $NH_3$ ambient monitoring data was available in order to establish a likely background concentration it is considered unlikely that there would be any breaches of this standard in the vicinity of the Site.

5.25 The greatest impact in annual mean $NH_3$ concentrations as a result of the proposed plant when operating in combined cycle mode will be a PC of 0.05$\mu g/m^3$ predicted at Residential Area B which is located close to the west boundary of the Site. The impact is less than 1% of the standard, therefore the impact is considered to be insignificant in accordance with the significance criteria.

5.26 A contour plot showing the annual mean $NH_3$ PC across the study area is shown in Figure 5.14 below.

**Figure 5.14: Predicted Maximum Annual Mean $NH_3$ PC Concentrations ($\mu g\ m^{-3}$)**


5.27 The maximum predicted short-term $NH_3$ PC concentrations at the identified sensitive receptor locations are presented in Table 5.8.

**Table 5.8: Maximum Predicted Short-Term (1 Hour, 24 Hour and Monthly) $NH_3$ Concentrations – Combined Cycle ($\mu g/m^3$)**

| Receptor | PC | PC as % of Standard |
|---|---|---|
| **1-Hour** | | |
| Residential Area A (H3) | 1.9 | 0.9 |
| Residential Area B (H1) | 1.9 | 1.0 |
| Residential Area C (H5) | 3.2 | 1.6 |
| Residential Area D (new homes) | 0.9 | 0.4 |
| Residential Area E (accommodation blocks (H8) | 0.9 | 0.5 |

| Receptor | PC | PC as % of Standard |
|---|---|---|
| Military Barracks | 1.5 | 0.8 |
| Sirdarya TPP (H2) | 0.9 | 0.5 |
| H4 | 0.7 | 0.4 |
| H6 | 0.8 | 0.4 |
| H7 | 0.7 | 0.4 |
| H9 | 0.7 | 0.4 |
| H10 | 0.7 | 0.4 |
| H11 | 0.9 | 0.4 |
| H12 | 0.9 | 0.5 |
| H18 | 4.5 | 2.2 |
| H19 | 4.5 | 2.2 |
| H27 | 1.1 | 0.6 |
| H34 | 0.6 | 0.3 |
| H35 | 0.9 | 0.4 |
| H36 | 0.8 | 0.4 |
| **24-Hour** | | |
| Residential Area A (H3) | 0.3 | 0.2 |
| Residential Area B (H1) | 0.6 | 0.5 |
| Residential Area C (H5) | 0.6 | 0.5 |
| Residential Area D (new homes) | 0.2 | 0.1 |
| Residential Area E (accommodation blocks (H8) | 0.3 | 0.2 |
| Military Barracks | 0.2 | 0.1 |
| Sirdarya TPP (H2) | 0.3 | 0.3 |
| H4 | 0.1 | 0.1 |
| H6 | 0.2 | 0.1 |
| H7 | 0.2 | 0.2 |
| H9 | 0.1 | 0.1 |
| H10 | 0.1 | 0.1 |
| H11 | 0.1 | 0.1 |
| H12 | 0.2 | 0.2 |
| H18 | 0.4 | 0.4 |
| H19 | 0.6 | 0.5 |
| H27 | 0.3 | 0.2 |
| H34 | 0.1 | 0.1 |
| H35 | 0.1 | 0.1 |
| H36 | 0.1 | 0.1 |

| Receptor | PC | PC as % of Standard |
|---|---|---|
| **Monthly** | | |
| Residential Area A (H3) | 0.07 | 0.11 |
| Residential Area B (H1) | 0.17 | 0.28 |
| Residential Area C (H5) | 0.08 | 0.14 |
| Residential Area D (new homes) | 0.03 | 0.05 |
| Residential Area E (accommodation blocks (H8) | 0.05 | 0.09 |
| Military Barracks | 0.05 | 0.08 |
| Sirdarya TPP (H2) | 0.07 | 0.12 |
| H4 | 0.03 | 0.06 |
| H6 | 0.04 | 0.06 |
| H7 | 0.04 | 0.07 |
| H9 | 0.01 | 0.01 |
| H10 | 0.01 | 0.02 |
| H11 | 0.01 | 0.02 |
| H12 | 0.02 | 0.04 |
| H18 | 0.05 | 0.09 |
| H19 | 0.06 | 0.10 |
| H27 | 0.10 | 0.16 |
| H34 | 0.02 | 0.03 |
| H35 | 0.02 | 0.03 |
| H36 | 0.02 | 0.04 |
| **1-Hour Standard** | 200 | |
| **24-Hour Standard** | 120 | |
| **Monthly Standard** | 60 | |

5.28 The hourly, 24-hour and monthly mean $NH_3$ standards are the Uzbekistan MPC standards of 200, 120 and 60µg/m$^3$. The predicted hourly, 24-hour and monthly mean PC concentrations arising from the proposed plant are well below these standards. Although no $NH_3$ ambient monitoring data was available in order to establish a likely background concentration it is considered unlikely that there would be any breaches of these standards in the vicinity of the Site.

5.29 The greatest impact on hourly mean $NH_3$ concentrations was 4.5µg/m$^3$ predicted at receptors H18 and H19 which are located in Bekobad over 8km to the east of the Site. As discussed above for hourly mean concentrations of the other pollutants considered, this may be due to the elevated terrain at these locations. At the remaining receptors the greatest impact is predicted to be 3.2µg/m$^3$ at Residential Area C which is located to the east of the Site. The impacts at all of the sensitive receptors are less than 10% of the relevant standard and therefore are considered to be insignificant in accordance with the significance criteria.

5.30 The greatest impact on 24-hour mean $NH_3$ concentrations as a result of the proposed plant when operating in combined cycle mode is predicted at Residential Area C which is located to the east of the Site. The impacts on 24 hourly mean $NH_3$ concentrations at all of the sensitive residential receptors are less than 10% of the relevant standard and therefore considered to be insignificant in accordance with the significance criteria.

5.31 The greatest impact on monthly mean $NH_3$ concentrations is predicted at Residential Area B which is located to the west of the Site. At this and all the other sensitive receptors close to the Site, the impacts are less than 10% of the relevant standard and therefore considered to be insignificant in accordance with the significance criteria.

5.32 The future exposure within the Site itself cannot be determined as there is no available ambient monitoring to establish the background concentration, however the greatest predicted hourly, 24 hour and monthly mean $NH_3$ PC concentrations with the Site as a result of the Project operating in combined cycle mode are 1.1, 0.2 and 0.04 $\mu g/m^3$ respectively which are all below the relevant standards.

5.33 The predicted short-term $NH_3$ PC concentrations are also presented as contour plots in Figures 5.15, 5.16 and 5.17.

**Figure 5.15: Predicted Maximum 1-Hour Mean $NH_3$ PC Concentrations ($\mu g\ m^{-3}$)**

**Figure 5.16: Predicted Maximum 24-Hour Mean $NH_3$ PC Concentrations ($\mu g\ m^{-3}$)**

Figure 5.17: Predicted Maximum Monthly Mean $NH_3$ PC Concentrations ($\mu g\ m^{-3}$)


**Scenario Two (Simple Cycle)**

<u>Nitrogen Dioxide ($NO_2$)</u>

5.34 The maximum predicted ground-level $NO_2$ concentrations at the identified sensitive receptor locations during periods of time when the Heat Recovery Steam Generators (HRSG) are not operational and the proposed plant is operating in Simple Cycle mode are presented in Table 5.9. It is envisaged that the simple cycle mode would be used for short periods of time only, therefore only the hourly and 24-hour results are presented.

**Table 5.9: Maximum Predicted Short-Term (1 Hour and 24 Hour) $NO_2$ Concentrations – Simple Cycle ($\mu g/m^3$)**

| Receptor | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Overall Impact (PEC – Baseline) |
|---|---|---|---|---|---|
| **1-Hour** | | | | | |
| Residential Area A (H3) | 82.8 | 1.8 | 2.1 | 69.0 | -13.8 |
| Residential Area B (H1) | 83.1 | 3.1 | 3.6 | 68.8 | -14.4 |
| Residential Area C (H5) | 84.2 | 1.4 | 1.7 | 64.5 | -19.7 |
| Residential Area D (new homes) | 91.0 | 1.6 | 1.9 | 69.4 | -21.7 |
| Residential Area E (accommodation blocks (H8) | 87.6 | 1.6 | 1.9 | 66.7 | -20.9 |
| Military Barracks | 95.0 | 1.6 | 1.9 | 73.9 | -21.2 |
| Sirdarya TPP (H2) | 42.7 | 1.7 | 2.0 | 43.7 | 1.0 |
| H4 | 80.5 | 1.6 | 1.9 | 64.0 | -16.4 |
| H6 | 85.5 | 1.4 | 1.6 | 66.4 | -19.1 |
| H7 | 81.1 | 1.5 | 1.8 | 64.2 | -16.9 |
| H9 | 79.3 | 1.6 | 1.9 | 66.8 | -12.4 |
| H10 | 76.0 | 1.6 | 1.9 | 64.7 | -11.4 |
| H11 | 73.1 | 1.3 | 1.5 | 61.3 | -11.8 |
| H12 | 80.8 | 1.5 | 1.8 | 65.8 | -15.0 |
| H18 | 74.3 | 3.2 | 3.8 | 60.3 | -13.9 |
| H19 | 73.4 | 3.3 | 3.8 | 60.1 | -13.3 |
| H27 | 92.3 | 1.7 | 2.0 | 75.8 | -16.6 |
| H34 | 87.8 | 1.6 | 1.8 | 71.4 | -16.4 |
| H35 | 84.8 | 1.5 | 1.7 | 66.2 | -18.6 |
| H36 | 84.9 | 1.7 | 2.0 | 69.3 | -15.6 |
| **24-Hour** | | | | | |
| Residential Area A (H3) | 44.6 | 0.3 | 0.5 | 43.6 | -1.0 |
| Residential Area B (H1) | 43.8 | 0.7 | 1.1 | 43.2 | -0.6 |
| Residential Area C (H5) | 46.4 | 0.4 | 0.7 | 44.1 | -2.3 |
| Residential Area D (new homes) | 48.6 | 0.0 | 0.0 | 45.5 | -3.1 |
| Residential Area E (accommodation blocks (H8) | 48.6 | 0.3 | 0.5 | 45.3 | -3.2 |
| Military Barracks | 46.3 | 0.1 | 0.2 | 43.6 | -2.7 |
| Sirdarya TPP (H2) | 42.0 | 0.4 | 0.6 | 42.4 | 0.3 |

| Receptor | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Overall Impact (PEC – Baseline) |
|---|---|---|---|---|---|
| H4 | 44.5 | 0.2 | 0.3 | 43.5 | -1.0 |
| H6 | 48.0 | 0.2 | 0.4 | 45.2 | -2.8 |
| H7 | 48.0 | 0.3 | 0.4 | 45.2 | -2.8 |
| H9 | 46.0 | 0.2 | 0.3 | 44.3 | -1.7 |
| H10 | 45.4 | 0.2 | 0.3 | 43.9 | -1.4 |
| H11 | 46.5 | 0.2 | 0.3 | 44.5 | -2.0 |
| H12 | 47.3 | 0.3 | 0.4 | 44.9 | -2.3 |
| H18 | 47.6 | 0.4 | 0.6 | 45.2 | -2.4 |
| H19 | 47.8 | 0.5 | 0.8 | 45.3 | -2.5 |
| H27 | 45.0 | 0.4 | 0.6 | 43.7 | -1.3 |
| H34 | 48.1 | 0.2 | 0.3 | 45.4 | -2.6 |
| H35 | 46.4 | 0.2 | 0.3 | 44.5 | -1.9 |
| H36 | 46.5 | 0.2 | 0.3 | 44.7 | -1.9 |
| **1-Hour Standard** | 85 | | | | |
| **24-Hour Standard** | 60 | | | | |

5.35 The results indicate that there will be no exceedances of the most stringent hourly and 24-hour mean $NO_2$ standards which are the Uzbekistan MPC standards of 85 and 60 $\mu g/m^3$ respectively within the nearby sensitive areas when the proposed plant is operating in simple cycle mode.

5.36 The predicted hourly and 24-hour $NO_2$ PCs arising from the proposed plant when operating in simple cycle mode will be less than 10% of the relevant standards at the nearest the sensitive receptors. The impacts are therefore considered to be insignificant in accordance with the significance criteria.

5.37 With regards to the future exposure within the Site itself, the greatest predicted hourly and 24 hour mean $NO_2$ PEC concentrations are 74.5 and 43.7 $\mu g/m^3$ respectively which are below the relevant standards.

Nitrogen Oxide (NO)

5.38 The maximum predicted ground-level NO concentrations at the identified sensitive receptor locations during periods of time the proposed plant is operating in Simple Cycle mode are presented in Table 5.10.

**Table 5.10: Maximum Predicted Short-Term (1 Hour and 24 Hour) NO Concentrations – Simple Cycle (μg/m³)**

| Receptor | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Overall Impact (PEC – Baseline) |
|---|---|---|---|---|---|
| **1-Hour** | | | | | |
| Residential Area A (H3) | 110.0 | 3.3 | 0.6 | 84.3 | -25.6 |
| Residential Area B (H1) | 110.6 | 5.7 | 1.0 | 83.9 | -26.8 |
| Residential Area C (H5) | 112.7 | 2.6 | 0.4 | 75.9 | -36.8 |
| Residential Area D (new homes) | 125.4 | 3.0 | 0.5 | 85.0 | -40.4 |
| Residential Area E (accommodation blocks (H8) | 119.0 | 3.0 | 0.5 | 79.9 | -39.0 |
| Military Barracks | 132.8 | 3.1 | 0.5 | 93.4 | -39.4 |
| Sirdarya TPP (H2) | 35.4 | 3.1 | 0.5 | 37.2 | 1.8 |
| H4 | 105.7 | 3.0 | 0.5 | 75.1 | -30.6 |
| H6 | 115.0 | 2.6 | 0.4 | 79.4 | -35.6 |
| H7 | 106.9 | 2.9 | 0.5 | 75.4 | -31.5 |
| H9 | 103.4 | 3.0 | 0.5 | 80.3 | -23.2 |
| H10 | 97.4 | 3.0 | 0.5 | 76.2 | -21.2 |
| H11 | 91.9 | 2.3 | 0.4 | 69.9 | -22.0 |
| H12 | 106.3 | 2.8 | 0.5 | 78.4 | -27.9 |
| H18 | 94.1 | 6.0 | 1.0 | 68.2 | -25.9 |
| H19 | 92.5 | 6.1 | 1.0 | 67.8 | -24.7 |
| H27 | 127.8 | 3.2 | 0.5 | 96.9 | -30.9 |
| H34 | 119.3 | 2.9 | 0.5 | 88.8 | -30.5 |
| H35 | 113.8 | 2.7 | 0.5 | 79.2 | -34.6 |
| H36 | 114.0 | 3.2 | 0.5 | 84.9 | -29.1 |
| **24-Hour** | | | | | |
| Residential Area A (H3) | 38.8 | 0.6 | 0.2 | 37.0 | -1.9 |
| Residential Area B (H1) | 37.4 | 1.2 | 0.5 | 36.3 | -1.1 |
| Residential Area C (H5) | 42.2 | 0.8 | 0.3 | 38.0 | -4.2 |

| Receptor | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Overall Impact (PEC – Baseline) |
|---|---|---|---|---|---|
| Residential Area D (new homes) | 46.3 | 0.0 | 0.0 | 40.5 | -5.8 |
| Residential Area E (accommodation blocks (H8) | 46.3 | 0.5 | 0.2 | 40.2 | -6.0 |
| Military Barracks | 42.0 | 0.3 | 0.1 | 37.0 | -5.0 |
| Sirdarya TPP (H2) | 34.1 | 0.7 | 0.3 | 34.7 | 0.6 |
| H4 | 38.7 | 0.3 | 0.1 | 36.8 | -1.9 |
| H6 | 45.1 | 0.4 | 0.2 | 39.9 | -5.2 |
| H7 | 45.1 | 0.5 | 0.2 | 39.9 | -5.2 |
| H9 | 41.5 | 0.3 | 0.1 | 38.3 | -3.2 |
| H10 | 40.3 | 0.3 | 0.1 | 37.6 | -2.7 |
| H11 | 42.4 | 0.4 | 0.1 | 38.6 | -3.8 |
| H12 | 43.8 | 0.5 | 0.2 | 39.5 | -4.3 |
| H18 | 44.4 | 0.7 | 0.3 | 39.9 | -4.4 |
| H19 | 44.8 | 0.9 | 0.4 | 40.1 | -4.7 |
| H27 | 39.6 | 0.7 | 0.3 | 37.1 | -2.5 |
| H34 | 45.3 | 0.3 | 0.1 | 40.4 | -4.8 |
| H35 | 42.2 | 0.3 | 0.1 | 38.6 | -3.6 |
| H36 | 42.4 | 0.3 | 0.1 | 39.0 | -3.5 |
| **1-Hour Standard** | 600 | | | | |
| **24-Hour Standard** | 250 | | | | |

5.39 The results indicate that there will be no exceedances of the most stringent hourly and 24-hour mean NO standards which are the Uzbekistan MPC standards of 600 and 250 $\mu g/m^3$ respectively within the nearby sensitive areas when the proposed plant is operating in simple cycle mode.

5.40 The predicted hourly and 24-hour mean NO PCs arising from the proposed plant when operating in simple cycle mode will be less than 10% of the relevant standards at the nearest sensitive receptors. The impacts are therefore considered to be insignificant in accordance with the significance criteria.

5.41 With regards to the future exposure within the Site itself, the greatest predicted hourly and 24-hour mean $NO_2$ PEC concentrations are 94.5 and 37.1 $\mu g/m^3$ respectively which are below the relevant standards.

Carbon Monoxide (CO)

5.42 The maximum predicted ground-level CO concentrations at the identified sensitive receptor locations when the proposed plant is operating in Simple Cycle mode are presented in Table 5.11.

**Table 5.11: Maximum Predicted Short-Term (Hourly, 8 Hour and 24 Hour) CO Concentrations – Simple Cycle ($\mu g/m^3$)**

| Receptor | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Overall Impact (PEC – Baseline) |
|---|---|---|---|---|---|
| **1-Hour** | | | | | |
| Residential Area A (H3) | 4402.7 | 5.1 | 0.1 | 4406.5 | 3.8 |
| Residential Area B (H1) | 4402.3 | 8.8 | 0.2 | 4408.8 | 6.5 |
| Residential Area C (H5) | 4402.6 | 4.0 | 0.1 | 4409.0 | 6.4 |
| Residential Area D (new homes) | 4402.8 | 4.7 | 0.1 | 4406.5 | 3.7 |
| Residential Area E (accommodation blocks (H8) | 4402.7 | 4.7 | 0.1 | 4406.3 | 3.6 |
| Military Barracks | 4402.8 | 4.7 | 0.1 | 4406.8 | 4.0 |
| Sirdarya TPP (H2) | 4400.1 | 4.8 | 0.1 | 4404.8 | 4.7 |
| H4 | 4402.4 | 4.5 | 0.1 | 4406.0 | 3.6 |
| H6 | 4403.0 | 4.0 | 0.1 | 4405.2 | 2.2 |
| H7 | 4402.7 | 4.4 | 0.1 | 4405.7 | 3.0 |
| H9 | 4402.6 | 4.6 | 0.1 | 4406.2 | 3.6 |
| H10 | 4402.4 | 4.5 | 0.1 | 4406.0 | 3.6 |
| H11 | 4401.9 | 3.6 | 0.1 | 4404.7 | 2.8 |
| H12 | 4402.7 | 4.3 | 0.1 | 4405.6 | 2.9 |
| H18 | 4402.2 | 9.2 | 0.2 | 4409.2 | 7.0 |
| H19 | 4402.2 | 9.3 | 0.2 | 4409.3 | 7.1 |
| H27 | 4402.7 | 4.9 | 0.1 | 4406.8 | 4.1 |
| H34 | 4403.2 | 4.5 | 0.1 | 4406.4 | 3.2 |
| H35 | 4403.0 | 4.1 | 0.1 | 4405.3 | 2.3 |
| H36 | 4403.0 | 4.9 | 0.1 | 4405.6 | 2.6 |
| **8-Hour** | | | | | |

| Receptor | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Overall Impact (PEC – Baseline) |
|---|---|---|---|---|---|
| Residential Area A (H3) | 4400.5 | 2.3 | 0.02 | 4402.3 | 1.8 |
| Residential Area B (H1) | 4400.4 | 3.1 | 0.03 | 4403.1 | 2.7 |
| Residential Area C (H5) | 4400.7 | 2.8 | 0.03 | 4402.8 | 2.1 |
| Residential Area D (new homes) | 4400.7 | 0.8 | 0.01 | 4401.1 | 0.3 |
| Residential Area E (accommodation blocks (H8) | 4400.9 | 1.7 | 0.02 | 4401.8 | 0.9 |
| Military Barracks | 4400.5 | 1.2 | 0.01 | 4401.2 | 0.7 |
| Sirdarya TPP (H2) | 4400.0 | 2.1 | 0.02 | 4402.1 | 2.1 |
| H4 | 4400.4 | 1.4 | 0.01 | 4401.5 | 1.1 |
| H6 | 4400.8 | 1.3 | 0.01 | 4401.5 | 0.7 |
| H7 | 4400.8 | 1.5 | 0.01 | 4401.6 | 0.8 |
| H9 | 4400.6 | 0.8 | 0.01 | 4401.1 | 0.5 |
| H10 | 4400.6 | 1.1 | 0.01 | 4401.4 | 0.8 |
| H11 | 4400.7 | 1.3 | 0.01 | 4401.7 | 1.0 |
| H12 | 4400.6 | 1.6 | 0.02 | 4401.7 | 1.1 |
| H18 | 4400.7 | 2.1 | 0.02 | 4402.3 | 1.5 |
| H19 | 4400.8 | 2.5 | 0.03 | 4402.5 | 1.7 |
| H27 | 4400.6 | 2.1 | 0.02 | 4402.1 | 1.5 |
| H34 | 4400.7 | 1.0 | 0.01 | 4401.3 | 0.5 |
| H35 | 4400.6 | 0.9 | 0.01 | 4401.2 | 0.6 |
| H36 | 4400.7 | 1.4 | 0.01 | 4401.7 | 1.0 |
| **24-Hour** | | | | | |
| Residential Area A (H3) | 4400.2 | 0.9 | 0.02 | 4400.9 | 0.7 |
| Residential Area B (H1) | 4400.1 | 1.9 | 0.05 | 4401.9 | 1.8 |
| Residential Area C (H5) | 4400.3 | 1.2 | 0.03 | 4401.2 | 0.9 |
| Residential Area D (new homes) | 4400.4 | 0.0 | 0.00 | 4400.4 | -0.1 |
| Residential Area E (accommodation blocks (H8) | 4400.5 | 0.8 | 0.02 | 4400.9 | 0.4 |
| Military Barracks | 4400.3 | 0.4 | 0.01 | 4400.4 | 0.1 |
| Sirdarya TPP (H2) | 4400.0 | 1.0 | 0.03 | 4401.0 | 1.0 |
| H4 | 4400.2 | 0.5 | 0.01 | 4400.5 | 0.4 |
| H6 | 4400.4 | 0.6 | 0.02 | 4400.7 | 0.3 |

| Receptor | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Overall Impact (PEC – Baseline) |
|---|---|---|---|---|---|
| H7 | 4400.4 | 0.7 | 0.02 | 4400.8 | 0.4 |
| H9 | 4400.3 | 0.5 | 0.01 | 4400.6 | 0.3 |
| H10 | 4400.2 | 0.5 | 0.01 | 4400.7 | 0.4 |
| H11 | 4400.3 | 0.6 | 0.01 | 4400.7 | 0.4 |
| H12 | 4400.4 | 0.7 | 0.02 | 4400.8 | 0.5 |
| H18 | 4400.4 | 1.1 | 0.03 | 4401.2 | 0.8 |
| H19 | 4400.4 | 1.4 | 0.04 | 4401.5 | 1.1 |
| H27 | 4400.2 | 1.0 | 0.03 | 4401.0 | 0.8 |
| H34 | 4400.4 | 0.5 | 0.01 | 4400.7 | 0.3 |
| H35 | 4400.3 | 0.4 | 0.01 | 4400.5 | 0.2 |
| H36 | 4400.3 | 0.5 | 0.01 | 4400.6 | 0.3 |
| **1-Hour Standard** | 5000 | | | | |
| **8-Hour Standard** | 10000 | | | | |
| **24-Hour Standard** | 4000 | | | | |

5.43 The most stringent standard for hourly mean CO is the Uzbekistan MPC of 5000µg/m$^3$. The results indicate that there will be no exceedances of this standard within the nearby sensitive areas. The impact of the emissions arising from the proposed plant when operating in simple cycle mode will be less than 10% of this standard, therefore the impact on hourly mean CO concentrations is considered to be insignificant in accordance with the significance criteria.

5.44 The results also indicate that there will be no exceedances of the 8-hour mean standard which is the EU standard and WHO guideline of 10,000µg/m$^3$ within the nearby sensitive areas. The impact of the emissions arising from the proposed plant when operating in simple cycle mode will be less than 10% of the standard, therefore the impact on 8-hour mean CO concentrations is considered to be insignificant in accordance with the significance criteria.

5.45 The short-term background concentration used for the modelling is in excess of the Uzbekistan MPC standard for 24-hour mean concentrations of 4000μg/m$^3$ in the vicinity of the Site. The predicted 24-hour concentrations at nearby sensitive receptors are therefore in exceedance of this standard. The impact of the emissions arising from the proposed plant when operating in simple cycle mode will be less than 10% of the standard, therefore the impact on 24 hour mean CO concentrations is also considered to be insignificant.

5.46 With regards to the future exposure within the Site itself, the greatest predicted hourly, 8 hour and 24-hour mean CO PEC concentrations are 4403.7, 4401.3 and 4400.6 μg/m$^3$ respectively. The predicted hourly and 8 hour mean concentrations within the Site are below the relevant standards. The predicted 24 hour mean CO PEC within the Site are above the relevant standard, however it should be noted that a worst-case assessment has been undertaken with regards to the local background concentrations.

<u>Ammonia ($NH_3$)</u>

5.47 The maximum predicted $NH_3$ PC concentrations arising from the proposed plant at the identified sensitive receptor locations during periods of time the proposed plant is operating in Simple Cycle mode are presented in Table 5.12.

**Table 5.12: Maximum Predicted Short-Term (1 Hour and 24 Hour) $NH_3$ Concentrations – Simple Cycle (μg/m$^3$)**

| Receptor | PC | PC as % of Standard |
|---|---|---|
| **1-Hour** | | |
| Residential Area A (H3) | 0.24 | 0.12 |
| Residential Area B (H1) | 0.41 | 0.20 |
| Residential Area C (H5) | 0.19 | 0.09 |
| Residential Area D (new homes) | 0.22 | 0.11 |
| Residential Area E (accommodation blocks (H8) | 0.22 | 0.11 |
| Military Barracks | 0.22 | 0.11 |
| Sirdarya TPP (H2) | 0.22 | 0.11 |
| H4 | 0.21 | 0.11 |
| H6 | 0.19 | 0.09 |
| H7 | 0.21 | 0.10 |
| H9 | 0.21 | 0.11 |
| H10 | 0.21 | 0.11 |
| H11 | 0.17 | 0.08 |
| H12 | 0.20 | 0.10 |

| Receptor | PC | PC as % of Standard |
|---|---|---|
| H18 | 0.43 | 0.21 |
| H19 | 0.43 | 0.22 |
| H27 | 0.23 | 0.11 |
| H34 | 0.21 | 0.10 |
| H35 | 0.19 | 0.10 |
| H36 | 0.23 | 0.11 |
| **24-Hour** | | |
| Residential Area A (H3) | 0.04 | 0.03 |
| Residential Area B (H1) | 0.09 | 0.07 |
| Residential Area C (H5) | 0.05 | 0.05 |
| Residential Area D (new homes) | 0.00 | 0.00 |
| Residential Area E (accommodation blocks (H8) | 0.04 | 0.03 |
| Military Barracks | 0.02 | 0.02 |
| Sirdarya TPP (H2) | 0.05 | 0.04 |
| H4 | 0.02 | 0.02 |
| H6 | 0.03 | 0.03 |
| H7 | 0.03 | 0.03 |
| H9 | 0.02 | 0.02 |
| H10 | 0.02 | 0.02 |
| H11 | 0.03 | 0.02 |
| H12 | 0.03 | 0.03 |
| H18 | 0.05 | 0.04 |
| H19 | 0.07 | 0.06 |
| H27 | 0.05 | 0.04 |
| H34 | 0.02 | 0.02 |
| H35 | 0.02 | 0.02 |
| H36 | 0.02 | 0.02 |
| **1-Hour Standard** | 200 | |
| **24-Hour Standard** | 120 | |

5.48 The hourly and 24-hour mean $NH_3$ standards which are the Uzbekistan MPC standards of 200 and 120 $\mu g/m^3$ respectively. The predicted hourly and 24-hour mean PC concentrations arising from the proposed plant are well below these standards. Although no $NH_3$ ambient monitoring data was available in order to establish a likely background concentration, it is considered unlikely that there would be any breaches of these standards in the vicinity of the Site.

5.49 The predicted hourly and 24-hour mean $NH_3$ PCs arising from the proposed plant when operating in simple cycle mode will be less than 10% of the relevant standards at the nearest sensitive receptors. The impacts are therefore considered to be insignificant in accordance with the significance criteria.

5.50 The future exposure within the Site itself cannot be determined as there is no available ambient monitoring to establish the background concentration, however the greatest predicted hourly and 24 hour mean $NH_3$ PC concentrations with the Site as a result of the proposed plant are 0.16, 0.03 $\mu g/m^3$ respectively which are all below the relevant standards.

**Scenario Three – Additional IFC Plant (Combined Cycle)**

Nitrogen Dioxide ($NO_2$)

5.51 The maximum predicted ground-level annual $NO_2$ concentrations at the nearest identified sensitive receptor locations and those that are showing elevated concentrations are presented in Table 5.13 full results are presented in **Appendix C**. The results are presented for the baseline scenario which includes the existing emissions arising from the neighbouring Sirdarya TPP and the likely local background concentration; the process contribution (PC) for the combined emissions from the proposed plant and the additional IFC plant and as a percentage of the relevant standard and the predicted environmental concentration (PEC) which includes the emissions from the retained plant at the neighbouring Sirdarya TPP following the upgrading and closure of some of the current plant.

**Table 5.13: Maximum Predicted Long Term (Annual) $NO_2$ Concentrations – Combined Cycle ($\mu g/m^3$)**

| Receptor | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Overall Impact (PEC – Baseline) |
|---|---|---|---|---|---|
| Residential Area A (H3) | 21.2 | 1.4 | 3.5 | 22.5 | 1.3 |
| Residential Area B (H1) | 21.2 | 1.7 | 4.2 | 22.8 | 1.6 |
| Residential Area C (H5) | 21.5 | 1.2 | 2.9 | 22.4 | 0.9 |
| Residential Area D (new homes) | 21.8 | 0.6 | 1.4 | 22.0 | 0.1 |
| Residential Area E (accommodation blocks (H8) | 21.8 | 0.9 | 2.2 | 22.2 | 0.4 |
| H4 | 21.2 | 0.7 | 1.6 | 21.8 | 0.6 |
| H6 | 21.9 | 0.7 | 1.9 | 22.2 | 0.3 |
| H7 | 21.8 | 0.8 | 2.1 | 22.2 | 0.4 |
| H9 | 21.3 | 0.1 | 0.3 | 21.3 | 0.0 |
| H10 | 21.4 | 0.1 | 0.4 | 21.3 | 0.0 |
| H11 | 21.5 | 0.2 | 0.6 | 21.5 | 0.0 |
| H12 | 21.6 | 0.4 | 1.0 | 21.7 | 0.1 |
| H18 | 22.0 | 0.8 | 2.0 | 22.3 | 0.3 |
| H19 | 22.1 | 0.9 | 2.2 | 22.3 | 0.3 |
| H27 | 21.4 | 1.3 | 3.3 | 22.5 | 1.1 |
| H34 | 22.2 | 0.4 | 1.0 | 22.0 | -0.1 |
| H35 | 21.8 | 0.3 | 0.8 | 21.7 | -0.1 |
| H36 | 22.1 | 0.4 | 0.9 | 21.9 | -0.2 |
| **Standard** | 40 | | | | |

5.52 The results indicate that there will be no exceedances of the relevant annual mean $NO_2$ standard (which is the Uzbekistan MPC standard, the EU standard and the WHO guideline concentration of $40\mu g/m^3$) within the nearby residential areas.

5.53 The greatest combined impact as a result of the proposed plant and IFC plant when operating in combined cycle mode will be a PC of $1.7\mu g/m^3$ predicted at Residential Area B which is located close to the west boundary of the Site. At this and 12 other nearby sensitive receptors (Residential Areas A, C, D, E, H4, H6, H7, H12, H18, H19, H27 and H34) the impact is greater than 1% of the standard. However, at all the selected locations within the study area, the predicted PEC is less than 70% of the relevant standard, therefore the impact is considered to be insignificant in accordance with the significance criteria.

5.54 The greatest change in annual mean $NO_2$ concentrations as a result of the changes (proposed and IFC plant plus changes to emissions from neighbouring Sirdarya TPP is an increase of 1.6$\mu g/m^3$ also predicted at Residential Area B.

5.55 The maximum predicted ground-level short-term $NO_2$ concentrations at the identified sensitive receptor locations are presented in Table 5.14. The results are presented for the process contribution (PC) for the combined emissions from the proposed and IFC plant and as a percentage of the relevant standard and as the predicted environmental concentration (PEC).

**Table 5.14: Maximum Predicted Short-Term (1 Hour, 24 Hour and Monthly) $NO_2$ Concentrations – Combined Cycle ($\mu g/m^3$)**

| Receptor | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Overall Impact (PEC – Baseline) |
|---|---|---|---|---|---|
| **1-Hour** | | | | | |
| Residential Area A (H3) | 82.8 | 20.6 | 24.3 | 75.3 | -7.4 |
| Residential Area B (H1) | 83.1 | 27.1 | 31.9 | 80.4 | -2.7 |
| Residential Area C (H5) | 84.2 | 28.4 | 33.4 | 76.2 | -8.0 |
| Residential Area D (new homes) | 91.0 | 15.2 | 17.9 | 78.3 | -12.7 |
| Residential Area E (accommodation blocks (H8) | 87.6 | 15.3 | 18.1 | 76.0 | -11.6 |
| Military Barracks | 95.0 | 15.2 | 17.9 | 81.5 | -13.5 |
| Sirdarya TPP (H2) | 42.7 | 17.7 | 20.8 | 59.7 | 17.0 |
| H4 | 80.5 | 13.7 | 16.2 | 71.5 | -9.0 |
| H6 | 85.5 | 15.4 | 18.1 | 69.0 | -16.5 |
| H7 | 81.1 | 15.0 | 17.7 | 68.3 | -12.8 |
| H9 | 79.3 | 13.7 | 16.1 | 74.7 | -4.6 |
| H10 | 76.0 | 13.4 | 15.7 | 72.2 | -3.8 |
| H11 | 73.1 | 14.7 | 17.2 | 69.6 | -3.4 |
| H12 | 80.8 | 15.0 | 17.6 | 73.0 | -7.8 |
| H18 | 74.3 | 82.0 | 96.5 | 124.0 | 49.8 |
| H19 | 73.4 | 83.2 | 97.9 | 125.2 | 51.8 |
| H27 | 92.3 | 17.1 | 20.2 | 82.9 | -9.5 |
| H34 | 87.8 | 11.7 | 13.7 | 77.4 | -10.4 |

| Receptor | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Overall Impact (PEC – Baseline) |
|---|---|---|---|---|---|
| H35 | 84.8 | 15.9 | 18.7 | 70.4 | -14.4 |
| H36 | 84.9 | 13.9 | 16.4 | 72.3 | -12.7 |
| **24-Hour** | | | | | |
| Residential Area A (H3) | 44.6 | 4.3 | 7.2 | 46.4 | 1.8 |
| Residential Area B (H1) | 43.8 | 9.5 | 15.9 | 51.5 | 7.7 |
| Residential Area C (H5) | 46.4 | 6.2 | 10.4 | 48.2 | 1.8 |
| Residential Area D (new homes) | 48.6 | 2.6 | 4.3 | 45.4 | -3.2 |
| Residential Area E (accommodation blocks (H8) | 48.6 | 4.4 | 7.3 | 46.9 | -1.7 |
| Military Barracks | 46.3 | 2.5 | 4.1 | 44.6 | -1.6 |
| Sirdarya TPP (H2) | 42.0 | 5.2 | 8.7 | 47.2 | 5.2 |
| H4 | 44.5 | 2.5 | 4.2 | 45.2 | 0.6 |
| H6 | 48.0 | 3.3 | 5.4 | 46.9 | -1.1 |
| H7 | 48.0 | 3.9 | 6.5 | 46.9 | -1.1 |
| H9 | 46.0 | 1.5 | 2.4 | 45.6 | -0.4 |
| H10 | 45.4 | 1.6 | 2.6 | 45.3 | 0.0 |
| H11 | 46.5 | 2.0 | 3.3 | 46.1 | -0.5 |
| H12 | 47.3 | 3.5 | 5.9 | 47.1 | -0.2 |
| H18 | 47.6 | 9.1 | 15.1 | 52.0 | 4.4 |
| H19 | 47.8 | 11.5 | 19.1 | 54.5 | 6.7 |
| H27 | 45.0 | 5.3 | 8.8 | 47.3 | 2.3 |
| H34 | 48.1 | 1.2 | 2.0 | 46.1 | -2.0 |
| H35 | 46.4 | 1.5 | 2.4 | 45.1 | -1.3 |
| H36 | 46.5 | 1.5 | 2.5 | 45.5 | -1.0 |
| **Monthly** | | | | | |
| Residential Area A (H3) | 42.3 | 1.4 | 2.8 | 43.4 | 1.1 |
| Residential Area B (H1) | 42.2 | 2.7 | 5.4 | 44.7 | 2.6 |
| Residential Area C (H5) | 42.7 | 1.4 | 2.9 | 43.8 | 1.1 |
| Residential Area D (new homes) | 43.5 | 0.6 | 1.1 | 43.3 | -0.2 |
| Residential Area E (accommodation blocks (H8) | 43.4 | 0.9 | 1.8 | 43.4 | 0.0 |
| Military Barracks | 42.7 | 0.8 | 1.6 | 42.8 | 0.2 |

| Receptor | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Overall Impact (PEC – Baseline) |
|---|---|---|---|---|---|
| Sirdarya TPP (H2) | 42.0 | 1.1 | 2.3 | 43.1 | 1.1 |
| H4 | 42.3 | 0.7 | 1.3 | 42.8 | 0.5 |
| H6 | 43.3 | 0.6 | 1.3 | 43.3 | 0.0 |
| H7 | 43.2 | 0.8 | 1.6 | 43.4 | 0.2 |
| H9 | 42.5 | 0.2 | 0.4 | 42.5 | 0.0 |
| H10 | 42.6 | 0.2 | 0.5 | 42.5 | 0.0 |
| H11 | 42.5 | 0.2 | 0.5 | 42.5 | 0.0 |
| H12 | 42.7 | 0.5 | 1.0 | 42.9 | 0.1 |
| H18 | 42.9 | 1.0 | 2.0 | 43.3 | 0.4 |
| H19 | 43.0 | 1.1 | 2.3 | 43.4 | 0.5 |
| H27 | 42.5 | 2.1 | 4.2 | 44.2 | 1.7 |
| H34 | 44.1 | 0.4 | 0.8 | 43.5 | -0.6 |
| H35 | 43.1 | 0.4 | 0.7 | 42.9 | -0.1 |
| H36 | 43.0 | 0.4 | 0.8 | 42.8 | -0.1 |
| **1-Hour Standard** | 85 | | | | |
| **24-Hour Standard** | 60 | | | | |
| **Monthly Standard** | 50 | | | | |

5.56 The results indicate that there will be no exceedances of the most stringent 24-hour or monthly mean $NO_2$ standards (which are the Uzbekistan MPC standards of 60 and 50$\mu$g/m$^3$ respectively) within the nearby residential areas with the proposed plant and IFC plant are operational.

5.57 Exceedances of the hourly mean $NO_2$ standard of 85$\mu$g/m$^3$ are predicted at receptors H18 and H19. The results of the modelling predicted that at receptors H18 and H19 the standard will be exceeded for 12 and 14 hours respectively in the worst-case year which equate to 0.13 and 0.15% of the time. As this is only a small number of hours predicted at the worst meteorological conditions over a three year period and as worst case assumptions are included in the modelling with regards to the emission rates, especially with regards to the emissions from the future IFC plant which assumes no $NO_x$ mitigation, it is considered unlikely that exceedances of the standard will occur.

5.58 The greatest impact on hourly mean $NO_2$ concentrations as a result of the proposed and IFC plant when operating in combined cycle mode are predicted at receptors H18 and H19 which are located in Bekobad over 8km to the east of the Site. As discussed previously, the terrain at these locations is approximately 130m higher than at the location of the Site. The elevated terrain may account for the higher concentrations. At the remaining receptors the greatest impact is predicted to be 28.4$\mu$g/m$^3$ at Residential Area C which is located to the east of the Site. At all of the nearby sensitive receptors, the impact on hourly mean $NO_2$ concentrations is greater than 10% of the relevant standard and therefore cannot be considered to be an insignificant impact. It should be noted however that the results indicate that at the majority of the nearby sensitive receptors the overall predicted PECs when considering the proposed upgrades to the Sirdarya TPP plant will be reduced compared to current levels and therefore the overall impact will be beneficial.

5.59 Further modelling has been undertaken to investigate the number of instances in a year that the predicted hourly PCs will exceed the significance criteria of 10% of the relevant standard. At the receptors with the highest PCs (Residential Area B, Residential Area C, H18 and H19) the PCs are predicted to exceed 10% of the relevant standard for 199, 134, 73 and 77 hours respectively in the worst-case year which equates to 2.3, 1.5, 0.8 and 0.9% of the year.

5.60 With regards to 24-hour $NO_2$ concentrations, the greatest impacts as a result of the proposed and IFC plant when operating in combined cycle mode are predicted at Residential Area B and receptors H18 and H19. The predicted PCs are less than 10% of the relevant standard at all but four of the nearest sensitive receptors. At these locations the impact is considered to be insignificant in accordance with the significance criteria. At the worst-case location within residential areas B and C and at receptors H18 and H19, the impact with regards to 24-hour mean $NO_2$ concentrations is higher than 10% and therefore cannot be considered to be insignificant. However, the overall PEC is below the relevant standard.

5.61 The greatest impact on monthly mean $NO_2$ concentrations is predicted at Residential Area B which is located to the west of the Site. At this and all the other sensitive receptors close to the Site, the predicted PC is less than 10% of the relevant standard and therefore the impact is considered to be insignificant in accordance with the significance criteria.

5.62 With regards to the future exposure within the Site itself, the greatest predicted hourly, 24 hour and monthly mean $NO_2$ PEC concentrations are 85.3, 44.9 and 42.9 $\mu$g/m$^3$ respectively. The predicted 24-hour and monthly $NO_2$ PEC concentrations are therefore below the relevant standards. The maximum predicted hourly mean $NO_2$ PEC of 85.3$\mu$g/m$^3$ within the Site itself is marginally above the relevant standard of 85$\mu$g/m$^3$. It should be noted however that this has been predicted using the worst-case meteorological data measured over a three-year period and worst-case background concentrations. The actual concentrations likely to be experienced at the Site are therefore likely to be lower than those presented.

Nitrogen Oxide (NO)

5.63 The maximum predicted ground-level annual NO concentrations at the nearest identified sensitive receptor locations are presented in Table 5.15, full results are presented in **Appendix C**.

**Table 5.15: Maximum Predicted Long Term (Annual) NO Concentrations – Combined Cycle (μg/m³)**

| Receptor | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Overall Impact (PEC – Baseline) |
|---|---|---|---|---|---|
| Residential Area A (H3) | 17.2 | 1.3 | 2.2 | 18.4 | 1.2 |
| Residential Area B (H1) | 17.2 | 1.6 | 2.6 | 18.6 | 1.5 |
| Residential Area C (H5) | 17.5 | 1.1 | 1.8 | 18.3 | 0.8 |
| Residential Area D (new homes) | 17.8 | 0.5 | 0.9 | 17.9 | 0.1 |
| Residential Area E (accommodation blocks (H8) | 17.8 | 0.8 | 1.4 | 18.2 | 0.4 |
| H4 | 17.2 | 0.6 | 1.0 | 17.7 | 0.5 |
| H6 | 17.8 | 0.7 | 1.2 | 18.1 | 0.3 |
| H7 | 17.7 | 0.8 | 1.3 | 18.1 | 0.4 |
| H9 | 17.3 | 0.1 | 0.2 | 17.3 | 0.0 |
| H10 | 17.4 | 0.1 | 0.2 | 17.3 | 0.0 |
| H11 | 17.4 | 0.2 | 0.4 | 17.4 | 0.0 |
| H12 | 17.5 | 0.4 | 0.6 | 17.6 | 0.1 |
| H18 | 17.9 | 0.8 | 1.3 | 18.2 | 0.3 |
| H19 | 18.0 | 0.8 | 1.3 | 18.2 | 0.3 |
| H27 | 17.4 | 1.2 | 2.1 | 18.4 | 1.0 |
| H34 | 18.1 | 0.4 | 0.6 | 17.9 | -0.1 |
| H35 | 17.7 | 0.3 | 0.5 | 17.7 | -0.1 |
| H36 | 18.0 | 0.3 | 0.6 | 17.9 | -0.2 |
| **Standard** | 60 | | | | |

5.64 The results indicate that there will be no exceedances of the relevant annual mean NO standard which is the Uzbekistan MPC of 60μg/m³ within the nearby residential areas.

5.65 The greatest impact on annual mean NO concentrations as a result of the proposed and IFC plant when operating in combined cycle mode will be a PC of 1.6μg/m³ predicted at Residential

Area B which is located close to the west boundary of the Site. At this and nine other nearby sensitive receptors (Residential Areas A, C, E, H4, H6, H7, H18, H19 and H27) the impact is greater than 1% of the standard. However, at all the selected locations within the study area, the predicted PEC is less than 70% of the relevant standard, therefore the impact is considered to be insignificant in accordance with the significance criteria.

5.66 The maximum predicted ground-level short-term NO concentrations at the identified sensitive receptor locations are presented in Table 5.16. The results are presented for the process contribution (PC) for the combined emissions from the proposed plant and IFC plant and as a percentage of the relevant standard and as the predicted environmental concentration (PEC).

**Table 5.16: Maximum Predicted Short-Term (1 Hour, 24 Hour and Monthly) NO Concentrations – Combined Cycle ($\mu g/m^3$)**

| Receptor | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Overall Impact (PEC – Baseline) |
|---|---|---|---|---|---|
| **1-Hour** | | | | | |
| Residential Area A (H3) | 110.0 | 38.5 | 6.4 | 96.1 | -13.8 |
| Residential Area B (H1) | 110.6 | 50.5 | 8.4 | 105.6 | -5.0 |
| Residential Area C (H5) | 112.7 | 52.8 | 8.8 | 97.7 | -15.0 |
| Residential Area D (new homes) | 125.4 | 28.3 | 4.7 | 101.7 | -23.7 |
| Residential Area E (accommodation blocks (H8) | 119.0 | 28.6 | 4.8 | 97.4 | -21.6 |
| Military Barracks | 132.8 | 28.4 | 4.7 | 107.6 | -25.2 |
| Sirdarya TPP (H2) | 35.4 | 32.9 | 5.5 | 67.0 | 31.6 |
| H4 | 105.7 | 25.6 | 4.3 | 89.0 | -16.7 |
| H6 | 115.0 | 28.6 | 4.8 | 84.3 | -30.7 |
| H7 | 106.9 | 28.0 | 4.7 | 83.1 | -23.9 |
| H9 | 103.4 | 25.5 | 4.2 | 94.9 | -8.5 |
| H10 | 97.4 | 24.9 | 4.1 | 90.2 | -7.2 |
| H11 | 91.9 | 27.3 | 4.6 | 85.5 | -6.4 |
| H12 | 106.3 | 27.9 | 4.7 | 91.7 | -14.6 |
| H18 | 94.1 | 152.8 | 25.5 | 186.8 | 92.7 |
| H19 | 92.5 | 155.0 | 25.8 | 189.0 | 96.6 |
| H27 | 127.8 | 31.9 | 5.3 | 110.2 | -17.6 |
| H34 | 119.3 | 21.8 | 3.6 | 99.9 | -19.4 |
| H35 | 113.8 | 29.6 | 4.9 | 86.9 | -26.9 |

| Receptor | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Overall Impact (PEC – Baseline) |
|---|---|---|---|---|---|
| H36 | 114.0 | 26.0 | 4.3 | 90.4 | -23.6 |
| **24-Hour** | | | | | |
| Residential Area A (H3) | 38.8 | 8.1 | 3.2 | 42.1 | 3.3 |
| Residential Area B (H1) | 37.4 | 17.8 | 7.1 | 51.8 | 14.4 |
| Residential Area C (H5) | 42.2 | 11.6 | 4.6 | 45.6 | 3.4 |
| Residential Area D (new homes) | 46.3 | 4.8 | 1.9 | 40.3 | -6.0 |
| Residential Area E (accommodation blocks (H8) | 46.3 | 8.1 | 3.3 | 43.2 | -3.1 |
| Military Barracks | 42.0 | 4.6 | 1.8 | 38.9 | -3.0 |
| Sirdarya TPP (H2) | 34.1 | 9.7 | 3.9 | 43.7 | 9.7 |
| H4 | 38.7 | 4.7 | 1.9 | 39.9 | 1.2 |
| H6 | 45.1 | 6.1 | 2.4 | 43.1 | -2.1 |
| H7 | 45.1 | 7.3 | 2.9 | 43.0 | -2.1 |
| H9 | 41.5 | 2.7 | 1.1 | 40.7 | -0.8 |
| H10 | 40.3 | 3.0 | 1.2 | 40.2 | -0.1 |
| H11 | 42.4 | 3.7 | 1.5 | 41.6 | -0.9 |
| H12 | 43.8 | 6.6 | 2.6 | 43.5 | -0.3 |
| H18 | 44.4 | 16.9 | 6.8 | 52.7 | 8.3 |
| H19 | 44.8 | 21.4 | 8.6 | 57.2 | 12.4 |
| H27 | 39.6 | 9.9 | 4.0 | 43.9 | 4.3 |
| H34 | 45.3 | 2.3 | 0.9 | 41.6 | -3.7 |
| H35 | 42.2 | 2.7 | 1.1 | 39.8 | -2.4 |
| H36 | 42.4 | 2.7 | 1.1 | 40.5 | -1.9 |
| **Monthly** | | | | | |
| Residential Area A (H3) | 34.6 | 2.6 | 2.1 | 36.6 | 2.0 |
| Residential Area B (H1) | 34.3 | 5.0 | 4.2 | 39.1 | 4.8 |
| Residential Area C (H5) | 35.3 | 2.7 | 2.2 | 37.3 | 2.1 |
| Residential Area D (new homes) | 36.8 | 1.1 | 0.9 | 36.5 | -0.3 |
| Residential Area E (accommodation blocks (H8) | 36.6 | 1.7 | 1.4 | 36.6 | 0.1 |
| Military Barracks | 35.3 | 1.5 | 1.2 | 35.6 | 0.3 |
| Sirdarya TPP | 34.0 | 2.1 | 1.8 | 36.1 | 2.1 |

| Receptor | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Overall Impact (PEC – Baseline) |
|---|---|---|---|---|---|
| H4 | 34.6 | 1.2 | 1.0 | 35.5 | 0.9 |
| H6 | 36.5 | 1.2 | 1.0 | 36.5 | 0.0 |
| H7 | 36.3 | 1.4 | 1.2 | 36.6 | 0.3 |
| H9 | 34.9 | 0.3 | 0.3 | 34.8 | -0.1 |
| H10 | 35.1 | 0.4 | 0.4 | 35.0 | -0.1 |
| H11 | 35.0 | 0.4 | 0.4 | 34.9 | 0.0 |
| H12 | 35.4 | 0.9 | 0.7 | 35.6 | 0.3 |
| H18 | 35.7 | 1.9 | 1.6 | 36.4 | 0.7 |
| H19 | 35.8 | 2.1 | 1.8 | 36.7 | 0.9 |
| H27 | 34.8 | 3.9 | 3.2 | 38.0 | 3.2 |
| H34 | 37.9 | 0.7 | 0.6 | 36.7 | -1.1 |
| H35 | 36.0 | 0.7 | 0.6 | 35.7 | -0.3 |
| H36 | 35.8 | 0.8 | 0.6 | 35.5 | -0.3 |
| **1-Hour Standard** | 600 | | | | |
| **24-Hour Standard** | 250 | | | | |
| **Monthly Standard** | 120 | | | | |

5.67 The results indicate that there will be no exceedances of the relevant hourly, 24-hour or monthly mean NO standards which are the Uzbekistan MPC standards of 600, 250 and 120$\mu g/m^3$ respectively at the nearby sensitive areas.

5.68 The greatest impact on hourly mean NO concentrations as a result of the proposed and IFC plant when operating in combined cycle mode are 152.8 and 155.0$\mu g/m^3$ predicted at receptors H18 and H19 which are located in Bekobad over 8km to the east of the Site. At the remaining receptors the greatest impact is predicted to be 52.8$\mu g/m^3$ at Residential Area C which is located to the east of the Site. The predicted PCs at all of the sensitive receptors with the exception of H18 and H19 are less than 10% of the relevant standard and therefore considered to be insignificant in accordance with the significance criteria. It should be noted that at all locations the predicted PECs are less than 35% of the standard and therefore breaches are very unlikely. At the majority of the nearby sensitive receptors the overall predicted PECs will be reduced compared to current levels and therefore the overall impact will be beneficial.

5.69 Further modelling has been undertaken to investigate the number of instances in a year that the predicted hourly PCs will exceed the significance criteria of 10% of the relevant standard. At the receptors with the highest PCs (H18 and H19) the PCs are predicted to exceed 10% of the relevant standard for 45 and 53 hours respectively in the worst-case year which equates to 0.5 and 0.6% of the year. It should be noted that for the assessment of NO concentrations, no conversion of NO to $NO_2$ is assumed, therefore the concentrations of NO are likely to be considerably lower than the predicted concentrations.

5.70 With regards to 24-hour NO concentrations, the greatest impacts as a result of the proposed and IFC plant when operating in combined cycle mode is predicted at receptors H18, H19 and Residential Area B. The predicted PCs at all sensitive receptors are less than 10% of the relevant standard and therefore the impact is considered to be insignificant in accordance with the significance criteria.

5.71 With regards to the future exposure within the Site itself, the greatest predicted hourly, 24 hour and monthly mean NO PEC concentrations are 114.7, 39.3 and 35.7 $\mu g/m^3$ respectively which are all lower than the relevant standards.

Carbon Monoxide (CO)

5.72 The maximum predicted ground-level annual CO concentrations at the nearest identified sensitive receptor locations are presented in Table 5.17, full results are presented in **Appendix C**.

**Table 5.17: Maximum Predicted Long Term (Annual) CO Concentrations – Combined Cycle ($\mu g/m^3$)**

| Receptor | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Overall Impact (PEC – Baseline) |
|---|---|---|---|---|---|
| Residential Area A (H3) | 2200.01 | 2.0 | 0.07 | 2202.02 | 2.0 |
| Residential Area B (H1) | 2200.01 | 2.4 | 0.08 | 2202.42 | 2.4 |
| Residential Area C (H5) | 2200.02 | 1.7 | 0.06 | 2201.67 | 1.7 |
| Residential Area D (new homes) | 2200.03 | 0.8 | 0.03 | 2200.82 | 0.8 |
| Residential Area E (accommodation blocks (H8) | 2200.03 | 1.2 | 0.04 | 2201.26 | 1.2 |
| H4 | 2200.01 | 0.9 | 0.03 | 2200.94 | 0.9 |
| H6 | 2200.03 | 1.1 | 0.04 | 2201.07 | 1.0 |
| H7 | 2200.03 | 1.2 | 0.04 | 2201.22 | 1.2 |
| H9 | 2200.01 | 0.2 | 0.01 | 2200.18 | 0.2 |
| H10 | 2200.01 | 0.2 | 0.01 | 2200.22 | 0.2 |
| H11 | 2200.02 | 0.3 | 0.01 | 2200.34 | 0.3 |
| H12 | 2200.02 | 0.6 | 0.02 | 2200.58 | 0.6 |
| H18 | 2200.03 | 1.2 | 0.04 | 2201.18 | 1.1 |
| H19 | 2200.04 | 1.2 | 0.04 | 2201.25 | 1.2 |
| H27 | 2200.01 | 1.9 | 0.06 | 2201.89 | 1.9 |
| H34 | 2200.04 | 0.6 | 0.02 | 2200.60 | 0.6 |
| H35 | 2200.03 | 0.4 | 0.01 | 2200.46 | 0.4 |
| H36 | 2200.04 | 0.5 | 0.02 | 2200.54 | 0.5 |
| **Standard** | 3000 | | | | |

5.73 The results indicate that there will be no exceedances of the relevant annual mean CO standard (which is the Uzbekistan MPC of 3000$\mu g/m^3$) within the nearby residential areas.

5.74 The greatest impact in annual mean CO concentrations as a result of the proposed and IFC plant when operating in combined cycle mode will be a PC of 2.4$\mu g/m^3$ predicted at Residential Area B which is located close to the west boundary of the Site. This is less than 1% of the standard. Therefore, the impact is considered to be insignificant in accordance with the significance criteria.

5.75 The maximum predicted ground-level short term CO concentrations at the identified sensitive receptor locations are presented in Table 5.18.

**Table 5.18: Maximum Predicted Short-Term (Hourly, 8 Hour, 24 Hour and Monthly) CO Concentrations – Combined Cycle (μg/m$^3$)**

| Receptor | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Overall Impact (PEC – Baseline) |
|---|---|---|---|---|---|
| **1-Hour** | | | | | |
| Residential Area A (H3) | 4402.7 | 59.0 | 1.2 | 4459.0 | 56.3 |
| Residential Area B (H1) | 4402.3 | 77.5 | 1.6 | 4477.5 | 75.3 |
| Residential Area C (H5) | 4402.6 | 81.0 | 1.6 | 4481.0 | 78.4 |
| Residential Area D (new homes) | 4402.8 | 43.4 | 0.9 | 4443.4 | 40.5 |
| Residential Area E (accommodation blocks (H8) | 4402.7 | 43.9 | 0.9 | 4443.9 | 41.1 |
| Military Barracks | 4402.8 | 43.6 | 0.9 | 4443.6 | 40.7 |
| Sirdarya TPP (H2) | 4400.1 | 50.5 | 1.0 | 4450.5 | 50.4 |
| H4 | 4402.4 | 39.2 | 0.8 | 4439.3 | 36.8 |
| H6 | 4403.0 | 43.9 | 0.9 | 4443.9 | 40.9 |
| H7 | 4402.7 | 43.0 | 0.9 | 4443.0 | 40.3 |
| H9 | 4402.6 | 39.1 | 0.8 | 4439.5 | 36.9 |
| H10 | 4402.4 | 38.2 | 0.8 | 4438.3 | 35.9 |
| H11 | 4401.9 | 41.9 | 0.8 | 4442.1 | 40.2 |
| H12 | 4402.7 | 42.8 | 0.9 | 4442.8 | 40.1 |
| H18 | 4402.2 | 234.4 | 4.7 | 4634.4 | 232.1 |
| H19 | 4402.2 | 237.8 | 4.8 | 4637.8 | 235.6 |
| H27 | 4402.7 | 49.0 | 1.0 | 4449.0 | 46.3 |
| H34 | 4403.2 | 33.4 | 0.7 | 4433.4 | 30.2 |
| H35 | 4403.0 | 45.3 | 0.9 | 4445.6 | 42.6 |
| H36 | 4403.0 | 39.8 | 0.8 | 4439.8 | 36.8 |
| **8-Hour** | | | | | |
| Residential Area A (H3) | 4400.5 | 36.5 | 0.4 | 4436.5 | 36.0 |
| Residential Area B (H1) | 4400.4 | 43.0 | 0.4 | 4443.0 | 42.5 |
| Residential Area C (H5) | 4400.7 | 34.3 | 0.3 | 4434.3 | 33.6 |
| Residential Area D (new homes) | 4400.7 | 18.6 | 0.2 | 4418.6 | 17.9 |
| Residential Area E (accommodation blocks (H8) | 4400.9 | 21.9 | 0.2 | 4421.9 | 21.1 |
| Military Barracks | 4400.5 | 17.8 | 0.2 | 4417.8 | 17.3 |
| Sirdarya TPP (H2) | 4400.0 | 26.7 | 0.3 | 4426.7 | 26.7 |

| Receptor | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Overall Impact (PEC – Baseline) |
|---|---|---|---|---|---|
| H4 | 4400.4 | 16.0 | 0.2 | 4416.0 | 15.6 |
| H6 | 4400.8 | 14.7 | 0.1 | 4414.8 | 14.0 |
| H7 | 4400.8 | 17.9 | 0.2 | 4418.0 | 17.2 |
| H9 | 4400.6 | 7.1 | 0.1 | 4407.4 | 6.8 |
| H10 | 4400.6 | 10.2 | 0.1 | 4410.5 | 9.9 |
| H11 | 4400.7 | 12.9 | 0.1 | 4413.3 | 12.5 |
| H12 | 4400.6 | 16.0 | 0.2 | 4416.2 | 15.5 |
| H18 | 4400.7 | 45.2 | 0.5 | 4445.2 | 44.4 |
| H19 | 4400.8 | 60.7 | 0.6 | 4460.7 | 59.9 |
| H27 | 4400.6 | 28.1 | 0.3 | 4428.1 | 27.4 |
| H34 | 4400.7 | 9.4 | 0.1 | 4409.5 | 8.8 |
| H35 | 4400.6 | 9.5 | 0.1 | 4409.5 | 8.9 |
| H36 | 4400.7 | 10.2 | 0.1 | 4410.2 | 9.5 |
| **24-Hour** | | | | | |
| Residential Area A (H3) | 4400.2 | 12.4 | 0.3 | 4412.4 | 12.2 |
| Residential Area B (H1) | 4400.1 | 27.2 | 0.7 | 4427.2 | 27.1 |
| Residential Area C (H5) | 4400.3 | 17.8 | 0.4 | 4417.8 | 17.4 |
| Residential Area D (new homes) | 4400.4 | 7.4 | 0.2 | 4407.4 | 7.0 |
| Residential Area E (accommodation blocks (H8) | 4400.5 | 12.5 | 0.3 | 4412.5 | 12.0 |
| Military Barracks | 4400.3 | 7.1 | 0.2 | 4407.1 | 6.8 |
| Sirdarya TPP (H2) | 4400.0 | 14.9 | 0.4 | 4414.9 | 14.9 |
| H4 | 4400.2 | 7.3 | 0.2 | 4407.3 | 7.1 |
| H6 | 4400.4 | 9.3 | 0.2 | 4409.3 | 8.9 |
| H7 | 4400.4 | 11.2 | 0.3 | 4411.2 | 10.7 |
| H9 | 4400.3 | 4.2 | 0.1 | 4404.3 | 4.0 |
| H10 | 4400.2 | 4.5 | 0.1 | 4404.7 | 4.4 |
| H11 | 4400.3 | 5.7 | 0.1 | 4405.8 | 5.5 |
| H12 | 4400.4 | 10.1 | 0.3 | 4410.2 | 9.9 |
| H18 | 4400.4 | 25.9 | 0.6 | 4426.0 | 25.6 |
| H19 | 4400.4 | 32.8 | 0.8 | 4432.9 | 32.5 |
| H27 | 4400.2 | 15.2 | 0.4 | 4415.2 | 15.0 |
| H34 | 4400.4 | 3.5 | 0.1 | 4403.6 | 3.2 |

| Receptor | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Overall Impact (PEC – Baseline) |
|---|---|---|---|---|---|
| H35 | 4400.3 | 4.2 | 0.1 | 4404.2 | 3.9 |
| H36 | 4400.3 | 4.2 | 0.1 | 4404.3 | 4.0 |
| **Monthly** | | | | | |
| Residential Area A (H3) | 4400.02 | 3.9 | 0.11 | 4403.95 | 3.9 |
| Residential Area B (H1) | 4400.01 | 7.7 | 0.22 | 4407.74 | 7.7 |
| Residential Area C (H5) | 4400.05 | 4.1 | 0.12 | 4404.12 | 4.1 |
| Residential Area D (new homes) | 4400.10 | 1.6 | 0.05 | 4401.67 | 1.6 |
| Residential Area E (accommodation blocks (H8) | 4400.10 | 2.6 | 0.08 | 4402.65 | 2.6 |
| Military Barracks | 4400.05 | 2.3 | 0.07 | 4402.29 | 2.2 |
| Sirdarya TPP (H2) | 4400.00 | 3.3 | 0.09 | 4403.26 | 3.3 |
| H4 | 4400.02 | 1.9 | 0.05 | 4401.90 | 1.9 |
| H6 | 4400.09 | 1.9 | 0.05 | 4401.88 | 1.8 |
| H7 | 4400.09 | 2.2 | 0.06 | 4402.24 | 2.1 |
| H9 | 4400.04 | 0.5 | 0.01 | 4400.54 | 0.5 |
| H10 | 4400.04 | 0.7 | 0.02 | 4400.69 | 0.6 |
| H11 | 4400.04 | 0.7 | 0.02 | 4400.70 | 0.7 |
| H12 | 4400.05 | 1.4 | 0.04 | 4401.39 | 1.3 |
| H18 | 4400.06 | 2.9 | 0.08 | 4402.88 | 2.8 |
| H19 | 4400.07 | 3.2 | 0.09 | 4403.27 | 3.2 |
| H27 | 4400.03 | 5.9 | 0.17 | 4405.94 | 5.9 |
| H34 | 4400.14 | 1.1 | 0.03 | 4401.17 | 1.0 |
| H35 | 4400.07 | 1.1 | 0.03 | 4401.09 | 1.0 |
| H36 | 4400.07 | 1.2 | 0.03 | 4401.19 | 1.1 |
| **1-Hour Standard** | 5000 | | | | |
| **8-Hour Standard** | 10000 | | | | |
| **24-Hour Standard** | 4000 | | | | |
| **Monthly Standard** | 3500 | | | | |

5.76 The most stringent standard for hourly mean CO is the Uzbekistan MPC of 5000$\mu g/m^3$. The results indicate that there will be no exceedances of this standard within the nearby sensitive areas. The predicted PCs arising from the combined emissions from the proposed and IFC plant when operating in combined cycle mode will be less than 10% of this standard, therefore the impact on hourly mean CO concentrations is considered to be insignificant.

5.77 The 8 hour mean CO standard is the EU standard and WHO guideline of 10,000μg/m$^3$. The results indicate that there will be no exceedances of this standard and the predicted PCs will be less than 10% of this standard, therefore the impact on 8-hour mean CO concentrations is considered to be insignificant in accordance with significance criteria.

5.78 The 24-hour mean and monthly mean CO standards are the Uzbekistan MPCs of 4000μg/m$^3$ and 3500μg/m$^3$ respectively. The results indicate that these standards are likely to be breached across the study area due to the high background concentration. The predicted PCs arising from the combined emissions from the proposed and IFC plant when operating in combined cycle mode will be less than 10% of the respective standards, therefore the impact on 24-hour mean and monthly mean CO concentrations is considered to be insignificant in accordance with the significance criteria.

5.79 With regards to the future exposure within the Site itself, the greatest predicted hourly, 8 hour, 24-hour and monthly mean CO PEC concentrations are 4448.7, 4417.4, 4408.1 and 4402.4 μg/m$^3$ respectively. The predicted hourly and 8 hour mean concentrations within the Site are below the relevant standards. The predicted 24 hour and monthly mean CO PECs within the Site are above the relevant standards, however it should be noted that a worst-case assessment has been undertaken with regards to the local background concentrations.

# 6 SUMMARY AND CONCLUSIONS

6.1 An assessment has been carried out to determine the potential air quality impacts associated with the proposed CCGT Project. Further modelling was undertaken to determine the combined impact of a future CCGT project on adjacent land (referred to as IFC within this report). The modelling of the overall concentrations included a contribution from the Sirdarya TPP which is located adjacent to the Site.

6.2 The key pollutants considered in the assessment were $NO_x$ (as $NO_2$ and NO) and CO. Concentrations of $NH_3$ arising from the ammonia slip associated with the $NO_x$ abatement measures are also considered.

6.3 Detailed dispersion modelling of potential emissions from the proposed facility has been carried out using AERMOD. A review of monitoring data obtained from two distant monitoring stations and review of short-term monitoring in the immediate vicinity of the Site was undertaken. The background concentrations used in this assessment are likely to be higher than those likely to be experienced in the vicinity of the Site, therefore the assessment can be considered to be worst case. The background concentrations and PECs presented in this report should be considered to be indicative only.

**Combined Cycle Operations**

6.4 For Combined Cycle operations the predicted long-term $NO_2$, NO and CO PECs at the sensitive locations are all below the relevant standards. Although no ambient $NH_3$ monitoring data is available to determine the likely background $NH_3$ concentrations, the predicted concentrations of $NH_3$ arising from the proposed plant is very low, therefore it is unlikely that the standard would be breached. The impact of the emissions of $NO_2$, NO, CO and $NH_3$ on long term concentrations is predicted to be insignificant in accordance with the significance criteria.

6.5 For short term concentrations of $NO_2$ and NO, there are no exceedances of the relevant standards with the proposed plant operational. PCs in excess of 10% of the relevant standard are predicted at a number of receptors for hourly mean $NO_2$ concentrations, the impacts at these locations therefore cannot be considered to be insignificant in accordance with the significance criteria. However, the majority of receptors that experience an increase in concentration greater than 10% of the relevant standards are also predicted to experience an overall reduction in concentrations when compared to the existing levels as a result of the reductions due to the proposed upgrades to the Sirdarya TPP.

6.6 The predicted PCs on hourly mean NO, 24 hour mean $NO_2$ and NO and monthly mean $NO_2$ and NO concentrations are less than 10% of the relevant standards, therefore the impacts are considered to be insignificant.

6.7 For hourly and 8-hour mean concentrations of CO, there are no exceedances of the relevant standards. Exceedances of the 24-hour and monthly mean standards are predicted, however these are due to the high background concentrations assumed for the area of the Site. The predicted PCs for short-term CO concentrations are all below 10% of the relevant standards, the impacts on short term CO concentrations is therefore considered to be insignificant.

6.8 The predicted short-term $NH_3$ PC concentrations are all below 10% of the relevant standards, therefore the impacts on short term $NH_3$ concentrations is considered to be insignificant.

**Simple Cycle Operations**

6.9 For Simple Cycle operations, the predicted short-term concentrations for $NO_2$ and NO are below the relevant standards.

6.10 The predicted hourly and 8-hour mean CO concentrations are also below the relevant standards. The predicted 24-hour mean CO concentrations are above the relevant standard, however this is due to the high background concentration used for the assessment.

6.11 Although no $NH_3$ ambient monitoring data was available to establish a likely background concentration, the predicted $NH_3$ PCs are very low therefore it is considered unlikely that the standards would be breached.

6.12 The predicted PCs for $NO_2$, NO, CO and $NH_3$ are below 10% of the relevant standards and therefore the impacts on short-term concentrations are considered to be insignificant.

**Additional Future Plant (IFC) Combined Cycle Operations**

6.13 The predicted long-term $NO_2$, NO and CO PECs at the sensitive locations are all below the relevant standards. The impact of the emissions on long term concentrations is predicted to be insignificant in accordance with the significance criteria.

6.14 Exceedances of the hourly mean $NO_2$ standard are predicted at receptors H18 and H19. The exceedances are only predicted for a maximum of 12 and 14 hours per year at the respective locations. It should be noted that the assessment includes worst-case assumptions with regards to the emission rates in particular from the future IFC plant for which no NOx abatement has been assumed. No other exceedances of the hourly mean $NO_2$ standard are predicted. No exceedances of the relevant standards are predicted for 24 hour or monthly mean $NO_2$ or any of the short-term standards for NO.

6.15 PCs in excess of 10% of the relevant standard are predicted at all of the nearby receptors for hourly mean $NO_2$ concentrations, the impacts at these locations cannot be considered to be insignificant in accordance with the significance criteria. However, the majority of receptors that experience an increase in concentrations greater than 10% of the relevant standard are also predicted to experience an overall reduction in concentration when compared to the existing levels as a result of the reductions due to the proposed upgrades to the Sirdarya TPP.

6.16 Four receptors are predicted to experience a greater than 10% increase in 24-hour $NO_2$ concentrations, however the overall predicted PECs are below the standard. The predicted PCs for monthly mean $NO_2$ are below 10% of the relevant standard and therefore the impact is considered to be insignificant.

6.17 PCs in excess of 10% of the relevant standard for NO are predicted only at receptors H18 and H19. The PCs are only predicted to exceed 10% of the standard for a maximum of 45 and 53 hours per year at the respective locations. It should be noted that the assessment includes worst-case assumptions with regards to the emission rates and assumes no conversion of NO to $NO_2$ for the assessment of NO concentrations. No other increases greater than 10% of the relevant standards were predicted for short-term NO concentrations, the impacts are therefore considered to be insignificant.

6.18 For hourly and 8-hour mean concentrations of CO, there are no exceedances of the relevant standards. Exceedances of the 24-hour and monthly mean standards are predicted, however these are due to the high background concentrations assumed for the area of the Site. The predicted PCs for short-term CO concentrations are all below 10% of the relevant standards, the impacts on short term CO concentrations is therefore considered to be insignificant.

## APPENDIX A – Air Quality Terminology

| Term | Definition |
|---|---|
| **Accuracy** | A measure of how well a set of data fits the true value. |
| **Air quality objective** | Policy target generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedences within a specific timescale (see also air quality standard). |
| **Air quality standard** | The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive sub groups (see also air quality objective). |
| **Ambient air** | Outdoor air in the troposphere, excluding workplace air. |
| **Annual mean** | The average (mean) of the concentrations measured for each pollutant for one year. Usually this is for a calendar year, but some species are reported for the period April to March, known as a pollution year. This period avoids splitting winter season between 2 years, which is useful for pollutants that have higher concentrations during the winter months. |
| **Exceedence** | A period of time where the concentrations of a pollutant is greater than, or equal to, the appropriate air quality standard. |
| **Fugitive emissions** | Emissions arising from the passage of vehicles that do not arise from the exhaust system. |
| **LDO** | Light diesel oil |
| **NO** | Nitrogen monoxide, a.k.a. nitric oxide. |
| **$NO_2$** | Nitrogen dioxide. |
| **$NO_x$** | Nitrogen oxides. |
| **$O_3$** | Ozone. |
| **Percentile** | The percentage of results below a given value. |
| **$PM_{10}$** | Particulate matter with an aerodynamic diameter of less than 10 micrometres. |
| **ppmw** | Parts per million by mass (weight) |
| **Ratification (Monitoring)** | Involves a critical review of all information relating to a data set, in order to amend or reject the data. When the data have been ratified they represent the final data to be used (see also validation). |
| **$\mu g/m^3$ micrograms per cubic metre** | A measure of concentration in terms of mass per unit volume. A concentration of $1 \mu g/m^3$ means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant. |
| **Uncertainty** | A measure, associated with the result of a measurement, which characterizes the range of values within which the true value is expected to lie. Uncertainty is usually expressed as the range within which the true value is expected to lie with a 95% probability, where standard statistical and other procedures have been used to evaluate this figure. Uncertainty is more clearly defined than the closely related parameter 'accuracy', and has replaced it on recent European legislation. |

## APPENDIX B – Stack Emission and Building Parameters

**Table B1: Stack Emission Parameters (Main Stack)**

| Parameter / Fuel | Natural Gas |
|---|---|
| Stack Height (m) | 60 |
| Stack Diameter (m) | 9.18 |
| Temperature (K) | 355.2 |
| % Oxygen content (v/v) | 10.62 |
| % $H_2O$ content (v/v) | 10.04 |
| Actual Flow Rate ($Am^3/s$) | 984.4 |
| Exit Velocity (m/s) | 14.88 |
| **Concentration ($mg/m^3$)[(a)]** | |
| $NO_x$ (as $NO_2$) | 32.5 |
| CO | 32.5 |
| **Emission Rate (g/s)** | |
| NOx (as $NO_2$) | 34.10 |
| NOx (as NO) | 22.24 |
| CO | 34.10 |
| (a) Corrected to 273K, 15%O2, dry | |

**Table B2: Stack Emission Parameters (Bypass Stack)**

| Parameter / Fuel | Natural Gas |
|---|---|
| Stack Height (m) | 45 |
| Stack Diameter (m) | 9.38 |
| Temperature (K) | 928 |
| % Oxygen content (v/v) | 10.62 |
| % $H_2O$ content (v/v) | 10.04 |
| Actual Flow Rate ($Am^3/s$) | 2543.1 |
| Exit Velocity (m/s) | 36.82 |
| **Concentration ($mg/m^3$)[(a)]** | |
| $NO_x$ (as $NO_2$) | 32.5 |
| CO | 32.5 |
| **Emission Rate (g/s)** | |
| NOx (as $NO_2$) | 33.72 |
| NOx (as NO) | 21.99 |

| | |
|---|---|
| CO | 21.99 |
| (a) Corrected to 273K, 15%O2, dry | |

**Table B3: Sirdarya TPP Existing Stack Emission Parameters**

| Parameter / Fuel | Stack 1 | Stack 2 | Stack 3 |
|---|---|---|---|
| Units | 1 & 2 | 3 & 4 | 5 to 10 |
| Stack Height (m) | 180 | 180 | 320 |
| Stack Diameter (m) | 7.2 | 7.2 | 9.6 |
| Temperature (K) | 463 | 463 | 463 |
| Actual Flow Rate ($Am^3/s$) | 1062.3 | 1062.3 | 3189.2 |
| Exit Velocity (m/s) | 26.09 | 26.09 | 44.06 |
| **Concentration ($mg/m^3$)** | | | |
| $NO_x$ (as $NO_2$) | 316.2 | 316.2 | 342.2 |
| CO | 7.98 | 7.98 | 7.98 |
| **Emission Rate (g/s)** | | | |
| NOx (as $NO_2$) | 335.9 | 335.9 | 1091.3 |
| NOx (as NO) | 219.1 | 219.1 | 711.7 |
| CO | 8.47 | 8.47 | 25.45 |

**Table B4: Sirdarya TPP Remaining Stack Emission Parameters (following upgrade)**

| Parameter / Fuel | Stack 1 | Stack 2 | Stack 3 |
|---|---|---|---|
| Units | - | 3 & 4 | 5,6,9 & 10 |
| Stack Height (m) | - | 180 | 320 |
| Stack Diameter (m) | - | 7.2 | 9.6 |
| Temperature (K) | - | 463 | 463 |
| Actual Flow Rate ($Am^3/s$) | - | 1062.3 | 3189.2 |
| Exit Velocity (m/s) | - | 26.09 | 44.06 |
| **Concentration ($mg/m^3$)** | | | |
| $NO_x$ (as $NO_2$) | - | 273.8 | 274.0 |
| CO | - | 6.38 | 7.18 |
| **Emission Rate (g/s)** | | | |
| NOx (as $NO_2$) | - | 290.8 | 582.1 |
| NOx (as NO) | | 189.7 | 379.6 |
| CO | - | 6.78 | 15.3 |

**Table B5: Stack Emission Parameters for IFC Plant (Main Stack)**

| Parameter / Fuel | Natural Gas |
|---|---|
| Stack Height (m) | 60 |
| Stack Diameter (m) | 9.18 |
| Temperature (K) | 355.2 |
| % Oxygen content (v/v) | 10.62 |
| % $H_2O$ content (v/v) | 10.04 |
| Actual Flow Rate ($Am^3/s$) | 984.4 |
| Exit Velocity (m/s) | 14.88 |
| **Concentration ($mg/m^3$)[(a)]** | |
| $NO_x$ (as $NO_2$) | 50 |
| CO | 50 |
| **Emission Rate (g/s)** | |
| NOx (as $NO_2$) | 52.46 |
| NOx (as NO) | 34.20 |
| CO | 52.46 |
| (b) Corrected to 273K, 15%O2, dry | |

**Table B6: Stack Emission Parameters for IFC Plant (Bypass Stack)**

| Parameter / Fuel | Natural Gas |
|---|---|
| Stack Height (m) | 45 |
| Stack Diameter (m) | 9.38 |
| Temperature (K) | 928 |
| % Oxygen content (v/v) | 10.62 |
| % H2O content (v/v) | 10.04 |
| Actual Flow Rate ($Am^3/s$) | 2543.1 |
| Exit Velocity (m/s) | 36.82 |
| **Concentration ($mg/m^3$)[(a)]** | |
| $NO_x$ (as $NO_2$) | 50 |
| CO | 50 |
| **Emission Rate (g/s)** | |
| NOx (as $NO_2$) | 51.87 |
| NOx (as NO) | 33.82 |
| CO | 51.87 |
| (b) Corrected to 273K, 15%O2, dry | |

**Table B7: Building Parameters**

| Building | Height (m) | X Length (m) | Y Length (m) | Angle (deg) |
|---|---|---|---|---|
| Gas Turbine Building | 25 | 88.2 | 37.9 | 30.7 |
| Steam Turbine Building | 25 | 72.7 | 65.4 | 30.8 |
| Control Building | 25 | 39.3 | 29.8 | 30.5 |
| HRSG 1 | 40 | 19.4 | 34.2 | 29.4 |
| HRSG 2 | 40 | 20.4 | 32.1 | 32 |
| IFC Gas Turbine Building | 25 | 88.2 | 37.9 | 30.7 |
| IFC Steam Turbine Buildings | 25 | 72.7 | 65.4 | 30.8 |
| IFC Control Building | 25 | 39.3 | 29.8 | 30.5 |
| IFC HRSG 1 | 40 | 19.4 | 34.2 | 29.4 |
| IFC HRSG 2 | 40 | 20.4 | 32.1 | 32 |

## APPENDIX C – Full Results

### Scenario One (Combined Cycle)

**Table C1: Maximum Predicted Long Term (Annual) Concentrations – Combined Cycle ($\mu g/m^3$)**

| Receptor | Annual $NO_2$ | | | | Annual NO | | | | Annual CO | | | | Annual $NH_3$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | PC | PC as % of Standard |
| Residential Area A (H3) | 21.2 | 0.5 | 1.3 | 21.6 | 17.2 | 0.5 | 1.2 | 17.6 | 2200.01 | 0.7 | 0.02 | 2200.75 | 0.03 | 0.09 |
| Residential Area B (H1) | 21.2 | 0.7 | 1.7 | 21.8 | 17.2 | 0.6 | 1.6 | 17.7 | 2200.01 | 1.0 | 0.03 | 2200.99 | 0.05 | 0.12 |
| Residential Area C (H5) | 21.5 | 0.5 | 1.2 | 21.7 | 17.5 | 0.4 | 1.1 | 17.6 | 2200.02 | 0.7 | 0.02 | 2200.69 | 0.03 | 0.08 |
| Residential Area D (new homes) | 21.8 | 0.2 | 0.5 | 21.6 | 17.8 | 0.2 | 0.5 | 17.6 | 2200.03 | 0.3 | 0.01 | 2200.33 | 0.01 | 0.04 |
| Residential Area E (accommodation blocks (H8) | 21.8 | 0.4 | 0.9 | 21.7 | 17.8 | 0.3 | 0.9 | 17.7 | 2200.03 | 0.5 | 0.02 | 2200.54 | 0.02 | 0.06 |
| H4 | 21.2 | 0.3 | 0.7 | 21.4 | 17.2 | 0.2 | 0.6 | 17.3 | 2200.01 | 0.4 | 0.01 | 2200.38 | 0.02 | 0.04 |
| H6 | 21.9 | 0.3 | 0.8 | 21.7 | 17.8 | 0.3 | 0.7 | 17.7 | 2200.03 | 0.4 | 0.01 | 2200.45 | 0.02 | 0.05 |
| H7 | 21.8 | 0.4 | 0.9 | 21.7 | 17.7 | 0.3 | 0.8 | 17.7 | 2200.03 | 0.5 | 0.02 | 2200.51 | 0.02 | 0.06 |
| H9 | 21.3 | 0.0 | 0.1 | 21.2 | 17.3 | 0.0 | 0.1 | 17.2 | 2200.01 | 0.1 | 0.00 | 2200.07 | 0.00 | 0.01 |
| H10 | 21.4 | 0.1 | 0.1 | 21.3 | 17.4 | 0.1 | 0.1 | 17.2 | 2200.01 | 0.1 | 0.00 | 2200.09 | 0.00 | 0.01 |
| H11 | 21.5 | 0.1 | 0.2 | 21.3 | 17.4 | 0.1 | 0.2 | 17.3 | 2200.02 | 0.1 | 0.00 | 2200.14 | 0.01 | 0.02 |
| H12 | 21.6 | 0.2 | 0.4 | 21.5 | 17.5 | 0.1 | 0.4 | 17.4 | 2200.02 | 0.2 | 0.01 | 2200.23 | 0.01 | 0.03 |
| H13 | 21.4 | 0.1 | 0.2 | 21.3 | 17.4 | 0.1 | 0.2 | 17.3 | 2200.02 | 0.1 | 0.00 | 2200.11 | 0.01 | 0.01 |
| H14 | 22.4 | 0.2 | 0.5 | 21.9 | 18.3 | 0.2 | 0.5 | 17.9 | 2200.05 | 0.3 | 0.01 | 2200.31 | 0.01 | 0.03 |
| H15 | 22.1 | 0.2 | 0.5 | 21.8 | 18.0 | 0.2 | 0.5 | 17.7 | 2200.04 | 0.3 | 0.01 | 2200.31 | 0.01 | 0.03 |
| H16 | 21.9 | 0.2 | 0.4 | 21.6 | 17.8 | 0.2 | 0.4 | 17.6 | 2200.03 | 0.2 | 0.01 | 2200.25 | 0.01 | 0.03 |
| H17 | 22.3 | 0.2 | 0.5 | 21.9 | 18.2 | 0.2 | 0.4 | 17.8 | 2200.05 | 0.3 | 0.01 | 2200.29 | 0.01 | 0.03 |
| H18 | 22.0 | 0.3 | 0.8 | 21.8 | 17.9 | 0.3 | 0.8 | 17.8 | 2200.03 | 0.5 | 0.02 | 2200.48 | 0.02 | 0.05 |

| Receptor | Annual $NO_2$ | | | | Annual NO | | | | Annual CO | | | | Annual $NH_3$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | PC | PC as % of Standard |
| H19 | 22.1 | 0.3 | 0.9 | 21.9 | 18.0 | 0.3 | 0.8 | 17.8 | 2200.04 | 0.5 | 0.02 | 2200.51 | 0.02 | 0.06 |
| H20 | 21.3 | 0.1 | 0.1 | 21.2 | 17.3 | 0.1 | 0.1 | 17.2 | 2200.01 | 0.1 | 0.00 | 2200.09 | 0.00 | 0.01 |
| H21 | 21.3 | 0.0 | 0.1 | 21.2 | 17.3 | 0.0 | 0.1 | 17.2 | 2200.01 | 0.1 | 0.00 | 2200.08 | 0.00 | 0.01 |
| H22 | 21.2 | 0.1 | 0.1 | 21.2 | 17.2 | 0.1 | 0.1 | 17.2 | 2200.01 | 0.1 | 0.00 | 2200.08 | 0.00 | 0.01 |
| H23 | 21.3 | 0.1 | 0.2 | 21.2 | 17.3 | 0.1 | 0.2 | 17.2 | 2200.01 | 0.1 | 0.00 | 2200.10 | 0.00 | 0.01 |
| H24 | 22.3 | 0.3 | 0.7 | 21.9 | 18.2 | 0.3 | 0.7 | 17.9 | 2200.04 | 0.4 | 0.01 | 2200.43 | 0.02 | 0.05 |
| H25 | 22.6 | 0.3 | 0.7 | 22.1 | 18.4 | 0.3 | 0.7 | 18.0 | 2200.05 | 0.4 | 0.01 | 2200.43 | 0.02 | 0.05 |
| H26 | 23.2 | 0.3 | 0.8 | 22.4 | 19.0 | 0.3 | 0.7 | 18.3 | 2200.08 | 0.4 | 0.01 | 2200.46 | 0.02 | 0.05 |
| H27 | 21.4 | 0.6 | 1.4 | 21.7 | 17.4 | 0.5 | 1.3 | 17.6 | 2200.01 | 0.8 | 0.03 | 2200.79 | 0.04 | 0.09 |
| H28 | 22.4 | 0.2 | 0.5 | 21.9 | 18.3 | 0.2 | 0.5 | 17.8 | 2200.05 | 0.3 | 0.01 | 2200.32 | 0.01 | 0.04 |
| H29 | 23.4 | 0.3 | 0.7 | 22.5 | 19.2 | 0.3 | 0.7 | 18.4 | 2200.08 | 0.4 | 0.01 | 2200.43 | 0.02 | 0.05 |
| H30 | 23.1 | 0.3 | 0.6 | 22.3 | 18.9 | 0.2 | 0.6 | 18.2 | 2200.07 | 0.4 | 0.01 | 2200.40 | 0.02 | 0.04 |
| H31 | 22.3 | 0.2 | 0.4 | 21.9 | 18.2 | 0.2 | 0.4 | 17.8 | 2200.05 | 0.2 | 0.01 | 2200.27 | 0.01 | 0.03 |
| H32 | 22.3 | 0.2 | 0.4 | 21.9 | 18.2 | 0.2 | 0.4 | 17.8 | 2200.05 | 0.2 | 0.01 | 2200.26 | 0.01 | 0.03 |
| H33 | 22.0 | 0.1 | 0.4 | 21.6 | 17.9 | 0.1 | 0.4 | 17.6 | 2200.03 | 0.2 | 0.01 | 2200.23 | 0.01 | 0.02 |
| H34 | 22.2 | 0.2 | 0.4 | 21.8 | 18.1 | 0.2 | 0.4 | 17.7 | 2200.04 | 0.2 | 0.01 | 2200.25 | 0.01 | 0.03 |
| H35 | 21.8 | 0.1 | 0.3 | 21.5 | 17.7 | 0.1 | 0.3 | 17.5 | 2200.03 | 0.2 | 0.01 | 2200.19 | 0.01 | 0.02 |
| H36 | 22.1 | 0.1 | 0.4 | 21.7 | 18.0 | 0.1 | 0.3 | 17.7 | 2200.04 | 0.2 | 0.01 | 2200.22 | 0.01 | 0.02 |
| H37 | 23.3 | 0.3 | 0.8 | 22.5 | 19.2 | 0.3 | 0.8 | 18.4 | 2200.08 | 0.5 | 0.02 | 2200.49 | 0.02 | 0.05 |
| H38 | 21.3 | 0.1 | 0.2 | 21.2 | 17.2 | 0.1 | 0.2 | 17.2 | 2200.01 | 0.1 | 0.00 | 2200.10 | 0.00 | 0.01 |
| H39 | 21.3 | 0.1 | 0.2 | 21.2 | 17.3 | 0.1 | 0.2 | 17.2 | 2200.01 | 0.1 | 0.00 | 2200.13 | 0.01 | 0.01 |
| H40 | 21.4 | 0.1 | 0.3 | 21.3 | 17.4 | 0.1 | 0.3 | 17.3 | 2200.01 | 0.2 | 0.01 | 2200.18 | 0.01 | 0.02 |
| **Standard** | 40 | | | | 60 | | | | 3000 | | | | 40 | |

## Table C2: Maximum Predicted Hourly Mean Concentrations – Combined Cycle ($\mu g/m^3$)

| Receptor | Hourly $NO_2$ | | | | Hourly NO | | | | Hourly CO | | | | Hourly $NH_3$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | PC | PC as % of Standard |
| Residential Area A (H3) | 82.8 | 14.1 | 16.6 | 67.9 | 110.0 | 26.3 | 4.4 | 82.3 | 4402.7 | 40.4 | 0.1 | 4440.4 | 1.9 | 0.9 |
| Residential Area B (H1) | 83.1 | 14.6 | 17.1 | 73.2 | 110.6 | 27.2 | 4.5 | 92.2 | 4402.3 | 41.6 | 0.1 | 4441.7 | 1.9 | 1.0 |
| Residential Area C (H5) | 84.2 | 24.0 | 28.3 | 69.1 | 112.7 | 44.8 | 7.5 | 84.6 | 4402.6 | 68.6 | 0.2 | 4468.6 | 3.2 | 1.6 |
| Residential Area D (new homes) | 91.0 | 6.6 | 7.8 | 72.8 | 125.4 | 12.4 | 2.1 | 91.4 | 4402.8 | 19.0 | 0.1 | 4419.0 | 0.9 | 0.4 |
| Residential Area E (accommodation blocks (H8) | 87.6 | 7.0 | 8.3 | 70.5 | 119.0 | 13.1 | 2.2 | 87.1 | 4402.7 | 20.1 | 0.1 | 4419.6 | 0.9 | 0.5 |
| Military Barracks | 95.0 | 11.3 | 13.3 | 75.9 | 132.8 | 21.0 | 3.5 | 97.1 | 4402.8 | 32.2 | 0.1 | 4432.2 | 1.5 | 0.8 |
| Sirdarya TPP Receptor 1 (H2) | 42.7 | 7.1 | 8.3 | 49.1 | 35.4 | 13.2 | 2.2 | 47.2 | 4400.1 | 20.2 | 0.1 | 4420.2 | 0.9 | 0.5 |
| Sirdarya TPP Receptor 2 (H2) | 45.3 | 7.0 | 8.3 | 50.0 | 40.1 | 13.1 | 2.2 | 48.9 | 4400.2 | 20.0 | 0.1 | 4420.0 | 0.9 | 0.5 |
| H4 | 80.5 | 5.3 | 6.3 | 65.7 | 105.7 | 9.9 | 1.7 | 78.1 | 4402.4 | 15.2 | 0.1 | 4415.2 | 0.7 | 0.4 |
| H6 | 85.5 | 5.9 | 7.0 | 67.1 | 115.0 | 11.1 | 1.8 | 80.8 | 4403.0 | 16.9 | 0.1 | 4417.0 | 0.8 | 0.4 |
| H7 | 81.1 | 5.6 | 6.6 | 65.3 | 106.9 | 10.5 | 1.7 | 77.5 | 4402.7 | 16.1 | 0.1 | 4416.1 | 0.7 | 0.4 |
| H9 | 79.3 | 5.5 | 6.5 | 68.9 | 103.4 | 10.2 | 1.7 | 84.1 | 4402.6 | 15.7 | 0.1 | 4416.1 | 0.7 | 0.4 |
| H10 | 76.0 | 5.5 | 6.4 | 66.8 | 97.4 | 10.2 | 1.7 | 80.2 | 4402.4 | 15.6 | 0.1 | 4416.0 | 0.7 | 0.4 |
| H11 | 73.1 | 6.5 | 7.7 | 63.9 | 91.9 | 12.2 | 2.0 | 74.8 | 4401.9 | 18.7 | 0.1 | 4418.7 | 0.9 | 0.4 |
| H12 | 80.8 | 6.9 | 8.1 | 68.1 | 106.3 | 12.8 | 2.1 | 82.7 | 4402.7 | 19.6 | 0.1 | 4419.7 | 0.9 | 0.5 |
| H13 | 78.9 | 7.2 | 8.5 | 65.4 | 102.8 | 13.5 | 2.2 | 77.7 | 4402.3 | 20.7 | 0.1 | 4420.7 | 1.0 | 0.5 |
| H14 | 83.7 | 5.4 | 6.3 | 69.3 | 111.7 | 10.0 | 1.7 | 84.8 | 4402.9 | 15.3 | 0.1 | 4415.5 | 0.7 | 0.4 |
| H15 | 84.2 | 5.8 | 6.8 | 65.4 | 112.6 | 10.7 | 1.8 | 77.5 | 4402.9 | 16.5 | 0.1 | 4416.5 | 0.8 | 0.4 |
| H16 | 83.0 | 5.9 | 7.0 | 65.1 | 110.4 | 11.1 | 1.8 | 77.1 | 4402.8 | 17.0 | 0.1 | 4417.0 | 0.8 | 0.4 |
| H17 | 82.0 | 5.0 | 5.9 | 67.5 | 108.6 | 9.3 | 1.6 | 81.5 | 4402.8 | 14.3 | 0.0 | 4414.5 | 0.7 | 0.3 |
| H18 | 74.3 | 33.7 | 39.7 | 75.7 | 94.1 | 62.8 | 10.5 | 96.8 | 4402.2 | 96.3 | 0.3 | 4496.3 | 4.5 | 2.2 |
| H19 | 73.4 | 33.5 | 39.4 | 75.5 | 92.5 | 62.5 | 10.4 | 96.5 | 4402.2 | 95.8 | 0.3 | 4495.8 | 4.5 | 2.2 |
| H20 | 71.8 | 4.2 | 4.9 | 60.4 | 89.6 | 7.8 | 1.3 | 68.3 | 4402.1 | 11.9 | 0.0 | 4412.5 | 0.6 | 0.3 |

| Receptor | Hourly $NO_2$ | | | | Hourly NO | | | | Hourly CO | | | | Hourly $NH_3$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | PC | PC as % of Standard |
| H21 | 72.9 | 4.5 | 5.3 | 60.7 | 91.5 | 8.3 | 1.4 | 68.9 | 4401.9 | 12.8 | 0.0 | 4413.4 | 0.6 | 0.3 |
| H22 | 78.9 | 4.7 | 5.5 | 63.6 | 102.8 | 8.7 | 1.4 | 74.2 | 4402.6 | 13.3 | 0.0 | 4413.6 | 0.6 | 0.3 |
| H23 | 72.9 | 3.7 | 4.4 | 59.5 | 91.7 | 6.9 | 1.2 | 66.6 | 4402.1 | 10.6 | 0.0 | 4410.6 | 0.5 | 0.2 |
| H24 | 75.6 | 4.7 | 5.5 | 61.2 | 96.6 | 8.8 | 1.5 | 69.8 | 4402.3 | 13.4 | 0.0 | 4413.4 | 0.6 | 0.3 |
| H25 | 74.1 | 4.4 | 5.2 | 60.9 | 93.8 | 8.3 | 1.4 | 69.3 | 4402.2 | 12.7 | 0.0 | 4412.7 | 0.6 | 0.3 |
| H26 | 74.3 | 5.3 | 6.2 | 61.0 | 94.2 | 9.8 | 1.6 | 69.3 | 4402.2 | 15.1 | 0.1 | 4415.4 | 0.7 | 0.4 |
| H27 | 92.3 | 8.3 | 9.7 | 77.4 | 127.8 | 15.4 | 2.6 | 100.0 | 4402.7 | 23.6 | 0.1 | 4423.6 | 1.1 | 0.6 |
| H28 | 89.0 | 6.4 | 7.5 | 70.8 | 121.6 | 11.9 | 2.0 | 87.7 | 4402.6 | 18.3 | 0.1 | 4418.3 | 0.9 | 0.4 |
| H29 | 81.1 | 5.9 | 7.0 | 65.1 | 106.8 | 11.0 | 1.8 | 77.0 | 4402.7 | 16.9 | 0.1 | 4417.4 | 0.8 | 0.4 |
| H30 | 85.1 | 4.4 | 5.2 | 66.1 | 114.3 | 8.2 | 1.4 | 78.8 | 4403.0 | 12.6 | 0.0 | 4413.2 | 0.6 | 0.3 |
| H31 | 80.9 | 4.1 | 4.8 | 64.2 | 106.6 | 7.7 | 1.3 | 75.4 | 4402.7 | 11.8 | 0.0 | 4411.8 | 0.5 | 0.3 |
| H32 | 80.6 | 3.9 | 4.6 | 66.3 | 105.9 | 7.3 | 1.2 | 79.3 | 4402.7 | 11.1 | 0.0 | 4411.1 | 0.5 | 0.3 |
| H33 | 83.8 | 3.7 | 4.3 | 67.5 | 111.9 | 6.8 | 1.1 | 81.6 | 4402.9 | 10.5 | 0.0 | 4410.5 | 0.5 | 0.2 |
| H34 | 87.8 | 4.5 | 5.2 | 72.8 | 119.3 | 8.3 | 1.4 | 91.5 | 4403.2 | 12.7 | 0.0 | 4412.8 | 0.6 | 0.3 |
| H35 | 84.8 | 6.7 | 7.9 | 67.1 | 113.8 | 12.5 | 2.1 | 80.7 | 4403.0 | 19.1 | 0.1 | 4419.4 | 0.9 | 0.4 |
| H36 | 84.9 | 5.7 | 6.8 | 70.0 | 114.0 | 10.7 | 1.8 | 86.2 | 4403.0 | 16.4 | 0.1 | 4416.4 | 0.8 | 0.4 |
| H37 | 78.4 | 5.2 | 6.1 | 62.8 | 101.9 | 9.7 | 1.6 | 72.8 | 4402.6 | 14.9 | 0.0 | 4414.9 | 0.7 | 0.3 |
| H38 | 82.4 | 4.4 | 5.2 | 65.1 | 109.4 | 8.2 | 1.4 | 77.0 | 4402.8 | 12.6 | 0.0 | 4413.0 | 0.6 | 0.3 |
| H39 | 75.3 | 4.4 | 5.1 | 60.7 | 96.1 | 8.1 | 1.4 | 68.8 | 4402.3 | 12.5 | 0.0 | 4412.5 | 0.6 | 0.3 |
| H40 | 78.0 | 4.2 | 5.0 | 62.4 | 101.0 | 7.9 | 1.3 | 72.0 | 4402.0 | 12.1 | 0.0 | 4412.1 | 0.6 | 0.3 |
| D1: Central Control Building | 94.3 | 1.9 | 2.2 | 73.1 | 131.4 | 3.5 | 0.6 | 92.0 | 4403.6 | 5.3 | 0.0 | 4407.4 | 0.2 | 0.1 |
| D2: Workshop Area | 94.9 | 4.4 | 5.2 | 74.4 | 132.6 | 8.2 | 1.4 | 94.4 | 4403.7 | 12.6 | 0.0 | 4412.6 | 0.6 | 0.3 |
| D3: Admin Building | 95.9 | 8.3 | 9.8 | 78.1 | 134.5 | 15.6 | 2.6 | 101.2 | 4403.8 | 23.8 | 0.1 | 4423.9 | 1.1 | 0.6 |
| D4: Social Building | 95.9 | 8.0 | 9.4 | 78.1 | 134.4 | 15.0 | 2.5 | 101.3 | 4403.8 | 22.9 | 0.1 | 4422.9 | 1.1 | 0.5 |
| D5: Gatehouse | 96.0 | 8.5 | 10.0 | 77.8 | 134.6 | 15.8 | 2.6 | 100.8 | 4403.8 | 24.2 | 0.1 | 4424.2 | 1.1 | 0.6 |

| Receptor | Hourly $NO_2$ | | | | Hourly NO | | | | Hourly CO | | | | Hourly $NH_3$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | PC | PC as % of Standard |
| **Standard** | 85 | | | | 600 | | | | 5000 | | | | 200 | |

**Table C3: Maximum Predicted 8 Hour Mean Concentrations – Combined Cycle ($\mu g/m^3$)**

| Receptor | 8 Hour CO | | | |
|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) |
| Residential Area A (H3) | 4400.5 | 13.8 | 0.14 | 4413.9 |
| Residential Area B (H1) | 4400.4 | 18.7 | 0.19 | 4418.7 |
| Residential Area C (H5) | 4400.7 | 26.7 | 0.27 | 4426.7 |
| Residential Area D (new homes) | 4400.7 | 8.6 | 0.09 | 4408.6 |
| Residential Area E (accommodation blocks (H8) | 4400.9 | 9.5 | 0.10 | 4409.6 |
| Military Barracks | 4400.5 | 7.7 | 0.08 | 4407.7 |
| Sirdarya TPP Receptor 1 (H2) | 4400.0 | 11.8 | 0.12 | 4411.8 |
| Sirdarya TPP Receptor 2 (H2) | 4400.0 | 11.1 | 0.11 | 4411.1 |
| H4 | 4400.4 | 7.0 | 0.07 | 4407.0 |
| H6 | 4400.8 | 6.3 | 0.06 | 4406.4 |
| H7 | 4400.8 | 7.8 | 0.08 | 4407.8 |
| H9 | 4400.6 | 2.5 | 0.03 | 4402.8 |
| H10 | 4400.6 | 4.0 | 0.04 | 4404.3 |
| H11 | 4400.7 | 5.2 | 0.05 | 4405.6 |
| H12 | 4400.6 | 6.5 | 0.06 | 4406.6 |
| H13 | 4400.9 | 4.5 | 0.05 | 4405.0 |

| Receptor | 8 Hour CO | | | |
|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) |
| H14 | 4400.9 | 4.4 | 0.04 | 4404.8 |
| H15 | 4400.8 | 4.2 | 0.04 | 4404.5 |
| H16 | 4400.7 | 3.7 | 0.04 | 4404.1 |
| H17 | 4400.8 | 4.3 | 0.04 | 4404.5 |
| H18 | 4400.7 | 16.4 | 0.16 | 4416.4 |
| H19 | 4400.8 | 24.0 | 0.24 | 4424.0 |
| H20 | 4400.9 | 3.2 | 0.03 | 4403.7 |
| H21 | 4400.5 | 3.0 | 0.03 | 4403.1 |
| H22 | 4400.4 | 3.3 | 0.03 | 4403.4 |
| H23 | 4400.3 | 3.0 | 0.03 | 4403.1 |
| H24 | 4401.1 | 4.7 | 0.05 | 4404.9 |
| H25 | 4401.2 | 4.6 | 0.05 | 4404.9 |
| H26 | 4400.8 | 4.5 | 0.04 | 4404.7 |
| H27 | 4400.6 | 13.0 | 0.13 | 4413.0 |
| H28 | 4400.9 | 5.4 | 0.05 | 4405.5 |
| H29 | 4400.9 | 4.3 | 0.04 | 4404.5 |
| H30 | 4400.9 | 3.9 | 0.04 | 4404.2 |
| H31 | 4400.6 | 2.9 | 0.03 | 4403.0 |
| H32 | 4400.6 | 2.8 | 0.03 | 4402.9 |
| H33 | 4400.5 | 3.2 | 0.03 | 4403.2 |
| H34 | 4400.7 | 3.5 | 0.04 | 4403.6 |
| H35 | 4400.6 | 3.9 | 0.04 | 4403.9 |
| H36 | 4400.7 | 4.2 | 0.04 | 4404.2 |
| H37 | 4401.0 | 4.8 | 0.05 | 4405.0 |
| H38 | 4400.4 | 3.0 | 0.03 | 4403.1 |

| Receptor | 8 Hour CO | | | |
|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) |
| H39 | 4400.3 | 4.1 | 0.04 | 4404.1 |
| H40 | 4400.5 | 4.6 | 0.05 | 4404.6 |
| D1: Central Control Building | 4400.5 | 0.8 | 0.01 | 4401.1 |
| D2: Workshop Area | 4400.5 | 5.2 | 0.05 | 4405.2 |
| D3: Admin Building | 4400.5 | 6.3 | 0.06 | 4406.3 |
| D4: Social Building | 4400.5 | 7.2 | 0.07 | 4407.2 |
| D5: Gatehouse | 4400.5 | 7.0 | 0.07 | 4407.1 |
| **Standard** | 10000 | | | |

## Table C4: Maximum Predicted 24 Hour Mean Concentrations – Combined Cycle ($\mu g/m^3$)

| Receptor | 24 Hour $NO_2$ | | | | 24 Hour NO | | | | 24 Hour CO | | | | 24 Hour $NH_3$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | PC | PC as % of Standard |
| Residential Area A (H3) | 44.6 | 2.0 | 3.4 | 44.2 | 38.8 | 3.8 | 1.5 | 38.2 | 4400.2 | 5.8 | 0.1 | 4404.6 | 0.3 | 0.2 |
| Residential Area B (H1) | 43.8 | 4.5 | 7.4 | 46.5 | 37.4 | 8.3 | 3.3 | 42.3 | 4400.1 | 12.7 | 0.3 | 4412.7 | 0.6 | 0.5 |
| Residential Area C (H5) | 46.4 | 4.8 | 8.1 | 46.8 | 42.2 | 9.0 | 3.6 | 43.0 | 4400.3 | 13.8 | 0.3 | 4413.8 | 0.6 | 0.5 |
| Residential Area D (new homes) | 48.6 | 1.2 | 2.0 | 45.4 | 46.3 | 2.2 | 0.9 | 40.3 | 4400.4 | 3.4 | 0.1 | 4403.4 | 0.2 | 0.1 |
| Residential Area E (accommodation blocks (H8) | 48.6 | 1.9 | 3.2 | 45.6 | 46.3 | 3.6 | 1.4 | 40.6 | 4400.5 | 5.5 | 0.1 | 4405.5 | 0.3 | 0.2 |
| Military Barracks | 46.3 | 1.2 | 1.9 | 44.2 | 42.0 | 2.1 | 0.9 | 38.1 | 4400.3 | 3.3 | 0.1 | 4403.3 | 0.2 | 0.1 |
| Sirdarya TPP Receptor 1 (H2) | 42.0 | 2.1 | 3.5 | 44.1 | 34.1 | 3.9 | 1.6 | 37.9 | 4400.0 | 6.1 | 0.2 | 4406.1 | 0.3 | 0.2 |
| Sirdarya TPP Receptor 2 (H2) | 42.1 | 2.4 | 4.0 | 44.4 | 34.3 | 4.5 | 1.8 | 38.5 | 4400.0 | 6.9 | 0.2 | 4406.9 | 0.3 | 0.3 |
| H4 | 44.5 | 1.1 | 1.8 | 44.1 | 38.7 | 2.0 | 0.8 | 37.9 | 4400.2 | 3.1 | 0.1 | 4403.1 | 0.1 | 0.1 |

| Receptor | 24 Hour $NO_2$ | | | | 24 Hour NO | | | | 24 Hour CO | | | | 24 Hour $NH_3$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | PC | PC as % of Standard |
| H6 | 48.0 | 1.3 | 2.2 | 45.7 | 45.1 | 2.5 | 1.0 | 40.9 | 4400.4 | 3.8 | 0.1 | 4403.8 | 0.2 | 0.1 |
| H7 | 48.0 | 1.6 | 2.7 | 45.5 | 45.1 | 3.0 | 1.2 | 40.5 | 4400.4 | 4.6 | 0.1 | 4404.6 | 0.2 | 0.2 |
| H9 | 46.0 | 0.5 | 0.8 | 44.6 | 41.5 | 0.9 | 0.4 | 38.9 | 4400.3 | 1.4 | 0.0 | 4401.6 | 0.1 | 0.1 |
| H10 | 45.4 | 0.7 | 1.1 | 44.4 | 40.3 | 1.2 | 0.5 | 38.5 | 4400.2 | 1.9 | 0.0 | 4402.0 | 0.1 | 0.1 |
| H11 | 46.5 | 0.9 | 1.5 | 45.1 | 42.4 | 1.6 | 0.7 | 39.8 | 4400.3 | 2.5 | 0.1 | 4402.6 | 0.1 | 0.1 |
| H12 | 47.3 | 1.5 | 2.5 | 45.8 | 43.8 | 2.8 | 1.1 | 41.0 | 4400.4 | 4.3 | 0.1 | 4404.4 | 0.2 | 0.2 |
| H13 | 46.1 | 0.6 | 1.0 | 44.8 | 41.6 | 1.1 | 0.4 | 39.2 | 4400.3 | 1.7 | 0.0 | 4401.8 | 0.1 | 0.1 |
| H14 | 48.9 | 0.8 | 1.4 | 46.1 | 46.9 | 1.6 | 0.6 | 41.6 | 4400.5 | 2.4 | 0.1 | 4402.5 | 0.1 | 0.1 |
| H15 | 48.2 | 0.7 | 1.2 | 46.0 | 45.5 | 1.4 | 0.5 | 41.4 | 4400.4 | 2.1 | 0.1 | 4402.2 | 0.1 | 0.1 |
| H16 | 47.0 | 0.7 | 1.1 | 45.4 | 43.4 | 1.3 | 0.5 | 40.3 | 4400.4 | 2.0 | 0.0 | 4402.1 | 0.1 | 0.1 |
| H17 | 48.8 | 0.8 | 1.3 | 46.0 | 46.7 | 1.4 | 0.6 | 41.5 | 4400.5 | 2.1 | 0.1 | 4402.3 | 0.1 | 0.1 |
| H18 | 47.6 | 3.3 | 5.6 | 46.3 | 44.4 | 6.2 | 2.5 | 42.0 | 4400.4 | 9.6 | 0.2 | 4409.6 | 0.4 | 0.4 |
| H19 | 47.8 | 4.6 | 7.7 | 47.6 | 44.8 | 8.6 | 3.4 | 44.4 | 4400.4 | 13.1 | 0.3 | 4413.2 | 0.6 | 0.5 |
| H20 | 46.3 | 0.4 | 0.6 | 44.7 | 42.0 | 0.7 | 0.3 | 39.1 | 4400.3 | 1.1 | 0.0 | 4401.3 | 0.1 | 0.0 |
| H21 | 45.0 | 0.5 | 0.8 | 43.9 | 39.6 | 0.9 | 0.3 | 37.6 | 4400.2 | 1.3 | 0.0 | 4401.4 | 0.1 | 0.1 |
| H22 | 43.9 | 0.4 | 0.6 | 43.2 | 37.5 | 0.7 | 0.3 | 36.2 | 4400.1 | 1.1 | 0.0 | 4401.2 | 0.1 | 0.0 |
| H23 | 43.7 | 0.3 | 0.5 | 43.0 | 37.1 | 0.6 | 0.2 | 35.9 | 4400.1 | 0.9 | 0.0 | 4400.9 | 0.0 | 0.0 |
| H24 | 49.8 | 0.8 | 1.3 | 47.1 | 48.5 | 1.5 | 0.6 | 43.5 | 4400.6 | 2.3 | 0.1 | 4402.3 | 0.1 | 0.1 |
| H25 | 50.2 | 0.7 | 1.2 | 47.1 | 49.2 | 1.3 | 0.5 | 43.5 | 4400.6 | 2.0 | 0.1 | 4402.2 | 0.1 | 0.1 |
| H26 | 47.6 | 0.9 | 1.4 | 45.2 | 44.4 | 1.6 | 0.6 | 39.9 | 4400.4 | 2.5 | 0.1 | 4402.5 | 0.1 | 0.1 |
| H27 | 45.0 | 2.1 | 3.5 | 44.1 | 39.6 | 3.9 | 1.6 | 37.9 | 4400.2 | 6.0 | 0.1 | 4406.0 | 0.3 | 0.2 |
| H28 | 49.3 | 1.2 | 1.9 | 46.1 | 47.6 | 2.2 | 0.9 | 41.7 | 4400.5 | 3.3 | 0.1 | 4403.4 | 0.2 | 0.1 |
| H29 | 50.8 | 0.8 | 1.3 | 46.8 | 50.5 | 1.4 | 0.6 | 43.0 | 4400.6 | 2.2 | 0.1 | 4402.3 | 0.1 | 0.1 |
| H30 | 48.3 | 0.6 | 1.0 | 45.6 | 45.8 | 1.2 | 0.5 | 40.7 | 4400.4 | 1.8 | 0.0 | 4401.8 | 0.1 | 0.1 |
| H31 | 46.9 | 0.5 | 0.9 | 44.8 | 43.2 | 1.0 | 0.4 | 39.2 | 4400.3 | 1.5 | 0.0 | 4401.5 | 0.1 | 0.1 |

| Receptor | 24 Hour $NO_2$ | | | | 24 Hour NO | | | | 24 Hour CO | | | | 24 Hour $NH_3$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | PC | PC as % of Standard |
| H32 | 47.1 | 0.5 | 0.8 | 44.9 | 43.5 | 0.9 | 0.4 | 39.5 | 4400.4 | 1.5 | 0.0 | 4401.5 | 0.1 | 0.1 |
| H33 | 46.2 | 0.6 | 0.9 | 44.4 | 41.8 | 1.1 | 0.4 | 38.5 | 4400.3 | 1.6 | 0.0 | 4401.6 | 0.1 | 0.1 |
| H34 | 48.1 | 0.5 | 0.8 | 45.6 | 45.3 | 0.9 | 0.4 | 40.7 | 4400.4 | 1.3 | 0.0 | 4401.5 | 0.1 | 0.1 |
| H35 | 46.4 | 0.6 | 1.0 | 44.6 | 42.2 | 1.1 | 0.4 | 38.8 | 4400.3 | 1.7 | 0.0 | 4401.7 | 0.1 | 0.1 |
| H36 | 46.5 | 0.6 | 1.0 | 44.9 | 42.4 | 1.1 | 0.4 | 39.5 | 4400.3 | 1.7 | 0.0 | 4401.8 | 0.1 | 0.1 |
| H37 | 50.7 | 0.9 | 1.4 | 47.2 | 50.1 | 1.6 | 0.6 | 43.7 | 4400.6 | 2.4 | 0.1 | 4402.6 | 0.1 | 0.1 |
| H38 | 44.1 | 0.4 | 0.6 | 43.2 | 37.9 | 0.7 | 0.3 | 36.3 | 4400.1 | 1.0 | 0.0 | 4401.0 | 0.0 | 0.0 |
| H39 | 43.8 | 0.5 | 0.8 | 43.1 | 37.3 | 0.9 | 0.4 | 36.0 | 4400.1 | 1.4 | 0.0 | 4401.4 | 0.1 | 0.1 |
| H40 | 44.1 | 0.5 | 0.9 | 43.6 | 38.0 | 1.0 | 0.4 | 36.9 | 4400.2 | 1.5 | 0.0 | 4401.5 | 0.1 | 0.1 |
| D1: Central Control Building | 45.3 | 0.1 | 0.2 | 43.7 | 40.1 | 0.2 | 0.1 | 37.1 | 4400.2 | 0.3 | 0.0 | 4400.4 | 0.0 | 0.0 |
| D2: Workshop Area | 44.7 | 0.6 | 1.0 | 43.6 | 39.1 | 1.1 | 0.5 | 37.1 | 4400.2 | 1.8 | 0.0 | 4401.8 | 0.1 | 0.1 |
| D3: Admin Building | 44.4 | 0.9 | 1.5 | 43.9 | 38.4 | 1.7 | 0.7 | 37.6 | 4400.2 | 2.6 | 0.1 | 4402.6 | 0.1 | 0.1 |
| D4: Social Building | 44.4 | 1.1 | 1.9 | 43.9 | 38.4 | 2.1 | 0.8 | 37.6 | 4400.2 | 3.2 | 0.1 | 4403.2 | 0.2 | 0.1 |
| D5: Gatehouse | 44.4 | 1.0 | 1.7 | 43.9 | 38.4 | 1.9 | 0.8 | 37.5 | 4400.2 | 2.9 | 0.1 | 4402.9 | 0.1 | 0.1 |
| **Standard** | 60 | | | | 250 | | | | 4000 | | | | 120 | |

**Table C5: Maximum Predicted Monthly Mean Concentrations – Combined Cycle ($\mu g/m^3$)**

| Receptor | Monthly $NO_2$ | | | | Monthly NO | | | | Monthly CO | | | | Monthly $NH_3$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | PC | PC as % of Standard |
| Residential Area A (H3) | 42.3 | 0.5 | 1.0 | 42.5 | 34.6 | 0.9 | 0.8 | 35.0 | 4400.0 | 1.4 | 0.04 | 4401.4 | 0.07 | 0.11 |
| Residential Area B (H1) | 42.2 | 1.3 | 2.5 | 43.3 | 34.3 | 2.4 | 2.0 | 36.4 | 4400.0 | 3.6 | 0.10 | 4403.6 | 0.17 | 0.28 |
| Residential Area C (H5) | 42.7 | 0.6 | 1.2 | 43.0 | 35.3 | 1.1 | 1.0 | 35.8 | 4400.0 | 1.7 | 0.05 | 4401.8 | 0.08 | 0.14 |

| Receptor | Monthly $NO_2$ | | | | Monthly NO | | | | Monthly CO | | | | Monthly $NH_3$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | PC | PC as % of Standard |
| Residential Area D (new homes) | 43.5 | 0.2 | 0.5 | 43.0 | 36.8 | 0.4 | 0.4 | 35.9 | 4400.1 | 0.7 | 0.02 | 4400.7 | 0.03 | 0.05 |
| Residential Area E (accommodation blocks (H8) | 43.4 | 0.4 | 0.8 | 43.0 | 36.6 | 0.7 | 0.6 | 35.9 | 4400.1 | 1.1 | 0.03 | 4401.2 | 0.05 | 0.09 |
| Military Barracks | 42.7 | 0.3 | 0.7 | 42.5 | 35.3 | 0.6 | 0.5 | 35.0 | 4400.0 | 1.0 | 0.03 | 4401.0 | 0.05 | 0.08 |
| Sirdarya TPP Receptor 1 (H2) | 42.0 | 0.6 | 1.1 | 42.6 | 34.0 | 1.0 | 0.9 | 35.0 | 4400.0 | 1.6 | 0.05 | 4401.6 | 0.07 | 0.12 |
| Sirdarya TPP Receptor 2 (H2) | 42.0 | 0.5 | 0.9 | 42.5 | 34.0 | 0.9 | 0.7 | 34.9 | 4400.0 | 1.3 | 0.04 | 4401.3 | 0.06 | 0.10 |
| H4 | 42.3 | 0.3 | 0.5 | 42.4 | 34.6 | 0.5 | 0.4 | 34.7 | 4400.0 | 0.7 | 0.02 | 4400.7 | 0.03 | 0.06 |
| H6 | 43.3 | 0.3 | 0.5 | 43.0 | 36.5 | 0.5 | 0.4 | 35.8 | 4400.1 | 0.8 | 0.02 | 4400.8 | 0.04 | 0.06 |
| H7 | 43.2 | 0.3 | 0.7 | 43.0 | 36.3 | 0.6 | 0.5 | 35.8 | 4400.1 | 0.9 | 0.03 | 4401.0 | 0.04 | 0.07 |
| H9 | 42.5 | 0.1 | 0.1 | 42.3 | 34.9 | 0.1 | 0.1 | 34.6 | 4400.0 | 0.2 | 0.01 | 4400.2 | 0.01 | 0.01 |
| H10 | 42.6 | 0.1 | 0.2 | 42.4 | 35.1 | 0.2 | 0.1 | 34.7 | 4400.0 | 0.3 | 0.01 | 4400.3 | 0.01 | 0.02 |
| H11 | 42.5 | 0.1 | 0.2 | 42.4 | 35.0 | 0.2 | 0.1 | 34.7 | 4400.0 | 0.3 | 0.01 | 4400.3 | 0.01 | 0.02 |
| H12 | 42.7 | 0.2 | 0.4 | 42.6 | 35.4 | 0.3 | 0.3 | 35.1 | 4400.1 | 0.5 | 0.02 | 4400.6 | 0.02 | 0.04 |
| H13 | 42.6 | 0.1 | 0.2 | 42.4 | 35.1 | 0.2 | 0.1 | 34.7 | 4400.0 | 0.2 | 0.01 | 4400.3 | 0.01 | 0.02 |
| H14 | 43.3 | 0.2 | 0.3 | 42.8 | 36.5 | 0.3 | 0.2 | 35.5 | 4400.1 | 0.5 | 0.01 | 4400.5 | 0.02 | 0.04 |
| H15 | 43.2 | 0.2 | 0.3 | 42.8 | 36.2 | 0.3 | 0.2 | 35.4 | 4400.1 | 0.4 | 0.01 | 4400.5 | 0.02 | 0.03 |
| H16 | 43.0 | 0.1 | 0.3 | 42.6 | 35.9 | 0.2 | 0.2 | 35.2 | 4400.1 | 0.4 | 0.01 | 4400.4 | 0.02 | 0.03 |
| H17 | 43.2 | 0.1 | 0.3 | 42.8 | 36.3 | 0.3 | 0.2 | 35.5 | 4400.1 | 0.4 | 0.01 | 4400.4 | 0.02 | 0.03 |
| H18 | 42.9 | 0.4 | 0.8 | 42.7 | 35.7 | 0.7 | 0.6 | 35.3 | 4400.1 | 1.1 | 0.03 | 4401.1 | 0.05 | 0.09 |
| H19 | 43.0 | 0.5 | 0.9 | 42.8 | 35.8 | 0.8 | 0.7 | 35.4 | 4400.1 | 1.3 | 0.04 | 4401.3 | 0.06 | 0.10 |
| H20 | 42.5 | 0.1 | 0.1 | 42.3 | 35.0 | 0.1 | 0.1 | 34.6 | 4400.0 | 0.2 | 0.00 | 4400.2 | 0.01 | 0.01 |
| H21 | 42.5 | 0.1 | 0.1 | 42.3 | 34.9 | 0.1 | 0.1 | 34.6 | 4400.0 | 0.2 | 0.00 | 4400.2 | 0.01 | 0.01 |
| H22 | 42.3 | 0.1 | 0.1 | 42.2 | 34.5 | 0.1 | 0.1 | 34.3 | 4400.0 | 0.2 | 0.01 | 4400.2 | 0.01 | 0.01 |

| Receptor | Monthly $NO_2$ | | | | Monthly NO | | | | Monthly CO | | | | Monthly $NH_3$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | PC | PC as % of Standard |
| H23 | 42.3 | 0.1 | 0.2 | 42.2 | 34.5 | 0.2 | 0.1 | 34.4 | 4400.0 | 0.2 | 0.01 | 4400.3 | 0.01 | 0.02 |
| H24 | 43.1 | 0.2 | 0.4 | 42.8 | 36.0 | 0.4 | 0.3 | 35.4 | 4400.1 | 0.5 | 0.02 | 4400.6 | 0.03 | 0.04 |
| H25 | 43.2 | 0.2 | 0.4 | 42.8 | 36.3 | 0.3 | 0.3 | 35.5 | 4400.1 | 0.5 | 0.02 | 4400.6 | 0.02 | 0.04 |
| H26 | 43.7 | 0.2 | 0.4 | 43.1 | 37.1 | 0.4 | 0.3 | 36.0 | 4400.1 | 0.6 | 0.02 | 4400.6 | 0.03 | 0.05 |
| H27 | 42.5 | 0.7 | 1.5 | 42.8 | 34.8 | 1.4 | 1.1 | 35.5 | 4400.0 | 2.1 | 0.06 | 4402.1 | 0.10 | 0.16 |
| H28 | 44.7 | 0.3 | 0.7 | 43.7 | 39.1 | 0.6 | 0.5 | 37.1 | 4400.2 | 0.9 | 0.03 | 4401.0 | 0.04 | 0.07 |
| H29 | 44.3 | 0.2 | 0.5 | 43.4 | 38.2 | 0.4 | 0.4 | 36.6 | 4400.2 | 0.6 | 0.02 | 4400.7 | 0.03 | 0.05 |
| H30 | 43.7 | 0.2 | 0.3 | 43.0 | 37.2 | 0.3 | 0.2 | 35.9 | 4400.1 | 0.5 | 0.01 | 4400.5 | 0.02 | 0.04 |
| H31 | 43.5 | 0.1 | 0.2 | 42.9 | 36.9 | 0.2 | 0.2 | 35.7 | 4400.1 | 0.3 | 0.01 | 4400.4 | 0.02 | 0.03 |
| H32 | 43.7 | 0.1 | 0.3 | 43.0 | 37.1 | 0.2 | 0.2 | 35.9 | 4400.1 | 0.4 | 0.01 | 4400.4 | 0.02 | 0.03 |
| H33 | 43.5 | 0.1 | 0.2 | 42.9 | 36.8 | 0.2 | 0.2 | 35.6 | 4400.1 | 0.3 | 0.01 | 4400.4 | 0.02 | 0.03 |
| H34 | 44.1 | 0.2 | 0.3 | 43.2 | 37.9 | 0.3 | 0.2 | 36.3 | 4400.1 | 0.4 | 0.01 | 4400.5 | 0.02 | 0.03 |
| H35 | 43.1 | 0.1 | 0.3 | 42.7 | 36.0 | 0.3 | 0.2 | 35.3 | 4400.1 | 0.4 | 0.01 | 4400.5 | 0.02 | 0.03 |
| H36 | 43.0 | 0.2 | 0.3 | 42.6 | 35.8 | 0.3 | 0.3 | 35.2 | 4400.1 | 0.5 | 0.01 | 4400.5 | 0.02 | 0.04 |
| H37 | 44.1 | 0.3 | 0.5 | 43.3 | 37.9 | 0.5 | 0.4 | 36.5 | 4400.1 | 0.7 | 0.02 | 4400.8 | 0.03 | 0.06 |
| H38 | 42.3 | 0.1 | 0.2 | 42.2 | 34.6 | 0.2 | 0.1 | 34.4 | 4400.0 | 0.2 | 0.01 | 4400.2 | 0.01 | 0.02 |
| H39 | 42.3 | 0.1 | 0.2 | 42.3 | 34.6 | 0.2 | 0.2 | 34.5 | 4400.0 | 0.3 | 0.01 | 4400.3 | 0.01 | 0.02 |
| H40 | 42.4 | 0.1 | 0.2 | 42.3 | 34.8 | 0.2 | 0.2 | 34.6 | 4400.0 | 0.3 | 0.01 | 4400.3 | 0.02 | 0.03 |
| D1: Central Control Building | 42.5 | 0.0 | 0.0 | 42.3 | 35.0 | 0.0 | 0.0 | 34.5 | 4400.0 | 0.0 | 0.00 | 4400.1 | 0.00 | 0.00 |
| D2: Workshop Area | 42.5 | 0.1 | 0.3 | 42.4 | 34.9 | 0.2 | 0.2 | 34.7 | 4400.0 | 0.4 | 0.01 | 4400.4 | 0.02 | 0.03 |
| D3: Admin Building | 42.4 | 0.3 | 0.7 | 42.4 | 34.8 | 0.6 | 0.5 | 34.8 | 4400.0 | 0.9 | 0.03 | 4400.9 | 0.04 | 0.07 |
| D4: Social Building | 42.4 | 0.3 | 0.6 | 42.4 | 34.8 | 0.6 | 0.5 | 34.8 | 4400.0 | 0.9 | 0.03 | 4400.9 | 0.04 | 0.07 |
| D5: Gatehouse | 42.5 | 0.3 | 0.6 | 42.5 | 34.9 | 0.6 | 0.5 | 34.9 | 4400.0 | 0.9 | 0.03 | 4400.9 | 0.04 | 0.07 |
| **Standard** | 50 | | | | 120 | | | | 3500 | | | | 60 | |

## Scenario Two (Simple Cycle)

### Table C6: Maximum Predicted Hourly Mean Concentrations – Simple Cycle ($\mu g/m^3$)

| Receptor | Hourly $NO_2$ | | | | Hourly NO | | | | Hourly CO | | | | Hourly $NH_3$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | PC | PC as % of Standard |
| Residential Area A (H3) | 82.8 | 1.8 | 2.1 | 69.0 | 110.0 | 3.3 | 0.6 | 84.3 | 4402.7 | 5.1 | 0.1 | 4406.5 | 0.24 | 0.12 |
| Residential Area B (H1) | 83.1 | 3.1 | 3.6 | 68.8 | 110.6 | 5.7 | 1.0 | 83.9 | 4402.3 | 8.8 | 0.2 | 4408.8 | 0.41 | 0.20 |
| Residential Area C (H5) | 84.2 | 1.4 | 1.7 | 64.5 | 112.7 | 2.6 | 0.4 | 75.9 | 4402.6 | 4.0 | 0.1 | 4409.0 | 0.19 | 0.09 |
| Residential Area D (new homes) | 91.0 | 1.6 | 1.9 | 69.4 | 125.4 | 3.0 | 0.5 | 85.0 | 4402.8 | 4.7 | 0.1 | 4406.5 | 0.22 | 0.11 |
| Residential Area E (accommodation blocks (H8) | 87.6 | 1.6 | 1.9 | 66.7 | 119.0 | 3.0 | 0.5 | 79.9 | 4402.7 | 4.7 | 0.1 | 4406.3 | 0.22 | 0.11 |
| Military Barracks | 95.0 | 1.6 | 1.9 | 73.9 | 132.8 | 3.1 | 0.5 | 93.4 | 4402.8 | 4.7 | 0.1 | 4406.8 | 0.22 | 0.11 |
| Sirdarya TPP Receptor 1 (H2) | 42.7 | 1.7 | 2.0 | 43.7 | 35.4 | 3.1 | 0.5 | 37.2 | 4400.1 | 4.8 | 0.1 | 4404.8 | 0.22 | 0.11 |
| Sirdarya TPP Receptor 2 (H2) | 45.3 | 1.6 | 1.9 | 47.7 | 40.1 | 3.1 | 0.5 | 44.6 | 4400.2 | 4.7 | 0.1 | 4405.0 | 0.22 | 0.11 |
| H4 | 80.5 | 1.6 | 1.9 | 64.0 | 105.7 | 3.0 | 0.5 | 75.1 | 4402.4 | 4.5 | 0.1 | 4406.0 | 0.21 | 0.11 |
| H6 | 85.5 | 1.4 | 1.6 | 66.4 | 115.0 | 2.6 | 0.4 | 79.4 | 4403.0 | 4.0 | 0.1 | 4405.2 | 0.19 | 0.09 |
| H7 | 81.1 | 1.5 | 1.8 | 64.2 | 106.9 | 2.9 | 0.5 | 75.4 | 4402.7 | 4.4 | 0.1 | 4405.7 | 0.21 | 0.10 |
| H9 | 79.3 | 1.6 | 1.9 | 66.8 | 103.4 | 3.0 | 0.5 | 80.3 | 4402.6 | 4.6 | 0.1 | 4406.2 | 0.21 | 0.11 |
| H10 | 76.0 | 1.6 | 1.9 | 64.7 | 97.4 | 3.0 | 0.5 | 76.2 | 4402.4 | 4.5 | 0.1 | 4406.0 | 0.21 | 0.11 |
| H11 | 73.1 | 1.3 | 1.5 | 61.3 | 91.9 | 2.3 | 0.4 | 69.9 | 4401.9 | 3.6 | 0.1 | 4404.7 | 0.17 | 0.08 |
| H12 | 80.8 | 1.5 | 1.8 | 65.8 | 106.3 | 2.8 | 0.5 | 78.4 | 4402.7 | 4.3 | 0.1 | 4405.6 | 0.20 | 0.10 |
| H13 | 78.9 | 1.6 | 1.9 | 63.6 | 102.8 | 3.0 | 0.5 | 74.3 | 4402.3 | 4.6 | 0.1 | 4406.0 | 0.21 | 0.11 |
| H14 | 83.7 | 1.8 | 2.2 | 67.7 | 111.7 | 3.4 | 0.6 | 82.0 | 4402.9 | 5.2 | 0.1 | 4406.4 | 0.24 | 0.12 |
| H15 | 84.2 | 1.7 | 2.0 | 64.8 | 112.6 | 3.2 | 0.5 | 76.5 | 4402.9 | 4.9 | 0.1 | 4406.2 | 0.23 | 0.11 |
| H16 | 83.0 | 1.5 | 1.8 | 64.4 | 110.4 | 2.8 | 0.5 | 75.8 | 4402.8 | 4.3 | 0.1 | 4405.3 | 0.20 | 0.10 |
| H17 | 82.0 | 1.8 | 2.2 | 66.1 | 108.6 | 3.4 | 0.6 | 78.8 | 4402.8 | 5.2 | 0.1 | 4406.3 | 0.24 | 0.12 |

| Receptor | Hourly $NO_2$ | | | | Hourly NO | | | | Hourly CO | | | | Hourly $NH_3$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | PC | PC as % of Standard |
| H18 | 74.3 | 3.2 | 3.8 | 60.3 | 94.1 | 6.0 | 1.0 | 68.2 | 4402.2 | 9.2 | 0.2 | 4409.2 | 0.43 | 0.21 |
| H19 | 73.4 | 3.3 | 3.8 | 60.1 | 92.5 | 6.1 | 1.0 | 67.8 | 4402.2 | 9.3 | 0.2 | 4409.3 | 0.43 | 0.22 |
| H20 | 71.8 | 1.3 | 1.5 | 59.2 | 89.6 | 2.3 | 0.4 | 66.0 | 4402.1 | 3.6 | 0.1 | 4404.7 | 0.17 | 0.08 |
| H21 | 72.9 | 1.4 | 1.6 | 59.6 | 91.5 | 2.6 | 0.4 | 66.8 | 4401.9 | 4.0 | 0.1 | 4405.1 | 0.18 | 0.09 |
| H22 | 78.9 | 1.3 | 1.6 | 62.6 | 102.8 | 2.5 | 0.4 | 72.3 | 4402.6 | 3.8 | 0.1 | 4405.2 | 0.18 | 0.09 |
| H23 | 72.9 | 1.2 | 1.4 | 59.0 | 91.7 | 2.2 | 0.4 | 65.7 | 4402.1 | 3.4 | 0.1 | 4404.3 | 0.16 | 0.08 |
| H24 | 75.6 | 1.4 | 1.6 | 60.8 | 96.6 | 2.5 | 0.4 | 68.9 | 4402.3 | 3.9 | 0.1 | 4404.4 | 0.18 | 0.09 |
| H25 | 74.1 | 1.3 | 1.6 | 60.4 | 93.8 | 2.5 | 0.4 | 68.2 | 4402.2 | 3.8 | 0.1 | 4404.4 | 0.18 | 0.09 |
| H26 | 74.3 | 1.5 | 1.8 | 60.4 | 94.2 | 2.8 | 0.5 | 68.3 | 4402.2 | 4.3 | 0.1 | 4405.0 | 0.20 | 0.10 |
| H27 | 92.3 | 1.7 | 2.0 | 75.8 | 127.8 | 3.2 | 0.5 | 96.9 | 4402.7 | 4.9 | 0.1 | 4406.8 | 0.23 | 0.11 |
| H28 | 89.0 | 1.6 | 1.8 | 69.9 | 121.6 | 2.9 | 0.5 | 86.1 | 4402.6 | 4.4 | 0.1 | 4405.2 | 0.21 | 0.10 |
| H29 | 81.1 | 1.5 | 1.7 | 64.7 | 106.8 | 2.7 | 0.5 | 76.3 | 4402.7 | 4.2 | 0.1 | 4405.2 | 0.20 | 0.10 |
| H30 | 85.1 | 1.5 | 1.7 | 65.5 | 114.3 | 2.7 | 0.5 | 77.8 | 4403.0 | 4.2 | 0.1 | 4404.8 | 0.19 | 0.10 |
| H31 | 80.9 | 1.3 | 1.5 | 63.6 | 106.6 | 2.3 | 0.4 | 74.2 | 4402.7 | 3.6 | 0.1 | 4405.0 | 0.17 | 0.08 |
| H32 | 80.6 | 1.4 | 1.6 | 65.2 | 105.9 | 2.5 | 0.4 | 77.2 | 4402.7 | 3.9 | 0.1 | 4405.5 | 0.18 | 0.09 |
| H33 | 83.8 | 1.3 | 1.5 | 66.4 | 111.9 | 2.4 | 0.4 | 79.5 | 4402.9 | 3.7 | 0.1 | 4405.3 | 0.17 | 0.09 |
| H34 | 87.8 | 1.6 | 1.8 | 71.4 | 119.3 | 2.9 | 0.5 | 88.8 | 4403.2 | 4.5 | 0.1 | 4406.4 | 0.21 | 0.10 |
| H35 | 84.8 | 1.5 | 1.7 | 66.2 | 113.8 | 2.7 | 0.5 | 79.2 | 4403.0 | 4.1 | 0.1 | 4405.3 | 0.19 | 0.10 |
| H36 | 84.9 | 1.7 | 2.0 | 69.3 | 114.0 | 3.2 | 0.5 | 84.9 | 4403.0 | 4.9 | 0.1 | 4405.6 | 0.23 | 0.11 |
| H37 | 78.4 | 1.5 | 1.7 | 61.9 | 101.9 | 2.7 | 0.5 | 71.1 | 4402.6 | 4.2 | 0.1 | 4404.7 | 0.20 | 0.10 |
| H38 | 82.4 | 1.4 | 1.6 | 64.3 | 109.4 | 2.5 | 0.4 | 75.6 | 4402.8 | 3.9 | 0.1 | 4404.7 | 0.18 | 0.09 |
| H39 | 75.3 | 1.3 | 1.5 | 60.3 | 96.1 | 2.4 | 0.4 | 68.0 | 4402.3 | 3.7 | 0.1 | 4404.6 | 0.17 | 0.09 |
| H40 | 78.0 | 1.6 | 1.8 | 61.8 | 101.0 | 2.9 | 0.5 | 70.9 | 4402.0 | 4.5 | 0.1 | 4405.6 | 0.21 | 0.10 |
| D1: Central Control Building | 94.3 | 0.6 | 0.8 | 71.3 | 131.4 | 1.2 | 0.2 | 88.7 | 4403.6 | 1.8 | 0.0 | 4402.4 | 0.09 | 0.04 |
| D2: Workshop Area | 94.9 | 0.6 | 0.7 | 72.3 | 132.6 | 1.2 | 0.2 | 90.5 | 4403.7 | 1.8 | 0.0 | 4402.5 | 0.08 | 0.04 |

| Receptor | Hourly $NO_2$ | | | | Hourly NO | | | | Hourly CO | | | | Hourly $NH_3$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | PC | PC as % of Standard |
| D3: Admin Building | 95.9 | 1.2 | 1.4 | 74.4 | 134.5 | 2.2 | 0.4 | 94.3 | 4403.8 | 3.3 | 0.1 | 4403.7 | 0.16 | 0.08 |
| D4: Social Building | 95.9 | 1.1 | 1.2 | 74.5 | 134.4 | 2.0 | 0.3 | 94.5 | 4403.8 | 3.0 | 0.1 | 4403.6 | 0.14 | 0.07 |
| D5: Gatehouse | 96.0 | 1.1 | 1.3 | 74.1 | 134.6 | 2.0 | 0.3 | 93.9 | 4403.8 | 3.1 | 0.1 | 4403.6 | 0.14 | 0.07 |
| **Standard** | 85 | | | | 600 | | | | 5000 | | | | 200 | |

### Table C7: Maximum Predicted 8 Hour Mean Concentrations – Simple Cycle ($\mu g/m^3$)

| Receptor | 8 Hour CO | | | |
|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) |
| Residential Area A (H3) | 4400.5 | 2.3 | 0.02 | 4402.3 |
| Residential Area B (H1) | 4400.4 | 3.1 | 0.03 | 4403.1 |
| Residential Area C (H5) | 4400.7 | 2.8 | 0.03 | 4402.8 |
| Residential Area D (new homes) | 4400.7 | 0.8 | 0.01 | 4401.1 |
| Residential Area E (accommodation blocks (H8) | 4400.9 | 1.7 | 0.02 | 4401.8 |
| Military Barracks | 4400.5 | 1.2 | 0.01 | 4401.2 |
| Sirdarya TPP Receptor 1 (H2) | 4400.0 | 2.1 | 0.02 | 4402.1 |
| Sirdarya TPP Receptor 2 (H2) | 4400.0 | 1.6 | 0.02 | 4401.6 |
| H4 | 4400.4 | 1.4 | 0.01 | 4401.5 |
| H6 | 4400.8 | 1.3 | 0.01 | 4401.5 |
| H7 | 4400.8 | 1.5 | 0.01 | 4401.6 |
| H9 | 4400.6 | 0.8 | 0.01 | 4401.1 |
| H10 | 4400.6 | 1.1 | 0.01 | 4401.4 |

| Receptor | 8 Hour CO | | | |
|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) |
| H11 | 4400.7 | 1.3 | 0.01 | 4401.7 |
| H12 | 4400.6 | 1.6 | 0.02 | 4401.7 |
| H13 | 4400.9 | 1.2 | 0.01 | 4401.6 |
| H14 | 4400.9 | 1.7 | 0.02 | 4402.1 |
| H15 | 4400.8 | 1.7 | 0.02 | 4402.0 |
| H16 | 4400.7 | 1.4 | 0.01 | 4401.8 |
| H17 | 4400.8 | 1.8 | 0.02 | 4402.2 |
| H18 | 4400.7 | 2.1 | 0.02 | 4402.3 |
| H19 | 4400.8 | 2.5 | 0.03 | 4402.5 |
| H20 | 4400.9 | 1.5 | 0.02 | 4402.0 |
| H21 | 4400.5 | 0.8 | 0.01 | 4401.0 |
| H22 | 4400.4 | 0.6 | 0.01 | 4400.8 |
| H23 | 4400.3 | 0.9 | 0.01 | 4401.0 |
| H24 | 4401.1 | 1.7 | 0.02 | 4402.2 |
| H25 | 4401.2 | 1.6 | 0.02 | 4401.9 |
| H26 | 4400.8 | 1.5 | 0.01 | 4401.8 |
| H27 | 4400.6 | 2.1 | 0.02 | 4402.1 |
| H28 | 4400.9 | 1.4 | 0.01 | 4401.6 |
| H29 | 4400.9 | 1.4 | 0.01 | 4401.8 |
| H30 | 4400.9 | 1.5 | 0.02 | 4402.0 |
| H31 | 4400.6 | 1.0 | 0.01 | 4401.2 |
| H32 | 4400.6 | 1.0 | 0.01 | 4401.2 |
| H33 | 4400.5 | 0.9 | 0.01 | 4401.1 |
| H34 | 4400.7 | 1.0 | 0.01 | 4401.3 |
| H35 | 4400.6 | 0.9 | 0.01 | 4401.2 |

| Receptor | 8 Hour CO | | | |
|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) |
| H36 | 4400.7 | 1.4 | 0.01 | 4401.7 |
| H37 | 4401.0 | 1.7 | 0.02 | 4402.0 |
| H38 | 4400.4 | 0.9 | 0.01 | 4401.0 |
| H39 | 4400.3 | 1.1 | 0.01 | 4401.3 |
| H40 | 4400.5 | 1.1 | 0.01 | 4401.3 |
| D1: Central Control Building | 4400.5 | 0.2 | 0.00 | 4400.5 |
| D2: Workshop Area | 4400.5 | 0.5 | 0.01 | 4400.5 |
| D3: Admin Building | 4400.5 | 1.3 | 0.01 | 4401.3 |
| D4: Social Building | 4400.5 | 1.3 | 0.01 | 4401.3 |
| D5: Gatehouse | 4400.5 | 1.0 | 0.01 | 4401.0 |
| **Standard** | 10000 | | | |

**Table C8: Maximum Predicted 24 Hour Mean Concentrations – Simple Cycle ($\mu g/m^3$)**

| Receptor | 24 Hour $NO_2$ | | | | 24 Hour NO | | | | 24 Hour CO | | | | 24 Hour $NH_3$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | PC | PC as % of Standard |
| Residential Area A (H3) | 44.6 | 0.3 | 0.5 | 43.6 | 38.8 | 0.6 | 0.2 | 37.0 | 4400.2 | 0.9 | 0.02 | 4400.9 | 0.04 | 0.03 |
| Residential Area B (H1) | 43.8 | 0.7 | 1.1 | 43.2 | 37.4 | 1.2 | 0.5 | 36.3 | 4400.1 | 1.9 | 0.05 | 4401.9 | 0.09 | 0.07 |
| Residential Area C (H5) | 46.4 | 0.4 | 0.7 | 44.1 | 42.2 | 0.8 | 0.3 | 38.0 | 4400.3 | 1.2 | 0.03 | 4401.2 | 0.05 | 0.05 |
| Residential Area D (new homes) | 48.6 | 0.0 | 0.0 | 45.5 | 46.3 | 0.0 | 0.0 | 40.5 | 4400.4 | 0.0 | 0.00 | 4400.4 | 0.00 | 0.00 |
| Residential Area E (accommodation blocks (H8) | 48.6 | 0.3 | 0.5 | 45.3 | 46.3 | 0.5 | 0.2 | 40.2 | 4400.5 | 0.8 | 0.02 | 4400.9 | 0.04 | 0.03 |
| Military Barracks | 46.3 | 0.1 | 0.2 | 43.6 | 42.0 | 0.3 | 0.1 | 37.0 | 4400.3 | 0.4 | 0.01 | 4400.4 | 0.02 | 0.02 |

| Receptor | 24 Hour $NO_2$ | | | | 24 Hour NO | | | | 24 Hour CO | | | | 24 Hour $NH_3$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | PC | PC as % of Standard |
| Sirdarya TPP Receptor 1 (H2) | 42.0 | 0.4 | 0.6 | 42.4 | 34.1 | 0.7 | 0.3 | 34.7 | 4400.0 | 1.0 | 0.03 | 4401.0 | 0.05 | 0.04 |
| Sirdarya TPP Receptor 2 (H2) | 42.1 | 0.4 | 0.6 | 42.4 | 34.3 | 0.7 | 0.3 | 34.7 | 4400.0 | 1.0 | 0.03 | 4401.0 | 0.05 | 0.04 |
| H4 | 44.5 | 0.2 | 0.3 | 43.5 | 38.7 | 0.3 | 0.1 | 36.8 | 4400.2 | 0.5 | 0.01 | 4400.5 | 0.02 | 0.02 |
| H6 | 48.0 | 0.2 | 0.4 | 45.2 | 45.1 | 0.4 | 0.2 | 39.9 | 4400.4 | 0.6 | 0.02 | 4400.7 | 0.03 | 0.03 |
| H7 | 48.0 | 0.3 | 0.4 | 45.2 | 45.1 | 0.5 | 0.2 | 39.9 | 4400.4 | 0.7 | 0.02 | 4400.8 | 0.03 | 0.03 |
| H9 | 46.0 | 0.2 | 0.3 | 44.3 | 41.5 | 0.3 | 0.1 | 38.3 | 4400.3 | 0.5 | 0.01 | 4400.6 | 0.02 | 0.02 |
| H10 | 45.4 | 0.2 | 0.3 | 43.9 | 40.3 | 0.3 | 0.1 | 37.6 | 4400.2 | 0.5 | 0.01 | 4400.7 | 0.02 | 0.02 |
| H11 | 46.5 | 0.2 | 0.3 | 44.5 | 42.4 | 0.4 | 0.1 | 38.6 | 4400.3 | 0.6 | 0.01 | 4400.7 | 0.03 | 0.02 |
| H12 | 47.3 | 0.3 | 0.4 | 44.9 | 43.8 | 0.5 | 0.2 | 39.5 | 4400.4 | 0.7 | 0.02 | 4400.8 | 0.03 | 0.03 |
| H13 | 46.1 | 0.1 | 0.2 | 44.4 | 41.6 | 0.3 | 0.1 | 38.4 | 4400.3 | 0.4 | 0.01 | 4400.6 | 0.02 | 0.02 |
| H14 | 48.9 | 0.3 | 0.5 | 45.8 | 46.9 | 0.5 | 0.2 | 41.1 | 4400.5 | 0.8 | 0.02 | 4401.1 | 0.04 | 0.03 |
| H15 | 48.2 | 0.3 | 0.5 | 45.5 | 45.5 | 0.5 | 0.2 | 40.5 | 4400.4 | 0.8 | 0.02 | 4401.0 | 0.04 | 0.03 |
| H16 | 47.0 | 0.3 | 0.4 | 44.9 | 43.4 | 0.5 | 0.2 | 39.5 | 4400.4 | 0.7 | 0.02 | 4400.9 | 0.03 | 0.03 |
| H17 | 48.8 | 0.3 | 0.5 | 45.8 | 46.7 | 0.6 | 0.2 | 41.0 | 4400.5 | 0.9 | 0.02 | 4401.1 | 0.04 | 0.04 |
| H18 | 47.6 | 0.4 | 0.6 | 45.2 | 44.4 | 0.7 | 0.3 | 39.9 | 4400.4 | 1.1 | 0.03 | 4401.2 | 0.05 | 0.04 |
| H19 | 47.8 | 0.5 | 0.8 | 45.3 | 44.8 | 0.9 | 0.4 | 40.1 | 4400.4 | 1.4 | 0.04 | 4401.5 | 0.07 | 0.06 |
| H20 | 46.3 | 0.2 | 0.3 | 44.5 | 42.0 | 0.3 | 0.1 | 38.7 | 4400.3 | 0.5 | 0.01 | 4400.7 | 0.02 | 0.02 |
| H21 | 45.0 | 0.1 | 0.2 | 43.8 | 39.6 | 0.2 | 0.1 | 37.3 | 4400.2 | 0.4 | 0.01 | 4400.5 | 0.02 | 0.01 |
| H22 | 43.9 | 0.1 | 0.1 | 43.1 | 37.5 | 0.1 | 0.1 | 36.0 | 4400.1 | 0.2 | 0.01 | 4400.3 | 0.01 | 0.01 |
| H23 | 43.7 | 0.1 | 0.2 | 42.9 | 37.1 | 0.2 | 0.1 | 35.7 | 4400.1 | 0.3 | 0.01 | 4400.3 | 0.01 | 0.01 |
| H24 | 49.8 | 0.3 | 0.5 | 46.8 | 48.5 | 0.6 | 0.2 | 42.9 | 4400.6 | 0.9 | 0.02 | 4401.0 | 0.04 | 0.04 |
| H25 | 50.2 | 0.3 | 0.5 | 46.9 | 49.2 | 0.6 | 0.2 | 43.2 | 4400.6 | 0.9 | 0.02 | 4401.0 | 0.04 | 0.03 |
| H26 | 47.6 | 0.3 | 0.4 | 45.0 | 44.4 | 0.5 | 0.2 | 39.7 | 4400.4 | 0.8 | 0.02 | 4400.9 | 0.04 | 0.03 |
| H27 | 45.0 | 0.4 | 0.6 | 43.7 | 39.6 | 0.7 | 0.3 | 37.1 | 4400.2 | 1.0 | 0.03 | 4401.0 | 0.05 | 0.04 |

| Receptor | 24 Hour $NO_2$ | | | | 24 Hour NO | | | | 24 Hour CO | | | | 24 Hour $NH_3$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | PC | PC as % of Standard |
| H28 | 49.3 | 0.3 | 0.5 | 45.7 | 47.6 | 0.6 | 0.2 | 40.9 | 4400.5 | 0.9 | 0.02 | 4401.0 | 0.04 | 0.03 |
| H29 | 50.8 | 0.2 | 0.3 | 46.7 | 50.5 | 0.4 | 0.1 | 42.7 | 4400.6 | 0.6 | 0.01 | 4400.8 | 0.03 | 0.02 |
| H30 | 48.3 | 0.2 | 0.3 | 45.5 | 45.8 | 0.3 | 0.1 | 40.4 | 4400.4 | 0.5 | 0.01 | 4400.7 | 0.02 | 0.02 |
| H31 | 46.9 | 0.2 | 0.3 | 44.7 | 43.2 | 0.3 | 0.1 | 39.0 | 4400.3 | 0.5 | 0.01 | 4400.6 | 0.02 | 0.02 |
| H32 | 47.1 | 0.2 | 0.3 | 44.8 | 43.5 | 0.3 | 0.1 | 39.3 | 4400.4 | 0.5 | 0.01 | 4400.6 | 0.02 | 0.02 |
| H33 | 46.2 | 0.2 | 0.3 | 44.3 | 41.8 | 0.3 | 0.1 | 38.4 | 4400.3 | 0.4 | 0.01 | 4400.6 | 0.02 | 0.02 |
| H34 | 48.1 | 0.2 | 0.3 | 45.4 | 45.3 | 0.3 | 0.1 | 40.4 | 4400.4 | 0.5 | 0.01 | 4400.7 | 0.02 | 0.02 |
| H35 | 46.4 | 0.2 | 0.3 | 44.5 | 42.2 | 0.3 | 0.1 | 38.6 | 4400.3 | 0.4 | 0.01 | 4400.5 | 0.02 | 0.02 |
| H36 | 46.5 | 0.2 | 0.3 | 44.7 | 42.4 | 0.3 | 0.1 | 39.0 | 4400.3 | 0.5 | 0.01 | 4400.6 | 0.02 | 0.02 |
| H37 | 50.7 | 0.3 | 0.4 | 46.8 | 50.1 | 0.5 | 0.2 | 42.9 | 4400.6 | 0.7 | 0.02 | 4401.1 | 0.03 | 0.03 |
| H38 | 44.1 | 0.1 | 0.2 | 43.2 | 37.9 | 0.2 | 0.1 | 36.1 | 4400.1 | 0.3 | 0.01 | 4400.3 | 0.01 | 0.01 |
| H39 | 43.8 | 0.1 | 0.2 | 43.0 | 37.3 | 0.3 | 0.1 | 35.8 | 4400.1 | 0.4 | 0.01 | 4400.4 | 0.02 | 0.01 |
| H40 | 44.1 | 0.1 | 0.2 | 43.3 | 38.0 | 0.3 | 0.1 | 36.4 | 4400.2 | 0.4 | 0.01 | 4400.5 | 0.02 | 0.02 |
| D1: Central Control Building | 45.3 | 0.1 | 0.1 | 43.7 | 40.1 | 0.1 | 0.0 | 37.1 | 4400.2 | 0.2 | 0.00 | 4400.2 | 0.01 | 0.01 |
| D2: Workshop Area | 44.7 | 0.1 | 0.1 | 43.4 | 39.1 | 0.1 | 0.0 | 36.5 | 4400.2 | 0.2 | 0.00 | 4400.2 | 0.01 | 0.01 |
| D3: Admin Building | 44.4 | 0.2 | 0.3 | 43.4 | 38.4 | 0.3 | 0.1 | 36.7 | 4400.2 | 0.4 | 0.01 | 4400.4 | 0.02 | 0.02 |
| D4: Social Building | 44.4 | 0.2 | 0.3 | 43.4 | 38.4 | 0.4 | 0.1 | 36.7 | 4400.2 | 0.6 | 0.01 | 4400.6 | 0.03 | 0.02 |
| D5: Gatehouse | 44.4 | 0.1 | 0.2 | 43.4 | 38.4 | 0.2 | 0.1 | 36.7 | 4400.2 | 0.4 | 0.01 | 4400.4 | 0.02 | 0.01 |
| **Standard** | 60 | | | | 250 | | | | 4000 | | | | 120 | |

## Scenario Three - Additional IFC Plant (Combined Cycle)

### Table C9: Maximum Predicted Long Term (Annual) Concentrations – Combined Cycle ($\mu g/m^3$)

| Receptor | Annual $NO_2$ | | | | Annual NO | | | | Annual CO | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) |
| Residential Area A (H3) | 21.2 | 1.4 | 3.5 | 22.5 | 17.2 | 1.3 | 2.2 | 18.4 | 2200.01 | 2.0 | 0.07 | 2202.02 |
| Residential Area B (H1) | 21.2 | 1.7 | 4.2 | 22.8 | 17.2 | 1.6 | 2.6 | 18.6 | 2200.01 | 2.4 | 0.08 | 2202.42 |
| Residential Area C (H5) | 21.5 | 1.2 | 2.9 | 22.4 | 17.5 | 1.1 | 1.8 | 18.3 | 2200.02 | 1.7 | 0.06 | 2201.67 |
| Residential Area D (new homes) | 21.8 | 0.6 | 1.4 | 22.0 | 17.8 | 0.5 | 0.9 | 17.9 | 2200.03 | 0.8 | 0.03 | 2200.82 |
| Residential Area E (accommodation blocks (H8) | 21.8 | 0.9 | 2.2 | 22.2 | 17.8 | 0.8 | 1.4 | 18.2 | 2200.03 | 1.2 | 0.04 | 2201.26 |
| H4 | 21.2 | 0.7 | 1.6 | 21.8 | 17.2 | 0.6 | 1.0 | 17.7 | 2200.01 | 0.9 | 0.03 | 2200.94 |
| H6 | 21.9 | 0.7 | 1.9 | 22.2 | 17.8 | 0.7 | 1.2 | 18.1 | 2200.03 | 1.1 | 0.04 | 2201.07 |
| H7 | 21.8 | 0.8 | 2.1 | 22.2 | 17.7 | 0.8 | 1.3 | 18.1 | 2200.03 | 1.2 | 0.04 | 2201.22 |
| H9 | 21.3 | 0.1 | 0.3 | 21.3 | 17.3 | 0.1 | 0.2 | 17.3 | 2200.01 | 0.2 | 0.01 | 2200.18 |
| H10 | 21.4 | 0.1 | 0.4 | 21.3 | 17.4 | 0.1 | 0.2 | 17.3 | 2200.01 | 0.2 | 0.01 | 2200.22 |
| H11 | 21.5 | 0.2 | 0.6 | 21.5 | 17.4 | 0.2 | 0.4 | 17.4 | 2200.02 | 0.3 | 0.01 | 2200.34 |
| H12 | 21.6 | 0.4 | 1.0 | 21.7 | 17.5 | 0.4 | 0.6 | 17.6 | 2200.02 | 0.6 | 0.02 | 2200.58 |
| H13 | 21.4 | 0.2 | 0.5 | 21.4 | 17.4 | 0.2 | 0.3 | 17.4 | 2200.02 | 0.3 | 0.01 | 2200.30 |
| H14 | 22.4 | 0.5 | 1.3 | 22.2 | 18.3 | 0.5 | 0.8 | 18.1 | 2200.05 | 0.7 | 0.02 | 2200.75 |
| H15 | 22.1 | 0.5 | 1.2 | 22.1 | 18.0 | 0.5 | 0.8 | 18.0 | 2200.04 | 0.7 | 0.02 | 2200.73 |
| H16 | 21.9 | 0.4 | 1.0 | 21.9 | 17.8 | 0.4 | 0.6 | 17.8 | 2200.03 | 0.6 | 0.02 | 2200.61 |
| H17 | 22.3 | 0.5 | 1.2 | 22.1 | 18.2 | 0.4 | 0.7 | 18.1 | 2200.05 | 0.7 | 0.02 | 2200.69 |
| H18 | 22.0 | 0.8 | 2.0 | 22.3 | 17.9 | 0.8 | 1.3 | 18.2 | 2200.03 | 1.2 | 0.04 | 2201.18 |
| H19 | 22.1 | 0.9 | 2.2 | 22.3 | 18.0 | 0.8 | 1.3 | 18.2 | 2200.04 | 1.2 | 0.04 | 2201.25 |
| H20 | 21.3 | 0.2 | 0.4 | 21.3 | 17.3 | 0.1 | 0.2 | 17.3 | 2200.01 | 0.2 | 0.01 | 2200.23 |
| H21 | 21.3 | 0.1 | 0.3 | 21.3 | 17.3 | 0.1 | 0.2 | 17.3 | 2200.01 | 0.2 | 0.01 | 2200.19 |

| Receptor | Annual $NO_2$ | | | | Annual NO | | | | Annual CO | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) |
| H22 | 21.2 | 0.1 | 0.3 | 21.2 | 17.2 | 0.1 | 0.2 | 17.2 | 2200.01 | 0.2 | 0.01 | 2200.19 |
| H23 | 21.3 | 0.2 | 0.4 | 21.3 | 17.3 | 0.2 | 0.3 | 17.3 | 2200.01 | 0.2 | 0.01 | 2200.25 |
| H24 | 22.3 | 0.7 | 1.8 | 22.4 | 18.2 | 0.7 | 1.1 | 18.3 | 2200.04 | 1.0 | 0.03 | 2201.05 |
| H25 | 22.6 | 0.7 | 1.8 | 22.5 | 18.4 | 0.7 | 1.1 | 18.4 | 2200.05 | 1.0 | 0.03 | 2201.06 |
| H26 | 23.2 | 0.8 | 1.9 | 22.8 | 19.0 | 0.7 | 1.2 | 18.7 | 2200.08 | 1.1 | 0.04 | 2201.13 |
| H27 | 21.4 | 1.3 | 3.3 | 22.5 | 17.4 | 1.2 | 2.1 | 18.4 | 2200.01 | 1.9 | 0.06 | 2201.89 |
| H28 | 22.4 | 0.5 | 1.3 | 22.2 | 18.3 | 0.5 | 0.8 | 18.1 | 2200.05 | 0.7 | 0.02 | 2200.75 |
| H29 | 23.4 | 0.7 | 1.7 | 22.9 | 19.2 | 0.6 | 1.1 | 18.8 | 2200.08 | 1.0 | 0.03 | 2201.02 |
| H30 | 23.1 | 0.6 | 1.6 | 22.7 | 18.9 | 0.6 | 1.0 | 18.6 | 2200.07 | 0.9 | 0.03 | 2200.94 |
| H31 | 22.3 | 0.4 | 1.1 | 22.1 | 18.2 | 0.4 | 0.7 | 18.0 | 2200.05 | 0.6 | 0.02 | 2200.63 |
| H32 | 22.3 | 0.4 | 1.0 | 22.1 | 18.2 | 0.4 | 0.6 | 18.0 | 2200.05 | 0.6 | 0.02 | 2200.62 |
| H33 | 22.0 | 0.4 | 0.9 | 21.9 | 17.9 | 0.3 | 0.6 | 17.8 | 2200.03 | 0.5 | 0.02 | 2200.55 |
| H34 | 22.2 | 0.4 | 1.0 | 22.0 | 18.1 | 0.4 | 0.6 | 17.9 | 2200.04 | 0.6 | 0.02 | 2200.60 |
| H35 | 21.8 | 0.3 | 0.8 | 21.7 | 17.7 | 0.3 | 0.5 | 17.7 | 2200.03 | 0.4 | 0.01 | 2200.46 |
| H36 | 22.1 | 0.4 | 0.9 | 21.9 | 18.0 | 0.3 | 0.6 | 17.9 | 2200.04 | 0.5 | 0.02 | 2200.54 |
| H37 | 23.3 | 0.8 | 2.0 | 22.9 | 19.2 | 0.8 | 1.3 | 18.8 | 2200.08 | 1.2 | 0.04 | 2201.19 |
| H38 | 21.3 | 0.2 | 0.4 | 21.3 | 17.2 | 0.2 | 0.3 | 17.3 | 2200.01 | 0.2 | 0.01 | 2200.24 |
| H39 | 21.3 | 0.2 | 0.5 | 21.4 | 17.3 | 0.2 | 0.3 | 17.3 | 2200.01 | 0.3 | 0.01 | 2200.32 |
| H40 | 21.4 | 0.3 | 0.7 | 21.5 | 17.4 | 0.3 | 0.5 | 17.5 | 2200.01 | 0.4 | 0.01 | 2200.42 |
| **Standard** | 40 | | | | 60 | | | | 3000 | | | |

## Table C10: Maximum Predicted Hourly Mean Concentrations – Combined Cycle ($\mu g/m^3$)

| Receptor | Hourly $NO_2$ | | | | Hourly NO | | | | Hourly CO | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) |
| Residential Area A (H3) | 82.8 | 20.6 | 24.3 | 75.3 | 110.0 | 38.5 | 6.4 | 96.1 | 4402.7 | 59.0 | 1.2 | 4459.0 |
| Residential Area B (H1) | 83.1 | 27.1 | 31.9 | 80.4 | 110.6 | 50.5 | 8.4 | 105.6 | 4402.3 | 77.5 | 1.6 | 4477.5 |
| Residential Area C (H5) | 84.2 | 28.4 | 33.4 | 76.2 | 112.7 | 52.8 | 8.8 | 97.7 | 4402.6 | 81.0 | 1.6 | 4481.0 |
| Residential Area D (new homes) | 91.0 | 15.2 | 17.9 | 78.3 | 125.4 | 28.3 | 4.7 | 101.7 | 4402.8 | 43.4 | 0.9 | 4443.4 |
| Residential Area E (accommodation blocks (H8) | 87.6 | 15.3 | 18.1 | 76.0 | 119.0 | 28.6 | 4.8 | 97.4 | 4402.7 | 43.9 | 0.9 | 4443.9 |
| Military Barracks | 95.0 | 15.2 | 17.9 | 81.5 | 132.8 | 28.4 | 4.7 | 107.6 | 4402.8 | 43.6 | 0.9 | 4443.6 |
| Sirdarya TPP Receptor 1 (H2) | 42.7 | 17.7 | 20.8 | 59.7 | 35.4 | 32.9 | 5.5 | 67.0 | 4400.1 | 50.5 | 1.0 | 4450.5 |
| Sirdarya TPP Receptor 2 (H2) | 45.3 | 15.3 | 18.0 | 57.3 | 40.1 | 28.6 | 4.8 | 62.6 | 4400.2 | 43.8 | 0.9 | 4443.8 |
| H4 | 80.5 | 13.7 | 16.2 | 71.5 | 105.7 | 25.6 | 4.3 | 89.0 | 4402.4 | 39.2 | 0.8 | 4439.3 |
| H6 | 85.5 | 15.4 | 18.1 | 69.0 | 115.0 | 28.6 | 4.8 | 84.3 | 4403.0 | 43.9 | 0.9 | 4443.9 |
| H7 | 81.1 | 15.0 | 17.7 | 68.3 | 106.9 | 28.0 | 4.7 | 83.1 | 4402.7 | 43.0 | 0.9 | 4443.0 |
| H9 | 79.3 | 13.7 | 16.1 | 74.7 | 103.4 | 25.5 | 4.2 | 94.9 | 4402.6 | 39.1 | 0.8 | 4439.5 |
| H10 | 76.0 | 13.4 | 15.7 | 72.2 | 97.4 | 24.9 | 4.1 | 90.2 | 4402.4 | 38.2 | 0.8 | 4438.3 |
| H11 | 73.1 | 14.7 | 17.2 | 69.6 | 91.9 | 27.3 | 4.6 | 85.5 | 4401.9 | 41.9 | 0.8 | 4442.1 |
| H12 | 80.8 | 15.0 | 17.6 | 73.0 | 106.3 | 27.9 | 4.7 | 91.7 | 4402.7 | 42.8 | 0.9 | 4442.8 |
| H13 | 78.9 | 13.3 | 15.6 | 70.7 | 102.8 | 24.8 | 4.1 | 87.6 | 4402.3 | 38.0 | 0.8 | 4438.3 |
| H14 | 83.7 | 13.3 | 15.7 | 73.9 | 111.7 | 24.9 | 4.1 | 93.4 | 4402.9 | 38.1 | 0.8 | 4438.3 |
| H15 | 84.2 | 14.4 | 17.0 | 69.5 | 112.6 | 26.9 | 4.5 | 85.3 | 4402.9 | 41.3 | 0.8 | 4441.3 |
| H16 | 83.0 | 14.8 | 17.4 | 67.7 | 110.4 | 27.6 | 4.6 | 81.9 | 4402.8 | 42.3 | 0.8 | 4442.4 |
| H17 | 82.0 | 12.5 | 14.7 | 72.0 | 108.6 | 23.3 | 3.9 | 89.9 | 4402.8 | 35.7 | 0.7 | 4435.9 |
| H18 | 74.3 | 82.0 | 96.5 | 124.0 | 94.1 | 152.8 | 25.5 | 186.8 | 4402.2 | 234.4 | 4.7 | 4634.4 |
| H19 | 73.4 | 83.2 | 97.9 | 125.2 | 92.5 | 155.0 | 25.8 | 189.0 | 4402.2 | 237.8 | 4.8 | 4637.8 |
| H20 | 71.8 | 10.3 | 12.1 | 63.8 | 89.6 | 19.1 | 3.2 | 74.6 | 4402.1 | 29.3 | 0.6 | 4429.9 |

| Receptor | Hourly $NO_2$ | | | | Hourly NO | | | | Hourly CO | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) |
| H21 | 72.9 | 11.6 | 13.7 | 65.3 | 91.5 | 21.6 | 3.6 | 77.3 | 4401.9 | 33.2 | 0.7 | 4433.7 |
| H22 | 78.9 | 11.4 | 13.5 | 67.3 | 102.8 | 21.3 | 3.6 | 81.2 | 4402.6 | 32.7 | 0.7 | 4433.0 |
| H23 | 72.9 | 9.4 | 11.1 | 61.8 | 91.7 | 17.6 | 2.9 | 70.9 | 4402.1 | 26.9 | 0.5 | 4426.9 |
| H24 | 75.6 | 12.1 | 14.2 | 63.7 | 96.6 | 22.5 | 3.8 | 74.4 | 4402.3 | 34.5 | 0.7 | 4434.6 |
| H25 | 74.1 | 11.4 | 13.4 | 63.3 | 93.8 | 21.2 | 3.5 | 73.7 | 4402.2 | 32.4 | 0.6 | 4432.5 |
| H26 | 74.3 | 13.7 | 16.1 | 63.2 | 94.2 | 25.5 | 4.2 | 73.5 | 4402.2 | 39.1 | 0.8 | 4439.4 |
| H27 | 92.3 | 17.1 | 20.2 | 82.9 | 127.8 | 31.9 | 5.3 | 110.2 | 4402.7 | 49.0 | 1.0 | 4449.0 |
| H28 | 89.0 | 15.1 | 17.8 | 73.9 | 121.6 | 28.1 | 4.7 | 93.5 | 4402.6 | 43.1 | 0.9 | 4443.1 |
| H29 | 81.1 | 15.1 | 17.8 | 66.9 | 106.8 | 28.1 | 4.7 | 80.5 | 4402.7 | 43.1 | 0.9 | 4443.6 |
| H30 | 85.1 | 11.5 | 13.5 | 68.5 | 114.3 | 21.4 | 3.6 | 83.3 | 4403.0 | 32.8 | 0.7 | 4433.5 |
| H31 | 80.9 | 10.3 | 12.2 | 67.5 | 106.6 | 19.3 | 3.2 | 81.4 | 4402.7 | 29.6 | 0.6 | 4429.6 |
| H32 | 80.6 | 9.4 | 11.1 | 70.4 | 105.9 | 17.5 | 2.9 | 86.9 | 4402.7 | 26.9 | 0.5 | 4427.1 |
| H33 | 83.8 | 9.5 | 11.2 | 71.2 | 111.9 | 17.7 | 2.9 | 88.4 | 4402.9 | 27.1 | 0.5 | 4427.1 |
| H34 | 87.8 | 11.7 | 13.7 | 77.4 | 119.3 | 21.8 | 3.6 | 99.9 | 4403.2 | 33.4 | 0.7 | 4433.4 |
| H35 | 84.8 | 15.9 | 18.7 | 70.4 | 113.8 | 29.6 | 4.9 | 86.9 | 4403.0 | 45.3 | 0.9 | 4445.6 |
| H36 | 84.9 | 13.9 | 16.4 | 72.3 | 114.0 | 26.0 | 4.3 | 90.4 | 4403.0 | 39.8 | 0.8 | 4439.8 |
| H37 | 78.4 | 12.9 | 15.2 | 68.0 | 101.9 | 24.1 | 4.0 | 82.5 | 4402.6 | 36.9 | 0.7 | 4437.0 |
| H38 | 82.4 | 11.7 | 13.7 | 68.2 | 109.4 | 21.7 | 3.6 | 82.9 | 4402.8 | 33.3 | 0.7 | 4433.8 |
| H39 | 75.3 | 11.0 | 13.0 | 63.5 | 96.1 | 20.5 | 3.4 | 74.1 | 4402.3 | 31.5 | 0.6 | 4431.5 |
| H40 | 78.0 | 10.6 | 12.5 | 65.2 | 101.0 | 19.8 | 3.3 | 77.3 | 4402.0 | 30.4 | 0.6 | 4430.4 |
| D1: Central Control Building | 94.3 | 12.9 | 15.2 | 79.2 | 131.4 | 24.1 | 4.0 | 103.4 | 4403.6 | 36.9 | 0.7 | 4437.0 |
| D2: Workshop Area | 94.9 | 14.0 | 16.5 | 81.0 | 132.6 | 26.1 | 4.4 | 106.6 | 4403.7 | 40.1 | 0.8 | 4440.1 |
| D3: Admin Building | 95.9 | 17.0 | 20.0 | 85.3 | 134.5 | 31.7 | 5.3 | 114.7 | 4403.8 | 48.6 | 1.0 | 4448.6 |
| D4: Social Building | 95.9 | 16.5 | 19.4 | 85.2 | 134.4 | 30.7 | 5.1 | 114.6 | 4403.8 | 47.1 | 0.9 | 4447.1 |
| D5: Gatehouse | 96.0 | 17.0 | 20.0 | 85.1 | 134.6 | 31.7 | 5.3 | 114.3 | 4403.8 | 48.6 | 1.0 | 4448.7 |

| Receptor | Hourly $NO_2$ | | | | Hourly NO | | | | Hourly CO | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) |
| **Standard** | 85 | | | | 600 | | | | 5000 | | | |

**Table C11: Maximum Predicted 8 Hour Mean Concentrations – Combined Cycle ($\mu g/m^3$)**

| Receptor | 8 Hour CO | | | |
|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) |
| Residential Area A (H3) | 4400.5 | 36.5 | 0.4 | 4459.0 |
| Residential Area B (H1) | 4400.4 | 43.0 | 0.4 | 4477.5 |
| Residential Area C (H5) | 4400.7 | 34.3 | 0.3 | 4481.0 |
| Residential Area D (new homes) | 4400.7 | 18.6 | 0.2 | 4443.4 |
| Residential Area E (accommodation blocks (H8) | 4400.9 | 21.9 | 0.2 | 4443.9 |
| Military Barracks | 4400.5 | 17.8 | 0.2 | 4443.6 |
| Sirdarya TPP Receptor 1 (H2) | 4400.0 | 26.7 | 0.3 | 4450.5 |
| Sirdarya TPP Receptor 2 (H2) | 4400.0 | 24.9 | 0.2 | 4443.8 |
| H4 | 4400.4 | 16.0 | 0.2 | 4439.3 |
| H6 | 4400.8 | 14.7 | 0.1 | 4443.9 |
| H7 | 4400.8 | 17.9 | 0.2 | 4443.0 |
| H9 | 4400.6 | 7.1 | 0.1 | 4439.5 |
| H10 | 4400.6 | 10.2 | 0.1 | 4438.3 |
| H11 | 4400.7 | 12.9 | 0.1 | 4442.1 |
| H12 | 4400.6 | 16.0 | 0.2 | 4442.8 |
| H13 | 4400.9 | 10.8 | 0.1 | 4438.3 |

| Receptor | 8 Hour CO | | | |
|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) |
| H14 | 4400.9 | 11.0 | 0.1 | 4438.3 |
| H15 | 4400.8 | 10.8 | 0.1 | 4441.3 |
| H16 | 4400.7 | 9.2 | 0.1 | 4442.4 |
| H17 | 4400.8 | 10.9 | 0.1 | 4435.9 |
| H18 | 4400.7 | 45.2 | 0.5 | 4634.4 |
| H19 | 4400.8 | 60.7 | 0.6 | 4637.8 |
| H20 | 4400.9 | 7.8 | 0.1 | 4429.9 |
| H21 | 4400.5 | 7.9 | 0.1 | 4433.7 |
| H22 | 4400.4 | 8.8 | 0.1 | 4433.0 |
| H23 | 4400.3 | 7.2 | 0.1 | 4426.9 |
| H24 | 4401.1 | 12.1 | 0.1 | 4434.6 |
| H25 | 4401.2 | 11.7 | 0.1 | 4432.5 |
| H26 | 4400.8 | 11.5 | 0.1 | 4439.4 |
| H27 | 4400.6 | 28.1 | 0.3 | 4449.0 |
| H28 | 4400.9 | 14.0 | 0.1 | 4443.1 |
| H29 | 4400.9 | 10.9 | 0.1 | 4443.6 |
| H30 | 4400.9 | 10.0 | 0.1 | 4433.5 |
| H31 | 4400.6 | 7.1 | 0.1 | 4429.6 |
| H32 | 4400.6 | 7.2 | 0.1 | 4427.1 |
| H33 | 4400.5 | 8.4 | 0.1 | 4427.1 |
| H34 | 4400.7 | 9.4 | 0.1 | 4433.4 |
| H35 | 4400.6 | 9.5 | 0.1 | 4445.6 |
| H36 | 4400.7 | 10.2 | 0.1 | 4439.8 |
| H37 | 4401.0 | 12.3 | 0.1 | 4437.0 |
| H38 | 4400.4 | 7.0 | 0.1 | 4433.8 |

| Receptor | 8 Hour CO | | | |
|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) |
| H39 | 4400.3 | 9.9 | 0.1 | 4431.5 |
| H40 | 4400.5 | 11.6 | 0.1 | 4430.4 |
| D1: Central Control Building | 4400.5 | 17.2 | 0.2 | 4437.0 |
| D2: Workshop Area | 4400.5 | 15.0 | 0.1 | 4440.1 |
| D3: Admin Building | 4400.5 | 17.2 | 0.2 | 4448.6 |
| D4: Social Building | 4400.5 | 16.4 | 0.2 | 4447.1 |
| D5: Gatehouse | 4400.5 | 17.4 | 0.2 | 4448.7 |
| **Standard** | 10000 | | | |

### Table C12: Maximum Predicted 24 Hour Mean Concentrations – Combined Cycle ($\mu g/m^3$)

| Receptor | 24 Hour $NO_2$ | | | | 24 Hour NO | | | | 24 Hour CO | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) |
| Residential Area A (H3) | 44.6 | 4.3 | 7.2 | 46.4 | 38.8 | 8.1 | 3.2 | 42.1 | 4400.2 | 12.4 | 0.3 | 4412.4 |
| Residential Area B (H1) | 43.8 | 9.5 | 15.9 | 51.5 | 37.4 | 17.8 | 7.1 | 51.8 | 4400.1 | 27.2 | 0.7 | 4427.2 |
| Residential Area C (H5) | 46.4 | 6.2 | 10.4 | 48.2 | 42.2 | 11.6 | 4.6 | 45.6 | 4400.3 | 17.8 | 0.4 | 4417.8 |
| Residential Area D (new homes) | 48.6 | 2.6 | 4.3 | 45.4 | 46.3 | 4.8 | 1.9 | 40.3 | 4400.4 | 7.4 | 0.2 | 4407.4 |
| Residential Area E (accommodation blocks (H8) | 48.6 | 4.4 | 7.3 | 46.9 | 46.3 | 8.1 | 3.3 | 43.2 | 4400.5 | 12.5 | 0.3 | 4412.5 |
| Military Barracks | 46.3 | 2.5 | 4.1 | 44.6 | 42.0 | 4.6 | 1.8 | 38.9 | 4400.3 | 7.1 | 0.2 | 4407.1 |
| Sirdarya TPP Receptor 1 (H2) | 42.0 | 5.2 | 8.7 | 47.2 | 34.1 | 9.7 | 3.9 | 43.7 | 4400.0 | 14.9 | 0.4 | 4414.9 |
| Sirdarya TPP Receptor 2 (H2) | 42.1 | 4.2 | 7.0 | 46.2 | 34.3 | 7.8 | 3.1 | 41.8 | 4400.0 | 12.0 | 0.3 | 4412.0 |
| H4 | 44.5 | 2.5 | 4.2 | 45.2 | 38.7 | 4.7 | 1.9 | 39.9 | 4400.2 | 7.3 | 0.2 | 4407.3 |

| Receptor | 24 Hour $NO_2$ | | | | 24 Hour NO | | | | 24 Hour CO | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) |
| H6 | 48.0 | 3.3 | 5.4 | 46.9 | 45.1 | 6.1 | 2.4 | 43.1 | 4400.4 | 9.3 | 0.2 | 4409.3 |
| H7 | 48.0 | 3.9 | 6.5 | 46.9 | 45.1 | 7.3 | 2.9 | 43.0 | 4400.4 | 11.2 | 0.3 | 4411.2 |
| H9 | 46.0 | 1.5 | 2.4 | 45.6 | 41.5 | 2.7 | 1.1 | 40.7 | 4400.3 | 4.2 | 0.1 | 4404.3 |
| H10 | 45.4 | 1.6 | 2.6 | 45.3 | 40.3 | 3.0 | 1.2 | 40.2 | 4400.2 | 4.5 | 0.1 | 4404.7 |
| H11 | 46.5 | 2.0 | 3.3 | 46.1 | 42.4 | 3.7 | 1.5 | 41.6 | 4400.3 | 5.7 | 0.1 | 4405.8 |
| H12 | 47.3 | 3.5 | 5.9 | 47.1 | 43.8 | 6.6 | 2.6 | 43.5 | 4400.4 | 10.1 | 0.3 | 4410.2 |
| H13 | 46.1 | 1.7 | 2.8 | 45.6 | 41.6 | 3.1 | 1.3 | 40.7 | 4400.3 | 4.8 | 0.1 | 4404.9 |
| H14 | 48.9 | 2.1 | 3.5 | 47.0 | 46.9 | 3.9 | 1.6 | 43.3 | 4400.5 | 6.0 | 0.1 | 4406.1 |
| H15 | 48.2 | 1.9 | 3.1 | 46.9 | 45.5 | 3.5 | 1.4 | 43.1 | 4400.4 | 5.3 | 0.1 | 4405.4 |
| H16 | 47.0 | 1.7 | 2.8 | 46.4 | 43.4 | 3.2 | 1.3 | 42.2 | 4400.4 | 4.8 | 0.1 | 4405.0 |
| H17 | 48.8 | 1.9 | 3.1 | 46.7 | 46.7 | 3.5 | 1.4 | 42.8 | 4400.5 | 5.4 | 0.1 | 4405.5 |
| H18 | 47.6 | 9.1 | 15.1 | 52.0 | 44.4 | 16.9 | 6.8 | 52.7 | 4400.4 | 25.9 | 0.6 | 4426.0 |
| H19 | 47.8 | 11.5 | 19.1 | 54.5 | 44.8 | 21.4 | 8.6 | 57.2 | 4400.4 | 32.8 | 0.8 | 4432.9 |
| H20 | 46.3 | 0.9 | 1.5 | 45.3 | 42.0 | 1.7 | 0.7 | 40.1 | 4400.3 | 2.6 | 0.1 | 4402.8 |
| H21 | 45.0 | 1.3 | 2.1 | 44.4 | 39.6 | 2.3 | 0.9 | 38.5 | 4400.2 | 3.6 | 0.1 | 4403.7 |
| H22 | 43.9 | 1.0 | 1.7 | 43.9 | 37.5 | 1.9 | 0.8 | 37.5 | 4400.1 | 3.0 | 0.1 | 4403.0 |
| H23 | 43.7 | 0.8 | 1.3 | 43.2 | 37.1 | 1.4 | 0.6 | 36.3 | 4400.1 | 2.2 | 0.1 | 4402.2 |
| H24 | 49.8 | 2.0 | 3.4 | 47.9 | 48.5 | 3.8 | 1.5 | 45.1 | 4400.6 | 5.8 | 0.1 | 4405.9 |
| H25 | 50.2 | 1.8 | 3.0 | 47.6 | 49.2 | 3.4 | 1.3 | 44.5 | 4400.6 | 5.2 | 0.1 | 4405.3 |
| H26 | 47.6 | 2.1 | 3.6 | 45.7 | 44.4 | 4.0 | 1.6 | 40.9 | 4400.4 | 6.1 | 0.2 | 4406.1 |
| H27 | 45.0 | 5.3 | 8.8 | 47.3 | 39.6 | 9.9 | 4.0 | 43.9 | 4400.2 | 15.2 | 0.4 | 4415.2 |
| H28 | 49.3 | 3.1 | 5.2 | 47.0 | 47.6 | 5.9 | 2.3 | 43.4 | 4400.5 | 9.0 | 0.2 | 4409.1 |
| H29 | 50.8 | 1.9 | 3.2 | 47.3 | 50.5 | 3.6 | 1.5 | 43.8 | 4400.6 | 5.6 | 0.1 | 4405.7 |
| H30 | 48.3 | 1.6 | 2.6 | 46.0 | 45.8 | 2.9 | 1.2 | 41.5 | 4400.4 | 4.5 | 0.1 | 4404.5 |
| H31 | 46.9 | 1.4 | 2.3 | 45.3 | 43.2 | 2.5 | 1.0 | 40.2 | 4400.3 | 3.9 | 0.1 | 4403.9 |

| Receptor | 24 Hour $NO_2$ | | | | 24 Hour NO | | | | 24 Hour CO | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) |
| H32 | 47.1 | 1.3 | 2.1 | 45.3 | 43.5 | 2.4 | 1.0 | 40.1 | 4400.4 | 3.7 | 0.1 | 4403.7 |
| H33 | 46.2 | 1.4 | 2.4 | 44.9 | 41.8 | 2.6 | 1.1 | 39.4 | 4400.3 | 4.1 | 0.1 | 4404.1 |
| H34 | 48.1 | 1.2 | 2.0 | 46.1 | 45.3 | 2.3 | 0.9 | 41.6 | 4400.4 | 3.5 | 0.1 | 4403.6 |
| H35 | 46.4 | 1.5 | 2.4 | 45.1 | 42.2 | 2.7 | 1.1 | 39.8 | 4400.3 | 4.2 | 0.1 | 4404.2 |
| H36 | 46.5 | 1.5 | 2.5 | 45.5 | 42.4 | 2.7 | 1.1 | 40.5 | 4400.3 | 4.2 | 0.1 | 4404.3 |
| H37 | 50.7 | 2.1 | 3.5 | 48.2 | 50.1 | 3.9 | 1.6 | 45.6 | 4400.6 | 6.0 | 0.2 | 4406.2 |
| H38 | 44.1 | 0.9 | 1.4 | 43.5 | 37.9 | 1.6 | 0.6 | 36.7 | 4400.1 | 2.4 | 0.1 | 4402.5 |
| H39 | 43.8 | 1.2 | 1.9 | 43.7 | 37.3 | 2.2 | 0.9 | 37.2 | 4400.1 | 3.3 | 0.1 | 4403.3 |
| H40 | 44.1 | 1.4 | 2.3 | 44.2 | 38.0 | 2.5 | 1.0 | 38.1 | 4400.2 | 3.9 | 0.1 | 4403.9 |
| D1: Central Control Building | 45.3 | 2.8 | 4.7 | 44.9 | 40.1 | 5.3 | 2.1 | 39.4 | 4400.2 | 8.1 | 0.2 | 4408.1 |
| D2: Workshop Area | 44.7 | 2.0 | 3.4 | 44.6 | 39.1 | 3.8 | 1.5 | 38.9 | 4400.2 | 5.8 | 0.1 | 4405.8 |
| D3: Admin Building | 44.4 | 2.6 | 4.4 | 44.8 | 38.4 | 4.9 | 1.9 | 39.3 | 4400.2 | 7.5 | 0.2 | 4407.5 |
| D4: Social Building | 44.4 | 2.4 | 4.1 | 44.8 | 38.4 | 4.6 | 1.8 | 39.3 | 4400.2 | 7.0 | 0.2 | 4407.0 |
| D5: Gatehouse | 44.4 | 2.6 | 4.4 | 44.8 | 38.4 | 4.9 | 2.0 | 39.3 | 4400.2 | 7.5 | 0.2 | 4407.5 |
| **Standard** | 60 | | | | 250 | | | | 4000 | | | |

**Table C13: Maximum Predicted Monthly Mean Concentrations – Combined Cycle ($\mu g/m^3$)**

| Receptor | Monthly $NO_2$ | | | | Monthly NO | | | | Monthly CO | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) |
| Residential Area A (H3) | 42.3 | 1.4 | 2.8 | 43.4 | 34.6 | 2.6 | 2.1 | 36.6 | 4400.02 | 3.9 | 0.11 | 4403.95 |
| Residential Area B (H1) | 42.2 | 2.7 | 5.4 | 44.7 | 34.3 | 5.0 | 4.2 | 39.1 | 4400.01 | 7.7 | 0.22 | 4407.74 |
| Residential Area C (H5) | 42.7 | 1.4 | 2.9 | 43.8 | 35.3 | 2.7 | 2.2 | 37.3 | 4400.05 | 4.1 | 0.12 | 4404.12 |

| Receptor | Monthly $NO_2$ | | | | Monthly NO | | | | Monthly CO | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) |
| Residential Area D (new homes) | 43.5 | 0.6 | 1.1 | 43.3 | 36.8 | 1.1 | 0.9 | 36.5 | 4400.10 | 1.6 | 0.05 | 4401.67 |
| Residential Area E (accommodation blocks (H8) | 43.4 | 0.9 | 1.8 | 43.4 | 36.6 | 1.7 | 1.4 | 36.6 | 4400.10 | 2.6 | 0.08 | 4402.65 |
| Military Barracks | 42.7 | 0.8 | 1.6 | 42.8 | 35.3 | 1.5 | 1.2 | 35.6 | 4400.05 | 2.3 | 0.07 | 4402.29 |
| Sirdarya TPP Receptor 1 (H2) | 42.0 | 1.1 | 2.3 | 43.1 | 34.0 | 2.1 | 1.8 | 36.1 | 4400.00 | 3.3 | 0.09 | 4403.26 |
| Sirdarya TPP Receptor 2 (H2) | 42.0 | 1.0 | 1.9 | 43.0 | 34.0 | 1.8 | 1.5 | 35.8 | 4400.00 | 2.7 | 0.08 | 4402.73 |
| H4 | 42.3 | 0.7 | 1.3 | 42.8 | 34.6 | 1.2 | 1.0 | 35.5 | 4400.02 | 1.9 | 0.05 | 4401.90 |
| H6 | 43.3 | 0.6 | 1.3 | 43.3 | 36.5 | 1.2 | 1.0 | 36.5 | 4400.09 | 1.9 | 0.05 | 4401.88 |
| H7 | 43.2 | 0.8 | 1.6 | 43.4 | 36.3 | 1.4 | 1.2 | 36.6 | 4400.09 | 2.2 | 0.06 | 4402.24 |
| H9 | 42.5 | 0.2 | 0.4 | 42.5 | 34.9 | 0.3 | 0.3 | 34.8 | 4400.04 | 0.5 | 0.01 | 4400.54 |
| H10 | 42.6 | 0.2 | 0.5 | 42.5 | 35.1 | 0.4 | 0.4 | 35.0 | 4400.04 | 0.7 | 0.02 | 4400.69 |
| H11 | 42.5 | 0.2 | 0.5 | 42.5 | 35.0 | 0.4 | 0.4 | 34.9 | 4400.04 | 0.7 | 0.02 | 4400.70 |
| H12 | 42.7 | 0.5 | 1.0 | 42.9 | 35.4 | 0.9 | 0.7 | 35.6 | 4400.05 | 1.4 | 0.04 | 4401.39 |
| H13 | 42.6 | 0.2 | 0.4 | 42.5 | 35.1 | 0.4 | 0.3 | 34.9 | 4400.04 | 0.6 | 0.02 | 4400.58 |
| H14 | 43.3 | 0.4 | 0.8 | 43.0 | 36.5 | 0.7 | 0.6 | 35.9 | 4400.09 | 1.1 | 0.03 | 4401.17 |
| H15 | 43.2 | 0.4 | 0.8 | 43.0 | 36.2 | 0.7 | 0.6 | 35.8 | 4400.08 | 1.1 | 0.03 | 4401.15 |
| H16 | 43.0 | 0.3 | 0.7 | 42.8 | 35.9 | 0.6 | 0.5 | 35.5 | 4400.07 | 1.0 | 0.03 | 4400.98 |
| H17 | 43.2 | 0.4 | 0.7 | 43.0 | 36.3 | 0.7 | 0.6 | 35.9 | 4400.09 | 1.0 | 0.03 | 4401.07 |
| H18 | 42.9 | 1.0 | 2.0 | 43.3 | 35.7 | 1.9 | 1.6 | 36.4 | 4400.06 | 2.9 | 0.08 | 4402.88 |
| H19 | 43.0 | 1.1 | 2.3 | 43.4 | 35.8 | 2.1 | 1.8 | 36.7 | 4400.07 | 3.2 | 0.09 | 4403.27 |
| H20 | 42.5 | 0.1 | 0.3 | 42.4 | 35.0 | 0.3 | 0.2 | 34.8 | 4400.04 | 0.4 | 0.01 | 4400.41 |
| H21 | 42.5 | 0.1 | 0.3 | 42.4 | 34.9 | 0.3 | 0.2 | 34.7 | 4400.03 | 0.4 | 0.01 | 4400.42 |
| H22 | 42.3 | 0.2 | 0.3 | 42.3 | 34.5 | 0.3 | 0.2 | 34.5 | 4400.02 | 0.4 | 0.01 | 4400.45 |
| H23 | 42.3 | 0.2 | 0.4 | 42.4 | 34.5 | 0.4 | 0.3 | 34.7 | 4400.02 | 0.6 | 0.02 | 4400.62 |
| H24 | 43.1 | 0.5 | 1.0 | 43.0 | 36.0 | 0.9 | 0.8 | 35.9 | 4400.08 | 1.4 | 0.04 | 4401.41 |

| Receptor | Monthly $NO_2$ | | | | Monthly NO | | | | Monthly CO | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) | Baseline (including existing TPP) | PC | PC as % of Standard | PEC (including retained TPP) |
| H25 | 43.2 | 0.5 | 0.9 | 43.1 | 36.3 | 0.9 | 0.7 | 36.0 | 4400.09 | 1.4 | 0.04 | 4401.39 |
| H26 | 43.7 | 0.5 | 1.1 | 43.3 | 37.1 | 1.0 | 0.8 | 36.5 | 4400.12 | 1.5 | 0.04 | 4401.59 |
| H27 | 42.5 | 2.1 | 4.2 | 44.2 | 34.8 | 3.9 | 3.2 | 38.0 | 4400.03 | 5.9 | 0.17 | 4405.94 |
| H28 | 44.7 | 0.8 | 1.7 | 44.2 | 39.1 | 1.6 | 1.3 | 38.1 | 4400.19 | 2.4 | 0.07 | 4402.51 |
| H29 | 44.3 | 0.6 | 1.2 | 43.7 | 38.2 | 1.1 | 0.9 | 37.2 | 4400.16 | 1.6 | 0.05 | 4401.72 |
| H30 | 43.7 | 0.4 | 0.8 | 43.3 | 37.2 | 0.8 | 0.6 | 36.3 | 4400.12 | 1.2 | 0.03 | 4401.21 |
| H31 | 43.5 | 0.3 | 0.6 | 43.1 | 36.9 | 0.6 | 0.5 | 36.0 | 4400.11 | 0.9 | 0.02 | 4400.93 |
| H32 | 43.7 | 0.3 | 0.7 | 43.2 | 37.1 | 0.6 | 0.5 | 36.2 | 4400.12 | 0.9 | 0.03 | 4400.99 |
| H33 | 43.5 | 0.3 | 0.6 | 43.0 | 36.8 | 0.6 | 0.5 | 35.9 | 4400.10 | 0.9 | 0.02 | 4400.91 |
| H34 | 44.1 | 0.4 | 0.8 | 43.5 | 37.9 | 0.7 | 0.6 | 36.7 | 4400.14 | 1.1 | 0.03 | 4401.17 |
| H35 | 43.1 | 0.4 | 0.7 | 42.9 | 36.0 | 0.7 | 0.6 | 35.7 | 4400.07 | 1.1 | 0.03 | 4401.09 |
| H36 | 43.0 | 0.4 | 0.8 | 42.8 | 35.8 | 0.8 | 0.6 | 35.5 | 4400.07 | 1.2 | 0.03 | 4401.19 |
| H37 | 44.1 | 0.7 | 1.3 | 43.6 | 37.9 | 1.2 | 1.0 | 37.0 | 4400.15 | 1.9 | 0.05 | 4401.94 |
| H38 | 42.3 | 0.2 | 0.4 | 42.3 | 34.6 | 0.4 | 0.3 | 34.6 | 4400.02 | 0.6 | 0.02 | 4400.58 |
| H39 | 42.3 | 0.3 | 0.5 | 42.4 | 34.6 | 0.5 | 0.4 | 34.7 | 4400.02 | 0.7 | 0.02 | 4400.73 |
| H40 | 42.4 | 0.3 | 0.6 | 42.5 | 34.8 | 0.5 | 0.5 | 34.9 | 4400.03 | 0.8 | 0.02 | 4400.85 |
| D1: Central Control Building | 42.5 | 0.7 | 1.4 | 42.8 | 35.0 | 1.3 | 1.1 | 35.6 | 4400.04 | 2.0 | 0.06 | 4402.00 |
| D2: Workshop Area | 42.5 | 0.6 | 1.2 | 42.9 | 34.9 | 1.1 | 0.9 | 35.6 | 4400.04 | 1.7 | 0.05 | 4401.76 |
| D3: Admin Building | 42.4 | 0.8 | 1.6 | 42.9 | 34.8 | 1.5 | 1.2 | 35.6 | 4400.03 | 2.3 | 0.07 | 4402.28 |
| D4: Social Building | 42.4 | 0.8 | 1.7 | 42.9 | 34.8 | 1.5 | 1.3 | 35.6 | 4400.03 | 2.4 | 0.07 | 4402.36 |
| D5: Gatehouse | 42.5 | 0.8 | 1.5 | 42.9 | 34.9 | 1.4 | 1.2 | 35.7 | 4400.03 | 2.2 | 0.06 | 4402.16 |
| **Standard** | 50 | | | | 120 | | | | 3500 | | | |

# APPENDIX L– NOISE MONITORING RESULTS

# Annex 1. Data log

## 1.1. Basic scope

Table 0-1 Noise monitoring for weekday (28th May)

| | | | | | | | Noise pressure level (in Gb at the oscillation speed Db and the average geometric frequency in the octave area) | | | | | | | | | Noise level (equivalent noise level in points) | Allowable amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Point | **GPS coordinates** | Ambient temperature °C | Wind speed, m/s | Wind direction | Start time | End time | 31.5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | |
| | 7:00 am – 23:00 pm | sunny | | | | | **79** | **63** | 52 | **45** | 39 | **35** | **32** | **30** | **28** | **40** | **55** |
| **1** | Lat: 40.236226°<br>Lon: 69.101855° | 29 | 0 | South | $07^{00}$ | $07^{20}$ | 68.1 | 60.1 | 47.8 | 41.3 | 38.4 | 33.8 | 29.6 | 26.8 | 24.6 | 38.8 | 49,6 |
| | | 30 | 0 | South | $07^{40}$ | $08^{00}$ | 65.4 | 59.7 | 49.2 | 43.2 | 35.8 | 31.3 | 28.5 | 24.9 | 23.1 | 36.2 | 45,4 |
| | | 32 | 0.2 | South-East | $08^{15}$ | $08^{30}$ | 60.0 | 55.4 | 47.5 | 41.8 | 33.4 | 28.6 | 25.4 | 22.3 | 21.0 | 34.5 | 41,8 |
| **3** | Lat: 40.246446°<br>Lon: 69.109537° | 33 | 0.3 | South-East | $09^{00}$ | $09^{20}$ | 58.4 | 52.2 | 45.2 | 40.4 | 34.8 | 26.4 | 26.4 | 25.4 | 20.6 | 35.4 | 42,3 |
| | | 35 | 0.5 | South-East | $09^{40}$ | $10^{00}$ | 62.5 | 54.2 | 47.2 | 42.8 | 34.4 | 27.6 | 26.4 | 23.2 | 21.4 | 34.8 | 42,0 |
| | | 36 | 0.6 | East | $10^{15}$ | $10^{35}$ | 60.1 | 52.1 | 46.4 | 41.4 | 35.4 | 26.6 | 22.4 | 24.2 | 22.4 | 35.1 | 40,2 |
| **6** | Lat: 40.237435°<br>Lon: 69.121277° | 37 | 1.2 | East | $11^{00}$ | $11^{20}$ | 58.2 | 50.0 | 44.2 | 38.6 | 34.2 | 28.6 | 26.4 | 22.0 | 23.4 | 32.1 | 42,1 |
| | | 37 | 1.5 | East | $11^{40}$ | $12^{00}$ | 56.1 | 52.0 | 44.4 | 36.6 | 35.2 | 27.4 | 26.0 | 20.0 | 22.2 | 34.0 | 40,1 |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **37** | 1.8 | East | $12^{20}$ | $12^{35}$ | 54.2 | 53.1 | 40.2 | 34.6 | 36.1 | 28.2 | 28.1 | 22.1 | 24.1 | 36.1 | 42,0 |
| **7** | Lat: 40.231497° Lon: 69.121150° | 38 | 1.7 | East | $13^{00}$ | $13^{20}$ | 56.1 | 54.2 | 42.2 | 36.8 | 35.2 | 28.2 | 27.4 | 22.4 | 25.2 | 35.2 | 40,0 |
| | | 38 | 1.7 | East | $13^{40}$ | $14^{00}$ | 55.2 | 55.1 | 43.0 | 36.8 | 35.2 | 28.2 | 27.4 | 22.4 | 25.2 | 34.0 | 40,2 |
| | | 39 | 1.6 | East | $14^{20}$ | $14^{40}$ | 54.3 | 56.2 | 42.0 | 35.2 | 36.0 | 27.1 | 26.2 | 23.1 | 26.2 | 35.0 | 39,1 |
| **2** | Lat: 40.246555° Lon: 69.098598° | 39 | 1.7 | East, North-East | $15^{05}$ | $15^{20}$ | 52.0 | 55.2 | 42.1 | 36.1 | 35.0 | 26.2 | 26.0 | 23.0 | 25.1 | 36.0 | 40,1 |
| | | 37 | 1 | North-West, West | $15^{40}$ | $16^{00}$ | 56.3 | 54.7 | 44.8 | 40.3 | 37.5 | 31.3 | 28.4 | 23.7 | 21.9 | 37.5 | 45,3 |
| | | 36 | 1.1 | West | $16^{20}$ | $16^{35}$ | 60.1 | 58.8 | 46.6 | 39.4 | 35.5 | 34.1 | 30.5 | 27.1 | 24.3 | 38.6 | 46,9 |
| **4** | Lat: 40.246868° Lon: 69.115726° | 36 | 1.6 | West | $17^{05}$ | $17^{20}$ | 65.3 | 61.1 | 49.5 | 41.8 | 37.4 | 31.9 | 29.3 | 27.5 | 25.8 | 37.1 | 43,8 |
| | | 35 | 1.4 | West, South-West | $17^{40}$ | $18^{00}$ | 61.1 | 58.6 | 51.9 | 40.6 | 35.5 | 29.8 | 26.6 | 25.9 | 27.3 | 40.0 | 45,7 |
| | | 33 | 1.6 | East | $19^{10}$ | $19^{30}$ | 63.4 | 55.4 | 50.3 | 42.7 | 35.1 | 30.6 | 29.8 | 25.5 | 23.8 | 34.2 | 43,3 |
| **8** | Lat: 40.228839° Lon: 69.112272° | 33 | 1 | East | $20^{00}$ | $20^{20}$ | 61.8 | 57.1 | 48.6 | 40.3 | 38.2 | 31.4 | 30.1 | 29.3 | 25.4 | 37.5 | 49,4 |
| | | 30 | 0.5 | East | $20^{40}$ | $21^{00}$ | 64.1 | 60.5 | 51.9 | 41.4 | 37.8 | 34.9 | 28.6 | 27.4 | 21.9 | 33.8 | 45,6 |
| | | 27 | 0.6 | East | $21^{20}$ | $21^{40}$ | 60.5 | 59.8 | 50.3 | 38.6 | 35.4 | 33.5 | 30.8 | 28.9 | 25.6 | 36.6 | 47,8 |
| **5** | Lat: 40.244618° Lon: 69.126085° | 25 | 07 | East. South-East | $22^{00}$ | $22^{15}$ | 59.8 | 57.5 | 49.9 | 37.3 | 34.8 | 30.7 | 29.3 | 27.6 | 23.4 | 38.4 | 45.3 |
| | | 25 | 0 | - | $22^{25}$ | $22^{40}$ | 61.7 | 56.4 | 51.9 | 40.6 | 33.5 | 34.9 | 27.4 | 25.9 | 21.5 | 35.7 | 45,5 |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 23 | 0.5 | South | $22^{45}$ | $23^{00}$ | 58.5 | 53.4 | 47.5 | 35.6 | 34.8 | 31.3 | 25.7 | 23.3 | 20.6 | 33.9 | 48,2 |
| | 23:00 pm - 7:00 am | | | | | | **72** | **55** | **44** | **35** | **29** | **25** | **22** | 20 | **18** | **40** | 45 |
| **1** | Lat: 40.236226° Lon: 69.101855° | 22 | 0.5 | South-East | $23^{00}$ | $23^{05}$ | 57.8 | 53.4 | 41.3 | 33.4 | 27.7 | 23.6 | 19.8 | 17.5 | 17.7 | 37.2 | 40,4 |
| | | 22 | 0.8 | South-East | $23^{15}$ | $23^{20}$ | 60.0 | 50.2 | 40.1 | 30.8 | 27.1 | 22.2 | 21.4 | 19.8 | 15.6 | 35.9 | 42,5 |
| | | 22 | 0 | East | $23^{30}$ | $23^{35}$ | 59.2 | 48.1 | 38.1 | 32.0 | 25.1 | 20.1 | 18.1 | 16.1 | 16.1 | 32.4 | 40,1 |
| **8** | Lat: 40.228839° Lon: 69.112272° | 25 | 0.8 | East | $23^{50}$ | $23^{55}$ | 57.1 | 49.1 | 36.1 | 33.0 | 24.0 | 21.1 | 16.0 | 14.1 | 14.1 | 30.1 | 38,1 |
| | | 25 | 0.5 | East | $24^{05}$ | $24^{10}$ | 58.3 | 47.1 | 35.0 | 31.0 | 24.2 | 21.4 | 15.4 | 13.2 | 13.0 | 32.2 | 36,2 |
| | | 25 | 0.6 | East | $24^{20}$ | $24^{25}$ | 59.2 | 47.0 | 34.2 | 31.2 | 25.2 | 20.2 | 16.2 | 13.5 | 14.2 | 34.0 | 40.1 |
| **2** | Lat: 40.246555° Lon: 69.098598 | 24 | 0.4 | East | $24^{45}$ | $24^{50}$ | 58.1 | 46.0 | 33.0 | 31.4 | 25.2 | 21.1 | 16.0 | 13.2 | 14.0 | 32.0 | 39,2 |
| | | 24 | 0.7 | East | $01^{00}$ | $01^{05}$ | 57.2 | 44.0 | 32.0 | 30.4 | 25.2 | 20.1 | 17.0 | 13.4 | 13.2 | 32.2 | 38,2 |
| | | 23 | 0 | East | $01^{15}$ | $01^{20}$ | 59.2 | 47.0 | 34.2 | 31.2 | 25.2 | 20.2 | 16.2 | 13.5 | 14.2 | 34.0 | 40,1 |
| **3** | Lat: 40.246446° Lon: 69.109537 | 22 | 0.5 | East | $01^{40}$ | $01^{45}$ | 58.2 | 45.0 | 32.0 | 30.4 | 25.2 | 21.1 | 17.0 | 13.4 | 13.0 | 33.2 | 39,2 |
| | | 21 | 0.6 | East | $01^{55}$ | $02^{05}$ | 58.2 | 45.0 | 32.0 | 30.1 | 24.0 | 21.0 | 16.4 | 13.2 | 13.0 | 32.4 | 39,4 |
| | | 21 | 0 | East | $02^{15}$ | $02^{20}$ | 58.2 | 45.0 | 32.0 | 31.2 | 25.2 | 21.1 | 17.0 | 13.4 | 13.0 | 33.2 | 38,1 |
| **4** | Lat: 40.246868° Lon: 69.115726° | 21 | 0.6 | East | $02^{35}$ | $02^{40}$ | 58.1 | 46.0 | 33.0 | 31.4 | 25.2 | 21.1 | 16.0 | 13.2 | 14.0 | 32.0 | 39,2 |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 22 | 0.5 | East | $02^{50}$ | $02^{55}$ | 60.1 | 44.1 | 32.0 | 30.5 | 20.1 | 19.1 | 17.2 | 14.1 | 12.1 | 32.1 | 36,4 |
| | | 23 | 0.6 | South, South-West | $03^{05}$ | $03^{10}$ | 58.1 | 46.0 | 33.0 | 31.4 | 25.2 | 21.1 | 16.0 | 13.2 | 14.0 | 32.0 | 39,2 |
| | | 24 | 0.7 | South | $03^{25}$ | $03^{30}$ | 56.0 | 53.7 | 48.8 | 34.8 | 30.5 | 28.7 | 24.9 | 22.3 | 18. | 31.5 | 17.9 |
| **7** | Lat: 40.231497° Lon: 69.121150° | 24 | 0.4 | South | $03^{40}$ | $03^{45}$ | 58.2 | 45.0 | 32.0 | 30.1 | 24.0 | 21.0 | 16.4 | 13.2 | 13.0 | 32.4 | 39,4 |
| | | 25 | 0.3 | South | $03^{55}$ | $04^{00}$ | 57.2 | 44.1 | 32.0 | 32.1 | 24.1 | 21.0 | 16.4 | 12.1 | 13.0 | 30.0 | 36,0 |
| | | 26 | 0.7 | South-East, East | $04^{20}$ | $04^{25}$ | 58.1 | 46.0 | 33.0 | 31.4 | 25.2 | 21.1 | 16.0 | 13.2 | 14.0 | 32.0 | 39,2 |
| 6 | Lat: 40.237435° Lon: 69.121277° | 27 | 0.7 | South-East | $04^{35}$ | $04^{40}$ | 58.2 | 45.0 | 32.0 | 30.1 | 24.0 | 21.0 | 16.4 | 13.2 | 13.0 | 32.4 | 39,4 |
| | | 27 | 0.6 | South-East | $04^{50}$ | $04^{55}$ | 58.4 | 46.0 | 33.0 | 31.4 | 25.2 | 21.1 | 16.0 | 13.2 | 14.0 | 32.0 | 35,2 |
| | | 28 | 0.4 | South-East | $06^{10}$ | $06^{15}$ | 60.1 | 44.1 | 32.0 | 30.5 | 20.1 | 19.1 | 17.2 | 14.1 | 12.1 | 32.1 | 36,4 |
| **5** | Lat: 40.244618° Lon: 69.126085° | 28 | 0.7 | East | $06^{25}$ | $06^{30}$ | 58.1 | 46.0 | 33.0 | 31.4 | 25.2 | 21.1 | 16.0 | 13.2 | 14.0 | 32.0 | 39,4 |
| | | 29 | 0.6 | South-East | $06^{40}$ | $07^{00}$ | 57.2 | 44.1 | 32.0 | 32.1 | 24.1 | 21.0 | 16.4 | 12.1 | 13.0 | 30.0 | 36,0 |

Table 0-2 Nose monitoring on weekend (31st May)

| | | Noise pressure level (in Gb at the oscillation speed Db and the average geometric frequency in the octave area) | Noise level (equivalent noise level in points) | Allowable amount |
|---|---|---|---|---|

| 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Point | **GPS coordinates** | Ambient temperature °C | Wind speed | Wind direction | Start time | End time | 31.5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | |
| | 7:00 am – 23:00 pm | sunny | | | | | 79 | 63 | 52 | 45 | 39 | 35 | 32 | 30 | 28 | 40 | 55 |
| 1 | Lat: 40.236226° Lon: 69.101855° | 25 | 0.5 | East | $07^{00}$ | $07^{20}$ | 67.2 | 59.2 | 47.4 | 40.3 | 37.0 | 32.4 | 26.2 | 27.2 | 25.2 | 36.2 | 48.2 |
| | | 25 | 1.1 | East | $07^{40}$ | $08^{00}$ | 68.4 | 59.0 | 46.2 | 39.1 | 36.0 | 32.4 | 25.1 | 25.1 | 24.1 | 35.1 | 47.0 |
| | | 26 | 1.5 | North-East | $08^{20}$ | $08^{40}$ | 59.0 | 54.2 | 47.5 | 41.8 | 32.2 | 28.6 | 24.2 | 22.3 | 21.0 | 34.2 | 41.8 |
| 3 | Lat: 40.236226° Lon: 69.101855° | 26 | 1.3 | East | $09^{00}$ | $09^{20}$ | 65.1 | 58.0 | 45.2 | 39.1 | 35.0 | 32.4 | 24.1 | 25.0 | 24.4 | 35.2 | 46.0 |
| | | 27 | 1.5 | East | $09^{40}$ | $10^{00}$ | 62.5 | 54.2 | 47.2 | 42.8 | 34.4 | 27.6 | 26.4 | 23.2 | 21.4 | 34.8 | 42.0 |
| | | 29 | 1.6 | East | $10^{20}$ | $10^{40}$ | 60.1 | 52.1 | 46.4 | 41.4 | 35.4 | 26.6 | 22.4 | 24.2 | 22.4 | 35.1 | 40.2 |
| 6 | Lat: 40.237435° Lon: 69.121277° | 31 | 0.5 | East | $11^{00}$ | $11^{20}$ | 62.5 | 54.2 | 47.2 | 42.8 | 34.4 | 27.6 | 26.4 | 23.2 | 21.4 | 34.8 | 42.0 |
| | | 33 | 0.4 | East, North-East | $11^{40}$ | $12^{00}$ | 54.1 | 52.1 | 44.2 | 35.6 | 35.2 | 25.4 | 26.0 | 20.1 | 22.6 | 35.0 | 40.4 |
| | | 35 | 0.8 | East | $12^{20}$ | $12^{40}$ | 54.2 | 53.1 | 40.2 | 34.4 | 36.1 | 28.2 | 28.1 | 22.1 | 24.1 | 36.2 | 42.1 |
| **7** | Lat: 40.231497° Lon: 69.121150° | 38 | 0.7 | East | $13^{00}$ | $13^{20}$ | 55.1 | 52.2 | 42.1 | 35.8 | 1<br>35.1 | 28.2 | 27.4 | 22.4 | 252 | 35.1 | 40.1 |
| | | 39 | 0 | - | $13^{40}$ | $14^{00}$ | 54.0 | 55.1 | 42.0 | 36.8 | 34.0 | 28.2 | 26.2 | 22.1 | 25.6 | 32.0 | 39.2 |
| | | 39 | 0 | - | $14^{20}$ | $14^{45}$ | 53.3 | 56.2 | 43.0 | 35.2 | 36.0 | 27.4 | 26.2 | 23.1 | 26.2 | 34.0 | 38.2 |
| | | 39 | 0 | - | $15^{05}$ | $15^{20}$ | 52.0 | 55.2 | 42.1 | 36.1 | 35.0 | 26.2 | 26.0 | 23.0 | 25.1 | 36.0 | 40.1 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 39 | 0 | - | $15^{40}$ | $16^{00}$ | 55.3 | 54.7 | 42.2 | 40.2 | 37.5 | 31.2 | 28.4 | 23.4 | 21.2 | 36.1 | 44.1 |
| | | 39 | 0 | - | $16^{20}$ | $16^{40}$ | 60.1 | 58.8 | 46.6 | 39.4 | 35.5 | 34.1 | 30.5 | 27.1 | 24.3 | 36.1 | 45.0 |
| **4** | Lat: 40.246868° Lon: 69.115726° | 38 | 0 | - | $17^{00}$ | $17^{20}$ | 65.3 | 61.1 | 49.5 | 41.8 | 37.4 | 31.9 | 29.3 | 27.5 | 25.8 | 37.1 | 43.8 |
| | | 38 | 0.8 | West | $17^{40}$ | $18^{00}$ | 60.1 | 55.0 | 51.2 | 39.0 | 34.0 | 27.0 | 26.6 | 24.0 | 26.0 | 34.0 | 42.0 |
| | | 36 | 0.8 | West, North-West | $18^{25}$ | $18^{55}$ | 63.4 | 55.4 | 50.3 | 42.7 | 35.1 | 30.6 | 29.8 | 25.5 | 23.8 | 34.0 | 43.3 |
| **8** | Lat: 40.228839° Lon: 69.112272E | 34 | 0.7 | East | $19^{15}$ | $19^{35}$ | 61.6 | 56.0 | 46.0 | 39.0 | 36.0 | 31.2 | 30.0 | 29.3 | 24.0 | 36.0 | 44.2 |
| | | 29 | 0.4 | East | $20^{05}$ | $20^{20}$ | 62.0 | 60.5 | 51.9 | 41.4 | 37.8 | 32.0 | 28.6 | 27.4 | 21.9 | 33.8 | 45.6 |
| | | 28 | 0.4 | East | $20^{40}$ | $21^{00}$ | 60.5 | 59.8 | 50.3 | 38.6 | 35.4 | 30.0 | 29.0 | 26.0 | 25.6 | 32.0 | 47.8 |
| **5** | Lat: 40.244618° Lon: 69.126085° | 27 | 0.2 | South-East | $21^{20}$ | $21^{40}$ | 56.0 | 54 | 49.9 | 37.3 | 34.8 | 30.7 | 29.3 | 27.6 | 23.4 | 38.4 | 45.3 |
| | | 26 | 0.4 | East | $22^{00}$ | $22^{20}$ | 61.7 | 54.0 | 51.9 | 40.6 | 33.5 | 34.9 | 27.4 | 25.9 | 21.5 | 35.7 | 45.5 |
| | | 25 | 0.6 | East | $22^{40}$ | $22^{55}$ | 56.0 | 52.0 | 46.0 | 36.0 | 34.0 | 31.3 | 25.7 | 22.0 | 19.0 | 32.0 | 46.0 |
| | **23:00 pm - 7:00 am** | | | | | | | | | | | | | | | | |
| | | | | | | | 72 | 55 | 44 | 35 | 29 | 25 | 22 | 20 | 18 | 40 | 45 |
| **1** | Lat: 40.236226° Lon: 69.101855° | 24 | 0.2 | East | $23^{00}$ | $23^{05}$ | 56.0 | 52.0 | 40.1 | 32.2 | 26.4 | 22.5 | 18.1 | 16.4 | 16.0 | 32.0 | 36.0 |
| | | 22 | 0.6 | South | $23^{15}$ | $23^{20}$ | 58.3 | 47.1 | 35.0 | 31.0 | 24.2 | 21.4 | 15.4 | 13.2 | 13.0 | 32.2 | 36.2 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 22 | 0.5 | South-West | $23^{30}$ | $23^{35}$ | 59.2 | 48.1 | 38.1 | 32.0 | 25.1 | 20.1 | 18.1 | 16.1 | 16.1 | 32.4 | 40.1 |
| 8 | Lat: 40.228839° Lon: 69.112272° | 22 | 0.8 | South-West | $23^{50}$ | $23^{55}$ | 57.1 | 49.1 | 36.1 | 33.0 | 24.0 | 21.1 | 16.0 | 14.1 | 14.1 | 30.1 | 38.1 |
| | | 22 | 0.8 | South-West | $00^{05}$ | $00^{10}$ | 58.1 | 46.0 | 33.0 | 31.4 | 25.2 | 21.1 | 16.0 | 13.2 | 14.0 | 32.0 | 39.2 |
| | | 22 | 0.6 | South-West | $00^{20}$ | $00^{25}$ | 59.1 | 46.0 | 34.2 | 30.1 | 25.2 | 19.1 | 16.2 | 13.5 | 14.2 | 33.1 | 40.0 |
| 2 | Lat: 40.246555° Lon: 69.098598 | 22 | 0.6 | East | $24^{45}$ | $24^{50}$ | 58.1 | 46.0 | 33.0 | 31.4 | 25.2 | 21.1 | 16.0 | 13.2 | 14.0 | 32.0 | 39.2 |
| | | 22 | 0.4 | East | $01^{00}$ | $01^{05}$ | 57.2 | 44.0 | 32.0 | 30.4 | 25.2 | 20.1 | 17.0 | 13.4 | 13.2 | 32.2 | 38.2 |
| | | 22 | 0.4 | South-East | $01^{15}$ | $01^{20}$ | 59.2 | 47.0 | 34.2 | 31.2 | 25.2 | 20.2 | 16.2 | 13.5 | 14.2 | 34.0 | 40.1 |
| 3 | Lat: 40.246446° Lon: 69.109537 | 21 | 0 | - | $0I^{40}$ | $0I^{45}$ | 58.1 | 44.0 | 32.0 | 30.4 | 25.2 | 21.1 | 17.0 | 13.4 | 13.0 | 33.0 | 39.0 |
| | | 21 | 0 | - | $01^{55}$ | $02^{05}$ | 56.2 | 44.0 | 32.1 | 30.4 | 24.0 | 21.0 | 16.0 | 14.0 | 13.0 | 32.4 | 37.0 |
| | | 21 | 0 | - | $02^{15}$ | $02^{20}$ | 58.4 | 45.0 | 32.0 | 31.2 | 25.2 | 21.1 | 17.0 | 13.4 | 13.0 | 33.2 | 38.1 |
| **4** | Lat: 40.246868° Lon: 69.115726° | 21 | 0 | - | $02^{35}$ | $02^{40}$ | 58.1 | 46.0 | 33.0 | 31.4 | 25.2 | 21.1 | 16.0 | 13.2 | 14.0 | 32.0 | 39.2 |
| | | 21 | 0 | - | $02^{50}$ | $02^{55}$ | 60.1 | 44.1 | 32.0 | 30.5 | 20.1 | 19.1 | 17.2 | 14.1 | 12.1 | 32.1 | 36.4 |
| | | 21 | 0 | - | $03^{05}$ | $03^{10}$ | 58.1 | 45.0 | 32.0 | 31.4 | 25.2 | 20.1 | 15.0 | 13.2 | 14.0 | 32.4 | 37.4 |
| **7** | Lat: 40.231497° Lon: 69.121150° | 21 | 0.5 | North | $03^{25}$ | $03^{30}$ | 56.0 | 53.7 | 48.8 | 34.8 | 30.5 | 28.7 | 24.9 | 22.3 | 18. | 31.5 | 17.9 |
| | | 21 | 0.5 | North-East,North | $03^{40}$ | $03^{45}$ | 56.2 | 44.0 | 32.0 | 30.0 | 23.0 | 20.0 | 16.1 | 12.1 | 12.0 | 32.0 | 36.0 |
| | | 21 | 0.3 | East | $03^{55}$ | $04^{00}$ | 56.2 | 42.2 | 32.0 | 30.0 | 24.1 | 21.0 | 15.0 | 13.0 | 12.0 | 31.0 | 34.0 |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **6** | Lat: 40.237435° Lon: 69.121277° | 21 | 0.6 | East | $04^{20}$ | $04^{25}$ | 57.1 | 45.0 | 34.0 | 32.4 | 25.2 | 21.1 | 15.0 | 13.0 | 14.0 | 32.0 | 36.0 |
| | | 21 | 0.8 | East | $04^{35}$ | $04^{40}$ | 57.0 | 44.0 | 32.0 | 31.0 | 23.0 | 21.0 | 16.4 | 12.0 | 13.0 | 30.2 | 37.2 |
| | | 21 | 0.4 | South-East | $04^{50}$ | $04^{55}$ | 58.4 | 46.0 | 33.0 | 31.4 | 25.2 | 21.1 | 16.0 | 13.2 | 14.0 | 32.0 | 35.2 |
| **5** | Lat: 40.244618° Lon: 69.126085° | 21 | 0.6 | East | $06^{10}$ | $06^{15}$ | 60.0 | 45.1 | 33.0 | 30.5 | 21.0 | 19.1 | 18.0 | 13.2 | 12.4 | 32.0 | 35.0 |
| | | 24 | 0.6 | East | $06^{25}$ | $06^{30}$ | 57.1 | 45.0 | 33.0 | 31.0 | 24.2 | 20.0 | 15.0 | 14.0 | 13.0 | 30.4 | 38.0 |
| | | 24 | 0.6 | East | $06^{40}$ | $07^{00}$ | 58.0 | 43.2 | 32.0 | 33.2 | 24.0 | 21.4 | 15.2 | 13.2 | 14.1 | 31.0 | 35.0 |

## 1.2. Additional scope

Table 0-3 NM 1 (weekday)

| **№** | **Start time** | **End time** | **Sound pressure in octave bands with geometric mean frequencies, Hz** | | | | | | | | | **LAeq, dB** | **LAmax, dB** | **Additional noise sources** | **Meteo data** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **31,5** | **63** | **125** | **250** | **500** | **1000** | **2000** | **4000** | **8000** | | | | **Temperature, $^0C$** | **Wind speed, m/sec** | **Pressure, mm Hg** | **Wind direction** |
| **NM 1 – 23.06.2020 г. (weekday). Coordinates: 40°14'10.41"N 69° 06'6.68" E; h = 1,2 м.** | | | | | | | | | | | | | | | | | | |
| 1 | $10^{10}$ | $10^{25}$ | 44,2 | 43,3 | 42,1 | 41,3 | 41,1 | 41,3 | 42,1 | 41,2 | 40,4 | 45,3 | 48,0 | Sirdarya TPP | 36,8 | 1,28 – 2,34 | 725 | NE |
| LA(min) Fast 35,0 – LA(max) Fast 37,1 | | | | | | | | | | | | | | | | | | |
| 2 | $10^{40}$ | $11^{55}$ | 44,9 | 43,7 | 42,1 | 41,3 | 41,0 | 41,3 | 42,2 | 41,2 | 40,2 | 41,3 | 47,2 | Sirdarya TPP | 36,4 | 1,7 – 2,4 | 725 | NE |
| LA(min) Fast 35,9 – LA(max) Fast 37,1 | | | | | | | | | | | | | | | | | | |
| 3 | $11^{10}$ | $11^{25}$ | 32,6 | 32,5 | 32,3 | 32,1 | 32,0 | 31,8 | 31,7 | 31,5 | 32,6 | 34,2 | 45,0 | Sirdarya TPP | 38,2 | 1,16 – 2,19 | 725 | SW |
| LA(min) Fast 27,9 – LA(max) Fast 30,1 | | | | | | | | | | | | | | | | | | |
| 4 | $11^{40}$ | $11^{55}$ | 34,6 | 34,3 | 34,1 | 33,0 | 32,8 | 32,7 | 32,0 | 31,8 | 31,7 | 36,2 | 47,2 | Sirdarya TPP | 38,7 | 1,64 – 2,81 | 725 | SW |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^0$C | Wind speed, m/sec | Pressure, mm Hg | Wind direction |
| LA(min) Fast 28,4 – LA(max) Fast 30,5 | | | | | | | | | | | | | | | | | | |
| 5 | $12^{05}$ | $12^{20}$ | 32,6 | 32,5 | 32,3 | 32,1 | 32,0 | 31,8 | 31,7 | 31,5 | 32,6 | 36,6 | 47,8 | Sirdarya TPP | 38,2 | 1,16 – 2,19 | 725 | SE |
| LA(min) Fast 29,9 – LA(max) Fast 32,1 | | | | | | | | | | | | | | | | | | |
| 6 | $12^{35}$ | $12^{50}$ | 34,6 | 34,3 | 34,1 | 32,0 | 32,8 | 32,7 | 32,0 | 31,8 | 31,7 | 35,5 | 47,2 | Sirdarya TPP | 38,7 | 1,24 – 2,78 | 725 | SE |
| LA(min) Fast 28,4 – LA(max) Fast 31,8 | | | | | | | | | | | | | | | | | | |
| 7 | $13^{15}$ | $13^{30}$ | 32,6 | 32,5 | 32,3 | 32,1 | 32,0 | 31,8 | 31,7 | 31,5 | 32,6 | 35,5 | 47,5 | Sirdarya TPP | 39,1 | 1,29 – 2,56 | 725 | SE |
| LA(min) Fast 28,0 – LA(max) Fast 30,1 | | | | | | | | | | | | | | | | | | |
| 8 | $13^{40}$ | $13^{55}$ | 42,9 | 43,2 | 42,4 | 44,0 | 43,2 | 44,8 | 45,1 | 45,3 | 45,0 | 40,0 | 52,0 | Sirdarya TPP, cars | 39,4 | 1,97 – 2,04 | 725 | SE |
| LA(min) Fast 28,7 – LA(max) Fast 31,0 | | | | | | | | | | | | | | | | | | |
| 9 | $14^{10}$ | $14^{25}$ | 32,1 | 32,3 | 32,6 | 32,3 | 33,2 | 33,8 | 33,6 | 33,3 | 33,1 | 42,0 | 51,8 | Sirdarya TPP, cars | 39,8 | 1,63 – 3,19 | 725 | SE |
| LA(min) Fast 34,0 – LA(max) Fast 36,0 | | | | | | | | | | | | | | | | | | |
| 10 | $14^{35}$ | $14^{50}$ | 41,0 | 41,2 | 44,0 | 44,3 | 44,0 | 44,4 | 44,2 | 44,3 | 45,1 | 44,6 | 60,1 | Sirdarya TPP, cars | 39,2 | 1,94 – 3,24 | 725 | SE |
| LA(min) Fast 34,4 – LA(max) Fast 35,9 | | | | | | | | | | | | | | | | | | |
| 11 | $15^{00}$ | $15^{15}$ | 41,0 | 41,2 | 44,0 | 44,3 | 44,0 | 44,4 | 43,2 | 43,3 | 43,1 | 43,8 | 59,8 | Sirdarya TPP, cars | 40,7 | 2,72 – 4,15 | 724 | SW |
| LA(min) Fast 30,0 – LA(max) Fast 34,3 | | | | | | | | | | | | | | | | | | |
| 12 | $15^{40}$ | $15^{55}$ | 41,0 | 41,2 | 44,0 | 44,3 | 44,0 | 44,4 | 44,2 | 44,3 | 45,1 | 43,5 | 57,8 | Sirdarya TPP, cars | 40,4 | 2,12 – 3,46 | 724 | SW |
| LA(min) Fast 31,0 – LA(max) Fast 34,0 | | | | | | | | | | | | | | | | | | |
| 13 | $16^{10}$ | $16^{25}$ | 34,2 | 34,7 | 34,4 | 33,6 | 34,2 | 34,4 | 35,4 | 32,7 | 31,3 | 33,8 | 56,4 | Sirdarya TPP, cars | 38,9 | 1,54 – 2,69 | 724 | SE |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^0C$ | Wind speed, m/sec | Pressure, mm Hg | Wind direction |
| LA(min) Fast 31,2 – LA(max) Fast 34,4 | | | | | | | | | | | | | | | | | | |
| 14 | $16^{44}$ | $16^{59}$ | 34,2 | 35,7 | 35,4 | 34,6 | 36,2 | 34,4 | 35,4 | 32,7 | 32,3 | 34,6 | 58,9 | Sirdarya TPP, cars | 38,2 | 1,13 – 2,01 | 724 | SE |
| LA(min) Fast 32,2 – LA(max) Fast 35,1 | | | | | | | | | | | | | | | | | | |
| 15 | $17^{03}$ | $17^{18}$ | 34,2 | 35,7 | 35,4 | 34,6 | 36,2 | 34,4 | 35,4 | 32,7 | 32,3 | 37,8 | 49,0 | Sirdarya TPP, | 38,6 | 1,63 – 2,7 | 724 | SE |
| LA(min) Fast 32,2 – LA(max) Fast 33,9 | | | | | | | | | | | | | | | | | | |
| 16 | $17^{44}$ | $17^{59}$ | 34,2 | 35,7 | 35,4 | 34,6 | 36,2 | 34,4 | 35,4 | 32,7 | 32,3 | 37,8 | 49,4 | Sirdarya TPP, cars | 38,5 | 1,89 – 2,31 | 724 | SE |
| LA(min) Fast 30,9 – LA(max) Fast 33,4 | | | | | | | | | | | | | | | | | | |
| 17 | $18^{00}$ | $18^{12}$ | 43,2 | 43,4 | 44,0 | 43,3 | 44,0 | 43,2 | 43,0 | 43,1 | 44,2 | 41,2 | 52,8 | Sirdarya TPP, cars | 36,3 | 0,79 – 1,27 | 724 | SE |
| LA(min) Fast 30,0 – LA(max) Fast 31,0 | | | | | | | | | | | | | | | | | | |
| 18 | $18^{35}$ | $18^{50}$ | 43,8 | 43,4 | 44,0 | 43,3 | 44,0 | 43,4 | 44,0 | 43,1 | 44,0 | 40,4 | 43,9 | Sirdarya TPP, cars | 36,0 | 0,44 – 1,98 | 724 | SE |
| LA(min) Fast 30,1 – LA(max) Fast 31,1 | | | | | | | | | | | | | | | | | | |
| 19 | $19^{00}$ | $19^{15}$ | 34,2 | 35,7 | 35,4 | 34,6 | 36,2 | 34,4 | 35,1 | 32,7 | 32,0 | 35,2 | 45,0 | Sirdarya TPP, cars | 34,2 | 0,38 – 0,61 | 724 | NW |
| LA(min) Fast 32,9 – LA(max) Fast 35,4 | | | | | | | | | | | | | | | | | | |
| 20 | $19^{44}$ | $19^{59}$ | 34,2 | 35,7 | 35,4 | 34,6 | 36,2 | 34,4 | 35,4 | 32,7 | 32,3 | 32,2 | 42,1 | Sirdarya TPP | 34,2 | 0,31 – 0,89 | 724 | NW |
| LA(min) Fast 32,2 – LA(max) Fast 36,9 | | | | | | | | | | | | | | | | | | |
| 21 | $20^{00}$ | $20^{15}$ | 44,3 | 45,1 | 45,3 | 46,0 | 45,2 | 46,3 | 46,1 | 45,2 | 46,2 | 43,4 | 52,2 | Sirdarya TPP | 31,3 | 0,68 – 1,13 | 724 | NE |
| LA(min) Fast 43,0 – LA(max) Fast 45,0 | | | | | | | | | | | | | | | | | | |
| 22 | $20^{38}$ | $20^{53}$ | 44,9 | 45,1 | 45,3 | 46,0 | 45,2 | 46,2 | 46,1 | 45,2 | 46,0 | 43,2 | 59,8 | Sirdarya TPP, cars | 31,0 | 0,55 – 1,14 | 724 | NE |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^0$C | Wind speed, m/sec | Pressure, mm Hg | Wind direction |
| LA(min) Fast 43,7 – LA(max) Fast 45,8 | | | | | | | | | | | | | | | | | | |
| 23 | $21^{10}$ | $21^{25}$ | 55,0 | 54,0 | 53,0 | 53,4 | 52,2 | 55,0 | 55,2 | 53,3 | 53,4 | 50,6 | 62,1 | Sirdarya TPP, cars | 29,2 | 0,47 – 1,14 | 724 | NE |
| LA(min) Fast 40,0 – LA(max) Fast 47,0 | | | | | | | | | | | | | | | | | | |
| 24 | $21^{40}$ | $21^{55}$ | 55,1 | 54,0 | 53,0 | 53,2 | 52,2 | 55,0 | 55,0 | 53,3 | 53,1 | 50,8 | 61,8 | Sirdarya TPP, cars | 29,1 | 0,64 – 1,19 | 724 | NE |
| LA(min) Fast 41,2 – LA(max) Fast 47,9 | | | | | | | | | | | | | | | | | | |
| 25 | $22^{00}$ | $22^{15}$ | 41,0 | 41,2 | 44,0 | 44,3 | 44,0 | 44,4 | 45,2 | 45,3 | 45,1 | 44,4 | 50,0 | Sirdarya TPP, cars | 26,8 | 2,4 – 4,15 | 725 | NE |
| LA(min) Fast 45,2 – LA(max) Fast 47,0 | | | | | | | | | | | | | | | | | | |
| 26 | $22^{38}$ | $22^{53}$ | 51,9 | 52,3 | 52,4 | 52,3 | 53,1 | 51,3 | 52,1 | 51,2 | 52,2 | 46,3 | 58,4 | Sirdarya TPP, cars | 26,2 | 2,77 – 3,98 | 725 | NE |
| LA(min) Fast 47,0 – LA(max) Fast 50,0 | | | | | | | | | | | | | | | | | | |
| 27 | $23^{05}$ | $23^{20}$ | 51,1 | 51,4 | 51,4 | 52,3 | 52,1 | 52,0 | 50,4 | 51,3 | 52,4 | 49,4 | 57,4 | Sirdarya TPP, cars | 26,1 | 1,28 – 2,38 | 725 | NE |
| LA(min) Fast 47,0 – LA(max) Fast 52,0 | | | | | | | | | | | | | | | | | | |
| 28 | $23^{38}$ | $23^{53}$ | 52,7 | 51,4 | 51,4 | 52,3 | 52,1 | 52,0 | 50,4 | 51,3 | 52,2 | 49,0 | 57,4 | Sirdarya TPP, cars | 26,0 | 1,55 – 2,68 | 725 | NE |
| LA(min) Fast 47,4 – LA(max) Fast 50,9 | | | | | | | | | | | | | | | | | | |
| **NM 1 – 24.06.2020 (weekday). Coordinates: 40°14'10.41"N 69° 06'6.68" E; h = 1,2 m.** | | | | | | | | | | | | | | | | | | |
| 29 | $00^{07}$ | $00^{22}$ | 51,4 | 52,3 | 52,4 | 52,3 | 53,1 | 53,1 | 52,0 | 51,4 | 52,2 | 49,2 | 58,2 | Sirdarya TPP, cars | 26,8 | 2,4 – 4,15 | 725 | NE |
| LA(min) Fast 46,0 – LA(max) Fast 51,0 | | | | | | | | | | | | | | | | | | |
| 30 | $00^{44}$ | $00^{59}$ | 51,7 | 52,3 | 52,4 | 52,3 | 53,2 | 53,1 | 52,0 | 51,4 | 52,3 | 47,5 | 54,7 | Sirdarya TPP, cars | 26,4 | 2,55 – 4,04 | 725 | NE |
| LA(min) Fast 46,3 – LA(max) Fast 50,3 | | | | | | | | | | | | | | | | | | |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^{0}C$ | Wind speed, m/sec | Pressure, mm Hg | Wind direction |
| 31 | $01^{12}$ | $01^{27}$ | 50,3 | 51,1 | 51,3 | 52,4 | 51,0 | 51,2 | 51,3 | 51,0 | 51,2 | 46,6 | 54,1 | Sirdarya TPP, frogs | 24,3 | 0,97 – 2,15 | 726 | NE |
| LA(min) Fast 45,5 – LA(max) Fast 49,0 | | | | | | | | | | | | | | | | | | |
| 32 | $01^{32}$ | $01^{47}$ | 40,9 | 41,4 | 41,3 | 42,4 | 41,0 | 41,2 | 41,3 | 41,0 | 41,1 | 46,5 | 55,1 | Sirdarya TPP, frogs | 24,1 | 0,36 – 2,94 | 726 | NE |
| LA(min) Fast 45,0 – LA(max) Fast 48,8 | | | | | | | | | | | | | | | | | | |
| 33 | $02^{03}$ | $02^{18}$ | 52,2 | 54,3 | 52,4 | 53,1 | 52,1 | 53,0 | 52,4 | 52,1 | 53,1 | 46,5 | 55,3 | Sirdarya TPP, frogs | 23,6 | 0,69 – 1,19 | 726 | NE |
| LA(min) Fast 43,9 – LA(max) Fast 48,0 | | | | | | | | | | | | | | | | | | |
| 34 | $02^{32}$ | $02^{47}$ | 52,2 | 54,3 | 52,4 | 53,1 | 52,1 | 53,0 | 52,4 | 52,1 | 53,1 | 46,4 | 54,4 | Sirdarya TPP, frogs | 23,0 | 0,44 – 1,56 | 726 | NE |
| LA(min) Fast 43,9 – LA(max) Fast 48,8 | | | | | | | | | | | | | | | | | | |
| 35 | $03^{10}$ | $03^{25}$ | 43,2 | 43,3 | 43,0 | 42,4 | 43,1 | 42,4 | 43,2 | 42,3 | 43,1 | 47,4 | 57,2 | Sirdarya TPP, frogs, cars | 23,2 | 1,27 – 1,74 | 725 | NE |
| LA(min) Fast 44,0 – LA(max) Fast 48,2 | | | | | | | | | | | | | | | | | | |
| 36 | $03^{36}$ | $03^{51}$ | 43,8 | 43,3 | 43,0 | 42,4 | 43,1 | 42,5 | 43,2 | 42,5 | 43,1 | 43,4 | 49,1 | Sirdarya TPP, frogs | 23,1 | 1,84 – 1,95 | 725 | NE |
| LA(min) Fast 43,0 – LA(max) Fast 47,2 | | | | | | | | | | | | | | | | | | |
| 37 | $04^{00}$ | $04^{15}$ | 42,1 | 42,3 | 43,2 | 43,4 | 43,2 | 44,0 | 43,1 | 43,3 | 43,2 | 44,7 | 51,0 | Sirdarya TPP, frogs | 23,0 | 0,81 – 1,43 | 726 | NE |
| LA(min) Fast 44,0 – LA(max) Fast 48,0 | | | | | | | | | | | | | | | | | | |
| 38 | $04^{22}$ | $04^{37}$ | 42,9 | 42,3 | 43,2 | 43,4 | 43,2 | 43,4 | 43,1 | 43,3 | 43,2 | 42,6 | 48,2 | Sirdarya TPP, frogs | 23,3 | 0,9 – 1,71 | 726 | NE |
| LA(min) Fast 42,4 – LA(max) Fast 45,8 | | | | | | | | | | | | | | | | | | |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^{0}C$ | Wind speed, m/sec | Pressure, mm Hg | Wind direction |
| 39 | $05^{17}$ | $05^{32}$ | 51,1 | 51,4 | 52,0 | 52,4 | 52,1 | 51,3 | 51,2 | 51,4 | 53,1 | 51,7 | 58,0 | Sirdarya TPP, frogs, cars | 24,8 | 0,33 – 1,13 | 726 | NW |
| LA(min) Fast 41,0 – LA(max) Fast 45,0 | | | | | | | | | | | | | | | | | | |
| 40 | $05^{43}$ | $05^{58}$ | 51,4 | 51,2 | 52,0 | 52,4 | 52,1 | 51,3 | 51,2 | 51,4 | 53,0 | 52,9 | 57,8 | Sirdarya TPP, frogs, cars | 24,7 | 0,51 – 1,89 | 726 | NW |
| LA(min) Fast 42,1 – LA(max) Fast 45,8 | | | | | | | | | | | | | | | | | | |
| 41 | $06^{10}$ | $06^{35}$ | 54,4 | 54,1 | 54,0 | 55,0 | 54,4 | 54,0 | 54,3 | 54,2 | 53,4 | 48,8 | 59,0 | Sirdarya TPP, frogs, cars | 27,4 | 2,59 – 4,16 | 726 | NE |
| LA(min) Fast 42,1 – LA(max) Fast 48,9 | | | | | | | | | | | | | | | | | | |
| 42 | $06^{45}$ | $07^{00}$ | 54,8 | 54,1 | 54,0 | 54,4 | 54,2 | 54,0 | 54,3 | 54,2 | 53,4 | 47,5 | 57,1 | Sirdarya TPP, frogs, cars | 27,5 | 2,4 – 3,78 | 726 | NE |
| LA(min) Fast 41,8 – LA(max) Fast 48,6 | | | | | | | | | | | | | | | | | | |
| 43 | $07^{12}$ | $07^{27}$ | 41,0 | 41,2 | 44,0 | 44,3 | 44,0 | 44,4 | 45,2 | 45,3 | 45,1 | 43,2 | 52,0 | Sirdarya TPP, frogs | 31,5 | 0,15 – 0,93 | 726 | NE |
| LA(min) Fast 42,4 – LA(max) Fast 44,3 | | | | | | | | | | | | | | | | | | |
| 44 | $07^{39}$ | $07^{54}$ | 43,1 | 43,2 | 44,0 | 43,4 | 43,0 | 43,1 | 43,3 | 43,4 | 44,4 | 44,2 | 54,2 | Sirdarya TPP, frogs, cars | 31,5 | 0,20 – 1,21 | 726 | NE |
| LA(min) Fast 41,8 – LA(max) Fast 44,0 | | | | | | | | | | | | | | | | | | |
| 45 | $08^{00}$ | $08^{15}$ | 52,4 | 53,3 | 53,0 | 53,1 | 52,3 | 52,4 | 53,4 | 54,2 | 53,2 | 43,6 | 59,0 | Sirdarya TPP, cars | 31,6 | 0,57 – 1,89 | 727 | NW |
| LA(min) Fast 42,8 – LA(max) Fast 45,0 | | | | | | | | | | | | | | | | | | |
| 46 | $08^{32}$ | $08^{47}$ | 52,6 | 53,3 | 53,1 | 53,1 | 52,3 | 52,4 | 53,2 | 54,2 | 53,2 | 50,6 | 62,0 | Sirdarya TPP, cars | 31,4 | 0,38 – 1,74 | 727 | NW |
| LA(min) Fast 42,1 – LA(max) Fast 44,7 | | | | | | | | | | | | | | | | | | |
| 47 | $09^{10}$ | $09^{25}$ | 44,1 | 44,3 | 43,4 | 44,0 | 43,2 | 45,1 | 46,3 | 45,2 | 45,4 | 44,4 | 50,0 | Sirdarya TPP | 34,8 | 2,11 – 4,59 | 727 | NW |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^0C$ | Wind speed, m/sec | Pressure, mm Hg | Wind direction |
| LA(min) Fast 43,0 – LA(max) Fast 48,0 | | | | | | | | | | | | | | | | | | |
| 48 | $09^{40}$ | $09^{55}$ | 44,1 | 44,3 | 43,4 | 44,0 | 43,2 | 45,1 | 46,3 | 45,2 | 45,4 | 41,2 | 50,2 | Sirdarya TPP | 34,7 | 2,55 – 4,28 | 727 | NW |
| LA(min) Fast 40,0 – LA(max) Fast 41,7 | | | | | | | | | | | | | | | | | | |

Table 0-4 NM1 (weekend)

| | | | | | | Noise pressure level (in Gb at the oscillation speed Db and the average geometric frequency in the octave area) | | | | | | | | | Noise level (equivalent noise level in points) | Allowable amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GPS coordinates | Ambient Temperature, °C | Wind speed, m/s | Wind direction | Start time | End time | 31.5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | |
| 7:00 am – 23:00 pm | sunny | | | | | 79 | **63** | **52** | **45** | **39** | **35** | 32 | **30** | 28 | **40** | **55** |
| Lat: 40.236226° Lon: 69.101855° | 22 | 1.2 | South | $07^{00}$ | $07^{20}$ | 64.2 | 59.2 | 46.4 | 40.2 | 36.4 | 32.1 | 27.1 | 25.2 | 23.2 | 36.4 | 46.4 |
| | 23 | 1.2 | South | $07^{40}$ | $08^{00}$ | 65.3 | 61.1 | 49.5 | 41.8 | 37.4 | 31.9 | 29.3 | 27.5 | 25.8 | 37.1 | 43.8 |
| | 24 | 1.6 | South-East | $08^{20}$ | $08^{40}$ | 60.2 | 55.1 | 45.5 | 41.8 | 33.4 | 28.4 | 25.4 | 22.3 | 22.0 | 34.2 | 41.1 |
| | 26 | 1.2 | South-East | $09^{00}$ | $09^{20}$ | 58.4 | 52.2 | 45.2 | 40.4 | 34.8 | 26.4 | 26.4 | 25.4 | 20.6 | 35.4 | 42.3 |
| | 27 | 1.1 | South-East | $09^{40}$ | $10^{00}$ | 61.8 | 57.1 | 48.6 | 40.3 | 38.2 | 31.4 | 30.1 | 29.3 | 25.4 | 37.5 | 49.4 |
| | 29 | 1.3 | South | $10^{20}$ | $10^{40}$ | 64.1 | 60.5 | 51.9 | 41.4 | 37.8 | 34.9 | 28.6 | 27.4 | 21.9 | 33.8 | 45.6 |
| | 33 | 0 | - | $11^{00}$ | $11^{20}$ | 56.1 | 51.0 | 44.2 | 38.6 | 34.2 | 28.7 | 26.4 | 21.0 | 23.0 | 30.1 | 40.1 |
| | 34 | 0 | - | $11^{40}$ | $12^{00}$ | 56.1 | 52.0 | 44.4 | 36.6 | 35.2 | 27.4 | 26.0 | 20.0 | 22.2 | 34.0 | 40.1 |
| | 36 | 0 | - | $12^{20}$ | $12^{40}$ | 54.2 | 53.1 | 40.2 | 34.6 | 36.1 | 28.2 | 28.1 | 22.1 | 24.1 | 36.1 | 42.0 |
| | 37 | 0 | - | $13^{00}$ | $13^{20}$ | 56.1 | 54.2 | 42.2 | 36.8 | 35.2 | 28.2 | 27.4 | 22.4 | 25.2 | 35.2 | 40.1 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 38 | 0 | - | $13^{40}$ | $14^{00}$ | 54.2 | 55.0 | 42.0 | 36.8 | 35.2 | 28.2 | 27.4 | 20.4 | 25.2 | 32.0 | 40.0 |
| | 38 | 0.5 | West | $14^{20}$ | $14^{40}$ | 54.3 | 56.2 | 42.0 | 35.2 | 36.0 | 27.1 | 26.2 | 23.1 | 26.2 | 35.0 | 39.1 |
| | 38 | 0.8 | West | $15^{05}$ | $15^{20}$ | 52.0 | 55.2 | 42.1 | 36.1 | 35.0 | 26.2 | 26.0 | 23.0 | 25.1 | 36.0 | 40.1 |
| | 37 | 0.9 | South-West | $15^{40}$ | $16^{00}$ | 56.3 | 54.7 | 44.8 | 40.3 | 37.5 | 31.3 | 28.4 | 23.7 | 21.9 | 37.5 | 45.3 |
| | 36 | 0.4 | South | $16^{20}$ | $16^{40}$ | 65.2 | 61.1 | 49.5 | 41.8 | 37.4 | 31.9 | 29.3 | 27.5 | 25.8 | 37.1 | 43.8 |
| | 35 | 0.4 | East | $17^{00}$ | $17^{20}$ | 60.2 | 58.4 | 51.9 | 39.1 | 35.5 | 29.8 | 24.0 | 24.2 | 27.3 | 39.0 | 42.4 |
| | 34 | 0.2 | East | $17^{40}$ | $18^{00}$ | 60.2 | 55.4 | 50.3 | 42.7 | 34.0 | 30.6 | 27.2 | 24.0 | 23.8 | 32.1 | 42.0 |
| | 33 | 0.5 | East | $19^{20}$ | $19^{40}$ | 60.1 | 56.0 | 46.2 | 40.3 | 38.2 | 31.4 | 30.1 | 29.2 | 21.4 | 36.2 | 45.1 |
| | 33 | 0.4 | East | $20^{00}$ | $20^{20}$ | 62.1 | 54.0 | 51.9 | 41.4 | 37.4 | 34.9 | 28.6 | 27.0 | 21.9 | 32.4 | 44.0 |
| | 31 | 0.3 | South-East | $20^{40}$ | $21^{00}$ | 61.5 | 57.4 | 50.3 | 38.6 | 35.4 | 30.0 | 30.8 | 28.4 | 24.2 | 34.2 | 46.1 |
| | 29 | 0.5 | South-East | $21^{20}$ | $21^{40}$ | 59.8 | 57.5 | 49.9 | 37.3 | 34.8 | 30.7 | 29.3 | 27.6 | 23.4 | 36.4 | 44.3 |
| | 29 | 0.2 | South-East | $22^{00}$ | $22^{20}$ | 62.0 | 54.4 | 52.9 | 41.0 | 32.4 | 34.2 | 27.4 | 23.2 | 22.0 | 34.0 | 43.1 |
| | 28 | 0.5 | South-East | $22^{30}$ | $22^{45}$ | 56.4 | 52.0 | 45.2 | 36.1 | 34.8 | 31.3 | 25.0 | 23.3 | 21.4 | 33.2 | 47.4 |
| $23^{00}$ pm - $7^{00}$am | | | | | | 72 | 55 | 44 | 35 | 29 | 25 | 22 | 20 | 18 | 40 | 45 |
| Lat: 40.236226° Lon: 69.101855° | 28 | 0 | - | $23^{20}$ | $23^{35}$ | 58.2 | 53.4 | 41.6 | 34.0 | 27.7 | 24.2 | 19.4 | 17.5 | 17.0 | 38.0 | 41.2 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 27 | 0 | - | $23^{50}$ | $00^{05}$ | 60.1 | 50.4 | 41.0 | 30.1 | 26.1 | 21.2 | 20.4 | 19.2 | 15.8 | 36.2 | **43.4** |
| | 26 | 0 | - | $00^{20}$ | $00^{35}$ | 58.3 | 47.1 | 35.0 | 31.0 | 24.2 | 21.4 | 15.4 | 13.2 | 13.0 | 32.2 | 36.2 |
| | 25 | 0 | - | $01^{00}$ | $01^{20}$ | 57.2 | 49.1 | 36.1 | 33.0 | 24.4 | 21.1 | 16.0 | 14.0 | 15.2 | 31.2 | 38.6 |
| | 25 | 0 | - | $01^{40}$ | $02^{00}$ | 58.3 | 47.1 | 35.0 | 31.0 | 24.2 | 21.4 | 15.4 | 13.2 | 13.0 | 32.2 | 36.2 |
| | 24 | 0 | - | $02^{20}$ | $02^{40}$ | 60.2 | 47.0 | 35.2 | 32.0 | 25.8 | 20.2 | 16.2 | 14.5 | 15.2 | 34.0 | 42.0 |
| | 24 | 0.5 | East | $03^{00}$ | $03^{20}$ | 60.0 | 47.0 | 33.1 | 31.4 | 25.5 | 21.5 | 16.1 | 13.2 | 14.2 | 33.1 | 40.1 |
| | 23 | 0.4 | East | $03^{40}$ | $04^{00}$ | 58.2 | 45.0 | 32.0 | 30.4 | 25.2 | 21.1 | 17.0 | 13.4 | 13.0 | 33.2 | 39.2 |
| | 23 | 0.6 | East | $04^{20}$ | $04^{40}$ | 59.2 | 47.0 | 35.2 | 31.4 | 25.2 | 20.1 | 16.4 | 13.2 | 14.3 | 34.0 | 41.0 |
| | 20 | 0.5 | East | $05^{00}$ | $05^{20}$ | 60.2 | 45.0 | 32.0 | 30.4 | 25.2 | 21.1 | 17.0 | 13.4 | 13.0 | 33.2 | 39.2 |
| | 20 | 1.5 | South-East | $05^{40}$ | $06^{00}$ | 58.1 | 46.0 | 32.0 | 30.1 | 24.0 | 22.0 | 16.4 | 13.4 | 13.0 | 33.4 | 38.4 |
| | 20 | 1.3 | South-East | $02^{35}$ | $02^{40}$ | 58.2 | 45.0 | 32.0 | 31.2 | 25.2 | 21.1 | 17.0 | 13.4 | 13.0 | 33.2 | 38.1 |
| | 20 | 1.4 | South-East | $03^{50}$ | $03^{55}$ | 58.1 | 46.4 | 33.1 | 31.4 | 26.2 | 21.1 | 16.0 | 14.2 | 14.2 | 32.2 | 38.0 |
| | 21 | 1.5 | South-East | $03^{05}$ | $03^{10}$ | 60.6 | 44.1 | 32.0 | 30.5 | 20.1 | 19.1 | 17.2 | 14.1 | 12.1 | 32.1 | 36.4 |
| | 21 | 0.5 | South-East | $03^{25}$ | $03^{30}$ | 58.1 | 46.2 | 33.0 | 31.5 | 25.2 | 22.1 | 17.0 | 13.2 | 15.0 | 33.0 | 40.2 |
| | 20 | 0.4 | South-East | $03^{45}$ | $03^{55}$ | 59.0 | 54.2 | 48.8 | 34.8 | 30.1 | 28.7 | 18.0 | 22.3 | 14.0 | 32.0 | 39.1 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 20 | 0.6 | South | $04^{35}$ | $04^{40}$ | 58.2 | 45.0 | 32.0 | 30.1 | 24.0 | 21.0 | 16.4 | 13.2 | 13.0 | 32.4 | 39.4 |
| | 20 | 0 | - | $04^{45}$ | $04^{50}$ | 55.2 | 45.1 | 32.0 | 32.1 | 24.5 | 21.4 | 16.2 | 12.6 | 13.0 | 31.0 | 37.0 |
| | 20 | 0 | - | $05^{20}$ | $05^{25}$ | 59.1 | 46.0 | 33.0 | 32.4 | 26.2 | 21.0 | 16.4 | 13.6 | 15.0 | 34.0 | 39.9 |
| | 21 | 0 | - | $05^{35}$ | $05^{40}$ | 60.1 | 44.1 | 32.0 | 30.5 | 20.1 | 19.1 | 17.2 | 14.1 | 12.1 | 32.1 | 36.4 |
| | 21 | 0.5 | West | $06^{05}$ | $06^{15}$ | 58.4 | 46.0 | 33.0 | 31.4 | 25.2 | 21.1 | 16.0 | 13.2 | 14.0 | 32.0 | 35.2 |
| | 22 | 0.7 | West | $06^{20}$ | $06^{25}$ | 60.4 | 44.2 | 32.0 | 30.5 | 20.5 | 19.1 | 18.2 | 14.5 | 13.1 | 33.1 | 37.2 |
| | 22 | 0.4 | West | $06^{30}$ | $06^{35}$ | 59.4 | 47.0 | 33.0 | 32.4 | 25.2 | 21.1 | 17.0 | 13.2 | 15.0 | 34.0 | 40.1 |

Table 0-5 NM 2 (weekend)

| **№** | **Start time** | **End time** | **Sound pressure in octave bands with geometric mean frequencies, Hz** | | | | | | | | | **LAeq, dB** | **LAmax, dB** | **Additional noise sources** | **Meteo data** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **31,5** | **63** | **125** | **250** | **500** | **1000** | **2000** | **4000** | **8000** | | | | **Temperature, $^0$C** | **Wind speed, m/sec** | **Pressure, mmHg** | **Wind direction** |
| **NM 2 – 21.06.2020 (weekend). Coordinates: 40˚14'47.60'' N, 69˚5'54.95'' E; h = 1,2 - 1,3 м.** | | | | | | | | | | | | | | | | | | |
| 1 | $10^{10}$ | $10^{25}$ | 62,4 | 62,7 | 63,2 | 63,4 | 62,7 | 64,0 | 63,0 | 63,1 | 64,0 | 66,3 | 69,0 | birds | 31,3 | 2,31 – 4,16 | 724 | NW |
| LA(min) Fast 64,0 – LA(max) Fast 67,1 | | | | | | | | | | | | | | | | | | |
| 2 | $10^{40}$ | $11^{55}$ | 62,1 | 62,6 | 63,0 | 63,1 | 62,4 | 63,7 | 63,0 | 63,2 | 64,0 | 65,3 | 67,2 | birds | 31,4 | 2,7 – 4,4 | 724 | NW |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^0$C | Wind speed, m/sec | Pressure, mmHg | Wind direction |
| LA(min) Fast 62,9 – LA(max) Fast 66,1 | | | | | | | | | | | | | | | | | | |
| 3 | $11^{10}$ | $11^{25}$ | 61,7 | 61,4 | 62,0 | 61,7 | 61,5 | 61,9 | 62,0 | 62,7 | 62,4 | 62,5 | 65,0 | house. livestock | 32,5 | 3,11 – 4,84 | 724 | NW |
| LA(min) Fast 59,9 – LA(max) Fast 63,1 | | | | | | | | | | | | | | | | | | |
| 4 | $11^{40}$ | $11^{55}$ | 61,5 | 61,3 | 62,0 | 61,5 | 61,4 | 61,7 | 62,0 | 62,4 | 62,2 | 64,2 | 67,2 | house. livestock | 35,7 | 3,64 – 4,81 | 724 | NW |
| LA(min) Fast 60,4 – LA(max) Fast 63,5 | | | | | | | | | | | | | | | | | | |
| 5 | $12^{05}$ | $12^{20}$ | 51,9 | 51,5 | 51,4 | 51,2 | 51,5 | 51,7 | 51,4 | 51,0 | 50,9 | 51,3 | 57,8 | house, birds, trees | 35,8 | 3,27 – 4,94 | 724 | NW |
| LA(min) Fast 50,9 – LA(max) Fast 54,1 | | | | | | | | | | | | | | | | | | |
| 6 | $12^{35}$ | $12^{50}$ | 51,7 | 51,5 | 51,4 | 51,1 | 51,5 | 51,4 | 51,4 | 51,0 | 50,5 | 53,2 | 57,2 | house. livestock, birds, trees | 35,7 | 2,24 – 3,78 | 724 | NW |
| LA(min) Fast 50,4 – LA(max) Fast 53,8 | | | | | | | | | | | | | | | | | | |
| 7 | $13^{15}$ | $13^{30}$ | 36,4 | 35,9 | 36,1 | 35,8 | 35,3 | 35,7 | 35,4 | 36,2 | 36,0 | 37,4 | 57,5 | house. livestock, birds, cars | 37,6 | 0,84 – 1,46 | 722 | SW |
| LA(min) Fast 34,0 – LA(max) Fast 38,1 | | | | | | | | | | | | | | | | | | |
| 8 | $13^{40}$ | $13^{55}$ | 36,0 | 35,7 | 36,1 | 35,5 | 35,3 | 35,4 | 35,4 | 36,0 | 35,7 | 35,5 | 52,0 | house. livestock, birds, | 37,4 | 0,97 – 2,04 | 722 | SW |
| LA(min) Fast 33,7 – LA(max) Fast 36,0 | | | | | | | | | | | | | | | | | | |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^0$C | Wind speed, m/sec | Pressure, mmHg | Wind direction |
| 9 | $14^{10}$ | $14^{25}$ | 36,4 | 36,0 | 36,7 | 35,8 | 35,9 | 36,2 | 36,2 | 36,1 | 36,0 | 37,1 | 61,8 | transport, birds, house. livestock | 38,3 | 0,69 – 1,16 | 722 | SW |
| LA(min) Fast 34,9 – LA(max) Fast 37,7 | | | | | | | | | | | | | | | | | | |
| 10 | $14^{35}$ | $14^{50}$ | 36,2 | 36,0 | 36,8 | 35,4 | 35,9 | 36,2 | 36,2 | 36,0 | 35,8 | 35,2 | 50,1 | birds, house. livestock | 38,1 | 0,94 – 1,24 | 722 | SW |
| LA(min) Fast 32,4 – LA(max) Fast 35,9 | | | | | | | | | | | | | | | | | | |
| 11 | $15^{00}$ | $15^{15}$ | 32,2 | 33,4 | 33,1 | 33,0 | 33,0 | 33,1 | 33,0 | 33,0 | 33,0 | 33,8 | 49,8 | birds, house. livestock, cars | 38,7 | 0,94 – 1,66 | 722 | SW |
| LA(min) Fast 32,0 – LA(max) Fast 34,3 | | | | | | | | | | | | | | | | | | |
| 12 | $15^{40}$ | $15^{55}$ | 32,2 | 33,4 | 33,1 | 33,0 | 33,0 | 33,1 | 33,0 | 33,0 | 33,0 | 33,5 | 37,8 | birds, house. livestock | 38,4 | 1,12 – 1,46 | 722 | SW |
| LA(min) Fast 32,0 – LA(max) Fast 34,0 | | | | | | | | | | | | | | | | | | |
| 13 | $16^{10}$ | $16^{25}$ | 32,1 | 33,2 | 33,1 | 33,0 | 33,1 | 33,1 | 33,0 | 33,0 | 33,1 | 33,8 | 36,4 | birds, house. livestock | 38,4 | 1,28 – 1,36 | 722 | SW |
| LA(min) Fast 31,2 – LA(max) Fast 34,4 | | | | | | | | | | | | | | | | | | |
| 14 | $16^{44}$ | $16^{59}$ | 32,1 | 33,2 | 33,0 | 32,0 | 33,1 | 33,0 | 33,0 | 33,0 | 33,1 | 34,6 | 38,9 | birds, house. livestock | 38,2 | 1,13 – 2,01 | 722 | SW |
| LA(min) Fast 32,2 – LA(max) Fast 35,1 | | | | | | | | | | | | | | | | | | |
| 15 | $17^{03}$ | $17^{18}$ | 32,1 | 33,1 | 33,0 | 32,0 | 33,1 | 33,1 | 33,0 | 33,2 | 33,1 | 33,2 | 42,0 | birds, house. livestock | 36,4 | 2,05 – 2,80 | 722 | SW |
| LA(min) Fast 30,2 – LA(max) Fast 33,9 | | | | | | | | | | | | | | | | | | |
| 16 | $17^{44}$ | $17^{59}$ | 32,1 | 33,1 | 33,0 | 32,0 | 33,1 | 33,1 | 33,0 | 33,2 | 33,1 | 36,0 | 49,4 | birds, house. livestock | 36,5 | 1,89 – 2,01 | 722 | SW |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^0$C | Wind speed, m/sec | Pressure, mmHg | Wind direction |
| LA(min) Fast 33,9 – LA(max) Fast 36,4 | | | | | | | | | | | | | | | | | | |
| 17 | $18^{00}$ | $18^{12}$ | 34,5 | 35,7 | 35,4 | 35,9 | 36,2 | 37,1 | 38,4 | 39,7 | 39,2 | 36,6 | 42,8 | birds, house. livestock, frogs | 36,4 | 0,32 – 0,78 | 722 | SW |
| LA(min) Fast 34,0 – LA(max) Fast 39,0 | | | | | | | | | | | | | | | | | | |
| 18 | $18^{35}$ | $18^{50}$ | 34,2 | 35,7 | 35,4 | 35,6 | 36,2 | 37,4 | 38,4 | 39,7 | 39,3 | 36,2 | 43,9 | birds, house. livestock, frogs | 35,0 | 0,44 – 0,98 | 722 | SW |
| LA(min) Fast 34,1 – LA(max) Fast 38,1 | | | | | | | | | | | | | | | | | | |
| 19 | $19^{00}$ | $19^{15}$ | 33,0 | 34,0 | 34,0 | 33,5 | 34,7 | 34,5 | 35,4 | 36,2 | 37,4 | 35,9 | 55,0 | birds, house. livestock, frogs, transport | 34,7 | 0,33 – 0,67 | 722 | SW |
| LA(min) Fast 34,9 – LA(max) Fast 37,4 | | | | | | | | | | | | | | | | | | |
| 20 | $19^{44}$ | $19^{59}$ | 33,8 | 34,0 | 34,0 | 33,2 | 34,7 | 34,5 | 35,3 | 36,2 | 37,4 | 35,4 | 52,1 | birds, house. livestock, frogs, transport | 34,2 | 0,31 – 0,89 | 722 | SW |
| LA(min) Fast 34,2 – LA(max) Fast 36,9 | | | | | | | | | | | | | | | | | | |
| 21 | $20^{00}$ | $20^{15}$ | 41,0 | 41,2 | 44,0 | 44,3 | 44,0 | 44,4 | 44,2 | 44,3 | 45,1 | 41,3 | 50,2 | birds, house. livestock, crickets, transport | 28,7 | 0,27 – 0,53 | 721 | SW |
| LA(min) Fast 42,0 – LA(max) Fast 44,0 | | | | | | | | | | | | | | | | | | |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^0$C | Wind speed, m/sec | Pressure, mmHg | Wind direction |
| 22 | $20^{38}$ | $20^{53}$ | 41,0 | 41,2 | 44,0 | 44,3 | 44,0 | 44,4 | 44,2 | 44,3 | 45,1 | 43,6 | 53,8 | birds, house. livestock, crickets, transport | 26,4 | 0,55 – 1,14 | 721 | SW |
| LA(min) Fast 41,7 – LA(max) Fast 44,8 | | | | | | | | | | | | | | | | | | |
| 23 | $21^{10}$ | $21^{25}$ | 43,2 | 43,3 | 43,3 | 43,4 | 44,0 | 44,2 | 44,2 | 44,4 | 45,1 | 45,5 | 54,8 | birds, house. livestock, crickets, frogs, transport | 26,9 | 0,57 – 0,83 | 721 | NE |
| LA(min) Fast 44,0 – LA(max) Fast 46,0 | | | | | | | | | | | | | | | | | | |
| 24 | $21^{40}$ | $21^{55}$ | 43,2 | 43,3 | 43,3 | 43,4 | 44,0 | 44,2 | 44,2 | 44,4 | 45,1 | 44,5 | 51,8 | birds, house. livestock, crickets, frogs, transport | 26,1 | 0,64 – 1,19 | 721 | NE |
| LA(min) Fast 43,2 – LA(max) Fast 44,9 | | | | | | | | | | | | | | | | | | |
| 25 | $22^{00}$ | $22^{15}$ | 46,1 | 45,2 | 45,2 | 45,4 | 45,4 | 46,0 | 46,0 | 46,2 | 46,2 | 45,4 | 50,0 | birds, house. livestock, crickets, frogs, | 24,5 | 0,36 – 0,71 | 721 | NE |
| LA(min) Fast 42,2 – LA(max) Fast 46,0 | | | | | | | | | | | | | | | | | | |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^{0}C$ | Wind speed, m/sec | Pressure, mmHg | Wind direction |
| 26 | $22^{38}$ | $22^{53}$ | 46,1 | 45,2 | 45,4 | 45,4 | 45,4 | 46,2 | 46,0 | 46,2 | 46,2 | 43,7 | 48,4 | birds, house. livestock, crickets, frogs, | 24,2 | 0,77 – 0,98 | 721 | NE |
| LA(min) Fast 42,0 – LA(max) Fast 44,0 | | | | | | | | | | | | | | | | | | |
| 27 | $23^{05}$ | $23^{20}$ | 45,4 | 45,2 | 45,4 | 45,4 | 45,4 | 45,7 | 45,4 | 46,2 | 46,2 | 42,6 | 46,4 | birds, house. livestock, crickets, frogs, | 22,4 | 0,41 – 0,62 | 721 | NE |
| LA(min) Fast 41,0 – LA(max) Fast 43,0 | | | | | | | | | | | | | | | | | | |
| 28 | $23^{38}$ | $23^{53}$ | 45,4 | 45,2 | 45,4 | 45,4 | 45,4 | 45,7 | 45,4 | 46,2 | 46,2 | 42,9 | 45,4 | birds, house. livestock, crickets, frogs, | 22,0 | 0,55 – 0,68 | 721 | NE |
| LA(min) Fast 40,4 – LA(max) Fast 42,9 | | | | | | | | | | | | | | | | | | |
| **NM 2 – 22.06.2020 (weekday). Coordinates: 40˚14'47.60'' N, 69˚5'54.95'' E; h = 1,2 - 1,3 m** | | | | | | | | | | | | | | | | | | |
| 29 | $00^{07}$ | $00^{22}$ | 42,1 | 42,1 | 42,2 | 42,3 | 42,4 | 42,5 | 43,3 | 43,4 | 45,1 | 42,6 | 46,2 | crickets, frogs, | 22,1 | 0,41 – 0,81 | 721 | NE |
| LA(min) Fast 41,0 – LA(max) Fast 43,0 | | | | | | | | | | | | | | | | | | |
| 30 | $00^{44}$ | $00^{59}$ | 42,1 | 42,1 | 42,2 | 42,3 | 42,4 | 42,5 | 43,3 | 43,4 | 45,1 | 42,0 | 44,7 | crickets, frogs, | 21,4 | 0,55 – 1,04 | 721 | NE |
| LA(min) Fast 40,3 – LA(max) Fast 44,3 | | | | | | | | | | | | | | | | | | |
| 31 | $01^{12}$ | $01^{27}$ | 41,3 | 41,3 | 41,1 | 41,2 | 41,2 | 40,4 | 41,4 | 42,1 | 42,0 | 41,8 | 44,1 | crickets, frogs, | 21,4 | 0,56 – 0,93 | 721 | NE |
| LA(min) Fast 40,5 – LA(max) Fast 42,0 | | | | | | | | | | | | | | | | | | |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^{0}C$ | Wind speed, m/sec | Pressure, mmHg | Wind direction |
| 32 | $01^{32}$ | $01^{47}$ | 41,3 | 41,3 | 41,1 | 41,2 | 41,2 | 40,4 | 41,4 | 42,1 | 42,0 | 41,1 | 45,1 | crickets, frogs, | 21,1 | 0,36 – 0,94 | 721 | NE |
| LA(min) Fast 41,0 – LA(max) Fast 43,8 | | | | | | | | | | | | | | | | | | |
| 33 | $02^{03}$ | $02^{18}$ | 41,3 | 41,3 | 41,1 | 41,2 | 41,2 | 40,4 | 41,4 | 42,1 | 42,4 | 41,3 | 43,3 | crickets, frogs, house. | 21,0 | 0,43 – 1,06 | 721 | NE |
| LA(min) Fast 40,9 – LA(max) Fast 43,0 | | | | | | | | | | | | | | | | | | |
| 34 | $02^{32}$ | $02^{47}$ | 41,3 | 41,3 | 41,2 | 41,1 | 41,2 | 40,4 | 41,1 | 42,1 | 42,4 | 40,6 | 44,0 | crickets, frogs, house. | 21,0 | 0,44 – 0,56 | 721 | NE |
| LA(min) Fast 39,9 – LA(max) Fast 42,8 | | | | | | | | | | | | | | | | | | |
| 35 | $03^{10}$ | $03^{25}$ | 41,3 | 41,3 | 41,2 | 41,1 | 41,5 | 40,4 | 41,1 | 42,1 | 42,4 | 40,4 | 43,2 | crickets, frogs, house. | 20,3 | 0,71 – 0,91 | 721 | NE |
| LA(min) Fast 40,0 – LA(max) Fast 42,2 | | | | | | | | | | | | | | | | | | |
| 36 | $03^{36}$ | $03^{51}$ | 41,3 | 41,3 | 41,2 | 41,1 | 41,5 | 40,9 | 41,1 | 42,0 | 42,1 | 43,4 | 49,1 | crickets, frogs, house. | 20,1 | 0,84 – 0,95 | 721 | NE |
| LA(min) Fast 43,0 – LA(max) Fast 45,2 | | | | | | | | | | | | | | | | | | |
| 37 | $04^{00}$ | $04^{15}$ | 42,2 | 42,3 | 43,1 | 43,1 | 43,3 | 44,0 | 44,1 | 44,2 | 44,2 | 43,5 | 48,0 | birds, house. | 20,7 | 0,51 – 0,89 | 721 | NE |
| LA(min) Fast 42,0 – LA(max) Fast 44,0 | | | | | | | | | | | | | | | | | | |
| 38 | $04^{22}$ | $04^{37}$ | 42,2 | 42,3 | 43,1 | 43,1 | 43,3 | 44,0 | 44,1 | 44,2 | 44,2 | 44,2 | 48,2 | birds, house. | 20,3 | 0,5 – 0,71 | 721 | NE |
| LA(min) Fast 42,4 – LA(max) Fast 44,8 | | | | | | | | | | | | | | | | | | |
| 39 | $05^{17}$ | $05^{32}$ | 42,1 | 42,1 | 42,0 | 42,0 | 42,1 | 42,2 | 42,3 | 42,3 | 42,4 | 42,5 | 45,0 | birds, house., frogs | 20,9 | 1,13 – 1,76 | 721 | NE |
| LA(min) Fast 41,0 – LA(max) Fast 43,0 | | | | | | | | | | | | | | | | | | |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^0C$ | Wind speed, m/sec | Pressure, mmHg | Wind direction |
| 40 | $05^{43}$ | $05^{58}$ | 42,5 | 42,1 | 42,0 | 42,2 | 42,1 | 42,2 | 42,3 | 42,3 | 42,4 | 43,3 | 44,8 | birds, house. | 20,7 | 0,51 – 0,89 | 721 | NE |
| LA(min) Fast 42,1 – LA(max) Fast 43,8 | | | | | | | | | | | | | | | | | | |
| 41 | $06^{10}$ | $06^{35}$ | 42,5 | 42,1 | 42,1 | 42,2 | 42,1 | 42,2 | 42,3 | 42,3 | 42,7 | 43,7 | 49,0 | birds, house. | 20,4 | 0,63 – 0,95 | 721 | NE |
| LA(min) Fast 40,1 – LA(max) Fast 44,9 | | | | | | | | | | | | | | | | | | |
| 42 | $06^{45}$ | $07^{00}$ | 42,5 | 42,1 | 42,0 | 42,0 | 42,1 | 42,2 | 42,2 | 42,3 | 42,4 | 43,8 | 47,1 | birds, house. | 20,5 | 0,4 – 0,78 | 721 | NE |
| LA(min) Fast 41,8 – LA(max) Fast 44,6 | | | | | | | | | | | | | | | | | | |
| 43 | $07^{12}$ | $07^{27}$ | 43,4 | 44,0 | 44,2 | 44,4 | 45,1 | 43,4 | 46,0 | 46,0 | 45,0 | 47,5 | 52,0 | birds, house., trees | 23,8 | 2,16 – 4,32 | 721 | NW |
| LA(min) Fast 45,4 – LA(max) Fast 48,3 | | | | | | | | | | | | | | | | | | |
| 44 | $07^{39}$ | $07^{54}$ | 43,4 | 44,0 | 44,2 | 44,4 | 45,1 | 43,4 | 46,0 | 46,0 | 45,0 | 48,0 | 54,2 | birds, house., trees | 23,5 | 2,20 – 4,21 | 721 | NW |
| LA(min) Fast 44,8 – LA(max) Fast 49,0 | | | | | | | | | | | | | | | | | | |
| 45 | $08^{00}$ | $08^{15}$ | No measurement due to wind speed > 5 m/s | | | | | | | | | | | | 27,3 | **4,21 – 6,13** | 721 | NW |
| 46 | $08^{32}$ | $08^{47}$ | 52,3 | 55,0 | 55,2 | 55,4 | 55,0 | 55,1 | 55,2 | 55,0 | 55,3 | 54,7 | 62,0 | birds, house., trees, transport | 27,4 | 3,38 – 4,74 | 721 | NW |
| LA(min) Fast 52,1 – LA(max) Fast 55,7 | | | | | | | | | | | | | | | | | | |
| 47 | $09^{10}$ | $09^{25}$ | 61,3 | 61,0 | 62,0 | 62,3 | 63,0 | 63,1 | 64,0 | 65,0 | 65,0 | 62,3 | 66,0 | birds, house., trees, transport | 31,2 | 2,78 – 4,62 | 721 | NW |
| LA(min) Fast 55,0 – LA(max) Fast 64,0 | | | | | | | | | | | | | | | | | | |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^0C$ | Wind speed, m/sec | Pressure, mmHg | Wind direction |
| 48 | $09^{40}$ | $09^{55}$ | 60,3 | 61,0 | 61,8 | 62,0 | 62,4 | 62,1 | 61,8 | 63,4 | 64,0 | 60,7 | 67,2 | birds, house., trees, transport | 31,7 | 2,55 – 4,78 | 721 | NW |
| LA(min) Fast 50,0 – LA(max) Fast 62,7 | | | | | | | | | | | | | | | | | | |

Table 0-6 NM 2 (weekday)

| NM 2 – 24.06.2020 (weekday). Coordinates: 40˚14'47.60'' N, 69˚5'54.95'' E; h = 1,2 - 1,3 m | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 49 | $11^{10}$ | $11^{25}$ | 51,4 | 53,0 | 50,3 | 51,2 | 51,4 | 52,2 | 53,1 | 51,1 | 51,0 | 51,4 | 58,0 | birds, house., trees | 28,5 | 2,71 – 4,56 | 727 | NW |
| LA(min) Fast 50,8 – LA(max) Fast 53,9 | | | | | | | | | | | | | | | | | | |
| 50 | $11^{35}$ | $10^{50}$ | 51,5 | 53,0 | 50,3 | 51,6 | 51,4 | 52,2 | 53,4 | 51,1 | 51,0 | 51,3 | 58,4 | birds, house., trees | 28,4 | 2,38 -4,25 | 727 | NW |
| LA(min) Fast 50,4 – LA(max) Fast 54,9 | | | | | | | | | | | | | | | | | | |
| 51 | $12^{00}$ | $12^{15}$ | 41,4 | 42,1 | 42,0 | 41,2 | 42,2 | 43,1 | 42,0 | 42,1 | 42,1 | 41,3 | 54,0 | birds, house., trees | 41,3 | 0,27 – 1,38 | 726 | SW |
| LA(min) Fast 40,4 – LA(max) Fast 44,9 | | | | | | | | | | | | | | | | | | |
| 52 | $12^{30}$ | $13^{45}$ | 41,8 | 42,1 | 42,0 | 41,2 | 42,2 | 43,1 | 42,4 | 42,4 | 42,1 | 41,7 | 50,0 | birds, house., trees | 42,0 | 0,45 – 1,58 | 726 | SW |
| LA(min) Fast 40,8 – LA(max) Fast 45,1 | | | | | | | | | | | | | | | | | | |
| 53 | $13^{10}$ | $13^{25}$ | 42,4 | 42,0 | 43,1 | 42,2 | 41,4 | 44,2 | 43,3 | 43,1 | 42,1 | 42,0 | 54,0 | birds, house., trees | 42,9 | 1,37 – 2,16 | 726 | ЮВ |
| LA(min) Fast 40,8 – LA(max) Fast 45,1 | | | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 54 | $13^{40}$ | $13^{55}$ | 42,8 | 42,0 | 43,2 | 42,2 | 41,4 | 44,1 | 43,3 | 43,1 | 42,1 | 43,4 | 51,8 | birds, house., trees | 43,0 | 1,46 – 2,9 | 726 | ЮВ |
| LA(min) Fast 43,0 – LA(max) Fast 45,1 | | | | | | | | | | | | | | | | | |
| 55 | $14^{00}$ | $14^{15}$ | 41,0 | 41,3 | 42,1 | 42,4 | 41,4 | 42,3 | 43,1 | 42,4 | 42,3 | 41,6 | 51,8 | birds, house., trees | 43,2 | 1,13 – 2,04 | 726 | SW |
| LA(min) Fast 41,0 – LA(max) Fast 44,1 | | | | | | | | | | | | | | | | | |
| 56 | $14^{40}$ | $14^{55}$ | 41,8 | 41,3 | 42,1 | 42,4 | 41,4 | 42,3 | 43,1 | 42,4 | 42,0 | 41,2 | 48,2 | birds, house., trees | 43,5 | 1,17 – 2,54 | 726 | SW |
| LA(min) Fast 40,0 – LA(max) Fast 45,0 | | | | | | | | | | | | | | | | | |
| 57 | $15^{10}$ | $15^{25}$ | 43,1 | 44,2 | 42,3 | 43,0 | 41,3 | 43,4 | 44,1 | 43,1 | 43,2 | 41,6 | 50,0 | birds, house., trees | 41,6 | 0,96 – 2,17 | 726 | SW |
| LA(min) Fast 40,0 – LA(max) Fast 44,0 | | | | | | | | | | | | | | | | | |
| 57 | $15^{40}$ | $15^{55}$ | 43,5 | 44,2 | 42,3 | 43,0 | 41,3 | 43,4 | 44,4 | 43,1 | 43,2 | 41,5 | 51,2 | birds, house., trees | 41,4 | 1,04 – 2,78 | 726 | SW |
| LA(min) Fast 40,9 – LA(max) Fast 44,6 | | | | | | | | | | | | | | | | | |
| 58 | $16^{00}$ | $16^{15}$ | 43,2 | 44,1 | 42,2 | 43,1 | 42,2 | 44,1 | 41,4 | 41,4 | 41,3 | 45,6 | 50,8 | birds, house., trees | 40,4 | 0,87 – 1,79 | 726 | SW |
| LA(min) Fast 41,9 – LA(max) Fast 44,6 | | | | | | | | | | | | | | | | | |
| 59 | $16^{35}$ | $16^{50}$ | 43,4 | 44,1 | 42,0 | 43,1 | 42,2 | 44,1 | 41,4 | 41,4 | 41,2 | 42,3 | 49,0 | birds, house., trees | 40,6 | 0,34 – 1,67 | 726 | SW |
| LA(min) Fast 40,9 – LA(max) Fast 44,6 | | | | | | | | | | | | | | | | | |
| 60 | $17^{14}$ | $17^{29}$ | 43,0 | 42,4 | 42,3 | 42,4 | 41,4 | 42,1 | 42,1 | 43,1 | 43,3 | 46,5 | 55,6 | birds, house., trees | 37,1 | 0,96 – 2,13 | 726 | SW |
| LA(min) Fast 45,9 – LA(max) Fast 49,6 | | | | | | | | | | | | | | | | | |
| 61 | $17^{40}$ | $17^{55}$ | 43,8 | 42,5 | 42,3 | 42,4 | 41,4 | 42,1 | 42,1 | 43,2 | 43,1 | 43,6 | 54,2 | birds, house., trees | 37,4 | 0,71 – 2,28 | 726 | SW |
| LA(min) Fast 42,0 – LA(max) Fast 48,6 | | | | | | | | | | | | | | | | | |
| 63 | $18^{00}$ | $18^{15}$ | 41,4 | 41,3 | 42,2 | 42,1 | 42,2 | 42,0 | 42,3 | 42,4 | 42,3 | 41,2 | 51,7 | birds, house., trees | 34,8 | 0,03 – 0,37 | 726 | ЮВ |
| LA(min) Fast 40,0 – LA(max) Fast 45,0 | | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 64 | $18^{40}$ | $18^{55}$ | 41,9 | 41,5 | 42,2 | 42,1 | 42,2 | 42,0 | 42,3 | 42,4 | 42,3 | 41,6 | 51,0 | birds, house., trees | 34,4 | 0,4 – 0,75 | 726 | ЮВ |
| LA(min) Fast 40,0 – LA(max) Fast 46,6 | | | | | | | | | | | | | | | | | | |
| 65 | $19^{00}$ | $19^{15}$ | 42,2 | 42,4 | 43,1 | 44,2 | 45,0 | 42,4 | 43,2 | 43,2 | 43,1 | 41,6 | 54,0 | birds, house., frogs | 31,4 | 0,24 – 0,48 | 726 | NW |
| LA(min) Fast 40,0 – LA(max) Fast 46,6 | | | | | | | | | | | | | | | | | | |
| 66 | $19^{40}$ | $19^{55}$ | 42,8 | 42,4 | 43,1 | 44,5 | 45,0 | 42,4 | 43,2 | 43,2 | 43,0 | 41,6 | 54,5 | birds, house., frogs | 31,8 | 0,46 – 1,02 | 726 | NW |
| LA(min) Fast 40,4 – LA(max) Fast 45,9 | | | | | | | | | | | | | | | | | | |
| 67 | $20^{05}$ | $20^{20}$ | 42,2 | 43,1 | 43,4 | 43,0 | 43,2 | 42,4 | 43,2 | 42,2 | 42,4 | 41,0 | 58,0 | birds, house., frogs | 29,7 | 0,34 – 0,62 | 726 | ЮВ |
| LA(min) Fast 40,0 – LA(max) Fast 44,9 | | | | | | | | | | | | | | | | | | |
| 68 | $20^{40}$ | $20^{55}$ | 42,4 | 43,1 | 43,4 | 43,1 | 43,2 | 42,4 | 43,2 | 42,6 | 42,4 | 41,6 | 48,0 | birds, house., frogs | 29,5 | 0,78 – 1,25 | 726 | ЮВ |
| LA(min) Fast 40,4 – LA(max) Fast 46,1 | | | | | | | | | | | | | | | | | | |
| 69 | $21^{00}$ | $21^{15}$ | 46,0 | 44,3 | 45,2 | 46,1 | 45,2 | 45,4 | 46,2 | 44,2 | 45,4 | 43,5 | 54,8 | birds, house., frogs | 27,3 | 1,75 – 3,12 | 727 | NW |
| LA(min) Fast 42,4 – LA(max) Fast 48,1 | | | | | | | | | | | | | | | | | | |
| 70 | $21^{30}$ | $21^{45}$ | 46,6 | 44,3 | 45,2 | 46,1 | 45,2 | 45,2 | 46,2 | 44,2 | 45,0 | 43,3 | 61,8 | birds, house., frogs | 27,1 | 1,15 – 2,28 | 727 | NW |
| LA(min) Fast 40,9 – LA(max) Fast 49,1 | | | | | | | | | | | | | | | | | | |
| 71 | $22^{00}$ | $22^{15}$ | 53,3 | 54,1 | 53,2 | 53,1 | 53,1 | 53,3 | 51,0 | 51,3 | 53,1 | 53,7 | 64,0 | birds, house., frogs | 25,3 | 1,52 – 3,11 | 727 | NW |
| LA(min) Fast 52,1 – LA(max) Fast 58,5 | | | | | | | | | | | | | | | | | | |
| 72 | $22^{30}$ | $22^{45}$ | 53,9 | 54,2 | 53,2 | 53,1 | 53,0 | 53,3 | 51,0 | 51,3 | 53,0 | 53,0 | 61,0 | birds, house., frogs | 25,4 | 1,68 – 2,74 | 727 | NW |
| LA(min) Fast 52,4 – LA(max) Fast 56,1 | | | | | | | | | | | | | | | | | | |
| 73 | $23^{00}$ | $23^{15}$ | 62,4 | 63,1 | 63,0 | 65,0 | 64,3 | 62,2 | 66,2 | 64,2 | 65,1 | 63,6 | 74,0 | birds, house., frogs | 24,9 | 2,54 – 4,28 | 727 | NW |
| LA(min) Fast 63,8 – LA(max) Fast 68,5 | | | | | | | | | | | | | | | | | | |
| 74 | $23^{30}$ | $23^{45}$ | 62,8 | 63,1 | 63,0 | 65,0 | 64,3 | 62,2 | 66,2 | 64,4 | 65,2 | 64,7 | 71,4 | birds, house., frogs | 25,0 | 2,46 – 4,11 | 727 | NW |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LA(min) Fast 52,4 – LA(max) Fast 56,1 | | | | | | | | | | | | | | | | | |
| **NM 2 – 25.06.2020 (weekday). Coordinates: 40˚14'47.60'' N, 69˚5'54.95'' E; h = 1,2 - 1,3 m.** | | | | | | | | | | | | | | | | | |
| 75 | $00^{12}$ | $00^{27}$ | No measurement due to wind speed > 5 m/s | | | | | | | | | | birds, house., frogs, wind | 24,3 | **3,11 – 7,22** | 727 | NW |
| 76 | $00^{33}$ | $00^{48}$ | No measurement due to wind speed > 5 m/s | | | | | | | | | | birds, house., frogs, wind | 24,8 | **3,78 – 7,24** | 727 | NW |
| 77 | $01^{00}$ | $01^{15}$ | No measurement due to wind speed > 5 m/s | | | | | | | | | | birds, house., frogs, wind | 24,1 | **4,63 – 7,42** | 727 | NW |
| 78 | $01^{25}$ | $01^{40}$ | No measurement due to wind speed > 5 m/s | | | | | | | | | | birds, house., frogs, wind | 24,0 | **4,46 – 7,74** | 727 | NW |
| 79 | $02^{00}$ | $02^{15}$ | 51,4 | 52,1 | 52,3 | 53,1 | 52,0 | 51,2 | 54,1 | 55,1 | 53,3 | 56,1 | 64,7 | birds, house., frogs | 22,3 | 2,95 – 4,56 | 727 | NW |
| LA(min) Fast 52,0 – LA(max) Fast 56,7 | | | | | | | | | | | | | | | | | |
| 80 | $02^{30}$ | $02^{45}$ | 51,8 | 52,5 | 52,3 | 53,1 | 52,0 | 51,2 | 54,1 | 55,5 | 53,3 | 52,7 | 68,1 | birds, house., frogs | 22,2 | 2,34 – 4,38 | 727 | NW |
| LA(min) Fast 50,0 – LA(max) Fast 55,5 | | | | | | | | | | | | | | | | | |
| 81 | $03^{00}$ | $03^{15}$ | 54,3 | 55,1 | 53,2 | 54,1 | 53,1 | 54,3 | 52,0 | 52,3 | 54,1 | 56,3 | 58,0 | house., frogs, wind | 21,0 | 2,89 – 4,43 | 727 | SW |
| LA(min) Fast 52,0 – LA(max) Fast 57,5 | | | | | | | | | | | | | | | | | |
| 82 | $03^{40}$ | $03^{55}$ | 54,5 | 55,1 | 53,2 | 54,2 | 53,1 | 54,3 | 52,0 | 52,2 | 54,1 | 54,3 | 58,0 | house., frogs, wind | 21,0 | 2,34 – 4,25 | 727 | SW |
| LA(min) Fast 50,0 – LA(max) Fast 55,1 | | | | | | | | | | | | | | | | | |
| 83 | $04^{00}$ | $04^{15}$ | 52,3 | 54,1 | 53,2 | 52,0 | 53,3 | 54,0 | 51,4 | 52,4 | 54,2 | 53,4 | 59,0 | house., frogs, wind | 21,7 | 2,64 – 4,21 | 727 | SW |
| LA(min) Fast 50,0 – LA(max) Fast 54,0 | | | | | | | | | | | | | | | | | |
| 84 | $04^{25}$ | $04^{40}$ | 52,6 | 54,2 | 53,2 | 52,1 | 53,3 | 54,0 | 51,8 | 52,4 | 54,1 | 54,3 | 59,0 | house., frogs, wind | 21,7 | 2,38 – 4,77 | 727 | SW |
| LA(min) Fast 50,0 – LA(max) Fast 55,1 | | | | | | | | | | | | | | | | | |
| 85 | $05^{10}$ | $05^{25}$ | 54,1 | 53,4 | 55,2 | 56,3 | 53,4 | 55,2 | 53,3 | 52,2 | 53,1 | 56,4 | 61,0 | house., frogs | 22,5 | 1,73 – 3,45 | 727 | SW |
| LA(min) Fast 52,0 – LA(max) Fast 57,2 | | | | | | | | | | | | | | | | | |
| 86 | $05^{35}$ | $05^{50}$ | 54,4 | 53,4 | 55,2 | 56,2 | 53,4 | 55,2 | 53,6 | 52,2 | 53,0 | 55,2 | 61,8 | house., frogs | 22,1 | 1,82 – 3,08 | 727 | SW |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LA(min) Fast 50,0 – LA(max) Fast 56,0 | | | | | | | | | | | | | | | | | | |
| 87 | $06^{00}$ | $06^{15}$ | 53,2 | 54,2 | 53,8 | 53,7 | 53,4 | 53,1 | 52,9 | 53,1 | 52,2 | 51,2 | 58,2 | house., frogs | 25,6 | 2,8 – 4,79 | 727 | SW |
| LA(min) Fast 50,0 – LA(max) Fast 54,0 | | | | | | | | | | | | | | | | | | |
| 88 | $06^{40}$ | $06^{55}$ | 53,4 | 54,3 | 53,8 | 53,7 | 53,6 | 53,1 | 52,9 | 53,1 | 52,1 | 54,4 | 58,4 | house., frogs | 25,4 | 2,4 – 4,52 | 727 | SW |
| LA(min) Fast 50,0 – LA(max) Fast 55,2 | | | | | | | | | | | | | | | | | | |
| 89 | $07^{00}$ | $07^{15}$ | No measurement due to wind speed > 5 m/s | | | | | | | | | | | house., birds, wind | 26,9 | **3,25 – 8,05** | 726 | NW |
| 90 | $07^{30}$ | $07^{45}$ | No measurement due to wind speed > 5 m/s | | | | | | | | | | | house., birds, wind | 26,2 | **4,01 – 7,46** | 726 | NW |
| 91 | $08^{10}$ | $08^{35}$ | No measurement due to wind speed > 5 m/s | | | | | | | | | | | house., birds, wind | 28,1 | **3,78 – 6,16** | 726 | NW |
| 92 | $08^{40}$ | $08^{55}$ | No measurement due to wind speed > 5 m/s | | | | | | | | | | | house., wind | 28,4 | **4,02 – 6,47** | 726 | NW |
| 93 | $09^{04}$ | $09^{19}$ | No measurement due to wind speed > 5 m/s | | | | | | | | | | | house., birds, wind | 30,1 | **8,86 – 12,74** | 726 | NW |
| 94 | $09^{30}$ | $09^{45}$ | No measurement due to wind speed > 5 m/s | | | | | | | | | | | house., birds, wind | 30,2 | **9,01 – 10,36** | 726 | NW |
| 95 | $10^{01}$ | $10^{16}$ | No measurement due to wind speed > 5 m/s | | | | | | | | | | | house., birds, wind | 31,9 | **7,41 – 10,18** | 726 | NW |
| 96 | $10^{40}$ | $10^{55}$ | No measurement due to wind speed > 5 m/s | | | | | | | | | | | house., birds, wind | 32,0 | **8,23 – 9,27** | 726 | NW |

Table 0-7 NM 3 (weekday)

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^0$C | Wind speed, m/sec | Pressure, mm Hg | Wind direction |
| NM 3 – 23.06.2020 (weekday). Coordinates: 40˚14'47.21'' N, 69˚6'34.33'' E; h = 1,2 m | | | | | | | | | | | | | | | | | | |
| 1 | $10^{10}$ | $10^{25}$ | 44,2 | 43,3 | 42,1 | 41,3 | 41,1 | 41,3 | 42,1 | 41,2 | 40,4 | 46,3 | 49,0 | house. livestock, birds. trees | 35,1 | 2,31 – 4,16 | 725 | SE |
| LA(min) Fast 44,0 – LA(max) Fast 47,1 | | | | | | | | | | | | | | | | | | |
| 2 | $10^{40}$ | $11^{55}$ | 44,9 | 43,7 | 42,1 | 41,3 | 41,0 | 41,3 | 42,2 | 41,2 | 40,2 | 41,3 | 47,2 | house. livestock, birds. trees | 35,4 | 2,7 – 4,4 | 725 | SE |
| LA(min) Fast 40,9 – LA(max) Fast 42,1 | | | | | | | | | | | | | | | | | | |
| 3 | $11^{10}$ | $11^{25}$ | 44,2 | 43,9 | 42,1 | 41,3 | 41,0 | 41,3 | 42,4 | 41,2 | 40,0 | 42,5 | 45,0 | house. livestock, birds | 36,8 | 1,28 – 2,34 | 725 | NE |
| LA(min) Fast 39,9 – LA(max) Fast 43,1 | | | | | | | | | | | | | | | | | | |
| 4 | $11^{40}$ | $11^{55}$ | 44,4 | 53,9 | 52,1 | 51,3 | 51,0 | 51,2 | 52,4 | 51,2 | 50,0 | 46,2 | 57,2 | house. livestock, birds | 36,7 | 1,64 – 2,81 | 725 | NE |
| LA(min) Fast 40,4 – LA(max) Fast 43,5 | | | | | | | | | | | | | | | | | | |
| 5 | $12^{05}$ | $12^{20}$ | 44,1 | 44,0 | 42,3 | 42,3 | 43,0 | 42,2 | 42,0 | 42,2 | 42,3 | 41,3 | 47,8 | house. livestock, birds, trees | 38,2 | 1,16 – 2,19 | 725 | SE |
| LA(min) Fast 44,9 – LA(max) Fast 47,1 | | | | | | | | | | | | | | | | | | |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^{0}C$ | Wind speed, m/sec | Pressure, mm Hg | Wind direction |
| 6 | $12^{35}$ | $12^{50}$ | 44,1 | 44,0 | 42,3 | 42,3 | 43,0 | 42,2 | 42,0 | 42,2 | 42,3 | 43,2 | 52,2 | house. livestock, birds, trees | 38,7 | 1,24 – 2,78 | 725 | SE |
| LA(min) Fast 44,4 – LA(max) Fast 47,8 | | | | | | | | | | | | | | | | | | |
| 7 | $13^{15}$ | $13^{30}$ | 42,3 | 43,2 | 42,4 | 44,0 | 43,2 | 44,2 | 45,1 | 45,3 | 45,4 | 43,0 | 47,5 | house. livestock, birds, car | 39,1 | 1,29 – 2,56 | 725 | SE |
| LA(min) Fast 42,0 – LA(max) Fast 45,1 | | | | | | | | | | | | | | | | | | |
| 8 | $13^{40}$ | $13^{55}$ | 42,9 | 43,2 | 42,4 | 44,0 | 43,2 | 44,8 | 45,1 | 45,3 | 45,0 | 43,2 | 52,0 | house. livestock, birds, | 39,4 | 1,97 – 2,04 | 725 | SE |
| LA(min) Fast 41,7 – LA(max) Fast 46,0 | | | | | | | | | | | | | | | | | | |
| 9 | $14^{10}$ | $14^{25}$ | 50,3 | 51,1 | 50,0 | 51,2 | 52,2 | 51,4 | 52,3 | 51,2 | 51,0 | 52,0 | 61,8 | birds, house. livestock, trees | 39,8 | 1,63 – 3,19 | 725 | SE |
| LA(min) Fast 51,0 – LA(max) Fast 54,0 | | | | | | | | | | | | | | | | | | |
| 10 | $14^{35}$ | $14^{50}$ | 50,8 | 51,0 | 51,0 | 51,2 | 52,2 | 51,4 | 52,3 | 51,2 | 51,0 | 52,6 | 60,1 | birds, house. livestock, trees | 39,2 | 1,94 – 3,24 | 725 | SE |
| LA(min) Fast 50,4 – LA(max) Fast 55,9 | | | | | | | | | | | | | | | | | | |
| 11 | $15^{00}$ | $15^{15}$ | 53,0 | 51,0 | 51,2 | 51,3 | 51,4 | 51,1 | 51,2 | 51,4 | 51,1 | 53,8 | 59,8 | birds, house. livestock, car | 40,7 | 2,92 – 4,15 | 724 | SW |
| LA(min) Fast 50,0 – LA(max) Fast 54,3 | | | | | | | | | | | | | | | | | | |
| 12 | $15^{40}$ | $15^{55}$ | 53,4 | 51,0 | 51,0 | 51,3 | 51,4 | 51,1 | 51,2 | 51,2 | 51,1 | 53,5 | 57,8 | birds, house. livestock | 40,4 | 2,12 – 3,46 | 724 | SW |
| LA(min) Fast 51,0 – LA(max) Fast 54,0 | | | | | | | | | | | | | | | | | | |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^{0}C$ | Wind speed, m/sec | Pressure, mm Hg | Wind direction |
| 13 | $16^{10}$ | $16^{25}$ | 51,0 | 50,4 | 51,2 | 51,3 | 51,1 | 51,2 | 50,4 | 51,1 | 51,2 | 53,8 | 56,4 | birds, house. livestock | 38,9 | 1,12 – 2,69 | 724 | SE |
| LA(min) Fast 51,2 – LA(max) Fast 54,4 | | | | | | | | | | | | | | | | | | |
| 14 | $16^{44}$ | $16^{59}$ | 52,1 | 53,2 | 53,0 | 52,0 | 53,1 | 53,0 | 53,0 | 53,0 | 53,1 | 54,6 | 58,9 | birds, house. livestock | 38,2 | 1,13 – 2,01 | 724 | SE |
| LA(min) Fast 52,2 – LA(max) Fast 55,1 | | | | | | | | | | | | | | | | | | |
| 15 | $17^{03}$ | $17^{18}$ | 43,1 | 42,4 | 42,2 | 43,3 | 43,0 | 42,2 | 43,2 | 43,3 | 43,1 | 43,1 | 49,0 | birds, house. livestock | 38,6 | 1,63 – 2,7 | 724 | SE |
| LA(min) Fast 40,2 – LA(max) Fast 46,9 | | | | | | | | | | | | | | | | | | |
| 16 | $17^{44}$ | $17^{59}$ | 44,1 | 42,4 | 42,0 | 43,3 | 43,0 | 43,2 | 43,2 | 43,3 | 43,0 | 42,4 | 49,4 | birds, house. livestock | 38,5 | 1,89 – 2,31 | 724 | SE |
| LA(min) Fast 40,9 – LA(max) Fast 46,4 | | | | | | | | | | | | | | | | | | |
| 17 | $18^{00}$ | $18^{12}$ | 43,2 | 43,4 | 44,0 | 43,3 | 44,0 | 43,2 | 43,0 | 43,1 | 44,2 | 43,6 | 52,8 | birds, house. livestock, trees | 36,3 | 0,79 – 1,27 | 724 | SE |
| LA(min) Fast 42,0 – LA(max) Fast 45,0 | | | | | | | | | | | | | | | | | | |
| 18 | $18^{35}$ | $18^{50}$ | 43,8 | 43,4 | 44,0 | 43,3 | 44,0 | 43,4 | 44,0 | 43,1 | 44,0 | 36,2 | 43,9 | birds, house. livestock, trees | 36,0 | 0,44 – 1,98 | 724 | SE |
| LA(min) Fast 34,1 – LA(max) Fast 38,1 | | | | | | | | | | | | | | | | | | |
| 19 | $19^{00}$ | $19^{15}$ | 43,8 | 43,4 | 44,0 | 43,3 | 44,0 | 43,4 | 44,0 | 43,1 | 44,0 | 44,4 | 55,0 | birds, house. livestock, frogs, trees | 34,2 | 0,38 – 0,61 | 724 | NW |
| LA(min) Fast 42,9 – LA(max) Fast 47,4 | | | | | | | | | | | | | | | | | | |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^{0}C$ | Wind speed, m/sec | Pressure, mm Hg | Wind direction |
| 20 | $19^{44}$ | $19^{59}$ | 43,8 | 43,2 | 44,0 | 43,4 | 43,0 | 43,0 | 43,3 | 43,4 | 44,0 | 44,0 | 52,1 | birds, house. livestock, frogs, trees | 34,2 | 0,31 – 0,89 | 724 | NW |
| LA(min) Fast 42,2 – LA(max) Fast 46,9 | | | | | | | | | | | | | | | | | | |
| 21 | $20^{00}$ | $20^{15}$ | 44,3 | 45,1 | 45,3 | 46,0 | 45,2 | 46,3 | 46,1 | 45,2 | 46,2 | 47,6 | 54,2 | birds, house. livestock, Crickets, frogs | 31,3 | 0,68 – 1,13 | 724 | NE |
| LA(min) Fast 45,0 – LA(max) Fast 49,0 | | | | | | | | | | | | | | | | | | |
| 22 | $20^{38}$ | $20^{53}$ | 44,9 | 45,1 | 45,3 | 46,0 | 45,2 | 46,2 | 46,1 | 45,2 | 46,0 | 47,0 | 53,8 | birds, house. livestock, Crickets, frogs | 31,0 | 0,55 – 1,14 | 724 | NE |
| LA(min) Fast 45,7 – LA(max) Fast 49,8 | | | | | | | | | | | | | | | | | | |
| 23 | $21^{10}$ | $21^{25}$ | 55,0 | 54,0 | 53,0 | 53,4 | 52,2 | 55,0 | 55,2 | 53,3 | 53,4 | 55,4 | 62,1 | birds, house. livestock, Crickets, frogs, tractor | 29,2 | 0,47 – 1,14 | 724 | NE |
| LA(min) Fast 52,0 – LA(max) Fast 56,0 | | | | | | | | | | | | | | | | | | |
| 24 | $21^{40}$ | $21^{55}$ | 55,1 | 54,0 | 53,0 | 53,2 | 52,2 | 55,0 | 55,0 | 53,3 | 53,1 | 54,3 | 61,8 | birds, house. livestock, Crickets, frogs, tractor | 29,1 | 0,64 – 1,19 | 724 | NE |
| LA(min) Fast 51,2 – LA(max) Fast 54,9 | | | | | | | | | | | | | | | | | | |
| 25 | $22^{00}$ | $22^{15}$ | 51,4 | 52,3 | 52,4 | 52,3 | 53,1 | 51,3 | 52,0 | 51,4 | 52,2 | 55,4 | 60,0 | birds, house. livestock, tractor, frogs, | 26,8 | 2,4 – 4,15 | 725 | NE |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^{0}C$ | Wind speed, m/sec | Pressure, mm Hg | Wind direction |
| LA(min) Fast 52,2 – LA(max) Fast 56,0 | | | | | | | | | | | | | | | | | | |
| 26 | $22^{38}$ | $22^{53}$ | 51,9 | 52,3 | 52,4 | 52,3 | 53,1 | 51,3 | 52,1 | 51,2 | 52,2 | 56,0 | 58,4 | birds, house. livestock, tractor, frogs, | 26,2 | 2,77 – 3,98 | 725 | NE |
| LA(min) Fast 52,0 – LA(max) Fast 57,0 | | | | | | | | | | | | | | | | | | |
| 27 | $23^{05}$ | $23^{20}$ | 51,1 | 51,4 | 51,4 | 52,3 | 52,1 | 52,0 | 50,4 | 51,3 | 52,4 | 54,0 | 62,4 | birds, house. livestock, tractor, frogs, | 26,1 | 1,28 – 2,38 | 725 | NE |
| LA(min) Fast 51,0 – LA(max) Fast 55,0 | | | | | | | | | | | | | | | | | | |
| 28 | $23^{38}$ | $23^{53}$ | 52,7 | 51,4 | 51,4 | 52,3 | 52,1 | 52,0 | 50,4 | 51,3 | 52,2 | 53,8 | 57,4 | birds, house. livestock, tractor, frogs, | 26,0 | 1,55 – 2,68 | 725 | NE |
| LA(min) Fast 50,4 – LA(max) Fast 55,9 | | | | | | | | | | | | | | | | | | |
| **NM 3 – 24.06.2020 (weekday). Coordinates: 40˚14'47.21'' N, 69˚6'34.33'' E; h = 1,2 - 1,3 m.** | | | | | | | | | | | | | | | | | | |
| 29 | $00^{07}$ | $00^{22}$ | 51,4 | 52,3 | 52,4 | 52,3 | 53,1 | 53,1 | 52,0 | 51,4 | 52,2 | 53,8 | 58,2 | house. livestock, frogs, tractor | 26,8 | 2,4 – 4,15 | 725 | NE |
| LA(min) Fast 51,0 – LA(max) Fast 55,0 | | | | | | | | | | | | | | | | | | |
| 30 | $00^{44}$ | $00^{59}$ | 51,7 | 52,3 | 52,4 | 52,3 | 53,2 | 53,1 | 52,0 | 51,4 | 52,3 | 53,9 | 59,7 | Crickets, frogs, | 26,4 | 2,55 – 4,04 | 725 | NE |
| LA(min) Fast 50,3 – LA(max) Fast 55,3 | | | | | | | | | | | | | | | | | | |
| 31 | $01^{12}$ | $01^{27}$ | 50,3 | 51,1 | 51,3 | 52,4 | 51,0 | 51,2 | 51,3 | 51,0 | 51,2 | 51,5 | 54,1 | house. livestock frogs, | 24,3 | 0,97 – 2,15 | 726 | NE |
| LA(min) Fast 50,5 – LA(max) Fast 53,0 | | | | | | | | | | | | | | | | | | |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^0C$ | Wind speed, m/sec | Pressure, mm Hg | Wind direction |
| 32 | $01^{32}$ | $01^{47}$ | 50,9 | 51,4 | 51,3 | 52,4 | 51,0 | 51,2 | 51,3 | 51,0 | 51,1 | 51,1 | 55,1 | Crickets, frogs, | 24,1 | 0,36 – 2,94 | 726 | NE |
| LA(min) Fast 41,0 – LA(max) Fast 53,8 | | | | | | | | | | | | | | | | | | |
| 33 | $02^{03}$ | $02^{18}$ | 52,2 | 54,3 | 52,4 | 53,1 | 52,1 | 53,0 | 52,4 | 52,1 | 53,1 | 51,3 | 55,3 | Crickets, frogs, house.livestock | 23,6 | 0,69 – 1,19 | 726 | NE |
| LA(min) Fast 50,9 – LA(max) Fast 53,0 | | | | | | | | | | | | | | | | | | |
| 34 | $02^{32}$ | $02^{47}$ | 52,2 | 54,3 | 52,4 | 53,1 | 52,1 | 53,0 | 52,4 | 52,1 | 53,1 | 50,6 | 54,4 | Crickets, frogs, house.livestock | 23,0 | 0,44 – 1,56 | 726 | NE |
| LA(min) Fast 49,9 – LA(max) Fast 53,8 | | | | | | | | | | | | | | | | | | |
| 35 | $03^{10}$ | $03^{25}$ | 43,2 | 43,3 | 43,0 | 42,4 | 43,1 | 42,4 | 43,2 | 42,3 | 43,1 | 39,9 | 47,2 | Crickets, frogs, house.livestock | 23,2 | 1,27 – 1,74 | 725 | NE |
| LA(min) Fast 40,0 – LA(max) Fast 45,2 | | | | | | | | | | | | | | | | | | |
| 36 | $03^{36}$ | $03^{51}$ | 43,8 | 43,3 | 43,0 | 42,4 | 43,1 | 42,5 | 43,2 | 42,5 | 43,1 | 43,4 | 49,1 | Crickets, frogs, house. livestock | 23,1 | 1,84 – 1,95 | 725 | NE |
| LA(min) Fast 43,0 – LA(max) Fast 45,2 | | | | | | | | | | | | | | | | | | |
| 37 | $04^{00}$ | $04^{15}$ | 42,1 | 42,3 | 43,2 | 43,4 | 43,2 | 44,0 | 43,1 | 43,3 | 43,2 | 42,1 | 48,0 | birds, house. livestock | 23,0 | 0,81 – 1,43 | 726 | NE |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^0$C | Wind speed, m/sec | Pressure, mm Hg | Wind direction |
| LA(min) Fast 42,0 – LA(max) Fast 46,0 | | | | | | | | | | | | | | | | | | |
| 38 | $04^{22}$ | $04^{37}$ | 42,9 | 42,3 | 43,2 | 43,4 | 43,2 | 43,4 | 43,1 | 43,3 | 43,2 | 42,6 | 48,2 | birds, house. livestock | 23,3 | 0,9 – 1,71 | 726 | NE |
| LA(min) Fast 42,4 – LA(max) Fast 45,8 | | | | | | | | | | | | | | | | | | |
| 39 | $05^{17}$ | $05^{32}$ | 51,1 | 51,4 | 52,0 | 52,4 | 52,1 | 51,3 | 51,2 | 51,4 | 53,1 | 51,7 | 58,0 | Crickets house. livestock, frogs | 24,8 | 0,33 – 1,13 | 726 | NW |
| LA(min) Fast 51,0 – LA(max) Fast 55,0 | | | | | | | | | | | | | | | | | | |
| 40 | $05^{43}$ | $05^{58}$ | 51,4 | 51,2 | 52,0 | 52,4 | 52,1 | 51,3 | 51,2 | 51,4 | 53,0 | 52,9 | 57,8 | frogs, house. livestock | 24,7 | 0,51 – 1,89 | 726 | NW |
| LA(min) Fast 52,1 – LA(max) Fast 55,8 | | | | | | | | | | | | | | | | | | |
| 41 | $06^{10}$ | $06^{35}$ | 54,4 | 54,1 | 54,0 | 55,0 | 54,4 | 54,0 | 54,3 | 54,2 | 53,4 | 53,7 | 59,0 | birds, house .livestock, tractor | 27,4 | 2,59 – 4,16 | 726 | NE |
| LA(min) Fast 50,1 – LA(max) Fast 54,9 | | | | | | | | | | | | | | | | | | |
| 42 | $06^{45}$ | $07^{00}$ | 54,8 | 54,1 | 54,0 | 54,4 | 54,2 | 54,0 | 54,3 | 54,2 | 53,4 | 53,8 | 57,1 | birds, house. livestock, tractor | 27,5 | 2,4 – 3,78 | 726 | NE |
| LA(min) Fast 51,8 – LA(max) Fast 54,6 | | | | | | | | | | | | | | | | | | |
| 43 | $07^{12}$ | $07^{27}$ | 55,0 | 54,2 | 54,4 | 58,0 | 57,7 | 53,1 | 52,3 | 53,2 | 54,4 | 57,5 | 62,0 | birds, house. livestock, tractor | 31,5 | 0,15 – 0,93 | 726 | NE |
| LA(min) Fast 55,4 – LA(max) Fast 58,3 | | | | | | | | | | | | | | | | | | |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^0C$ | Wind speed, m/sec | Pressure, mm Hg | Wind direction |
| 44 | $07^{39}$ | $07^{54}$ | 55,4 | 54,2 | 54,4 | 57,0 | 57,7 | 53,1 | 52,3 | 53,2 | 54,4 | 58,0 | 64,2 | birds, house. livestock, tractor | 31,5 | 0,20 – 1,21 | 726 | NE |
| LA(min) Fast 54,8 – LA(max) Fast 59,0 | | | | | | | | | | | | | | | | | | |
| 45 | $08^{00}$ | $08^{15}$ | 52,4 | 53,3 | 53,0 | 53,1 | 52,3 | 52,4 | 53,4 | 54,2 | 53,2 | 53,6 | 59,0 | birds, house. livestock, tractor | 31,6 | 0,57 – 1,89 | 727 | NW |
| LA(min) Fast 52,8 – LA(max) Fast 55,0 | | | | | | | | | | | | | | | | | | |
| 46 | $08^{32}$ | $08^{47}$ | 52,6 | 53,3 | 53,1 | 53,1 | 52,3 | 52,4 | 53,2 | 54,2 | 53,2 | 54,7 | 62,0 | birds, house. livestock, tractor | 31,4 | 0,38 – 1,74 | 727 | NW |
| LA(min) Fast 52,1 – LA(max) Fast 55,7 | | | | | | | | | | | | | | | | | | |
| 47 | $09^{10}$ | $09^{25}$ | 44,1 | 44,3 | 43,4 | 44,0 | 43,2 | 45,1 | 46,3 | 45,2 | 45,4 | 45,3 | 56,0 | birds, house.l ivestock, trees, tractor | 34,8 | 2,11 – 4,59 | 727 | NW |
| LA(min) Fast 45,0 – LA(max) Fast 48,0 | | | | | | | | | | | | | | | | | | |
| 48 | $09^{40}$ | $09^{55}$ | 44,1 | 44,3 | 43,4 | 44,0 | 43,2 | 45,1 | 46,3 | 45,2 | 45,4 | 49,8 | 60,2 | birds, house. livestock, trees, tractor | 34,7 | 2,55 – 4,28 | 727 | NW |
| LA(min) Fast 45,0 – LA(max) Fast 47,7 | | | | | | | | | | | | | | | | | | |

Table 0-8 NM 3 (weekend)

| | | | | | | | Noise pressure level (in Gb at the oscillation speed Db and the average geometric frequency in the octave area) | | | | | | | | | Noise level (equivalent noise level in points) | Allowable amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **15** | **16** | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | | | |
| **Point** | GPS coordinates | Ambient Temperature, °C | Wind speed, m/s | Wind direction | Start time | End time | 31.5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | |
| | **7:00 am – 23:00 pm** | **sunny** | | | | | **79** | **63** | **52** | **45** | **39** | 35 | **32** | 30 | **28** | **40** | 55 |
| **3** | Lat: 40.246446° Long:69.109537° | **21** | 1,2 | East | $07^{00}$ | $07^{20}$ | 66.0 | 59.1 | 46.2 | 40.3 | 37.0 | 31.4 | 26.2 | 26.2 | 21.2 | 34.2 | 46.2 |
| | | 22 | 1,2 | South-East | $07^{40}$ | $08^{00}$ | 54.1 | 52.1 | 44.2 | 35.6 | 35.2 | 25.4 | 26.0 | 20.1 | 22.6 | 35.0 | 40.4 |
| | | 22 | 1,2 | East | $08^{20}$ | $08^{40}$ | 58.0 | 53.2 | 47.5 | 41.8 | 32.2 | 28.6 | 25.2 | 22.3 | 20.0 | 35.1 | 38.2 |
| | | 23 | 1.2 | East | $09^{00}$ | $09^{20}$ | 64.1 | 58.0 | 45.2 | 38.1 | 35.0 | 30.4 | 24.1 | 24.0 | 24.4 | 34.2 | 42.0 |
| | | 24 | 0 | - | $09^{40}$ | $10^{00}$ | 60.5 | 54.2 | 46.2 | 42.8 | 34.4 | 27.6 | 25.4 | 23.2 | 20.4 | 32.8 | 40.0 |
| | | 24 | 0 | - | $10^{20}$ | $10^{40}$ | 61.1 | 50.1 | 46.4 | 40.4 | 35.4 | 26.6 | 22.4 | 21.2 | 22.4 | 34.0 | 38.2 |
| | | 27 | 0 | - | $11^{00}$ | $11^{20}$ | 60.5 | 52.2 | 47.2 | 42.8 | 31.4 | 27.6 | 21.4 | 23.2 | 20.4 | 32.4 | 37.4 |
| | | 33 | 0 | - | $11^{40}$ | $12^{00}$ | 50.1 | 48.4 | 44.1 | 35.6 | 35.2 | 24.4 | 26.0 | 20.0 | 22.2 | 32.0 | 36.1 |
| | | 35 | 0 | - | $12^{20}$ | $12^{40}$ | 54.2 | 53.1 | 40.2 | 34.4 | 36.1 | 28.2 | 28.1 | 22.1 | 24.1 | 34.2 | 40.0 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 35 | 0.6 | East | $13^{00}$ | $13^{20}$ | 55.1 | 54.2 | 40.1 | 36.8 | 34.2 | 28.2 | 27.2 | 22.1 | 24.0 | 32.1 | 36.4 |
| | | 36 | 1.1 | East | $13^{40}$ | $14^{00}$ | 54.2 | 54.0 | 42.0 | 36.8 | 35.2 | 29.0 | 27.4 | 21.4 | 25.2 | 33.4 | 38.0 |
| | | 37 | 0 | - | $14^{20}$ | $14^{40}$ | 52.3 | 56.2 | 40.0 | 35.2 | 33.0 | 27.1 | 26.2 | 23.1 | 26.2 | 32.0 | 36.2 |
| | | 37 | 0 | - | $15^{05}$ | $15^{20}$ | 56.3 | 54.7 | 44.8 | 40.3 | 37.5 | 31.3 | 28.4 | 23.7 | 21.9 | 36.4 | 40.1 |
| | | 37 | 0 | - | $15^{40}$ | $16^{00}$ | 54.1 | 50.2 | 42.1 | 35.8 | 35.1 | 28.2 | 27.2 | 22.0 | 25.2 | 34.2 | 39.0 |
| | | 34 | 0 | - | $16^{20}$ | $16^{40}$ | 53.0 | 55.1 | 42.1 | 36.8 | 34.0 | 28.1 | 26.2 | 22.1 | 25.6 | 33.0 | 40.1 |
| | | 30 | 0.6 | East | $17^{00}$ | $17^{20}$ | 54.3 | 55.0 | 42.0 | 33.2 | 34.0 | 24.4 | 26.2 | 20.4 | 22.6 | 32,0 | 38,2 |
| | | 28 | 0.7 | East | $17^{40}$ | $18^{00}$ | 52.0 | 55.4 | 43.1 | 36.1 | 35.1 | 26.1 | 26.0 | 23.1 | 25.1 | 35.2 | 40.1 |
| | | 28 | 0.6 | East | $19^{20}$ | $19^{40}$ | 55.3 | 54.4 | 42.3 | 40.2 | 37.4 | 31.2 | 28.4 | 23.2 | 20.2 | 34.2 | 39.6 |
| | | 27 | 0.3 | East | $20^{00}$ | $20^{20}$ | 58.1 | 58.8 | 46.2 | 39.4 | 35.5 | 34.2 | 30.5 | 27.4 | 24.3 | 35.4 | 41.4 |
| | | 27 | 1.2 | East | $20^{40}$ | $21^{00}$ | 65.9 | 61.6 | 49.5 | 42.8 | 37.4 | 31.9 | 27.4 | 27.5 | 22.4 | 36.2 | 42.3 |
| | | 26 | 0.6 | South-East | $21^{20}$ | $21^{40}$ | 60,4 | 57,2 | 49,1 | 36,3 | 32,8 | 28,7 | 26.1 | 25.6 | 22.1 | 34.2 | 40,4 |
| | | 25 | 0.6 | East | $22^{00}$ | $22^{20}$ | 62,0 | 52,2 | 50,1 | 40,0 | 32.4 | 34,2 | 27,1 | 23,2 | 23,0 | 36,0 | 41.4 |
| | | 25 | 0.7 | East | $22^{40}$ | $22^{55}$ | 52,4 | 51,0 | 42,2 | 36,4 | 32,4 | 31,1 | 26,0 | 23.1 | 20,2 | 32,4 | 38,2 |
| | **23:00 pm-<br>7:00 am** | | | | | | **72** | **55** | **44** | **35** | **29** | **25** | **22** | **20** | **18** | **40** | **45** |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **3** | Lat: 40.246446°<br>Long:69.10953° | 25 | 0.5 | East | $23^{00}$ | $23^{05}$ | 54.0 | 50.0 | 38.1 | 32.4 | 25.6 | 23.4 | 19.0 | 18.4 | 14.12 | 34.0 | 36.1 |
| | | 25 | 0.7 | East | $23^{15}$ | $23^{20}$ | 56.1 | 47.2 | 34.0 | 30.1 | 24.2 | 22.4 | 15.4 | 14.2 | 12.8 | 32.0 | 37.4 |
| | | 24 | 0.5 | South-East | $23^{30}$ | $23^{35}$ | 58.1 | 48.4 | 38.1 | 33.0 | 25.4 | 19.1 | 16.4 | 15.4 | 14.8 | 32.6 | 38.4 |
| | | 24 | 0.3 | East | $23^{50}$ | $23^{55}$ | 59.4 | 45.0 | 34.2 | 30.2 | 25.2 | 18.4 | 16.2 | 14.2 | 14.2 | 32.6 | 36.9 |
| | | 23 | 0 | - | $24^{05}$ | $24^{10}$ | 58.4 | 46.0 | 32.0 | 30.2 | 24.0 | 22.0 | 16.4 | 13.1 | 13.0 | 32.2 | 36.2 |
| | | 23 | 1.1 | East | $24^{20}$ | $24^{25}$ | 58.2 | 44.0 | 32.1 | 30.4 | 25.0 | 21.0 | 15.2 | 14.0 | 14.5 | 34.4 | 36.4 |
| | | 22 | 1.5 | South-East | $24^{45}$ | $24^{50}$ | 56.2 | 45.0 | 32.0 | 31.2 | 24.0 | 20.1 | 15.8 | 13.4 | 14.0 | 32.4 | 38.6 |
| | | 22 | 1.5 | East | $01^{00}$ | $01^{05}$ | 59.3 | 44.6 | 32.8 | 31.4 | 25.2 | 21.9 | 15.1 | 13.2 | 13.5 | 32.2 | 36.4 |
| | | 21 | 1.2 | East | $01^{15}$ | $01^{20}$ | 59.2 | 47.0 | 35.2 | 31.1 | 24.0 | 19.1 | 16.4 | 14.1 | 13.2 | 32.5 | 38.2 |
| | | 2021 | 1.6 | South-West | $01^{40}$ | $01^{45}$ | 60.4 | 45.0 | 32.0 | 31.7 | 25.2 | 21.1 | 17.0 | 13.4 | 13.0 | 32.4 | 36.1 |
| | | 20 | 0.5 | South-West | $01^{55}$ | $02^{05}$ | 58.6 | 46.4 | 32.0 | 30.8 | 23.0 | 22.8 | 16.1 | 13.1 | 13.8 | 33.2 | 38.0 |
| | | 20 | 0.6 | South-West | $02^{15}$ | $02^{20}$ | 54.2 | 42.4 | 32.7 | 31.1 | 24.0 | 21.5 | 15.1 | 14.0 | 13.0 | 34.5 | 38.1 |
| | | 20 | 0.8 | South-West | $02^{35}$ | $02^{40}$ | 57.2 | 45.0 | 32.0 | 31.5 | 25.2 | 20.0 | 17.0 | 13.4 | 13.0 | 32.4 | 39.2 |
| | | 20 | 0.3 | East | $02^{50}$ | $02^{55}$ | 58.4 | 46.0 | 33.2 | 31.4 | 25.2 | 21.1 | 16.0 | 13.1 | 14.7 | 32.6 | 38.4 |
| | | **20** | 0.7 | East | $03^{05}$ | $03^{10}$ | 60.4 | 45.2 | 32.0 | 30.5 | 20.4 | 19.1 | 17.5 | 15.1 | 13.2 | 33.5 | 37.2 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 19 | 0.4 | East | $03^{25}$ | $03^{30}$ | 58.1 | 48.1 | 40.4 | 32.4 | 24.6 | 22.0 | 17.2 | 18.6 | 14.3 | 32.8 | 38.0 |
| | | 19 | 0.5 | East | $03^{40}$ | $03^{45}$ | 57.2 | 44.0 | 32.0 | 30.1 | 24.0 | 21.0 | 16.4 | 12.4 | 14.0 | 32.0 | 36.1 |
| | | 19 | 0.4 | East | $03^{55}$ | $04^{00}$ | 56.4 | 45.1 | 32.0 | 32.5 | 24.5 | 21.4 | 16.1 | 12.6 | 13.8 | 31.4 | 37.8 |
| | | 19 | 0.5 | South-East | $04^{20}$ | $04^{25}$ | 59.5 | 44.0 | 33.7 | 32.4 | 25.0 | 21.0 | 16.4 | 13.0 | 15.0 | 34.8 | 38.2 |
| | | 19 | 0.3 | South-East | $04^{35}$ | $04^{40}$ | 59.2 | 42.1 | 32.0 | 30.1 | 21.1 | 19.0 | 16.8 | 14.0 | 15.2 | 32.6 | 38.2 |
| | | 20 | 0.7 | South-East | $04^{50}$ | $04^{55}$ | 58.2 | 46.0 | 33.5 | 31.4 | 24.2 | 21.1 | 15.1 | 14.8 | 15.1 | 34.0 | 37.4 |
| | | 20 | 0.7 | South-East | $05^{10}$ | $05^{15}$ | 59.2 | 42.2 | 32.5 | 30.2 | 20.1 | 19.8 | 17.2 | 15.5 | 14.0 | 32.4 | 38.0 |
| | | 19 | 0.3 | South-East | $05^{25}$ | $05^{30}$ | 60.1 | 45.0 | 34.0 | 32.5 | 24.6 | 21.8 | 17.5 | 14.1 | 15.6 | 32.0 | 39.1 |
| | | 19 | 0.6 | South-East | $06^{40}$ | $07^{00}$ | 60.4 | 48.2 | 33.4 | 30.6 | 25.2 | 20.8 | 17.1 | 12.9 | 15.4 | 33.5 | 39.8 |

Table 0-9 NM 4 (weekend)

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^0C$ | Wind speed, m/sec | Pressure, mmHg | Wind direction |
| **NM 4 – 21.06.2020 (weekend). Coordinates: 40˚14'48.73'' N, 69˚6'56.61'' E; h = 1,2 m.** | | | | | | | | | | | | | | | | | | |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **31,5** | **63** | **125** | **250** | **500** | **1000** | **2000** | **4000** | **8000** | | | | **Temperature, $^0$C** | **Wind speed, m/sec** | **Pressure, mmHg** | **Wind direction** |
| 1 | $10^{10}$ | $10^{25}$ | 34,2 | 33,3 | 32,1 | 31,3 | 31,1 | 31,3 | 32,1 | 31,2 | 30,4 | 36,3 | 39,0 | birds | 31,3 | 2,31 – 4,16 | 724 | NE |
| LA(min) Fast 34,0 – LA(max) Fast 37,1 | | | | | | | | | | | | | | | | | | |
| 2 | $10^{40}$ | $11^{55}$ | 34,9 | 33,7 | 32,1 | 31,3 | 31,0 | 31,3 | 32,2 | 31,2 | 30,2 | 31,3 | 37,2 | birds | 31,4 | 2,7 – 4,4 | 724 | NE |
| LA(min) Fast 30,9 – LA(max) Fast 32,1 | | | | | | | | | | | | | | | | | | |
| 3 | $11^{10}$ | $11^{25}$ | 44,2 | 43,9 | 42,1 | 41,3 | 41,0 | 41,3 | 42,4 | 41,2 | 40,0 | 42,5 | 45,0 | birds | 32,5 | 3,11 – 4,76 | 724 | SW |
| LA(min) Fast 39,9 – LA(max) Fast 43,1 | | | | | | | | | | | | | | | | | | |
| 4 | $11^{40}$ | $11^{55}$ | No measurements due to wind speed | | | | | | | | | | | birds | 32,7 | **3,64 – 5,81** | 724 | SW |
| 5 | $12^{05}$ | $12^{20}$ | No measurements due to wind speed | | | | | | | | | | | birds | 35,8 | **3,27 – 5,65** | 724 | SW |
| 6 | $12^{35}$ | $12^{50}$ | No measurements due to wind speed | | | | | | | | | | | birds | 38,7 | **3,24 – 5,78** | 724 | SW |
| 7 | $13^{15}$ | $13^{30}$ | 32,3 | 33,2 | 32,4 | 34,0 | 33,2 | 34,2 | 35,1 | 35,3 | 35,4 | 34,0 | 47,5 | birds | 37,6 | 0,84 – 1,46 | 722 | SW |
| 8 | $13^{40}$ | $13^{55}$ | 32,9 | 33,2 | 32,4 | 34,0 | 33,2 | 34,8 | 35,1 | 35,3 | 35,0 | 33,2 | 42,0 | birds | 37,4 | 0,97 – 1,04 | 722 | SW |
| LA(min) Fast 31,7 – LA(max) Fast 36,0 | | | | | | | | | | | | | | | | | | |
| 9 | $14^{10}$ | $14^{25}$ | 30,3 | 31,1 | 30,0 | 31,2 | 32,2 | 31,4 | 32,3 | 31,2 | 31,0 | 32,0 | 51,8 | birds | 38,3 | 0,69 – 1,16 | 722 | SW |
| LA(min) Fast 31,0 – LA(max) Fast 34,0 | | | | | | | | | | | | | | | | | | |
| 10 | $14^{35}$ | $14^{50}$ | 30,8 | 31,0 | 31,0 | 31,2 | 32,2 | 31,4 | 32,3 | 31,2 | 31,0 | 32,6 | 50,1 | birds | 38,2 | 0,94 – 1,24 | 722 | SW |
| LA(min) Fast 30,4 – LA(max) Fast 35,9 | | | | | | | | | | | | | | | | | | |
| 11 | $15^{00}$ | $15^{15}$ | 33,0 | 31,0 | 31,2 | 31,3 | 31,4 | 31,1 | 31,2 | 31,4 | 31,1 | 33,8 | 49,8 | birds | 38,8 | 0,94 – 1,66 | 722 | SW |
| LA(min) Fast 30,0 – LA(max) Fast 36,3 | | | | | | | | | | | | | | | | | | |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^0C$ | Wind speed, m/sec | Pressure, mmHg | Wind direction |
| 12 | $15^{40}$ | $15^{55}$ | 33,4 | 31,0 | 31,0 | 31,3 | 31,4 | 31,1 | 31,2 | 31,2 | 31,1 | 33,5 | 47,8 | birds | 38,4 | 1,12 – 2,46 | 722 | SW |
| LA(min) Fast 31,0 – LA(max) Fast 36,0 | | | | | | | | | | | | | | | | | | |
| 13 | $16^{10}$ | $16^{25}$ | 31,0 | 30,4 | 31,2 | 31,3 | 31,1 | 31,2 | 30,4 | 31,1 | 31,2 | 33,8 | 46,4 | birds | 39,7 | 1,12 – 1,97 | 722 | SW |
| LA(min) Fast 31,2 – LA(max) Fast 35,4 | | | | | | | | | | | | | | | | | | |
| 14 | $16^{44}$ | $16^{59}$ | 32,1 | 33,2 | 33,0 | 32,0 | 33,1 | 33,0 | 33,0 | 33,0 | 33,1 | 34,6 | 48,9 | birds | 39,2 | 1,13 – 2,01 | 722 | SW |
| LA(min) Fast 30,2 – LA(max) Fast 35,1 | | | | | | | | | | | | | | | | | | |
| 15 | $17^{03}$ | $17^{18}$ | 27,1 | 26,4 | 27,2 | 27,3 | 27,0 | 26,2 | 26,2 | 27,3 | 27,1 | 29,3 | 39,0 | birds | 40,4 | 1,62 – 2,13 | 722 | SW |
| LA(min) Fast 24,2 – LA(max) Fast 31,9 | | | | | | | | | | | | | | | | | | |
| 16 | $17^{44}$ | $17^{59}$ | 30,1 | 30,4 | 30,0 | 30,3 | 30,0 | 29,2 | 29,2 | 29,3 | 29,0 | 29,7 | 39,4 | birds | 40,5 | 1,89 – 2,31 | 722 | SW |
| LA(min) Fast 27,9 – LA(max) Fast 31,4 | | | | | | | | | | | | | | | | | | |
| 17 | $18^{00}$ | $18^{12}$ | 31,2 | 30,4 | 31,0 | 30,3 | 31,0 | 29,2 | 29,0 | 29,1 | 29,2 | 33,6 | 42,8 | birds | 38,4 | 0,79 – 1,27 | 722 | SW |
| LA(min) Fast 26,0 – LA(max) Fast 32,0 | | | | | | | | | | | | | | | | | | |
| 18 | $18^{35}$ | $18^{50}$ | 23,8 | 23,4 | 24,0 | 23,3 | 24,0 | 23,4 | 24,0 | 23,1 | 24,0 | 36,2 | 43,9 | birds | 38,0 | 0,32 – 0,78 | 722 | SW |
| LA(min) Fast 24,1 – LA(max) Fast 32,1 | | | | | | | | | | | | | | | | | | |
| 19 | $19^{00}$ | $19^{15}$ | 27,1 | 27,2 | 27,0 | 27,4 | 27,0 | 27,1 | 26,3 | 26,4 | 26,4 | 27,5 | 35,0 | birds, frogs | 37,7 | 0,38 – 0,61 | 722 | SW |
| LA(min) Fast 25,9 – LA(max) Fast 30,4 | | | | | | | | | | | | | | | | | | |
| 20 | $19^{44}$ | $19^{59}$ | 27,8 | 27,2 | 27,0 | 27,4 | 27,0 | 27,0 | 26,3 | 26,4 | 26,0 | 27,0 | 32,1 | birds, frogs | 37,2 | 0,33 – 0,67 | 722 | SW |
| LA(min) Fast 25,2 – LA(max) Fast 29,9 | | | | | | | | | | | | | | | | | | |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^0C$ | Wind speed, m/sec | Pressure, mmHg | Wind direction |
| 21 | $20^{00}$ | $20^{15}$ | 31,3 | 32,1 | 32,3 | 31,0 | 31,2 | 30,3 | 30,1 | 30,2 | 30,2 | 32,6 | 34,2 | birds, frogs | 28,7 | 0,68 – 1,13 | 721 | SW |
| LA(min) Fast 30,0 – LA(max) Fast 32,0 | | | | | | | | | | | | | | | | | | |
| 22 | $20^{38}$ | $20^{53}$ | 31,9 | 33,1 | 33,3 | 35,0 | 34,2 | 35,2 | 35,1 | 35,2 | 33,0 | 36,0 | 36,8 | birds, frogs | 28,0 | 0,27 – 0,53 | 721 | SW |
| LA(min) Fast 30,7 – LA(max) Fast 33,8 | | | | | | | | | | | | | | | | | | |
| 23 | $21^{10}$ | $21^{25}$ | 45,0 | 44,0 | 43,0 | 43,4 | 42,2 | 45,0 | 45,2 | 43,3 | 43,4 | 45,4 | 52,1 | birds, frogs | 26,9 | 0,57 – 0,83 | 722 | NE |
| LA(min) Fast 40,0 – LA(max) Fast 44,0 | | | | | | | | | | | | | | | | | | |
| 24 | $21^{40}$ | $21^{55}$ | 45,1 | 44,0 | 43,0 | 43,2 | 42,2 | 45,0 | 45,0 | 43,3 | 43,1 | 44,3 | 51,8 | birds, frogs | 26,1 | 0,64 – 1,19 | 722 | NE |
| LA(min) Fast 41,2 – LA(max) Fast 44,9 | | | | | | | | | | | | | | | | | | |
| 25 | $22^{00}$ | $22^{15}$ | 41,4 | 42,3 | 42,4 | 42,3 | 43,1 | 41,3 | 42,0 | 41,4 | 42,2 | 45,4 | 50,0 | birds, frogs, sounds from cafe | 24,5 | 0,36 – 0,71 | 721 | NE |
| LA(min) Fast 42,2 – LA(max) Fast 46,0 | | | | | | | | | | | | | | | | | | |
| 26 | $22^{38}$ | $22^{53}$ | 41,4 | 42,3 | 42,4 | 42,3 | 43,1 | 41,3 | 42,0 | 41,4 | 42,2 | 45,2 | 56,4 | birds, frogs, sounds from cafe | 24,2 | 0,76 – 1,22 | 721 | NE |
| LA(min) Fast 42,0 – LA(max) Fast 45,0 | | | | | | | | | | | | | | | | | | |
| 27 | $23^{05}$ | $23^{20}$ | 44,2 | 43,9 | 42,1 | 41,3 | 41,0 | 41,3 | 42,4 | 41,2 | 40,0 | 44,0 | 52,4 | birds, frogs | 22,4 | 0,41 – 0,62 | 721 | NE |
| LA(min) Fast 38,0 – LA(max) Fast 42,0 | | | | | | | | | | | | | | | | | | |
| 28 | $23^{38}$ | $23^{53}$ | 44,0 | 43,9 | 42,1 | 41,0 | 41,0 | 41,3 | 42,0 | 41,2 | 40,0 | 43,8 | 57,4 | birds, frogs | 22,0 | 1,55 – 2,68 | 721 | NE |
| LA(min) Fast 38,4 – LA(max) Fast 42,9 | | | | | | | | | | | | | | | | | | |
| **NM 4 – 22.06.2020 (weekday). Coordinates: 40˚14'48.73'' N, 69˚6'56.61'' E; h = 1,2 m.** | | | | | | | | | | | | | | | | | | |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^0C$ | Wind speed, m/sec | Pressure, mmHg | Wind direction |
| 29 | $00^{07}$ | $00^{22}$ | 44,2 | 43,9 | 42,1 | 41,3 | 41,0 | 41,3 | 42,4 | 41,2 | 40,0 | 43,8 | 48,2 | birds, frogs | 22,8 | 0,42 – 0,81 | 721 | NE |
| LA(min) Fast 40,0 – LA(max) Fast 42,0 | | | | | | | | | | | | | | | | | | |
| 30 | $00^{44}$ | $00^{59}$ | 41,4 | 42,3 | 42,4 | 42,3 | 43,1 | 41,3 | 42,0 | 41,4 | 42,2 | 43,9 | 47,7 | birds, frogs | 22,4 | 0,55 – 0,91 | 721 | NE |
| LA(min) Fast 40,3 – LA(max) Fast 43,3 | | | | | | | | | | | | | | | | | | |
| 31 | $01^{12}$ | $01^{27}$ | 43,8 | 43,4 | 44,0 | 43,3 | 44,0 | 43,4 | 44,0 | 43,1 | 44,0 | 39,5 | 44,1 | birds, frogs | 21,4 | 0,97 – 2,15 | 721 | NE |
| LA(min) Fast 36,5 – LA(max) Fast 38,0 | | | | | | | | | | | | | | | | | | |
| 32 | $01^{32}$ | $01^{47}$ | 43,8 | 43,4 | 44,0 | 43,3 | 44,0 | 43,4 | 44,0 | 41,1 | 41,0 | 41,1 | 45,1 | Crickets, frogs, | 21,1 | 0,56 – 0,93 | 721 | NE |
| LA(min) Fast 36,0 – LA(max) Fast 38,8 | | | | | | | | | | | | | | | | | | |
| 33 | $02^{03}$ | $02^{18}$ | 31,9 | 33,1 | 33,3 | 35,0 | 34,2 | 35,2 | 35,1 | 35,2 | 33,0 | 41,3 | 45,3 | Crickets, frogs, | 21,0 | 0,43 – 1,06 | 721 | NE |
| LA(min) Fast 32,9 – LA(max) Fast 36,0 | | | | | | | | | | | | | | | | | | |
| 34 | $02^{32}$ | $02^{47}$ | 31,9 | 33,1 | 33,3 | 35,0 | 34,2 | 35,2 | 35,1 | 35,2 | 33,0 | 40,6 | 44,4 | Crickets, frogs, | 21,0 | 0,44 – 1,56 | 721 | NE |
| LA(min) Fast 31,9 – LA(max) Fast 36,8 | | | | | | | | | | | | | | | | | | |
| 35 | $03^{10}$ | $03^{25}$ | 31,9 | 33,1 | 33,3 | 35,0 | 34,2 | 35,2 | 35,1 | 35,2 | 33,0 | 37,9 | 47,2 | Crickets, frogs, | 20,3 | 1,27 – 1,74 | 721 | NE |
| LA(min) Fast 32,0 – LA(max) Fast 36,2 | | | | | | | | | | | | | | | | | | |
| 36 | $03^{36}$ | $03^{51}$ | 33,9 | 33,1 | 33,3 | 34,0 | 34,2 | 35,2 | 35,1 | 35,2 | 33,0 | 33,4 | 39,1 | Crickets, frogs, | 20,1 | 0,71 – 0,91 | 721 | NE |
| LA(min) Fast 33,0 – LA(max) Fast 35,2 | | | | | | | | | | | | | | | | | | |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^{0}C$ | Wind speed, m/sec | Pressure, mmHg | Wind direction |
| 37 | $04^{00}$ | $04^{15}$ | 32,1 | 32,3 | 33,2 | 33,4 | 33,2 | 34,0 | 33,1 | 33,3 | 33,2 | 32,1 | 38,0 | Crickets, frogs, | 21,7 | 0,51 – 0,89 | 721 | NE |
| LA(min) Fast 34,0 – LA(max) Fast 36,0 | | | | | | | | | | | | | | | | | | |
| 38 | $04^{22}$ | $04^{37}$ | 32,1 | 32,3 | 33,2 | 33,4 | 33,2 | 34,0 | 33,1 | 33,3 | 33,2 | 32,6 | 38,2 | Crickets, frogs, | 21,3 | 0,9 – 1,71 | 721 | NE |
| LA(min) Fast 32,4 – LA(max) Fast 35,8 | | | | | | | | | | | | | | | | | | |
| 39 | $05^{17}$ | $05^{32}$ | 31,9 | 33,1 | 33,3 | 35,0 | 34,2 | 35,2 | 35,1 | 35,2 | 33,0 | 41,7 | 48,0 | Crickets frogs | 20,4 | 0,33 – 1,13 | 721 | NE |
| LA(min) Fast 31,0 – LA(max) Fast 38,0 | | | | | | | | | | | | | | | | | | |
| 40 | $05^{43}$ | $05^{58}$ | 31,9 | 33,1 | 33,3 | 35,0 | 34,2 | 35,2 | 35,1 | 35,2 | 33,0 | 40,9 | 47,8 | frogs | 20,7 | 1,13 – 1,76 | 721 | NE |
| LA(min) Fast 32,1 – LA(max) Fast 38,8 | | | | | | | | | | | | | | | | | | |
| 41 | $06^{10}$ | $06^{35}$ | 43,2 | 43,4 | 44,0 | 43,3 | 44,0 | 43,2 | 43,0 | 43,1 | 44,2 | 43,7 | 49,0 | birds, frogs | 23,8 | 2,59 – 4,16 | 721 | NE |
| LA(min) Fast 40,1 – LA(max) Fast 44,9 | | | | | | | | | | | | | | | | | | |
| 42 | $06^{45}$ | $07^{00}$ | 43,1 | 43,2 | 44,0 | 43,4 | 43,0 | 43,1 | 43,3 | 43,4 | 44,4 | 43,8 | 47,1 | birds, frogs | 23,5 | 2,16 – 4,32 | 721 | NE |
| LA(min) Fast 11,8 – LA(max) Fast 44,6 | | | | | | | | | | | | | | | | | | |
| 43 | $07^{12}$ | $07^{27}$ | 43,8 | 43,2 | 44,0 | 43,4 | 43,0 | 43,0 | 43,3 | 43,4 | 44,0 | 46,5 | 52,0 | birds, sound from livestock | 23,8 | 2,16 – 4,32 | 721 | NE |
| LA(min) Fast 40,4 – LA(max) Fast 47,3 | | | | | | | | | | | | | | | | | | |
| 44 | $07^{39}$ | $07^{54}$ | 44,3 | 45,1 | 45,3 | 46,0 | 45,2 | 46,3 | 46,1 | 45,2 | 46,2 | 46,0 | 54,2 | birds, sound from livestock | 23,0 | 0,20 – 1,21 | 721 | NE |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^{0}$C | Wind speed, m/sec | Pressure, mmHg | Wind direction |
| LA(min) Fast 40,8 – LA(max) Fast 49,0 | | | | | | | | | | | | | | | | | | |
| 45 | $08^{00}$ | $08^{15}$ | No measurements due to wind speed | | | | | | | | | | | birds, sound from livestock, wind | 27,3 | **4,21 – 6,73** | 721 | NE |
| 46 | $08^{32}$ | $08^{47}$ | No measurements due to wind speed | | | | | | | | | | | birds, sound from livestock, wind | 27,4 | **4,38 – 6,42** | 721 | NE |
| 47 | $09^{10}$ | $09^{25}$ | 44,1 | 44,3 | 43,4 | 44,0 | 43,2 | 45,1 | 46,3 | 45,2 | 45,4 | 43,3 | 46,0 | birds, sound from livestock | 31,2 | 2,11 – 4,59 | 721 | NE |
| LA(min) Fast 38,0 – LA(max) Fast 42,0 | | | | | | | | | | | | | | | | | | |
| 48 | $09^{40}$ | $09^{55}$ | 44,1 | 44,3 | 43,4 | 44,0 | 43,2 | 45,1 | 46,3 | 45,2 | 45,4 | 40,7 | 50,2 | birds, sound from livestock | 31,7 | 2,55 – 4,28 | 721 | NE |
| LA(min) Fast 35,0 – LA(max) Fast 42,7 | | | | | | | | | | | | | | | | | | |

Table 0-10 NM 4 (weekday)

| NM 4 – 24.06.2020 (weekday). Coordinates: 40˚14'48.73'' N, 69˚6'56.61'' E; h = 1,2 ,m. | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 49 | $11^{10}$ | $11^{25}$ | 44,1 | 44,3 | 43,4 | 44,0 | 43,2 | 45,1 | 46,3 | 45,2 | 45,4 | 43,2 | 54,0 | birds, wind | 37,3 | 2,71 – 4,56 | 727 | NE |
| LA(min) Fast 41,0 – LA(max) Fast 43,7 | | | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50 | $11^{40}$ | $11^{55}$ | 44,1 | 44,3 | 43,4 | 44,0 | 43,2 | 45,1 | 46,3 | 45,2 | 45,4 | 44,0 | 54,8 | birds, wind | 37,5 | 2,78 – 4,64 | 727 | NE |
| LA(min) Fast 41,0 – LA(max) Fast 43,0 | | | | | | | | | | | | | | | | | | |
| 51 | $12^{02}$ | $12^{17}$ | 32,2 | 33,4 | 33,1 | 33,0 | 33,0 | 33,1 | 33,0 | 33,0 | 33,0 | 32,8 | 44,1 | birds | 41,3 | 0,27 – 1,38 | 726 | SW |
| LA(min) Fast 25,0 – LA(max) Fast 30,0 | | | | | | | | | | | | | | | | | | |
| 52 | $12^{36}$ | $12^{51}$ | 32,1 | 33,2 | 33,1 | 33,0 | 33,1 | 33,1 | 33,0 | 33,0 | 33,1 | 32,9 | 41,4 | birds | 41,0 | 0,29 – 1,45 | 726 | SW |
| LA(min) Fast 26,0 – LA(max) Fast 30,0 | | | | | | | | | | | | | | | | | | |
| 53 | $13^{00}$ | $13^{15}$ | 32,1 | 33,2 | 33,0 | 32,0 | 33,1 | 33,0 | 33,0 | 33,0 | 33,1 | 28,0 | 38,7 | birds | 42,9 | 1,37 – 2,16 | 726 | SW |
| LA(min) Fast 23,0 – LA(max) Fast 25,0 | | | | | | | | | | | | | | | | | | |
| 54 | $13^{40}$ | $13^{55}$ | 31,1 | 31,1 | 31,0 | 30,0 | 31,1 | 31,0 | 31,0 | 31,2 | 31,1 | 29,6 | 41,0 | birds | 42,5 | 1,34 – 2,48 | 726 | SW |
| LA(min) Fast 23,1 – LA(max) Fast 25,4 | | | | | | | | | | | | | | | | | | |
| 55 | $10^{00}$ | $14^{15}$ | 32,1 | 33,2 | 33,1 | 33,0 | 33,1 | 33,1 | 33,0 | 33,0 | 33,1 | 31,3 | 40,5 | birds | 42,3 | 1,13 – 2,04 | 726 | SW |
| LA(min) Fast 30,1 – LA(max) Fast 32,4 | | | | | | | | | | | | | | | | | | |
| 56 | $14^{41}$ | $14^{56}$ | 32,1 | 33,2 | 33,1 | 33,0 | 33,1 | 33,1 | 33,0 | 33,0 | 33,1 | 33,5 | 44,0 | birds | 42,5 | 1,19 – 2,09 | 726 | SW |
| LA(min) Fast 30,0 – LA(max) Fast 32,0 | | | | | | | | | | | | | | | | | | |
| 57 | $15^{08}$ | $15^{23}$ | 33,8 | 34,0 | 34,0 | 33,2 | 34,7 | 34,5 | 35,3 | 36,2 | 37,4 | 30,1 | 40,0 | birds | 41,6 | 0,96 – 2,17 | 726 | SW |
| LA(min) Fast 26,0 – LA(max) Fast 30,0 | | | | | | | | | | | | | | | | | | |
| 58 | $15^{35}$ | $15^{50}$ | 34,2 | 35,7 | 35,4 | 35,6 | 36,2 | 37,4 | 38,4 | 39,7 | 39,3 | 36,4 | 48,0 | birds | 41,4 | 0,94 – 2,33 | 726 | SW |
| LA(min) Fast 26,7 – LA(max) Fast 30,4 | | | | | | | | | | | | | | | | | | |
| 59 | $16^{00}$ | $16^{15}$ | 33,0 | 34,0 | 34,0 | 33,5 | 34,7 | 34,5 | 35,4 | 36,2 | 37,4 | 34,3 | 44,8 | birds | 40,4 | 0,87 – 1,79 | 726 | SW |
| LA(min) Fast 30,0 – LA(max) Fast 32,8 | | | | | | | | | | | | | | | | | | |
| 60 | $16^{40}$ | $16^{55}$ | 32,1 | 33,2 | 33,0 | 32,0 | 33,1 | 33,0 | 33,0 | 33,0 | 32,1 | 31,5 | 42,0 | birds | 40,5 | 0,82 – 1,4 | 726 | SW |
| LA(min) Fast 30,0 – LA(max) Fast 32,0 | | | | | | | | | | | | | | | | | | |
| 61 | $17^{02}$ | $17^{17}$ | 41,0 | 41,2 | 44,0 | 44,3 | 44,0 | 44,4 | 44,2 | 44,3 | 45,1 | 45,4 | 57,4 | birds, tracktor | 37,1 | 0,96 – 2,13 | 726 | SW |
| LA(min) Fast 37,0 – LA(max) Fast 40,0 | | | | | | | | | | | | | | | | | | |

<table>
<tr><td>62</td><td>$17^{40}$</td><td>$17^{55}$</td><td>41,0</td><td>41,2</td><td>44,0</td><td>44,3</td><td>44,0</td><td>44,4</td><td>44,2</td><td>44,3</td><td>45,1</td><td>41,0</td><td>52,1</td><td>birds</td><td>37,0</td><td>0,94 – 2,33</td><td>726</td><td>ЮВ</td></tr>
<tr><td colspan="19">LA(min) Fast 37,0 – LA(max) Fast 38,0</td></tr>
<tr><td>63</td><td>$18^{04}$</td><td>$18^{19}$</td><td>33,8</td><td>34,0</td><td>34,0</td><td>33,2</td><td>34,7</td><td>34,5</td><td>35,3</td><td>36,2</td><td>37,4</td><td>34,1</td><td>44,6</td><td>birds</td><td>34,8</td><td>0,03 – 0,37</td><td>726</td><td>ЮВ</td></tr>
<tr><td colspan="19">LA(min) Fast 28,0 – LA(max) Fast 30,0</td></tr>
<tr><td>64</td><td>$18^{32}$</td><td>$18^{47}$</td><td>32,2</td><td>33,4</td><td>33,1</td><td>33,0</td><td>33,0</td><td>33,1</td><td>33,0</td><td>33,0</td><td>33,0</td><td>30,6</td><td>42,0</td><td>birds</td><td>35,1</td><td>0,4 – 0,68</td><td>726</td><td>SW</td></tr>
<tr><td colspan="19">LA(min) Fast 27,9 – LA(max) Fast 30,1</td></tr>
<tr><td>65</td><td>$19^{01}$</td><td>$19^{16}$</td><td>43,2</td><td>43,3</td><td>43,3</td><td>43,4</td><td>44,0</td><td>44,2</td><td>44,2</td><td>44,4</td><td>45,1</td><td>46,8</td><td>57,0</td><td>birds, tracktor</td><td>31,4</td><td>0,24 – 0,48</td><td>726</td><td>NE</td></tr>
<tr><td colspan="19">LA(min) Fast 40,0 – LA(max) Fast 47,0</td></tr>
<tr><td>66</td><td>$19^{30}$</td><td>$19^{45}$</td><td>41,0</td><td>41,2</td><td>44,0</td><td>44,3</td><td>44,0</td><td>44,4</td><td>44,2</td><td>44,3</td><td>45,1</td><td>44,1</td><td>55,9</td><td>birds, tracktor</td><td>31,0</td><td>0,22 – 0,44</td><td>726</td><td>NE</td></tr>
<tr><td colspan="19">LA(min) Fast 40,5 – LA(max) Fast 47,3</td></tr>
<tr><td>67</td><td>$20^{00}$</td><td>$20^{15}$</td><td>33,8</td><td>34,0</td><td>34,0</td><td>33,2</td><td>34,7</td><td>34,5</td><td>35,3</td><td>36,2</td><td>37,4</td><td>32,2</td><td>41,8</td><td>birds</td><td>29,7</td><td>0,34 – 0,62</td><td>726</td><td>ЮВ</td></tr>
<tr><td colspan="19">LA(min) Fast 28,1 – LA(max) Fast 33,3</td></tr>
<tr><td>68</td><td>$20^{40}$</td><td>$20^{55}$</td><td>32,1</td><td>33,1</td><td>33,0</td><td>32,0</td><td>33,1</td><td>33,1</td><td>33,0</td><td>33,2</td><td>33,1</td><td>30,1</td><td>40,4</td><td>birds</td><td>29,0</td><td>0,68 – 1,09</td><td>726</td><td>ЮВ</td></tr>
<tr><td colspan="19">LA(min) Fast 28,0 – LA(max) Fast 33,0</td></tr>
<tr><td>69</td><td>$21^{00}$</td><td>$21^{15}$</td><td>34,5</td><td>35,7</td><td>35,4</td><td>35,9</td><td>36,2</td><td>37,1</td><td>38,4</td><td>39,7</td><td>39,2</td><td>35,8</td><td>45,0</td><td>birds, wind</td><td>27,3</td><td>1,75 – 3,12</td><td>727</td><td>NE</td></tr>
<tr><td colspan="19">LA(min) Fast 34,1 – LA(max) Fast 38,3</td></tr>
<tr><td>70</td><td>$21^{40}$</td><td>$21^{55}$</td><td>32,1</td><td>33,1</td><td>33,0</td><td>32,0</td><td>33,1</td><td>33,1</td><td>33,0</td><td>33,2</td><td>33,1</td><td>34,9</td><td>42,9</td><td>birds, wind</td><td>27,0</td><td>1,84 – 3,08</td><td>727</td><td>NE</td></tr>
<tr><td colspan="19">LA(min) Fast 34,0 – LA(max) Fast 37,2</td></tr>
<tr><td>71</td><td>$22^{04}$</td><td>$22^{19}$</td><td>33,0</td><td>34,0</td><td>34,0</td><td>33,5</td><td>34,7</td><td>34,5</td><td>35,4</td><td>36,2</td><td>37,4</td><td>35,6</td><td>44,0</td><td>birds, wind</td><td>25,3</td><td>1,52 – 3,11</td><td>727</td><td>NE</td></tr>
<tr><td colspan="19">LA(min) Fast 33,0 – LA(max) Fast 36,2</td></tr>
<tr><td>72</td><td>$22^{43}$</td><td>$22^{58}$</td><td>34,5</td><td>35,7</td><td>35,4</td><td>35,9</td><td>36,2</td><td>37,1</td><td>38,4</td><td>39,7</td><td>39,2</td><td>37,4</td><td>48,0</td><td>birds, wind</td><td>25,0</td><td>1,66 – 3,4</td><td>727</td><td>NE</td></tr>
<tr><td colspan="19">LA(min) Fast 33,0 – LA(max) Fast 36,0</td></tr>
<tr><td>73</td><td>$23^{00}$</td><td>$23^{12}$</td><td colspan="11">No measurements due to wind speed</td><td>birds, wind</td><td>29,4</td><td>3,54 – 5,28</td><td>727</td><td>NE</td></tr>
<tr><td>74</td><td>$23^{40}$</td><td>$23^{55}$</td><td colspan="11">No measurements due to wind speed</td><td>birds, wind</td><td>29,5</td><td>3,78 – 6,42</td><td>727</td><td>NE</td></tr>
</table>

**NM 4 – 25.06.2020 (weekday). Coordiantes: 40˚14'48.73'' N, 69˚6'56.61'' E; h = 1,2 m.**

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 75 | $00^{01}$ | $00^{16}$ | No measurements due to wind speed | | | | | | | | | | | birds, wind | 24,3 | **3,54 – 5,26** | 727 | NE |
| 76 | $00^{38}$ | $00^{53}$ | No measurements due to wind speed | | | | | | | | | | | birds, wind | 24,0 | **4,48 – 6,22** | 727 | NE |
| 77 | $01^{08}$ | $08^{23}$ | No measurements due to wind speed | | | | | | | | | | | birds, wind | 24,1 | **4,63 – 7,42** | 727 | NE |
| 78 | $01^{40}$ | $01^{55}$ | No measurements due to wind speed | | | | | | | | | | | birds, wind | 24,0 | **4,48 – 6,89** | 727 | NE |
| 79 | $02^{10}$ | $02^{25}$ | 52,3 | 55,0 | 55,2 | 55,4 | 55,0 | 55,1 | 55,2 | 55,0 | 55,3 | 51,0 | 59,8 | birds, wind | 22,3 | 2,95 – 4,56 | 727 | NE |
| LA(min) Fast 48,0 – LA(max) Fast 52,0 | | | | | | | | | | | | | | | | | | |
| 80 | $02^{40}$ | $02^{55}$ | 51,4 | 53,0 | 50,3 | 51,2 | 51,4 | 52,2 | 53,1 | 51,1 | 51,0 | 51,8 | 63,2 | birds, wind, car | 22,0 | 2,34 – 4,47 | 727 | NE |
| LA(min) Fast 48,4 – LA(max) Fast 51,8 | | | | | | | | | | | | | | | | | | |
| 81 | $03^{10}$ | $03^{25}$ | 51,5 | 53,0 | 50,3 | 51,6 | 51,4 | 52,2 | 53,4 | 51,1 | 51,0 | 52,2 | 63,8 | birds, wind, car | 21,0 | 2,89 – 4,43 | 727 | SW |
| LA(min) Fast 49,0 – LA(max) Fast 54,0 | | | | | | | | | | | | | | | | | | |
| 82 | $03^{40}$ | $03^{55}$ | 53,3 | 54,1 | 53,2 | 53,1 | 53,1 | 53,3 | 51,0 | 51,3 | 53,1 | 51,4 | 61,8 | birds, wind | 21,0 | 2,4 – 4,78 | 727 | SW |
| LA(min) Fast 48,4 – LA(max) Fast 52,6 | | | | | | | | | | | | | | | | | | |
| 83 | $04^{00}$ | $04^{15}$ | 54,4 | 53,9 | 52,1 | 51,3 | 51,0 | 51,2 | 52,4 | 51,2 | 50,0 | 52,1 | 61,0 | birds, wind | 21,5 | 2,64 – 4,21 | 727 | SW |
| LA(min) Fast 50,4 – LA(max) Fast 51,6 | | | | | | | | | | | | | | | | | | |
| 84 | $04^{37}$ | $04^{52}$ | 53,0 | 51,0 | 51,2 | 51,3 | 51,4 | 51,1 | 51,2 | 51,4 | 51,1 | 50,6 | 59,9 | birds, wind | 21,7 | 2,88 – 4,46 | 727 | SW |
| LA(min) Fast 50,0 – LA(max) Fast 52,1 | | | | | | | | | | | | | | | | | | |
| 85 | $05^{04}$ | $05^{19}$ | 53,4 | 51,0 | 51,0 | 51,3 | 51,4 | 51,1 | 51,2 | 51,2 | 51,1 | 41,8 | 53,2 | birds, wind | 22,0 | 1,73 – 2,45 | 727 | SW |
| LA(min) Fast 36,0 – LA(max) Fast 38,0 | | | | | | | | | | | | | | | | | | |
| 86 | $05^{32}$ | $05^{47}$ | 43,1 | 42,4 | 42,2 | 43,3 | 43,0 | 42,2 | 43,2 | 43,3 | 43,1 | 42,3 | 55,0 | birds, wind | 22,5 | 1,88 – 2,67 | 727 | SW |
| LA(min) Fast 35,9 – LA(max) Fast 38,4 | | | | | | | | | | | | | | | | | | |
| 87 | $06^{00}$ | $06^{15}$ | 44,1 | 42,4 | 42,0 | 43,3 | 43,0 | 43,2 | 43,2 | 43,3 | 43,0 | 46,1 | 58,1 | birds, wind | 25,6 | 2,8 – 4,79 | 726 | NE |
| LA(min) Fast 33,9 – LA(max) Fast 38,0 | | | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 88 | $06^{33}$ | $06^{48}$ | 55,0 | 54,0 | 53,0 | 53,4 | 52,2 | 55,0 | 55,2 | 53,3 | 53,4 | 50,0 | 62,0 | birds, wind, car | 26,0 | 3,1 – 4,75 | 726 | NE |
| LA(min) Fast 34,0 – LA(max) Fast 39,0 | | | | | | | | | | | | | | | | | | |
| 89 | $07^{10}$ | $07^{25}$ | No measurements due to wind speed | | | | | | | | | | | birds, wind | 26,4 | **3,25 – 8,25** | 726 | NE |
| 90 | $07^{40}$ | $07^{55}$ | No measurements due to wind speed | | | | | | | | | | | birds, wind | 26,9 | **4,94 – 6,88** | 726 | NE |
| 91 | $08^{02}$ | $08^{17}$ | No measurements due to wind speed | | | | | | | | | | | birds, wind | 28,1 | **3,78 – 6,16** | 726 | NE |
| 92 | $08^{36}$ | $08^{51}$ | No measurements due to wind speed | | | | | | | | | | | birds, wind | 28,0 | **4,05 – 7,08** | 726 | NE |
| 93 | $09^{00}$ | $09^{15}$ | No measurements due to wind speed | | | | | | | | | | | birds, wind | 30,0 | **8,86 – 12,7** | 726 | NE |
| 94 | $09^{40}$ | $09^{55}$ | No measurements due to wind speed | | | | | | | | | | | birds, wind | 30,1 | **8,31 – 10,2** | 726 | NE |
| 95 | $10^{02}$ | $10^{17}$ | No measurements due to wind speed | | | | | | | | | | | birds, wind | 31,9 | **7,41 – 10,2** | 726 | NE |
| 96 | $10^{42}$ | $10^{57}$ | No measurements due to wind speed | | | | | | | | | | | birds, wind | 31,7 | **7,32 – 9,44** | 726 | NE |

Table 0-11 NM 5 (weekday)

| **№** | **Start time** | **End time** | **Sound pressure in octave bands with geometric mean frequencies, Hz** | | | | | | | | | **LAeq, dB** | **LAmax, dB** | **Additional noise sources** | **Meteo data** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **31,5** | **63** | **125** | **250** | **500** | **1000** | **2000** | **4000** | **8000** | | | | **Temperature, $^0$C** | **Wind speed, m/sec** | **Pressure, mmHg** | **Wind direction** |
| **NM 5 – 25.06.2020 (weekday). Coordinates: 40°14'40.63"N 69° 7'33.91" E; h = 1,2 m.** | | | | | | | | | | | | | | | | | | |
| 1 | $11^{10}$ | $11^{25}$ | 55,0 | 54,0 | 53,0 | 53,4 | 52,2 | 55,0 | 55,2 | 53,3 | 53,4 | 50,5 | 63,0 | birds, house. livestock, wind | 33,1 | 2,94 – 5,00 | 725 | NE |
| LA(min) Fast 54,9 – LA(max) Fast 59,1 | | | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | $11^{40}$ | $11^{55}$ | 55,0 | 54,0 | 53,2 | 53,4 | 52,2 | 55,5 | 55,2 | 53,3 | 53,0 | 57,9 | 64,2 | birds, house. livestock, wind | 33,7 | 3,64 – 4,81 | 725 | NE |
| LA(min) Fast 55,0 – LA(max) Fast 58,5 | | | | | | | | | | | | | | | | | | |
| 3 | $12^{05}$ | $12^{20}$ | No measurement due to wind speed > 5 m/s | | | | | | | | | | | birds, house. livestock, wind | 35,4 | **3,39 – 5,9** | 725 | NE |
| 4 | $12^{35}$ | $12^{50}$ | No measurement due to wind speed > 5 m/s | | | | | | | | | | | birds, house. livestock, wind | 35,7 | **3,24 – 5,78** | 725 | NE |
| 5 | $13^{15}$ | $13^{30}$ | 44,9 | 45,1 | 45,3 | 46,0 | 45,2 | 46,2 | 46,1 | 45,2 | 46,0 | 51,6 | 57,5 | birds, house. livestock, wind | 36,7 | 2,19 – 4,71 | 725 | SW |
| LA(min) Fast 43,0 – LA(max) Fast 48,1 | | | | | | | | | | | | | | | | | | |
| 6 | $13^{40}$ | $13^{55}$ | 44,3 | 45,1 | 45,3 | 46,0 | 45,2 | 46,3 | 46,1 | 45,2 | 46,2 | 49,5 | 52,0 | birds, house. livestock, wind | 36,4 | 2,97 – 4,04 | 725 | SW |
| LA(min) Fast 43,7 – LA(max) Fast 46,0 | | | | | | | | | | | | | | | | | | |
| 7 | $14^{10}$ | $14^{25}$ | 44,9 | 45,1 | 45,3 | 46,0 | 45,2 | 46,2 | 46,1 | 45,2 | 46,0 | 47,1 | 51,8 | birds, house. livestock, wind | 36,8 | 2,95 – 4,35 | 725 | NE |
| LA(min) Fast 40,9 – LA(max) Fast 46,7 | | | | | | | | | | | | | | | | | | |
| 8 | $14^{35}$ | $14^{50}$ | 44,3 | 45,1 | 45,3 | 46,0 | 45,2 | 46,3 | 46,1 | 45,2 | 46,2 | 45,2 | 50,1 | birds, house. livestock, wind | 36,1 | 2,94 – 4,24 | 725 | NE |
| LA(min) Fast 40,4 – LA(max) Fast 45,9 | | | | | | | | | | | | | | | | | | |
| 9 | $15^{00}$ | $15^{15}$ | 43,8 | 43,4 | 44,0 | 43,3 | 44,0 | 43,4 | 44,0 | 43,1 | 44,0 | 53,8 | 59,8 | birds, house. livestock, wind | 36,2 | 2,48 – 4,53 | 725 | NE |
| LA(min) Fast 40,0 – LA(max) Fast 44,3 | | | | | | | | | | | | | | | | | | |
| 10 | $15^{40}$ | $15^{55}$ | 43,2 | 43,4 | 44,0 | 43,3 | 44,0 | 43,2 | 43,0 | 43,1 | 44,2 | 53,5 | 57,8 | birds, house. livestock, wind | 36,4 | 2,12 – 4,46 | 725 | NE |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LA(min) Fast 42,0 – LA(max) Fast 44,0 | | | | | | | | | | | | | | | | | |
| 11 | $16^{10}$ | $16^{25}$ | 42,1 | 42,3 | 43,2 | 43,4 | 43,2 | 44,0 | 43,1 | 43,3 | 43,2 | 42,1 | 48,4 | birds, house. livestock | 36,7 | 2,58 – 3,85 | 722 | NE |
| LA(min) Fast 38,2 – LA(max) Fast 42,4 | | | | | | | | | | | | | | | | | |
| 12 | $16^{44}$ | $16^{59}$ | 43,8 | 43,3 | 43,0 | 42,4 | 43,1 | 42,5 | 43,2 | 42,5 | 43,1 | 44,6 | 48,9 | birds, house. livestock | 36,2 | 2,13 – 3,01 | 722 | NE |
| LA(min) Fast 39,2 – LA(max) Fast 43,1 | | | | | | | | | | | | | | | | | |
| 13 | $17^{03}$ | $17^{18}$ | 42,3 | 43,1 | 42,2 | 44,3 | 45,2 | 43,1 | 44,2 | 43,0 | 43,4 | 41,4 | 49,0 | birds, cars | 35,6 | 2,7 – 3,75 | 722 | SW |
| LA(min) Fast 32,2 – LA(max) Fast 35,9 | | | | | | | | | | | | | | | | | |
| 14 | $17^{44}$ | $17^{59}$ | 42,5 | 43,1 | 42,2 | 44,3 | 45,2 | 43,6 | 44,2 | 43,0 | 43,4 | 46,0 | 52,4 | birds, cars | 35,5 | 2,89 – 3,01 | 722 | SW |
| LA(min) Fast 33,9 – LA(max) Fast 36,4 | | | | | | | | | | | | | | | | | |
| 15 | $18^{00}$ | $18^{12}$ | 43,2 | 43,3 | 43,0 | 42,4 | 43,1 | 42,4 | 43,2 | 42,3 | 43,1 | 41,4 | 48,8 | birds, cars, | 34,6 | 1,64 – 2,91 | 722 | SW |
| LA(min) Fast 30,0 – LA(max) Fast 34,0 | | | | | | | | | | | | | | | | | |
| 16 | $18^{35}$ | $18^{50}$ | 34,2 | 35,7 | 35,4 | 34,6 | 36,2 | 34,4 | 35,4 | 32,7 | 32,3 | 33,7 | 49,9 | birds, cars, | 34,0 | 1,44 – 2,98 | 722 | SW |
| LA(min) Fast 30,1 – LA(max) Fast 33,1 | | | | | | | | | | | | | | | | | |
| 17 | $19^{00}$ | $19^{15}$ | 34,2 | 35,7 | 35,4 | 34,6 | 36,2 | 34,4 | 35,4 | 32,7 | 32,3 | 32,8 | 40,0 | birds, cars, | 33,1 | 1,15 – 2,43 | 722 | NE |
| LA(min) Fast 31,9 – LA(max) Fast 34,4 | | | | | | | | | | | | | | | | | |
| 18 | $19^{44}$ | $19^{59}$ | 32,1 | 32,3 | 32,6 | 32,3 | 33,2 | 33,8 | 33,6 | 33,3 | 33,1 | 32,4 | 42,1 | birds, cars, | 33,2 | 1,31 – 2,89 | 722 | NE |
| LA(min) Fast 31,2 – LA(max) Fast 36,9 | | | | | | | | | | | | | | | | | |
| 19 | $20^{00}$ | $20^{15}$ | 41,2 | 44,0 | 44,3 | 44,0 | 44,4 | 43,2 | 43,3 | 43,1 | 41,2 | 41,3 | 50,2 | birds, cars, frogs | 30,8 | 1,21 – 1,98 | 722 | NE |
| LA(min) Fast 31,0 – LA(max) Fast 35,0 | | | | | | | | | | | | | | | | | |
| 20 | $20^{38}$ | $20^{53}$ | 41,0 | 41,2 | 44,0 | 44,3 | 44,0 | 44,4 | 44,2 | 44,3 | 45,1 | 36,8 | 43,8 | birds, cars, frogs | 30,4 | 1,55 – 2,14 | 722 | NE |
| LA(min) Fast 32,7 – LA(max) Fast 34,8 | | | | | | | | | | | | | | | | | |
| 21 | $21^{10}$ | $21^{25}$ | 41,0 | 41,2 | 44,0 | 44,3 | 44,0 | 44,4 | 44,2 | 44,3 | 45,1 | 43,6 | 49,8 | birds, cars, frogs | 29,1 | 1,47 – 2,04 | 722 | SW |
| LA(min) Fast 36,0 – LA(max) Fast 40,0 | | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22 | $21^{40}$ | $21^{55}$ | 41,0 | 41,2 | 44,0 | 44,3 | 44,0 | 44,4 | 44,2 | 44,3 | 45,1 | 42,2 | 51,8 | birds, cars, frogs | 29,1 | 1,64 – 2,19 | 722 | SW |
| LA(min) Fast 37,0 – LA(max) Fast 40,9 | | | | | | | | | | | | | | | | | | |
| 23 | $22^{00}$ | $22^{15}$ | 46,4 | 45,1 | 46,2 | 44,3 | 45,2 | 46,1 | 47,2 | 48,3 | 47,2 | 47,4 | 50,0 | birds, cars, crickets, frogs, | 27,3 | 0,36 – 0,71 | 722 | NE |
| LA(min) Fast 44,2 – LA(max) Fast 46,0 | | | | | | | | | | | | | | | | | | |
| 24 | $22^{38}$ | $22^{53}$ | 46,4 | 45,1 | 46,2 | 44,3 | 45,2 | 46,1 | 47,2 | 48,3 | 47,2 | 46,2 | 48,4 | birds, cars, crickets, frogs, | 27,2 | 0,77 – 0,98 | 722 | NE |
| LA(min) Fast 44,0 – LA(max) Fast 46,0 | | | | | | | | | | | | | | | | | | |
| 25 | $23^{05}$ | $23^{20}$ | 42,3 | 43,1 | 46,2 | 44,0 | 45,1 | 43,3 | 44,2 | 46,4 | 45,8 | 46,6 | 49,4 | birds, cars, frogs | 27,6 | 0,79 – 1,16 | 722 | NE |
| LA(min) Fast 46,0 – LA(max) Fast 48,0 | | | | | | | | | | | | | | | | | | |
| 26 | $23^{38}$ | $23^{53}$ | 42,2 | 43,1 | 46,2 | 44,4 | 45,1 | 43,6 | 44,2 | 46,4 | 45,8 | 46,3 | 51,4 | birds, cars, frogs | 27,0 | 0,55 – 1,68 | 722 | NE |
| LA(min) Fast 43,4 – LA(max) Fast 47,9 | | | | | | | | | | | | | | | | | | |
| **NM 5 – 26.06.2020 (weekend). Coordinates: 40°14'40.63"N 69° 7'33.91" E; h = 1,2 m.** | | | | | | | | | | | | | | | | | | |
| 27 | $00^{07}$ | $00^{22}$ | 44,3 | 45,1 | 45,3 | 46,0 | 45,2 | 46,3 | 46,1 | 45,2 | 46,2 | 47,9 | 49,9 | birds, frogs | 25,9 | 1,1 – 2,06 | 722 | NE |
| LA(min) Fast 45,0 – LA(max) Fast 49,0 | | | | | | | | | | | | | | | | | | |
| 28 | $00^{44}$ | $00^{59}$ | 42,4 | 43,1 | 45,2 | 44,3 | 45,2 | 44,4 | 45,3 | 46,1 | 44,2 | 42,0 | 49,9 | birds, frogs | 25,4 | 1,55 – 2,04 | 722 | NE |
| LA(min) Fast 42,3 – LA(max) Fast 49,3 | | | | | | | | | | | | | | | | | | |
| 29 | $01^{12}$ | $01^{27}$ | 46,1 | 49,3 | 47,2 | 48,1 | 47,2 | 45,4 | 46,3 | 47,1 | 48,2 | 47,5 | 54,1 | birds, frogs | 25,2 | 1,14 – 1,73 | 722 | NE |
| LA(min) Fast 41,5 – LA(max) Fast 48,0 | | | | | | | | | | | | | | | | | | |
| 30 | $01^{32}$ | $01^{47}$ | 46,1 | 49,3 | 47,2 | 48,1 | 47,7 | 45,4 | 46,3 | 47,4 | 48,2 | 42,9 | 54,1 | birds, frogs | 25,1 | 1,36 – 1,94 | 722 | NE |
| LA(min) Fast 42,0 – LA(max) Fast 48,8 | | | | | | | | | | | | | | | | | | |
| 31 | $02^{03}$ | $02^{18}$ | 43,2 | 43,4 | 44,0 | 43,3 | 44,0 | 43,2 | 43,0 | 43,1 | 44,2 | 42,8 | 53,3 | birds, frogs | 23,9 | 0,87 – 1,36 | 722 | NE |
| LA(min) Fast 42,0 – LA(max) Fast 44,0 | | | | | | | | | | | | | | | | | | |
| 32 | $02^{32}$ | $02^{47}$ | 41,3 | 54,0 | 52,5 | 51,1 | 53,3 | 54,3 | 53,0 | 53,4 | 52,2 | 51,8 | 54,0 | birds, frogs | 23,0 | 0,44 – 1,56 | 722 | NE |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LA(min) Fast 41,9 – LA(max) Fast 44,8 | | | | | | | | | | | | | | | | | |
| 33 | $03^{10}$ | $03^{25}$ | 43,8 | 43,4 | 44,0 | 43,3 | 44,0 | 43,4 | 44,0 | 43,1 | 44,0 | 43,4 | 53,2 | birds, frogs | 23,4 | 1,32 – 1,66 | 722 | NE |
| LA(min) Fast 42,0 – LA(max) Fast 44,2 | | | | | | | | | | | | | | | | | |
| 34 | $03^{36}$ | $03^{51}$ | 43,2 | 43,4 | 44,0 | 43,3 | 44,0 | 43,2 | 43,0 | 43,1 | 44,2 | 44,4 | 50,1 | birds, frogs | 23,1 | 1,84 – 1,95 | 722 | NE |
| LA(min) Fast 43,0 – LA(max) Fast 45,2 | | | | | | | | | | | | | | | | | |
| 35 | $04^{00}$ | $04^{15}$ | 34,2 | 35,7 | 35,4 | 34,6 | 36,2 | 34,4 | 35,4 | 32,7 | 32,3 | 32,2 | 48,0 | birds, frogs | 23,7 | 0,54 – 1,26 | 722 | NE |
| LA(min) Fast 31,0 – LA(max) Fast 33,0 | | | | | | | | | | | | | | | | | |
| 36 | $04^{22}$ | $04^{37}$ | 34,2 | 35,7 | 35,4 | 34,6 | 36,2 | 34,4 | 35,4 | 32,7 | 32,3 | 32,8 | 48,2 | birds, frogs | 23,3 | 0,5 – 1,71 | 722 | NE |
| LA(min) Fast 30,4 – LA(max) Fast 32,8 | | | | | | | | | | | | | | | | | |
| 37 | $05^{17}$ | $05^{32}$ | 32,1 | 32,3 | 32,6 | 32,3 | 33,2 | 33,8 | 33,6 | 33,3 | 33,1 | 33,5 | 35,9 | frogs, birds | 25,1 | 1,14 – 2,22 | 722 | NE |
| LA(min) Fast 29,0 – LA(max) Fast 31,0 | | | | | | | | | | | | | | | | | |
| 38 | $05^{43}$ | $05^{58}$ | 34,2 | 35,7 | 35,4 | 34,6 | 36,2 | 34,4 | 35,4 | 32,7 | 32,3 | 34,3 | 44,8 | frogs, birds | 25,7 | 1,51 – 1,89 | 722 | NE |
| LA(min) Fast 30,1 – LA(max) Fast 32,8 | | | | | | | | | | | | | | | | | |
| 39 | $06^{10}$ | $06^{35}$ | 34,2 | 34,7 | 34,4 | 33,6 | 34,2 | 34,4 | 35,4 | 32,7 | 31,3 | 34,7 | 39,0 | frogs, birds | 26,7 | 1,18 – 1,96 | 722 | NE |
| LA(min) Fast 26,1 – LA(max) Fast 28,9 | | | | | | | | | | | | | | | | | |
| 40 | $06^{45}$ | $07^{00}$ | 34,2 | 35,7 | 35,4 | 34,6 | 36,2 | 34,4 | 35,4 | 32,7 | 32,3 | 34,8 | 37,1 | frogs, birds | 26,5 | 1,4 – 1,78 | 722 | NE |
| LA(min) Fast 26,8 – LA(max) Fast 29,6 | | | | | | | | | | | | | | | | | |
| 41 | $07^{12}$ | $07^{27}$ | 34,2 | 35,7 | 35,4 | 34,6 | 36,2 | 34,4 | 35,1 | 32,7 | 32,0 | 34,5 | 37,0 | birds | 28,3 | 1,67 – 2,19 | 722 | NE |
| LA(min) Fast 26,4 – LA(max) Fast 30,3 | | | | | | | | | | | | | | | | | |
| 42 | $07^{39}$ | $07^{54}$ | 34,2 | 35,7 | 35,4 | 34,6 | 36,2 | 34,4 | 35,4 | 32,7 | 32,3 | 34,8 | 38,2 | birds | 28,5 | 1,20 – 2,21 | 722 | NE |
| LA(min) Fast 26,8 – LA(max) Fast 29,0 | | | | | | | | | | | | | | | | | |
| 43 | $08^{00}$ | $08^{15}$ | 32,6 | 32,5 | 32,3 | 32,1 | 32,0 | 31,8 | 31,7 | 31,5 | 32,6 | 32,2 | 42,4 | birds | 29,7 | 1,36 – 2,19 | 723 | NE |
| LA(min) Fast 31,8 – LA(max) Fast 33,0 | | | | | | | | | | | | | | | | | |
| 44 | $08^{32}$ | $08^{47}$ | 34,6 | 34,3 | 34,1 | 33,0 | 32,8 | 32,7 | 32,0 | 31,8 | 31,7 | 33,0 | 42,0 | birds | 29,4 | 1,38 – 2,74 | 723 | NE |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LA(min) Fast 32,1 – LA(max) Fast 33,7 | | | | | | | | | | | | | | | | | | |
| 45 | $09^{10}$ | $09^{25}$ | 33,4 | 34,1 | 32,2 | 33,1 | 34,0 | 34,4 | 33,1 | 32,2 | 33,3 | 35,8 | 36,4 | birds | 31,2 | 0,46 – 0,83 | 723 | NE |
| LA(min) Fast 30,0 – LA(max) Fast 32,0 | | | | | | | | | | | | | | | | | | |
| 46 | $09^{40}$ | $09^{55}$ | 33,4 | 34,1 | 32,3 | 33,1 | 34,0 | 34,6 | 33,1 | 32,2 | 33,5 | 36,5 | 39,8 | birds | 31,7 | 0,55 – 0,78 | 723 | NE |
| LA(min) Fast 30,0 – LA(max) Fast 32,7 | | | | | | | | | | | | | | | | | | |
| 47 | $10^{00}$ | $10^{15}$ | 33,5 | 34,1 | 32,2 | 33,6 | 34,0 | 34,4 | 33,1 | 32,2 | 33,4 | 35,6 | 44,0 | birds | 32,1 | 0,56 – 0,98 | 723 | NE |
| LA(min) Fast 28,0 – LA(max) Fast 30,1 | | | | | | | | | | | | | | | | | | |
| 48 | $10^{30}$ | $10^{45}$ | 33,5 | 34,1 | 32,4 | 33,6 | 34,0 | 34,8 | 33,1 | 32,2 | 33,1 | 35,2 | 40,0 | birds | 32,1 | 1,25 – 2,68 | 723 | NE |
| LA(min) Fast 28,0 – LA(max) Fast 31,0 | | | | | | | | | | | | | | | | | | |

Table 0-12 NM 5 (weekend)

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NM 5 – 27.06.2020 (weekend). Coordinates: 40°14'40.63"N 69° 7'33.91" E; h = 1,2 m.** | | | | | | | | | | | | | | | | | | |
| 49 | $7^{10}$ | $7^{25}$ | No measurement due to wind speed > 5 m/s | | | | | | | | | | | wind, birds | 22,4 | **3,39 – 5,28** | 727 | SE |
| 50 | $7^{35}$ | $7^{50}$ | 52,2 | 53,4 | 54,3 | 54,1 | 52,4 | 53,2 | 55,3 | 53,2 | 54,1 | 53,3 | 61,2 | wind, birds | 22,4 | 3,38 –4,25 | 727 | SE |
| LA(min) Fast 50,4 – LA(max) Fast 52,9 | | | | | | | | | | | | | | | | | | |
| 51 | $8^{00}$ | $8^{15}$ | 53,2 | 54,1 | 54,3 | 53,1 | 52,2 | 53,4 | 53,0 | 52,1 | 54,3 | 41,3 | 54,0 | wind, birds | 24,1 | 2,86 – 4,42 | 727 | SE |
| LA(min) Fast 38,4 – LA(max) Fast 42,9 | | | | | | | | | | | | | | | | | | |
| 52 | $8^{30}$ | $8^{45}$ | 44,2 | 43,3 | 42,1 | 41,3 | 41,1 | 41,3 | 42,1 | 41,2 | 40,4 | 44,3 | 50,0 | wind, birds | 24,0 | 2,45 – 4,58 | 727 | SE |
| LA(min) Fast 37,8 – LA(max) Fast 42,1 | | | | | | | | | | | | | | | | | | |
| 53 | $9^{10}$ | $9^{25}$ | 56,2 | 57,1 | 54,3 | 56,1 | 54,2 | 56,4 | 57,1 | 56,3 | 54,1 | 54,3 | 62,0 | wind, birds | 25,6 | 2,94 – 4,95 | 729 | SE |
| LA(min) Fast 45,8 – LA(max) Fast 48,1 | | | | | | | | | | | | | | | | | | |
| 54 | $9^{40}$ | $9^{55}$ | No measurement due to wind speed > 5 m/s | | | | | | | | | | | wind, birds | 25,2 | **3,46 – 5,9** | 729 | SE |
| 55 | $10^{00}$ | $10^{15}$ | No measurement due to wind speed > 5 m/s | | | | | | | | | | | wind, birds | 26,2 | **4,41 – 6,79** | 729 | SE |
| 56 | $10^{40}$ | $10^{55}$ | No measurement due to wind speed > 5 m/s | | | | | | | | | | | wind, birds | 26,4 | **4,17 – 5,54** | 729 | SE |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 57 | $11^{10}$ | $11^{25}$ | No measurement due to wind speed > 5 m/s | | | | | | | | | | | wind, birds | 26,5 | **3,39 – 6,71** | 729 | SE |
| 58 | $11^{40}$ | $11^{55}$ | No measurement due to wind speed > 5 m/s | | | | | | | | | | | wind, birds | 26,4 | **3,04 – 6,75** | 729 | SE |
| 59 | $12^{00}$ | $12^{15}$ | No measurement due to wind speed > 5 m/s | | | | | | | | | | | wind, birds | 26,7 | **4,53 – 6,27** | 730 | SE |
| 60 | $12^{35}$ | $12^{50}$ | No measurement due to wind speed > 5 m/s | | | | | | | | | | | wind, birds | 26,1 | **4,34 – 6,34** | 730 | SE |
| 61 | $13^{14}$ | $13^{29}$ | 52,1 | 52,4 | 53,3 | 54,2 | 55,1 | 53,4 | 52,2 | 56,1 | 54,3 | 43,4 | 55,6 | cars, birds | 27,4 | 3,61 – 4,58 | 730 | SE |
| LA(min) Fast 31,9 – LA(max) Fast 36,6 | | | | | | | | | | | | | | | | | | |
| 62 | $13^{40}$ | $13^{55}$ | 52,0 | 52,4 | 53,3 | 54,2 | 55,8 | 53,4 | 52,2 | 56,1 | 54,3 | 53,6 | 64,2 | cars, birds | 27,4 | 3,71 – 4,28 | 730 | SE |
| LA(min) Fast 32,0 – LA(max) Fast 35,6 | | | | | | | | | | | | | | | | | | |
| 63 | $14^{00}$ | $14^{15}$ | 43,2 | 44,1 | 44,3 | 46,1 | 42,2 | 45,1 | 44,2 | 46,1 | 44,2 | 41,2 | 61,7 | cars, birds | 30,2 | 1,63 – 3,12 | 730 | SE |
| LA(min) Fast 38,0 – LA(max) Fast 42,0 | | | | | | | | | | | | | | | | | | |
| 64 | $14^{40}$ | $14^{55}$ | 42,9 | 44,1 | 44,3 | 46,1 | 42,2 | 45,1 | 44,2 | 46,1 | 44,2 | 41,6 | 61,0 | cars, birds | 30,4 | 1,4 – 3,75 | 730 | SE |
| LA(min) Fast 38,0 – LA(max) Fast 45,6 | | | | | | | | | | | | | | | | | | |
| 65 | $15^{00}$ | $15^{15}$ | 42,4 | 43,1 | 43,4 | 43,0 | 44,2 | 45,1 | 47,2 | 43,3 | 46,1 | 42,6 | 46,0 | birds | 27,6 | 2,66 – 4,91 | 730 | SE |
| LA(min) Fast 30,0 – LA(max) Fast 34,6 | | | | | | | | | | | | | | | | | | |
| 66 | $15^{40}$ | $15^{55}$ | 34,6 | 34,3 | 34,1 | 33,0 | 32,8 | 32,7 | 32,0 | 31,8 | 31,7 | 34,6 | 54,5 | birds | 27,6 | 2,46 – 5,02 | 730 | SE |
| LA(min) Fast 30,4 – LA(max) Fast 34,9 | | | | | | | | | | | | | | | | | | |
| 67 | $16^{05}$ | $16^{20}$ | 46,4 | 47,1 | 47,3 | 48,4 | 45,3 | 49,1 | 47,2 | 46,4 | 49,3 | 46,0 | 48,0 | wind, birds | 26,7 | 2,17 – 4,58 | 730 | SE |
| LA(min) Fast 36,0 – LA(max) Fast 39,9 | | | | | | | | | | | | | | | | | | |
| 68 | $16^{40}$ | $16^{55}$ | 46,4 | 47,8 | 47,6 | 48,4 | 45,3 | 49,8 | 47,2 | 46,4 | 49,3 | 44,6 | 48,0 | wind, birds | 26,9 | 2,78 – 4,25 | 730 | SE |
| LA(min) Fast 36,4 – LA(max) Fast 40,1 | | | | | | | | | | | | | | | | | | |
| 69 | $17^{00}$ | $17^{15}$ | 53,0 | 52,2 | 53,0 | 52,1 | 52,4 | 53,1 | 53,3 | 53,4 | 52,4 | 53,5 | 54,8 | cars, birds | 25,3 | 1,75 – 3,12 | 730 | SE |
| LA(min) Fast 42,4 – LA(max) Fast 44,1 | | | | | | | | | | | | | | | | | | |
| 70 | $17^{30}$ | $17^{45}$ | No measurement due to wind speed > 5 m/s | | | | | | | | | | | cars, birds | 25,4 | **2,8 – 5,31** | 730 | SE |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 71 | $18^{00}$ | $18^{15}$ | 43,4 | 44,0 | 44,4 | 43,3 | 43,2 | 44,0 | 43,0 | 45,4 | 46,4 | 46,7 | 60,0 | cars, birds | 25,0 | 1,75 – 3,85 | 730 | SE |
| LA(min) Fast 32,1 – LA(max) Fast 36,5 | | | | | | | | | | | | | | | | | | |
| 72 | $18^{30}$ | $18^{45}$ | 32,6 | 32,5 | 32,3 | 32,1 | 32,0 | 31,8 | 31,7 | 31,5 | 32,6 | 43,0 | 61,0 | birds, cars | 25,4 | 1,68 – 2,74 | 730 | SE |
| LA(min) Fast 32,4 – LA(max) Fast 36,1 | | | | | | | | | | | | | | | | | | |
| 73 | $19^{00}$ | $19^{15}$ | 34,6 | 34,3 | 34,1 | 33,0 | 32,8 | 32,7 | 32,0 | 31,8 | 31,7 | 48,7 | 64,0 | birds, cars, frogs | 24,1 | 1,57 и-3,15 | 730 | SE |
| LA(min) Fast 33,8 – LA(max) Fast 37,5 | | | | | | | | | | | | | | | | | | |
| 74 | $19^{30}$ | $19^{45}$ | 47,2 | 47,1 | 48,3 | 47,4 | 46,2 | 46,4 | 47,9 | 48,3 | 47,4 | 48,3 | 61,4 | birds, cars, frogs | 24,0 | 2,46 – 4,11 | 730 | SE |
| LA(min) Fast 33,4 – LA(max) Fast 37,1 | | | | | | | | | | | | | | | | | | |
| 75 | $20^{00}$ | $20^{15}$ | 51,4 | 53,3 | 54,1 | 52,2 | 53,1 | 53,4 | 54,4 | 53,4 | 52,4 | 57,4 | 66,8 | birds, cars, frogs | 22,2 | 1,36 – 2,12 | 729 | SE |
| LA(min) Fast 36,0 – LA(max) Fast 40,0 | | | | | | | | | | | | | | | | | | |
| 76 | $20^{30}$ | $20^{45}$ | 51,8 | 53,5 | 54,1 | 52,2 | 53,1 | 53,4 | 54,4 | 53,4 | 52,4 | 54,8 | 64,0 | birds, cars, frogs | 22,4 | 1,46 – 2,8 | 729 | SE |
| LA(min) Fast 36,8 – LA(max) Fast 40,1 | | | | | | | | | | | | | | | | | | |
| 77 | $21^{10}$ | $21^{25}$ | 52,4 | 53,3 | 54,2 | 55,1 | 53,4 | 56,1 | 53,2 | 54,2 | 53,3 | 51,9 | 58,1 | birds, frogs | 21,0 | 1,54 – 2,75 | 730 | SE |
| LA(min) Fast 39,0 – LA(max) Fast 43,0 | | | | | | | | | | | | | | | | | | |
| 78 | $21^{35}$ | $21^{50}$ | 41,0 | 41,2 | 44,0 | 44,3 | 44,0 | 44,4 | 44,2 | 44,3 | 45,1 | 49,0 | 54,0 | birds, frogs | 21,0 | 1,48 – 2,24 | 730 | SE |
| LA(min) Fast 39,8 – LA(max) Fast 42,4 | | | | | | | | | | | | | | | | | | |
| 79 | $22^{00}$ | $22^{15}$ | 41,0 | 41,2 | 44,0 | 44,3 | 44,0 | 44,4 | 43,2 | 43,3 | 43,1 | 48,9 | 53,1 | frogs | 19,3 | 0,98 – 1,62 | 730 | SE |
| LA(min) Fast 38,0 – LA(max) Fast 42,0 | | | | | | | | | | | | | | | | | | |
| 80 | $22^{40}$ | $22^{55}$ | 44,3 | 45,1 | 45,3 | 46,0 | 45,2 | 46,3 | 46,1 | 45,2 | 46,2 | 47,4 | 59,8 | frogs | 19,7 | 0,94 – 1,36 | 730 | SE |
| LA(min) Fast 42,1 – LA(max) Fast 48,0 | | | | | | | | | | | | | | | | | | |
| 81 | $23^{00}$ | 44,9 | 45,1 | 45,3 | 46,0 | 45,2 | 46,2 | 46,1 | 45,2 | 46,0 | 44,9 | 46,4 | 53,1 | frogs | 18,5 | 0,64 – 1,07 | 730 | NE |
| LA(min) Fast 42,0 – LA(max) Fast 48,0 | | | | | | | | | | | | | | | | | | |
| 82 | $23^{40}$ | $23^{55}$ | 51,1 | 51,4 | 51,4 | 52,3 | 52,1 | 52,0 | 50,4 | 51,3 | 52,4 | 47,0 | 54,3 | frogs | 18,4 | 0,98 – 1,22 | 730 | NE |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LA(min) Fast 42,1 – LA(max) Fast 48,8 | | | | | | | | | | | | | | | | | | |
| **NM 5 – 28.06.2020 (weekend). Coordinates: 40°14'40.63"N 69° 7'33.91" E; h = 1,2 m.** | | | | | | | | | | | | | | | | | | |
| 83 | $00^{00}$ | $00^{15}$ | 41,2 | 44,0 | 44,3 | 44,0 | 44,4 | 45,2 | 45,3 | 45,1 | 41,2 | 48,4 | 57,0 | frogs | 18,3 | 0,57 – 1,14 | 730 | NE |
| LA(min) Fast 42,0 – LA(max) Fast 46,0 | | | | | | | | | | | | | | | | | | |
| 84 | $00^{25}$ | $00^{40}$ | 43,8 | 43,3 | 43,0 | 42,4 | 43,1 | 42,5 | 43,2 | 42,5 | 43,1 | 43,3 | 59,0 | frogs | 18,7 | 0,38 – 1,77 | 730 | NE |
| LA(min) Fast 42,0 – LA(max) Fast 46,1 | | | | | | | | | | | | | | | | | | |
| 85 | $01^{10}$ | $01^{25}$ | 42,1 | 42,3 | 43,2 | 43,4 | 43,2 | 44,0 | 43,1 | 43,3 | 43,2 | 46,4 | 51,0 | frogs | 16,1 | 0,41 – 1,23 | 731 | NE |
| LA(min) Fast 40,0 – LA(max) Fast 42,2 | | | | | | | | | | | | | | | | | | |
| 86 | $01^{35}$ | $01^{50}$ | 42,9 | 42,3 | 43,2 | 43,4 | 43,2 | 43,4 | 43,1 | 43,3 | 43,2 | 48,2 | 51,8 | frogs | 16,4 | 0,82 – 1,88 | 731 | NE |
| LA(min) Fast 40,0 – LA(max) Fast 43,0 | | | | | | | | | | | | | | | | | | |
| 87 | $02^{00}$ | $02^{15}$ | 48,1 | 48,2 | 49,4 | 47,2 | 48,1 | 45,4 | 46,3 | 47,2 | 48,3 | 44,2 | 48,2 | frogs | 16,6 | 0,63 – 0,98 | 731 | NE |
| LA(min) Fast 40,0 – LA(max) Fast 42,0 | | | | | | | | | | | | | | | | | | |
| 88 | $02^{40}$ | $02^{55}$ | 48,4 | 48,2 | 48,4 | 47,2 | 48,1 | 45,9 | 46,3 | 47,8 | 48,3 | 44,4 | 48,4 | frogs | 16,6 | 0,66 – 1,32 | 731 | NE |
| LA(min) Fast 40,0 – LA(max) Fast 43,2 | | | | | | | | | | | | | | | | | | |
| 89 | $03^{00}$ | $03^{15}$ | 46,4 | 47,2 | 48,3 | 49,1 | 48,4 | 47,2 | 46,1 | 46,3 | 45,2 | 46,1 | 49,2 | frogs | 16,9 | 0,65 – 1,31 | 731 | NE |
| LA(min) Fast 40,0 – LA(max) Fast 42,0 | | | | | | | | | | | | | | | | | | |
| 90 | $03^{30}$ | $03^{45}$ | 46,8 | 47,2 | 48,3 | 49,4 | 48,2 | 47,2 | 46,1 | 46,3 | 45,2 | 45,8 | 56,0 | frogs | 16,5 | 0,69 – 1,74 | 731 | NE |
| LA(min) Fast 40,0 – LA(max) Fast 42,7 | | | | | | | | | | | | | | | | | | |
| 91 | $04^{02}$ | $04^{17}$ | 45,3 | 46,2 | 46,4 | 47,3 | 48,2 | 47,1 | 46,3 | 45,2 | 44,1 | 47,4 | 54,8 | frogs | 17,1 | 0,73 – 1,17 | 731 | NE |
| LA(min) Fast 38,0 – LA(max) Fast 42,0 | | | | | | | | | | | | | | | | | | |
| 92 | $04^{31}$ | $04^{46}$ | 45,3 | 46,0 | 46,4 | 47,3 | 48,2 | 47,0 | 46,3 | 45,8 | 44,1 | 47,2 | 53,0 | frogs | 17,0 | 0,28 – 1,94 | 731 | NE |
| LA(min) Fast 38,0 – LA(max) Fast 42,0 | | | | | | | | | | | | | | | | | | |
| 93 | $05^{00}$ | $05^{15}$ | 46,3 | 47,2 | 48,1 | 48,3 | 47,1 | 46,4 | 45,2 | 44,3 | 45,2 | 47,1 | 51,0 | frogs | 17,6 | 0,69 – 1,25 | 731 | SW |
| LA(min) Fast 34,0 – LA(max) Fast 37,0 | | | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 94 | $05^{30}$ | $05^{45}$ | 46,4 | 47,2 | 48,1 | 48,3 | 47,4 | 46,8 | 45,2 | 44,5 | 45,2 | 45,8 | 50,4 | birds, frogs | 17,4 | 0,64 – 1,38 | 731 | SW |
| LA(min) Fast 34,0 – LA(max) Fast 36,0 | | | | | | | | | | | | | | | | | | |
| 95 | $06^{10}$ | $06^{25}$ | 41,0 | 41,2 | 44,0 | 44,3 | 44,0 | 44,4 | 45,2 | 45,3 | 45,1 | 47,2 | 58,0 | birds, cars, frogs | 18,7 | 079 – 1,36 | 731 | SW |
| LA(min) Fast 34,0 – LA(max) Fast 36,0 | | | | | | | | | | | | | | | | | | |
| 96 | $06^{40}$ | $06^{55}$ | 44,1 | 44,3 | 43,4 | 44,0 | 43,2 | 45,1 | 46,3 | 45,2 | 45,4 | 44,8 | 65,0 | birds, cars, frogs | 20,3 | 1,28 – 2,09 | 731 | SE |
| LA(min) Fast 31,0 – LA(max) Fast 33,0 | | | | | | | | | | | | | | | | | | |

Table 0-13 NM 6 (weekend)

| **№** | **Start time** | **End time** | **Sound pressure in octave bands with geometric mean frequencies, Hz** | | | | | | | | | **LAeq, dB** | **LAmax, dB** | **Additional noise sources** | **Meteo data** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **31,5** | **63** | **125** | **250** | **500** | **1000** | **2000** | **4000** | **8000** | | | | **Temperature, $^0$C** | **Wind speed, m/sec** | **Pressure, mm Hg** | **Wind direction** |
| **NM 6 – 20.06.2020 (weekend). Coordinates: 40˚14'14.77'' N, 69˚7'16.60'' E; h = 1,2 m.** | | | | | | | | | | | | | | | | | | |
| 1 | $10^{10}$ | $10^{25}$ | 44,4 | 53,9 | 52,1 | 51,3 | 51,0 | 51,2 | 52,4 | 51,2 | 50,0 | 46,2 | 57,2 | house. livestock, birds, | 35,6 | 0,59 – 1,16 | 728 | NE |
| LA(min) Fast 42,0 – LA(max) Fast 45,1 | | | | | | | | | | | | | | | | | | |
| 2 | $10^{10}$ | $10^{25}$ | 44,2 | 43,9 | 42,1 | 41,3 | 41,0 | 41,3 | 42,4 | 41,2 | 40,0 | 48,5 | 55,0 | house. livestock, birds, | 35,9 | 0,38 – 2,21 | 728 | NE |
| LA(min) Fast 43,0 – LA(max) Fast 46,1 | | | | | | | | | | | | | | | | | | |
| 3 | $11^{10}$ | $11^{25}$ | 44,2 | 43,9 | 42,1 | 41,3 | 41,0 | 41,3 | 42,4 | 41,2 | 40,0 | 47,5 | 55,0 | house. livestock, birds | 36,8 | 1,28 – 2,34 | 728 | SW |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^0$C | Wind speed, m/sec | Pressure, mm Hg | Wind direction |
| LA(min) Fast 43,0 – LA(max) Fast 45,1 | | | | | | | | | | | | | | | | | | |
| 4 | $11^{40}$ | $11^{55}$ | 44,4 | 53,9 | 52,1 | 51,3 | 51,0 | 51,2 | 52,4 | 51,2 | 50,0 | 46,2 | 57,2 | house. livestock, birds | 36,7 | 1,64 – 2,81 | 728 | SW |
| LA(min) Fast 43,0 – LA(max) Fast 45,0 | | | | | | | | | | | | | | | | | | |
| 5 | $12^{05}$ | $12^{20}$ | 44,1 | 44,0 | 42,3 | 42,3 | 43,0 | 42,2 | 42,0 | 42,2 | 42,3 | 45,3 | 57,8 | house. livestock, birds | 38,2 | 1,16 – 2,19 | 728 | SW |
| LA(min) Fast 46,0 – LA(max) Fast 49,0 | | | | | | | | | | | | | | | | | | |
| 6 | $12^{35}$ | $12^{50}$ | 44,1 | 44,0 | 42,3 | 42,3 | 43,0 | 42,2 | 42,0 | 42,2 | 42,3 | 43,2 | 52,2 | house. livestock, birds, | 38,7 | 1,24 – 2,78 | 728 | SW |
| LA(min) Fast 44,4 – LA(max) Fast 48,0 | | | | | | | | | | | | | | | | | | |
| 7 | $13^{15}$ | $13^{30}$ | 32,6 | 32,5 | 32,3 | 32,1 | 32,0 | 31,8 | 31,7 | 31,5 | 32,6 | 34,2 | 47,5 | house. livestock, | 36,9 | 1,29 – 2,56 | 728 | SW |
| LA(min) Fast 32,4 – LA(max) Fast 34,0 | | | | | | | | | | | | | | | | | | |
| 8 | $13^{35}$ | $13^{50}$ | 32,6 | 32,5 | 32,3 | 32,1 | 32,0 | 31,8 | 31,7 | 31,5 | 32,6 | 36,8 | 49,5 | house. livestock, | 36,1 | 1,29 – 2,56 | 728 | SW |
| LA(min) Fast 32,0 – LA(max) Fast 34,7 | | | | | | | | | | | | | | | | | | |
| 9 | $14^{00}$ | $14^{15}$ | 42,9 | 43,2 | 42,4 | 44,0 | 43,2 | 44,8 | 45,1 | 45,3 | 45,0 | 43,2 | 52,0 | house. livestock, birds, | 37,4 | 1,97 – 2,04 | 728 | SW |
| LA(min) Fast 42,0 – LA(max) Fast 44,7 | | | | | | | | | | | | | | | | | | |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^0$C | Wind speed, m/sec | Pressure, mm Hg | Wind direction |
| 10 | $14^{40}$ | $14^{55}$ | 42,9 | 43,2 | 42,4 | 44,0 | 43,2 | 44,8 | 45,1 | 45,3 | 45,0 | 41,0 | 48,0 | house. livestock, birds, | 37,4 | 1,97 – 2,04 | 728 | SW |
| LA(min) Fast 42,0 – LA(max) Fast 44,1 | | | | | | | | | | | | | | | | | | |
| 11 | $15^{00}$ | $15^{15}$ | 35,1 | 35,1 | 41,0 | 42,0 | 42,0 | 42,0 | 43,1 | 43,0 | 43,2 | 39,4 | 49,8 | birds, house. livestock, | 37,9 | 2,92 – 4,15 | 728 | SW |
| LA(min) Fast 37,0 – LA(max) Fast 39,0 | | | | | | | | | | | | | | | | | | |
| 12 | $15^{00}$ | $15^{15}$ | 35,0 | 35,1 | 41,0 | 42,5 | 42,3 | 42,0 | 42,0 | 43,0 | 43,0 | 43,2 | 49,8 | birds, house. livestock, | 37,9 | 2,92 – 4,15 | 728 | SW |
| LA(min) Fast 37,0 – LA(max) Fast 39,4 | | | | | | | | | | | | | | | | | | |
| 13 | $16^{10}$ | $16^{25}$ | 38,0 | 39,1 | 39,1 | 40,0 | 41,0 | 42,0 | 42,2 | 42,0 | 43,0 | 44,2 | 49,0 | birds, house. livestock, frogs | 40,2 | 1,43 – 2,08 | 728 | SW |
| LA(min) Fast 41,0 – LA(max) Fast 43,4 | | | | | | | | | | | | | | | | | | |
| 14 | $16^{44}$ | $16^{59}$ | 38,0 | 39,1 | 39,1 | 40,4 | 41,0 | 42,2 | 42,1 | 42,0 | 43,0 | 44,8 | 51,0 | birds, house. livestock, frogs | 40,4 | 1,45 – 2,26 | 728 | SW |
| LA(min) Fast 41,0 – LA(max) Fast 44,0 | | | | | | | | | | | | | | | | | | |
| 15 | $17^{03}$ | $17^{18}$ | 38,0 | 42,0 | 42,0 | 42,0 | 42,0 | 43,0 | 43,0 | 44,0 | 44,0 | 44,9 | 49,8 | birds, house. livestock, frogs | 38,1 | 0,9 – 1,62 | 726 | SW |
| LA(min) Fast 31,0 – LA(max) Fast 33,0 | | | | | | | | | | | | | | | | | | |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^0C$ | Wind speed, m/sec | Pressure, mm Hg | Wind direction |
| 16 | $17^{44}$ | $17^{59}$ | 38,0 | 42,1 | 42,0 | 42,3 | 42,3 | 43,0 | 4310 | 44,2 | 44,0 | 45,3 | 51,8 | birds, house. livestock, frogs | 38,0 | 0,8 – 1,34 | 726 | SW |
| LA(min) Fast 31,2 – LA(max) Fast 34,0 | | | | | | | | | | | | | | | | | | |
| 17 | $18^{00}$ | $18^{12}$ | 36,0 | 37,0 | 37,0 | 38,0 | 38,0 | 38,0 | 38,0 | 39,0 | 40,0 | 38,6 | 47,2 | birds, house. livestock, frogs | 36,1 | 0,27 – 0,43 | 726 | SW |
| LA(min) Fast 30,2 – LA(max) Fast 32,0 | | | | | | | | | | | | | | | | | | |
| 18 | $18^{35}$ | $18^{50}$ | 36,0 | 37,0 | 37,0 | 38,0 | 38,0 | 38,0 | 38,0 | 39,0 | 40,0 | 44,4 | 49,5 | birds, house. livestock, frogs | 36,0 | 0,22 – 0,54 | 726 | SW |
| LA(min) Fast 30,0 – LA(max) Fast 32,8 | | | | | | | | | | | | | | | | | | |
| 19 | $19^{00}$ | $19^{15}$ | 45,0 | 46,0 | 46,0 | 46,0 | 46,0 | 44,0 | 44,0 | 44,0 | 45,0 | 44,5 | 51,0 | birds, house. livestock, frogs | 31,2 | 0,31 – 0,76 | 726 | NW |
| LA(min) Fast 42,9 – LA(max) Fast 45,4 | | | | | | | | | | | | | | | | | | |
| 20 | $19^{44}$ | $19^{59}$ | 45,1 | 46,0 | 46,0 | 46,2 | 46,2 | 44,0 | 44,3 | 44,2 | 45,0 | 46,2 | 53,4 | birds, house. livestock, frogs | 32,0 | 0,29 – 0,84 | 726 | NW |
| LA(min) Fast 42,9 – LA(max) Fast 47,4 | | | | | | | | | | | | | | | | | | |
| 21 | $20^{00}$ | $20^{15}$ | 21,0 | 23,0 | 23,0 | 24,0 | 25,0 | 34,0 | 36,0 | 38,0 | 33,0 | 43,6 | 48,1 | birds, house. livestock, frogs | 28,1 | 0,43 – 0,86 | 726 | NW |
| LA(min) Fast 43,0 – LA(max) Fast 45,0 | | | | | | | | | | | | | | | | | | |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^0$C | Wind speed, m/sec | Pressure, mm Hg | Wind direction |
| 22 | $20^{38}$ | $20^{53}$ | 21,5 | 23,4 | 23,0 | 24,3 | 25,1 | 34,5 | 36,2 | 38,0 | 33,0 | 45,8 | 53,2 | birds, house. livestock, frogs | 28,4 | 0,45 – 0,94 | 726 | NW |
| LA(min) Fast 43,2 – LA(max) Fast 45,4 | | | | | | | | | | | | | | | | | | |
| 23 | $21^{10}$ | $21^{25}$ | 73,0 | 73,0 | 72,0 | 73,0 | 73,0 | 74,0 | 74,0 | 75,0 | 75,0 | 60,8 | 75,0 | birds, house. livestock, frogs | 27,8 | 0,49 – 0,93 | 726 | NW |
| LA(min) Fast 61,0 – LA(max) Fast 62,0 | | | | | | | | | | | | | | | | | | |
| 24 | $21^{40}$ | $21^{55}$ | 73,0 | 73,1 | 72,0 | 73,0 | 73,1 | 74,2 | 74,2 | 76,4 | 75,1 | 61,9 | 76,0 | birds, house. livestock, frogs | 28,0 | 0,67 – 1,06 | 726 | NW |
| LA(min) Fast 62,0 – LA(max) Fast 65,0 | | | | | | | | | | | | | | | | | | |
| 25 | $22^{00}$ | $22^{15}$ | 71,0 | 72,0 | 72,0 | 73,0 | 73,0 | 74,0 | 75,0 | 75,0 | 75,0 | 74,4 | 76,0 | frogs, Crickets, house. livestock | 25,3 | 0,56 – 1,08 | 726 | NW |
| LA(min) Fast 72,2 – LA(max) Fast 75,0 | | | | | | | | | | | | | | | | | | |
| 26 | $22^{38}$ | $22^{53}$ | 71,5 | 72,8 | 72,8 | 73,0 | 73,4 | 74,1 | 75,0 | 75,5 | 75,0 | 74,8 | 76,2 | frogs, Crickets, house. livestock | 25,0 | 0,64 – 1,22 | 726 | NW |
| LA(min) Fast 72,2 – LA(max) Fast 75,2 | | | | | | | | | | | | | | | | | | |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^0C$ | Wind speed, m/sec | Pressure, mm Hg | Wind direction |
| 27 | $23^{05}$ | $23^{20}$ | 71,0 | 70,0 | 71,0 | 72,0 | 72,3 | 73,0 | 73,6 | 73,0 | 74,0 | 74,9 | 76,0 | frogs, Crickets, house. livestock | 23,2 | 0,87 – 1,46 | 726 | NE |
| LA(min) Fast 71,0 – LA(max) Fast 74,0 | | | | | | | | | | | | | | | | | | |
| 28 | $23^{38}$ | $23^{53}$ | 71,0 | 70,0 | 71,1 | 72,0 | 72,3 | 73,0 | 73,6 | 73,2 | 74,0 | 75,5 | 78,1 | frogs, Crickets, house. livestock | 23,0 | 0,92 – 1,34 | 726 | NE |
| LA(min) Fast 71,0 – LA(max) Fast 73,4 | | | | | | | | | | | | | | | | | | |
| **NM 6 – 21.06.2020 (weekend). Coordinates: 40˚14'14.77'' N, 69˚7'16.60'' E; h = 1,2 m.** | | | | | | | | | | | | | | | | | | |
| 29 | $00^{07}$ | $00^{22}$ | 71,0 | 70,0 | 71,0 | 72,0 | 72,3 | 73,0 | 73,6 | 73,0 | 74,0 | 72,1 | 75,2 | frogs, Crickets, house. livestock | 21,6 | 0,88 – 1,32 | 726 | NE |
| LA(min) Fast 71,0 – LA(max) Fast 74,0 | | | | | | | | | | | | | | | | | | |
| 30 | $00^{44}$ | $00^{59}$ | 71,1 | 72,1 | 72,0 | 73,0 | 73,1 | 74,0 | 75,0 | 75,0 | 75,1 | 74,4 | 79,7 | frogs, Crickets, house. livestock | 22,0 | 0,66 – 1,22 | 726 | NE |
| LA(min) Fast 71,0 – LA(max) Fast 72,8 | | | | | | | | | | | | | | | | | | |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^0$C | Wind speed, m/sec | Pressure, mm Hg | Wind direction |
| 31 | $01^{12}$ | $01^{27}$ | 61,0 | 61,3 | 61,0 | 61,0 | 61,0 | 62,0 | 62,0 | 63,0 | 64,0 | 74,1 | 78,0 | frogs, Crickets, house. livestock | 21,0 | 0,67 – 1,34 | 726 | NE |
| LA(min) Fast 61,0 – LA(max) Fast 64,0 | | | | | | | | | | | | | | | | | | |
| 32 | $01^{32}$ | $01^{47}$ | 61,0 | 61,3 | 61,0 | 61,2 | 61,7 | 62,0 | 62,0 | 63,3 | 64,1 | 70,4 | 76,2 | frogs, Crickets, house. livestock | 21,4 | 0,74 – 1,29 | 726 | NE |
| LA(min) Fast 61,0 – LA(max) Fast 62,0 | | | | | | | | | | | | | | | | | | |
| 33 | $02^{03}$ | $02^{18}$ | 34,0 | 34,0 | 34,5 | 35,0 | 35,0 | 35,0 | 36,0 | 36,0 | 35,0 | 44,8 | 54,0 | frogs, Crickets, house. livestock | 19,8 | 0,36 – 0,78 | 726 | NW |
| LA(min) Fast 33,9 – LA(max) Fast 36,0 | | | | | | | | | | | | | | | | | | |
| 34 | $02^{32}$ | $02^{47}$ | 34,5 | 34,0 | 34,5 | 35,0 | 35,0 | 35,3 | 36,3 | 36,3 | 35,0 | 42,8 | 51,3 | frogs, Crickets, house. livestock | 19,5 | 0,74 – 0,95 | 726 | NW |
| LA(min) Fast 34,0 – LA(max) Fast 36,0 | | | | | | | | | | | | | | | | | | |
| 35 | $03^{10}$ | $03^{25}$ | 32,0 | 33,0 | 33, | 34,0 | 34,0 | 34,0 | 34,0 | 34,0 | 34,0 | 38,1 | 59,2 | frogs, Crickets, house. livestock | 20,4 | 0,46 – 0,91 | 726 | NW |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^{0}C$ | Wind speed, m/sec | Pressure, mm Hg | Wind direction |
| LA(min) Fast 33,0 – LA(max) Fast 34,0 | | | | | | | | | | | | | | | | | | |
| 36 | $03^{36}$ | $03^{51}$ | 32,0 | 33,0 | 33, | 34,1 | 34,1 | 34,0 | 34,2 | 34,3 | 34,0 | 40,4 | 55,9 | frogs, Crickets, house. livestock | 20,1 | 0,59 – 0,98 | 726 | NW |
| LA(min) Fast 32,8 – LA(max) Fast 34,5 | | | | | | | | | | | | | | | | | | |
| 37 | $04^{00}$ | $04^{15}$ | 33,0 | 33,0 | 34,0 | 34,3 | 34,0 | 34,0 | 34,0 | 35,0 | 35,0 | 39,8 | 54,1 | frogs, birds, house. livestock | 21,3 | 0,27 – 0,79 | 726 | NW |
| LA(min) Fast 32,0 – LA(max) Fast 34,0 | | | | | | | | | | | | | | | | | | |
| 38 | $04^{22}$ | $04^{37}$ | 33,0 | 33,0 | 34,0 | 34,3 | 34,0 | 34,0 | 34,0 | 35,0 | 35,0 | 40,1 | 52,8 | frogs, birds, house. livestock | 21,0 | 0,34 – 0,81 | 726 | NW |
| LA(min) Fast 32,1 – LA(max) Fast 34,4 | | | | | | | | | | | | | | | | | | |
| 39 | $05^{17}$ | $05^{32}$ | 33,0 | 33,0 | 34,0 | 34,7 | 34,0 | 34,5 | 34,5 | 35,0 | 35,0 | 38,7 | 53,8 | birds, house. livestock | 21,7 | 0,54 – 1,28 | 726 | NW |
| LA(min) Fast 31,0 – LA(max) Fast 32,0 | | | | | | | | | | | | | | | | | | |
| 40 | $05^{43}$ | $05^{58}$ | 32,0 | 33,0 | 33, | 34,1 | 34,1 | 34,0 | 34,2 | 34,3 | 34,0 | 40,5 | 54,0 | birds, house. livestock | 22,3 | 0,63 – 1,31 | 726 | NW |
| LA(min) Fast 33,0 – LA(max) Fast 34,0 | | | | | | | | | | | | | | | | | | |
| 41 | $06^{10}$ | $06^{35}$ | 34,0 | 34,0 | 34,2 | 35,0 | 35,0 | 35,0 | 35,2 | 35,0 | 35,3 | 47,1 | 53,4 | birds, house. livestock | 21,7 | 0,36 – 1,14 | 726 | NW |
| LA(min) Fast 30,1 – LA(max) Fast 33,9 | | | | | | | | | | | | | | | | | | |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^{0}C$ | Wind speed, m/sec | Pressure, mm Hg | Wind direction |
| 42 | $06^{40}$ | $06^{55}$ | 34,0 | 34,0 | 34,2 | 35,0 | 35,2 | 35,5 | 35,2 | 35,0 | 35,1 | 44,9 | 55,8 | birds, house. livestock | 22,0 | 0,44 – 1,05 | 726 | NW |
| LA(min) Fast 33,0 – LA(max) Fast 34,0 | | | | | | | | | | | | | | | | | | |
| 43 | $07^{12}$ | $07^{27}$ | 33,0 | 33,0 | 33,0 | 33,4 | 34,0 | 34,0 | 34,0 | 34,0 | 34,0 | 48,4 | 60,0 | birds, house. livestock | 24,6 | 0,81 – 1,32 | 726 | NW |
| LA(min) Fast 33,0 – LA(max) Fast 36,0 | | | | | | | | | | | | | | | | | | |
| 44 | $07^{39}$ | $07^{54}$ | 33,0 | 33,3 | 33,2 | 33,4 | 34,8 | 34,8 | 34,6 | 34,1 | 34,0 | 43,5 | 57,9 | birds, house. livestock | 24,8 | 0,84 – 1,46 | 726 | NW |
| LA(min) Fast 33,1 – LA(max) Fast 36,4 | | | | | | | | | | | | | | | | | | |
| 45 | $08^{00}$ | $08^{15}$ | 34,0 | 35,0 | 41,0 | 41,0 | 42,0 | 41,0 | 42,0 | 42,0 | 42,0 | 40,4 | 54,2 | birds, house. livestock | 26,5 | 1,31 – 2,43 | 726 | NW |
| LA(min) Fast 35,8 – LA(max) Fast 38,0 | | | | | | | | | | | | | | | | | | |
| 46 | $08^{32}$ | $08^{47}$ | 34,2 | 35,2 | 41,0 | 41,0 | 42,3 | 41,4 | 42,1 | 42,0 | 42,0 | 42,4 | 56,8 | birds, house. livestock | 27,0 | 1,38 – 2,44 | 726 | NW |
| LA(min) Fast 36,0 – LA(max) Fast 38,4 | | | | | | | | | | | | | | | | | | |
| 47 | $09^{10}$ | $09^{25}$ | 56,0 | 56,0 | 57,0 | 57,0 | 57,0 | 56,0 | 56,0 | 55,0 | 55,0 | 56,0 | 58,1 | birds, house. livestock | 28,0 | 1,28 – 1,73 | 725 | NW |
| LA(min) Fast 51,0 – LA(max) Fast 53,4 | | | | | | | | | | | | | | | | | | |
| 48 | $09^{40}$ | $09^{55}$ | 56,4 | 56,2 | 57,0 | 57,0 | 57,1 | 56,0 | 56,0 | 55,3 | 55,0 | 54,8 | 59,2 | birds, house. livestock | 29,7 | 1,48 – 1,82 | 725 | NW |
| LA(min) Fast 51,0 – LA(max) Fast 53,1 | | | | | | | | | | | | | | | | | | |

Table 0-14 NM 6 (weekday)

| **NM 6 – 22.06.2020 (weekday). Coordinates: 40˚14'14.77'' N, 69˚7'16.60'' E; h = 1,2 m.** | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 49 | $10^{10}$ | $10^{25}$ | 64,3 | 64,1 | 62,1 | 64,2 | 64,2 | 61,3 | 58,0 | 58,3 | 58,0 | 66,3 | 69,8 | house. livestock, birds, trees | 35,9 | 2,69 – 4,52 | 720 | NW |
| LA(min) Fast 63,0 – LA(max) Fast 67,1 | | | | | | | | | | | | | | | | | | |
| 50 | $10^{40}$ | $11^{55}$ | 64,0 | 64,1 | 62,4 | 64,2 | 64,2 | 61,3 | 58,0 | 58,5 | 58,0 | 65,3 | 67,2 | birds | 36,4 | 2,7 – 4,41 | 720 | NW |
| LA(min) Fast 62,9 – LA(max) Fast 66,1 | | | | | | | | | | | | | | | | | | |
| 51 | $11^{10}$ | $11^{25}$ | 64,1 | 62,1 | 64,2 | 64,2 | 61,3 | 58,0 | 58,3 | 58,0 | 64,1 | 58,8 | 65,5 | house. livestock | 32,5 | 3,11 – 4,84 | 720 | NW |
| LA(min) Fast 41,0 – LA(max) Fast 56,0 | | | | | | | | | | | | | | | | | | |
| 52 | $11^{40}$ | $11^{55}$ | 64,1 | 62,1 | 64,2 | 64,2 | 61,3 | 58,2 | 58,3 | 58,0 | 64,4 | 55,1 | 61,4 | house. livestock, trees | 37,3 | 2,17 – 3,68 | 720 | NW |
| LA(min) Fast 41,6 – LA(max) Fast 55,4 | | | | | | | | | | | | | | | | | | |
| 53 | $12^{05}$ | $12^{20}$ | 64,4 | 62,1 | 64,2 | 64,2 | 61,3 | 58,2 | 58,2 | 58,0 | 64,4 | 51,3 | 57,8 | house. livestock, birds, trees | 35,8 | 3,27 – 4,94 | 720 | NW |
| LA(min) Fast 40,9 – LA(max) Fast 54,1 | | | | | | | | | | | | | | | | | | |
| 54 | $12^{35}$ | $12^{50}$ | 51,7 | 51,5 | 51,4 | 51,1 | 51,5 | 51,4 | 51,4 | 51,0 | 58,1 | 53,2 | 61,2 | house. livestock, birds, trees | 35,7 | 2,24 – 3,78 | 720 | NW |
| LA(min) Fast 54,4 – LA(max) Fast 58,8 | | | | | | | | | | | | | | | | | | |
| 55 | $13^{15}$ | $13^{30}$ | 51,7 | 51,5 | 51,4 | 51,1 | 51,5 | 51,4 | 51,4 | 51,0 | 58,1 | 57,3 | 64,8 | house. livestock, birds, car | 37,6 | 2,70 – 4,32 | 720 | NW |
| LA(min) Fast 56,0 – LA(max) Fast 58,1 | | | | | | | | | | | | | | | | | | |
| 56 | $13^{40}$ | $13^{55}$ | 51,7 | 51,5 | 51,4 | 51,1 | 51,5 | 51,4 | 51,4 | 51,0 | 58,1 | 65,5 | 67,0 | house. livestock, birds, trees | 37,4 | 2,74 – 4,28 | 720 | NW |
| LA(min) Fast 63,7 – LA(max) Fast 66,0 | | | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 57 | $14^{10}$ | $14^{25}$ | 44,4 | 44,0 | 43,7 | 42,8 | 42,9 | 42,2 | 41,2 | 41,1 | 41,0 | 43,6 | 55,0 | transport, birds, house. livestock | 36,7 | 1,23 – 2,07 | 719 | NW |
| LA(min) Fast 41,9 – LA(max) Fast 44,2 | | | | | | | | | | | | | | | | | | |
| 58 | $14^{35}$ | $14^{50}$ | 44,4 | 44,0 | 43,7 | 42,4 | 42,9 | 42,2 | 41,0 | 41,1 | 41,0 | 45,2 | 54,1 | birds, house. livestock | 36,1 | 0,94 – 1,24 | 719 | NW |
| LA(min) Fast 42,4 – LA(max) Fast 45,9 | | | | | | | | | | | | | | | | | | |
| 59 | $15^{00}$ | $15^{15}$ | 42,0 | 42,0 | 42,0 | 42,3 | 41,2 | 43,0 | 43,0 | 43,2 | 43,3 | 43,8 | 49,8 | birds, house. livestock, car | 36,9 | 0,93 – 1,74 | 719 | NW |
| LA(min) Fast 40,0 – LA(max) Fast 41,3 | | | | | | | | | | | | | | | | | | |
| 60 | $15^{40}$ | $15^{55}$ | 42,0 | 42,0 | 42,0 | 42,3 | 41,2 | 43,0 | 43,0 | 43,2 | 43,3 | 43,3 | 47,8 | birds, house. livestock | 36,9 | 1,12 – 1,46 | 719 | NW |
| LA(min) Fast 40,0 – LA(max) Fast 44,0 | | | | | | | | | | | | | | | | | | |
| 61 | $16^{10}$ | $16^{25}$ | 42,3 | 42,0 | 42,2 | 42,3 | 43,0 | 42,2 | 42,4 | 45,1 | 43,1 | 43,8 | 46,4 | birds, house. livestock | 36,5 | 1,28 – 1,36 | 719 | NW |
| LA(min) Fast 41,2 – LA(max) Fast 44,4 | | | | | | | | | | | | | | | | | | |
| 62 | $16^{44}$ | $16^{59}$ | 42,3 | 42,0 | 42,2 | 42,3 | 43,0 | 42,2 | 42,4 | 45,1 | 43,1 | 44,6 | 48,9 | birds, house. livestock | 36,5 | 1,23 – 1,73 | 719 | NW |
| LA(min) Fast 42,2 – LA(max) Fast 45,1 | | | | | | | | | | | | | | | | | | |
| 63 | $17^{03}$ | $17^{18}$ | 42,5 | 42,2 | 42,2 | 42,3 | 43,0 | 42,1 | 42,4 | 45,1 | 43,1 | 43,2 | 48,0 | birds, house. livestock | 36,5 | 1,66 – 1,84 | 719 | NW |
| LA(min) Fast 40,2 – LA(max) Fast 43,9 | | | | | | | | | | | | | | | | | | |
| 64 | $17^{44}$ | $17^{59}$ | 42,3 | 42,0 | 42,2 | 42,3 | 43,4 | 42,0 | 42,4 | 45,1 | 43,1 | 42,2 | 49,4 | birds, house. livestock | 36,5 | 1,34 – 1,85 | 719 | NW |
| LA(min) Fast 40,9 – LA(max) Fast 44,4 | | | | | | | | | | | | | | | | | | |
| 65 | $18^{00}$ | $18^{12}$ | 42,3 | 42,0 | 42,2 | 42,3 | 43,4 | 42,0 | 42,4 | 45,1 | 43,1 | 42,6 | 52,8 | birds, house. livestock, frogs | 34,3 | 0,31 – 0,57 | 719 | NW |
| LA(min) Fast 42,0 – LA(max) Fast 44,0 | | | | | | | | | | | | | | | | | | |
| 66 | $18^{35}$ | $18^{50}$ | 42,3 | 42,0 | 42,2 | 42,3 | 43,4 | 42,0 | 42,4 | 45,1 | 43,1 | 42,1 | 53,9 | birds, house. livestock, frogs | 34,0 | 0,44 – 0,98 | 719 | NW |
| LA(min) Fast 40,1 – LA(max) Fast 45,1 | | | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 67 | $19^{00}$ | $19^{15}$ | 42,4 | 43,1 | 42,4 | 42,3 | 43,0 | 42,3 | 42,2 | 42,2 | 42,3 | 42,9 | 55,0 | birds, house. livestock, frogs, | 32,5 | 0,46 – 0,67 | 719 | NW |
| LA(min) Fast 41,9 – LA(max) Fast 44,6 | | | | | | | | | | | | | | | | | | |
| 68 | $19^{44}$ | $19^{59}$ | 42,4 | 43,1 | 42,4 | 42,3 | 43,0 | 42,3 | 42,2 | 42,2 | 42,3 | 43,1 | 52,1 | birds, house. livestock, frogs, | 32,2 | 0,31 – 0,89 | 719 | NW |
| LA(min) Fast 40,2 – LA(max) Fast 46,9 | | | | | | | | | | | | | | | | | | |
| 69 | $20^{00}$ | $20^{15}$ | 42,3 | 43,2 | 43,3 | 52,3 | 51,0 | 51,0 | 50,4 | 51,3 | 50,4 | 41,3 | 50,2 | birds, house. livestock, Crickets, | 28,7 | 0,87 – 1,53 | 719 | NW |
| LA(min) Fast 40,0 – LA(max) Fast 44,0 | | | | | | | | | | | | | | | | | | |
| 70 | $20^{38}$ | $20^{53}$ | 42,3 | 43,2 | 43,3 | 52,3 | 51,0 | 51,0 | 50,4 | 51,3 | 50,4 | 43,6 | 53,8 | birds, house. livestock, Crickets | 26,4 | 0,85 – 1,14 | 719 | NW |
| LA(min) Fast 41,7 – LA(max) Fast 44,8 | | | | | | | | | | | | | | | | | | |
| 71 | $21^{10}$ | $21^{25}$ | 53,2 | 53,1 | 52,4 | 52,4 | 53,0 | 53,2 | 55,1 | 55,3 | 54,4 | 55,6 | 58,8 | birds, house. livestock, Crickets, frogs | 32,2 | 1,36 – 2,01 | 720 | NW |
| LA(min) Fast 55,0 – LA(max) Fast 57,0 | | | | | | | | | | | | | | | | | | |
| 72 | $21^{40}$ | $21^{55}$ | 53,2 | 53,1 | 52,4 | 52,4 | 53,4 | 53,2 | 55,0 | 55,3 | 52,4 | 56,1 | 61,8 | birds, house. livestock, Crickets, frogs | 32,2 | 1,64 – 2,19 | 720 | NW |
| LA(min) Fast 53,2 – LA(max) Fast 59,9 | | | | | | | | | | | | | | | | | | |
| 73 | $22^{00}$ | $22^{15}$ | 62,3 | 64,4 | 65,2 | 63,4 | 63,3 | 61,4 | 62,3 | 64,1 | 63,2 | 63,0 | 70,0 | birds, house. livestock, Crickets, frogs, | 29,8 | 1,76 – 2,51 | 719 | NE |
| LA(min) Fast 62,2 – LA(max) Fast 66,0 | | | | | | | | | | | | | | | | | | |
| 74 | $22^{38}$ | $22^{53}$ | 62,3 | 64,4 | 65,2 | 63,4 | 63,3 | 61,4 | 62,3 | 64,1 | 63,2 | 62,6 | 68,4 | birds, house. livestock, Crickets, frogs, | 29,8 | 1,77 – 2,98 | 719 | NE |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LA(min) Fast 62,0 – LA(max) Fast 64,0 | | | | | | | | | | | | | | | | | | |
| 75 | $23^{05}$ | $23^{20}$ | 62,3 | 64,4 | 65,2 | 63,4 | 63,0 | 61,2 | 62,3 | 64,0 | 63,2 | 61,8 | 68,4 | birds, house. livestock, Crickets, frogs, | 28,2 | 4,2 – 5,9 | 719 | NE |
| LA(min) Fast 61,0 – LA(max) Fast 64,2 | | | | | | | | | | | | | | | | | | |
| 76 | $23^{38}$ | $23^{53}$ | 63,2 | 64,0 | 62,3 | 66,3 | 63,4 | 63,3 | 64,4 | 61,2 | 62,2 | 61,9 | 69,2 | birds, house. livestock, Crickets, frogs, | 28,0 | 3,1 – 5,88 | 719 | NE |
| LA(min) Fast 60,4 – LA(max) Fast 64,9 | | | | | | | | | | | | | | | | | | |
| **NM 6 – 23.06.2020 (weekday). Coordinates: 40˚14'14.77'' N, 69˚7'16.60'' E; h = 1,2 m.** | | | | | | | | | | | | | | | | | | |
| 77 | $00^{07}$ | $00^{22}$ | No measurement due to wind speed>5m/s | | | | | | | | | | | Crickets, frogs, ветер | 28,2 | **4,41 – 5,81** | 719 | NE |
| 78 | $00^{44}$ | $00^{59}$ | No measurement due to wind speed>5m/s | | | | | | | | | | | Crickets, frogs, ветер | 26,0 | **2,88 – 5,85** | 719 | NE |
| 79 | $01^{12}$ | $01^{27}$ | No measurement due to wind speed>5m/s | | | | | | | | | | | Crickets, frogs, | 25,8 | **3,56 – 5,93** | 719 | NE |
| 80 | $01^{32}$ | $01^{47}$ | 52,3 | 52,5 | 52,4 | 53,2 | 53,4 | 54,0 | 53,4 | 54,0 | 53,3 | 51,7 | 59,1 | Crickets, frogs, | 24,6 | 3,12 – 4,23 | 719 | NE |
| LA(min) Fast 51,0 – LA(max) Fast 54,8 | | | | | | | | | | | | | | | | | | |
| 81 | $02^{03}$ | $02^{18}$ | 52,3 | 52,5 | 52,4 | 53,2 | 53,4 | 54,0 | 53,4 | 54,0 | 53,3 | 51,3 | 53,3 | Crickets, frogs, house.livestoc k | 24,6 | 3,43 – 4,26 | 719 | NE |
| LA(min) Fast 50,9 – LA(max) Fast 53,0 | | | | | | | | | | | | | | | | | | |
| 82 | $02^{32}$ | $02^{47}$ | 53,3 | 52,5 | 52,4 | 53,0 | 53,2 | 54,0 | 53,4 | 54,0 | 52,3 | 51,8 | 59,0 | Crickets, frogs, house.livestoc k | 24,1 | 3,44 – 4,56 | 719 | NE |
| LA(min) Fast 49,9 – LA(max) Fast 54,8 | | | | | | | | | | | | | | | | | | |

<table>
<tr><td>83</td><td>$03^{10}$</td><td>$03^{25}$</td><td>46,3</td><td>52,2</td><td>53,1</td><td>53,4</td><td>54,2</td><td>54,2</td><td>53,3</td><td>52,4</td><td>53,3</td><td>50,4</td><td>63,2</td><td>Crickets, frogs, house.livestoc k</td><td>26,2</td><td>2,71 – 4,49</td><td>719</td><td>NE</td></tr>
<tr><td colspan="19">LA(min) Fast 45,0 – LA(max) Fast 55,2</td></tr>
<tr><td>84</td><td>$03^{36}$</td><td>$03^{51}$</td><td>46,3</td><td>52,2</td><td>53,1</td><td>53,4</td><td>54,2</td><td>54,2</td><td>53,0</td><td>52,4</td><td>52,3</td><td>50,0</td><td>59,1</td><td>Crickets, frogs, house.livestoc k</td><td>26,1</td><td>1,84 – 4,35</td><td>719</td><td>NE</td></tr>
<tr><td colspan="19">LA(min) Fast 43,0 – LA(max) Fast 55,2</td></tr>
<tr><td>85</td><td>$04^{00}$</td><td>$04^{15}$</td><td>42,4</td><td>43,2</td><td>43,3</td><td>43,4</td><td>43,1</td><td>44,2</td><td>44,3</td><td>45,3</td><td>44,4</td><td>45,6</td><td>48,0</td><td>birds, house.livestoc k</td><td>26,4</td><td>1,82 – 2,43</td><td>722</td><td>NE</td></tr>
<tr><td colspan="19">LA(min) Fast 42,0 – LA(max) Fast 47,0</td></tr>
<tr><td>86</td><td>$04^{22}$</td><td>$04^{37}$</td><td>42,4</td><td>43,2</td><td>43,3</td><td>43,4</td><td>43,1</td><td>44,2</td><td>44,1</td><td>45,3</td><td>44,0</td><td>43,8</td><td>48,2</td><td>birds, house.livestoc k, frogs</td><td>26,3</td><td>1,5 – 2,71</td><td>722</td><td>NE</td></tr>
<tr><td colspan="19">LA(min) Fast 42,4 – LA(max) Fast 47,8</td></tr>
<tr><td>87</td><td>$05^{17}$</td><td>$05^{32}$</td><td>42,0</td><td>41,3</td><td>41,4</td><td>41,4</td><td>41,3</td><td>41,2</td><td>42,1</td><td>42,2</td><td>42,1</td><td>44,0</td><td>55,0</td><td>birds, house.livestoc k, frogs</td><td>25,8</td><td>1,13 – 3,76</td><td>722</td><td>NE</td></tr>
<tr><td colspan="19">LA(min) Fast 42,0 – LA(max) Fast 47,0</td></tr>
<tr><td>88</td><td>$05^{43}$</td><td>$05^{58}$</td><td>42,0</td><td>41,3</td><td>41,4</td><td>41,4</td><td>41,3</td><td>41,1</td><td>42,1</td><td>42,2</td><td>42,0</td><td>44,3</td><td>52,8</td><td>birds, house.livestoc k, frogs</td><td>25,7</td><td>1,06 – 3,69</td><td>722</td><td>NE</td></tr>
<tr><td colspan="19">LA(min) Fast 42,1 – LA(max) Fast 44,8</td></tr>
<tr><td>89</td><td>$06^{10}$</td><td>$06^{35}$</td><td>41,1</td><td>41,4</td><td>41,3</td><td>41,4</td><td>41,1</td><td>42,1</td><td>42,3</td><td>42,0</td><td>41,4</td><td>41,4</td><td>49,0</td><td>birds, house.livestoc k</td><td>29,0</td><td>1,14 – 2,26</td><td>722</td><td>NE</td></tr>
<tr><td colspan="19">LA(min) Fast 40,1 – LA(max) Fast 43,9</td></tr>
</table>

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 90 | $06^{45}$ | $07^{00}$ | 41,1 | 41,4 | 41,3 | 41,4 | 41,1 | 42,0 | 42,3 | 42,0 | 41,4 | 43,8 | 47,1 | birds, house.livestock | 29,0 | 1,4 – 2,78 | 722 | NE |
| LA(min) Fast 41,8 – LA(max) Fast 44,6 | | | | | | | | | | | | | | | | | | |
| 91 | $07^{12}$ | $07^{27}$ | 41,1 | 41,4 | 41,3 | 41,4 | 41,1 | 42,0 | 42,3 | 42,0 | 41,4 | 43,5 | 52,0 | birds, house.livestock, trees | 29,2 | 2,16 – 4,32 | 722 | NE |
| LA(min) Fast 45,4 – LA(max) Fast 44,3 | | | | | | | | | | | | | | | | | | |
| 92 | $07^{39}$ | $07^{54}$ | 43,4 | 44,0 | 44,2 | 44,4 | 45,1 | 43,4 | 46,0 | 46,0 | 45,0 | 48,0 | 54,2 | birds, house.livestock, trees | 29,6 | 1,35 – 2,18 | 724 | NE |
| LA(min) Fast 44,8 – LA(max) Fast 49,0 | | | | | | | | | | | | | | | | | | |
| 93 | $08^{00}$ | $08^{15}$ | 42,3 | 43,1 | 42,0 | 42,2 | 44,3 | 42,4 | 44,2 | 45,3 | 43,2 | 43,3 | 63,5 | birds, house.livestock, tracktor | 29,3 | 1,21 – 2,13 | 724 | NE |
| LA(min) Fast 42,8 – LA(max) Fast 44,0 | | | | | | | | | | | | | | | | | | |
| 94 | $08^{32}$ | $08^{47}$ | 42,3 | 43,1 | 42,0 | 42,2 | 44,2 | 42,4 | 44,2 | 45,1 | 43,2 | 44,7 | 62,0 | birds, house.livestock | 27,4 | 3,38 – 4,74 | 724 | NE |
| LA(min) Fast 42,1 – LA(max) Fast 45,7 | | | | | | | | | | | | | | | | | | |
| 95 | $09^{10}$ | $09^{25}$ | 41,3 | 42,0 | 42,1 | 45,4 | 43,3 | 44,2 | 51,1 | 51,3 | 51,0 | 43,6 | 66,0 | birds, house.livestock, trees | 33,4 | 2,63 – 3,74 | 724 | SE |
| LA(min) Fast 43,0 – LA(max) Fast 45,0 | | | | | | | | | | | | | | | | | | |
| 96 | $09^{40}$ | $09^{55}$ | 31,0 | 33,2 | 33,3 | 34,0 | 34,1 | 33,0 | 33,3 | 33,4 | 33,0 | 32,2 | 47,2 | birds, house.livestock, trees | 35,1 | 1,48 – 2,64 | 725 | SE |
| LA(min) Fast 30,0 – LA(max) Fast 35,7 | | | | | | | | | | | | | | | | | | |

Table 0-15 NM 7 (weekend)

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^{0}C$ | Wind speed, m/sec | Pressure, mmHg | Wind direction |
| **NM 7 – 20.06.2020 (weekend). Coordinates: 40˚13'53.39'' N, 69˚7'16.14'' E; h = 1,2 m.** | | | | | | | | | | | | | | | | | | |
| 1 | $10^{00}$ | $10^{15}$ | 32,9 | 32,6 | 32,5 | 32,3 | 32,1 | 32,0 | 31,8 | 31,7 | 31,5 | 33,8 | 40,4 | road, transformer | 34,8 | 0,72 – 1,02 | 728 | NE |
| LA(min) Fast 32,3– LA(max) Fast 34,5 | | | | | | | | | | | | | | | | | | |
| 2 | $10^{40}$ | $11^{55}$ | 34,6 | 34,3 | 34,1 | 33,0 | 32,8 | 32,7 | 32,0 | 31,8 | 31,7 | 36,3 | 42,1 | road, transformer | 35,0 | 0,81 – 1,90 | 728 | NE |
| LA(min) Fast 32,9– LA(max) Fast 36,1 | | | | | | | | | | | | | | | | | | |
| 3 | $11^{05}$ | $11^{20}$ | 32,1 | 32,0 | 31,8 | 31,5 | 31,2 | 32,1 | 31,0 | 30,8 | 30,4 | 30,8 | 36,9 | road, transformer | 35,3 | 1,12 – 1,87 | 728 | SW |
| LA(min) Fast 30,2– LA(max) Fast 33,1 | | | | | | | | | | | | | | | | | | |
| 4 | $11^{30}$ | $11^{45}$ | 32,1 | 32,3 | 32,6 | 32,3 | 33,2 | 33,8 | 33,6 | 33,3 | 33,1 | 32,4 | 38,4 | road, transformer | 36,7 | 1,96 – 3,50 | 728 | SW |
| LA(min) Fast 32,5– LA(max) Fast 34,9 | | | | | | | | | | | | | | | | | | |
| 5 | $12^{00}$ | $12^{15}$ | 33,4 | 33,1 | 32,8 | 32,7 | 32,4 | 32,4 | 31,8 | 31,5 | 31,3 | 32,6 | 39,4 | road, transformer | 36,7 | 2,04 – 3,4 | 728 | SW |
| LA(min) Fast 30,7– LA(max) Fast 33,9 | | | | | | | | | | | | | | | | | | |
| 6 | $12^{40}$ | $12^{55}$ | 33,5 | 33,1 | 32,9 | 32,7 | 32,4 | 32,4 | 31,9 | 31,5 | 31,4 | 33,8 | 41,4 | road, transformer | 36,7 | 1,43 – 2,56 | 728 | SW |
| LA(min) Fast 30,7– LA(max) Fast 34,5 | | | | | | | | | | | | | | | | | | |
| 7 | $13^{10}$ | $13^{25}$ | 35,2 | 34,8 | 34,6 | 34,2 | 34,0 | 33,7 | 33,6 | 33,1 | 33,0 | 37,9 | 46,2 | road, transformer, household noise | 36,9 | 0,74 – 0,98 | 728 | SW |
| LA(min) Fast 32,7– LA(max) Fast 35,7 | | | | | | | | | | | | | | | | | | |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^{0}C$ | Wind speed, m/sec | Pressure, mmHg | Wind direction |
| 8 | $13^{40}$ | $13^{55}$ | 35,2 | 34,8 | 34,6 | 36,2 | 36,0 | 33,7 | 33,6 | 33,1 | 33,0 | 38,1 | 44,2 | road, transformer, household noise | 36,9 | 0,79 – 1,06 | 728 | SW |
| LA(min) Fast 32,7– LA(max) Fast 36,4 | | | | | | | | | | | | | | | | | | |
| 9 | $14^{00}$ | $14^{15}$ | 32,1 | 32,0 | 31,8 | 31,5 | 31,2 | 32,1 | 31,0 | 30,8 | 30,4 | 31,4 | 41,0 | road, transformer | 37,4 | 1,147 – 1,26 | 728 | SW |
| LA(min) Fast 30,2– LA(max) Fast 32,1 | | | | | | | | | | | | | | | | | | |
| 10 | $14^{30}$ | $14^{45}$ | 32,1 | 32,0 | 31,8 | 31,5 | 31,2 | 32,1 | 31,0 | 30,8 | 30,4 | 38,8 | 47,6 | road, transformer | 37,4 | 1,12 – 1,75 | 728 | SW |
| LA(min) Fast 30,2– LA(max) Fast 33,1 | | | | | | | | | | | | | | | | | | |
| 11 | $15^{00}$ | $15^{15}$ | 33,4 | 33,1 | 32,8 | 32,7 | 32,4 | 32,4 | 31,8 | 31,5 | 31,3 | 39,2 | 47,4 | road, transformer, birds | 37,9 | 3,15 – 3,85 | 728 | SW |
| LA(min) Fast 31,7– LA(max) Fast 35,7 | | | | | | | | | | | | | | | | | | |
| 12 | $15^{40}$ | $15^{55}$ | 32,1 | 32,3 | 32,6 | 32,3 | 33,2 | 33,8 | 33,6 | 33,3 | 33,1 | 37,0 | 44,5 | road, transformer, birds | 37,4 | 3,46 – 3,68 | 728 | SW |
| LA(min) Fast 32,7– LA(max) Fast 35,7 | | | | | | | | | | | | | | | | | | |
| 13 | $16^{00}$ | $16^{15}$ | 33,0 | 34,0 | 34,0 | 33,5 | 34,5 | 34,5 | 35,6 | 36,6 | 37,2 | 37,8 | 48,0 | road, transformer, pedestrians`s conversations | 40,2 | 1,43 – 2,08 | 728 | SW |
| LA(min) Fast 35,7– LA(max) Fast 36,7 | | | | | | | | | | | | | | | | | | |
| 14 | $16^{40}$ | $16^{55}$ | 33,5 | 34,3 | 34,0 | 33,5 | 34,5 | 34,5 | 35,6 | 36,6 | 37,2 | 34,9 | 43,2 | road, transformer, pedestrians`s conversations | 40,4 | 1,45 – 2,26 | 728 | SW |
| LA(min) Fast 34,7– LA(max) Fast 36,7 | | | | | | | | | | | | | | | | | | |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^0$C | Wind speed, m/sec | Pressure, mmHg | Wind direction |
| 15 | $17^{00}$ | $17^{15}$ | 36,2 | 37,3 | 37,5 | 38,4 | 38,0 | 38,1 | 38,4 | 39,1 | 40,3 | 38,5 | 48,0 | road, transformer | 39,2 | 0,9 – 1,62 | 728 | SW |
| LA(min) Fast 36,7– LA(max) Fast 38,7 | | | | | | | | | | | | | | | | | | |
| 16 | $17^{40}$ | $17^{55}$ | 36,2 | 37,3 | 37,2 | 38,4 | 38,0 | 38,4 | 38,4 | 39,1 | 39,3 | 41,0 | 46,0 | road, transformer | 38,1 | 0,81 – 1,05 | 728 | SW |
| LA(min) Fast 34,7– LA(max) Fast 36,7 | | | | | | | | | | | | | | | | | | |
| 17 | $18^{00}$ | $18^{15}$ | 35,0 | 35,2 | 41,8 | 42,0 | 42,1 | 42,3 | 43,0 | 43,1 | 43,7 | 36,0 | 42,0 | road, transformer | 35,4 | 0,35 – 0,48 | 726 | SW |
| LA(min) Fast 36,0 – LA(max) Fast 39,0 | | | | | | | | | | | | | | | | | | |
| 18 | $18^{40}$ | $18^{55}$ | 35,0 | 35,0 | 41,0 | 42,5 | 43,8 | 43,0 | 43,6 | 43,8 | 43,0 | 38,2 | 45,8 | road, transformer | 35,2 | 0,46 – 1,22 | 726 | SW |
| LA(min) Fast 36,2 – LA(max) Fast 39,4 | | | | | | | | | | | | | | | | | | |
| 19 | $19^{00}$ | $19^{15}$ | 35,2 | 36,2 | 41,5 | 41,9 | 43,0 | 41,8 | 42,0 | 42,0 | 42,4 | 37,8 | 43,3 | road, transformer | 31,2 | 0,35 – 0,48 | 726 | SW |
| LA(min) Fast 36,0 – LA(max) Fast 39,0 | | | | | | | | | | | | | | | | | | |
| 20 | $19^{40}$ | $19^{55}$ | 35,9 | 36,3 | 41,5 | 41,1 | 43,0 | 41,0 | 42,0 | 42,0 | 42,4 | 38,1 | 44,0 | road, transformer | 31,0 | 0,67 – 1,02 | 726 | SW |
| LA(min) Fast 35,4 – LA(max) Fast 39,1 | | | | | | | | | | | | | | | | | | |
| 21 | $20^{00}$ | $20^{15}$ | 35,0 | 35,2 | 41,8 | 42,0 | 42,1 | 42,3 | 43,0 | 43,1 | 43,7 | 42,0 | 45,2 | road, transformer | 30,2 | 0,45 – 0,56 | 726 | SW |
| LA(min) Fast 38,1 – LA(max) Fast 44,1 | | | | | | | | | | | | | | | | | | |
| 22 | $20^{40}$ | $20^{55}$ | 36,2 | 37,3 | 37,2 | 38,4 | 38,0 | 38,4 | 38,4 | 39,1 | 39,3 | 40,3 | 46,0 | road, transformer | 30,1 | 0,34 – 0,62 | 726 | SW |
| LA(min) Fast 38,0 – LA(max) Fast 41,8 | | | | | | | | | | | | | | | | | | |
| 23 | $21^{00}$ | $21^{15}$ | 35,0 | 35,2 | 41,8 | 42,0 | 42,1 | 42,3 | 43,0 | 43,1 | 43,7 | 38,2 | 42,0 | road, transformer | 27,7 | 0,49 – 0,93 | 726 | NW |
| LA(min) Fast 34,0 – LA(max) Fast 39,0 | | | | | | | | | | | | | | | | | | |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^0$C | Wind speed, m/sec | Pressure, mmHg | Wind direction |
| 24 | $21^{40}$ | $21^{55}$ | 36,2 | 37,3 | 37,2 | 38,4 | 38,0 | 38,4 | 38,4 | 39,1 | 39,3 | 38,0 | 48,2 | road, transformer | 26,4 | 0,44 – 1,15 | 726 | NW |
| LA(min) Fast 33,4 – LA(max) Fast 38,1 | | | | | | | | | | | | | | | | | | |
| 25 | $22^{00}$ | $22^{15}$ | 33,8 | 34,0 | 34,0 | 33,2 | 34,7 | 34,5 | 35,3 | 36,2 | 37,4 | 39,5 | 44,1 | road, transformer | 25,8 | 0,56 – 1,08 | 726 | NW |
| LA(min) Fast 38,0 – LA(max) Fast 40,0 | | | | | | | | | | | | | | | | | | |
| 26 | $22^{40}$ | $22^{55}$ | 34,2 | 35,7 | 35,4 | 35,6 | 36,2 | 37,4 | 38,4 | 39,7 | 39,3 | 36,1 | 42,4 | road, transformer | 25,9 | 0,34 – 1,12 | 726 | NW |
| LA(min) Fast 34,0 – LA(max) Fast 39,0 | | | | | | | | | | | | | | | | | | |
| 27 | $23^{10}$ | $23^{45}$ | 34,2 | 35,7 | 35,4 | 35,6 | 36,2 | 37,4 | 38,4 | 32,7 | 32,3 | 33,8 | 36,2 | road, transformer | 22,6 | 0,87 – 1,47 | 726 | NE |
| LA(min) Fast 32,0 – LA(max) Fast 34,0 | | | | | | | | | | | | | | | | | | |
| 28 | $23^{40}$ | $23^{55}$ | 34,2 | 35,7 | 35,4 | 35,6 | 36,2 | 37,4 | 38,4 | 32,7 | 32,3 | 32,4 | 43,9 | road, transformer | 22,0 | 0,84 – 2,01 | 726 | NE |
| LA(min) Fast 32,1 – LA(max) Fast 34,7 | | | | | | | | | | | | | | | | | | |
| **NM 7 – 21.06.2020 (weekend). Coordinates: 40˚13'53.39'' N, 69˚7'16.14'' E; h = 1,2 - 1,3 m.** | | | | | | | | | | | | | | | | | | |
| 29 | $00^{05}$ | $00^{20}$ | 34,2 | 35,7 | 35,4 | 34,6 | 36,2 | 34,4 | 35,4 | 32,7 | 32,3 | 34,1 | 39,2 | road, transformer | 21,6 | 0,67 – 1,34 | 726 | NE |
| LA(min) Fast 31,1 – LA(max) Fast 35,7 | | | | | | | | | | | | | | | | | | |
| 30 | $00^{30}$ | $00^{45}$ | 34,9 | 35,7 | 35,4 | 34,6 | 36,2 | 34,4 | 35,4 | 32,7 | 32,3 | 33,9 | 40,1 | road, transformer | 21,0 | 0,32 – 1,28 | 726 | NE |
| LA(min) Fast 33,1 – LA(max) Fast 35,9 | | | | | | | | | | | | | | | | | | |
| 31 | $01^{05}$ | $01^{20}$ | 34,2 | 35,7 | 35,4 | 34,6 | 36,2 | 34,4 | 35,1 | 32,7 | 32,0 | 34,2 | 39,1 | road, transformer | 19,8 | 0,36 – 0,78 | 726 | NW |
| LA(min) Fast 31,1 – LA(max) Fast 34,7 | | | | | | | | | | | | | | | | | | |
| 32 | $01^{40}$ | $01^{55}$ | 34,2 | 35,7 | 35,4 | 34,6 | 36,2 | 34,4 | 35,4 | 32,7 | 32,3 | 32,0 | 36,0 | road, transformer | 19,7 | 0,59 – 0,72 | 726 | NW |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^{0}C$ | Wind speed, m/sec | Pressure, mmHg | Wind direction |
| LA(min) Fast 31,1 – LA(max) Fast 34,0 | | | | | | | | | | | | | | | | | | |
| 33 | $02^{10}$ | $02^{25}$ | 34,2 | 35,7 | 35,4 | 34,6 | 36,2 | 34,4 | 35,4 | 32,7 | 32,3 | 34,1 | 37,2 | road, transformer | 19,8 | 0,74 – 1,05 | 726 | NW |
| LA(min) Fast 31,1 – LA(max) Fast 35,0 | | | | | | | | | | | | | | | | | | |
| 34 | $02^{40}$ | $02^{55}$ | 34,9 | 35,7 | 35,4 | 34,6 | 36,2 | 34,4 | 35,4 | 32,7 | 32,3 | 33,0 | 36,9 | road, transformer | 20,4 | 0,99 – 1,1 | 726 | NW |
| LA(min) Fast 31,0 – LA(max) Fast 34,4 | | | | | | | | | | | | | | | | | | |
| 35 | $03^{00}$ | $03^{15}$ | 34,2 | 34,7 | 34,4 | 33,6 | 34,2 | 34,4 | 35,4 | 32,7 | 31,3 | 33,5 | 36,1 | road, transformer | 20,0 | 0,46 – 0,91 | 726 | NW |
| LA(min) Fast 30,1 – LA(max) Fast 34,0 | | | | | | | | | | | | | | | | | | |
| 36 | $03^{41}$ | $03^{56}$ | 34,2 | 34,7 | 33,4 | 34,6 | 34,2 | 34,4 | 32,4 | 32,7 | 31,3 | 32,8 | 37,0 | road, transformer | 20,4 | 0,72 – 0,98 | 726 | NW |
| LA(min) Fast 30,0 – LA(max) Fast 34,0 | | | | | | | | | | | | | | | | | | |
| 37 | $04^{05}$ | $04^{20}$ | 41,0 | 41,2 | 44,0 | 44,3 | 44,0 | 44,4 | 44,2 | 44,3 | 45,1 | 44,1 | 46,9 | road, transformer | 21,8 | 0,27 – 0,79 | 728 | NW |
| LA(min) Fast 40,1 – LA(max) Fast 45,0 | | | | | | | | | | | | | | | | | | |
| 38 | $04^{30}$ | $04^{45}$ | 41,0 | 41,2 | 44,0 | 44,3 | 44,0 | 44,4 | 43,2 | 43,3 | 43,1 | 43,5 | 47,0 | road, transformer | 22,0 | 0,22 – 0,74 | 728 | NW |
| LA(min) Fast 40,1 – LA(max) Fast 44,0 | | | | | | | | | | | | | | | | | | |
| 39 | $05^{04}$ | $05^{19}$ | 41,0 | 41,2 | 44,0 | 44,3 | 44,0 | 44,4 | 44,2 | 44,3 | 45,1 | 45,7 | 52,4 | road, transformer, birds | 22,7 | 0,27 – 0,79 | 726 | NW |
| LA(min) Fast 38,2 – LA(max) Fast 46,0 | | | | | | | | | | | | | | | | | | |
| 40 | $05^{40}$ | $05^{55}$ | 41,0 | 41,2 | 44,0 | 44,3 | 44,0 | 44,4 | 45,2 | 45,3 | 45,1 | 53,8 | 58,3 | road, transformer, birds | 22,4 | 0,22 – 0,44 | 726 | NW |
| LA(min) Fast 39,1 – LA(max) Fast 47,0 | | | | | | | | | | | | | | | | | | |
| 41 | $06^{04}$ | $06^{19}$ | 32,2 | 32,7 | 33,4 | 33,6 | 33,2 | 33,4 | 32,4 | 32,7 | 31,3 | 29,0 | 33,6 | road, transformer | 22,7 | 0,59 – 1,16 | 726 | NW |

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^0$C | Wind speed, m/sec | Pressure, mmHg | Wind direction |
| LA(min) Fast 26,1 – LA(max) Fast 30,0 | | | | | | | | | | | | | | | | | | |
| 42 | $06^{41}$ | $06^{56}$ | 32,2 | 34,7 | 33,4 | 32,6 | 32,2 | 33,4 | 32,4 | 32,7 | 31,3 | 30,8 | 32,6 | road, transformer | 23,0 | 0,53 – 1,28 | 726 | NW |
| LA(min) Fast 29,1 – LA(max) Fast 32,0 | | | | | | | | | | | | | | | | | | |
| 43 | $07^{10}$ | $07^{25}$ | 34,2 | 34,7 | 33,4 | 34,6 | 34,2 | 34,4 | 32,4 | 32,7 | 31,3 | 35,9 | 38,4 | road, transformer | 24,0 | 0,84 – 1,32 | 726 | NW |
| LA(min) Fast 30,0 – LA(max) Fast 34,0 | | | | | | | | | | | | | | | | | | |
| 44 | $07^{30}$ | $07^{45}$ | 34,2 | 34,7 | 33,4 | 34,6 | 34,2 | 34,4 | 32,4 | 32,7 | 31,3 | 34,0 | 37,0 | road, transformer | 24,6 | 0,35 – 1,81 | 726 | NW |
| LA(min) Fast 30,8 – LA(max) Fast 34,2 | | | | | | | | | | | | | | | | | | |
| 45 | $08^{00}$ | $08^{15}$ | 41,0 | 41,2 | 43,0 | 43,3 | 43,0 | 42,4 | 43,2 | 44,3 | 42,1 | 42,8 | 48,6 | road, transformer | 26,0 | 1,31 – 2,43 | 726 | NW |
| LA(min) Fast 38,8 – LA(max) Fast 43,0 | | | | | | | | | | | | | | | | | | |
| 46 | $08^{22}$ | $08^{37}$ | 41,0 | 41,2 | 43,0 | 43,3 | 44,0 | 43,4 | 43,2 | 44,3 | 43,1 | 40,9 | 51,0 | road, transformer | 26,5 | 1,38 – 2,16 | 726 | NW |
| LA(min) Fast 37,8 – LA(max) Fast 43,2 | | | | | | | | | | | | | | | | | | |
| 47 | $09^{10}$ | $09^{25}$ | 41,0 | 41,2 | 44,0 | 44,3 | 44,0 | 44,4 | 44,2 | 44,3 | 45,1 | 44,3 | 58,0 | road, transformer | 29,0 | 1,28 – 1,73 | 725 | NW |
| LA(min) Fast 41,0 – LA(max) Fast 45,2 | | | | | | | | | | | | | | | | | | |
| 48 | $09^{40}$ | $09^{55}$ | 41,0 | 41,2 | 45,0 | 44,3 | 44,0 | 44,4 | 43,2 | 44,3 | 44,1 | 43,2 | 56,7 | road, transformer | 29,7 | 1,24 – 1,76 | 725 | NW |
| LA(min) Fast 40,8 – LA(max) Fast 45,2 | | | | | | | | | | | | | | | | | | |

Table 0-16 NM 7 (weekday)

**NM 7 – 22.06.2020 (weekday). Coordinates: 40˚13'53.39'' N, 69˚7'16.14'' E; h = 1,2 m.**

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 49 | $10^{00}$ | $10^{15}$ | 34,2 | 34,7 | 33,4 | 34,6 | 34,2 | 34,4 | 32,4 | 32,7 | 31,3 | 42,5 | 54,0 | road, transformer | 31,2 | 3,58 – 4,92 | 721 | NW |
| LA(min) Fast 32,8 – LA(max) Fast 36,2 | | | | | | | | | | | | | | | | | | |
| 50 | $10^{30}$ | $10^{45}$ | No measurement due to wind speed > 5 m/s | | | | | | | | | | | | 31,0 | **3,69 – 5,62** | 721 | NW |
| 51 | $11^{00}$ | $11^{15}$ | 34,2 | 34,7 | 33,4 | 34,6 | 34,2 | 34,4 | 32,4 | 32,7 | 31,3 | 42,0 | 52,9 | road, transformer | 35,9 | 2,69 – 4,52 | 720 | NW |
| LA(min) Fast 32,8 – LA(max) Fast 37,0 | | | | | | | | | | | | | | | | | | |
| 52 | $11^{40}$ | $11^{55}$ | 43,8 | 43,4 | 44,0 | 43,3 | 44,0 | 43,4 | 44,0 | 43,1 | 44,0 | 42,4 | 53,7 | road, transformer | 36,0 | 2,61 – 4,28 | 720 | NW |
| LA(min) Fast 32,8 – LA(max) Fast 37,0 | | | | | | | | | | | | | | | | | | |
| 53 | $12^{10}$ | $12^{25}$ | 43,8 | 43,4 | 44,0 | 43,3 | 44,0 | 43,4 | 44,0 | 43,1 | 44,0 | 51,4 | 55,4 | road, transformer, wind | 37,3 | 2,69 – 3,44 | 720 | NW |
| LA(min) Fast 42,8 – LA(max) Fast 47,0 | | | | | | | | | | | | | | | | | | |
| 54 | $12^{40}$ | $12^{55}$ | 44,0 | 44,2 | 45,0 | 44,3 | 44,0 | 44,4 | 43,2 | 44,3 | 43,1 | 49,0 | 54,6 | road, transformer, wind | 37,5 | 2,17 – 3,68 | 720 | NW |
| LA(min) Fast 46,8 – LA(max) Fast 50,0 | | | | | | | | | | | | | | | | | | |
| 55 | $13^{00}$ | $13^{15}$ | 43,1 | 42,4 | 42,2 | 43,3 | 43,0 | 42,2 | 43,2 | 43,3 | 43,1 | 45,0 | 52,7 | road, transformer, wind | 39,8 | 2,74 – 4,32 | 720 | NW |
| LA(min) Fast 44,8 – LA(max) Fast 47,0 | | | | | | | | | | | | | | | | | | |
| 56 | $13^{40}$ | $13^{55}$ | 44,1 | 42,4 | 42,0 | 43,3 | 43,0 | 43,2 | 43,2 | 43,3 | 43,0 | 44,0 | 51,9 | road, transformer, wind | 40,0 | 2,68 – 4,55 | 720 | NW |
| LA(min) Fast 42,9 – LA(max) Fast 46,0 | | | | | | | | | | | | | | | | | | |
| 57 | $14^{00}$ | $14^{15}$ | 44,1 | 42,4 | 42,0 | 43,3 | 43,0 | 43,2 | 43,2 | 43,3 | 41,9 | 47,5 | 58,0 | road, transformer | 38,7 | 1,23 – 2,07 | 719 | NW |
| LA(min) Fast 42,9 – LA(max) Fast 46,3 | | | | | | | | | | | | | | | | | | |
| 58 | $14^{35}$ | $14^{50}$ | 43,2 | 43,4 | 44,0 | 43,3 | 44,0 | 43,2 | 43,0 | 43,1 | 44,2 | 45,7 | 54,7 | road, transformer | 38,9 | 1,48 – 2,69 | 719 | NW |
| LA(min) Fast 42,0 – LA(max) Fast 46,0 | | | | | | | | | | | | | | | | | | |
| 59 | $15^{00}$ | $15^{15}$ | 43,8 | 43,4 | 44,0 | 43,3 | 44,0 | 43,4 | 44,0 | 43,1 | 44,0 | 44,7 | 52,9 | road, transformer | 39,8 | 2,74 – 4,32 | 720 | NW |
| LA(min) Fast 44,0 – LA(max) Fast 46,0 | | | | | | | | | | | | | | | | | | |
| 60 | $15^{35}$ | $15^{50}$ | 43,2 | 43,4 | 44,0 | 43,3 | 44,0 | 43,2 | 43,0 | 43,1 | 44,2 | 47,5 | 58,0 | road, transformer | 40,0 | 2,81 – 4,36 | 720 | NW |
| LA(min) Fast 42,0 – LA(max) Fast 46,0 | | | | | | | | | | | | | | | | | | |
| 61 | $16^{05}$ | $16^{20}$ | 44,1 | 42,4 | 42,0 | 43,3 | 43,0 | 43,2 | 43,2 | 43,3 | 43,0 | 42,1 | 51,9 | road, transformer | 38,7 | 1,23 – 2,07 | 719 | NW |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LA(min) Fast 40,0 – LA(max) Fast 42,0 | | | | | | | | | | | | | | | | | | |
| 62 | $16^{40}$ | $16^{55}$ | 43,2 | 43,4 | 44,0 | 43,3 | 44,0 | 43,2 | 43,0 | 43,1 | 44,2 | 44,8 | 54,8 | road, transformer | 38,8 | 1,44 – 2,09 | 719 | NW |
| LA(min) Fast 41,5 – LA(max) Fast 46,0 | | | | | | | | | | | | | | | | | | |
| 63 | $17^{05}$ | $17^{20}$ | 43,8 | 43,4 | 44,0 | 43,3 | 44,0 | 43,4 | 44,0 | 43,1 | 44,0 | 40,5 | 50,7 | road, transformer | 36,5 | 1,26 – 1,73 | 719 | NW |
| LA(min) Fast 37,5 – LA(max) Fast 40,0 | | | | | | | | | | | | | | | | | | |
| 64 | $17^{45}$ | $18^{00}$ | 43,1 | 43,2 | 44,0 | 43,4 | 43,0 | 43,1 | 43,3 | 43,4 | 44,4 | 43,8 | 54,8 | road, transformer | 36,4 | 1,09 – 1,24 | 719 | NW |
| LA(min) Fast 38,0 – LA(max) Fast 41,0 | | | | | | | | | | | | | | | | | | |
| 65 | $18^{15}$ | $18^{30}$ | 51,1 | 51,4 | 51,4 | 52,3 | 52,1 | 52,0 | 50,4 | 51,3 | 52,4 | 45,0 | 59,0 | road, transformer | 34,3 | 0,31 – 0,57 | 719 | NW |
| LA(min) Fast 48,0 – LA(max) Fast 51,0 | | | | | | | | | | | | | | | | | | |
| 66 | $18^{42}$ | $18^{57}$ | 52,7 | 51,4 | 51,4 | 52,3 | 52,1 | 52,0 | 50,4 | 51,3 | 52,2 | 48,7 | 53,9 | road, transformer | 34,0 | 0,71 – 0,94 | 719 | NW |
| LA(min) Fast 48,0 – LA(max) Fast 50,0 | | | | | | | | | | | | | | | | | | |
| 67 | $19^{05}$ | $19^{20}$ | 44,2 | 43,9 | 42,1 | 41,3 | 41,0 | 41,3 | 42,4 | 41,2 | 40,0 | 46,0 | 58,0 | road, transformer | 32,5 | 0,46 – 0,62 | 719 | NW |
| LA(min) Fast 34,0 – LA(max) Fast 40,0 | | | | | | | | | | | | | | | | | | |
| 68 | $19^{40}$ | $19^{55}$ | 43,1 | 42,4 | 42,2 | 43,3 | 43,0 | 42,2 | 43,2 | 43,3 | 43,1 | 44,2 | 55,4 | road, transformer | 32,0 | 0,44 – 0,78 | 719 | NW |
| LA(min) Fast 36,0 – LA(max) Fast 41,0 | | | | | | | | | | | | | | | | | | |
| 69 | $20^{04}$ | $20^{19}$ | 44,1 | 42,4 | 42,0 | 43,3 | 43,0 | 43,2 | 43,2 | 43,3 | 43,0 | 42,0 | 52,8 | road, transformer | 32,2 | 0,87 – 1,57 | 719 | NW |
| LA(min) Fast 38,0 – LA(max) Fast 40,0 | | | | | | | | | | | | | | | | | | |
| 70 | $20^{36}$ | $20^{51}$ | 43,2 | 43,4 | 44,0 | 43,3 | 44,0 | 43,2 | 43,0 | 43,1 | 44,2 | 43,2 | 54,0 | road, transformer | 32,5 | 0,94 – 1,33 | 719 | NW |
| LA(min) Fast 38,0 – LA(max) Fast 41,0 | | | | | | | | | | | | | | | | | | |
| 71 | $21^{09}$ | $21^{24}$ | 43,8 | 43,4 | 44,0 | 43,3 | 44,0 | 43,4 | 44,0 | 43,1 | 44,0 | 39,4 | 50,9 | road, transformer | 32,1 | 1,64 – 2,04 | 720 | NW |
| LA(min) Fast 32,0 – LA(max) Fast 34,0 | | | | | | | | | | | | | | | | | | |
| 72 | $21^{40}$ | $21^{55}$ | 43,8 | 43,4 | 44,0 | 43,3 | 44,0 | 43,4 | 44,0 | 43,1 | 44,0 | 39,9 | 51,4 | road, transformer | 32,0 | 1,48 – 2,46 | 720 | NW |
| LA(min) Fast 31,8 – LA(max) Fast 34,0 | | | | | | | | | | | | | | | | | | |
| 73 | $22^{00}$ | $22^{15}$ | 34,2 | 34,7 | 33,4 | 34,6 | 34,2 | 34,4 | 32,4 | 32,7 | 31,3 | 45,4 | 57,0 | road, transformer | 29,8 | 1,73 – 2,56 | 719 | NE |
| LA(min) Fast 31,7 – LA(max) Fast 36,0 | | | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 74 | $22^{36}$ | $22^{51}$ | 43,7 | 42,1 | 41,3 | 41,0 | 41,3 | 42,2 | 41,2 | 40,2 | 43,7 | 47,4 | 59,4 | road, transformer | 29,4 | 1,88 – 2,22 | 719 | NE |
| LA(min) Fast 32,0 – LA(max) Fast 36,0 | | | | | | | | | | | | | | | | | | |
| 75 | $23^{00}$ | $23^{15}$ | No measurement due to wind speed > 5 m/s | | | | | | | | | | | road, transformer | 28,2 | **4,20 – 6,13** | 719 | NE |
| 76 | $23^{40}$ | $23^{55}$ | No measurement due to wind speed > 5 m/s | | | | | | | | | | | road, transformer | 28,0 | **4,88 – 6,44** | 719 | NE |
| **NM 7 – 23.06.2020 г. (weekday). Coordinates: 40˚13'53.39'' N, 69˚7'16.14'' E; h = 1,2 m.** | | | | | | | | | | | | | | | | | | |
| 77 | $00^{08}$ | $08^{23}$ | No measurement due to wind speed > 5 m/s | | | | | | | | | | | road, transformer | 26,0 | **2,85 – 5,85** | 719 | NE |
| 78 | $00^{40}$ | $00^{55}$ | 43,9 | 42,1 | 41,3 | 41,0 | 41,3 | 42,4 | 41,2 | 40,0 | 43,9 | 44,5 | 54,0 | road, transformer | 26,0 | 2,34 – 4,89 | 719 | NE |
| LA(min) Fast 40,0 – LA(max) Fast 46,0 | | | | | | | | | | | | | | | | | | |
| 79 | $01^{00}$ | $01^{15}$ | 43,7 | 42,1 | 41,3 | 41,0 | 41,3 | 42,2 | 41,2 | 40,2 | 43,7 | 45,2 | 55,7 | road, transformer | 24,6 | 3,12 – 4,23 | 719 | NE |
| LA(min) Fast 40,0 – LA(max) Fast 44,0 | | | | | | | | | | | | | | | | | | |
| 80 | $01^{38}$ | $01^{53}$ | 44,1 | 44,0 | 42,3 | 42,3 | 43,0 | 42,2 | 42,0 | 42,2 | 42,3 | 44,6 | 54,9 | road, transformer | 24,4 | 3,16 – 4,76 | 719 | NE |
| LA(min) Fast 40,0 – LA(max) Fast 45,2 | | | | | | | | | | | | | | | | | | |
| 81 | $02^{00}$ | $02^{15}$ | 44,1 | 44,0 | 42,3 | 42,3 | 43,0 | 42,2 | 42,0 | 42,2 | 42,3 | 44,5 | 55,0 | road, transformer | 23,1 | 3,41 – 4,52 | 719 | NE |
| LA(min) Fast 40,0 – LA(max) Fast 43,0 | | | | | | | | | | | | | | | | | | |
| 82 | $02^{40}$ | $02^{55}$ | 42,3 | 43,2 | 42,4 | 44,0 | 43,2 | 44,2 | 45,1 | 45,3 | 45,4 | 43,9 | 58,1 | road, transformer | 22,8 | 3,98 – 4,66 | 719 | NE |
| LA(min) Fast 42,0 – LA(max) Fast 43,2 | | | | | | | | | | | | | | | | | | |
| 83 | $03^{05}$ | $03^{20}$ | 42,9 | 43,2 | 42,4 | 44,0 | 43,2 | 44,8 | 45,1 | 45,3 | 45,0 | 44,8 | 52,0 | road, transformer | 26,2 | 2,17 – 4,49 | 719 | NE |
| LA(min) Fast 44,0 – LA(max) Fast 47,2 | | | | | | | | | | | | | | | | | | |
| 84 | $03^{44}$ | $03^{59}$ | 42,3 | 43,2 | 42,4 | 44,0 | 43,2 | 44,2 | 45,1 | 45,3 | 45,4 | 47,8 | 53,1 | road, transformer | 26,0 | 2,15 – 4,45 | 719 | NE |
| LA(min) Fast 42,0 – LA(max) Fast 48,2 | | | | | | | | | | | | | | | | | | |
| 85 | $04^{00}$ | $04^{15}$ | 43,8 | 43,4 | 44,0 | 43,3 | 44,0 | 43,4 | 44,0 | 43,1 | 44,0 | 41,2 | 52,0 | road, transformer | 26,4 | 1,82 – 2,43 | 722 | NE |
| LA(min) Fast 37,0 – LA(max) Fast 39,0 | | | | | | | | | | | | | | | | | | |
| 86 | $04^{35}$ | $04^{50}$ | 42,9 | 42,3 | 43,2 | 43,4 | 43,2 | 43,4 | 43,1 | 43,3 | 43,2 | 43,7 | 55,1 | road, transformer | 26,0 | 1,84 – 2,65 | 722 | NE |
| LA(min) Fast 37,0 – LA(max) Fast 38,2 | | | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 87 | $05^{10}$ | $05^{25}$ | 43,8 | 43,4 | 44,0 | 43,3 | 44,0 | 43,4 | 44,0 | 43,1 | 44,0 | 41,4 | 53,4 | road, transformer | 26,4 | 1,82 – 2,43 | 722 | NE |
| LA(min) Fast 32,0 – LA(max) Fast 34,0 | | | | | | | | | | | | | | | | | | |
| 88 | $05^{40}$ | $05^{55}$ | 34,2 | 34,7 | 33,4 | 34,6 | 34,2 | 34,4 | 32,4 | 32,7 | 31,3 | 41,0 | 53,0 | road, transformer | 26,2 | 1,34 – 2,35 | 722 | NE |
| LA(min) Fast 31,9 – LA(max) Fast 33,2 | | | | | | | | | | | | | | | | | | |
| 89 | $06^{00}$ | $06^{15}$ | 44,9 | 43,7 | 42,1 | 41,3 | 41,0 | 41,3 | 42,2 | 41,2 | 40,2 | 46,0 | 58,0 | road, transformer | 25,8 | 1,06 – 3,69 | 722 | NE |
| LA(min) Fast 31,9 – LA(max) Fast 34,5 | | | | | | | | | | | | | | | | | | |
| 90 | $06^{40}$ | $06^{55}$ | 44,2 | 43,9 | 42,1 | 41,3 | 41,0 | 41,3 | 42,4 | 41,2 | 40,0 | 45,5 | 57,7 | road, transformer | 25,6 | 1,12 – 3,74 | 722 | NE |
| LA(min) Fast 31,0 – LA(max) Fast 34,0 | | | | | | | | | | | | | | | | | | |
| 91 | $07^{05}$ | $07^{20}$ | 44,1 | 42,4 | 42,0 | 43,3 | 43,0 | 43,2 | 43,2 | 43,3 | 43,0 | 40,9 | 52,4 | road, transformer | 29,0 | 1,14 – 2,26 | 722 | NE |
| LA(min) Fast 33,0 – LA(max) Fast 36,0 | | | | | | | | | | | | | | | | | | |
| 92 | $07^{40}$ | $07^{55}$ | 43,8 | 43,4 | 44,0 | 43,3 | 44,0 | 43,4 | 44,0 | 43,1 | 44,0 | 42,3 | 54,0 | road, transformer | 29,0 | 1,47 – 1,8 | 722 | NE |
| LA(min) Fast 32,0 – LA(max) Fast 36,0 | | | | | | | | | | | | | | | | | | |
| 93 | $08^{14}$ | $08^{29}$ | 43,8 | 43,4 | 44,0 | 43,3 | 44,0 | 43,4 | 44,0 | 43,1 | 44,0 | 41,4 | 53,0 | road, transformer | 29,6 | 1,35 – 2,18 | 724 | NE |
| LA(min) Fast 32,0 – LA(max) Fast 34,0 | | | | | | | | | | | | | | | | | | |
| 94 | $08^{40}$ | $08^{55}$ | 43,2 | 43,4 | 44,0 | 43,3 | 44,0 | 43,2 | 43,0 | 43,1 | 44,2 | 43,0 | 55,0 | road, transformer | 29,4 | 1,76 – 2,14 | 724 | NE |
| LA(min) Fast 33,0 – LA(max) Fast 34,0 | | | | | | | | | | | | | | | | | | |
| 95 | $09^{05}$ | $09^{20}$ | 44,3 | 45,1 | 45,3 | 46,0 | 45,2 | 46,3 | 46,1 | 45,2 | 46,2 | 46,4 | 58,7 | road, transformer, pets | 33,4 | 724 | 2,63 – 3,74 | SE |
| LA(min) Fast 34,0 – LA(max) Fast 37,0 | | | | | | | | | | | | | | | | | | |
| 96 | $09^{41}$ | $09^{56}$ | 44,3 | 45,1 | 45,3 | 46,0 | 45,2 | 46,3 | 46,1 | 45,2 | 46,2 | 46,7 | 59,0 | road, transformer, pets | 33,9 | 724 | 2,22 – 3,78 | SE |
| LA(min) Fast 34,4 – LA(max) Fast 37,2 | | | | | | | | | | | | | | | | | | |

Table 0-17 NM 8 (weekday)

| № | Start time | End time | Sound pressure in octave bands with geometric mean frequencies, Hz | | | | | | | | | LAeq, dB | LAmax, dB | Additional noise sources | Meteo data | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | Temperature, $^{0}C$ | Wind speed, m/sec | Pressure, mmHg | Wind direction |
| **NM 8 – 25.06.2020 (weekday). Coordinates: 40˚13'43.82'' N, 69˚6'14.18'' E; h = 1,2 m.** | | | | | | | | | | | | | | | | | | |
| 1 | $11^{10}$ | $11^{25}$ | 63,1 | 62,2 | 62,4 | 63,3 | 65,4 | 64,1 | 63,2 | 62,1 | 64,3 | 67,5 | 75,0 | birds, car | 33,1 | 2,94 – 5,00 | 725 | NW |
| LA(min) Fast 59,9 – LA(max) Fast 68,1 | | | | | | | | | | | | | | | | | | |
| 2 | $11^{40}$ | $11^{55}$ | 63,8 | 62,2 | 62,4 | 63,3 | 65,5 | 64,1 | 63,2 | 62,1 | 64,3 | 67,9 | 74,2 | birds, cars | 33,7 | 3,64 – 4,81 | 725 | NW |
| LA(min) Fast 60,4 – LA(max) Fast 68,5 | | | | | | | | | | | | | | | | | | |
| 3 | $12^{05}$ | $12^{20}$ | 63,2 | 64,1 | 65,0 | 65,2 | 64,1 | 66,2 | 63,1 | 63,4 | 62,2 | 63,5 | 69,8 | birds, cars | 35,4 | 3,39 – 4,9 | 725 | NW |
| LA(min) Fast 61,9 – LA(max) Fast 67,1 | | | | | | | | | | | | | | | | | | |
| 4 | $12^{35}$ | $12^{50}$ | 63,4 | 64,1 | 65,0 | 65,2 | 64,2 | 66,2 | 63,1 | 63,7 | 62,2 | 64,3 | 69,2 | birds, cars | 35,7 | 3,24 – 4,78 | 725 | NW |
| LA(min) Fast 63,4 – LA(max) Fast 67,8 | | | | | | | | | | | | | | | | | | |
| 5 | $13^{15}$ | $13^{30}$ | 61,2 | 62,1 | 62,4 | 62,0 | 62,4 | 63,1 | 61,1 | 62,2 | 61,3 | 62,6 | 67,5 | birds, cars | 36,7 | 2,19 – 4,71 | 725 | SW |
| LA(min) Fast 62,0 – LA(max) Fast 65,1 | | | | | | | | | | | | | | | | | | |
| 6 | $13^{40}$ | $13^{55}$ | 61,6 | 62,1 | 62,4 | 62,1 | 62,4 | 63,1 | 61,1 | 62,2 | 61,4 | 65,5 | 72,0 | birds, cars | 36,4 | 2,97 – 4,04 | 725 | SW |
| LA(min) Fast 63,7 – LA(max) Fast 66,0 | | | | | | | | | | | | | | | | | | |
| 7 | $14^{10}$ | $14^{25}$ | 52,1 | 53,0 | 53,3 | 52,0 | 53,1 | 54,2 | 53,4 | 54,2 | 52,4 | 57,1 | 61,8 | birds, cars | 36,8 | 2,95 – 4,35 | 725 | NW |
| LA(min) Fast 54,9 – LA(max) Fast 57,7 | | | | | | | | | | | | | | | | | | |
| 8 | $14^{35}$ | $14^{50}$ | 52,4 | 53,0 | 53,3 | 52,0 | 53,6 | 54,2 | 53,4 | 54,2 | 52,4 | 55,2 | 60,1 | birds, cars | 36,1 | 2,94 – 4,24 | 725 | NW |
| LA(min) Fast 52,4 – LA(max) Fast 55,9 | | | | | | | | | | | | | | | | | | |

<table>
<tr><td>9</td><td>$15^{00}$</td><td>$15^{15}$</td><td>61,0</td><td>61,3</td><td>62,2</td><td>63,1</td><td>63,2</td><td>65,1</td><td>62,2</td><td>64,3</td><td>63,1</td><td>63,8</td><td>69,8</td><td>birds, trees, cars</td><td>36,2</td><td>2,48 – 4,53</td><td>725</td><td>NW</td></tr>
<tr><td colspan="19">LA(min) Fast 62,0 – LA(max) Fast 64,3</td></tr>
<tr><td>10</td><td>$15^{40}$</td><td>$15^{55}$</td><td>61,5</td><td>61,3</td><td>62,2</td><td>63,3</td><td>63,2</td><td>65,1</td><td>62,2</td><td>64,5</td><td>63,1</td><td>63,5</td><td>67,8</td><td>birds, trees, cars</td><td>36,4</td><td>2,12 – 4,46</td><td>725</td><td>NW</td></tr>
<tr><td colspan="19">LA(min) Fast 62,0 – LA(max) Fast 64,0</td></tr>
<tr><td>11</td><td>$16^{10}$</td><td>$16^{25}$</td><td>61,1</td><td>61,3</td><td>62,4</td><td>62,1</td><td>65,3</td><td>65,0</td><td>65,1</td><td>65,4</td><td>64,1</td><td>62,1</td><td>68,4</td><td>birds, house. livestock</td><td>36,7</td><td>2,58 – 3,85</td><td>722</td><td>NW</td></tr>
<tr><td colspan="19">LA(min) Fast 61,2 – LA(max) Fast 65,4</td></tr>
<tr><td>12</td><td>$16^{44}$</td><td>$16^{59}$</td><td>61,6</td><td>61,3</td><td>62,4</td><td>62,2</td><td>65,3</td><td>65,0</td><td>65,1</td><td>65,4</td><td>64,1</td><td>64,6</td><td>68,9</td><td>birds, house. livestock</td><td>36,2</td><td>2,13 – 3,01</td><td>722</td><td>NW</td></tr>
<tr><td colspan="19">LA(min) Fast 62,2 – LA(max) Fast 65,1</td></tr>
<tr><td>13</td><td>$17^{03}$</td><td>$17^{18}$</td><td>42,3</td><td>43,1</td><td>42,2</td><td>44,3</td><td>45,2</td><td>43,1</td><td>44,2</td><td>43,0</td><td>43,4</td><td>41,4</td><td>49,0</td><td>birds, cars</td><td>35,6</td><td>2,7 – 3,75</td><td>722</td><td>SW</td></tr>
<tr><td colspan="19">LA(min) Fast 40,2 – LA(max) Fast 45,9</td></tr>
<tr><td>14</td><td>$17^{44}$</td><td>$17^{59}$</td><td>42,5</td><td>43,1</td><td>42,2</td><td>44,3</td><td>45,2</td><td>43,6</td><td>44,2</td><td>43,0</td><td>43,4</td><td>46,0</td><td>52,4</td><td>birds, cars</td><td>35,5</td><td>2,89 – 3,01</td><td>722</td><td>SW</td></tr>
<tr><td colspan="19">LA(min) Fast 43,9 – LA(max) Fast 46,4</td></tr>
<tr><td>15</td><td>$18^{00}$</td><td>$18^{12}$</td><td>52,3</td><td>51,3</td><td>51,0</td><td>50,4</td><td>55,4</td><td>56,0</td><td>53,3</td><td>53,4</td><td>55,0</td><td>51,4</td><td>58,8</td><td>birds, cars, frogs</td><td>34,6</td><td>1,64 – 2,91</td><td>722</td><td>SW</td></tr>
<tr><td colspan="19">LA(min) Fast 51,0 – LA(max) Fast 53,0</td></tr>
<tr><td>16</td><td>$18^{35}$</td><td>$18^{50}$</td><td>52,3</td><td>51,3</td><td>51,5</td><td>50,4</td><td>55,4</td><td>56,0</td><td>53,3</td><td>53,4</td><td>55,0</td><td>43,7</td><td>49,9</td><td>birds, cars, frogs</td><td>34,0</td><td>1,44 – 2,98</td><td>722</td><td>SW</td></tr>
<tr><td colspan="19">LA(min) Fast 43,1 – LA(max) Fast 46,1</td></tr>
<tr><td>17</td><td>$19^{00}$</td><td>$19^{15}$</td><td>53,1</td><td>52,3</td><td>55,0</td><td>53,1</td><td>51,4</td><td>53,4</td><td>53,1</td><td>53,4</td><td>55,0</td><td>52,8</td><td>60,0</td><td>birds, cars, frogs</td><td>33,1</td><td>1,15 – 2,43</td><td>722</td><td>NW</td></tr>
<tr><td colspan="19">LA(min) Fast 51,9 – LA(max) Fast 56,4</td></tr>
<tr><td>18</td><td>$19^{44}$</td><td>$19^{59}$</td><td>53,5</td><td>52,3</td><td>55,3</td><td>53,1</td><td>51,4</td><td>53,4</td><td>53,1</td><td>53,4</td><td>55,0</td><td>52,4</td><td>62,1</td><td>birds, cars, frogs</td><td>33,2</td><td>1,31 – 2,89</td><td>722</td><td>NW</td></tr>
<tr><td colspan="19">LA(min) Fast 51,2 – LA(max) Fast 56,9</td></tr>
<tr><td>19</td><td>$20^{00}$</td><td>$20^{15}$</td><td>52,4</td><td>51,3</td><td>51,2</td><td>51,1</td><td>51,2</td><td>54,0</td><td>53,8</td><td>54,4</td><td>55,0</td><td>51,3</td><td>60,2</td><td>birds, cars, frogs</td><td>30,8</td><td>1,21 – 1,98</td><td>722</td><td>NW</td></tr>
<tr><td colspan="19">LA(min) Fast 51,0 – LA(max) Fast 54,0</td></tr>
</table>

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | $20^{38}$ | $20^{53}$ | 52,4 | 51,3 | 51,2 | 51,4 | 51,2 | 54,1 | 53,8 | 54,4 | 55,0 | 56,8 | 63,8 | birds, cars, frogs | 30,4 | 1,55 – 2,14 | 722 | NW |
| LA(min) Fast 50,7 – LA(max) Fast 54,8 | | | | | | | | | | | | | | | | | | |
| 21 | $21^{10}$ | $21^{25}$ | 52,4 | 55,3 | 54,1 | 54,3 | 55,2 | 53,2 | 52,1 | 54,2 | 52,4 | 53,6 | 59,8 | birds, cars, frogs | 29,1 | 1,47 – 2,04 | 722 | SW |
| LA(min) Fast 53,0 – LA(max) Fast 56,0 | | | | | | | | | | | | | | | | | | |
| 22 | $21^{40}$ | $21^{55}$ | 52,2 | 55,3 | 54,1 | 54,3 | 55,4 | 53,3 | 52,1 | 54,2 | 52,4 | 52,2 | 61,8 | birds, cars, frogs | 29,1 | 1,64 – 2,19 | 722 | SW |
| LA(min) Fast 51,0 – LA(max) Fast 56,9 | | | | | | | | | | | | | | | | | | |
| 23 | $22^{00}$ | $22^{15}$ | 46,4 | 45,1 | 46,2 | 44,3 | 45,2 | 46,1 | 47,2 | 48,3 | 47,2 | 47,4 | 60,0 | birds, cars, crickets, frogs, | 27,3 | 0,36 – 0,71 | 722 | NW |
| LA(min) Fast 46,2 – LA(max) Fast 49,0 | | | | | | | | | | | | | | | | | | |
| 24 | $22^{38}$ | $22^{53}$ | 46,4 | 45,1 | 46,2 | 44,3 | 45,2 | 46,1 | 47,2 | 48,3 | 47,2 | 48,2 | 58,4 | birds, cars, crickets, frogs, | 27,2 | 0,77 – 0,98 | 722 | NW |
| LA(min) Fast 47,0 – LA(max) Fast 49,0 | | | | | | | | | | | | | | | | | | |
| 25 | $23^{05}$ | $23^{20}$ | 42,3 | 43,1 | 46,2 | 44,0 | 45,1 | 43,3 | 44,2 | 46,4 | 45,8 | 44,6 | 49,4 | birds, cars, crickets, frogs, | 27,6 | 0,79 – 1,16 | 722 | NW |
| LA(min) Fast 44,0 – LA(max) Fast 47,0 | | | | | | | | | | | | | | | | | | |
| 26 | $23^{38}$ | $23^{53}$ | 42,2 | 43,1 | 46,2 | 44,4 | 45,1 | 43,6 | 44,2 | 46,4 | 45,8 | 42,3 | 51,4 | birds, cars, crickets, frogs, | 27,0 | 0,55 – 1,68 | 722 | NW |
| LA(min) Fast 40,4 – LA(max) Fast 47,9 | | | | | | | | | | | | | | | | | | |
| **NM 8 – 26.06.2020 (weekday). Coordinates: 40˚13'43.82'' N, 69˚6'14.18'' E; h = 1,2 m.** | | | | | | | | | | | | | | | | | | |
| 27 | $00^{07}$ | $00^{22}$ | 42,4 | 43,1 | 45,2 | 44,3 | 45,2 | 44,4 | 45,3 | 46,1 | 44,2 | 41,9 | 49,2 | birds, cars, crickets, frogs, | 25,9 | 1,1 – 2,06 | 722 | NW |
| LA(min) Fast 41,0 – LA(max) Fast 45,0 | | | | | | | | | | | | | | | | | | |
| 28 | $00^{44}$ | $00^{59}$ | 42,4 | 43,1 | 45,2 | 44,3 | 45,2 | 44,4 | 45,3 | 46,1 | 44,2 | 42,0 | 44,9 | birds, cars, crickets, frogs, | 25,4 | 1,55 – 2,04 | 722 | NW |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LA(min) Fast 40,3 – LA(max) Fast 44,3 | | | | | | | | | | | | | | | | | |
| 29 | $01^{12}$ | $01^{27}$ | 46,1 | 49,3 | 47,2 | 48,1 | 47,2 | 45,4 | 46,3 | 47,1 | 48,2 | 47,5 | 54,1 | cars, frogs, | 25,2 | 1,14 – 1,73 | 722 | NW |
| LA(min) Fast 45,5 – LA(max) Fast 49,0 | | | | | | | | | | | | | | | | | |
| 30 | $01^{32}$ | $01^{47}$ | 46,1 | 49,3 | 47,2 | 48,1 | 47,7 | 45,4 | 46,3 | 47,4 | 48,2 | 41,9 | 55,1 | cars, frogs, | 25,1 | 1,36 – 1,94 | 722 | NW |
| LA(min) Fast 41,0 – LA(max) Fast 49,8 | | | | | | | | | | | | | | | | | |
| 31 | $02^{03}$ | $02^{18}$ | 53,1 | 54,0 | 52,3 | 51,1 | 53,4 | 54,3 | 53,0 | 53,4 | 52,2 | 52,8 | 63,3 | cars, frogs, | 23,9 | 0,87 – 1,36 | 722 | NW |
| LA(min) Fast 50,9 – LA(max) Fast 54,0 | | | | | | | | | | | | | | | | | |
| 32 | $02^{32}$ | $02^{47}$ | 41,3 | 54,0 | 52,5 | 51,1 | 53,3 | 54,3 | 53,0 | 53,4 | 52,2 | 51,8 | 64,0 | cars, frogs, | 23,0 | 0,44 – 1,56 | 722 | NW |
| LA(min) Fast 39,9 – LA(max) Fast 54,8 | | | | | | | | | | | | | | | | | |
| 33 | $03^{10}$ | $03^{25}$ | 53,1 | 53,4 | 52,3 | 54,4 | 55,2 | 53,1 | 52,2 | 51,4 | 53,3 | 53,4 | 63,2 | cars, frogs, | 23,4 | 1,32 – 1,66 | 722 | NW |
| LA(min) Fast 50,0 – LA(max) Fast 55,2 | | | | | | | | | | | | | | | | | |
| 34 | $03^{36}$ | $03^{51}$ | 53,5 | 53,4 | 52,3 | 54,4 | 55,8 | 53,6 | 52,2 | 51,4 | 53,3 | 54,4 | 60,1 | cars, frogs, | 23,1 | 1,84 – 1,95 | 722 | NW |
| LA(min) Fast 53,0 – LA(max) Fast 55,2 | | | | | | | | | | | | | | | | | |
| 35 | $04^{00}$ | $04^{15}$ | 52,3 | 53,3 | 52,2 | 53,1 | 51,4 | 52,2 | 51,2 | 53,1 | 51,4 | 52,2 | 58,0 | cars, frogs, | 23,7 | 0,54 – 1,26 | 722 | NW |
| LA(min) Fast 51,0 – LA(max) Fast 53,0 | | | | | | | | | | | | | | | | | |
| 36 | $04^{22}$ | $04^{37}$ | 52,3 | 53,3 | 52,2 | 53,1 | 51,4 | 52,2 | 51,2 | 53,1 | 51,4 | 52,8 | 58,2 | cars, frogs, | 23,3 | 0,5 – 1,71 | 722 | NW |
| LA(min) Fast 50,4 – LA(max) Fast 54,8 | | | | | | | | | | | | | | | | | |
| 37 | $05^{17}$ | $05^{32}$ | 53,4 | 53,1 | 52,2 | 53,3 | 54,4 | 54,0 | 583,4 | 53,3 | 53,1 | 53,5 | 55,9 | cars, frogs, birds | 25,1 | 1,14 – 2,22 | 722 | NE |
| LA(min) Fast 51,0 – LA(max) Fast 55,0 | | | | | | | | | | | | | | | | | |
| 38 | $05^{43}$ | $05^{58}$ | 53,4 | 53,1 | 52,5 | 53,3 | 54,4 | 54,6 | 583,4 | 53,7 | 53,1 | 54,3 | 64,8 | cars, frogs, birds | 25,7 | 1,51 – 1,89 | 722 | NE |
| LA(min) Fast 52,1 – LA(max) Fast 55,8 | | | | | | | | | | | | | | | | | |
| 39 | $06^{10}$ | $06^{35}$ | 52,3 | 53,2 | 53,4 | 52,4 | 53,1 | 53,4 | 52,3 | 53,1 | 53,4 | 54,7 | 59,0 | cars, frogs, birds | 26,7 | 1,18 – 1,96 | 722 | NE |
| LA(min) Fast 50,1 – LA(max) Fast 56,9 | | | | | | | | | | | | | | | | | |

<table>
<tr><td>40</td><td>$06^{45}$</td><td>$07^{00}$</td><td>52,3</td><td>53,2</td><td>53,4</td><td>52,4</td><td>53,1</td><td>53,3</td><td>52,6</td><td>53,1</td><td>53,4</td><td>54,8</td><td>67,1</td><td>cars, frogs, birds</td><td>26,5</td><td>1,4 – 1,78</td><td>722</td><td>NE</td></tr>
<tr><td colspan="19">LA(min) Fast 51,8 – LA(max) Fast 56,6</td></tr>
<tr><td>41</td><td>$07^{12}$</td><td>$07^{27}$</td><td>53,2</td><td>54,1</td><td>53,3</td><td>54,2</td><td>54,4</td><td>52,2</td><td>53,1</td><td>54,2</td><td>53,4</td><td>54,5</td><td>67,0</td><td>birds, cars, груз. car</td><td>28,3</td><td>1,67 – 2,19</td><td>722</td><td>NE</td></tr>
<tr><td colspan="19">LA(min) Fast 53,4 – LA(max) Fast 55,3</td></tr>
<tr><td>42</td><td>$07^{39}$</td><td>$07^{54}$</td><td>53,2</td><td>54,5</td><td>53,3</td><td>54,2</td><td>54,2</td><td>52,2</td><td>53,1</td><td>54,2</td><td>53,4</td><td>54,8</td><td>78,2</td><td>birds, cars, груз. car</td><td>28,5</td><td>1,20 – 2,21</td><td>722</td><td>NE</td></tr>
<tr><td colspan="19">LA(min) Fast 52,8 – LA(max) Fast 56,0</td></tr>
<tr><td>43</td><td>$08^{00}$</td><td>$08^{15}$</td><td>51,4</td><td>52,2</td><td>53,1</td><td>51,3</td><td>52,2</td><td>51,3</td><td>53,1</td><td>52,4</td><td>53,3</td><td>52,2</td><td>72,4</td><td>birds, cars (passenger car and truck)</td><td>29,7</td><td>1,36 – 2,19</td><td>723</td><td>NE</td></tr>
<tr><td colspan="19">LA(min) Fast 50,8 – LA(max) Fast 53,0</td></tr>
<tr><td>44</td><td>$08^{32}$</td><td>$08^{47}$</td><td>51,4</td><td>52,6</td><td>53,1</td><td>51,3</td><td>52,6</td><td>51,3</td><td>53,5</td><td>52,4</td><td>53,3</td><td>52,0</td><td>62,0</td><td>birds, cars (passenger car and truck)</td><td>29,4</td><td>1,38 – 2,74</td><td>723</td><td>NE</td></tr>
<tr><td colspan="19">LA(min) Fast 42,1 – LA(max) Fast 47,7</td></tr>
<tr><td>45</td><td>$09^{10}$</td><td>$09^{25}$</td><td>33,4</td><td>34,1</td><td>32,2</td><td>33,1</td><td>34,0</td><td>34,4</td><td>33,1</td><td>32,2</td><td>33,3</td><td>45,8</td><td>66,4</td><td>birds, cars (passenger car and truck)</td><td>31,2</td><td>0,46 – 0,83</td><td>723</td><td>NE</td></tr>
<tr><td colspan="19">LA(min) Fast 55,0 – LA(max) Fast 64,0</td></tr>
<tr><td>46</td><td>$09^{40}$</td><td>$09^{55}$</td><td>33,4</td><td>34,1</td><td>32,3</td><td>33,1</td><td>34,0</td><td>34,6</td><td>33,1</td><td>32,2</td><td>33,5</td><td>46,5</td><td>69,8</td><td>birds, cars (passenger car and truck)</td><td>31,7</td><td>0,55 – 0,78</td><td>723</td><td>NE</td></tr>
<tr><td colspan="19">LA(min) Fast 45,0 – LA(max) Fast 47,7</td></tr>
<tr><td>47</td><td>$10^{00}$</td><td>$10^{15}$</td><td>33,5</td><td>34,1</td><td>32,2</td><td>33,6</td><td>34,0</td><td>34,4</td><td>33,1</td><td>32,2</td><td>33,4</td><td>45,6</td><td>74,0</td><td>birds, cars (passenger car and truck)</td><td>32,1</td><td>0,56 – 0,98</td><td>723</td><td>NE</td></tr>
<tr><td colspan="19">LA(min) Fast 43,0 – LA(max) Fast 47,1</td></tr>
<tr><td>48</td><td>$10^{30}$</td><td>$10^{45}$</td><td>33,5</td><td>34,1</td><td>32,4</td><td>33,6</td><td>34,0</td><td>34,8</td><td>33,1</td><td>32,2</td><td>33,1</td><td>45,2</td><td>70,0</td><td>birds, cars (passenger car and truck)</td><td>32,1</td><td>1,25 – 2,68</td><td>723</td><td>NE</td></tr>
</table>

| |
|---|
| LA(min) Fast 42,0 – LA(max) Fast 47,0 |

Table 0-18 NM 8 (weekend)

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NM 8 – 27.06.2020 (weekend). Coordinates: 40°13'43.82'' N, 69°6'14.18'' E; h = 1,2 m.** | | | | | | | | | | | | | | | | | | |
| 49 | $7^{10}$ | $7^{25}$ | 52,2 | 53,4 | 54,3 | 54,1 | 52,4 | 53,2 | 55,3 | 53,2 | 54,1 | 54,7 | 84,0 | 47 cars, 3 trucks | 22,4 | 3,39 – 5,00 | 727 | SE |
| LA(min) Fast 52,8 – LA(max) Fast 55,9 | | | | | | | | | | | | | | | | | | |
| 50 | $7^{35}$ | $7^{50}$ | 52,2 | 53,4 | 54,3 | 54,1 | 52,4 | 53,2 | 55,3 | 53,2 | 54,1 | 53,3 | 81,2 | 43 cars, 4 грузовых | 22,4 | 3,38 –4,25 | 727 | SE |
| LA(min) Fast 51,4 – LA(max) Fast 54,9 | | | | | | | | | | | | | | | | | | |
| 51 | $8^{00}$ | $8^{15}$ | 53,2 | 54,1 | 54,3 | 53,1 | 52,2 | 53,4 | 53,0 | 52,1 | 54,3 | 51,3 | 64,0 | birds, cars | 24,1 | 2,86 – 4,42 | 727 | SE |
| LA(min) Fast 50,4 – LA(max) Fast 54,9 | | | | | | | | | | | | | | | | | | |
| 52 | $8^{30}$ | $8^{45}$ | 53,2 | 54,1 | 54,3 | 53,1 | 52,2 | 53,8 | 53,0 | 52,1 | 54,1 | 54,3 | 70,0 | birds, cars | 24,0 | 2,45 – 4,58 | 727 | SE |
| LA(min) Fast 52,8 – LA(max) Fast 55,1 | | | | | | | | | | | | | | | | | | |
| 53 | $9^{10}$ | $9^{25}$ | 56,2 | 57,1 | 54,3 | 56,1 | 54,2 | 56,4 | 57,1 | 56,3 | 54,1 | 57,3 | 64,0 | birds, cars | 25,6 | 2,94 – 4,95 | 729 | SE |
| LA(min) Fast 55,8 – LA(max) Fast 58,1 | | | | | | | | | | | | | | | | | | |
| 54 | $9^{40}$ | $9^{55}$ | No measurement due to wind speed>5m/s | | | | | | | | | | | birds, cars, wind | 25,2 | **3,46 – 5,9** | 729 | SE |
| 55 | $10^{00}$ | $10^{15}$ | No measurement due to wind speed>5m/s | | | | | | | | | | | birds, cars, wind | 26,2 | **4,41 – 6,79** | 729 | SE |
| 56 | $10^{40}$ | $10^{55}$ | No measurement due to wind speed>5m/s | | | | | | | | | | | birds, cars, wind | 26,4 | **4,17 – 5,54** | 729 | SE |
| 57 | $11^{10}$ | $11^{25}$ | No measurement due to wind speed>5m/s | | | | | | | | | | | birds, cars, wind | 26,5 | **3,39 – 6,71** | 729 | SE |
| 57 | $11^{40}$ | $11^{55}$ | No measurement due to wind speed>5m/s | | | | | | | | | | | birds, cars, wind | 26,4 | **3,04 – 6,78** | 729 | SE |
| 58 | $12^{00}$ | $12^{15}$ | No measurement due to wind speed>5m/s | | | | | | | | | | | birds, cars, wind | 26,7 | **4,53 – 6,27** | 730 | SE |
| 59 | $12^{35}$ | $12^{50}$ | No measurement due to wind speed>5m/s | | | | | | | | | | | birds, cars, wind | 26,1 | **4,34 – 6,67** | 730 | SE |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 60 | $13^{14}$ | $13^{29}$ | 52,1 | 52,4 | 53,3 | 54,2 | 55,1 | 53,4 | 52,2 | 56,1 | 54,3 | 53,4 | 65,6 | cars, birds | 27,4 | 3,61 – 4,58 | 730 | SE |
| LA(min) Fast 51,9 – LA(max) Fast 54,6 | | | | | | | | | | | | | | | | | | |
| 61 | $13^{40}$ | $13^{55}$ | 52,0 | 52,4 | 53,3 | 54,2 | 55,8 | 53,4 | 52,2 | 56,1 | 54,3 | 53,6 | 64,2 | cars, birds | 27,4 | 3,71 – 4,28 | 730 | SE |
| LA(min) Fast 52,0 – LA(max) Fast 58,6 | | | | | | | | | | | | | | | | | | |
| 63 | $14^{00}$ | $14^{15}$ | 43,2 | 44,1 | 44,3 | 46,1 | 42,2 | 45,1 | 44,2 | 46,1 | 44,2 | 41,2 | 61,7 | cars, birds | 30,2 | 1,63 – 3,12 | 730 | SE |
| LA(min) Fast 40,0 – LA(max) Fast 45,0 | | | | | | | | | | | | | | | | | | |
| 64 | $14^{40}$ | $14^{55}$ | 42,9 | 44,1 | 44,3 | 46,1 | 42,2 | 45,1 | 44,2 | 46,1 | 44,2 | 41,6 | 61,0 | cars, birds | 30,4 | 1,4 – 3,75 | 730 | SE |
| LA(min) Fast 40,0 – LA(max) Fast 46,6 | | | | | | | | | | | | | | | | | | |
| 65 | $15^{00}$ | $15^{15}$ | 42,4 | 43,1 | 43,4 | 43,0 | 44,2 | 45,1 | 47,2 | 43,3 | 46,1 | 42,6 | 66,0 | cars, birds | 27,6 | 2,66 – 4,91 | 730 | SE |
| LA(min) Fast 40,0 – LA(max) Fast 46,6 | | | | | | | | | | | | | | | | | | |
| 66 | $15^{40}$ | $15^{55}$ | 42,9 | 43,1 | 43,4 | 43,0 | 44,6 | 45,1 | 47,2 | 43,3 | 46,0 | 44,6 | 64,5 | cars, birds | 27,6 | 2,46 – 5,02 | 730 | SE |
| LA(min) Fast 40,4 – LA(max) Fast 45,9 | | | | | | | | | | | | | | | | | | |
| 67 | $16^{05}$ | $16^{20}$ | 46,4 | 47,1 | 47,3 | 48,4 | 45,3 | 49,1 | 47,2 | 46,4 | 49,3 | 46,0 | 58,0 | cars, birds | 26,7 | 2,17 – 4,58 | 730 | SE |
| LA(min) Fast 40,0 – LA(max) Fast 48,9 | | | | | | | | | | | | | | | | | | |
| 68 | $16^{40}$ | $16^{55}$ | 46,4 | 47,8 | 47,6 | 48,4 | 45,3 | 49,8 | 47,2 | 46,4 | 49,3 | 44,6 | 58,0 | cars, birds | 26,9 | 2,78 – 4,25 | 730 | SE |
| LA(min) Fast 40,4 – LA(max) Fast 47,1 | | | | | | | | | | | | | | | | | | |
| 69 | $17^{00}$ | $17^{15}$ | 53,0 | 52,2 | 53,0 | 52,1 | 52,4 | 53,1 | 53,3 | 53,4 | 52,4 | 53,5 | 54,8 | cars, birds | 25,3 | 1,75 – 3,12 | 730 | SE |
| LA(min) Fast 52,4 – LA(max) Fast 54,1 | | | | | | | | | | | | | | | | | | |
| 70 | $17^{30}$ | $17^{45}$ | No measurement due to wind speed>5m/s | | | | | | | | | | | cars, birds | 25,4 | **2,8 – 5,31** | 730 | SE |
| 71 | $18^{00}$ | $18^{15}$ | 53,4 | 54,0 | 54,4 | 53,3 | 53,2 | 54,0 | 53,0 | 55,4 | 56,4 | 56,7 | 70,0 | cars, birds | 25,0 | 1,75 – 3,85 | 730 | SE |
| LA(min) Fast 52,1 – LA(max) Fast 58,5 | | | | | | | | | | | | | | | | | | |
| 72 | $18^{30}$ | $18^{45}$ | 53,9 | 54,2 | 53,2 | 53,1 | 53,0 | 53,3 | 51,0 | 51,3 | 53,0 | 53,0 | 71,0 | birds, cars, frogs | 25,4 | 1,68 – 2,74 | 730 | SE |
| LA(min) Fast 52,4 – LA(max) Fast 56,1 | | | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 73 | $19^{00}$ | $19^{15}$ | 46,2 | 47,1 | 48,3 | 47,4 | 46,2 | 46,4 | 47,1 | 48,3 | 47,4 | 58,7 | 74,0 | birds, cars, frogs | 24,1 | 1,57 и-3,15 | 730 | SE |
| LA(min) Fast 47,8 – LA(max) Fast 49,5 | | | | | | | | | | | | | | | | | | |
| 74 | $19^{30}$ | $19^{45}$ | 47,2 | 47,1 | 48,3 | 47,4 | 46,2 | 46,4 | 47,9 | 48,3 | 47,4 | 58,3 | 71,4 | birds, cars, frogs | 24,0 | 2,46 – 4,11 | 730 | SE |
| LA(min) Fast 47,4 – LA(max) Fast 49,1 | | | | | | | | | | | | | | | | | | |
| 75 | $20^{00}$ | $20^{15}$ | 51,4 | 53,3 | 54,1 | 52,2 | 53,1 | 53,4 | 54,4 | 53,4 | 52,4 | 67,4 | 76,8 | birds, cars, frogs | 22,2 | 1,36 – 2,12 | 729 | SE |
| LA(min) Fast 52,0 – LA(max) Fast 54,0 | | | | | | | | | | | | | | | | | | |
| 76 | $20^{30}$ | $20^{45}$ | 51,8 | 53,5 | 54,1 | 52,2 | 53,1 | 53,4 | 54,4 | 53,4 | 52,4 | 64,8 | 74,0 | birds, cars, frogs | 22,4 | 1,46 – 2,8 | 729 | SE |
| LA(min) Fast 51,8 – LA(max) Fast 55,1 | | | | | | | | | | | | | | | | | | |
| 77 | $21^{10}$ | $21^{25}$ | 52,4 | 53,3 | 54,2 | 55,1 | 53,4 | 56,1 | 53,2 | 54,2 | 53,3 | 61,9 | 68,1 | birds, cars, frogs | 21,0 | 1,54 – 2,75 | 730 | SE |
| LA(min) Fast 53,0 – LA(max) Fast 55,0 | | | | | | | | | | | | | | | | | | |
| 78 | $21^{35}$ | $21^{50}$ | 52,0 | 53,5 | 54,2 | 55,6 | 53,4 | 56,1 | 53,2 | 52,2 | 54,3 | 59,0 | 64,0 | birds, cars, frogs | 21,0 | 1,48 – 2,24 | 730 | SE |
| LA(min) Fast 53,8 – LA(max) Fast 56,4 | | | | | | | | | | | | | | | | | | |
| 79 | $22^{00}$ | $22^{15}$ | 52,3 | 53,1 | 52,2 | 53,4 | 53,0 | 54,2 | 55,1 | 52,1 | 53,2 | 58,9 | 63,1 | birds, cars, frogs | 19,3 | 0,98 – 1,62 | 730 | SE |
| LA(min) Fast 53,0 – LA(max) Fast 55,0 | | | | | | | | | | | | | | | | | | |
| 80 | $22^{40}$ | $22^{55}$ | 52,6 | 53,1 | 52,2 | 53,4 | 53,4 | 54,2 | 55,1 | 52,2 | 53,2 | 57,4 | 59,8 | birds, cars, frogs | 19,7 | 0,94 – 1,36 | 730 | SE |
| LA(min) Fast 50,1 – LA(max) Fast 54,0 | | | | | | | | | | | | | | | | | | |
| 81 | $23^{00}$ | $23^{15}$ | 52,3 | 53,2 | 54,0 | 53,3 | 54,1 | 54,2 | 54,1 | 53,3 | 53,1 | 56,4 | 63,1 | birds, cars, frogs | 18,5 | 0,64 – 1,07 | 730 | NE |
| LA(min) Fast 52,0 – LA(max) Fast 54,0 | | | | | | | | | | | | | | | | | | |
| 82 | $23^{40}$ | $23^{55}$ | 52,5 | 53,2 | 54,4 | 53,3 | 54,6 | 54,2 | 54,1 | 53,3 | 53,1 | 57,0 | 64,3 | birds, cars, frogs | 18,4 | 0,98 – 1,22 | 730 | NE |
| LA(min) Fast 52,1 – LA(max) Fast 54,8 | | | | | | | | | | | | | | | | | | |
| **NM 8 – 28.06.2020 (weekend). Coordinates: 40˚13'43.82'' N, 69˚6'14.18'' E; h = 1,2m.** | | | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 83 | $00^{00}$ | $00^{15}$ | 62,3 | 62,4 | 62,2 | 60,3 | 61,1 | 60,4 | 61,3 | 61,1 | 61,0 | 68,4 | 77,0 | birds, cars, frogs | 18,3 | 0,57 – 1,147 | 730 | NE |
| LA(min) Fast 61,0 – LA(max) Fast 64,0 | | | | | | | | | | | | | | | | | |
| 84 | $00^{25}$ | $00^{40}$ | 62,3 | 62,4 | 62,2 | 60,3 | 61,1 | 60,4 | 61,3 | 61,1 | 61,0 | 68,3 | 79,0 | birds, cars, frogs | 18,7 | 0,38 – 1,77 | 730 | NE |
| LA(min) Fast 60,0 – LA(max) Fast 65,1 | | | | | | | | | | | | | | | | | |
| 85 | $01^{10}$ | $01^{25}$ | 54,3 | 55,4 | 55,1 | 56,2 | 55,4 | 55,1 | 56,3 | 56,1 | 55,2 | 56,4 | 61,0 | birds, cars, frogs | 16,1 | 0,41 – 1,23 | 731 | NW |
| LA(min) Fast 52,0 – LA(max) Fast 57,2 | | | | | | | | | | | | | | | | | |
| 86 | $01^{35}$ | $01^{50}$ | 54,8 | 55,4 | 55,1 | 56,2 | 55,4 | 55,8 | 56,3 | 56,1 | 55,1 | 58,2 | 61,8 | birds, cars, frogs | 16,4 | 0,82 – 1,88 | 731 | NW |
| LA(min) Fast 52,0 – LA(max) Fast 58,0 | | | | | | | | | | | | | | | | | |
| 87 | $02^{00}$ | $02^{15}$ | 48,1 | 49,2 | 49,4 | 47,2 | 48,1 | 45,4 | 46,3 | 47,2 | 48,3 | 54,2 | 58,2 | birds, cars, frogs | 16,6 | 0,63 – 0,98 | 731 | NW |
| LA(min) Fast 48,0 – LA(max) Fast 50,0 | | | | | | | | | | | | | | | | | |
| 88 | $02^{40}$ | $02^{55}$ | 48,4 | 49,2 | 49,4 | 47,2 | 48,1 | 45,9 | 46,3 | 47,8 | 48,3 | 54,4 | 58,4 | birds, cars, frogs | 16,6 | 0,66 – 1,32 | 731 | NW |
| LA(min) Fast 48,0 – LA(max) Fast 53,2 | | | | | | | | | | | | | | | | | |
| 89 | $03^{00}$ | $03^{15}$ | 46,4 | 47,2 | 48,3 | 49,1 | 48,4 | 47,2 | 46,1 | 46,3 | 45,2 | 46,1 | 57,2 | birds, cars, frogs | 16,9 | 0,65 – 1,31 | 731 | NW |
| LA(min) Fast 45,0 – LA(max) Fast 47,0 | | | | | | | | | | | | | | | | | |
| 90 | $03^{30}$ | $03^{45}$ | 46,8 | 47,2 | 48,3 | 49,4 | 48,2 | 47,2 | 46,1 | 46,3 | 45,2 | 45,9 | 56,0 | birds, cars, frogs | 16,5 | 0,69 – 1,74 | 731 | NW |
| LA(min) Fast 44,0 – LA(max) Fast 47,0 | | | | | | | | | | | | | | | | | |
| 91 | $04^{02}$ | $04^{17}$ | 45,3 | 46,2 | 46,4 | 47,3 | 48,2 | 47,1 | 46,3 | 45,2 | 44,1 | 47,4 | 54,8 | birds, cars, frogs | 17,1 | 0,73 – 1,17 | 731 | NW |
| LA(min) Fast 44,0 – LA(max) Fast 47,0 | | | | | | | | | | | | | | | | | |
| 92 | $04^{31}$ | $04^{46}$ | 45,3 | 46,0 | 46,4 | 47,3 | 48,2 | 47,0 | 46,3 | 45,8 | 44,1 | 47,2 | 53,0 | birds, cars, frogs | 17,0 | 0,28 – 1,94 | 731 | NW |
| LA(min) Fast 45,0 – LA(max) Fast 47,0 | | | | | | | | | | | | | | | | | |
| 93 | $05^{00}$ | $05^{15}$ | 46,3 | 47,2 | 48,1 | 48,3 | 47,1 | 46,4 | 45,2 | 44,3 | 45,2 | 47,1 | 65,0 | birds, cars, frogs | 17,6 | 0,69 – 1,25 | 731 | SW |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LA(min) Fast 45,0 – LA(max) Fast 47,0 | | | | | | | | | | | | | | | | | | |
| 94 | $05^{30}$ | $05^{45}$ | 46,4 | 47,2 | 48,1 | 48,3 | 47,4 | 46,8 | 45,2 | 44,5 | 45,2 | 45,8 | 61,0 | birds, cars, frogs | 17,4 | 0,64 – 1,38 | 731 | SW |
| LA(min) Fast 45,0 – LA(max) Fast 47,0 | | | | | | | | | | | | | | | | | | |
| 95 | $06^{10}$ | $06^{25}$ | 52,3 | 53,1 | 54,0 | 52,2 | 53,0 | 53,2 | 55,3 | 52,1 | 52,4 | 55,1 | 58,0 | birds, cars, frogs | 18,7 | 079 – 1,36 | 731 | SW |
| LA(min) Fast 52,0 – LA(max) Fast 54,0 | | | | | | | | | | | | | | | | | | |
| 96 | $06^{40}$ | $06^{55}$ | 52,1 | 51,4 | 53,1 | 53,3 | 54,2 | 52,2 | 53,4 | 54,2 | 52,1 | 64,8 | 75,0 | birds, cars, frogs | 20,3 | 1,28 – 2,09 | 731 | SE |
| LA(min) Fast 51,0 – LA(max) Fast 53,0 | | | | | | | | | | | | | | | | | | |

## 2. Photos

## 3. Certificates

Table 3-1 Laboratory certificate

УЗБЕКСКОЕ АГЕНТСТВО СТАНДАРТИЗАЦИИ, МЕТРОЛОГИИ И СЕРТИФИКАЦИИ
(АГЕНТСТВО "УЗСТАНДАРТ")

Национальная система Аккредитации
Республики Узбекистан

СВИДЕТЕЛЬСТВО
ОБ АККРЕДИТАЦИИ

Зарегистрировано в государственном Реестре
органов по оценке соответствия

«08» августа 2017г.

№ UZ.AMT.07.MAI.429

действительно до «08» августа 2022г.

Государственное предприятие «Узбекаккредитация» удостоверяет, что комплекс испытательных лабораторий Центра специализированного аналитического контроля в области охраны окружающей среды при Государственном комитете Республики Узбекистан по экологии и охране окружающей среды (Юридический и фактический адрес: 100100, г.Ташкент, ул. Шота Руставели, дом 13а) соответствует требованиям стандарта O'z DSt ISO/IEC 17025:2007 и аккредитована на техническую компетентность и независимость в Национальной системе аккредитации Республики Узбекистан.

Область аккредитации прилагается к настоящему свидетельству.

Уполномоченное лицо Ш.Б. Алимов

М.П.

**UZBEK AGENCY OF STANDARTIZATION, METEOROLOGY AND CETRIFICATION**

**(Uzstandard agency)**

**National accreditation system of the Republic of Uzbekistan**

**ACCREDITATION CERTIFICATE**

**Registered in state register of authorized organization**

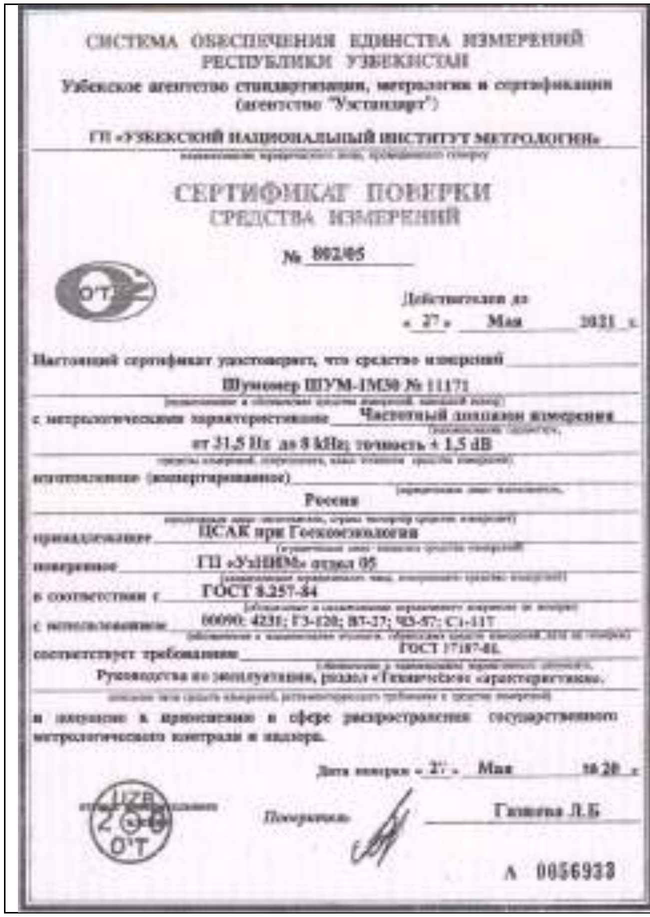
**8th of August, 2017**

**№UZ.AMT.07.MAI.429**

**Valid until 8th of August, 2022**

The state enterprise "Uzbekaccreditation" certifies that the complex of testing laboratories of the Center for Specialized Analytical Control in the Field of Environmental Protection under the State Committee of the Republic of Uzbekistan on Ecology and Environmental Protection (Legal and actual address: 100100, Tashkent, Shota Rustaveli Street, 13a) meets the requirements of standard O’z DSt ISO/IEC 17025:2007 and is accredited for technical competence and independence in the National Accreditation System of the Republic of Uzbekistan.

**Signed by**
**Authorized person**
**Sh.B.Alimov**



СИСТЕМА ОБЕСПЕЧЕНИЯ ЕДИНСТВА ИЗМЕРЕНИЙ
РЕСПУБЛИКИ УЗБЕКИСТАН
Узбекское агентство стандартизации, метрологии и сертификации
(агентство "Узстандарт")

ГП «УЗБЕКСКИЙ НАЦИОНАЛЬНЫЙ ИНСТИТУТ МЕТРОЛОГИИ»

СЕРТИФИКАТ ПОВЕРКИ
СРЕДСТВА ИЗМЕРЕНИЙ

№ 802/05

Действителен до
« 27 » Мая 2021 г.

Настоящий сертификат удостоверяет, что средство измерений
Шумомер ШУМ-1М30 № 11171
с метрологическими характеристиками Частотный диапазон измерения
от 31,5 Hz до 8 kHz; точность ± 1,5 dB
изготовленное (импортированное)
Россия
принадлежащее ЦСАК при Госкомэкологии
поверенное ГП «УзНИМ» отдел 05
в соответствии с ГОСТ 8.257-84
с использованием 00090; 4231; Г3-120; В7-27; Ч3-57; С1-117
соответствует требованиям ГОСТ 17187-81,
Руководства по эксплуатации, раздел «Технические характеристики».
и допущено к применению в сфере распространения государственного метрологического контроля и надзора.

Дата поверки « 27 » Мая 2020 г.

Поверитель Газиева Л.Б

UZB
O'T

А 0056933

**Unit Of Measurements System**
**Republic Of Uzbekistan**
**Uzbek Agency For Standardization, Metrology And Certification**
**(Agency "UzStandard")**
**SE « Uzbek National Institute Of Metrology »**

**Verification Certificate**

**Of Measurement Tool №» 802/05**

Valid Until 27st May 2021

This Certificate Certifies That Noise Meter Shum – 1m30 № 11171 With
measurement range of 31.5 Hz – 8kHz; accuracy ± 1.5 dB
manufactured in Russia
belongs to Center for specialized analytical control (CSAC) inder State committee on ecology and environmental protection
verified by Uzbek National Institute Of Metrology
in accordance with GOST 8.257-84
the equipment corresponds to GOST 17187-81
**approved for use in the field of dissemination of state metrological control and supervision**

date of verification 27 May 2020
Executor *sign* Gazieva. L.B.

O‘ZBEKISTON RESPUBLIKASINING O‘LCHASHLAR BIRLILIGINI TA'MINLASH TIZIMI

O‘zbekiston standartlashtirish, metrologiya va sertifikatlashtirish agentligi ("O‘zstandart" agentligi)

**“O‘zbekiston milliy metrologiya instituti” Davlat korxonasi**

**754/05 -sonli**

O‘LCHASH VOSITALARINI

QIYOSLASH SERTIFIKATI

Amal qilish muddati « *20* » *Mav* 20 *21* y.gacha

Ushbu sertifikat

**00090; 4228; ГЗ-120; В7-27; Ч3-57; С1-117** dan foydalangan holda

**ГОСТ 8.257-84, Pasport, « Qiyoslash » bo'limi** ga muvofiq

**«O`zMMI» DK 05 bo‘lim** tomonidan qiyoslangan

**«MEXNAT AYDITLAB» XK** tegishli

**ООО « Измеритель »** tayyorlangan (import qilingan)

**Rossiya**

**Chastotaviy dianazoni (20 Hz-12.5 kHz). Aniqlik ...** metrologik tavsifli

**Shovqin o‘lchagich ВШВ-003 № 3772** o‘lchash vositasi

**ГОСТ 17187, foydalanish bo‘yicha qo‘llanma, «Texnik xarakteristikalar» bo‘limi** talablariga mosligini

tasdiqlaydi va davlat metrologik tekshiruvi va nazoratiga taalluqli doirada qo‘llanishiga yo‘l qo‘yiladi.

Qiyoslash sanasi « *20* » *May* 20 *20* y.

UZB 200 O‘T

Qiyoslash tamg‘asi izi

Qiyoslovchi *Gazieva L.B.*

A 0056888

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**UNIT OF MEASUREMENTS SYSTEM**

**REPUBLIC OF UZBEKISTAN**

**Uzbek Agency for Standardization, Metrology and Certification**

**(agency "Uzdavlatstandart")**

**SE « UZBEK NATIONAL INSTITUTE OF METROLOGY »**

name of the legal entity that performed the verification

## VERIFICATION CERTIFICATE

**of MEASUREMENT TOOL №» 754/05**

Valid till 21st May 2021

This certificate certifies that

**Using 00090; 4231; ГЗ-120; В7-27; 43-57; Ci-I**

(designation and name of standards, exemplary measuring instruments, date of their verification)

In accordance with **GOST 8.257-84**

Verified by **SE “ UZNim “ Department #5**

(name of the legal entity that has verified the measuring instrument)

Owned by PE **“MEXNAT AYDITLAB”**

Manufactured by **LLC “Измеритель” , Russia**

(legal entity-manufacturer, importing country of measuring instruments)

with metrological **characteristics 20 Hz to 12 kHz; accuracy ± 1.5 d**

(measurement limits, errors, accuracy class of measuring instruments )

Measuring instrument **Noise meter VSHV-003 No.3772**

(name and designation of the measuring instrument, serial number)

Meets the requirements **GOST 17187**

(designation and title of the regulatory document)

**Operations manual «Technical characteristics» section**

(description of the type of measuring instruments that regulate the requirements for the measuring instrument)

approved for use in the field permitted by state metrological control and supervision.

date of verification 20 May 2020

Executor *sign* Gazieva. L.B.

# APPENDIX M– NOISE ASSESSMENT REPORT

# ACWA Power Sydarya 1,500MW CCGT IPP

# Noise Assessment

**September 2020**

# ACWA Power Sydarya 1,500MW CCGT IPP

# Noise Assessment

| Revision | Date | Notes | Author | Checked | Approved |
|---|---|---|---|---|---|
| Ver 1.0 | 24-07-20 | Noise Assessment | SB | SP | ND |
| Ver 1.1 | 30-07-20 | Amendments Following Client Review | SB | SP | ND |
| Ver 1.2 | 04-08-20 | Final Report | SB | SP | ND |
| Ver 1.3 | 25-09-20 | Amended site, New Equipment, Directivity Corrections | SB | SP | ND |

**Entran Limited**
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**Wick**
**Bristol**
**BS30 5RL**

**T: 0117 937 4077**
**www.entranltd.co.uk**

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# 1 INTRODUCTION

1.1 Entran Ltd has been commissioned by 5 Capitals Environmental & Management Consulting (5 Capitals) to undertake an assessment of the predicted noise impacts arising from the operation of the proposed ACWA Power Sydarya 1,500MW Combined Cycle Gas Turbine (CCGT) Power Plant IPP at Shirin, Uzbekistan (known from herein as the 'Project'). The Project is located on a plot of land that has been allocated for the development of two (2) CCGT Power Plant projects. The eastern plot, which is the subject of this assessment, has been granted to ACWA Power. The western plot has yet to be allocated but is understood to be under a tendering process with the IFC. It is anticipated that a similar sized plant will be operated in the future on this land (hereafter known as the 'IFC Project').

1.2 The Project is located near other existing power infrastructure near the settlement Shirin, a border town with Tajikistan. The Site is located in close proximity to the Sirdarya Thermal Power Plant (TPP) which currently operates 8 units of 300MW and 2 units of 325MW and a Combined Heat and Power Plant bringing the total capacity to 3065MW. It is understood there will be either a full or partial decommissioning of the Sirdarya TTP to coincide with the operation of the Project and adjacent IFC. The Project location is presented in Figure 1.

1.3 The purpose of this assessment is to establish the potential noise egress from the proposed Project (and the cumulative impact with the future IFC Project) and the potential effect on receptors. Applicable national and lender standards/guidelines for noise at receptors is presented in Section 2. The assessment of noise is presented in Section 3 together with Entran's recommendations for mitigation, to be considered as part of the on-going ESIA. The assessment is summarised in Section 4.

1.4 This report is necessarily technical in nature and contains terminology relating to acoustics and noise. Therefore, a glossary together with a brief introduction on the subject of noise has been provided in Appendix A.

## Figure 1 Project Location

## 2 STANDARDS AND REGULATORY REQUIREMENTS

2.1 The applicable environmental standards for the Project as per the national regulations and lender requirements are outlined below.

**National Standards**

2.2 Given the proximity of the nearby communities, it is expected that the applicable residential standards will be applicable to the Project. SanPiN No. 0339-16 “Sanitary rules and norms of planning and development of settlements of Uzbekistan provides criteria for noise levels at residential areas.

2.3 The guideline criteria for residential areas are set out in Table 2.1 below.

**Table 2.1 National Noise Standards**

| Receptor | Uzbekistan, SanPiN No. 0325-16. | |
|---|---|---|
| | Daytime (07:00 to 23:00) | Night-time (23:00 to 07:00) |
| Residential, institutional, educational | 55 | 45 |
| Industry, commercial | 75 | 70 |

**Lender Requirements**

2.4 ACWA Power is seeking project finance from one or more Financial Institutions (FIs). Currently, this includes EBRD and DEG (part of KfW) who have their own internal Environmental & Social Policies, Safeguards and Performance Requirements.

**DEG**

2.5 DEG, as part of KfW is aligned with the requirements of the Equator Principles, and as such requires the implementation of the IFC Performance Standards and WBG EHS Guidelines.

**Table 2.2 World Bank Group Noise Level Guideline (adopted from WHO guidance)**

| Receptor | $L_{Aeq,1hr}$ (dB) | |
|---|---|---|
| | Daytime 07:00 – 22:00 | Night time 22:00 – 07:00 |
| Residential, Institutional, Educational | 55 | 45 |
| Industrial, Commercial | 70 | 70 |

2.6 Noise impacts should not exceed the levels presented above, or result in a maximum increase in background levels of 3 dB(A) at the nearest sensitive receptor location off-site

**EBRD**

2.7 As stated in EBRD Performance Requirement 3, 'The client will structure the project to meet relevant EU substantive environmental standards, where these can be applied at the project level.

2.8 It is noted that where national standards differ from the standards required by the lenders, borrowers/clients are normally required to achieve whichever is more stringent.

2.9 The European Commission Environmental Noise Directive (Directive 2002/49/EC) relating to the assessment and management of environmental noise is the main EU instrument to identify noise pollution levels and to trigger the necessary action both at Member State and at EU level.

2.10 The Directive applies to noise to which humans are exposed, particularly in built-up areas, in public parks or other quiet areas in an agglomeration, in quiet areas in open country, near schools, hospitals and other noise-sensitive buildings and areas.

2.11 It is important to note that the Directive does not set limit or target values, nor does it prescribe the measures to be included in the action plans, thus leaving those issues at the discretion of the competent Member State authorities.

## 3 NOISE ASSESSMENT

<u>Ambient Noise Levels</u>

3.1 For the purposes of calculating the potential noise impacts at nearby noise sensitive receptors, baseline noise survey data (undertaken as part of 5 Capitals' ESIA study in 2020) has been utilised for this assessment. Noise surveys were undertaken in June 2020 by the Centre of Specialized Analytical Control in the Field of Environmental Protection (CSAC), who were appointed by 5 Capitals to undertake measurements of the existing ambient environment. The CSAC was appointed separately to Entran, and the survey data adopted for the purpose of this assessment is understood to have been obtained by individuals competent in the collection of acoustic data. Further information of the noise survey can be obtained via 5 Capitals.

3.2 The noise monitoring locations are presented in Figure 2.

**Figure 2 Noise Monitoring Locations**

3.3 In order to derive a representative noise level for the purpose of assessment, daytime and night-time noise levels are calculated from the logarithmic average of all measurements obtained over a given period of time (i.e. 16-hour and 8-hour for day and night, respectively).

3.4 Accordingly, the provided monitoring data has been logarithmically averaged across the daytime and night-time periods to obtain a single ambient noise level for each location and assessment period. The results of the noise surveys are presented in Table 3.1

**Table 3.1 Noise Survey Results**

| Monitoring Point | Measured Noise Levels $L_{Aeq,T}$ dB | |
|---|---|---|
| | Day (07:00 – 23:00) | Night (23:00 – 07:00) |
| NM1 | 42.0 | 44.6 |
| NM2 | 54.3 | 54.2 |
| NM3 | 49.5 | 47.9 |
| NM4 | 39.0 | 46.1 |
| NM5 | 48.3 | 45.7 |
| NM6 | 57.6 | 54.2 |
| NM7 | 43.1 | 43.5 |
| NM8 | 59.1 | 58.4 |

Computer Noise Modelling

3.5 The Engineering, Procurement, Construction (EPC) Contractor has identified the major sources of noise generation both internally (i.e. within the gas turbine house and the steam turbine house) as well as externally located plant (i.e. the HRSG, ancillary equipment including ventilation units, water treatment plant, switchgear equipment etc). The noise source data of all plant are referenced in Appendix B. This report considers the following operational scenarios of the Project:

- Simple Cycle (without HRSG); and
- Combined Cycle (With HRSG)

3.6 Calculations have been undertaken for the above scenarios for the Project, adjacent IFC and the combined noise levels (Project & IFC) as well as the potential noise impact at discrete receptors.

3.7 In order to provide an indicative assessment of the potential cumulative impacts, the IFC Project has been assumed to be of identical design and technology of the proposed Project. The location of the IFC Project is in the centre of the available plot of land allocated for that Project. The predictive modelling results are provided only as a high-level indication of potential cumulative impacts and should therefore be taken as indicative for the IFC Project, on the basis that the design and location of plant may be subject to change.

3.8 By considering the source noise levels, the area of acoustic or non-acoustic enclosures (where available) and the intervening distance to the receptor, a noise model was constructed using proprietary software IMMI2020 using the methodology outlined in ISO9613 (ISO 9613-2 "Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation") which describes a detailed procedure to calculate sound levels from point/line/area sources. Please note that due to different sound propagation characteristics of area, line and point sources (including acoustical 'far' and 'near' field propagation), the noise level attributable to the sources should not be simply aggregated to compute noise levels at nearby receptors but instead calculations to follow the above-mentioned ISO 9613 methodology. Directivity corrections for the stacks and ventilation openings were added using the methodology of VDI3733 (Bypass Stacks with an exit velocity of 37m/s (gas temperature 655ºC); Main Stacks with an exit velocity of 15m/s (gas temperature 82ºC)).

3.9 ISO 9613-2 computes long-term average sound levels including downwind conditions (favourable propagation of sound with significant positive wind from source to receiver).

3.10 The guidance given by ISO 9613-2 on how to determine the meteorological correction term C0 is rather unsatisfactory and therefore the following global parameters are included in the noise model:

- Temperature 10ºC; relative Humidity 70% (worst-case for sound propagation);
- Light downwind propagation towards the receptor (standard ISO9613 application);
- Ground attenuation factor 0 (worst-case);
- Hard Reflection of all on-site buildings

3.11 Where information was available, noise attenuation from buildings/significant plant on/off-site, has been included in the noise model. The results of the noise modelling at representative receptors (NSRs) are presented below for the Project and Project + IFC Project impacts only (without baseline inclusion).

Calculated Noise Levels

3.12 Noise levels at discrete noise receptors have been predicted in accordance with the guidance outlined in ISO 9613. The receptor locations are presented in Figure 3, the calculated noise levels are presented in Table 3.2.

**Figure 3 Closest Receptor Locations**

**Table 3.2 Predicted Noise Levels at Nearby Receptors (without baseline)**

| Receptor | Location (UTM 42T) | Calculated Noise Levels, $L_{Aeq,T}$ dB | | | | | |
|---|---|---|---|---|---|---|---|
| | | Project | | IFC | | IFC & Project | |
| | | Combined Cycle | Simple Cycle | Combined Cycle | Simple Cycle | Combined Cycle | Simple Cycle |
| 1 | 510433.8, 4454506.5 | 44 | 42 | 39 | 37 | 45 | 43 |
| 2 | 510424.1, 4453643.5 | 40 | 37 | 36 | 34 | 41 | 39 |
| 3 | 510613.2, 4452751.4 | 34 | 33 | 32 | 30 | 36 | 35 |
| 4 | 510065.3, 4452765.9 | 36 | 34 | 34 | 32 | 38 | 36 |
| 5 | 509755, 4453187.8 | 40 | 38 | 36 | 35 | 41 | 40 |
| 6 | 509265.3, 4453488.3 | 38 | 37 | 40 | 38 | 42 | 41 |
| 7 | 508620.5, 4453939.2 | 40 | 39 | 38 | 36 | 42 | 41 |
| 8 | 507747.8, 4454336.8 | 36 | 35 | 38 | 37 | 40 | 39 |
| 9 | 509144.1, 4455262.8 | 41 | 40 | **46** | 45 | **47** | **46** |
| 10 | 510312.4, 4454121.9 | 45 | 43 | 39 | 38 | **46** | 44 |

3.13 As can be seen from the above, the predicted noise levels for the Project and adjacent IFC Project are predicted to be in compliance with the SanPiN No. 0325-16 optimal sound levels, as well as the WHO noise standards (as referenced by the World Bank's EHS Guidelines) for the majority of noise sensitive receptors during both simple and combined cycle operations. However, receptors 9 & 10, noise levels are just above the adopted criterion with the introduction of the IFC scheme. Accordingly, and depending on its ultimate design and location placement, the IFC project may require mitigation measures for the future noise impacts to achieve the criteria. These measures could potentially include attenuation to the IFC exhaust/diverter, higher sound insulation for the CT and ST buildings as well as quieter pumps/extract systems/air intake systems. The IFC Project will require the designers to address the potential noise impact at the identified receptors to enable full compliance

3.14 The predicted noise levels of Table 3.2 were combined with the measured ambient noise levels (of Table 3.1) to derive the overall predicted cumulative noise impacts at each receptor, for the Project, adjacent IFC Project and for the Project and IFC Projects combined.

It is noted that the measured baseline noise levels account for the existing Sydarya TPP to be fully operational with all 10 units active. It is understood that up to 4 of the existing TPP units may be decommissioned at the time of Project and IFC Project commissioning. Therefore, the cumulative impact assessment (i.e. with baseline) can be considered to portray a worst-case for noise impacts from the proposed plant and the future IFC Project.

3.15 The predicted cumulative noise levels for the Project are presented in Table 3.3.

**Table 3.3 Cumulative Noise Levels, Project Scenario Only + Baseline**

| Period | Receptor | Ambient Noise Level, $L_{Aeq,T}$ dB | Calculated Noise Levels, Project & Ambient, $L_{Aeq,T}$ dB | | Excess Over Existing Ambient Noise Level, dB | |
|---|---|---|---|---|---|---|
| | | | Combined Cycle | Simple Cycle | Combined Cycle | Simple Cycle |
| Day | 1 | 57.6 | 57.8 | 57.7 | 0.2 | 0.1 |
| | 2 | 43.1 | 44.7 | 44.0 | 1.6 | 0.9 |
| | 3 | 59.1 | 59.1 | 59.1 | 0 | 0 |
| | 4 | 59.1 | 59.1 | 59.1 | 0 | 0 |
| | 5 | 59.1 | 59.1 | 59.1 | 0 | 0 |
| | 6 | 59.1 | 59.1 | 59.1 | 0 | 0 |
| | 7 | 42.0 | 44.2 | 43.8 | 2.2 | 1.8 |
| | 8 | 42.0 | 42.9 | 42.8 | 0.9 | 0.8 |
| | 9 | 49.5 | 50.0 | 49.9 | 0.5 | 0.4 |
| | 10 | 57.6 | 57.8 | 57.8 | 0.2 | 0.2 |
| Night | 1 | 54.2 | 54.6 | 54.5 | 0.4 | 0.3 |
| | 2 | 43.5 | 45.0 | 44.4 | 1.5 | 0.9 |
| | 3 | 58.4 | 58.4 | 58.4 | 0 | 0 |
| | 4 | 58.4 | 58.4 | 58.4 | 0 | 0 |
| | 5 | 58.4 | 58.5 | 58.4 | 0.1 | 0 |
| | 6 | 58.4 | 58.4 | 58.4 | 0 | 0 |
| | 7 | 44.6 | 46.0 | 45.7 | 1.4 | 1.1 |
| | 8 | 44.6 | 45.1 | 45.0 | 0.5 | 0.4 |
| | 9 | 47.9 | 48.6 | 48.5 | 0.7 | 0.6 |
| | 10 | 54.2 | 54.7 | 54.5 | 0.5 | 0.3 |

3.16 The cumulative Project and ambient noise levels do not increase the existing noise levels by more than 3 dB, which aligns with the WBG EHS Guidelines where existing baseline is in excess of the applicable standards.

3.17 The cumulative noise levels for the future adjacent IFC Project with baseline are presented in Table 3.4.

**Table 3.4 Cumulative Noise Levels, IFC Project Scenario Only + Baseline**

| Period | Receptor | Ambient Noise Level, $L_{Aeq,T}$ dB | Calculated Noise Levels, IFC & Baseline, $L_{Aeq,T}$ dB | | Excess Over Existing Ambient Noise Level, dB | |
|---|---|---|---|---|---|---|
| | | | Combined Cycle | Simple Cycle | Combined Cycle | Simple Cycle |
| Day | 1 | 57.6 | 57.7 | 57.6 | 0.1 | 0 |
| | 2 | 43.1 | 43.9 | 43.6 | 0.8 | 0.5 |
| | 3 | 59.1 | 59.1 | 59.1 | 0 | 0 |
| | 4 | 59.1 | 59.1 | 59.1 | 0 | 0 |
| | 5 | 59.1 | 59.1 | 59.1 | 0 | 0 |
| | 6 | 59.1 | 59.1 | 59.1 | 0 | 0 |
| | 7 | 42.0 | 43.4 | 43.0 | 1.4 | 1 |
| | 8 | 42.0 | 43.4 | 43.2 | 1.4 | 1.2 |
| | 9 | 49.5 | 51.2 | 50.9 | 1.7 | 1.4 |
| | 10 | 57.6 | 57.7 | 57.6 | 0.1 | 0 |
| Night | 1 | 54.2 | 54.3 | 54.3 | 0.1 | 0.1 |
| | 2 | 43.5 | 44.2 | 44.0 | 0.7 | 0.5 |
| | 3 | 58.4 | 58.4 | 58.4 | 0 | 0 |
| | 4 | 58.4 | 58.4 | 58.4 | 0 | 0 |
| | 5 | 58.4 | 58.4 | 58.4 | 0 | 0 |
| | 6 | 58.4 | 58.5 | 58.4 | 0.1 | 0 |
| | 7 | 44.6 | 45.5 | 45.2 | 0.9 | 0.6 |
| | 8 | 44.6 | 45.4 | 45.3 | 0.8 | 0.7 |
| | 9 | 47.9 | 50.2 | 49.9 | 2.3 | 2 |
| | 10 | 54.2 | 54.3 | 54.3 | 0.1 | 0.1 |

3.18 The cumulative IFC Project and ambient noise levels do not increase the existing noise levels by more than 3 dB, which aligns with the WBG EHS Guidelines where existing baseline is in excess of the applicable standards.

3.19 The cumulative noise levels for the combined Project and IFC Project are presented in Table 3.5.

**Table 3.5 Cumulative Noise Levels, Project and IFC Project + Baseline**

| Period | Receptor | Ambient Noise Level, $L_{Aeq,T}$ dB | Calculated Noise Levels, IFC, Project & Baseline, $L_{Aeq,T}$ dB | | Excess Over Existing Ambient Noise Level, dB | |
|---|---|---|---|---|---|---|
| | | | Combined Cycle | Simple Cycle | Combined Cycle | Simple Cycle |
| Day | 1 | 57.6 | 57.8 | 57.8 | 0.2 | 0.2 |
| | 2 | 43.1 | 45.3 | 44.4 | 2.2 | 1.3 |
| | 3 | 59.1 | 59.1 | 59.1 | 0 | 0 |
| | 4 | 59.1 | 59.1 | 59.1 | 0 | 0 |
| | 5 | 59.1 | 59.2 | 59.1 | 0.1 | 0 |
| | 6 | 59.1 | 59.2 | 59.2 | 0.1 | 0.1 |
| | 7 | 42.0 | 45.2 | 44.6 | 3.2 | 2.6 |
| | 8 | 42.0 | 44.0 | 43.7 | 2 | 1.7 |
| | 9 | 49.5 | 51.6 | 51.2 | 2.1 | 1.7 |
| | 10 | 57.6 | 57.6 | 57.8 | 0.3 | 0.2 |
| Night | 1 | 54.2 | 54.7 | 54.5 | 0.5 | 0.3 |
| | 2 | 43.5 | 45.5 | 44.7 | 2 | 1.2 |
| | 3 | 58.4 | 58.4 | 58.4 | 0 | 0 |
| | 4 | 58.4 | 58.4 | 58.4 | 0 | 0 |
| | 5 | 58.4 | 58.5 | 58.5 | 0.1 | 0.1 |
| | 6 | 58.4 | 58.5 | 58.5 | 0.1 | 0.1 |
| | 7 | 44.6 | 46.6 | 46.2 | 2 | 1.6 |
| | 8 | 44.6 | 45.8 | 45.6 | 1.2 | 1 |
| | 9 | 47.9 | 50.7 | 50.2 | 2.8 | 2.3 |
| | 10 | 54.2 | 54.8 | 54.6 | 0.6 | 0.4 |

3.20 The calculated cumulative noise levels from the combined Project and IFC Project are predicted to increase the existing noise level by more than 3 dB at calculation location 7.

3.21 Cumulative noise levels from the combined Project and IFC Project increase the baseline by up to 3.2 dB at calculation receptor 7 during the day. As has been outlined above and depending on the final IFC Project design and IFC Project location, mitigation measures may be required at the IFC Project to reduce the combined noise levels to meet the applicable standards/guidelines.

Noise Contours

3.22 Noise contours based on the above methodology have been computed for two key operational scenarios; namely 'simple cycle' and 'combined cycle'. Calculated contours for each scenario are presented for the Project only, the adjacent IFC, and for the cumulative project and IFC. The calculated noise contours are presented in Figures 4 – 9.

**Figure 4 Computed Noise Contours, Simple Cycle, Project Only**

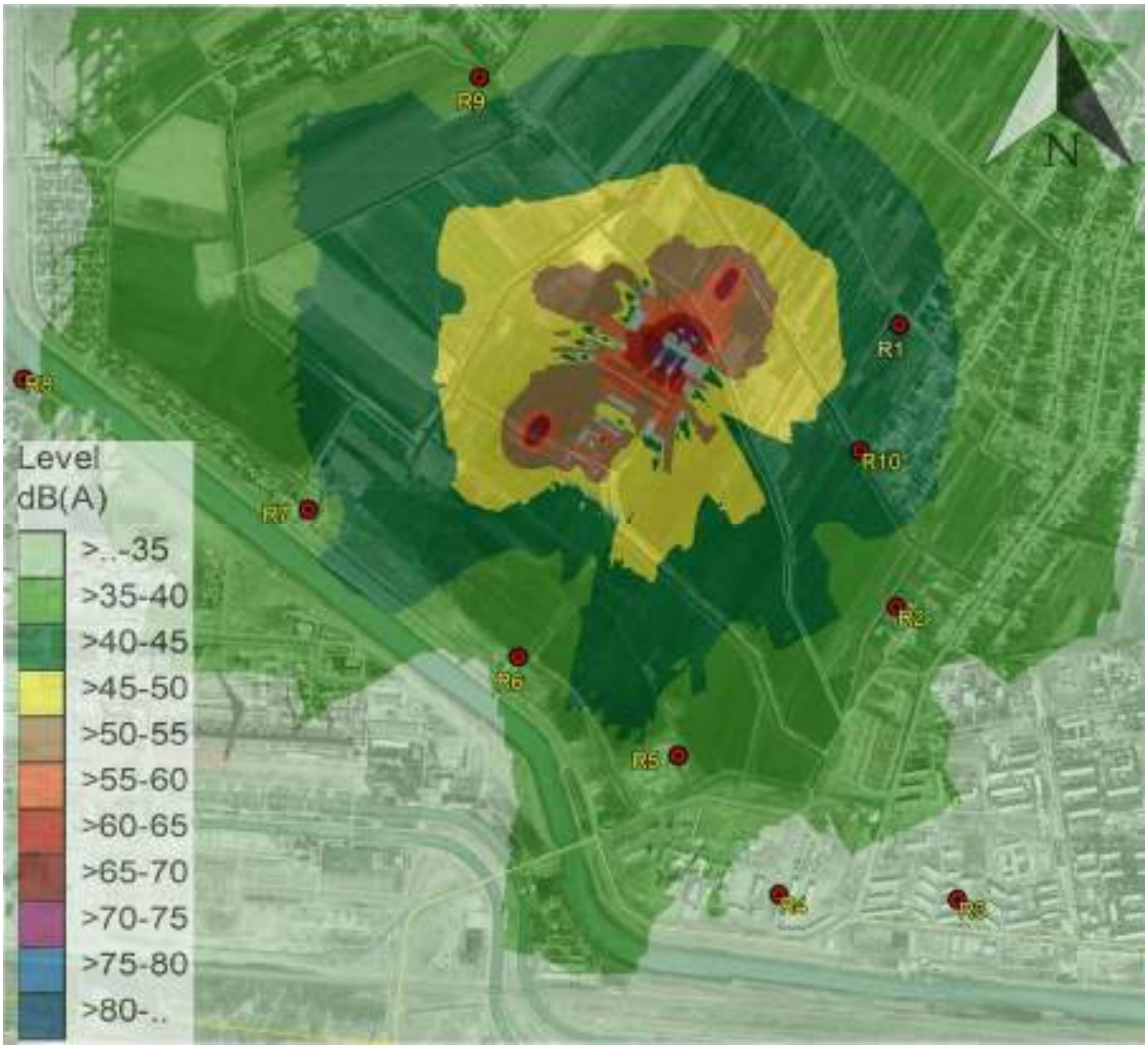


Figure 5 Computed Noise Contours, Combined Cycle, Project Only

Figure 6 Computed Noise Contours, Simple Cycle, IFC Only

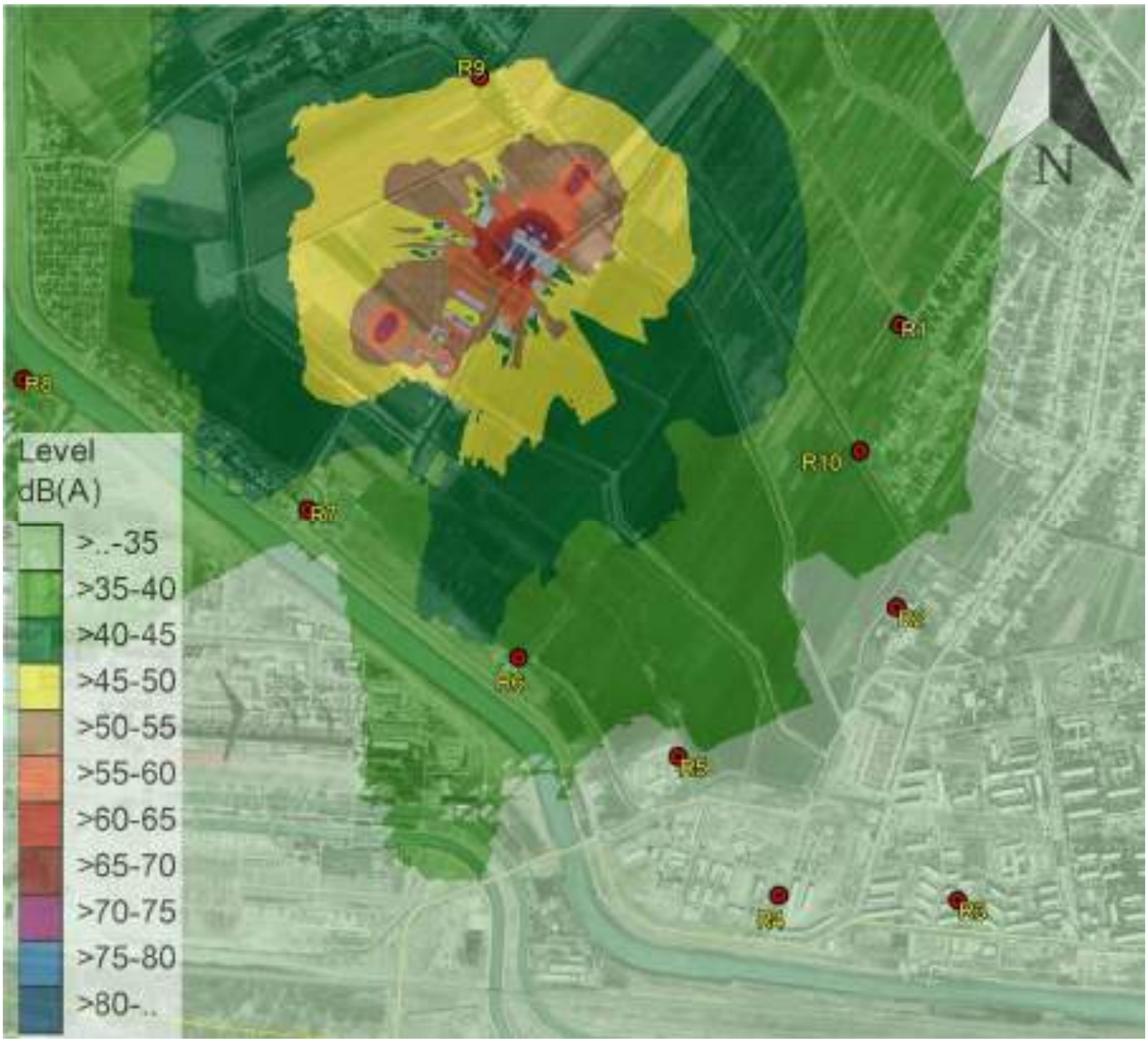


**Figure 7 Computed Noise Contours, Combined Cycle, IFC Only**

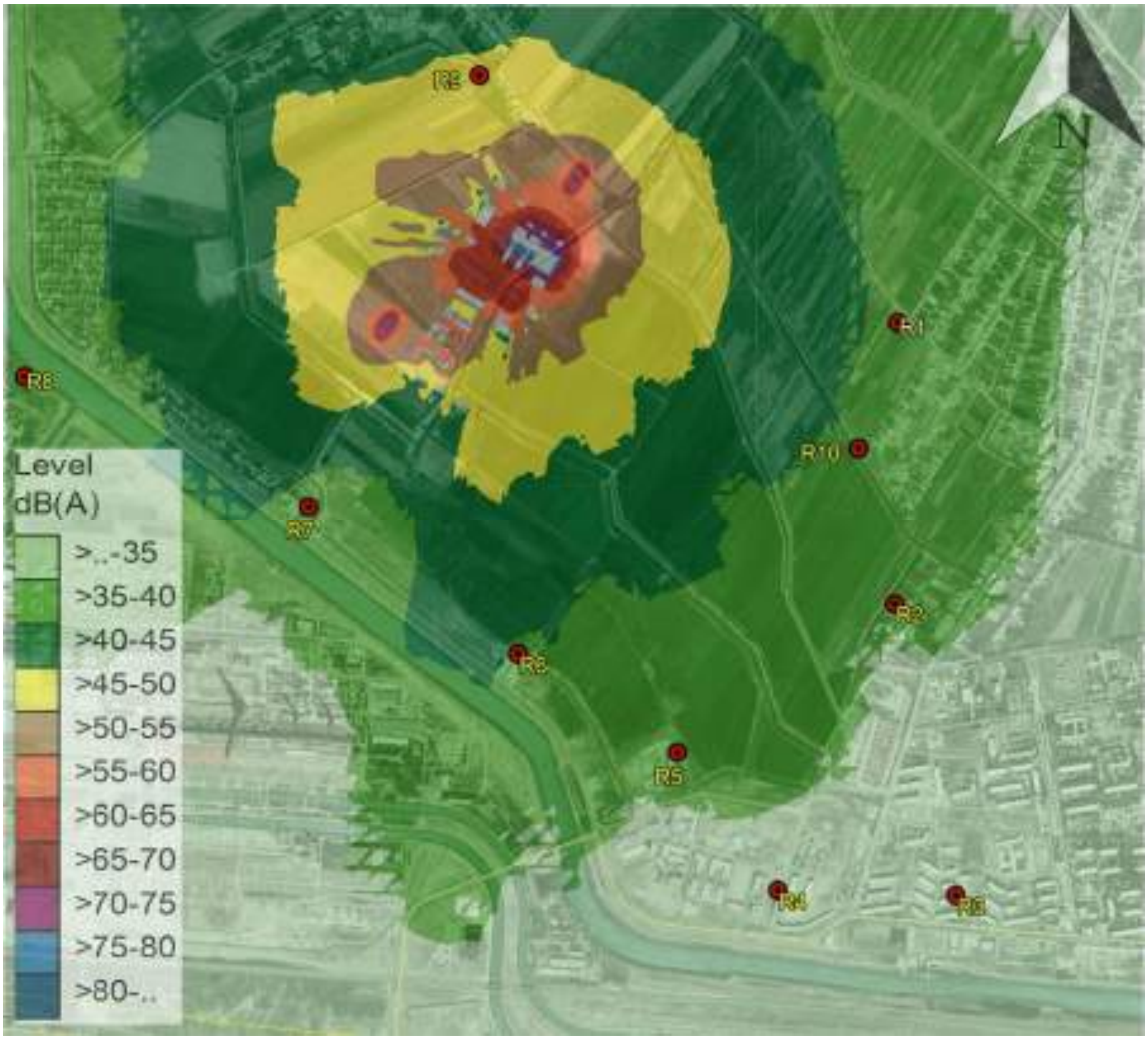


**Figure 8 Computed Noise Contours, Simple Cycle, Project & IFC**

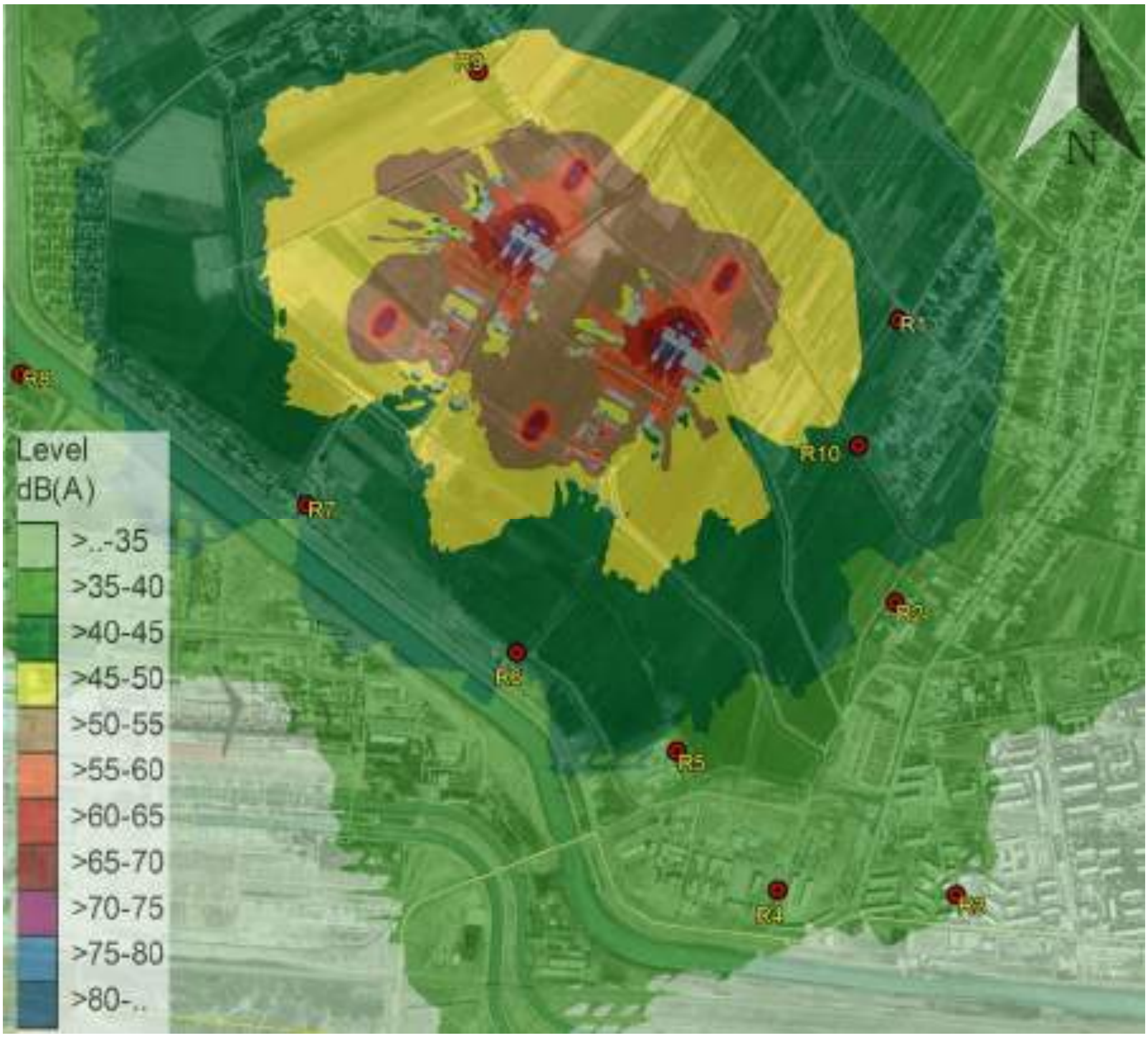
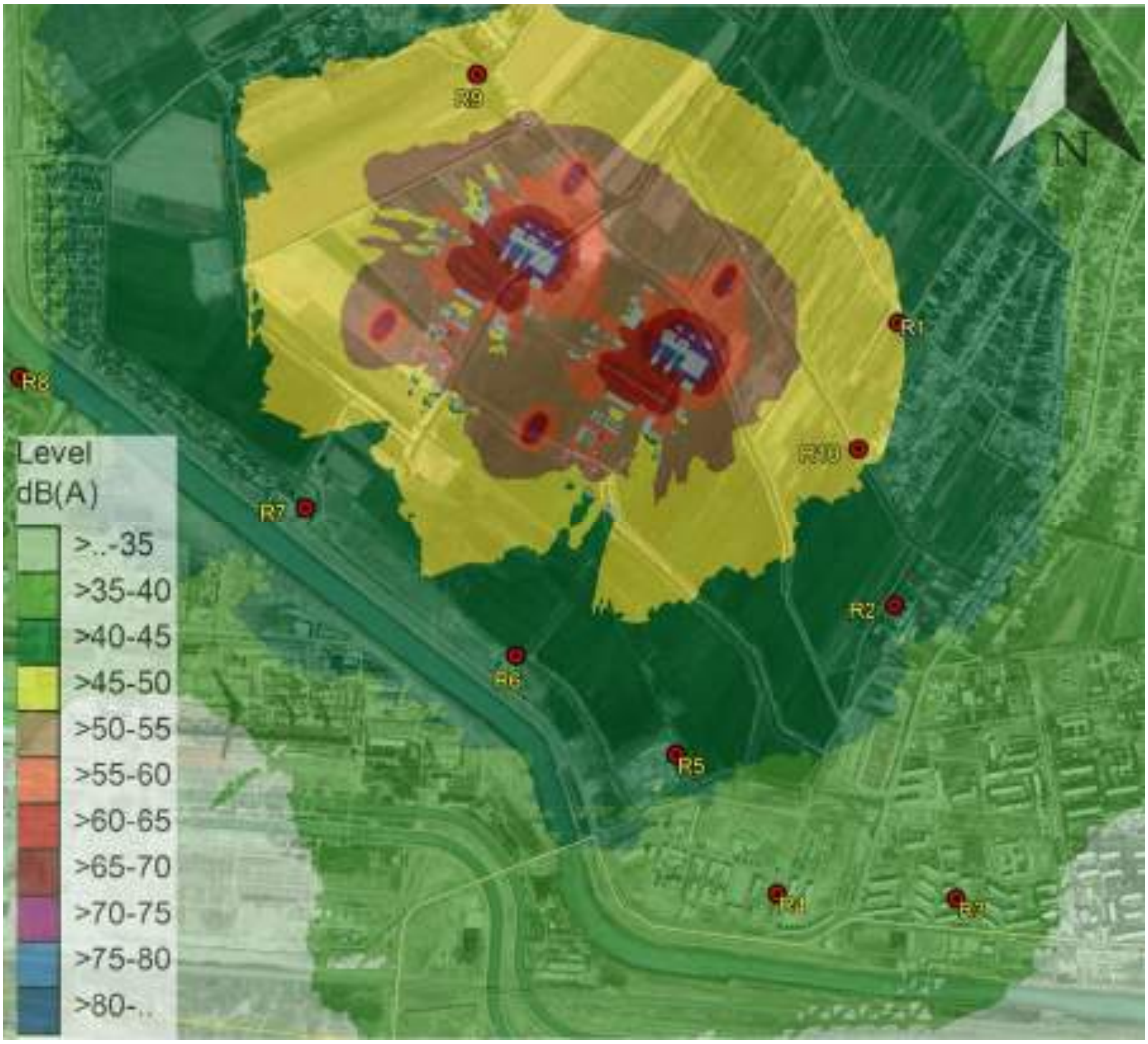


**Figure 9 Computed Noise Contours, Combined Cycle, Project & IFC**



## 4 SUMMARY

4.1 Entran Ltd have undertaken a noise assessment on behalf of 5 Capitals for the proposed ACWA Power 1,500MW Sydarya Combined Cycle Gas Turbine power plant located near Shirin, Uzbekistan.

4.2 This assessment has predicted the potential noise impacts of the proposed project at local receptors, during the operational phase. The assessment has been based on a series of environmental noise calculations using ISO9613 methodology, with input data provided by the EPC Contractor. Both simple and combined cycle operations have been considered. In addition, the expected future IFC Project (located on adjacent land to the Project) has also been included for a cumulative impact assessment.

4.3 Calculated noise levels associated with the Project operations (without incorporating the existing baseline noise levels) at the nearest residential receptors are within the applicable Uzbekistan noise standards, as well as the WHO Noise Standards as referenced by World Bank's EHS Guidelines for all receptor sites. However, for the future IFC Project, noise levels at Receptor 9 is slightly above the adopted criterion. Further, the IFC Project in combination with the Project is also slightly above the adopted criterion at Receptor 10.

4.4 When including existing baseline measurements in the predictions, noise levels from the proposed Project would not increase existing levels by more than 3 dB, and therefore the noise levels associated with the Project achieve WBG EHS Guideline criteria.

4.5 The predicted change in noise levels from the adjacent IFC Project in combination with the Project would increase the noise level at receptor location 7 by 3.2 dB (daytime) for combined cycle operations whilst other receptors remain less than a 3dB change.

4.6 Depending on the final IFC Project design and IFC Project location, mitigation measures may be required at the IFC Project to reduce the combined noise levels to meet the applicable standards/guidelines.

## APPENDIX A: INTRODUCTION TO NOISE

In order to assist the understanding of acoustic terminology and the relative change in noise, the following background information is provided.

The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale is used. The decibel scale typically ranges from 0 dB (the threshold of hearing) to over 120 dB.

The ear is less sensitive to some frequencies than to others. The A-weighting scale is used to approximate the frequency response of the ear. Levels weighted using this scale are commonly identified by the notation dB(A).

A noise impact on a community is deemed to occur when a new noise is introduced that is out of character with the area, or when a significant increase above the pre-existing ambient noise level occurs. For levels of noise that vary with time, it is necessary to employ a statistical index that allows for this variation. These statistical indices are expressed as the sound level that is exceeded for a percentage of the time period of interest.

For instance, the 'A'-weighted sound pressure of the residual noise at the assessment position that is exceeded for 90 per cent of a given time interval, T, measured using the time weighting, F, and quoted to the nearest whole number of decibels. It is often referred to as the background noise level and is used in the assessment of disturbance from industrial noise.

An alternative way of assessing the time varying noise levels is to use the equivalent continuous sound level, $L_{Aeq}$ - this is the value of the sound pressure level of a continuous steady noise that, a measurement interval of time (t), has the same mean square sound pressure as the sound under consideration whose level varies with time. It is a unit commonly used to describe construction noise, noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise

To put these quantities into contact of perceptible noise:

- differences in noise levels of less than approximately 2 dB(A) are generally imperceptible in practice;
- differences in noise levels of around 5 dB(A) are considered to be significant; and
- differences in noise levels of around 10 dB(A) are generally perceived to be a doubling (or halving) of the perceived loudness of the noise.

## Appendix A1: Glossary of Terms

| Term | Definition |
|---|---|
| Decibel (dB) | A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log10 (s1/s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20µPa. |
| A-weighting, dB(A) | The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies. |
| Noise Level Indices | Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out. |
| $L_{eq, T}$ | A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded. |
| $L_{max,T}$ | A noise level index defined as the maximum noise level during the period T. $L_{max}$ is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall $L_{eq}$ noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response. |
| $L_{90,T}$ | A noise level index. The noise level exceeded for 90% of the time over the period T. $L_{90}$ can be considered to be the "average minimum" noise level and is often used to describe the background noise. |
| Free-Field | Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m |
| Ambient Noise Level | The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near ($L_{Aeq,T}$). |
| Residual Noise Level | The ambient noise remaining at a given position in a given situation when specified sources are suppressed to a degree such that they do not contribute to the ambient noise level ($L_{Aeq,T}$) |
| Specific Noise Level | The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source (the noise source under investigation) over a given time interval ($L_{Aeq,T}$) |
| Rating Noise Level | The specific noise level plus any adjustment for the characteristic features of the noise ($L_{Ar,Tr}$). |

# APPENDIX B: NOISE SOURCE DATA

## Appendix B1: EPC Contractor Source Noise Data

| Equipment name | SPL | Sound source (1m from equipment) dB (SPL) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | dB(A) | 31.5 Hz | 63 Hz | 125 Hz | 250 Hz | 500 Hz | 1000 Hz | 2000 Hz | 4000 Hz | 8000 Hz |
| GT inlet air filter (Intake surface area, Front) | 93 | 107.8 | 91.2 | 84.9 | 79.9 | 78.2 | 90.2 | 87.1 | 81.5 | 71.2 |
| GT inlet air filter (Intake surface area, Left) | 93 | 107.8 | 91.2 | 84.9 | 79.9 | 78.2 | 90.2 | 87.1 | 81.5 | 71.2 |
| GT inlet air filter (Intake surface area, Right) | 93 | 107.8 | 91.2 | 84.9 | 79.9 | 78.2 | 90.2 | 87.1 | 81.5 | 71.2 |
| GT inlet air filter (wall area) | 93 | 103.4 | 91.7 | 88.7 | 82.9 | 81 | 89.9 | 87.4 | 81.8 | 69.7 |
| GT Inlet air silencer | 93 | 98.1 | 87 | 83.8 | 80.7 | 82 | 90.5 | 86.9 | 80.3 | 68.3 |
| GT inlet air duct A | 93 | 100.2 | 88.9 | 91.1 | 83.4 | 86 | 90.3 | 86.4 | 79.7 | 67.1 |
| GT inlet air duct B | 93 | 100.2 | 88.9 | 91.1 | 83.4 | 86 | 90.3 | 86.4 | 79.7 | 67.1 |
| GT enclosure | 93 | 90.5 | 91.7 | 94.4 | 88.1 | 84.5 | 89.5 | 85.7 | 83.9 | 73.5 |
| GT exhaust duct A | 93 | 99 | 98.4 | 101.1 | 91.3 | 86.7 | 86.6 | 86.1 | 82.3 | 77 |
| GT enclosure ventilation fan A | 93 | 92.8 | 95.6 | 98.7 | 93.5 | 89.8 | 86.5 | 84.2 | 82.5 | 71 |
| GT enclosure ventilation fan B | 93 | 92.8 | 95.6 | 98.7 | 93.5 | 89.8 | 86.5 | 84.2 | 82.5 | 71 |
| GT enclosure ventilation fan C | 93 | 92.8 | 95.6 | 98.7 | 93.5 | 89.8 | 86.5 | 84.2 | 82.5 | 71 |
| GT Enclosure Ventilation Duct | 93 | 94.2 | 94 | 97.2 | 92.5 | 91.4 | 87.8 | 82.6 | 78.1 | 68 |
| GT Enclosure Ventilation Duct Outlet | 105 | 111.2 | 111.5 | 106.1 | 103.7 | 103 | 99.7 | 97.9 | 86.3 | 79.6 |
| GT lube oil unit | 93 | 84.3 | 93.5 | 98.1 | 90.4 | 90.3 | 88.2 | 85 | 79.5 | 70.5 |
| GT control oil unit | 93 | 82.9 | 95.8 | 92.6 | 88 | 88.7 | 89.4 | 85.7 | 79.6 | 71.3 |
| GT Fuel Gas Unit | 93 | 86.1 | 89.7 | 94.8 | 87.4 | 87 | 88.2 | 86.7 | 83.5 | 76.7 |
| GT lube oil mist separator fan | 93 | 97 | 90.7 | 88 | 84.6 | 88.8 | 89.8 | 85.6 | 79.5 | 72 |
| GT lube oil mist separator outlet | 95 | 99.9 | 98.1 | 93.1 | 88.7 | 86.7 | 93 | 85.8 | 82.6 | 77.7 |
| 4S cooler | 93 | 96 | 93.2 | 90.4 | 86.5 | 80.6 | 79.9 | 86.1 | 89.7 | 75.8 |
| Enhanced cooling air cooler | 93 | 96 | 93.2 | 90.4 | 86.5 | 80.6 | 79.9 | 86.1 | 89.7 | 75.8 |
| GT enhanced cooling air compressor | 93 | | 91.4 | 95.7 | 97.4 | 92 | 85.7 | 69.2 | 63.3 | 56.2 |
| GT Evaporative Cooler Pump Skid | 93 | | 79.9 | 79.9 | 81.9 | 84.9 | 86.9 | 87.9 | 84.9 | 81.9 |
| GT Inlet Air Cooling System (High Fogging) | 93 | | 79.9 | 79.9 | 81.9 | 84.9 | 86.9 | 87.9 | 84.9 | 81.9 |
| GT generator and slip ring housing | 93 | 104.2 | 105.7 | 108.3 | 80.5 | 79 | 81.7 | 68.5 | 67.9 | 57.7 |
| GT Cooling Air Cooler with Fuel Gas Heater | 93 | | 100 | 99 | 94 | 91 | 87.9 | 80 | 76 | 72 |
| Steam Turbine generator set w/o condenser | 115 | 124 | 118 | 118 | 112 | 111 | 108 | 107 | 107 | 101 |
| Steam Turbine SST-5000 series | 113 | 123 | 115 | 116 | 111 | 110 | 105 | 106 | 106 | 100 |
| Steam Condenser (offered as an option) | 113 | 123 | 117 | 116 | 112 | 111 | 106 | 106 | 102 | 95 |
| Steam Generator | 111 | 121 | 119 | 117 | 111 | 108 | 104 | 105 | 96 | 89 |
| Bypass Stack | 93 | | 97 | 97 | 95 | 88 | 86 | 86 | 84 | 71 |
| Main Stack | 86 | 105 | 101 | 100 | 88 | 77 | 72 | 65 | 69 | 56 |
| Evaporators | 85 dB(A), 1m (x7 units) | | | | | | | | | |

| | |
|---|---|
| AIS Transformer Area (switchyard) | 85 dB(A), 1m (x6 units) |
| GSUTs (rear of GT/ST buildings) | 85 dB(A), 1m (x3 units) |
| Water Treatment Plant Area | 75 dB(A), 1m (radiating façade/roof of each building) |
| GT Building Vents | 75 dB(A), 1m (x16 units) |
| ST Building Vents | 75 dB(A), 1m (x10 units) |
| Central Control Building, rooftop AC/VRV units | 70 dB(A), 1m (x8 units) |
| Social Building & Administration Building, rooftop VRV units | 70 dB(A), 1m (x5 units for each building) |

*Green shading shows equipment not in use during simple cycle operations otherwise all equipment is operational for the combined cycle.*

# APPENDIX N– WATER SUPPLY ASSESSMENT REPORT

# WATER SUPPLY ASSESSMENT REPORT

## CLIENT: ACWA POWER

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**Project: Hydrological data and water supply for the CCGT project in the Syrdarya region**

Contents

ABBREVIATIONS AND ACCRONYMS

BWO “Sirdarya” – Basin Water Organization “Syrdarya”

YGC - Yuzhny-Golodnostepskiy canal

SIC ICWC - Scientific Information Center of Interstate Coordination Water Commission

CCGT – Combined Cycle Power Plant

IFAS - International Fund for Saving the Aral Sea

Uzhydromet - Uzbekistan Hydrometeorological Service

TPP - Thermal Power Plant (TPP)

MPL - Vaximum permissible limit

UzDSt – Uzbekistan state standard

TDS - Total dissolved solids

## 1. Introduction

This document summarizes the methodology used for hydraulics, hydrology, hydrochemistry and presents results of the involved estimations. The main aim of the analysis is to determine water availability and accessibility at the selected site.

The project site is located in Shirin town where Dustlik and Yuzhny-Golodnostepsky canals separate from Farhad derivation canal (Benjaminovich, E.M. Tersitsky 1975). The canals withdraw water from Syrdarya river several kilometers below from Bekabad hydrogauge.

Hydraulic, hydrological and hydrochemical investigation were carried out in order to study the water availability and accessibility at the planned project site. As a result of the preliminary work, initial data were obtained on the hydrological and hydrochemical regimes of water resources and primary data processing and analysis were conducted. As a result of investigation, hydrological and water quality data necessary for the design of the facility were obtained and analysed.

Location of the survey site: Syrdarya region, Bayaut district, Shirin town.

Specific objectives of the report are:

- collecting water resources data from related organizations for certain period;
- assessment different water sources and analysing water availability in the survey site;
- giving information on upstream and downstream status quo in the survey site;
- collecting physical and chemical parameters of the water sources and preliminary water quality assessment in base of government regulation documents
- Report is based on: review of publicly available information;
- hydraulic and hydrological assessment of collected water supply materials and data;
- Assess qualitatively of physical and chemical parameters of water;
- describing upstream and downstream status quo condition of the survey site.

The methodology of water supply assessment delivers application for the hydrologic and hydraulic, water quality analysis, as well as the results of the involved calculations. The aim of the methodology is to determine the quantitative and qualitative assessments of water resources in the survey site. Several hydraulic, hydrological methods i.e. probability analysis, hydraulic water discharge estimation, temporal variation of flow parameters with graphical illustrations were used in this report.

The main types of water resources were considered as surface water (Syrdarya river and main canals). Water resources at the survey site were assessed qualitatively as physical and chemical parameters of water is an important aspect of the analysis phase. The methodology of probability analysis, statistical application on hydrological calculation were used in this report. The water resources were assessed based on the information from previous publication, reports, periodically observed data and also hydraulic and hydrological and advanced water quality assessment were evaluated based on the guidelines on water resources and hydrological investigations (Alley 2007; Chapman 1992; Rodda 2011).

River and canal flow patterns, water level, water temperature and flow velocity in the past 50 years. i.e. monthly mean water discharge of the canals 1975-2018 by Uzhydromet, physical and chemical parameters of the canals were collected analyzed for 2015-2019 years.

Hydrological measurements of Syrdarya river were carried out at the territory under consideration, using hydrometer and water gauging stations of Uzhydromet. Water regime studies of Dustlik and Yuzhny-Golodnostepsky (YG) canals were monitored by the Syrdarya Basin Water Organization.

## 2. Hydraulic data and primary hydraulic and hydrological data analyses on YG canal

The total length of the canal is 127 km. 2/3 length of the canal was built by cut and fill process, and the remaining part was excavated. The canal route passes under rather difficult hydrogeological conditions, mainly in the zone of natural high groundwater level (about 2-4 m from the surface). The nature of the interaction of groundwater and filtration water in different sections of the canal during the vegetation and non-vegetation periods is not same. Regarding to this occasion, the canal partially feeds groundwater, partially drains itself. All of this leads to insignificant filtration water from the canal bed - an average of about 65 liters per 1 km. This circumstance made it possible to abandon the expensive concrete cladding of such a large canal and lay it up to the 103rd canal in the earthen type lining. Only on the last 24 km the canal bed is covered with concrete lining.

The canal efficiency is generally high and at a flow rate of 300$m^3$/s is 0.97.

The cross section profile of the earthen part of the canal is almost the entire length of polygonal outline and only in the end part is trapezoidal. In the head, the channel has a width of 68 m along the top and 18 m along the bottom with a depth of 6.5 m. We used cross section data of between Alighment station 0 and 623 where the survey area is located. Obviously, central and downsteam areas of the canal cross section parameters are shortened due to canal branching.

The longitudinal slope of the canal between the Alighment station 0 and 923 are 0.00005-0.00007. The average slope i=0.00006 was used in our hydraulic calculations in the report. From Alighment station 923 to the end the slope of the canal is 0.0001.

Peak estimations for water measurement points were carried out based on YG canal design data (Benjaminovich, E.M. Tersitsky 1975).

Bed of the watercourse H=309.7m, water level H=316.9m, Max bank height H=318.4m

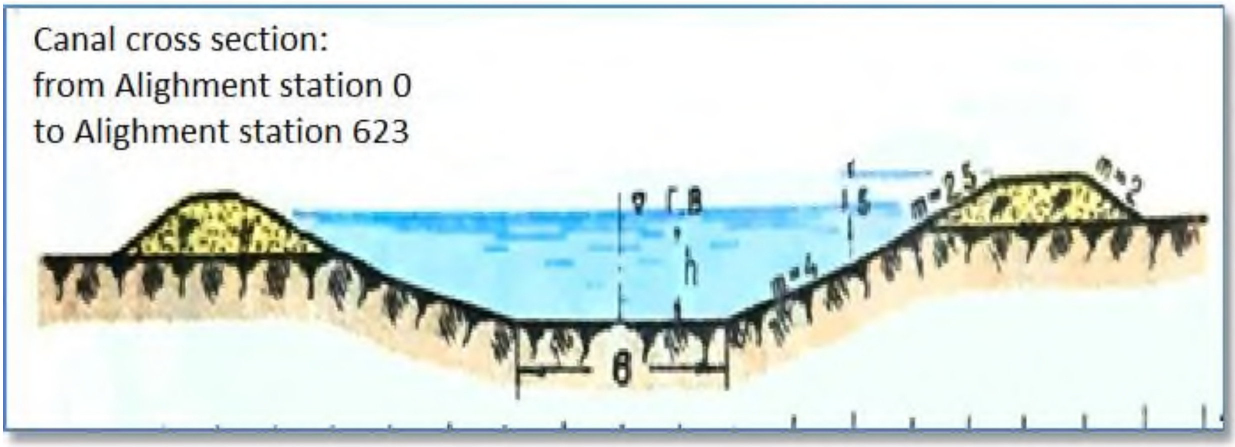


*Figure 1 Cross section of YG canal between alignment station 0 and 623.*
*Source: Benjaminovich, E.M. Tersitsky, D.K. 1975.*

Due to limited availability of data, we use hydraulic parameters (Figure 1) of the canal (water level data) to estimate water flow.

b=18m, h=7.2m, m=4, n=0.02

Determine the slope for the bed of the watercourse:

$$i = \frac{\Delta h}{l} = \frac{309.7m - 309.4m}{5000m} = 0.00006$$

We measured the cross-section area using the depths corresponding to the water levels and calculated the stream flow velocity using Chézy formula (Sturm and Tuzson 2001), which allowed us to calculate water flow.

Following the above tasks, we determined water flow corresponding to the measured water levels (Figure 2). Based on the observed data and measurement results, we charted the water level measurement of possible discharge in the canal (Figure 3). The chart also depicts the maximum and catastrophic surface water discharges in the canal.

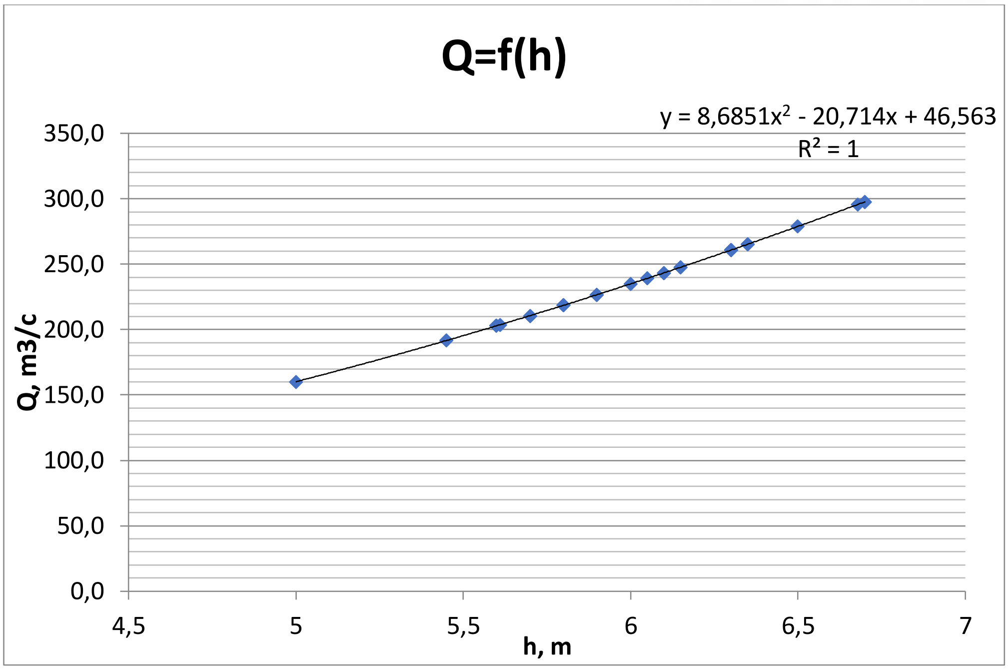


*Figure 2 Estimated water discharge (Q) from water height (H) and other design hydraulic parameters of YG canal.*

*Source: illustrated by the data of YG canal administration and Uzhydromet*

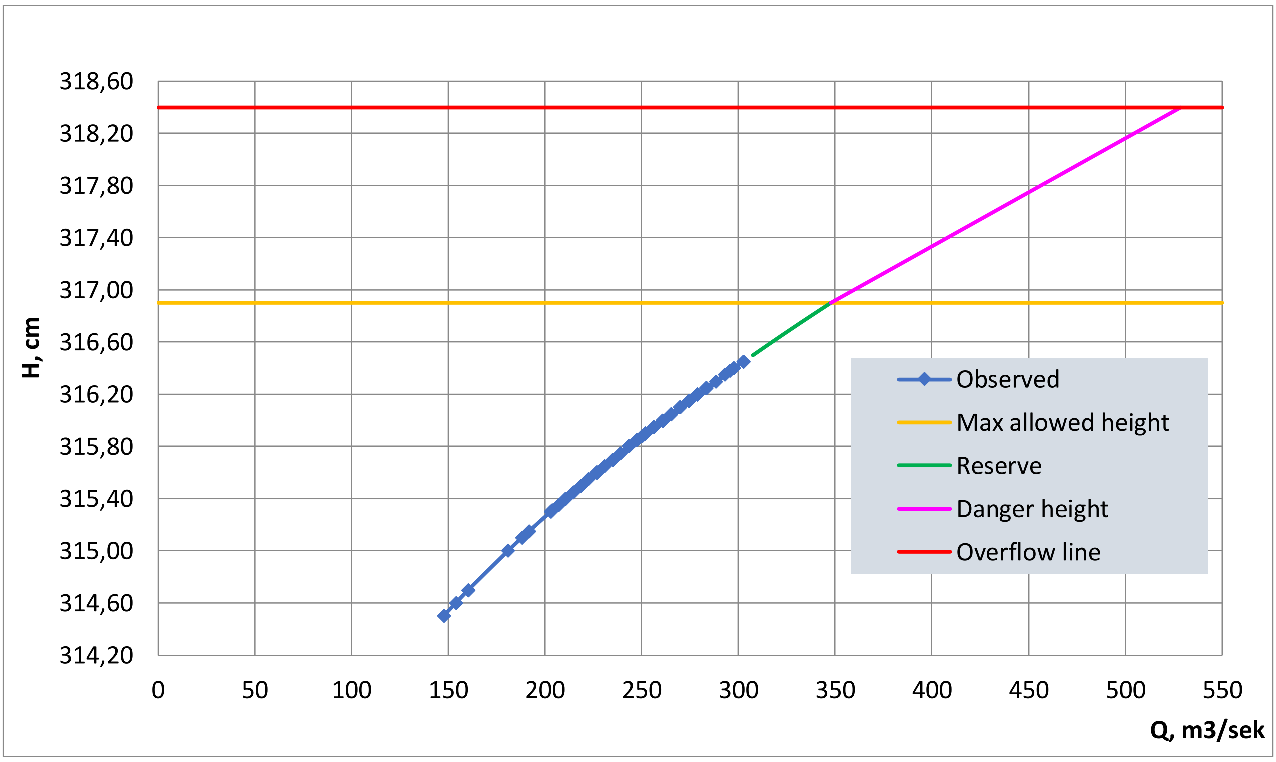


*Figure 3 Estimated overflow discharge and observed water height and discharge in YG*

*Source: illustrated by the data of YG canal administration and hydraulic parameters from Benjaminovich, E.M. Tersitsky 1975*

The Figure 5 shows monthly changing of mean, maximum and minimum water level values of YG from 2010 to 2019. The data obtained from YG canal administration.

The monthly mean water levels varied from 315.55 (2010) cm to 316.08 cm with average water level consisted 315.81 cm for observed period. Based on the Figure 3 the mean water levels indicated water discharge in the range of 222.8-268.4 $m^3$/sek.

Monthly maximum values observed in that period from 315.8 cm (2010) to 316.5 cm (2018) which were below from maximum allowed height (316.90 cm). The corresponding water discharges were in 243.4 – 302.5 $m^3$/sek.

The monthly minimum values of water level was observed almost same amount within 315.1-315.5 cm in first 5 year (2010-2014), but the second 5 year minimum water height more fluctuated in the range 314.5-315.5 cm. Minimum water height declined to 314.5 cm in 2019 which corresponded to water discharge values 147.1 $m^3$/sek.

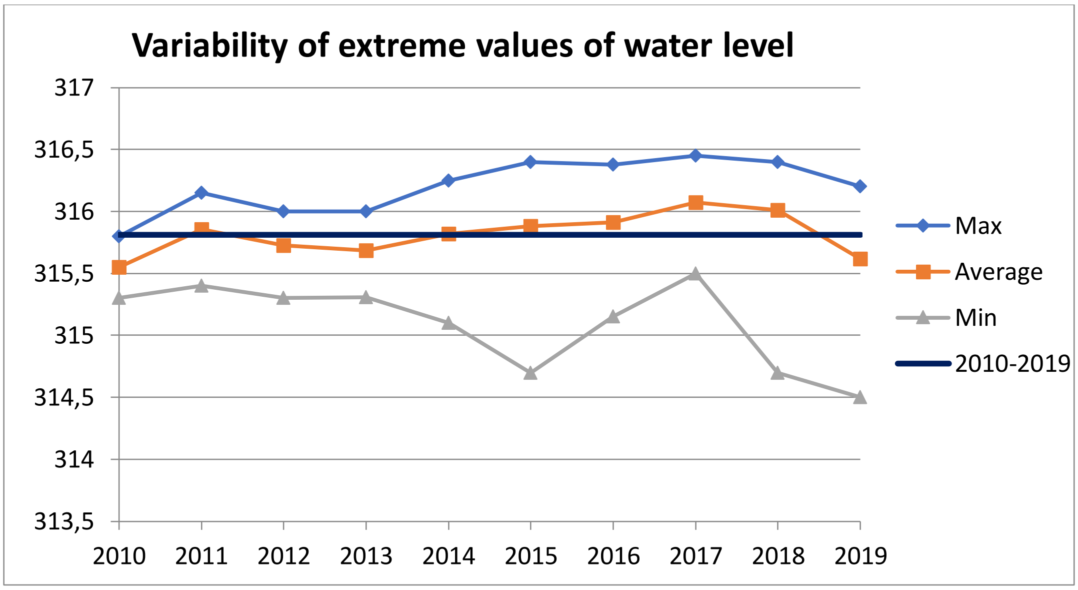


*Figure 4 Variation of extreme values of water level of YG canal*
*Source: illustrated by the data of YG canal administration*

The Figure 5. shows how water temperature changed in YG canal in the period of 2010-2019 years. The mean, maximum and minimum monthly water temperatures were illustrated. Overall these extreme values of water temperatures were significantly different from each other. That can be explained by seasonal climatic variation. However, mean, maximum and minimum water temperatures in the canal remained stable over the years. Mean water temperature was 19.2±0.5°C, while maximum water temperature 25.3±0.5°C observed in summer months. Only minimum water temperature observed in winter season relatively more fluctuated with amount 11.2±2°C due to rose in 2019.

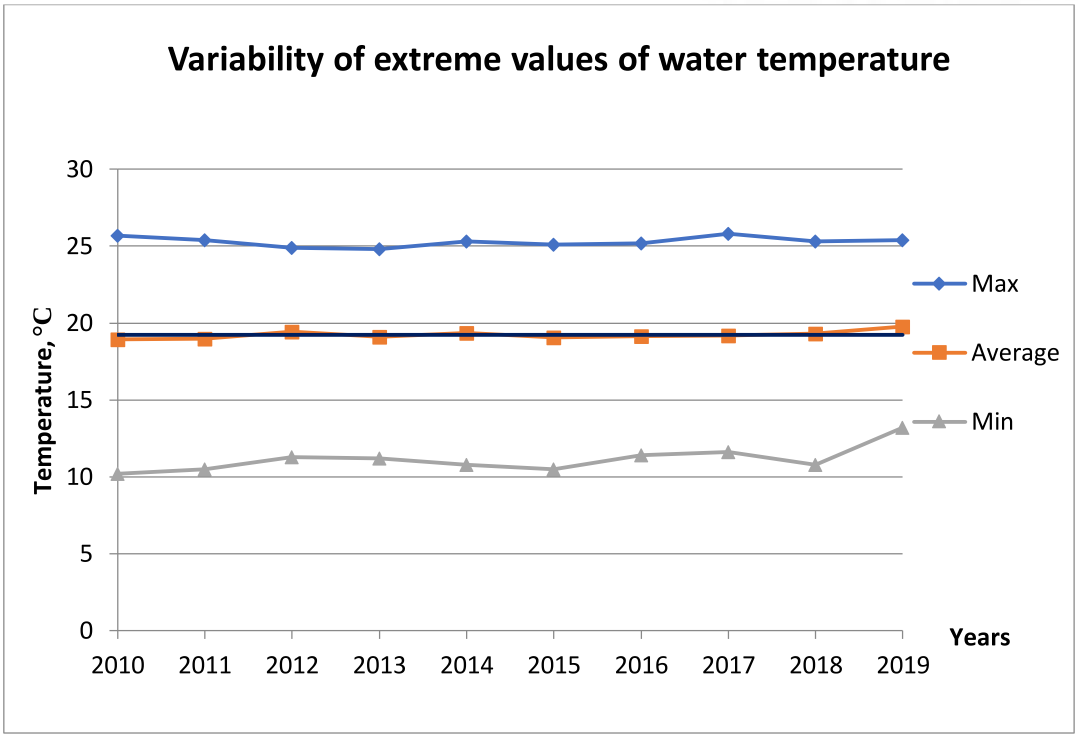


*Figure 5 Variation of extreme values of water temperature of YG canal*
*Source: illustrated by the data of YG canal administration*

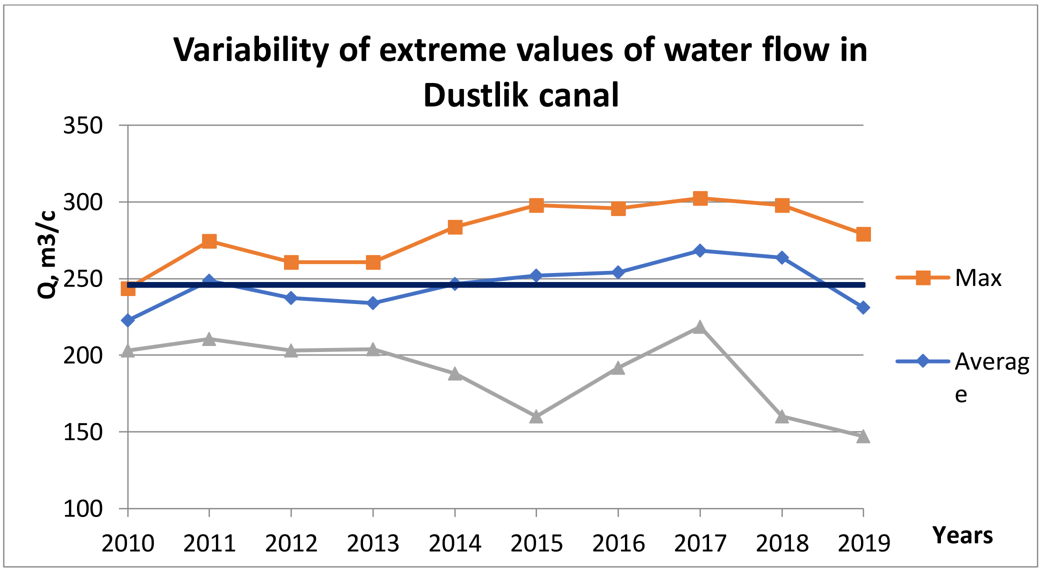


*Figure 6 Variation of extreme values of water flow of Dustlik canal*
*Source: illustrated by the data of Dustlik canal administration*

## 3. Upstream and downstream water status quo levels, including water facilities

### 3.1. Upstream status quo

Administratively, the survey area is located in the Syrdarya region, Bayavut district of Shirin town.

The site is located 14 km west of Bekabad and approx. 8 km north-west of the city of Bakht, with the center of these regions located approx. 45 km from the site.

Syrdarya river basin is located in the territories of four Central Asian countries: Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan. The river originates in the Tian Shan mountains in Kyrgyzstan, fed by precipitation and glacier melt, and formed by the confluence of Naryn and Karadarya rivers, discharging to the Aral Sea flowing for 2790 km in total along with the Naryn river.

The average long-term flow of the Syrdarya river is 41 km$^3$/year (Chub 2007).

The population of the Syrdarya river basin is 22.1 million people (Libert and Lipponen 2012).

Five main reservoirs are located on the Syrdarya river and its tributaries, which include 3 upper and 2 channel reservoirs, with the following total volumes:

1. Toktogul - 19.5 km$^3$;
2. Andijan - 1.9 km$^3$;
3. Charvak - 2.05 km$^3$;
4. Bahri Tojik (Kayrokkum) - 3.4 km$^3$;
5. Shardara - 5.4 km$^3$.

### 3.2. Formation of legal status of Basin Water Organization “Syrdarya” (BWO Syrdarya)

In 1992, BWO Syrdarya becomes the executive body of ICWC (Interstate Coordination Water Commission of Central Asia) under the agreement signed by five countries. BWO Syrdarya in 1997 entered the structure of the International Fund for Saving the Aral Sea (IFAS). BWO Syrdarya acquired the status of an international organization by an agreement signed by the Presidents of Central Asia. The central administration of BWO Syrdarya is located in Tashkent and its structure includes four territorial divisions, including Tajik and Kazakh branches, i.e. Gulistan water network and Dustlik canal administration.

The main objectives of the water network administrations are i) to provide monitoring and water resources management of the canals which withdraw water from Syrdarya river; ii) maintenance and overhaul of the main hydrotechnical facilities and mechanized canal cleaning; iii) provision of water supply limits according to the applications of the states - water consumers, water supply to provide irrigated land for the middle reaches of the Syrdarya river and water supply to the Aral Sea.

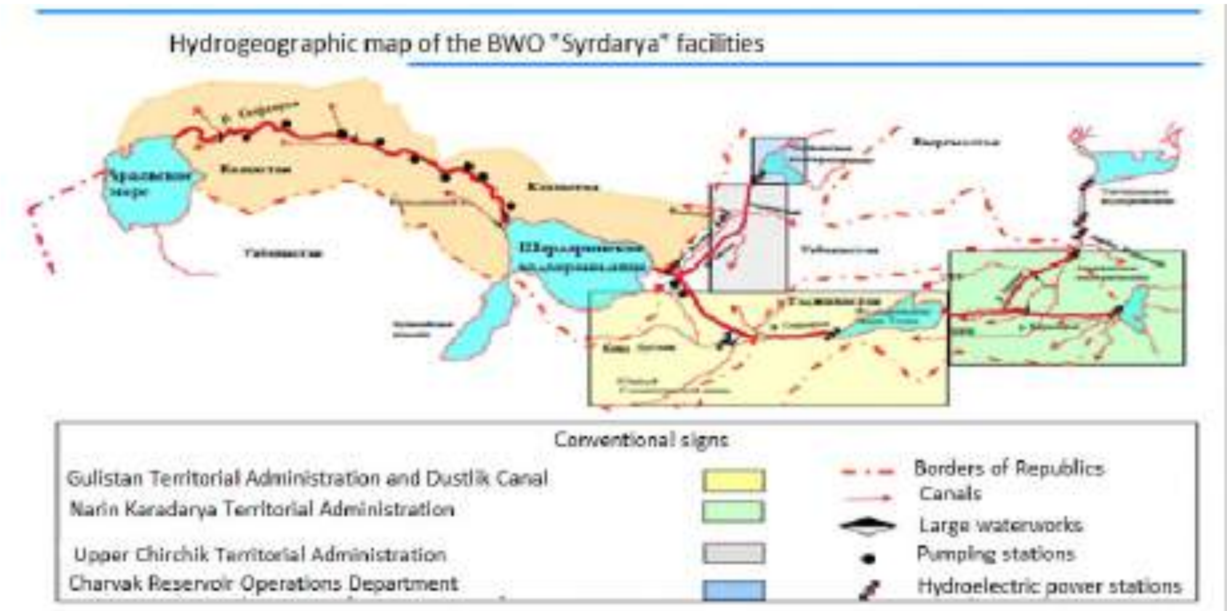


*Figure 7 Hydrographic scheme of objects of BWO Syrdarya*
*Source: cawater-info.net*

In order to ensure the implementation of the initiatives of the President of the Republic of Uzbekistan Sh. M. Mirziyoyev voiced at the Summit of the Heads of the IFAS (August 24, 2018) in the city of Turkmenbashi, BWO Syrdarya together with Scientific Information Center of Interstate Coordination Water Commission of Central Asia (SIC ICWC) and Uzbekistan Hydrometeorological Service (Uzhydromet) prepared the following two regional projects:

1. Modernization and implementation of an automated water resources management system and sustainable operation of hydraulic structures of interstate importance of the Syrdarya river basin;
2. Safety of dams and other hydrotechnical structures in Central Asia.

### 3.3. The Farhad hydroelectric facility

The Farhad hydroelectric facility is located in the alignment in the Farhad cliffs just above Bekabad city. A hydropower plant with a small reservoir is designed to provide a gravity intake and supply water free-flowing canals to the lands of the Golodnaya and Dalverzinsky steppes, as well as daily regulation of river flow for hydropower.

The reservoir capacity at maximum allowance level is 330 million m$^3$, its length is 28 km, its width is from 250 to 3000 m and its area is 46 km$^2$. The average water depth is 7.2 m, the maximum depth at dam is 23.6 m (Benjaminovich, E.M. Tersitsky 1975).

The Farhad hydroelectric complex includes: the spillway concrete dam, dead earth dam, the regulator of the Farhad derivation canal of the hydroelectric power station, and a regulator of the Dalverzin irrigation canal on the right bank of the Syrdarya river.

A spillway dam with a total length of 120 m, has 8 spans each 10 m wide in the light, each covered by dances with wheel locks. The height of the Dam is 25 m and it is designed to pass the maximum estimated flow rate of 4430 $m^3/s$ and catastrophic flow rate of 5800 $m^3/s$(Benjaminovich, E.M. Tersitsky 1975).

The Farhad derivation canal regulator is located at the left end of the earthen dam. Designed for a pass of 470 $m^3/s$ of water, it has 7 spans of 10 m in the light.

To protect the water intake from bottom sediments, flushing sluice are located in front of the thresholds of the regulator.

## 4. Downstream status quo

### 4.1. The site of structures at PK145 YG canal

From the 14.5th km, the YG canal is floe on the virgin soil. At the 32nd km, it crosses the Syrdarya-Havast railway, passes through the city of Yangiyer and at the 127th km it ends with the discharge into the Sangzar (Kly) river on the south western border of the Golodnaya Steppe, at the north of the city of Jizzakh.

The canal efficiency is generally high and at a flow rate of 300 $m^3/s$ is 0.97 (Benjaminovich, E.M. Tersitsky 1975).

Numerous structures have also been built along the course of YG canal i.e. the head regulator, 9 blocking structures, 44 water outlets, 6 pipes and siphons, 12 mudflow outlets, 6 road and 1 railroad bridge, a spillway to Tokursai.

Land resources of the Golodnaya Steppe zone, irrigated mainly by YG canal and Dustlik, are shown in Table 1.

*Table 1 Areas irrigated by Dustlik and YG canals*

| Administrative regions | Irrigated area, ha | Irrigated area by canals, ha | |
|---|---|---|---|
| | | Dustlik | YG canal |
| **Uzbekistan** | 523 033 | 130 000 | 400 133 |
| **Including:** | | | |
| **Syrdarya** | 292 900 | 130 000 | 170 000 |
| **Djizak** | 230 133 | 0 | 230 133 |
| **Kazakhstan** | 145 000 | 145 000 | 0 |
| **Total** | 668 033 | 275 000 | 400 133 |

*Source: BWO Syrdarya materials*

## 5. Water availability analysis

The average long-term water discharge of the Syrdarya river in the downstream of the dam of the Kairakkum hydroelectric station for the period 1992 - 2018 is 678 $m^3/s$ (Uzhydromet).

The average annual water discharge of the Syrdarya in the lower course of the Farhad dam was 165 $m^3/s$ for the period 1992-2018, and varied from 52.2 $m^3/s$ (2009) to 242 $m^3/s$ (2010). The highest average monthly water discharge in the downstream of the dam for 1980-2018 period is observed in January-February - 361-407 $m^3/s$, the lowest in September - up to 8.4 $m^3/s$. In some years, from one to six months a year (2009), the river bed of Syrdarya below the Farhad dam was almost dry.

In the Syrdarya region, there are no natural watercourses of their own. The arrival of transboundary river waters in Syrdarya region is 240 $m^3/s$ (Uzhydromet). YG and Dustlik are the main canals that supply water to the region.

Collector-drainage waters in volumes varying between 1.8 to 2.1 $km^3$ are formed in the area and are discharged into the Syrdarya river and Arnasay lowlands. The main collectors in the project area comprise Shuruzyak, the main collector in the bottomland area, and the Central Golodnostepsky collectors (Якубов, Якубов, and Якубов 2011).

The bulk of fresh groundwater is concentrated in the north and east parts of the Syrdarya region, in the Syrdarya river valley. The region is fed by 5 source deposits of fresh underground water: Syrdarya, Central Gulistan, Verkhnyaya Pliocene, Havast and Dustlik. The largest annual withdraws occur at the Syrdarya and Central Gulistan deposits and in 2007 amounted to more than $0.3*10^6$ $m^3/day$. Groundwater is mainly used for household water supply. In the region there are 13 municipal water supply facilities taking water from underground aquifers. Water for the remaining settlements is provided from local underground water withdrawal.

## 5.1. Flow pattern in the canals

We obtained data from BWO Sirdarya for Dustlik and YG canals with flow information containing 45-year data, and identified their monthly minimum, maximum and mean water discharges (Table 2) and analyzed graphically (Figure 8). We also obtained data from Syrdarya Thermal Power Plant (TPP) and performed primary assessment of information related to thermal and other physical and chemical parameters of the water. Sydrarya TPP is located in Shirin city along the YG canal – the water is withdrawn from the Farhad derivation canal with the water used for cooling eventually discharged to YG canal.

*Table 2 Monthly mean, maximum and minimum water discharge of YG canal for 1976-2013 period. Cv - coefficient of variation indicates ratio of the standard deviation to the mean.*

| | J | F | M | A | M | J | J | A | S | O | N | D | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Mean** | 95,4 | 67,8 | 79,2 | 107,4 | 126,7 | 214,8 | 278,6 | 237,7 | 74,7 | 67,1 | 56,2 | 49,1 | 121,1 |
| **Max** | 195 | 201 | 194 | 202 | 216 | 291 | 349 | 290 | 141 | 148 | 177 | 145 | 156 |
| **Min** | 18,0 | 12,0 | 0,4 | 9,5 | 8,8 | 123,0 | 157,5 | 136,0 | 28,7 | 9,5 | 0,2 | 4,9 | 92,1 |
| **Standard deviation** | 38,3 | 43,5 | 58,3 | 60,6 | 54,2 | 42,6 | 48,4 | 35,2 | 26,4 | 44,1 | 51,1 | 40,6 | 15,4 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **$C_V$ (coefficient of variation** | 0,40 | 0,64 | 0,74 | 0,56 | 0,43 | 0,20 | 0,17 | 0,15 | 0,35 | 0,66 | 0,91 | 0,83 | 0,13 |

*Source: Estimated by data of YG canal administration*

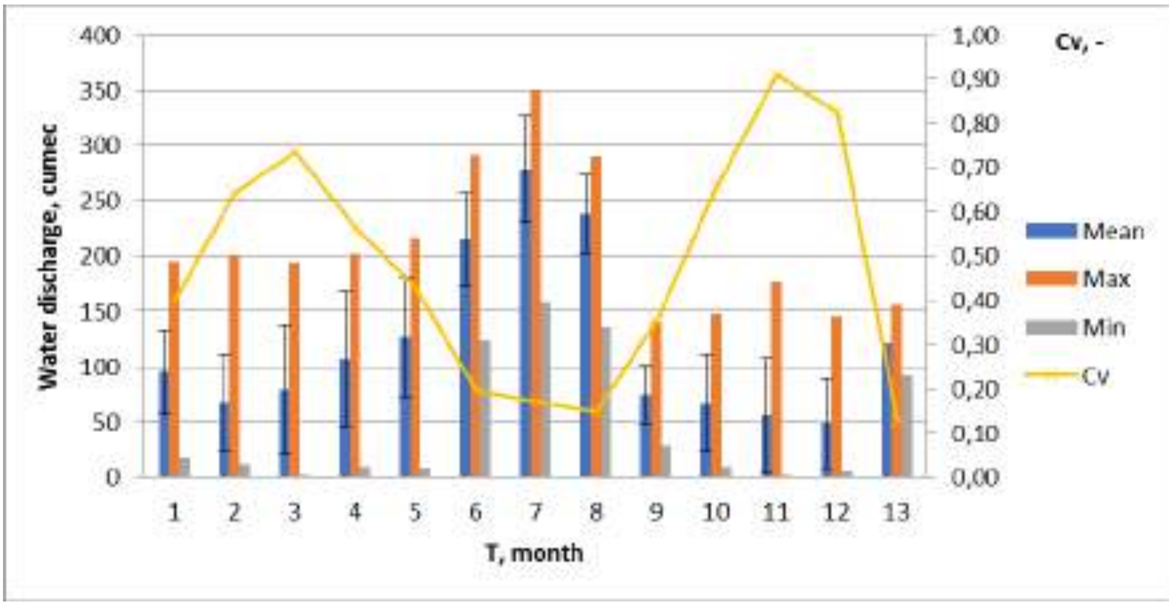


*Figure 8 Monthly mean, maximum and minimum water discharge of YG canal for 1976-2013 period. Cv - coefficient of variation indicates ratio of the standard deviation to the mean.*
*Source: Estimated by data of YG canal administration*

As mentioned above Table 2 shows extreme water discharge of YG canal and their statistical analysis values for 1976-2013 with graphically illustration (Figure 8). In general, high water discharge was observed in vegetation period as canal serves mainly for agriculture in the region and high demands for water in that season. The mean inter-annul water discharge was 121.1±15.4 m3/sek while coefficient of variation (CV) was 0.13 which indicates inter-annual flow stable. However, (inner) annual variation of flow in YG canal is considerable different within the months. Maximum monthly mean value – 278.6±48.4 m3/sek was observed in July, while minimum monthly mean value 49.1±40.6 m3/sek observed in December. There were high coefficient of variation in winter period, especially December (0.91), November (0.83) and March (0.74). There reason of high variation in this period can be explained with a) less water required in non vegetation period, but steady water demand increased due to agricultural reforms in independence years with increasing winter wheat producing instead of cotton by water consumers; b) relatively low water flowed in the canal in the early period (1973-1980) because of canal construction was still developing in that period; c) canal used occasionally for reducing flood risk in middle and downstream of Syrdarya River in winter and spring season.

Absolute minimum water discharges mainly observed in in non-vegetation period was observed in 1970-80s (Attachment 4 ). Based on the observed water discharges in YG canal, in the last 20 years monthly minimum water discharges was not below from 5 $m^3$/sek. According to conversation with the personnel of YG canal administration only middle and downstream sections and branches of the canal be completely dried out during regularly maintaining of the canal once a year. However, Alignment section between 0 and 923 where the survey area is located still remains with water. Elsewhere, according to historic observed data canal has not been become dry after starting to in full operation.

### 5.2. Monthly minimum, maximum and mean water temperature

Monthly temperature fluctuations of Dustlik and YG canals were analyzed for the 2010-2019 period (Figures 9 and 10). Additionally, Figure 11 shows the impact of Syrdarya Thermal Power Plant (TPP) on water temperature of YG canal.

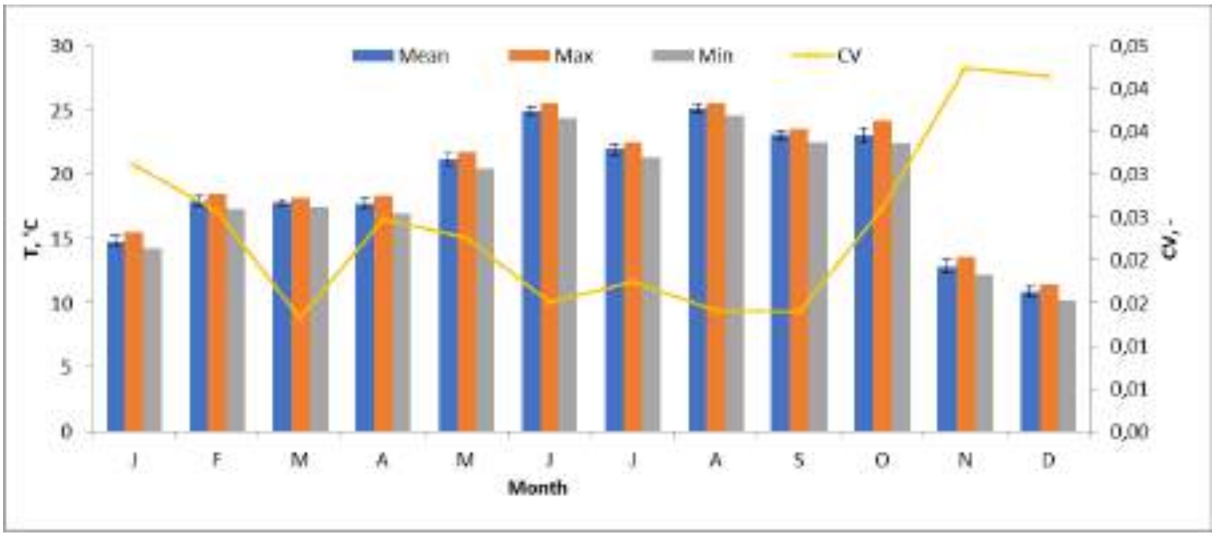


*Figure 9 Monthly mean, maximum and minimum water temperature of Dustlik canal for 2010-2019 period. Cv - coefficient of variation indicates ratio of the standard deviation to the mean.*
*Source: Illustrated by data of Dustlik canal administration*

The Figure 9. shows variation of monthly water temperature in Dsutlik canal in the period of 2010-2019 years. The extreme values of water temperatures in each month were not significantly different from each other, as only had 0.3-0.5°C difference between maximum and minimum values. However, monthly water temperature varied +9.8±0.4°C (in December) to 24.8±0.3°C (in June, August). The high values of coefficient of correlation belonged to winter months.

The Figure 10 illustrates monthly water temperature changes in YG canal in the period of 2010-2019 years. As abovementioned in Figure 5 the monthly values of water temperatures were significantly different from each other, that can be explained by seasonal climatic variation. However, extreme values of water temperatures in each month was similar. High water temperatures were also observed in summer months (about 23-25°C) while low water water temperatures referred to winter months (11-14°C). Monthly values of variation coefficients were relatively low (below 0.05). Only in

July CV coefficient was above 0.05, however it did not reflect significantly in water temperature value and its CV was higher due to minimum water temperature not maximum.

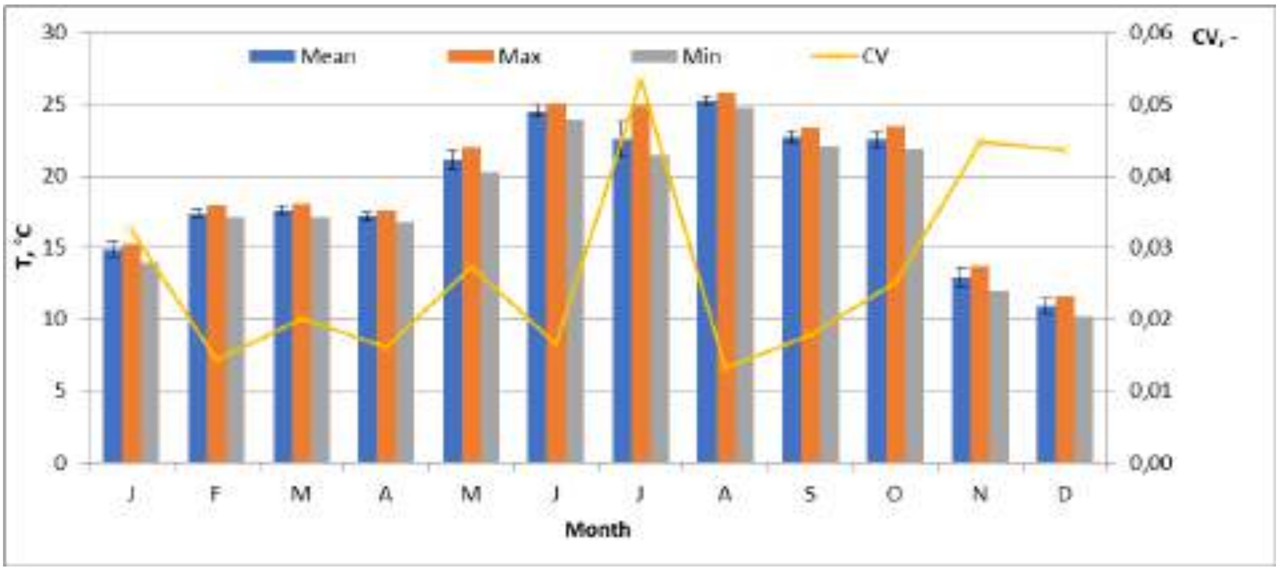


*Figure 10 Monthly mean, maximum and minimum water temperature of YG canal for 2010-2019 period. Cv - coefficient of variation indicates ratio of the standard deviation to the mean.*
*Source: Illustrated by data of YG canal administration*

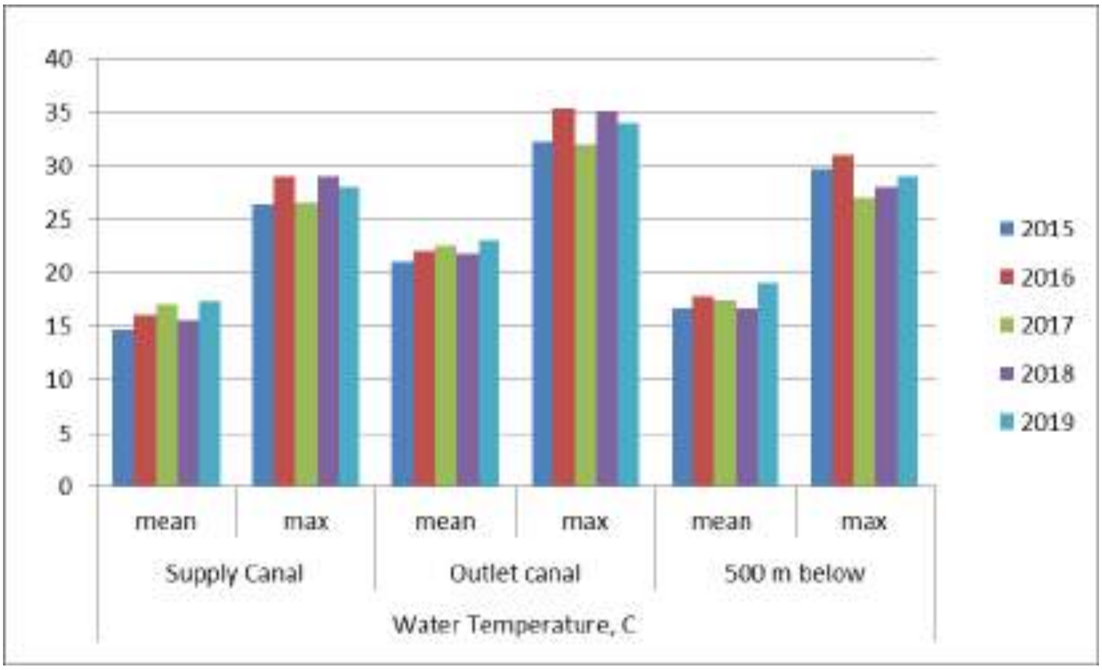


*Figure 11 The impact of Syrdarya thermal power plant (TPP) on water temperature of YG canal*

*Source: Illustrated by data of Syrdarya TPP*

The effect of Syrdarya TPP on water temperature of YG canal based on the data observed 2015-2016. Mean and maximum monthly values of water temperatures were analysed before (supply canal) and after (outlet canal) using of water in the plant. The water temperature measured 500 m below indicates that the values of water temperature after mixing again with YG canal water. Comparing of Outlet canal to Supply we observed that water temperatures increased in average +6.0°C and +5.9°C in mean and maximum values accordingly. After mixing with YG canal (comparing of Outlet canal and 500 m below) the water temperatures declined again in average -4.6°C and -4.8°C The net effects of Syrdarya TPP to YG canal was in average +1.4°C and 1.2°C in mean and maximum values accordingly.

## 6. Water quality and initial variability

Water quality analysis of the water resources in the selected site were investigated based on following scientific sources and data obtained from relevant organizations:

- Temporal and spatial changes of Syrdarya river (Mamatov 2008)
- 2019 water quality data for Dustlik and YG canals from local ecological pollution monitoring department of the State committee of the Republic of Uzbekistan on ecology and environmental protection
- monthly min, max and mean physical and chemical parameters of water before and after use at Syrdarya TPP during 2015-2019 period

Water quality analysis at Syrdarya river and Dustlik, and YG canals was carried out based on the following assessment methods:

- Temporal (spatial) changes in water quality parameters of Syrdarya river and Dustlik and YG canals;
- Water quality parameters with maximum permissible limit (MPL) for household and drinking water in accordance with the state standard of Uzbekistan (UzDSt951-2011 2011).

### 6.1. Water quality at the Syrdarya river

Hydrochemical regime of Syrdarya river, which determines the qualitative composition of its water, depends both on the hydrological regime, which itself depends on the natural and climatic conditions, and the influence of anthropogenic factors, associated primarily with discharges of sewage and drainage water into the river.

The discharge of contaminated drainage water into the river worsens the ecological condition and the domestic quality of the water used for drinking, fishery and irrigation. Certain contribution to the pollution of the Syrdarya and its tributaries is made by the discharges of sewage, insufficiently treated water from industrial enterprises and public utilities (Mamatov 2008).

The increase in anthropogenic pressures has led to a significant change in the quality of river flow. As a result of decreasing runoff discharge and increasing return water from irrigated lands into the river in the second half of the 20th century, there was a deterioration of the river water quality, especially in its middle course, where Dustlik and YG canals withdraw water.

According to the Syrdarya river water quality analysis conducted by Mamatov (2008), water salinity in the Syrdarya river tends to increase towards downstream (from the Kal gauges to the Nadezhdinsk gauge). Its values in the upper Kal section were always lower than 1.0 g/l, and in the sections of the middle reaches of the river (Bekabad, Nadezhda), water mineralization increased, and its average annual values were usually higher than the maximum permissible concentration (MPC). Towards the Chinaz site, mineralization decreases (Figure 12).

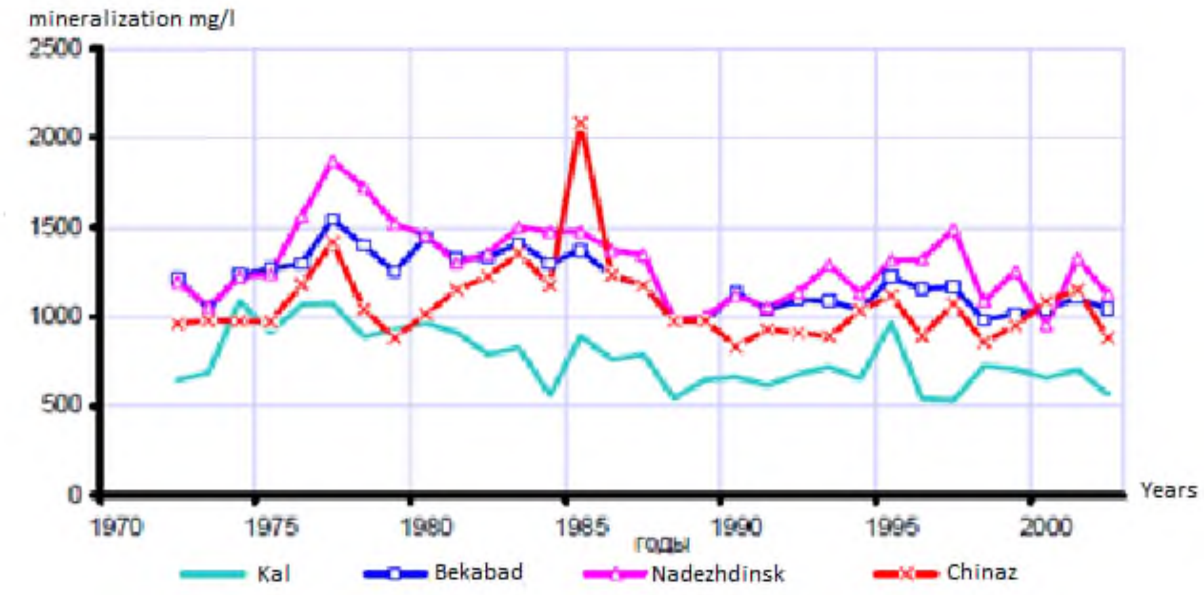


*Figure 12 Water salinity changes in Syrdarya river*

*Source:* Mamatov 2008

## 6.2. Water quality data of Dustlik and Yuzhny-Golodnostepsky canal for 2019

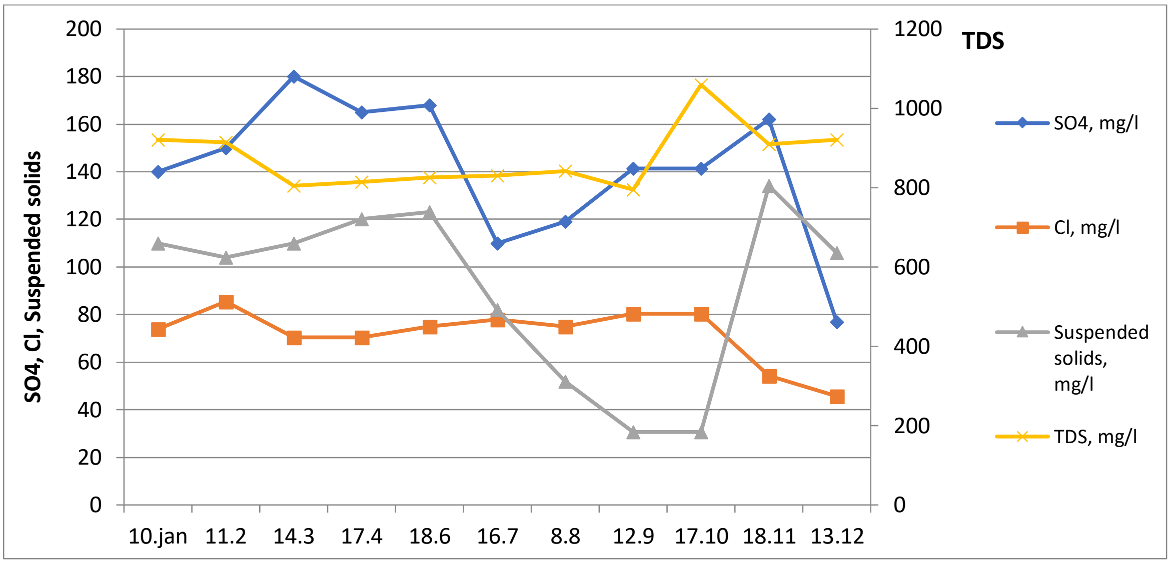


*Figure 13 TDC, SO4, Cl and suspended solids at the beginning of Dustlik canal in 2019*

*Source: Illustrated by Syrdarya TPP data*

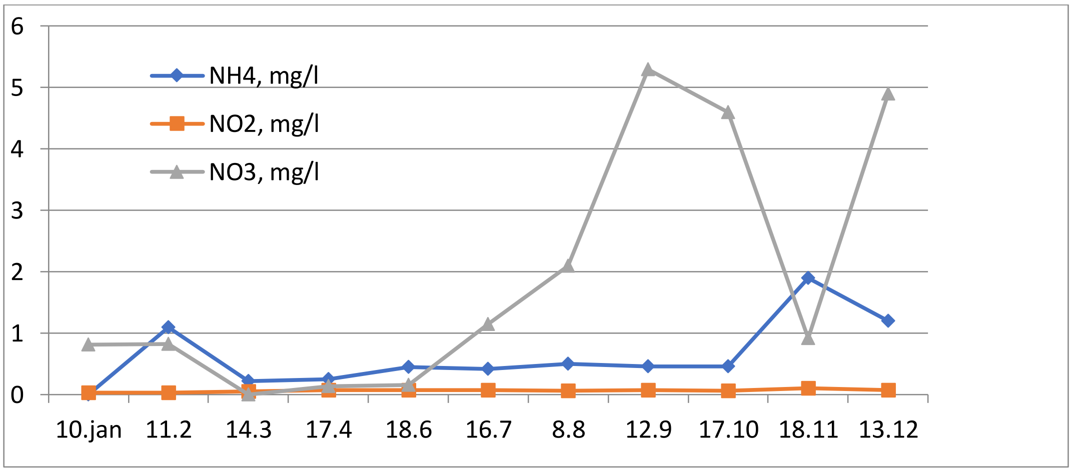


*Figure 14 Nutrients in water at the beginning of Dustlik canal in 2019*
*Source: Illustrated by Syrdarya TPP data*

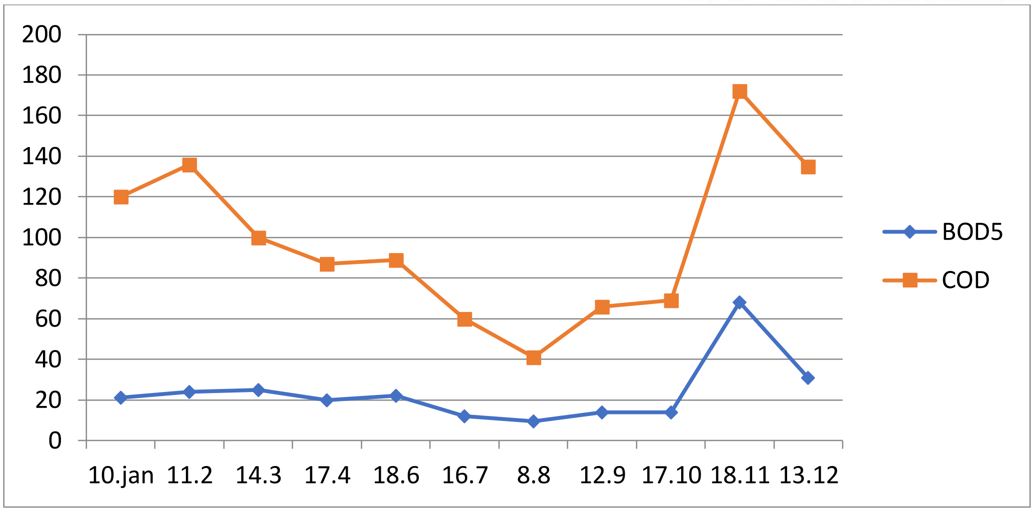


*Figure 15 Biochemical Oxygen Demand and Chemical Oxygen demand at the beginning of Dustlik canal*

*Source: Illustrated by Syrdarya TPP data*

### 6.3. Monthly min, max and mean physical and chemical parameters of the water before and after use at Syrdarya TPP for 2015-2019 period

Following parameters were used to assess change in water quality in the canals: water salinity (total dissolved solids), organic matters ($NO_2$, $NO_3$, $NH_4$) and other physical (pH, hardness, suspended solids) and chemical ($Cl_2$, Fe, BOD, COD) parameters, which characterize qualitative condition of the water sources. The dynamics of water quality parameters were analyzed for the period from 2015 to 2019.

Assessment of water quality change in used water of Syrdarya river by Syrdarya TPP was carried out on the basis of MPL comparison and correspondence of their MPL for drinking water (UzDSt951-2011 2011).

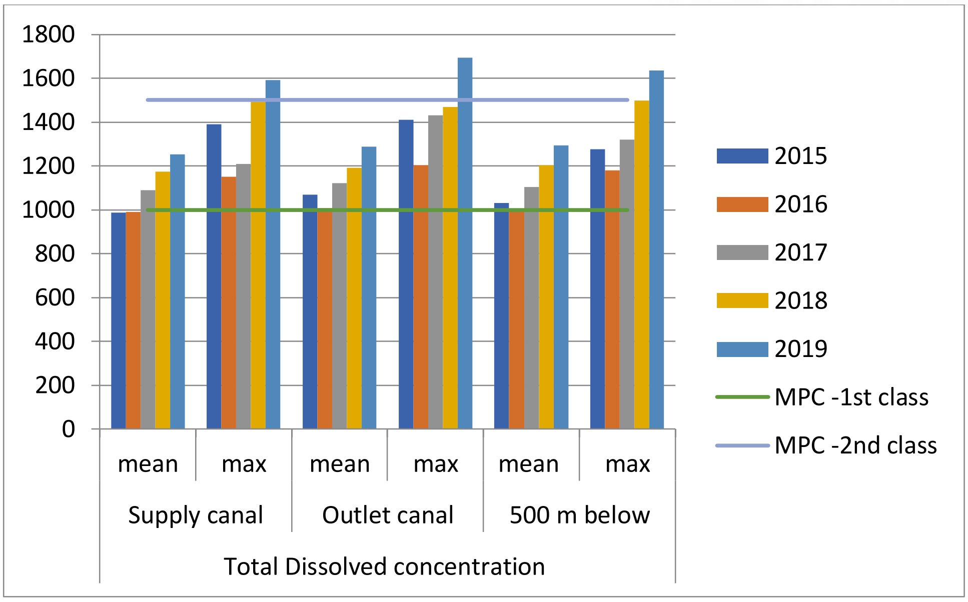


*Figure 16 Total Dissolved concentration (TDC) of water used by Syrdarya TPP*
*Source: Illustrated by Syrdarya TPP data*

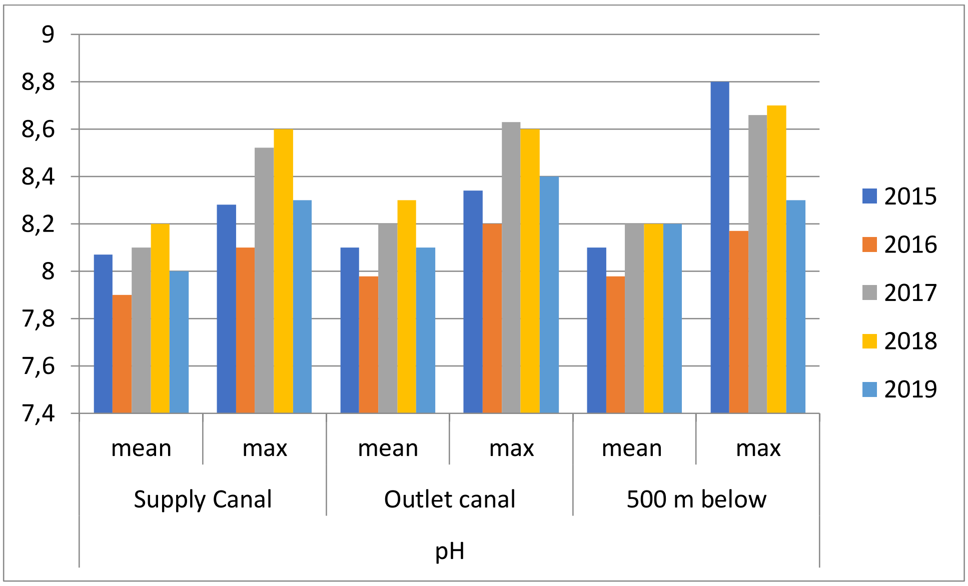


*Figure 17 Changes in pH value of water after use by Syrdarya TPP*
*Source: Illustrated by Syrdarya TPP data*

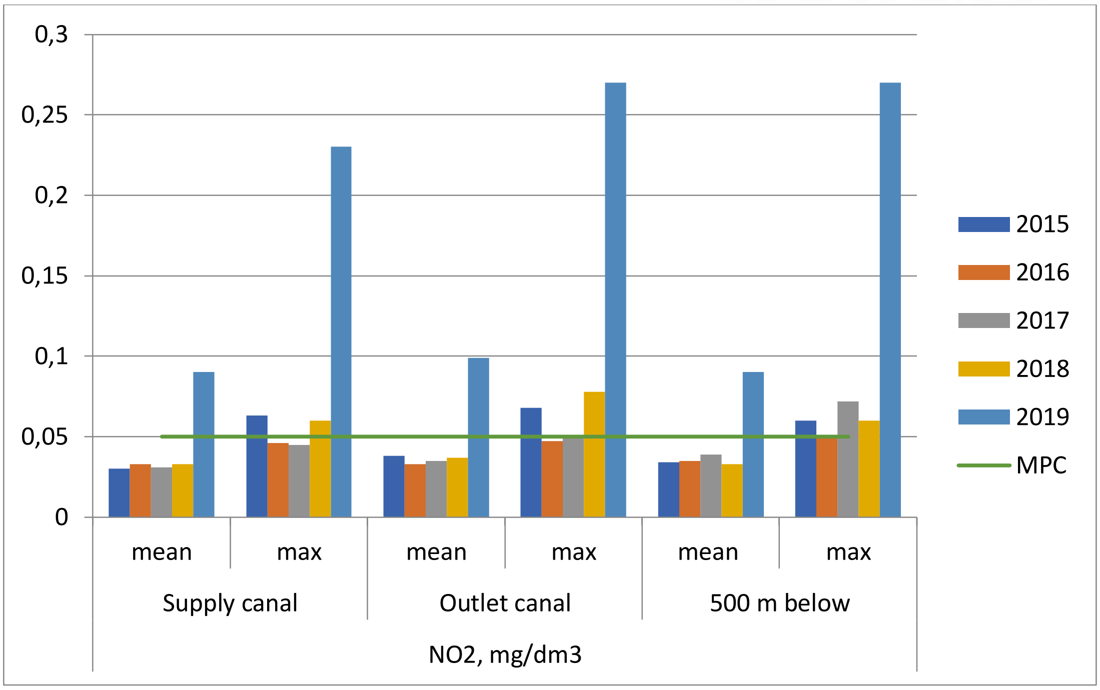


*Figure 18 Nitrate (NO2) change in water used by Syrdarya TPP*
*Source: Illustrated by Syrdarya TPP data*

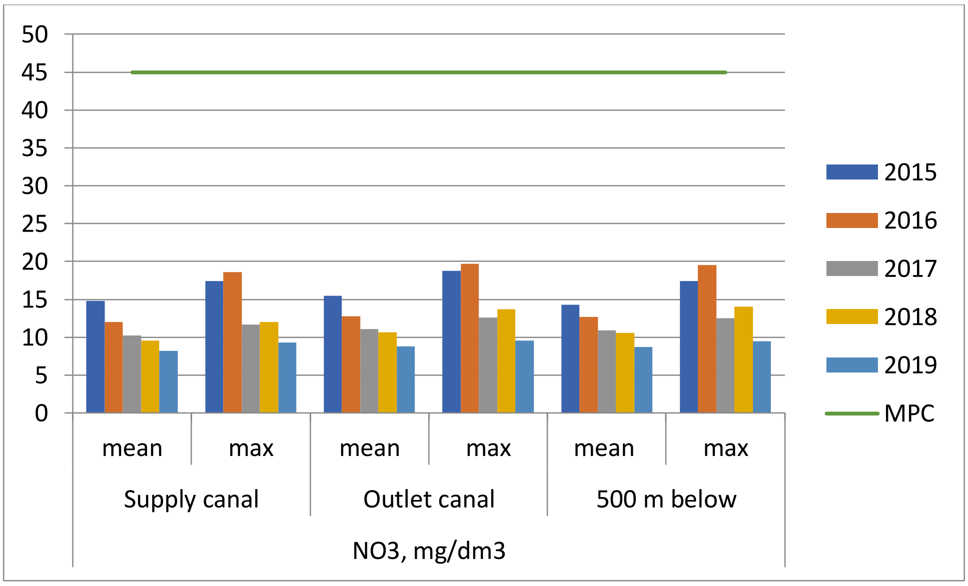


*Figure 19 Nitrite (NO3) change in water used by Syrdarya TPP*
*Source: Illustrated by Syrdarya TPP data*

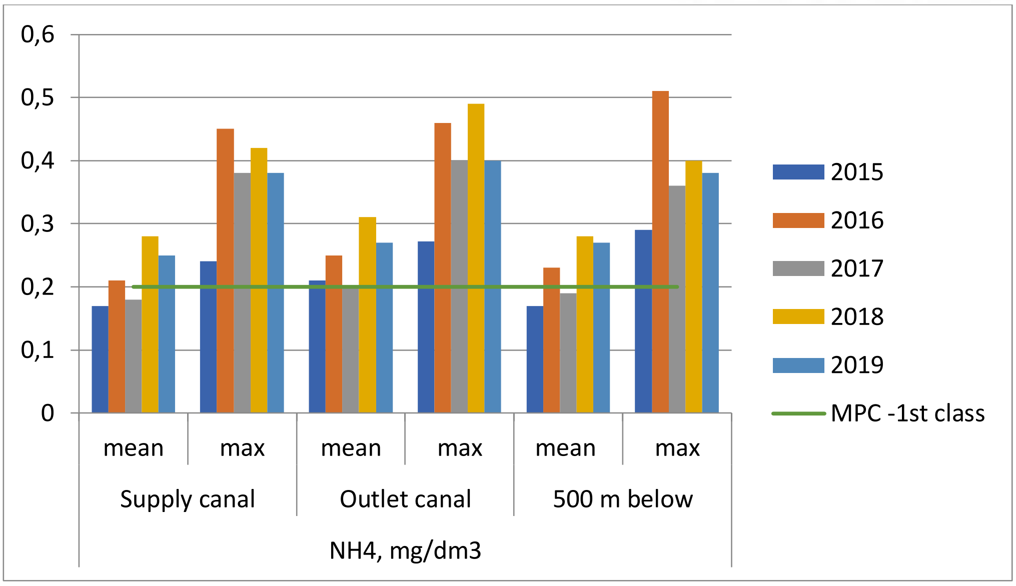


*Figure 20 Ammonium (NH4) change in water used by Syrdarya TPP*
*Source: Illustrated by Syrdarya TPP data*

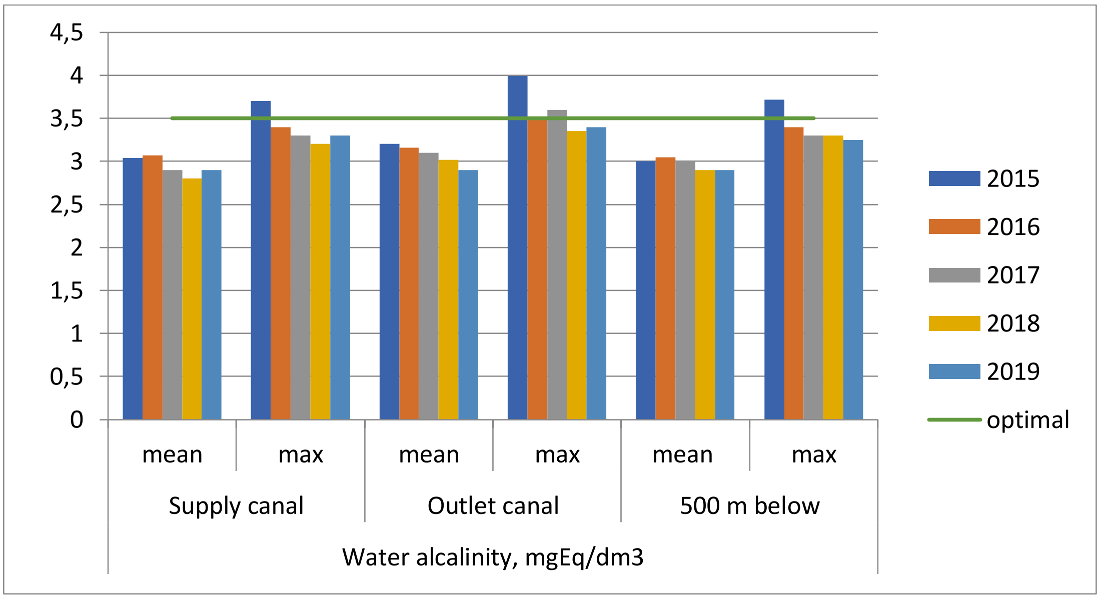


*Figure 21 Alkalinity parameter of water used by Syrdarya TPP*
*Source: Illustrated by Syrdarya TPP data*

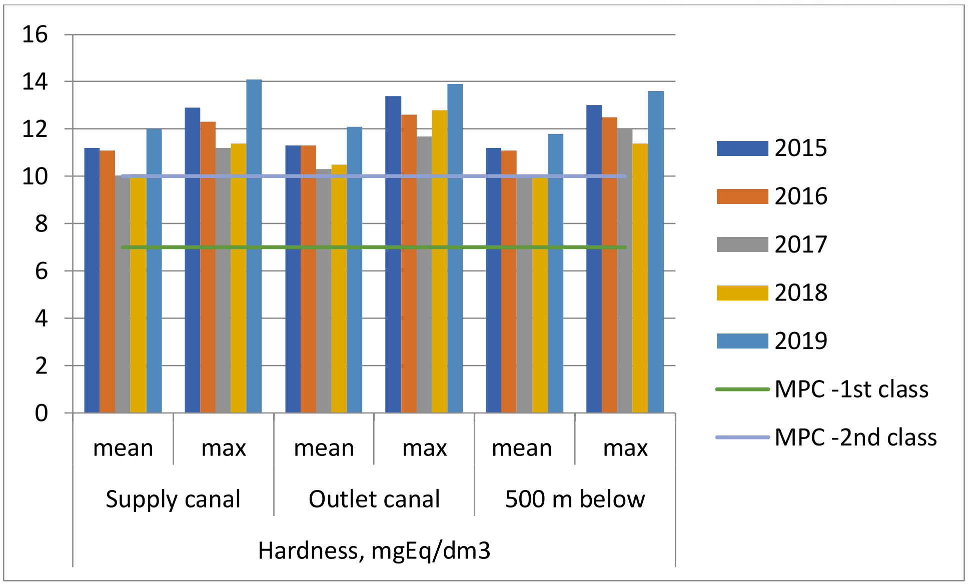


*Figure 22 Hardness of water used by Syrdarya TPP*
*Source: Illustrated by Syrdarya TPP data*

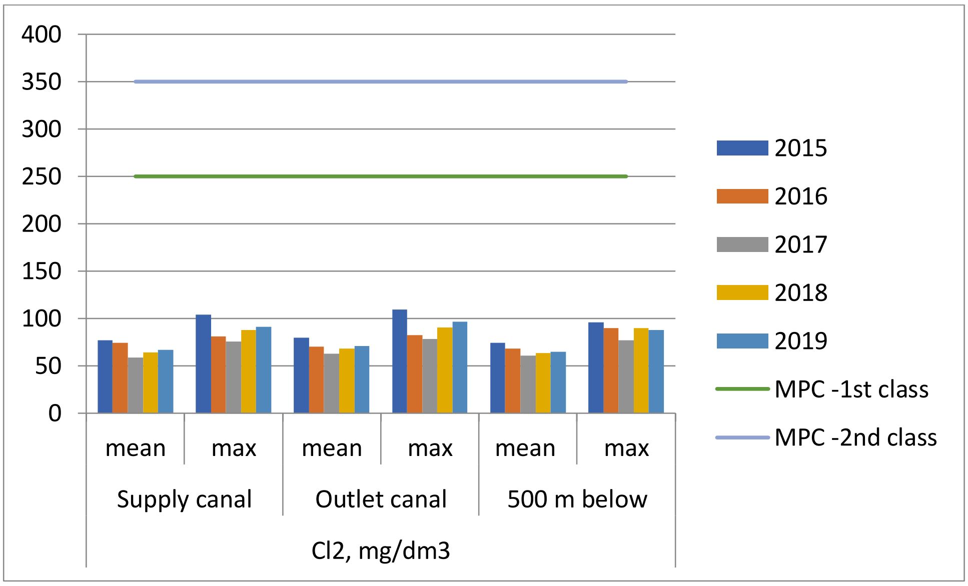


*Figure 23 Change in chlorine concentration of water used by Syrdarya TPP*
*Source: Illustrated by Syrdarya TPP data*

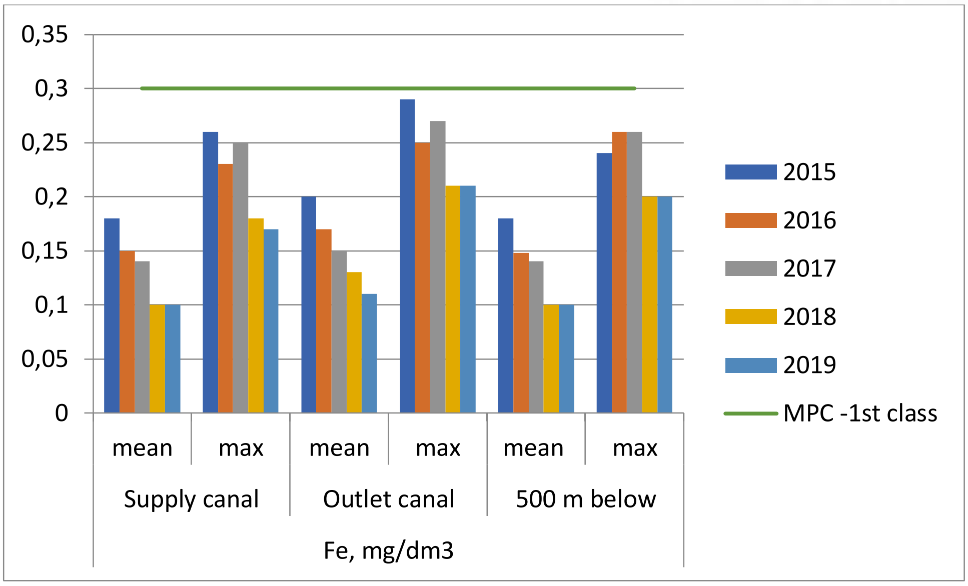


*Figure 24 Change in iron (Fe) concentration of water used by Syrdarya TPP*
*Source: Illustrated by Syrdarya TPP data*

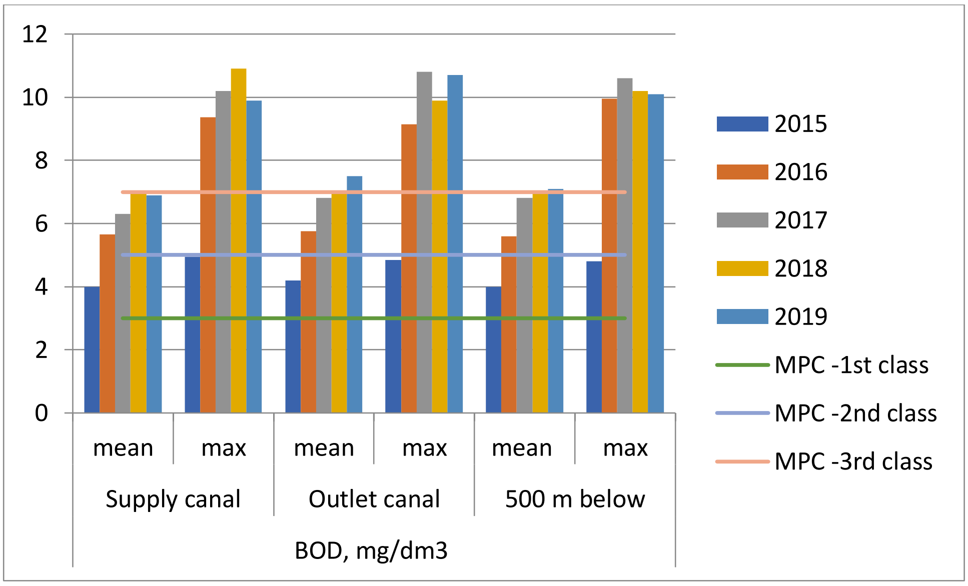


*Figure 25 Change of Biochemical Oxygen Demand (BOD) of water used by Syrdarya TPP*
*Source: Illustrated by Syrdarya TPP data*

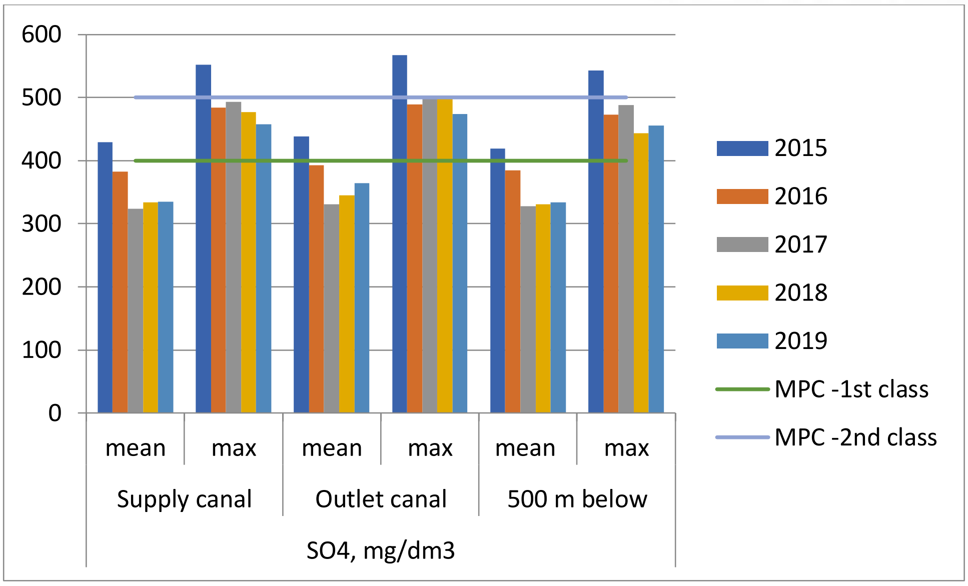


*Figure 26 Change in sulphate (SO4) concentration of water used by Syrdarya TPP*
*Source: Illustrated by Syrdarya TPP data*

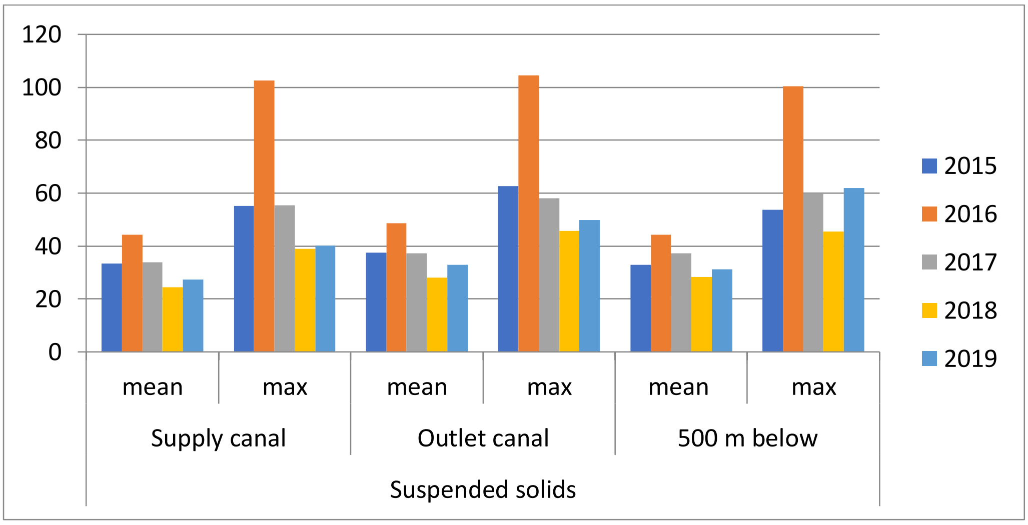


*Figure 27 Suspended solids of water used by Syrdarya TPP*
*Source: Illustrated by Syrdarya TPP data*

## 7. Conclusions

Main conclusions of the water availability and accessibility study can be summarized as follows:

- According to obtained water resources data water supply can be assessed, as the Syrdarya river is the prior water sources in the site of the project;
- Based on the hydraulic parameters of the YG canal, maximum (316.90 m) and catastrophic water levels (318.40 m) of the canal were estimated in selected section of the site. Obtained theoretical Q=f(H) curve estimation, water availability and flooding risk analyses can be performed;
- Annual water discharge at Yuzhny-Golodnostepsky canal was estimated at 121.1 $m^3/s$ - mean, 156 $m^3/s$ - max and 92.1 $m^3/s$ – min.
- Upstream and downstream water status quo levels were studied;
- Water quality data was collected and analyzed graphically against national maximum permissible limits;
- Certain physical and chemical parameters of water i.e. hardness, TDC, $SO_4$, $NH_4$, Nitrate (2019) were observed above Maximum Permissible Concentration (MPC).

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# ANNEXES

## Annex A

List of figures



## Annex B

List of tables

Juru Energy

Attachments:

*Attachment 1 Monthly mean water level (H), water velocity (V) and water temperature (T) of* Dustlik *canal for 2010-2019 period.*

| Month/Year | | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | Mean | Max | Min | SD | CV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January | H, cm | 130 | 157 | 127 | 218 | 295 | 310 | 310 | 282 | 319 | 247 | 239,5 | 319,0 | 127 | 65,20 | 0,272 |
| | V, m/sek | 0,2 | 0,2 | 0,3 | 1 | 1,3 | 1,4 | 1,4 | 1,2 | 1,2 | 1,1 | 0,93 | 1,4 | 0,2 | 0,42 | 0,449 |
| | T, °C | 14,2 | 14,8 | 14,5 | 15,2 | 14,3 | 14,6 | 15,4 | 15,5 | 14,8 | 14,4 | 14,77 | 15,5 | 14,2 | 0,37 | 0,025 |
| February | H, cm | 220 | 242 | 92 | 255 | 117 | 156 | 235 | 228 | 276 | 267 | 208,8 | 276,0 | 92 | 52,28 | 0,250 |
| | V, m/sek | 0,8 | 1 | 0,1 | 1,3 | 0,1 | 0,3 | 0,9 | 0,9 | 0,9 | 1,2 | 0,75 | 1,3 | 0,1 | 0,35 | 0,467 |
| | T, °C | 17,6 | 17,5 | 18,5 | 17,5 | 18,2 | 17,8 | 18,2 | 18,5 | 18,4 | 17,3 | 17,95 | 18,5 | 17,3 | 0,41 | 0,023 |
| March | H, cm | 165 | 152 | 176 | 114 | 202 | 158 | 175 | 229 | 168 | 242 | 178,1 | 242,0 | 114 | 27,74 | 0,156 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | V, m/sek | 0,3 | 0,2 | 0,6 | 0,1 | 0,7 | 0,3 | 0,2 | 0,9 | 0,4 | 1,1 | 0,48 | 1,1 | 0,1 | 0,28 | 0,575 |
| | T, °C | 17,6 | 18 | 17,6 | 17,8 | 17,9 | 18 | 17,6 | 17,5 | 18,2 | 18 | 17,82 | 18,2 | 17,5 | 0,20 | 0,011 |
| April | H, cm | 155 | 163 | 216 | 165 | 125 | 234 | 124 | 160 | 150 | 144 | 163,6 | 234,0 | 124 | 24,84 | 0,152 |
| | V, m/sek | 0,4 | 0,5 | 0,9 | 0,5 | 0,2 | 0,9 | 0,2 | 0,3 | 0,4 | 0,2 | 0,45 | 0,9 | 0,2 | 0,20 | 0,444 |
| | T, °C | 17 | 17,4 | 17,5 | 17,8 | 18 | 17,6 | 17,2 | 18,2 | 18,4 | 17,8 | 17,69 | 18,4 | 17 | 0,35 | 0,020 |
| May | H, cm | 193 | 222 | 188 | 190 | 192 | 239 | 180 | 229 | 220 | 142 | 199,5 | 239,0 | 142 | 22,40 | 0,112 |
| | V, m/sek | 0,6 | 0,8 | 0,6 | 0,7 | 0,5 | 0,7 | 0,3 | 0,9 | 0,4 | 0,3 | 0,58 | 0,9 | 0,3 | 0,16 | 0,283 |
| | T, °C | 20,8 | 21 | 20,5 | 20,9 | 21,2 | 21,6 | 21,8 | 20,8 | 21,7 | 21,8 | 21,21 | 21,8 | 20,5 | 0,41 | 0,019 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| June | H, cm | 247 | 232 | 218 | 244 | 234 | 274 | 209 | 297 | 285 | 279 | 251,9 | 297,0 | 209 | 25,48 | 0,101 |
| | V, m/sek | 0,9 | 0,8 | 1 | 0,9 | 0,8 | 0,7 | 0,9 | 1,2 | 1,2 | 1,1 | 0,95 | 1,2 | 0,7 | 0,14 | 0,147 |
| | T, °C | 25 | 24,6 | 25,4 | 24,4 | 25,1 | 24,6 | 25,2 | 25,6 | 25 | 24,8 | 24,97 | 25,6 | 24,4 | 0,30 | 0,012 |
| July | H, cm | 264 | 254 | 228 | 194 | 237 | 228 | 248 | 346 | 322 | 322 | 264,3 | 346,0 | 194 | 39,42 | 0,149 |
| | V, m/sek | 1 | 1 | 0,9 | 0,7 | 0,7 | 1 | 0,9 | 1,4 | 1,4 | 1,3 | 1,03 | 1,4 | 0,7 | 0,20 | 0,196 |
| | T, °C | 22,4 | 22,2 | 21,8 | 21,6 | 22,4 | 22,5 | 22,2 | 21,8 | 21,4 | 21,7 | 22 | 22,5 | 21,4 | 0,34 | 0,015 |
| August | H, cm | 303 | 302 | 213 | 232 | 227 | 251 | 216 | 286 | 231 | 266 | 252,7 | 303,0 | 213 | 29,24 | 0,116 |
| | V, m/sek | 1,3 | 1,3 | 1 | 1 | 0,7 | 0,5 | 0,8 | 1,2 | 1,1 | 1,1 | 1 | 1,3 | 0,5 | 0,20 | 0,200 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | T, °C | 25,1 | 25,6 | 25,4 | 24,8 | 24,7 | 24,6 | 25,4 | 25,4 | 25,2 | 25,5 | 25,17 | 25,6 | 24,6 | 0,30 | 0,012 |
| September | H, cm | 187 | 192 | 132 | 136 | 160 | 122 | 173 | 171 | 155 | 118 | 154,6 | 192,0 | 118 | 22,08 | 0,143 |
| | V, m/sek | 0,3 | 0,4 | 0,3 | 0,2 | 0,2 | 0,1 | 0,2 | 0,3 | 0,3 | 0,2 | 0,25 | 0,4 | 0,1 | 0,07 | 0,280 |
| | T, °C | 22,5 | 22,8 | 22,9 | 23,2 | 23,4 | 23,1 | 23,2 | 23,4 | 23,6 | 23,1 | 23,12 | 23,6 | 22,5 | 0,24 | 0,010 |
| October | H, cm | 114 | 174 | 145 | 115 | 107 | 110 | 187 | 210 | 128 | 168 | 145,8 | 210,0 | 107 | 31,16 | 0,214 |
| | V, m/sek | 0,1 | 0,4 | 0,1 | 0,2 | 0,1 | 0,1 | 0,3 | 0,3 | 0,2 | 0,3 | 0,21 | 0,4 | 0,1 | 0,09 | 0,438 |
| | T, °C | 22,5 | 22,6 | 23,5 | 23,6 | 23,1 | 22,5 | 22,8 | 24,2 | 22,4 | 23,4 | 23,06 | 24,2 | 22,4 | 0,50 | 0,022 |
| November | H, cm | 145 | 121 | 125 | 144 | 120 | 74 | 223 | 225 | 141 | 200 | 151,8 | 225,0 | 74 | 38,52 | 0,254 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | V, m/sek | 0,5 | 0,1 | 0,2 | 0,5 | 0,2 | 0,05 | 0,8 | 0,4 | 0,3 | 0,3 | 0,34 | 0,8 | 0,05 | 0,17 | 0,513 |
| | T, °C | 12,4 | 12,2 | 12,4 | 12,6 | 13,6 | 13,5 | 13,2 | 12,6 | 12,4 | 13,5 | 12,84 | 13,6 | 12,2 | 0,49 | 0,038 |
| December | H, cm | 117 | 0 | 139 | 187 | 141 | 252 | 222 | 230 | 154 | | 160,2 | 252,0 | 0 | 55,58 | 0,347 |
| | V, m/sek | 0,3 | 0 | 0,3 | 0,9 | 0,3 | 0,8 | 0,8 | 0,4 | 0,3 | | 0,5 | 0,9 | 0 | 0,25 | 0,553 |
| | T, °C | 10,56 | 10,8 | 11 | 11,2 | 11,3 | 11,5 | 10,2 | 10,3 | 11,1 | | 10,9 | 11,5 | 10,2 | 0,37 | 0,034 |
| Mean | H, cm | 186,67 | 184,25 | 166,58 | 182,83 | 179,75 | 200,67 | 208,50 | 241,08 | 212,42 | 217,73 | 198,05 | 241,1 | 166,6 | 18,03 | 0,09 |
| | V, m/sek | 0,56 | 0,56 | 0,53 | 0,67 | 0,48 | 0,57 | 0,64 | 0,78 | 0,68 | 0,75 | 0,62 | 0,8 | 0,48 | 0,08 | 0,13 |
| | T, °C | 18,97 | 19,13 | 19,25 | 19,22 | 19,43 | 19,33 | 19,37 | 19,48 | 19,38 | 20,12 | 19,37 | 20,1 | 19,0 | 0,19 | 0,01 |
| Max | H, cm | 303 | 302 | 228 | 255 | 295 | 310 | 310 | 346 | 322 | 322 | | | | | |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | V, m/sek | 1,3 | 1,3 | 1 | 1,3 | 1,3 | 1,4 | 1,4 | 1,4 | 1,4 | 1,3 | | | | | |
| | T, °C | 25,1 | 25,6 | 25,4 | 24,8 | 25,1 | 24,6 | 25,4 | 25,6 | 25,2 | 25,5 | | | | | |
| Min | H, cm | 114 | 0 | 92 | 114 | 107 | 74 | 124 | 160 | 128 | 118 | | | | | |
| | V, m/sek | 0,1 | 0 | 0,1 | 0,1 | 0,1 | 0,05 | 0,2 | 0,3 | 0,2 | 0,2 | | | | | |
| | T, °C | 10,6 | 10,8 | 11,0 | 11,2 | 11,3 | 11,5 | 10,2 | 10,3 | 11,1 | 13,5 | | | | | |

Note: extreme values are highlighted

Juru Energy

*Attachment 2 Monthly mean water level (H), water velocity (V) and water temperature (T) of YG canal for 2010-2019 period.*

| Month/Year | | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | Mean | Max | Min | SD | CV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January | H, cm | 130 | 157 | 127 | 218 | 295 | 310 | 310 | 282 | 319 | 247 | 239,5 | 319,0 | 127 | 65,20 | 0,272 |
| | V, m/sek | 0,2 | 0,2 | 0,3 | 1 | 1,3 | 1,4 | 1,4 | 1,2 | 1,2 | 1,1 | 0,93 | 1,4 | 0,2 | 0,42 | 0,449 |
| | T, °C | 14,2 | 14,8 | 14,5 | 15,2 | 14,3 | 14,6 | 15,4 | 15,5 | 14,8 | 14,4 | 14,77 | 15,5 | 14,2 | 0,37 | 0,025 |
| February | H, cm | 220 | 242 | 92 | 255 | 117 | 156 | 235 | 228 | 276 | 267 | 208,8 | 276,0 | 92 | 52,28 | 0,250 |
| | V, m/sek | 0,8 | 1 | 0,1 | 1,3 | 0,1 | 0,3 | 0,9 | 0,9 | 0,9 | 1,2 | 0,75 | 1,3 | 0,1 | 0,35 | 0,467 |
| | T, °C | 17,6 | 17,5 | 18,5 | 17,5 | 18,2 | 17,8 | 18,2 | 18,5 | 18,4 | 17,3 | 17,95 | 18,5 | 17,3 | 0,41 | 0,023 |
| March | H, cm | 165 | 152 | 176 | 114 | 202 | 158 | 175 | 229 | 168 | 242 | 178,1 | 242,0 | 114 | 27,74 | 0,156 |
| | V, m/sek | 0,3 | 0,2 | 0,6 | 0,1 | 0,7 | 0,3 | 0,2 | 0,9 | 0,4 | 1,1 | 0,48 | 1,1 | 0,1 | 0,28 | 0,575 |
| | T, °C | 17,6 | 18 | 17,6 | 17,8 | 17,9 | 18 | 17,6 | 17,5 | 18,2 | 18 | 17,82 | 18,2 | 17,5 | 0,20 | 0,011 |
| April | H, cm | 155 | 163 | 216 | 165 | 125 | 234 | 124 | 160 | 150 | 144 | 163,6 | 234,0 | 124 | 24,84 | 0,152 |
| | V, m/sek | 0,4 | 0,5 | 0,9 | 0,5 | 0,2 | 0,9 | 0,2 | 0,3 | 0,4 | 0,2 | 0,45 | 0,9 | 0,2 | 0,20 | 0,444 |
| | T, °C | 17 | 17,4 | 17,5 | 17,8 | 18 | 17,6 | 17,2 | 18,2 | 18,4 | 17,8 | 17,69 | 18,4 | 17 | 0,35 | 0,020 |
| May | H, cm | 193 | 222 | 188 | 190 | 192 | 239 | 180 | 229 | 220 | 142 | 199,5 | 239,0 | 142 | 22,40 | 0,112 |
| | V, m/sek | 0,6 | 0,8 | 0,6 | 0,7 | 0,5 | 0,7 | 0,3 | 0,9 | 0,4 | 0,3 | 0,58 | 0,9 | 0,3 | 0,16 | 0,283 |
| | T, °C | 20,8 | 21 | 20,5 | 20,9 | 21,2 | 21,6 | 21,8 | 20,8 | 21,7 | 21,8 | 21,21 | 21,8 | 20,5 | 0,41 | 0,019 |
| June | H, cm | 247 | 232 | 218 | 244 | 234 | 274 | 209 | 297 | 285 | 279 | 251,9 | 297,0 | 209 | 25,48 | 0,101 |
| | V, m/sek | 0,9 | 0,8 | 1 | 0,9 | 0,8 | 0,7 | 0,9 | 1,2 | 1,2 | 1,1 | 0,95 | 1,2 | 0,7 | 0,14 | 0,147 |
| | T, °C | 25 | 24,6 | 25,4 | 24,4 | 25,1 | 24,6 | 25,2 | 25,6 | 25 | 24,8 | 24,97 | 25,6 | 24,4 | 0,30 | 0,012 |
| July | H, cm | 264 | 254 | 228 | 194 | 237 | 228 | 248 | 346 | 322 | 322 | 264,3 | 346,0 | 194 | 39,42 | 0,149 |
| | V, m/sek | 1 | 1 | 0,9 | 0,7 | 0,7 | 1 | 0,9 | 1,4 | 1,4 | 1,3 | 1,03 | 1,4 | 0,7 | 0,20 | 0,196 |
| | T, °C | 22,4 | 22,2 | 21,8 | 21,6 | 22,4 | 22,5 | 22,2 | 21,8 | 21,4 | 21,7 | 22 | 22,5 | 21,4 | 0,34 | 0,015 |
| August | H, cm | 303 | 302 | 213 | 232 | 227 | 251 | 216 | 286 | 231 | 266 | 252,7 | 303,0 | 213 | 29,24 | 0,116 |
| | V, m/sek | 1,3 | 1,3 | 1 | 1 | 0,7 | 0,5 | 0,8 | 1,2 | 1,1 | 1,1 | 1 | 1,3 | 0,5 | 0,20 | 0,200 |
| | T, °C | 25,1 | 25,6 | 25,4 | 24,8 | 24,7 | 24,6 | 25,4 | 25,4 | 25,2 | 25,5 | 25,17 | 25,6 | 24,6 | 0,30 | 0,012 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| September | H, cm | 187 | 192 | 132 | 136 | 160 | 122 | 173 | 171 | 155 | 118 | 154,6 | 192,0 | 118 | 22,08 | 0,143 |
| | V, m/sek | 0,3 | 0,4 | 0,3 | 0,2 | 0,2 | 0,1 | 0,2 | 0,3 | 0,3 | 0,2 | 0,25 | 0,4 | 0,1 | 0,07 | 0,280 |
| | T, °C | 22,5 | 22,8 | 22,9 | 23,2 | 23,4 | 23,1 | 23,2 | 23,4 | 23,6 | 23,1 | 23,12 | 23,6 | 22,5 | 0,24 | 0,010 |
| October | H, cm | 114 | 174 | 145 | 115 | 107 | 110 | 187 | 210 | 128 | 168 | 145,8 | 210,0 | 107 | 31,16 | 0,214 |
| | V, m/sek | 0,1 | 0,4 | 0,1 | 0,2 | 0,1 | 0,1 | 0,3 | 0,3 | 0,2 | 0,3 | 0,21 | 0,4 | 0,1 | 0,09 | 0,438 |
| | T, °C | 22,5 | 22,6 | 23,5 | 23,6 | 23,1 | 22,5 | 22,8 | 24,2 | 22,4 | 23,4 | 23,06 | 24,2 | 22,4 | 0,50 | 0,022 |
| November | H, cm | 145 | 121 | 125 | 144 | 120 | 74 | 223 | 225 | 141 | 200 | 151,8 | 225,0 | 74 | 38,52 | 0,254 |
| | V, m/sek | 0,5 | 0,1 | 0,2 | 0,5 | 0,2 | 0,05 | 0,8 | 0,4 | 0,3 | 0,3 | 0,34 | 0,8 | 0,05 | 0,17 | 0,513 |
| | T, °C | 12,4 | 12,2 | 12,4 | 12,6 | 13,6 | 13,5 | 13,2 | 12,6 | 12,4 | 13,5 | 12,84 | 13,6 | 12,2 | 0,49 | 0,038 |
| December | H, cm | 117 | 0 | 139 | 187 | 141 | 252 | 222 | 230 | 154 | | 160,2 | 252,0 | 0 | 55,58 | 0,347 |
| | V, m/sek | 0,3 | 0 | 0,3 | 0,9 | 0,3 | 0,8 | 0,8 | 0,4 | 0,3 | | 0,5 | 0,9 | 0 | 0,25 | 0,553 |
| | T, °C | 10,56 | 10,8 | 11 | 11,2 | 11,3 | 11,5 | 10,2 | 10,3 | 11,1 | | 10,9 | 11,5 | 10,2 | 0,37 | 0,034 |
| Mean | H, cm | 186,67 | 184,25 | 166,58 | 182,83 | 179,75 | 200,67 | 208,50 | 241,08 | 212,42 | 217,73 | 198,05 | 241,1 | 166,6 | 18,03 | 0,09 |
| | V, m/sek | 0,56 | 0,56 | 0,53 | 0,67 | 0,48 | 0,57 | 0,64 | 0,78 | 0,68 | 0,75 | 0,62 | 0,8 | 0,48 | 0,08 | 0,13 |
| | T, °C | 18,97 | 19,13 | 19,25 | 19,22 | 19,43 | 19,33 | 19,37 | 19,48 | 19,38 | 20,12 | 19,37 | 20,1 | 19,0 | 0,19 | 0,01 |
| Max | H, cm | 303 | 302 | 228 | 255 | 295 | 310 | 310 | 346 | 322 | 322 | | | | | |
| | V, m/sek | 1,3 | 1,3 | 1 | 1,3 | 1,3 | 1,4 | 1,4 | 1,4 | 1,4 | 1,3 | | | | | |
| | T, °C | 25,1 | 25,6 | 25,4 | 24,8 | 25,1 | 24,6 | 25,4 | 25,6 | 25,2 | 25,5 | | | | | |
| Min | H, cm | 114 | 0 | 92 | 114 | 107 | 74 | 124 | 160 | 128 | 118 | | | | | |
| | V, m/sek | 0,1 | 0 | 0,1 | 0,1 | 0,1 | 0,05 | 0,2 | 0,3 | 0,2 | 0,2 | | | | | |
| | T, °C | 10,6 | 10,8 | 11,0 | 11,2 | 11,3 | 11,5 | 10,2 | 10,3 | 11,1 | 13,5 | | | | | |

Note: extreme values are highlighted

*Attachment 3 Monthly mean water discharge of Dustlik canal for 1932-2006 years*

| Year | I | II | III | IV | V | VI | VII | VIII | IX | X | XI | XII | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1932 | 11,7 | 11,5 | 1,85 | 18,9 | 35 | 59,8 | 80,6 | 72 | 42,8 | 32,2 | 20,6 | 8,11 | 32,9 |
| 1933 | 3,88 | 4,52 | 0 | 6,9 | 34,2 | 65,3 | 79,1 | 70,5 | 38,3 | 18,3 | 13,5 | 7,73 | 28,5 |
| 1934 | 4,2 | 3,23 | 0 | 3,7 | 16,1 | 55,7 | 81,2 | 71 | 33,7 | 15,2 | 13,5 | 8,15 | 25,5 |
| 1935 | 3,56 | 3,81 | 1,7 | 22,2 | 51,5 | 53,4 | 73,8 | 68,4 | 28,8 | 17,3 | 9,5 | 11,5 | 28,8 |
| 1936 | 3,86 | 13,6 | 0 | 8,33 | 33 | 61,4 | 79,8 | 64,8 | 31,2 | 17 | 22,9 | 8,89 | 28,7 |
| 1937 | 5,46 | 7,16 | 0 | 10,6 | 34,2 | 68 | 75,1 | 74,1 | 36,6 | 18,9 | 12,8 | 16 | 29,9 |
| 1938 | 21,9 | 4,65 | 0 | 29 | 63 | 69 | 79 | 77 | 36 | 29,7 | 18,8 | 14,2 | 36,9 |
| 1939 | 21,4 | 0,54 | 1,15 | 20,5 | 56,9 | 75,6 | 79,9 | 79,6 | 37,1 | 36,1 | 23,2 | 27,9 | 38,3 |
| 1940 | 24,1 | 11,9 | 4,4 | 44,4 | 71,3 | 91,1 | 104 | 99,6 | 50,4 | 38,6 | 24,3 | 4,23 | 47,4 |
| 1941 | 9,13 | 12,1 | 1,47 | 1,91 | 83,5 | 118 | 127 | 111 | 69,8 | 43,5 | 33,3 | 14,7 | 52,1 |
| 1942 | 13,7 | 5,93 | 2,31 | 59,7 | 109 | 128 | 151 | 134 | 54,1 | 23,3 | 18,2 | 18,5 | 59,8 |
| 1943 | 13,7 | 5,98 | 2,31 | 12,4 | 61,6 | 104 | 120 | 119 | 52 | 23 | 96 | 12,2 | 51,9 |
| 1944 | 14 | 5 | 1 | 7,5 | 64 | 104 | 123 | 122 | 53,5 | 15,7 | 9,2 | 20,6 | 45,0 |
| 1945 | 14,5 | 4 | 0 | 3,1 | 66,3 | 105 | 127 | 124 | 55,1 | 8,8 | 15,2 | 22,6 | 45,5 |
| 1946 | 15,6 | 0,64 | 1,8 | 59,2 | 96,7 | 106 | 124 | 114 | 55,3 | 9,45 | 21 | 20,9 | 52,1 |
| 1947 | 5,1 | 1,24 | 3,89 | 44,3 | 66,1 | 108 | 105 | 111 | 55,6 | 11,7 | 9,9 | 24,8 | 45,6 |
| 1948 | 25,1 | 0 | 2,9 | 10,7 | 79 | 115 | 132 | 127 | 52 | 13,2 | 16,9 | 16 | 49,2 |
| 1949 | 3,83 | 4,57 | 0 | 13,8 | 41,8 | 115 | 140 | 115 | 50,7 | 6,71 | 5,47 | 13,7 | 42,6 |
| 1950 | 16 | 0 | 7,4 | 63,9 | 108 | 117 | 134 | 118 | 41,3 | 19,2 | 17,3 | 16,1 | 54,9 |
| 1951 | 9,6 | 16,2 | 2,44 | 36,5 | 94,2 | 127 | 137 | 69,4 | 60,4 | 15,4 | 30,7 | 33,5 | 52,7 |
| 1952 | 17,1 | 0 | 1,41 | 13,5 | 75,3 | 141 | 130 | 140 | 51,4 | 12,9 | 18,1 | 25,6 | 52,2 |
| 1953 | 21,6 | 1,75 | 0 | 14,7 | 93,4 | 129 | 153 | 133 | 48,8 | 9,6 | 10 | 15,1 | 52,5 |
| 1954 | 4,54 | 0,98 | 1,3 | 2,85 | 89,1 | 139 | 152 | 134 | 42,3 | 15,9 | 11,3 | 10,9 | 50,4 |
| 1955 | 24,3 | 29 | 1,47 | 9,55 | 98,8 | 135 | 166 | 155 | 56,6 | 14,6 | 11,7 | 38,9 | 61,7 |
| 1956 | 18,2 | 3,41 | 0 | 11,8 | 83,9 | 164 | 126 | 161 | 62,3 | 17,7 | 17,4 | 40,7 | 58,9 |
| 1957 | 6,49 | 6,82 | 2,29 | 10,2 | 130 | 156 | 193 | 178 | 6,86 | 24,2 | 19 | 31,6 | 63,7 |
| 1958 | 62,4 | 1,3 | 0 | 184 | 34,8 | 160 | 188 | 176 | 83,2 | 21,7 | 18 | 28,4 | 79,8 |
| 1959 | 9 | 10 | 0 | 18,7 | 86,8 | 167 | 200 | 173 | 62,9 | 22,6 | 18,6 | 54,5 | 68,6 |
| 1960 | 23,5 | 0 | 0 | 6,7 | 69,2 | 123 | 213 | 200 | 68 | 33,9 | 37,8 | 66,2 | 70,1 |
| 1961 | 70,9 | 37,1 | 1,32 | 23,3 | 112 | 187 | 195 | 164 | 51,1 | 36,7 | 44,7 | 109 | 86,0 |
| 1962 | 79,5 | 5,61 | 14,1 | 83 | 83,2 | 177 | 220 | 195 | 71 | 28,6 | 30,5 | 37,9 | 85,5 |
| 1963 | 113 | 61,4 | 8,56 | 75,7 | 82,2 | 198 | 228 | 159 | 60,5 | 28,1 | 0,62 | 8,74 | 85,3 |
| 1964 | 87,9 | 106 | 11,9 | 7,79 | 59,3 | 18,2 | 218 | 195 | 55,2 | 26,6 | 20,9 | 56,8 | 72,0 |
| 1965 | 82,4 | 20,2 | 15,2 | 24,7 | 146 | 186 | 196 | 147 | 49,3 | 28,2 | 28,3 | 123 | 87,2 |
| 1966 | 86,8 | 15 | 15,9 | 61 | 104 | 189 | 223 | 150 | 44,3 | 36,8 | 39,1 | 176 | 95,1 |
| 1967 | 57,8 | 2 | 35,8 | 43 | 91,4 | 191 | 223 | 193 | 58 | 27,5 | 26,6 | 157 | 92,2 |
| 1968 | 128 | 0 | 0 | 31,7 | 106 | 183 | 220 | 187 | 70,7 | 35,6 | 37,6 | 123 | 93,6 |
| 1969 | 15,5 | 0 | 0 | 0 | 25,3 | 129 | 213 | 186 | 65,5 | 34,1 | 22,9 | 5,2 | 58,0 |
| 1970 | 106 | 27,1 | 4,02 | 51,6 | 125 | 208 | 220 | 152 | 59 | 35,8 | 45,1 | 182 | 101,3 |
| 1971 | | | | | | | | | | | | | |
| 1972 | | | | | | | | | | | | | |
| 1973 | 23,1 | 0 | 3,9 | 47,2 | 123 | 208 | 219 | 193 | 66,7 | 14 | 76,4 | | 88,6 |
| 1974 | 47 | 0 | 3,55 | 60,4 | 109 | 154 | 147 | 113 | 48,3 | 51,1 | 93,1 | 165 | 82,6 |
| 1975 | 21,4 | 0 | 0 | 44,7 | 100 | 129 | 136 | 75,3 | 50 | 41,8 | 99,5 | 173 | 72,6 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1976 | 69 | 0 | 0 | 3,6 | 90,8 | 151 | 180 | 136 | 56,4 | 39,1 | 48,3 | 146 | 76,7 |
| 1977 | 123 | 58,4 | 7,43 | 58,2 | 105 | 120 | 177 | 78,8 | 38,2 | 19,1 | 52,7 | 163 | 83,4 |
| 1978 | 89,7 | 11,7 | 0,18 | 41,7 | 78,7 | 148 | 219 | 151 | 53,2 | 37,9 | 27,8 | 72,6 | 77,6 |
| 1979 | 19 | 40,2 | 7,23 | 23,7 | 63,8 | 148 | 213 | 169 | 49,3 | 47,9 | 24,7 | 128 | 77,8 |
| 1980 | 190 | 5,7 | 2,9 | 54,7 | 102 | 172 | 217 | 163 | 64,4 | 51 | 53,1 | 155 | 102,6 |
| 1981 | 22,8 | 6 | 4,42 | 26,8 | 87,4 | 178 | 219 | 160 | 58,3 | 45,9 | 42,5 | 196 | 87,3 |
| 1982 | 128 | 0 | 16,1 | 39,6 | 123 | 159 | 158 | 135 | 31,7 | 12,3 | 0 | 29,8 | 69,4 |
| 1983 | 180 | 45,8 | 14,1 | 28,5 | 79,8 | 140 | 190 | 146 | 37,9 | 23,4 | 4,66 | 58,3 | 79,0 |
| 1984 | 168 | 13,2 | 1,55 | 14,9 | 83,5 | 155 | 205 | 149 | 27,7 | 9 | 28 | | 71,2 |
| 1985 | 140 | 30,6 | 143 | 75 | 69,2 | 90,4 | 197 | 144 | 19,1 | 16,1 | 1,97 | 14,6 | 78,4 |
| 1986 | 120 | 8,05 | 3,5 | 42 | 84,9 | 139 | 213 | 169 | 28,3 | 13,4 | 6,8 | 108 | 78,0 |
| 1987 | 162 | 3,64 | | 29,7 | 65 | 149 | 208 | 172 | 52 | 15,6 | | 112 | 80,8 |
| 1988 | 128 | 0 | 3,55 | 44,4 | 82,5 | 142 | 210 | 169 | 28,3 | 14,4 | 4,8 | 109 | 78,0 |
| 1989 | 115 | | 5,42 | 43 | 86,7 | 134 | 203 | 157 | 35,2 | 9,97 | 0,97 | 7,32 | 72,5 |
| 1990 | 144,7 | 2,7 | 7 | 27,7 | 66,8 | 149,2 | 200,5 | 164 | 18,2 | 7,8 | 0 | 108,9 | 75,1 |
| 1991 | 112,8 | 0 | 0 | 33,5 | 75,7 | 142,7 | 200,7 | 166,5 | 14,1 | 14 | 2,5 | 54,3 | 67,8 |
| 1992 | 145 | 17,7 | 4,8 | 47,6 | 44,9 | 135,3 | 190 | 190,7 | 35,8 | 9,9 | 13,4 | 7 | 70,2 |
| 1993 | 152,8 | 62 | 0 | 34,1 | 30,8 | 109,7 | 195,7 | 179,9 | 43,9 | 28,9 | 5,5 | 0 | 70,3 |
| 1994 | 0 | 46 | 63,7 | 83,3 | 82,6 | 148,3 | 196,5 | 144,8 | 97,8 | 43,8 | 26 | 44,5 | 81,4 |
| 1995 | 107,5 | 33 | 6,1 | 40 | 70,5 | 96,9 | 130,3 | 90,9 | 16,6 | 21,9 | 45,7 | 51,3 | 59,2 |
| 1996 | 98,4 | 43,1 | 0 | 36,9 | 76,3 | 116,5 | 171,1 | 169,1 | 44,9 | 40,3 | 58 | 44,2 | 74,9 |
| 1997 | 109,5 | 73,5 | 9,7 | 45,7 | 43 | 87,5 | 143,3 | 120,5 | 22 | 49,4 | 62,1 | 52 | 68,2 |
| 1998 | 95 | 73 | 4,8 | 49,1 | 47,9 | 66,3 | 160,7 | 163,9 | 34,7 | 46,6 | 59,9 | 13,2 | 67,9 |
| 1999 | 49,8 | 61,7 | 46,5 | 56,8 | 86,7 | 98,7 | 161,8 | 160,2 | 43,5 | 49,5 | 36,1 | 3,6 | 71,2 |
| 2000 | 57,8 | 69,1 | 109,9 | 40 | 59,6 | 81,6 | 99,5 | 135,1 | 62,9 | 58,1 | 25,3 | 0 | 66,6 |
| 2001 | 61 | 127,4 | 134 | 52,2 | 52,8 | 86,4 | 139,3 | 95,1 | 32,6 | 57,2 | 10 | 3,3 | 71,0 |
| 2002 | 48,6 | 72,3 | 91,8 | 23,4 | 37,2 | 81,9 | 127,6 | 157 | 41,3 | 39,1 | 44,6 | 7,2 | 64,3 |
| 2003 | 9,7 | 110,6 | 103,9 | 13,8 | 54,9 | 64,1 | 145,7 | 167,4 | 39,3 | 46,2 | 15,2 | 0 | 64,2 |
| 2004 | 57,6 | 106 | 108,8 | 43,9 | 63,5 | 107,6 | 190,7 | 174,8 | 38,1 | 38,4 | 24,7 | 6,7 | 80,1 |
| 2005 | 54,6 | 93,4 | 122,3 | 67,5 | 77 | 124,4 | 186,9 | 153,9 | 31,1 | 33,5 | 44,2 | 54,3 | 86,9 |
| 2006 | 76,6 | 65,5 | 111,4 | 56,2 | 85,7 | 125,2 | 155,9 | 155,5 | 73,6 | 62,4 | 47,6 | 52,1 | 89,0 |
| | J | F | M | A | M | J | J | A | S | O | N | D | Annual |
| Mean | 92,0 | 38,8 | 34,6 | 42,1 | 76,2 | 127,6 | 179,6 | 149,1 | 42,2 | 32,6 | 32,9 | 66,9 | 76,0 |
| Max | 190 | 127,4 | 143 | 83,3 | 123 | 208 | 219 | 193 | 97,8 | 62,4 | 99,5 | 196 | 102,6 |
| Min | 0 | 0 | 0 | 3,6 | 30,8 | 64,1 | 99,5 | 75,3 | 14,1 | 7,8 | 0 | 0 | 59,2 |
| Standard deviation | 52,7 | 37,6 | 48,9 | 17,0 | 22,5 | 33,2 | 32,0 | 29,4 | 17,9 | 17,0 | 27,1 | 61,4 | 8,7 |
| $C_V$ (coefficient of variation | 0,57 | 0,97 | 1,41 | 0,40 | 0,30 | 0,26 | 0,18 | 0,20 | 0,42 | 0,52 | 0,82 | 0,92 | 0,1 |

*Attachment 4 Monthly mean water discharge of YG canal for 1976 -2013 years*

| Year | I | II | III | IV | V | VI | VII | VIII | IX | X | XI | XII | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1976 | 127 | 118 | 0,35 | 12,2 | 8,8 | 219 | 274 | 218 | 59,9 | 35 | 11,9 | 112 | 99,7 |
| 1977 | 104 | 36,1 | 33,9 | 99,2 | 200 | 205 | 262 | 143 | 65,6 | 33,5 | 9,9 | 73 | 105 |
| 1978 | 106 | 18,8 | 4,93 | 45 | 70,9 | 231 | 290 | 215 | 55,8 | 40,8 | 13,4 | 14 | 92,1 |
| 1979 | 110 | 16,8 | 19 | 10,6 | 62 | 244 | 292 | 290 | 59,7 | 30,6 | 22,2 | 72,7 | 102 |
| 1980 | 195 | 66,8 | 9,8 | 58,4 | 104 | 274 | 310 | 229 | 65,3 | 39,2 | 42,3 | 19 | 117 |
| 1981 | 115 | 42,3 | 1,5 | 35,3 | 101 | 277 | 304 | 202 | 55 | 46 | 54 | 115 | 118 |
| 1982 | 174 | 12 | 48 | 78 | 210 | 256 | 280 | 209 | 44,1 | 25,8 | 0,2 | 18,6 | 113 |
| 1983 | 132 | 110 | 46,3 | 71,5 | 122 | 236 | 310 | 250 | 43,8 | 17,8 | 30,5 | 51 | 134 |
| 1984 | 137 | 49,3 | 55,9 | 9,47 | 111 | 253 | 334 | 279 | 46,3 | 9,87 | 5 | 5 | 112 |
| 1985 | 108 | 39,3 | 131 | 38,9 | 119 | 243 | 315 | 240 | 41,1 | 20,8 | 18 | 119 | 110 |
| 1986 | 114 | 42,5 | 26,8 | 70,6 | 148 | 177 | 286 | 246 | 39,7 | 11 | 33,7 | 15,2 | 113 |
| 1987 | 132 | 61,1 | 16,6 | 40,2 | 96,3 | 269 | 325 | 285 | 58,2 | 21,5 | 7,95 | 36,4 | 112 |
| 1988 | 80 | 24,5 | 152 | 59,6 | 104 | 291 | 349 | 252 | 28,7 | 25,4 | 29,6 | 56,3 | 121 |
| 1989 | 56 | 16,9 | 114 | 177 | 114 | 236 | 330 | 272 | 49,4 | 34,2 | 5,11 | 13,9 | 118 |
| 1990 | 52 | 20,3 | 130 | 141 | 91,9 | 264 | 338 | 276 | 58,2 | 39,2 | 1,2 | 50,1 | 122 |
| 1991 | 57 | 38,6 | 114 | 128 | 88,3 | 242 | 329 | 266 | 53,3 | 41,7 | 9,1 | 7,4 | 114 |
| 1992 | 39 | 76,8 | 111 | 175 | 17,5 | 232 | 326 | 278 | 74,6 | 47,2 | 20,4 | 45,7 | 116 |
| 1993 | 18 | 36,7 | 23,7 | 180 | 49,4 | 188 | 338 | 269 | 85,5 | 64,2 | 24,9 | 37,5 | 106 |
| 1994 | 106 | 53,2 | 25,6 | 154 | 131 | 241 | 328 | 234 | 70 | 85,9 | 65 | 22,2 | 113 |
| 1995 | 66 | 65,3 | 37,1 | 202 | 190 | 220 | 268,7 | 262 | 75,4 | 80,1 | 115 | 19,6 | 133 |
| 1996 | 46 | 63 | 12,6 | 202 | 190 | 220 | 268,7 | 262 | 75,4 | 83,6 | 177 | 58,9 | 138 |
| 1997 | 123 | 91,6 | 76,1 | 166 | 85,1 | 194 | 272,7 | 232 | 73,9 | 122 | 142 | 75,8 | 138 |
| 1998 | 94 | 68,2 | 36,6 | 161 | 129 | 137 | 284 | 242 | 94,7 | 135 | 162 | 20,4 | 130 |
| 1999 | 102 | 56,2 | 112 | 136 | 216 | 200 | 275,8 | 256 | 102 | 145 | 65,6 | 31,6 | 141 |
| 2000 | 94 | 132 | 194 | 118 | 189 | 211 | 234,7 | 259 | 130 | 131 | 112 | 18,9 | 152 |
| 2001 | 111 | 140 | 171 | 152 | 154 | 167 | 204,9 | 216 | 98,8 | 101 | 73,1 | 15,7 | 134 |
| 2002 | 100 | 112 | 121 | 29 | 88,4 | 184 | 210,7 | 223 | 92,4 | 86,1 | 109 | 17,3 | 114 |
| 2003 | 59 | 137 | 119 | 91,2 | 159 | 147 | 213,6 | 221 | 116 | 9,5 | 4,5 | 8,8 | 107 |
| 2004 | 63 | 108 | 131 | 146 | 208 | 208 | 268,7 | 263 | 111 | 96,2 | 65,5 | 4,9 | 139 |
| 2005 | 69 | 54,8 | 139 | 193 | 200 | 236 | 289,4 | 238 | 118 | 85 | 40,3 | 73,1 | 138 |
| 2006 | 112 | 19,7 | 145 | 177 | 187 | 204 | 221,5 | 222 | 118 | 142 | 113 | 16,9 | 140 |
| 2007 | 117 | 201 | 186 | 56,5 | 143 | 190 | 253 | 235 | 110 | 148 | 114 | 113 | 156 |
| 2008 | 86 | 89,4 | 82,7 | 121 | 88,1 | 123 | 157,5 | 136 | 85,6 | 116 | 83,7 | 145 | 109 |
| 2009 | 105 | 66,2 | 41,5 | 79,6 | 132 | 134 | 175,8 | 199 | 87,9 | 96,6 | 47,7 | 93 | 105 |
| 2010 | 31 | 90 | 103 | 143 | 128 | 166 | 232 | 202 | 72,7 | 103 | 137 | 121 | 127 |
| 2011 | **34,7** | **90,1** | **103,4** | **162,5** | **175,3** | **169,3** | **192,7** | **180,9** | **103,1** | **100,7** | **47,2** | **29,9** | 116 |
| 2012 | **104,5** | **64,4** | **130,8** | **149,2** | **178** | **171,5** | **207,7** | **189,4** | **118,9** | **114,4** | **126,6** | **84,5** | 137 |
| 2013 | **111,8** | **173,8** | **121,9** | **118,2** | **130,5** | **132** | **194,6** | **215,4** | **140,8** | **61** | **47,2** | **95,4** | 129 |

| | J | F | M | A | M | J | J | A | S | O | N | D | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean | 95,4 | 67,8 | 79,2 | 107,4 | 126,7 | 214,8 | 278,6 | 237,7 | 74,7 | 67,1 | 56,2 | 49,1 | 121,1 |
| Max | 195 | 201 | 194 | 202 | 216 | 291 | 349 | 290 | 141 | 148 | 177 | 145 | 156 |
| Min | 18,0 | 12,0 | 0,4 | 9,5 | 8,8 | 123,0 | 157,5 | 136,0 | 28,7 | 9,5 | 0,2 | 4,9 | 92,1 |
| Standard deviation | 38,3 | 43,5 | 58,3 | 60,6 | 54,2 | 42,6 | 48,4 | 35,2 | 26,4 | 44,1 | 51,1 | 40,6 | 15,4 |
| $C_V$ (coefficient of variation | 0,40 | 0,64 | 0,74 | 0,56 | 0,43 | 0,20 | 0,17 | 0,15 | 0,35 | 0,66 | 0,91 | 0,83 | 0,13 |

*Attachment 5 Estimated monthly mean water discharge of YG canal for 2010 -2019 years*

| Month | parameters | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | Сред | Max | Min |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January | H, m | 315,6 | 315,4 | 315,5 | 315,7 | 316,0 | 316,4 | 316,4 | 315,8 | 316,4 | 315,9 | 315,9 | 316,4 | 315,4 |
| | h, m | 5,9 | 5,7 | 5,8 | 6,0 | 6,3 | 6,7 | 6,7 | 6,1 | 6,7 | 6,2 | 6,2 | 6,7 | 5,7 |
| | R, m | 3,7 | 3,6 | 3,6 | 3,7 | 3,9 | 4,1 | 4,1 | 3,8 | 4,1 | 3,8 | 3,8 | 4,1 | 3,6 |
| | v, m/sek | 0,9 | 0,9 | 0,9 | 0,9 | 1,0 | 1,0 | 1,0 | 0,9 | 1,0 | 0,9 | 0,9 | 1,0 | 0,9 |
| | W, $m^2$ | 245,4 | 232,6 | 239,0 | 252,0 | 272,2 | 300,2 | 298,7 | 255,3 | 300,2 | 262,0 | 265,7 | 300,2 | 232,6 |
| | Q, $m^3$/sek | 226,7 | 210,7 | 218,6 | 234,9 | 260,8 | 297,7 | 295,8 | 239,1 | 297,7 | 247,6 | 253,0 | 297,7 | 210,7 |
| February | H, m | 315,3 | 316,0 | 315,3 | 315,3 | 315,4 | 314,7 | 315,2 | 315,5 | 316,2 | 316,0 | 315,5 | 316,2 | 314,7 |
| | h, m | 5,6 | 6,3 | 5,6 | 5,6 | 5,7 | 5,0 | 5,4 | 5,8 | 6,5 | 6,3 | 5,8 | 6,5 | 5,0 |
| | R, m | 3,5 | 3,9 | 3,5 | 3,5 | 3,6 | 3,2 | 3,4 | 3,6 | 4,0 | 3,9 | 3,6 | 4,0 | 3,2 |
| | v, m/sek | 0,9 | 1,0 | 0,9 | 0,9 | 0,9 | 0,8 | 0,9 | 0,9 | 1,0 | 1,0 | 0,9 | 1,0 | 0,8 |
| | W, $m^2$ | 226,2 | 272,2 | 226,2 | 226,9 | 232,6 | 190,0 | 216,9 | 239,0 | 286,0 | 272,2 | 238,8 | 286,0 | 190,0 |
| | Q, $m^3$/sek | 203,0 | 260,8 | 203,0 | 203,7 | 210,7 | 160,1 | 191,7 | 218,6 | 278,9 | 260,8 | 219,1 | 278,9 | 160,1 |
| March | H, m | 315,3 | 315,8 | 315,8 | 315,5 | 315,6 | 315,6 | 316,0 | 316,1 | 315,9 | 316,1 | 315,8 | 316,1 | 315,3 |
| | h, m | 5,6 | 6,1 | 6,1 | 5,8 | 5,9 | 5,9 | 6,3 | 6,4 | 6,2 | 6,4 | 6,1 | 6,4 | 5,6 |
| | R, m | 3,5 | 3,8 | 3,8 | 3,6 | 3,7 | 3,7 | 3,9 | 3,9 | 3,8 | 3,9 | 3,8 | 3,9 | 3,5 |
| | v, m/sek | 0,9 | 0,9 | 0,9 | 0,9 | 0,9 | 0,9 | 1,0 | 1,0 | 0,9 | 1,0 | 0,9 | 1,0 | 0,9 |
| | W, $m^2$ | 226,2 | 258,6 | 258,6 | 239,0 | 245,4 | 245,4 | 272,2 | 275,6 | 262,0 | 275,6 | 255,9 | 275,6 | 226,2 |
| | Q, $m^3$/sek | 203,0 | 243,4 | 243,4 | 218,6 | 226,7 | 226,7 | 260,8 | 265,2 | 247,6 | 265,2 | 240,0 | 265,2 | 203,0 |
| April | H, m | 315,4 | 316,0 | 315,9 | 315,7 | 315,6 | 316,3 | 315,5 | 315,6 | 316,3 | 314,5 | 315,7 | 316,3 | 314,5 |
| | h, m | 5,7 | 6,3 | 6,2 | 6,0 | 5,9 | 6,6 | 5,8 | 5,9 | 6,6 | 4,8 | 6,0 | 6,6 | 4,8 |
| | R, m | 3,6 | 3,9 | 3,8 | 3,7 | 3,7 | 4,0 | 3,6 | 3,7 | 4,0 | 3,1 | 3,7 | 4,0 | 3,1 |
| | v, m/sek | 0,9 | 1,0 | 0,9 | 0,9 | 0,9 | 1,0 | 0,9 | 0,9 | 1,0 | 0,8 | 0,9 | 1,0 | 0,8 |
| | W, $m^2$ | 229,4 | 272,2 | 265,4 | 252,0 | 245,4 | 293,0 | 239,0 | 242,2 | 289,5 | 178,6 | 250,7 | 293,0 | 178,6 |
| | Q, $m^3$/sek | 206,8 | 260,8 | 252,0 | 234,9 | 226,7 | 288,2 | 218,6 | 222,6 | 283,5 | 147,1 | 234,1 | 288,2 | 147,1 |
| May | H, m | 315,8 | 316,0 | 315,9 | 315,6 | 315,8 | 316,1 | 316,3 | 316,3 | 316,2 | 315,6 | 315,9 | 316,3 | 315,6 |
| | h, m | 6,1 | 6,3 | 6,2 | 5,9 | 6,1 | 6,4 | 6,6 | 6,6 | 6,4 | 5,9 | 6,2 | 6,6 | 5,9 |
| | R, m | 3,8 | 3,9 | 3,8 | 3,7 | 3,8 | 3,9 | 4,0 | 4,0 | 4,0 | 3,7 | 3,9 | 4,0 | 3,7 |
| | v, m/sek | 0,9 | 1,0 | 0,9 | 0,9 | 0,9 | 1,0 | 1,0 | 1,0 | 1,0 | 0,9 | 1,0 | 1,0 | 0,9 |
| | W, $m^2$ | 258,6 | 272,2 | 262,0 | 245,4 | 258,6 | 279,0 | 289,5 | 289,5 | 282,5 | 245,4 | 268,3 | 289,5 | 245,4 |
| | Q, $m^3$/sek | 243,4 | 260,8 | 247,6 | 226,7 | 243,4 | 269,7 | 283,5 | 283,5 | 274,3 | 226,7 | 255,9 | 283,5 | 226,7 |
| June | H, m | 315,6 | 316,0 | 315,7 | 315,9 | 316,2 | 316,3 | 316,1 | 316,2 | 316,4 | 316,0 | 316,0 | 316,4 | 315,6 |
| | h, m | 5,9 | 6,3 | 6,0 | 6,2 | 6,5 | 6,6 | 6,4 | 6,5 | 6,7 | 6,3 | 6,3 | 6,7 | 5,9 |
| | R, m | 3,7 | 3,9 | 3,7 | 3,8 | 4,0 | 4,0 | 3,9 | 4,0 | 4,1 | 3,9 | 3,9 | 4,1 | 3,7 |
| | v, m/sek | 0,9 | 1,0 | 0,9 | 0,9 | 1,0 | 1,0 | 1,0 | 1,0 | 1,0 | 1,0 | 1,0 | 1,0 | 0,9 |
| | W, $m^2$ | 245,4 | 272,2 | 252,0 | 265,4 | 286,0 | 289,5 | 279,0 | 286,0 | 296,6 | 272,2 | 274,4 | 296,6 | 245,4 |
| | Q, $m^3$/sek | 226,7 | 260,8 | 234,9 | 252,0 | 278,9 | 283,5 | 269,7 | 278,9 | 292,9 | 260,8 | 263,9 | 292,9 | 226,7 |
| July | H, m | 315,7 | 316,0 | 316,0 | 315,7 | 316,3 | 316,3 | 316,1 | 316,5 | 316,1 | 315,0 | 316,0 | 316,5 | 315,0 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | h, m | 5,9 | 6,3 | 6,3 | 6,0 | 6,6 | 6,6 | 6,4 | 6,8 | 6,4 | 5,3 | 6,3 | 6,8 | 5,3 |
| | R, m | 3,7 | 3,9 | 3,9 | 3,7 | 4,0 | 4,0 | 3,9 | 4,1 | 3,9 | 3,4 | 3,9 | 4,1 | 3,4 |
| | v, m/sek | 0,9 | 1,0 | 1,0 | 0,9 | 1,0 | 1,0 | 1,0 | 1,0 | 1,0 | 0,9 | 1,0 | 1,0 | 0,9 |
| | W, $m^2$ | 248,7 | 272,2 | 272,2 | 252,0 | 289,5 | 289,5 | 279,0 | 303,8 | 279,0 | 207,8 | 269,4 | 303,8 | 207,8 |
| | Q, $m^3$/sek | 230,8 | 260,8 | 260,8 | 234,9 | 283,5 | 283,5 | 269,7 | 302,5 | 269,7 | 180,8 | 257,7 | 302,5 | 180,8 |
| August | H, m | 315,7 | 316,0 | 315,9 | 316,0 | 316,2 | 316,0 | 316,1 | 316,5 | 316,2 | 316,0 | 316,0 | 316,5 | 315,7 |
| | h, m | 6,0 | 6,3 | 6,2 | 6,3 | 6,4 | 6,3 | 6,4 | 6,8 | 6,4 | 6,3 | 6,3 | 6,8 | 6,0 |
| | R, m | 3,7 | 3,9 | 3,8 | 3,9 | 4,0 | 3,9 | 3,9 | 4,1 | 4,0 | 3,9 | 3,9 | 4,1 | 3,7 |
| | v, m/sek | 0,9 | 1,0 | 0,9 | 1,0 | 1,0 | 1,0 | 1,0 | 1,0 | 1,0 | 1,0 | 1,0 | 1,0 | 0,9 |
| | W, $m^2$ | 252,0 | 272,2 | 265,4 | 272,2 | 282,5 | 272,2 | 279,0 | 303,8 | 282,5 | 272,2 | 275,4 | 303,8 | 252,0 |
| | Q, $m^3$/sek | 234,9 | 260,8 | 252,0 | 260,8 | 274,3 | 260,8 | 269,7 | 302,5 | 274,3 | 260,8 | 265,1 | 302,5 | 234,9 |
| September | H, m | 315,6 | 315,5 | 315,8 | 315,7 | 315,5 | 315,9 | 315,6 | 316,0 | 314,7 | 314,6 | 315,5 | 316,0 | 314,6 |
| | h, m | 5,9 | 5,8 | 6,1 | 6,0 | 5,8 | 6,2 | 5,9 | 6,3 | 5,0 | 4,9 | 5,8 | 6,3 | 4,9 |
| | R, m | 3,7 | 3,6 | 3,8 | 3,7 | 3,6 | 3,8 | 3,7 | 3,9 | 3,2 | 3,2 | 3,6 | 3,9 | 3,2 |
| | v, m/sek | 0,9 | 0,9 | 0,9 | 0,9 | 0,9 | 0,9 | 0,9 | 1,0 | 0,8 | 0,8 | 0,9 | 1,0 | 0,8 |
| | W, $m^2$ | 245,4 | 239,0 | 258,6 | 252,0 | 239,0 | 264,0 | 245,4 | 268,8 | 190,0 | 184,2 | 238,6 | 268,8 | 184,2 |
| | Q, $m^3$/sek | 226,7 | 218,6 | 243,4 | 234,9 | 218,6 | 250,2 | 226,7 | 256,3 | 160,1 | 153,5 | 218,9 | 256,3 | 153,5 |
| October | H, m | 315,6 | 315,9 | 315,5 | 315,7 | 315,1 | 315,7 | 315,6 | 316,2 | 315,9 | 316,0 | 315,7 | 316,2 | 315,1 |
| | h, m | 5,9 | 6,2 | 5,8 | 6,0 | 5,4 | 6,0 | 5,9 | 6,4 | 6,2 | 6,3 | 6,0 | 6,4 | 5,4 |
| | R, m | 3,7 | 3,8 | 3,6 | 3,7 | 3,4 | 3,7 | 3,7 | 4,0 | 3,8 | 3,9 | 3,7 | 4,0 | 3,4 |
| | v, m/sek | 0,9 | 0,9 | 0,9 | 0,9 | 0,9 | 0,9 | 0,9 | 1,0 | 0,9 | 1,0 | 0,9 | 1,0 | 0,9 |
| | W, $m^2$ | 245,4 | 265,4 | 235,8 | 252,0 | 213,8 | 252,0 | 245,4 | 282,5 | 265,4 | 272,2 | 253,0 | 282,5 | 213,8 |
| | Q, $m^3$/sek | 226,7 | 252,0 | 214,6 | 234,9 | 188,0 | 234,9 | 226,7 | 274,3 | 252,0 | 260,8 | 236,0 | 274,3 | 188,0 |
| November | H, m | 315,6 | 316,2 | 315,9 | 316,0 | 316,2 | 315,7 | 316,2 | 316,2 | 316,1 | 316,2 | 316,0 | 316,2 | 315,6 |
| | h, m | 5,9 | 6,4 | 6,2 | 6,3 | 6,5 | 6,0 | 6,5 | 6,4 | 6,4 | 6,5 | 6,3 | 6,5 | 5,9 |
| | R, m | 3,7 | 4,0 | 3,8 | 3,9 | 4,0 | 3,7 | 4,0 | 4,0 | 3,9 | 4,0 | 3,9 | 4,0 | 3,7 |
| | v, m/sek | 0,9 | 1,0 | 0,9 | 1,0 | 1,0 | 0,9 | 1,0 | 1,0 | 1,0 | 1,0 | 1,0 | 1,0 | 0,9 |
| | W, $m^2$ | 245,4 | 282,5 | 265,4 | 272,2 | 286,0 | 252,0 | 286,0 | 282,5 | 279,0 | 286,0 | 273,7 | 286,0 | 245,4 |
| | Q, $m^3$/sek | 226,7 | 274,3 | 252,0 | 260,8 | 278,9 | 234,9 | 278,9 | 274,3 | 269,7 | 278,9 | 262,9 | 278,9 | 226,7 |
| December | H, m | 315,5 | 315,5 | 315,6 | 315,4 | 316,1 | 315,7 | 316,0 | 316,5 | 316,0 | | 315,8 | 316,5 | 315,4 |
| | h, m | 5,8 | 5,8 | 5,9 | 5,7 | 6,4 | 6,0 | 6,3 | 6,8 | 6,3 | | 6,1 | 6,8 | 5,7 |
| | R, m | 3,6 | 3,6 | 3,7 | 3,6 | 3,9 | 3,7 | 3,9 | 4,1 | 3,9 | | 3,8 | 4,1 | 3,6 |
| | v, m/sek | 0,9 | 0,9 | 0,9 | 0,9 | 1,0 | 0,9 | 1,0 | 1,0 | 1,0 | | 0,9 | 1,0 | 0,9 |
| | W, $m^2$ | 239,0 | 239,0 | 245,4 | 232,6 | 275,6 | 252,0 | 268,8 | 303,8 | 272,2 | | 258,7 | 303,8 | 232,6 |
| | Q, $m^3$/sek | 218,6 | 218,6 | 226,7 | 210,7 | 265,2 | 234,9 | 256,3 | 302,5 | 260,8 | | 243,8 | 302,5 | 210,7 |
| Mean | v, m/sek | 315,6 | 315,9 | 315,7 | 315,7 | 315,8 | 315,9 | 315,9 | 316,1 | 316,0 | 315,6 | 315,8 | 316,1 | 315,6 |
| | W, $m^2$ | 242,3 | 262,5 | 253,8 | 251,1 | 260,6 | 264,9 | 266,6 | 277,7 | 273,7 | 248,0 | 260,1 | 277,7 | 242,3 |
| | Q, $m^3$/sek | 222,8 | 248,5 | 237,4 | 234,0 | 246,3 | 252,1 | 254,0 | 268,4 | 263,4 | 231,2 | 245,8 | 268,4 | 222,8 |
| Max | v, m/sek | 315,8 | 316,2 | 316,0 | 316,0 | 316,3 | 316,4 | 316,4 | 316,5 | 316,4 | 316,2 | 316,2 | 316,5 | 315,8 |
| | W, $m^2$ | 258,6 | 282,5 | 272,2 | 272,2 | 289,5 | 300,2 | 298,7 | 303,8 | 300,2 | 286,0 | 286,4 | 303,8 | 258,6 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Q, m³/sek | 243,4 | 274,3 | 260,8 | 260,8 | 283,5 | 297,7 | 295,8 | 302,5 | 297,7 | 278,9 | 279,5 | 302,5 | 243,4 |
| Min | v, m/sek | 315,3 | 315,4 | 315,3 | 315,3 | 315,1 | 314,7 | 315,2 | 315,5 | 314,7 | 314,5 | 315,1 | 315,5 | 314,5 |
| | W, m² | 226,2 | 232,6 | 226,2 | 226,9 | 213,8 | 190,0 | 216,9 | 239,0 | 190,0 | 178,6 | 214,0 | 239,0 | 178,6 |
| | Q, m³/sek | 203,0 | 210,7 | 203,0 | 203,7 | 188,0 | 160,1 | 191,7 | 218,6 | 160,1 | 147,1 | 188,6 | 218,6 | 147,1 |

*Attachment 6 Physical and chemical parameters of used water at Syrdarya TPP for 2015-2019 years*

Physical and chemical parameters of used water at Sirdaryo TPP for 2019

Supply canal

| | T, °C | pH | $NO_2$, mg/l | $NO_3$, mg/l | $NH_4$, mg/l | Alcalinity, mgEq/l | Hardness, mgEq/l | $Cl_2$, mg/l | Fe, mg/l | $PO_2$ | БП К-5, mg/l | н/п | $SO_4$, mg/l | Suspended solids | TDS, mg/l |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jan | 5 | 8 | 0,12 | 9,2 | 0,21 | 3,2 | 13 | 55,1 | 0,059 | 8,7 | 6,7 | 0,095 | 277 | 35,8 | 1255 |
| Feb | 5,3 | 8,2 | 0,085 | 8,1 | 0,35 | 3 | 13,3 | 53,3 | 0,09 | 7,8 | 7 | 0,098 | 317,6 | 36 | 1474 |
| Mar | 12 | 8,3 | 0,091 | 8,6 | 0,38 | 2,7 | 13,6 | 56 | 0,11 | 7,2 | 6,1 | 0,12 | 310,5 | 26 | 1285 |
| Apr | 18 | 8,2 | 0,078 | 8,7 | 0,28 | 2,6 | 14,1 | 61,2 | 0,04 | 7 | 6,2 | 0,33 | 380 | 38,3 | 1591 |
| May | 21 | 8,05 | 0,09 | 7,8 | 0,18 | 2,6 | 12,2 | 52,8 | 0,1 | 6,1 | 5,1 | 0,066 | 406,7 | 25,1 | 1245 |
| Jun | 24 | 8 | 0,014 | 8,5 | 0,19 | 2,5 | 12 | 54,4 | 0,17 | 6,5 | 5,4 | 0,096 | 372 | 40,2 | 1320 |
| Jul | 28 | 7,9 | 0,012 | 8 | 0,34 | 2,8 | 11,9 | 65,6 | 0,05 | 6,5 | 4,4 | 0,08 | 457,4 | 19 | 1093 |
| Aug | 28 | 7,75 | 0,23 | 6,8 | 0,24 | 3 | 12,6 | 77,7 | 0,07 | 8,6 | 7,7 | 0,18 | 307 | 18,6 | 1070 |
| Sep | 23 | 7,73 | 0,21 | 7,2 | 0,19 | 3,3 | 11 | 91 | 0,09 | 8 | 7,3 | 0,15 | 271 | 18,5 | 1322 |
| Oct | 21 | 7,9 | 0,044 | 8,6 | 0,21 | 2,8 | 11,5 | 88 | 0,17 | 9,2 | 8,5 | 0,11 | 297 | 38,5 | 1180 |
| Nov | 11 | 7,9 | 0,035 | 7,7 | 0,21 | 3,1 | 9,6 | 77,2 | 0,17 | 10,5 | 8,5 | 0,07 | 312,5 | 21 | 1265 |
| Dec | 12 | 8,05 | 0,038 | 9,3 | 0,18 | 3,1 | 9,6 | 69,6 | 0,12 | 12,6 | 9,9 | 0,073 | 313 | 10,3 | 918,3 |
| Mean | 17,3 | 8 | 0,09 | 8,2 | 0,25 | 2,9 | 12 | 66,8 | 0,1 | 8,2 | 6,9 | 0,12 | 335,1 | 27,3 | 1251,5 |
| Max | 28 | 8,3 | 0,23 | 9,3 | 0,38 | 3,3 | 14,1 | 91 | 0,17 | 12,6 | 9,9 | 0,33 | 457,4 | 40,2 | 1591 |

Outlet canal

| | T, °C | pH | $NO_2$, mg/l | $NO_3$, mg/l | $NH_4$, mg/l | Alcalinity, mgEq/l | Hardness, mgEq/l | $Cl_2$, mg/l | Fe, mg/l | $PO_2$ | БПК-5, mg/l | н/п | $SO_4$, mg/l | Suspended solids | TDS, mg/l |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jan | 11 | 8,1 | 0,04 | 9,6 | 0,24 | 3,3 | 9,8 | 57,9 | 0,06 | 12,8 | 10,7 | 0,1 | 301 | 13 | 1277 |
| Feb | 14 | 8,2 | 0,039 | 9,1 | 0,38 | 3,2 | 9,9 | 56,6 | 0,092 | 11,5 | 9,3 | 0,1 | 347,8 | 26 | 1497 |
| Mar | 18 | 8,4 | 0,046 | 9,2 | 0,4 | 3 | 12 | 59,6 | 0,13 | 9,5 | 8,8 | 0,125 | 324 | 44,2 | 1296,5 |
| Apr | 23 | 8,3 | 0,24 | 8,9 | 0,35 | 3,3 | 11 | 66,6 | 0,05 | 8,5 | 7,6 | 0,34 | 412,2 | 21,8 | 1693 |
| May | 25,3 | 8,2 | 0,27 | 8,6 | 0,2 | 2,9 | 11,8 | 57,3 | 0,13 | 8,9 | 7,85 | 0,085 | 436 | 19,9 | 1268 |
| Jun | 30 | 8,15 | 0,014 | 9,3 | 0,22 | 2,9 | 12,2 | 60,2 | 0,21 | 6,9 | 5 | 0,1 | 390 | 22,6 | 1338 |
| Jul | 34 | 8,05 | 0,017 | 8,3 | 0,39 | 2,7 | 12,1 | 71,6 | 0,068 | 6,5 | 5,7 | 0,094 | 474,2 | 49,8 | 1169 |
| Aug | 34 | 8 | 0,099 | 7,7 | 0,28 | 2,7 | 12,7 | 80,5 | 0,087 | 6,8 | 5,9 | 0,2 | 383 | 30,9 | 1106 |
| Sep | 28 | 7,95 | 0,1 | 7,9 | 0,21 | 2,7 | 13,8 | 96,5 | 0,1 | 6,9 | 7,5 | 0,17 | 291 | 45,2 | 1380 |
| Oct | 25 | 8,1 | 0,092 | 8,8 | 0,22 | 2,7 | 13,9 | 91 | 0,18 | 7,6 | 7 | 0,12 | 301 | 29 | 1194 |
| Nov | 18 | 8,1 | 0,09 | 8,6 | 0,22 | 3,2 | 13,8 | 80 | 0,11 | 8,6 | 7,6 | 0,097 | 389 | 45 | 1287 |
| Dec | 16,3 | 8,18 | 0,14 | 9,6 | 0,19 | 3,4 | 12,5 | 73 | 0,15 | 9,4 | 6,93 | 0,075 | 324 | 47,6 | 945,9 |
| Mean | 23 | 8,1 | 0,099 | 8,8 | 0,27 | 2,9 | 12,1 | 70,9 | 0,11 | 8,6 | 7,5 | 0,13 | 364,4 | 32,9 | 1288 |
| Max | 34 | 8,4 | 0,27 | 9,6 | 0,4 | 3,4 | 13,9 | 96,5 | 0,21 | 12,8 | 10,7 | 0,34 | 474,2 | 49,8 | 1693 |

500 m below

| | T, °C | pH | | $NO_3$, mg/l | $NH_4$, mg/l | Alcalinity, | Hardness, | $Cl_2$, mg/l | Fe, mg/l | $PO_2$ | | н/п | $SO_4$, mg/l | | TDS, mg/l |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| | | | $NO_2$, mg/l | | | mgEq/l | mgEq/l | | | | БПК-5, mg/l | | | Suspended solids | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jan | 7 | 8,1 | 0,044 | 8,7 | 0,28 | 3 | 9,4 | 51,9 | 0,055 | 12 | 9,5 | 0,048 | 270 | 12,5 | 1306 |
| Feb | 7 | 8,2 | 0,036 | 8,5 | 0,28 | 3 | 9 | 49,5 | 0,082 | 11,2 | 10,1 | 0,12 | 298,1 | 19,4 | 1560 |
| Mar | 13 | 8,3 | 0,04 | 9 | 0,38 | 2,8 | 12 | 58,5 | 0,12 | 9 | 8,6 | 0,12 | 312 | 39 | 1290 |
| Apr | 20 | 8,3 | 0,27 | 9,5 | 0,35 | 3,25 | 10,7 | 58,9 | 0,04 | 8,4 | 7,6 | 0,21 | 336 | 21,5 | 1635 |
| May | 22,3 | 8,2 | 0,22 | 8,8 | 0,2 | 3 | 11,4 | 50,4 | 0,095 | 8 | 7,3 | 0,068 | 420 | 19,4 | 1205 |
| Jun | 24,3 | 8,2 | 0,011 | 8,6 | 0,21 | 2,8 | 11,3 | 57,9 | 0,2 | 6 | 4,2 | 0,098 | 355 | 21,5 | 1316 |
| Jul | 29 | 8,1 | 0,015 | 8,4 | 0,35 | 2,6 | 11,7 | 67,8 | 0,05 | 6,3 | 5,3 | 0,083 | 455 | 30,9 | 1112 |
| Aug | 29 | 8,1 | 0,09 | 7,4 | 0,23 | 2,5 | 12,9 | 73,3 | 0,13 | 6,3 | 5,5 | 0,22 | 363 | 23,8 | 1222 |
| Sep | 25 | 8,08 | 0,081 | 7,9 | 0,2 | 2,6 | 13,6 | 87,6 | 0,08 | 6,6 | 6,2 | 0,15 | 316 | 37,8 | 1373 |
| Oct | 23 | 8,15 | 0,1 | 9,4 | 0,26 | 2,6 | 13,4 | 85 | 0,18 | 6,6 | 6,5 | 0,1 | 308,5 | 29 | 1196 |
| Nov | 12 | 8,2 | 0,08 | 8,9 | 0,24 | 3,2 | 13,3 | 71,1 | 0,08 | 8,3 | 7,2 | 0,1 | 270,4 | 62 | 1226 |
| Dec | 13,3 | 8,28 | 0,12 | 9,2 | 0,2 | 3,25 | 13 | 65,3 | 0,088 | 9,1 | 7,1 | 0,06 | 302 | 59,4 | 1081 |
| Mean | 19 | 8,2 | 0,09 | 8,7 | 0,27 | 2,9 | 11,8 | 64,8 | 0,1 | 8,15 | 7,1 | 0,11 | 333,8 | 31,3 | 1293 |
| Max | 29 | 8,3 | 0,27 | 9,5 | 0,38 | 3,25 | 13,6 | 87,6 | 0,2 | 12 | 10,1 | 0,22 | 455 | 62 | 1635 |

Physical and chemical parameters of used water at Sirdaryo TPP for 2018

Supply canal

| | T, °C | pH | $NO_2$, mg/l | $NO_3$, mg/l | $NH_4$, mg/l | Alcalinity, mgEq/l | Hardness, mgEq/l | $Cl_2$, mg/l | Fe, mg/l | $PO_2$ | БП К-5, mg/l | н/п | $SO_4$, mg/l | Suspended solids | TDS, mg/l |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jan | 4 | 8,4 | 0,034 | 9,5 | 0,39 | 2,8 | 9,3 | 36,2 | 0,1 | 11,6 | 9,4 | 0,06 | 259,4 | 38,9 | 1035,7 |
| Feb | 3,8 | 8,5 | 0,032 | 9,8 | 0,42 | 2,5 | 8,4 | 43 | 0,087 | 11,4 | 8,7 | 0,087 | 326 | 24,1 | 1086 |
| Mar | 10 | 8,4 | 0,036 | 8,1 | 0,3 | 3,1 | 9,2 | 42,2 | 0,098 | 8,9 | 6,5 | 0,076 | 263 | 10,3 | 1188 |
| Apr | 15 | 8,6 | 0,033 | 11,1 | 0,14 | 3,2 | 9,8 | 60,3 | 0,077 | 8,1 | 5,7 | 0,08 | 296,1 | 36,6 | 1131 |
| May | 20 | 8,3 | 0,042 | 12 | 0,19 | 3,1 | 10,4 | 59,9 | 0,12 | 8,3 | 5,6 | 0,08 | 340,2 | 18,8 | 1199 |
| Jun | 23 | 7,9 | 0,06 | 10,9 | 0,4 | 2,6 | 10,8 | 69,9 | 0,18 | 6,4 | 5,4 | 0,06 | 349 | 31,4 | 1147 |
| Jul | 29 | 7,85 | 0,03 | 11,1 | 0,33 | 2,9 | 10,3 | 68,7 | 0,1 | 7,1 | 4,6 | 0,06 | 297,8 | 16,8 | 1176 |
| Aug | 26,8 | 7,92 | 0,025 | 7,7 | 0,32 | 2,4 | 10,5 | 80,6 | 0,06 | 6,2 | 5,3 | 0,16 | 337 | 11,6 | 1185 |
| Sep | 23 | 7,9 | 0,025 | 8,1 | 0,27 | 2,8 | 11,4 | 81,2 | 0,1 | 8,3 | 7,4 | 0,07 | 388,2 | 33,7 | 1120 |
| Oct | 16,3 | 8 | 0,016 | 8,1 | 0,18 | 3,1 | 10,7 | 87,5 | 0,06 | 10,1 | 6,62 | 0,071 | 404,5 | 35,4 | 1062,5 |
| Nov | 9,3 | 8,1 | 0,023 | 9,1 | 0,21 | 2,3 | 11,1 | 83 | 0,11 | 11,2 | 7,5 | 0,04 | 477 | 22,6 | 1491 |
| Dec | 6 | 8,2 | 0,035 | 9,3 | 0,23 | 3,2 | 9,5 | 58,9 | 0,14 | 13,7 | 10,9 | 0,06 | 274 | 12,8 | 1281 |
| Mean | 15,5 | 8,2 | 0,033 | 9,6 | 0,28 | 2,8 | 10,1 | 64,3 | 0,1 | 9,3 | 7 | 0,075 | 334,3 | 24,4 | 1175,2 |
| Max | 29 | 8,6 | 0,06 | 12 | 0,42 | 3,2 | 11,4 | 87,5 | 0,18 | 13,7 | 10,9 | 0,16 | 477 | 38,9 | 1491 |
| Outlet canal | | | | | | | | | | | | | | | |

| | T, °C | pH | $NO_2$, mg/l | $NO_3$, mg/l | $NH_4$, mg/l | Alcalinity, mgEq/l | Hardness, mgEq/l | $Cl_2$, mg/l | Fe, mg/l | $PO_2$ | БПК-5, mg/l | н/п | $SO_4$, mg/l | Suspended solids | TDS, mg/l |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jan | 11 | 8,5 | 0,041 | 11,3 | 0,44 | 3,1 | 9,6 | 39,5 | 0,12 | 11,3 | 9,6 | 0,084 | 296,3 | 45,7 | 1106,7 |
| Feb | 9,6 | 8,45 | 0,033 | 11,4 | 0,44 | 2,6 | 8,3 | 45,8 | 0,095 | 11,7 | 8,8 | 0,092 | 329 | 28,3 | 1097 |
| Mar | 17 | 8,5 | 0,038 | 9,2 | 0,38 | 3,3 | 9,6 | 45,8 | 0,11 | 9,5 | 6,9 | 0,093 | 307 | 10,5 | 1206 |
| Apr | 22 | 8,6 | 0,038 | 11,9 | 0,2 | 3,3 | 9,9 | 64,7 | 0,09 | 7,6 | 5,9 | 0,098 | 310 | 42,3 | 1160 |
| May | 25 | 8,35 | 0,046 | 13,7 | 0,21 | 3,2 | 10,5 | 63 | 0,14 | 8,6 | 5,62 | 0,096 | 346 | 21,5 | 1207 |
| Jun | 30 | 7,9 | 0,078 | 13,1 | 0,49 | 2,9 | 11,4 | 72,8 | 0,21 | 6,6 | 5,6 | 0,09 | 370 | 36,4 | 1153 |
| Jul | 35 | 7,95 | 0,037 | 11,8 | 0,35 | 3,1 | 10,5 | 73,2 | 0,13 | 7,4 | 4,7 | 0,08 | 302 | 18,5 | 1186 |
| Aug | 31,3 | 8,2 | 0,027 | 8,1 | 0,34 | 2,5 | 10,9 | 86,8 | 0,078 | 6,3 | 5,3 | 0,18 | 359 | 15,2 | 1194 |
| Sep | 28 | 8 | 0,026 | 8,2 | 0,23 | 2,8 | 12,8 | 85,5 | 0,13 | 8,3 | 7 | 0,081 | 319,5 | 36,5 | 1128 |
| Oct | 23 | 8,2 | 0,017 | 9,7 | 0,19 | 3,2 | 11,2 | 90,5 | 0,076 | 10,2 | 6,67 | 0,086 | 411,2 | 37,4 | 1083,7 |
| Nov | 16,3 | 8,2 | 0,026 | 9,6 | 0,24 | 2,9 | 11,4 | 84,2 | 0,13 | 11,8 | 7,65 | 0,06 | 499 | 25,3 | 1470 |
| Dec | 13 | 8,35 | 0,04 | 10,4 | 0,25 | 3,35 | 9,9 | 61,9 | 0,2 | 13,9 | 9,9 | 0,08 | 293 | 18 | 1310 |
| Mean | 21,8 | 8,3 | 0,037 | 10,7 | 0,31 | 3,02 | 10,5 | 67,8 | 0,13 | 9,4 | 7 | 0,09 | 345,2 | 28 | 1191,8 |
| Max | 35 | 8,6 | 0,078 | 13,7 | 0,49 | 3,35 | 12,8 | 90,5 | 0,21 | 13,9 | 9,9 | 0,18 | 499 | 45,7 | 1470 |
| 500 m below | | | | | | | | | | | | | | | |
| | T, °C | pH | | $NO_3$, mg/l | $NH_4$, mg/l | Alcalinity, | Hardness, | $Cl_2$, mg/l | Fe, mg/l | $PO_2$ | | н/п | $SO_4$, mg/l | | TDS, mg/l |

| | | | NO2, mg/l | | | mgEq/l | mgEq/l | | | | БП К-5, mg/l | | | Suspended solids | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jan | 6 | 8,6 | 0,036 | 11,2 | 0,36 | 3,1 | 9,3 | 34,6 | 0,1 | 12,2 | 10,2 | 0,09 | 268,7 | 45,6 | 1067,3 |
| Feb | 4,5 | 8,3 | 0,037 | 12 | 0,4 | 2,7 | 8,3 | 46,6 | 0,078 | 12,4 | 9,2 | 0,091 | 306 | 30,7 | 1170 |
| Mar | 12 | 8,6 | 0,03 | 8,4 | 0,28 | 3,1 | 9,3 | 43,8 | 0,11 | 9,6 | 6,5 | 0,092 | 285 | 10,6 | 1359 |
| Apr | 16 | 8,7 | 0,03 | 12 | 0,13 | 3,3 | 9,7 | 59,7 | 0,068 | 8,2 | 5,9 | 0,09 | 312,6 | 43,7 | 1210 |
| May | 21 | 8,4 | 0,045 | 12,7 | 0,18 | 3 | 10,2 | 60,1 | 0,13 | 8,6 | 5,5 | 0,1 | 320,2 | 23,7 | 1204 |
| Jun | 24 | 8,1 | 0,06 | 14 | 0,4 | 2,9 | 11,1 | 65,2 | 0,2 | 6,8 | 5,6 | 0,08 | 395,6 | 34,6 | 1180 |
| Jul | 28 | 8 | 0,03 | 11,6 | 0,4 | 2,9 | 10,1 | 71,2 | 0,12 | 6,3 | 4,3 | 0,06 | 324 | 16,4 | 1075 |
| Aug | 26,6 | 8 | 0,028 | 8,9 | 0,31 | 2,55 | 10,2 | 77,8 | 0,056 | 6,7 | 5,8 | 0,16 | 353 | 15,8 | 1127 |
| Sep | 25 | 8,05 | 0,028 | 8,4 | 0,2 | 2,7 | 10,7 | 80,69 | 0,08 | 8,1 | 7 | 0,065 | 321 | 37 | 1134 |
| Oct | 18 | 8 | 0,016 | 8,4 | 0,19 | 2,95 | 11 | 89,4 | 0,06 | 10,8 | 6,77 | 0,072 | 393,1 | 33,9 | 1073,9 |
| Nov | 10 | 8,15 | 0,022 | 9,4 | 0,23 | 2,8 | 11,4 | 79,4 | 0,11 | 12,3 | 7,9 | 0,05 | 443 | 24,4 | 1499 |
| Dec | 8 | 8,2 | 0,036 | 9,7 | 0,32 | 3,2 | 9,2 | 54 | 0,14 | 12,3 | 9,7 | 0,05 | 252 | 22,3 | 1332 |
| Mean | 16,6 | 8,2 | 0,033 | 10,6 | 0,28 | 2,9 | 10 | 63,5 | 0,1 | 9,5 | 7 | 0,08 | 331,2 | 28,2 | 1202,6 |
| Max | 28 | 8,7 | 0,06 | 14 | 0,4 | 3,3 | 11,4 | 89,4 | 0,2 | 12,4 | 10,2 | 0,16 | 443 | 45,6 | 1499 |

Physical and chemical parameters of used water at Sirdaryo TPP for 2017

Supply canal

| | T, °C | pH | | $NO_3$, mg/l | $NH_4$, mg/l | Alcalinity, | Hardness, | $Cl_2$, mg/l | Fe, mg/l | $PO_2$ | | н/п | $SO_4$, mg/l | | TDS, mg/l |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| | | | NO2, mg/l | | | mgEq/l | mgEq/l | | | | БПК-5, mg/l | | | Suspended solids | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jan | 6 | 7,8 | 0,042 | 11 | 0,32 | 3,2 | 10 | 61,4 | 0,19 | 10,2 | 8,6 | 0,12 | 493,3 | 25,5 | 964,7 |
| Feb | 3,5 | 7,9 | 0,042 | 10,5 | 0,38 | 3,1 | 9,8 | 62,6 | 0,25 | 11,4 | 10,2 | 0,11 | 369,2 | 21,9 | 921,2 |
| Mar | 9,3 | 7,98 | 0,028 | 11,3 | 0,18 | 3,2 | 9,8 | 66,7 | 0,1 | 10,3 | 7,9 | 0,1 | 295,2 | 34,3 | 921,5 |
| Apr | 16,6 | 7,89 | 0,045 | 10 | 0,21 | 3 | 10,2 | 73,4 | 0,17 | 9,04 | 7,61 | 0,08 | 304,8 | 25,4 | 1125,2 |
| May | 22 | 8,1 | 0,038 | 11,7 | 0,14 | 2,8 | 9,5 | 75,2 | 0,18 | 8,19 | 4,53 | 0,083 | 284,7 | 15,2 | 1162 |
| Jun | 26 | 8 | 0,024 | 11,2 | 0,16 | 2,6 | 10 | 60,5 | 0,19 | 7,82 | 4,6 | 0,11 | 310,8 | 21,2 | 1012,5 |
| Jul | 26,6 | 7,95 | 0,034 | 9,01 | 0,17 | 2,78 | 9,3 | 49,8 | 0,061 | 6,36 | 4,53 | 0,07 | 321,1 | 55,4 | 1234 |
| Aug | 25,2 | 8,22 | 0,036 | 8,2 | 0,11 | 2,53 | 9 | 40,7 | 0,04 | 6,27 | 5,32 | 0,065 | 321,1 | 37,2 | 1089,5 |
| Sep | 25,3 | 8,1 | 0,022 | 8,3 | 0,102 | 2,72 | 9,83 | 47,6 | 0,07 | 7,23 | 5,32 | 0,105 | 251 | 34,3 | 1209,2 |
| Oct | 19,3 | 8,18 | 0,025 | 9,35 | 0,1 | 2,69 | 10,7 | 61,5 | 0,13 | 6,83 | 4,13 | 0,1 | 281,9 | 47,7 | 1090,4 |
| Nov | 12,3 | 8,2 | 0,015 | 11,2 | 0,14 | 3 | 11,2 | 52,8 | 0,17 | 10,1 | 5 | 0,1 | 341,1 | 43,9 | 1110,2 |
| Dec | 9 | 8,52 | 0,021 | 11,2 | 0,14 | 3,3 | 10,3 | 48,6 | 0,093 | 10,2 | 7,9 | 0,092 | 308,1 | 44,3 | 1228 |
| Mean | 17 | 8,1 | 0,031 | 10,2 | 0,18 | 2,9 | 10 | 58,4 | 0,14 | 8,7 | 6,3 | 0,094 | 323,5 | 33,8 | 1089 |
| Max | 26,6 | 8,52 | 0,045 | 11,7 | 0,38 | 3,3 | 11,2 | 75,2 | 0,25 | 11,4 | 10,2 | 0,12 | 493,3 | 55,4 | 1234 |
| Outlet canal | | | | | | | | | | | | | | | |
| | T, °C | pH | $NO_2$, mg/l | $NO_3$, mg/l | $NH_4$, mg/l | Alcalinity, mgEq/l | Hardness, mgEq/l | $Cl_2$, mg/l | Fe, mg/l | $PO_2$ | БПК-5, mg/l | н/п | $SO_4$, mg/l | Suspended solids | TDS, mg/l |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jan | 12 | 7,9 | 0,042 | 12 | 0,34 | 3,4 | 10,1 | 65,2 | 0,22 | 10,6 | 9,3 | 0,13 | 502,6 | 28,2 | 976,2 |
| Feb | 12 | 8 | 0,046 | 11,7 | 0,4 | 3,4 | 9,9 | 66,8 | 0,27 | 10,9 | 10,8 | 0,113 | 374,5 | 25,9 | 936,6 |
| Mar | 16,3 | 8,1 | 0,034 | 12,6 | 0,23 | 3,3 | 9,9 | 69,7 | 0,13 | 10,1 | 8,4 | 0,11 | 300,5 | 35,4 | 925,8 |
| Apr | 19 | 8 | 0,047 | 11 | 0,23 | 3,3 | 10,4 | 74,9 | 0,18 | 9,98 | 7,87 | 0,1 | 309,4 | 26,4 | 1138,4 |
| May | 28,1 | 8,2 | 0,041 | 12 | 0,18 | 3,1 | 9,9 | 78,3 | 0,2 | 8,41 | 7,4 | 0,1 | 304,6 | 18 | 1181,5 |
| Jun | 31 | 8,15 | 0,025 | 11,9 | 0,18 | 2,85 | 11,5 | 62,3 | 0,22 | 7,85 | 4,7 | 0,13 | 312,6 | 23,8 | 1016 |
| Jul | 32 | 8 | 0,036 | 9,37 | 0,19 | 2,88 | 9,5 | 51,2 | 0,07 | 6,62 | 4,72 | 0,08 | 329,6 | 58 | 1251,3 |
| Aug | 31,6 | 8,18 | 0,049 | 9,2 | 0,13 | 2,73 | 9,36 | 48 | 0,05 | 6,8 | 5,66 | 0,09 | 267,1 | 40,8 | 1133,8 |
| Sep | 30,6 | 8,2 | 0,026 | 8,8 | 0,12 | 2,92 | 10,22 | 55 | 0,087 | 7,78 | 5,72 | 0,12 | 268 | 39,2 | 1227,4 |
| Oct | 22,5 | 8,28 | 0,03 | 11,2 | 0,12 | 2,75 | 11,3 | 64 | 0,146 | 7,13 | 4,53 | 0,11 | 288,7 | 51,7 | 1106,8 |
| Nov | 19,3 | 8,39 | 0,019 | 12,2 | 0,16 | 3,2 | 11,7 | 64 | 0,186 | 10,1 | 5,1 | 0,115 | 352,9 | 52,7 | 1127,3 |
| Dec | 15,3 | 8,63 | 0,026 | 11,8 | 0,18 | 3,6 | 10,3 | 51,4 | 0,102 | 10,1 | 7,7 | 0,12 | 356,4 | 46,4 | 1431 |
| Mean | 22,5 | 8,2 | 0,035 | 11,1 | 0,2 | 3,1 | 10,3 | 62,6 | 0,15 | 8,9 | 6,8 | 0,11 | 331 | 37,2 | 1121 |
| Max | 32 | 8,63 | 0,049 | 12,6 | 0,4 | 3,6 | 11,7 | 78,3 | 0,27 | 10,9 | 10,8 | 0,13 | 502,6 | 58 | 1431 |
| 500 m below | | | | | | | | | | | | | | | |
| | T, °C | pH | $NO_2$, mg/l | $NO_3$, mg/l | $NH_4$, mg/l | Alcalinity, mgEq/l | Hardness, mgEq/l | $Cl_2$, mg/l | Fe, mg/l | $PO_2$ | БПК-5, mg/l | н/п | $SO_4$, mg/l | Suspended solids | TDS, mg/l |
| Jan | 6 | 7,9 | 0,039 | 11,6 | 0,34 | 3,3 | 9,8 | 58,6 | 0,17 | 11 | 9,2 | 0,13 | 487,6 | 28,8 | 1022 |
| Feb | 6,3 | 8,3 | 0,047 | 10,8 | 0,36 | 3 | 9,6 | 69,3 | 0,26 | 12,4 | 10,6 | 0,12 | 379 | 27,3 | 931,5 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mar | 9,3 | 8,16 | 0,049 | 12,5 | 0,2 | 3 | 10,1 | 74,1 | 0,14 | 9,8 | 8,5 | 0,1 | 300,2 | 37,3 | 930,7 |
| Apr | 15,6 | 8,1 | 0,046 | 11,6 | 0,22 | 3,3 | 10,1 | 72,9 | 0,17 | 9,15 | 7,53 | 0,072 | 304,2 | 28,1 | 1131,5 |
| May | 22,3 | 8,2 | 0,038 | 11,9 | 0,12 | 3 | 9,3 | 76,5 | 0,19 | 8,74 | 7,7 | 0,13 | 326,8 | 18,1 | 1180 |
| Jun | 27 | 8,2 | 0,026 | 12,4 | 0,2 | 2,8 | 12 | 64 | 0,21 | 7,8 | 4,75 | 0,12 | 321,5 | 24 | 1021,2 |
| Jul | 27 | 8,1 | 0,072 | 9,3 | 0,17 | 2,78 | 8,7 | 45,1 | 0,055 | 6,77 | 4,99 | 0,13 | 322,3 | 59,7 | 1161 |
| Aug | 26,5 | 8,2 | 0,055 | 8,76 | 0,12 | 2,9 | 8,7 | 38,6 | 0,047 | 6,7 | 5,53 | 0,076 | 259,2 | 40,2 | 1098,1 |
| Sep | 26,8 | 8,2 | 0,024 | 8,22 | 0,13 | 2,85 | 9,47 | 48,3 | 0,084 | 7,82 | 5,5 | 0,1 | 258,8 | 37,3 | 1140,8 |
| Oct | 19 | 8,28 | 0,03 | 10,5 | 0,14 | 2,73 | 11,13 | 63,2 | 0,13 | 6,96 | 4,12 | 0,13 | 294,2 | 53,2 | 1116,5 |
| Nov | 13,3 | 8,36 | 0,016 | 11,3 | 0,14 | 2,98 | 11,1 | 63,2 | 0,15 | 10,2 | 4,89 | 0,125 | 334,8 | 48,9 | 1179 |
| Dec | 10,6 | 8,66 | 0,024 | 11,6 | 0,16 | 3,2 | 10,2 | 50,2 | 0,083 | 10,4 | 8,3 | 0,114 | 346,3 | 44,8 | 1320 |
| Mean | 17,5 | 8,2 | 0,039 | 10,9 | 0,19 | 3 | 10 | 60,3 | 0,14 | 9 | 6,8 | 0,11 | 328 | 37,3 | 1102,7 |
| Max | 27 | 8,66 | 0,072 | 12,5 | 0,36 | 3,3 | 12 | 76,5 | 0,26 | 12,4 | 10,6 | 0,13 | 487,6 | 59,7 | 1320 |

Physical and chemical parameters of used water at Sirdaryo TPP for 2016

Supply canal

| | T, °C | pH | $NO_2$, mg/l | $NO_3$, mg/l | $NH_4$, mg/l | Alcalinity, mgEq/l | Hardness, mgEq/l | $Cl_2$, mg/l | Fe, mg/l | $PO_2$ | БПК-5, mg/l | н/п | $SO_4$, mg/l | Suspended solids | TDS, mg/l |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jan | 4 | 7,8 | 0,038 | 9,9 | 0,32 | 3,3 | 10 | 61,9 | 0,09 | 10,3 | 7,9 | 0,05 | 426,5 | 30,5 | 1083 |
| Feb | 7,3 | 7,76 | 0,04 | 18,6 | 0,22 | 3,08 | 10 | 64,8 | 0,12 | 11,23 | 8,2 | 0,089 | 384,3 | 26,8 | 991,1 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mar | 11,6 | 8,1 | 0,033 | 12,4 | 0,13 | 3,3 | 10,6 | 73,2 | 0,17 | 8 | 4,3 | 0,11 | 355,7 | 32,7 | 914,7 |
| Apr | 16,3 | 8,05 | 0,027 | 12,1 | 0,1 | 3,2 | 10,5 | 72,3 | 0,09 | 7,29 | 5,14 | 0,076 | 273,2 | 53,9 | 904,5 |
| May | 21,6 | 8,03 | 0,039 | 10,3 | 0,16 | 3 | 11,5 | 75,2 | 0,1 | 7,01 | 4,5 | 0,067 | 350,3 | 47,8 | 1150,3 |
| Jun | 27 | 8,1 | 0,038 | 11,4 | 0,2 | 2,87 | 12,1 | 78,6 | 0,19 | 7,48 | 4,12 | 0,087 | 469,6 | 42,4 | 955,2 |
| Jul | 29 | 8 | 0,031 | 12,7 | 0,1 | 2,9 | 12,2 | 78 | 0,16 | 7,2 | 4,27 | 0,082 | 402,1 | 41,2 | 904,4 |
| Aug | 27,3 | 7,25 | 0,027 | 9,96 | 0,24 | 2,43 | 11,4 | 78,1 | 0,11 | 7,15 | 4,33 | 0,063 | 484,2 | 102,5 | 1031 |
| Sep | 26 | 8 | 0,024 | 12,2 | 0,18 | 2,76 | 12,3 | 75,6 | 0,14 | 7,33 | 4 | 0,079 | 288,6 | 39,3 | 960,7 |
| Oct | 11,5 | 7,8 | 0,023 | 11 | 0,19 | 3,4 | 10,5 | 75,1 | 0,21 | 7,2 | 4,42 | 0,11 | 363,2 | 34,7 | 941,2 |
| Nov | 5,5 | 7,85 | 0,024 | 10,8 | 0,3 | 3,3 | 10,8 | 80,8 | 0,23 | 10,2 | 7,4 | 0,1 | 423,7 | 39,6 | 1026,9 |
| Dec | 5,3 | 7,85 | 0,046 | 12,5 | 0,45 | 3,3 | 10,9 | 72,8 | 0,17 | 12,26 | 9,36 | 0,19 | 365,6 | 41,7 | 1006,7 |
| Mean | 16 | 7,9 | | 12 | 0,21 | | | 73,9 | 0,15 | | | 0,092 | 382,2 | | 989,1 |
| Max | 29 | 8,1 | 0,046 | 18,6 | 0,45 | 3,4 | 12,3 | 80,8 | 0,23 | 12,26 | 9,36 | 0,19 | 484,2 | 102,5 | 1150,3 |
| Outlet canal | | | | | | | | | | | | | | | |
| | T, °C | pH | $NO_2$, mg/l | $NO_3$, mg/l | $NH_4$, mg/l | Alcalinity, mgEq/l | Hardness, mgEq/l | $Cl_2$, mg/l | Fe, mg/l | $PO_2$ | БПК-5, mg/l | н/п | $SO_4$, mg/l | Suspended solids | TDS, mg/l |
| Jan | 11 | 8 | 0,03 | 9,6 | 0,36 | 3,35 | 10 | 64,6 | 0,1 | 10,2 | 7,9 | 0,061 | 436,4 | 34,1 | 1103 |
| Feb | 13,3 | 7,8 | 0,041 | 19,7 | 0,29 | 3,08 | 10,3 | 66,6 | 0,16 | 10,8 | 8,27 | 0,101 | 395,8 | 32,8 | 1014 |
| Mar | 17,3 | 8,2 | 0,03 | 13 | 0,2 | 3,5 | 11,1 | 76,1 | 0,23 | 8,27 | 4,4 | 0,121 | 369 | 34,9 | 942,4 |
| Apr | 21 | 7,97 | 0,029 | 12,6 | 0,11 | 3,3 | 10 | 74,7 | 0,096 | 10,83 | 5,34 | 0,087 | 279,3 | 72,4 | 929,8 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| May | 25,6 | 8,1 | 0,04 | 11,3 | 0,12 | 3,2 | 11,6 | 74,3 | 0,12 | 6,98 | 4,36 | 0,079 | 389,7 | 52,6 | 1201,9 |
| Jun | 31,3 | 8,18 | 0,04 | 12,2 | 0,24 | 2,92 | 12 | 80,1 | 0,21 | 7,52 | 4,21 | 0,099 | 477 | 45,7 | 978,9 |
| Jul | 35,3 | 8 | 0,033 | 14,3 | 0,12 | 2,98 | 12,6 | 82,3 | 0,17 | 7,94 | 4,61 | 0,094 | 407,9 | 43 | 916,3 |
| Aug | 33,6 | 7,75 | 0,03 | 10,8 | 0,27 | 2,53 | 12 | 80,4 | 0,14 | 7,41 | 4,64 | 0,075 | 488,9 | 104,4 | 1050,8 |
| Sep | 31,3 | 8,02 | 0,027 | 13,5 | 0,22 | 2,86 | 11,7 | 78,9 | 0,16 | 7,4 | 4,2 | 0,09 | 300 | 43 | 984 |
| Oct | 16,8 | 8 | 0,024 | 11,9 | 0,2 | 3,35 | 12 | 77,2 | 0,24 | 7,43 | 4,68 | 0,112 | 368,5 | 36,2 | 946,6 |
| Nov | 13,3 | 7,8 | 0,0245 | 11,2 | 0,35 | 3,5 | 11,3 | 7,8 | 0,25 | 11,3 | 7,28 | 0,11 | 427,3 | 42,3 | 1029 |
| Dec | 14,3 | 7,91 | 0,047 | 13 | 0,46 | 3,4 | 11,5 | 74,4 | 0,18 | 11,8 | 9,14 | 0,195 | 369,1 | 42,6 | 1008,7 |
| Mean | 22,008333 | 7,9775 | 0,0033 | 12,758333 | 0,245 | 3,1641667 | 11,341667 | 69,783333 | 0,1713333 | 8,99 | 5,7525 | 0,102 | 392,40833 | 48,666667 | 1008,7833 |
| Max | 35,3 | 8,2 | 0,047 | 19,7 | 0,46 | 3,5 | 12,6 | 82,3 | 0,25 | 11,8 | 9,14 | 0,195 | 488,9 | 104,4 | 1201,9 |
| 500 m below | | | | | | | | | | | | | | | |
| | T, °C | pH | $NO_2$, mg/l | $NO_3$, mg/l | $NH_4$, mg/l | Alcalinity, mgEq/l | Hardness, mgEq/l | $Cl_2$, mg/l | Fe, mg/l | $PO_2$ | БПК-5, mg/l | н/п | $SO_4$, mg/l | Suspended solids | TDS, mg/l |
| Jan | 6,3 | 8,1 | 0,04 | 8,8 | 0,36 | 3,4 | 10 | 58,1 | 0,1 | 10,1 | 7,1 | 0,05 | 427,5 | 30,7 | 1064 |
| Feb | 8,2 | 7,9 | 0,037 | 19,5 | 0,24 | 2,83 | 10,6 | 61,7 | 0,09 | 10,93 | 8,03 | 0,068 | 381 | 24,6 | 996,4 |
| Mar | 13 | 8,1 | 0,036 | 12,1 | 0,15 | 3,36 | 10,1 | 69,1 | 0,14 | 7,7 | 4,47 | 0,097 | 355,5 | 30,9 | 940 |
| Apr | 15 | 7,93 | 0,041 | 12,3 | 0,11 | 3,18 | 10,5 | 73,3 | 0,08 | 11,1 | 5,47 | 0,077 | 291 | 61,7 | 956 |
| May | 26,6 | 8,05 | 0,042 | 10,4 | 0,16 | 3 | 11,6 | 75,6 | 0,08 | 6,02 | 3,75 | 0,067 | 396,5 | 50,1 | 1179,8 |
| Jun | 28,6 | 8,17 | 0,036 | 12,5 | 0,23 | 2,77 | 11,1 | 75,7 | 0,18 | 7,43 | 4,06 | 0,091 | 459,6 | 40 | 944,8 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jul | 31 | 8,05 | 0,031 | 12,9 | 0,09 | 2,82 | 12,3 | 79,8 | 0,14 | 7,08 | 4,07 | 0,078 | 403 | 39,4 | 899,4 |
| Aug | 29 | 7,85 | 0,029 | 10,35 | 0,2 | 2,46 | 11 | 79,7 | 0,12 | 7,65 | 4,65 | 0,08 | 472,4 | 100,5 | 1027 |
| Sep | 27,3 | 7,96 | 0,022 | 13,3 | 0,17 | 2,81 | 11,46 | 73,9 | 0,156 | 7,19 | 3,98 | 0,078 | 287,2 | 39 | 963,2 |
| Oct | 12 | 7,95 | 0,027 | 13,5 | 0,21 | 3,3 | 12,5 | 7,95 | 0,26 | 7,6 | 4,46 | 0,12 | 327,9 | 31,5 | 951,5 |
| Nov | 8,1 | 7,85 | 0,03 | 13 | 0,31 | 3,35 | 11 | 89,9 | 0,24 | 12,6 | 7,26 | 0,125 | 429,6 | 41,5 | 1031,5 |
| Dec | 8 | 7,83 | 0,049 | 13,9 | 0,51 | 3,3 | 11,1 | 69,9 | 0,19 | 12,4 | 9,96 | 0,16 | 386,3 | 41,5 | 1011,5 |
| Mean | 17,758333 | 7,9783333 | 0,0035 | 12,7125 | 0,2283333 | 3,0483333 | 11,105 | 67,8875 | 0,148 | 8,9833333 | 5,605 | 0,0909167 | 384,79167 | 44,283333 | 997,09167 |
| Max | 31 | 8,17 | 0,049 | 19,5 | 0,51 | 3,4 | 12,5 | 89,9 | 0,26 | 12,6 | 9,96 | 0,16 | 472,4 | 100,5 | 1179,8 |
| Т Ч Е Т | | | | | | | | | | | | | | | |

Physical and chemical parameters of used water at Sirdaryo TPP for 2015

| Supply canal | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | T, °C | pH | $NO_2$, mg/l | $NO_3$, mg/l | $NH_4$, mg/l | Alcalinity, mgEq/l | Hardness, mgEq/l | $Cl_2$, mg/l | Fe, mg/l | $PO_2$ | БПК-5, mg/l | н/п | $SO_4$, mg/l | Suspended solids | TDS, mg/l |
| Jan | 3 | 8,17 | 0,033 | 15,8 | 0,16 | 3,05 | 10 | 60,9 | 0,205 | 9,53 | 3,94 | 0,094 | 491 | 17,7 | 1020,7 |
| Feb | 3,7 | 8,13 | 0,029 | 17,3 | 0,19 | 3,28 | 9,9 | 62,6 | 0,21 | 9,18 | 4,12 | 0,097 | 441,7 | 24,9 | 1010,7 |
| Mar | 5 | 8 | 0,026 | 17,4 | 0,14 | 3,1 | 8 | 69,3 | 0,24 | 8,94 | 3,8 | 0,1 | 422,8 | 33,4 | 930 |
| Apr | 15,7 | 7,95 | 0,033 | 14,1 | 0,24 | 3,53 | 11,1 | 67,9 | 0,22 | 7,84 | 3,44 | 0,096 | 437,2 | 27,4 | 1112,7 |
| May | 20 | 8,28 | 0,039 | 17 | 0,1 | 3,25 | 11,4 | 74 | 0,2 | 7,85 | 3,96 | 0,1 | 447,2 | 24,6 | 1022 |
| Jun | 22,3 | 8,13 | 0,063 | 16,6 | 0,24 | 3,7 | 12,8 | 87,1 | 0,26 | 9,6 | 4,23 | 0,103 | 551,7 | 55,1 | 1389 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jul | 26,3 | 8,24 | 0,032 | 14,2 | 0,19 | 2,65 | 12,3 | 104 | 0,17 | 8,56 | 4,44 | 0,094 | 514,4 | 38 | 514,4 |
| Aug | 24,7 | 8,09 | 0,03 | 14,3 | 0,17 | 2,72 | 11,9 | 76,3 | 0,19 | 8,5 | 3,97 | 0,087 | 435,9 | 26,9 | 1031 |
| Sep | 21 | 8 | 0,025 | 16,9 | 0,12 | 2,71 | 12,9 | 95,8 | 0,12 | 7,6 | 4,94 | 0,099 | 412,2 | 46,6 | 991,6 |
| Oct | 20 | 8 | 0,022 | 12 | 0,11 | 2,68 | 12,6 | 74 | 0,11 | 7,46 | 3,68 | 0,081 | 299,2 | 33,7 | 952 |
| Nov | 9,8 | 7,78 | 0,027 | 9,71 | 0,16 | 2,66 | 11,1 | 78,7 | 0,11 | 6,97 | 3,5 | 0,1 | 275,67 | 40,4 | 852,45 |
| Dec | 4,7 | 8,05 | 0,03 | 12,5 | 0,24 | 3,15 | 9,93 | 69,8 | 0,15 | 9,35 | 4,53 | 0,1 | 409,2 | 33,6 | 1022,6 |
| Mean | 14,7 | 8,07 | 0,03 | 14,8 | 0,17 | 3,04 | 11,2 | 76,7 | 0,18 | 8,4 | 4 | 0,096 | 428,8 | 33,5 | 987,4 |
| Max | 26,3 | 8,28 | 0,063 | 17,4 | 0,24 | 3,7 | 12,9 | 104 | 0,26 | 9,6 | 4,94 | 0,103 | 551,7 | 55,1 | 1389 |
| Outlet canal | | | | | | | | | | | | | | | |
| | T, °C | pH | $NO_2$, mg/l | $NO_3$, mg/l | $NH_4$, mg/l | Alcalinity, mgEq/l | Hardness, mgEq/l | $Cl_2$, mg/l | Fe, mg/l | $PO_2$ | БПК-5, mg/l | н/п | $SO_4$, mg/l | Suspended solids | TDS, mg/l |
| Jan | 11 | 8,23 | 0,037 | 17,6 | 0,19 | 3,15 | 10 | 65,8 | 0,22 | 9,9 | 4,06 | 0,107 | 501,9 | 20,7 | 1036 |
| Feb | 12 | 8,14 | 0,031 | 17,6 | 0,23 | 3,3 | 10 | 72 | 0,23 | 9,43 | 4,2 | 0,11 | 448,1 | 26,8 | 1034,7 |
| Mar | 14 | 8,05 | 0,032 | 17,8 | 0,24 | 3,1 | 8 | 69,3 | 0,256 | 9 | 4,23 | 0,114 | 428,9 | 37 | 958 |
| Apr | 22 | 7,98 | 0,039 | 14,4 | 0,26 | 3,72 | 11,45 | 68,5 | 0,26 | 7,85 | 3,46 | 0,11 | 441,4 | 31,4 | 1132,7 |
| May | 26,7 | 8,34 | 0,042 | 17,2 | 0,14 | 3,4 | 11,5 | 76,6 | 0,22 | 8 | 4,11 | 0,114 | 454,8 | 30,6 | 1043,3 |
| Jun | 29,7 | 8,24 | 0,068 | 17 | 0,272 | 3,99 | 13,1 | 91,1 | 0,29 | 10 | 4,46 | 0,114 | 567,1 | 62,6 | 1409,7 |
| Jul | 32,2 | 8,29 | 0,038 | 14,7 | 0,24 | 2,73 | 12,5 | 109,2 | 0,2 | 8,74 | 4,51 | 0,108 | 533,1 | 44,4 | 1241,8 |
| Aug | 31 | 8,13 | 0,035 | 15,3 | 0,22 | 2,85 | 12,2 | 80,1 | 0,21 | 8,7 | 4,13 | 0,1 | 442,4 | 31,7 | 1038,3 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sep | 25,6 | 8,15 | 0,029 | 18,8 | 0,15 | 2,81 | 13,4 | 100,2 | 0,14 | 7,85 | 4,84 | 0,113 | 431,4 | 49 | 1008,2 |
| Oct | 23 | 8,15 | 0,028 | 132 | 0,125 | 3 | 13,2 | 73,5 | 0,12 | 6,29 | 3,88 | 0,086 | 304,6 | 36,2 | 989,2 |
| Nov | 11 | 7,4 | 0,039 | 9,4 | 0,23 | 2,7 | 10 | 81 | 0,11 | 7,1 | 3,63 | 0,114 | 288,1 | 46,05 | 875,45 |
| Dec | 9,4 | 8,16 | 0,035 | 13,5 | 0,26 | 3,26 | 10 | 70,4 | 0,2 | 9,47 | 4,77 | 0,113 | 419,7 | 35,4 | 1048,9 |
| Mean | 21 | 8,105 | 0,038 | 15,5 | 0,21 | 3,2 | 11,3 | 79,8 | 0,2 | 8,5 | 4,2 | 0,11 | 438,5 | 37,6 | 1068 |
| Max | 32,2 | 8,34 | 0,068 | 132 | 0,272 | 3,99 | 13,4 | 109,2 | 0,29 | 10 | 4,84 | 0,114 | 567,1 | 62,6 | 1409,7 |
| 500 m below | | | | | | | | | | | | | | | |
| | T, °C | pH | $NO_2$, mg/l | $NO_3$, mg/l | $NH_4$, mg/l | Alcalinity, mgEq/l | Hardness, mgEq/l | $Cl_2$, mg/l | Fe, mg/l | $PO_2$ | БП К-5, mg/l | н/п | $SO_4$, mg/l | Suspended solids | TDS, mg/l |
| Jan | 3,7 | 8,13 | 0,033 | 15,8 | 0,15 | 3 | 9,7 | 58,6 | 0,2 | 9,69 | 3,84 | 0,092 | 480,2 | 19,6 | 929,3 |
| Feb | 5,3 | 8,05 | 0,031 | 16,8 | 0,2 | 3,2 | 10 | 61,3 | 0,2 | 8,65 | 3,97 | 0,095 | 426,6 | 24,2 | 1014 |
| Mar | 8 | 8,1 | 0,02 | 17,4 | 0,16 | 3,05 | 9,5 | 60 | 0,22 | 8,9 | 3,82 | 0,118 | 420,9 | 36,8 | 1011 |
| Apr | 17,7 | 7,95 | 0,037 | 14 | 0,205 | 3,4 | 10,3 | 67 | 0,21 | 8,2 | 3,42 | 0,107 | 420,3 | 26,3 | 1101,7 |
| May | 21,7 | 8,27 | 0,031 | 16,9 | 0,087 | 3,18 | 11,2 | 73,6 | 0,2 | 7,34 | 3,88 | 0,087 | 426,5 | 23 | 1033 |
| Jun | 29,7 | 8,2 | 0,06 | 16,4 | 0,25 | 3,72 | 12,5 | 80,3 | 0,24 | 9,6 | 4,3 | 0,1 | 543,2 | 53,6 | 1275,7 |
| Jul | 28 | 8,25 | 0,03 | 13,9 | 0,19 | 2,62 | 11,9 | 95,5 | 0,16 | 8,51 | 4,27 | 0,098 | 518,1 | 35,4 | 1180,3 |
| Aug | 26,7 | 8,06 | 0,03 | 14,2 | 0,18 | 2,72 | 11,7 | 76,7 | 0,18 | 8,42 | 4 | 0,08 | 433,5 | 27,6 | 1024 |
| Sep | 22,6 | 8 | 0,022 | 17,2 | 0,11 | 2,8 | 12,4 | 95,7 | 0,13 | 7,61 | 4,76 | 0,083 | 414,4 | 45,5 | 971,7 |
| Oct | 20,6 | 8,1 | 0,023 | 10,4 | 0,1 | 2,7 | 12,7 | 73,3 | 0,1 | 6,56 | 3,39 | 0,075 | 291 | 30,1 | 943,1 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nov | 9 | 7,41 | 0,06 | 5,9 | 0,18 | 3 | 13 | 84 | 0,099 | 7,14 | 3,33 | 0,092 | 257,1 | 41,4 | 874,2 |
| Dec | 5,6 | 8,8 | 0,034 | 12,7 | 0,29 | 3 | 10 | 67,3 | 0,17 | 9,98 | 4,8 | 0,12 | 394,6 | 32,2 | 1018,8 |
| Mean | 16,6 | 8,11 | 0,034 | 14,3 | 0,17 | 3 | 11,2 | 74,4 | 0,18 | 8,4 | 4 | 0,096 | 418,9 | 33 | 1031,4 |
| Max | 29,7 | 8,8 | 0,06 | 17,4 | 0,29 | 3,72 | 13 | 95,7 | 0,24 | 9,98 | 4,8 | 0,12 | 543,2 | 53,6 | 1275,7 |

Note: colored are indicate maximum values

*Source: Syrdarya TPP*

*Attachment 7 Physical and chemical parameters of Dustlik canal for 2019 year*

| Region | Sampling point | | Date | Physical and chemical parameters of water | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | t, C | pH, - | Hardness | Oxygen demand | Solid content | NH4, mg/l | NO2, mg/l | NO3, mg/l | SO4, mg/l | Cl2, mg/l | PO4, mg/l | НП | Спав | Fe, mg/l | Suspended solids | BOD 5 | COD |
| Sydrarya region | Dustlik canal | head | 10.jan | 12,5 | 8,35 | 3,25 | 4,12 | 920 | 0 | 0,03 | 0,82 | 140 | 74 | 0,23 | 0,05 | 0 | 0 | 110 | 21 | 120 |
| | | exit | 11.1 | 12,2 | 7,98 | 3,48 | 4,15 | 770 | 0 | 0,04 | 0,45 | 190 | 98,2 | 0,32 | 0,07 | 0,04 | 0 | 124 | 24 | 140 |
| | Dustlik canal | head | 11.2 | 10,2 | 8,37 | 3,25 | 4,22 | 915 | 1,1 | 0,03 | 0,83 | 150 | 85,4 | 0,26 | 0,35 | 0 | 0 | 104 | 24 | 136 |
| | | exit | 12.2 | 10,5 | 7,94 | 3,48 | 4,26 | 928 | 1,25 | 0,06 | 0,64 | 160 | 96,7 | 0,35 | 0,039 | 0,057 | 0 | 120 | 27 | 157 |
| | Dustlik canal | head | 14.3 | 18 | 7,2 | 2,9 | 3,96 | 804 | 0,22 | 0,05 | o,1 | 180 | 70,4 | 1,1 | 0,045 | 0 | 0 | 110 | 25 | 100 |
| | | exit | 15.3 | 18,2 | 7,4 | 3,01 | 4,1 | 720 | 0,21 | 0,9 | 1,1 | 201 | 66,2 | 0,8 | 0,04 | 0,07 | 0 | 115 | 28 | 110 |
| | Dustlik canal | head | 17.4 | 16 | 7,24 | 2,92 | 3,94 | 814 | 0,25 | 0,07 | 0,14 | 165 | 70,5 | 1,16 | 0,042 | 0 | 0 | 120 | 20 | 87 |
| | | exit | 23.4 | 16,2 | 7,43 | 3,05 | 4,15 | 728 | 0,27 | 0,95 | 1,13 | 192 | 65,2 | 0,84 | 0,047 | 0,07 | 0 | 135 | 24 | 98 |
| | Dustlik canal | head | 18.6 | 18,2 | 7,26 | 2,72 | 4,9 | 825 | 0,45 | 0,08 | 0,16 | 168 | 75 | 1,19 | 0,047 | 0 | 0 | 123 | 22 | 89 |
| | | exit | 20.6 | 18,8 | 7,46 | 3,25 | 5,15 | 740 | 0,37 | 0,97 | 1,17 | 210 | 68 | 0,86 | 0,049 | 0,075 | 0 | 137 | 28 | 110 |
| | Dustlik canal | head | 16.7 | 19,2 | 7,26 | 5,76 | 7,15 | 830 | 0,42 | 0,07 | 1,15 | 110 | 78 | 128 | 0,37 | 0 | 0 | 82 | 12 | 60 |
| | | exit | 17.7 | 19,5 | 7,54 | 6,35 | 7,35 | 860 | 0,47 | 0,65 | 2,1 | 145 | 85 | 1,62 | 0,046 | 0,086 | 0 | 105 | 15 | 75 |

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Dustlik canal | head | 8.8 | 20,2 | 7,28 | 6,1 | 14 | 841 | 0,5 | 0,06 | 2,1 | 119 | 75 | 0,3 | 0,04 | 0 | 0,31 | 52 | 9,6 | 41 |
| | | exit | 9.8 | 20,5 | 7,58 | 6,04 | 11,3 | 1130 | 0,65 | 0,08 | 2,5 | 148 | 76,4 | 0,48 | 0,06 | 0,045 | 0,4 | 66 | 11 | 34 |
| | Dustlik canal | head | 12.9 | 19,5 | 7,88 | 12,4 | 5,4 | 795 | 0,46 | 0,07 | 5,3 | 141,3 | 80,3 | 0,22 | 0,055 | 0 | 0,41 | 30,6 | 14 | 66 |
| | | exit | 13.9 | 20,2 | 7,82 | 18,2 | 7,2 | 1216 | 0,56 | 0,06 | 2,81 | 135 | 86 | 1,64 | 0,044 | 0,95 | 0,53 | 52 | 25,2 | 45 |
| | Dustlik canal | head | 17.10 | 19,5 | 7,88 | 12,4 | 4,8 | 1059 | 0,46 | 0,06 | 4,6 | 141,3 | 80,3 | 0,22 | 0,05 | 0 | 0,34 | 30,6 | 14 | 69 |
| | | exit | 18.10 | 20,2 | 7,82 | 18,2 | 7,2 | 1216 | 0,56 | 0,09 | 2,8 | 135 | 86 | 1,64 | 0,04 | 0,95 | 0,58 | 52 | 25,2 | 43 |
| | Dustlik canal | head | 18.11 | 10,5 | 8 | 3,2 | 4,2 | 910 | 1,9 | 0,11 | 0,92 | 162 | 54,2 | 0,6 | 0,042 | 0 | 0,45 | 134 | 68 | 172 |
| | | exit | 19.11 | 10,8 | 7,9 | 4,4 | 5,1 | 889 | 1,8 | 1,04 | 2,3 | 247 | 68,7 | 0,63 | 0,078 | 0 | 0,68 | 88 | 78 | 154 |
| | Dustlik canal | head | 13.12 | 10,5 | 7,6 | 3,3 | 5,1 | 920 | 1,2 | 0,08 | 4,9 | 76,9 | 45,6 | 0,29 | 0,07 | 0 | 0 | 106 | 31 | 135 |
| | | exit | 13.12 | 10,7 | 8,1 | 3,49 | 5,3 | 877 | 1,6 | 0,09 | 5,8 | 92,3 | 48,5 | 0,9 | 0,055 | 0,03 | 0 | 110 | 37 | 144 |

Note: head – upstream, exit – downstream sampling points

*Source: Syrdarya Ecology and Environmental protection Region Administration*

*Attachment 8  Some physical and chemical parameters of YG canal for 2019 year*

| № | Water quality parameters | MPC | Yuzhny-Golodnostepsky canal |
|---|---|---|---|
| 1 | Color | | colorless |
| 2 | Smell | | odourless |
| 3 | Temperature, $^{o}C$ | | 17,5 |
| 4 | pH | 6,5-8,5 | 7,2 |
| 5 | TDS, mg/l | 1000 | 105 |
| 6 | NO3, mg/l | 0,02 | 0,05 |
| 7 | SO4, mg/l | 100 | 173,4 |
| 8 | NH4, mg/l | 0,5 | 1,5 |
| 9 | Fe, mg/l | 0,05 | 0 |
| 10 | Cl2, mg/l | 300 | 39 |
| 11 | COD ,mg/l | 15 | 96 |
| 12 | PO2, mg/l | 0,3 | 0 |

*Source: Syrdarya Ecology and Environmental protection Region Administration*

# APPENDIX O– ZOOPLANKTON & PHYTOPLANKTON SURVEY REPORT

# ZOOPLANKTON AND PHYTOPLANKTON SURVEY REPORT

## UZBEKISTAN COMBINED CYCLE POWER PROJECT:

## LOCAL SUPPORT IN THE DEVELOPMENT, SUBMISSION AND APPROVAL OF ESIA

## CLIENT: 5CAPITALS

Date: May 2020

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## Abbreviations/Acronyms

| | |
|---|---|
| AMB | – Active metabolism of biocenosis (status of ecological status) |
| BPI | – Biotic peripheral index |
| C | – Subdominant community view. |
| D | – Dominant community view |
| O | – oligo, β- and α- mesosaprobic levels of pollution of a reservoir by organic substances |
| SI | – Saprobity index |
| TPP | – Thermal Power Plant |
| YG canal | – Yuzhny-Golodnostepsky canal |

## 1. Introduction

Hydrobiology is a complex biological science that studies aquatic ecosystems and their components, which are essential for understanding the features and functions of hydrobionts – aquatic organisms that form communities (biocenoses) that inhabit the water column (plankton), the soil column and surface (benthos), biofouling (periphyton) and macrophytes.

The primary link in the life cycle in Yuzhny-Golodnostepsky canal (hereinafter referred to as "the YG canal") is represented by plant organisms of plankton (single-celled microscopic algae), phytoplankton, that forms the basis of the biological productivity of the canal and largely determines the functioning of aquatic ecosystems and the quality of their waters, i.e. phytoplankton is the main producer of primary organic matter and oxygen, because of which all living matter exists in a body of water.

Zooplankton (colorless flagellates, ciliates, rotifers, cladocerans and copepods) consuming phytoplankton, bacteria and detritus, is itself an essential component in the diet of fish and carnivorous invertebrates, that is, hydrobiological studies of aquatic biocenoses make it possible to determine and predict the formation of the natural forage base of the reservoir. Zooplankton also serves as a good indicator of water pollution, both during a comparative analysis of the species composition and quantitative growth in parts of canal water with varying degrees of anthropogenic impact, and when observing changes in the species composition over an extended time period. Changes in the environment can affect the change in species composition, the ratio of taxonomic groups, and quantitative indicators of zooplankton.

Periphyton, as an integral part of aquatic ecosystems, undergoes various changes with it, due to various natural and anthropogenic factors, which is expressed in spatial and temporal successions of periphyton communities. Due to its confinement to the substrate, periphyton, as an object of observation, allows a wide possibility to experiment in natural conditions and also allows one to judge the average pollution of the water mass for a certain period of time preceding sampling.

*The purpose of conducting hydrobiological research* is as follows:

- To collect necessary and sufficient data for a comprehensive assessment of the impact of planned Project on the canal's plankton ecology (phytoplankton, zooplankton, periphyton and ichthyofauna), as well as the impact of the environment on the CCGT;
- To compare the state of aquatic ecosystems given the natural and technogenic conditions of the area;
- To assess potential environmental risks for hydrobionts (aquatic organisms).

During the site visit on March, 20, the following tasks were performed:

- Determined the initial state of planktonic and periphyton communities;
- Assessed organic pollution level of water (determined the level of saprobity using the index and bioindication properties of periphyton and zooplankton species);
- Identified the absence of harmful periphyton types, which upon biofouling on submerged parts of technical objects can lead to their efficiency decrease;
- Determined the absence/presence of endemic or rare species; and
- Evaluated the potential fish productivity of the YG canal.

## 2. Sampling points

To perform hydrobiological research the survey determined 4 locations (sampling points) on YG canal for collection of zooplankton, phytoplankton and periphyton samples. Coordinates of the locations are given in the table below.

*Table 1 Sampling points and their coordinates (Source: 5Capitals)*

| Sampling point no. | Coordinates |
|---|---|
| P1 | 40•13'59.27 N<br>69•6'17.41E |
| P2 | 40•13'.51.22N<br>69•6'28.60E |
| P3 | 40•13'45.00N<br>69•6'36.60E |
| P4 | 40•14'4.50N<br>69•6'8.25E |

At the time of sampling, the YG canal had moderate filling, the color of the water ranged from green to grayish-green, the transparency was 0.35-1.2 m (according to Secchi disk), the nature of bottom sediments was a dark gray silt with sediments of sand and clay.

The littoral zone of the canal was overgrown with common reed (*Phragmites communis*) up to 70-80%, reeds (*Scirpus lacustris*) up to 10-15%, cattail (*Tupha latifolia*) 10%. The macrophyte thickets were moderately well grown and covered the bottom of the littoral strip (up to 0.5-1 m from the coast) and were represented by separate small bunches or spots-clusters of stonewort (*Chara sp.*) – 70-80%, fennel-leaved pondweed (*Potamogetom crispus*), and meakin (*Meriophyllum spicatum*) – 20-30%.

In total 11 hydrobiological samples were collected, including 4 samples of phytoplankton, 4 samples of zooplankton, and 3 samples for periphyton.

*Table 2 Detailed description of the sampling points on canal (March, 20)*

| Sampling date | Sampling point / Time | Location | Depth, m | Secchi disk transparency, m | Water temp., °C | Clay | Vegetation |
|---|---|---|---|---|---|---|---|
| 20 Mar, 2020 | P1/15:40 | YG canal, to the right of Syrdarya TPP; 1-1.5 m from the canal bank (Fig. 1 and 2) | 1.0 | 0.45-0.50 | 13 | clay, gray silt; thickets of macrophytes (chara[1], etc.) | Along the banks of an old cattail, reed |
| 20 Mar, 2020 | P2/16:19 | YG canal, of Syrdarya TPP; 250m from P1 (Fig. 3 and 4) | 1.5 | 0.35-0.40 | 13 | gray silt, clay bed; thickets of macrophytes (chara, etc.) | Along the banks of the thicket of old cattail and reed |
| 20 Mar, 2020 | P3/16:40 | YG canal, to the right of Syrdarya TPP; 250m from P2 (Fig. 5 and 6) | 1.2 | 1.2 | 12 | dark gray silts, clay; thickets of macrophytes | Debris and thickets of old cattail and reeds along the shore |
| 20 Mar, 2020 | P4/17:05 | YG canal, to the right of Syrdarya TPP; 250m from P2, gateway (Figure 4) | 1.0 | 0.95 | 12 | dark gray silts, clay; thickets of macrophytes | Along the coast, scraps and fragments of an old cattail and reeds |

[1] Chara is a calcephilic plant, which are able to accumulate calcium in large quantities. Developing in large quantities mainly on littoral areas, at depths of 0.2–4.5 m, they form a rather dense filtration lattice and, to a greater extent than other wetland vegetation, create favorable conditions for the accumulation of silt, which we observed at the sampling locations on canal.

Views of sampling locations are given below.

*Figure 1 Sampling point 1 (P1): A - side view*

*Figure 2 Sampling point 1 (P1): B – place of sampling*

*Figure 3 Sampling point 2 (P2): A - view from above*

*Figure 4 Sampling point 2 (P2): B - place of sampling*

*Figure 5 Sampling point 3 (P3): view A*

*Figure 6 Sampling point 3 (P3): view B*

*Figure 7 Sampling point 4 (P4): view A*

*Figure 8 Sampling point 4 (P4): view B*

## 3. Phytoplankton and periphyton

Phytoplankton are microscopic plant organisms that freely float in the water column and live in all types of canals with sufficient amount of light and dissolved mineral substances. Phytoplankton produce organic substances and oxygen during photosynthesis from mineral substances dissolved in water, thereby ensuring respiration of aquatic organisms. Phytoplankton are a good marker for water quality and determine the productivity of the canal.

Depending on the habitat in the canal, several ecological groups of algae are distinguished:

**Phytoplankton** – microscopic algae that inhabits in suspension in the water column. There are following forms of phytoplankton:

- *true planktonic (euplanktonic)* species spend their whole lives in suspension. The process of its assimilation and reproduction occur in water column, they sink to the bottom only in a dead state;
- *temporary planktonic* forms also inhabit in the water column, but spend part of their life cycle (at the stage of spores or cysts) at the bottom;
- *passive planktonic* organisms usually inhabit in the water column due to the fact that they attach to other planktonic inhabitants;
- *random planktonic forms* - species that usually inhabit at the bottom or in a biofouling, triggered by an event (e.g. wind or wave transposition) to blend into plankton and are able to survive in a new environment.

**Phytoneuston** is a form of algae, which inhabits on surface film of water about 5cm thick. They usually inhabit on stagnant water and calm backwaters of flowing waters. All of them are capable of withstanding intense ultraviolet radiation, as well as sharp fluctuations in temperature and concentration of dissolved salts; many have special apparatus that hold them on the surface of the water (aerial caps, mucic structures, etc.).

**Phytobenthos** - shade-tolerant attached or free-floating algae, which spends entire life cycle at the bottom. The growth and life of phytobenthos microalgae are greatly affected by the availability of light, temperature and water mobility. The water flow allows to bring the necessary nutrients, remove the decay products and wash off the animals that feed on phytobenthos, therefore, as a rule, the diversity of benthic species is greater where there is movement of water.

**Periphyton** (biofoulings) is one of the constituents of aquatic ecosystems and, as an integral part of it, undergoes various changes due to various natural and anthropogenic factors, which are expressed in spatial and temporal successions of periphyton communities.

Periphyton organisms inhabit on various objects located in the water column - hydraulic structures, water supply walls, snags, logs, aquatic plants and animals; can be attached and mobile. The types of periphyton are *autotrophic organisms* - producers - algae; heterotrophic organisms - consumers: protozoa, rotifers, ciliates, crustaceans, cyclops, daphnia, sponges, bryozoans, worms, bivalves and others; Reducing organisms - filamentous, coccoid, rod-shaped, zoogleal and other bacteria, fungi.

The formation of the periphyton community occurs in certain sequence – the bacteria grow first on the substrate, then fungi, algae, and then larvae and adult forms of invertebrates. Rough substrata colonize faster than smooth ones; horizontal surfaces are more intense than vertical ones. The maximum growth of periphyton is observed on the horizon with optimal lighting conditions, temperature and the level of nutrients.

Due to its confinement to the substrate, periphyton, as an object of observation, allows a wide possibility to experiment in natural conditions while also providing for evaluation of the average pollution of the water mass for a certain period of time preceding sampling.

## 4. Phytoplankton and periphyton sampling methods

### Phytoplankton sampling methods

The bathometric method is considered the most reliable phytoplankton sampling method. Samples taken by the bathometer are used for both quantitative calculation and for the qualitative characteristics of the sample.

Phytoplankton samples were taken with a one-liter Ruttner bathometer; 250 ml were poured into 500 ml dishes, mixed (i.e. integral samples were taken).

A plankton net from silk gauze was used for high-quality collection of phytoplankton. For “soft” fixation of phytoplankton samples a Lugol solution was used (and until color turns slightly yellow), followed by addition of formalin (10 ml of 40% formalin is sufficient for 0.5L of sample). Higher fixative concentrations cause deformation of algae and discoloration of their pigment.

Phytoplankton samples were collected according to generally accepted algological methods (Usachev, 1961; Kiselev, 1969; Makarova and Pichkily, 1970; Talsky, 1997; Mustafaeva et al., 2017), and determinants were used to identify the species composition of microalgae (Zabelina et al., 1954; Kursanov et al., 1977; Moshkova, Gollerbach, 1986; Muzafarov et al., 1988; Khalilov et al., 2012, 2014; Streble, Krauter, 1988). The sample taken in a plastic bottle was fixed with 40% formalin and Lugol solution, and labeled (sample number, date, water body, station). Standard sampling horizons: 0 (surface); 0.5; 1.0; 2.5; 5m.

The settling method was used for phytoplankton sampling. The sediment was, in accordance with the methodology, then brought to 100 ml (5-7 days).

The settling method was used for sample concentration in laboratory environment, as planktonic cells settle at a speed of 1 cm in 3 hours (Fedorov and Kapkov, 2006). Then the samples settled in a shaded place for 5-10 days, followed by slow suction of the filtrate by siphon through a double layer of gauze No.76 (this helps to preserve the fine structures of algae).

Compacting the sample was carried out in two stages: from 0.5L to 0.1L (100ml). After secondary settling (not exceeding 5 days), the solution is sucked out again. Poor samples (winter) are brought to 10ml (usually up to 20ml), very rich (during the bloom period, blue-green) – up to 50ml and even 100ml (in this case, secondary sedimentation is not performed).

The indicator properties of phytoplankton are determined by the fact of the presence or absence of certain species and the degree of their quantitative growth. The following qualitative and quantitative characteristics of phytoplankton were determined:

- Species composition of phytoplankton (Table 6)
- The number of species in each main group – Taxonomic composition of phytoplankton (Table 4);
- Population and biomass of the main groups of phytoplankton – 1.2 (cell population*$10^3$);

Quantitative processing of data was carried out according to the generally accepted algological method in a Goryaev chamber with a volume (0.001 $mm^3$) or in a Fuchs-Rosenthal chamber with a volume (3.2 $mm^3$). Further studies were carried out in the laboratory using

MEIJI microscope. The data obtained during the calculation of phytoplankton were used to calculate its algae population size, for which the following recalculation formula was used:

$$N = n \times v_1 / v_2 \times W,$$ (Abakumov and et.al., 1987)

Where, $N$ – the number of cells in 1 $cm^3$ of water;

$n$ – The number of cells in a chamber with a volume of 1 $mm^3$;

$v_1$ – Sample concentrate volume ($cm^3$);

$v_2$ – Chamber volume ($cm^3$);

$W$ – The volume of the sample taken ($cm^3$).

The phytoplankton biomass was determined by the generally accepted calculation method (Usachev, 1961; Kiselev, 1969; Makarova and Pichkily, 1970).

### Methodology for the selection and analysis of periphyton samples

Determination of hydrobiological indicators for periphyton, sampling and their processing are usually carried out 3 times a year according to standard methods (Moshkova et al., 1986; Muzaffarov, 1965, 1988; Hydrometanalysis, 1977) during the growing season (spring, summer, autumn).

Periphyton samples should be taken from neutral substrates (stones, concrete structures). Biofouling from higher aquatic vegetation (macrophytes) is collected only in those cases when there are no other substrates at the sampling point.

To assess the quality of water by periphyton the following are determined:

- species composition;
- mass species;
- saprobity index.

A comparative analysis of sampling points according to hydrobiological indicators (taxonomic diversity, dominant and subdominant species, identification of saprobity index) is also carried out.

To determine the species composition of algae, freshwater algae determinants were used in accordance with the analyzed group of hydrobionts and other generally accepted determinants (Talskih, 2015; Salazkin et al., 1984; Mochenko, 1974; Makrushin, 1974; Kutikova, 1970; Kiselev, 1969; Katanskaya, 1981; Zabelina, 1953).

Along with the determination of the species composition of periphyton, the frequency-abundance index "***h***" for each species was assessed using the eye-scale:

- 9 - very often (many in each field of view);
- 7 - often (in each field of view);
- 5 - frequent (not in all fields of view);
- 3 - rare (in few fields of view);
- 2 - very rare (several instances on the specimen);
- 1 - single (single instances in the sample).

Mass (dominant) species that form the governing complex are considered to be those whose abundance is 5-9 points; subdominant – those with an abundance of 3 points; single – the abundance of 1-2 points.

If we aggregate the abundance index "***h***" by individual taxa (type, family, genus) or functional groups (producers, consumers, reducers), then numerical expressions of abundance ∑h were obtained, which makes it possible to evaluate the relative role of different groups of organisms in peripheral biocenoses and carry out comparative spatial or temporal assessment. The most convenient, as applied to periphyton organisms, it is recommended to use the Pantle-Bucca saprobiological analysis method in Sladecek's modification (Talskih, 2015). This method takes into account the frequency (abundance) of hydrobionts ***"h"*** and their saprobity indicator value ***"S"*** (saprobic valency). The determination of the relative frequency of abundance of "***h***" is carried out on the eye scale. The saprobic indicator value ***"S"*** and the saprobity zone are determined for each species according to the lists of saprobic organisms (Kursanov et al, 1977).

Both values (h and S) are included in the formula for calculating the saprobity index (SI):

$$S = \frac{\sum(sh)}{\sum h},$$

For statistical reliability of the results of the research, it is necessary that the sample contains at least 12 indicator species with a total frequency of occurrence (abundance) $\sum h$ of 30.

SI is specified with an accuracy of one hundredth.

For the xenosaprobic zone, it is in the range 0-0.50; oligosaprobic – 0.51-1.50; b-mesosaprobic – 1.51-2.50; a-mesosaprobic – 2.51-3.50; polysaprobic – 3.51-4.00.

The conclusion about the quality of water in terms of periphyton was made taking into account information about the species composition and diversity, the frequency of occurrence of species, saprobity of the dominant forms and saprobity index (SI), as well as the biotic periphyton index (BPI), which was developed based on the data collected mainly in the Syrdarya river basin, is applicable region-wide and adapted to the regional characteristics of the rivers of Central Asia (Mustafaeva et al, 2017).

Biotic indices are designed to assess the ecological status and water quality of a water body. They assume immediate change in biotic parameters characterizing the biological state of ecosystems, which from an ecological point of view is considered a central element in regulating the quality of the aquatic environment and allows to attribute each studied section of a water to a specific class of water on a six-point scale of water quality according to hydrobiological indicators (Table 3).

Assessment of the structure of periphyton biocenoses and water quality by the biotic periphyton index (BPI) – its development is based on ranking the biological responses of periphyton to changes in the complex of abiotic conditions and chemical composition of water – from the formation zone to the zone of active dispersion and pollution of surface runoff, as well as digital coding of different states of periphyton biocenoses using grades: from 10-9 (very clean water) to 1-0 (very dirty water). BPI is zero in conditions of pronounced toxic stress.

The proposed evaluation system takes into account, mainly, the sequence of separation from the periphyton the individual indicator species sensitive to water quality, higher taxa and groups of organisms, changes in the functional structure of periphyton (changes in the ratio of producers, consumers and reducers) with increasing pollution load.

*Table 3 Classifier of quality and ecological state of surface waters based on SI and BPI values*

| Water class | Water quality | BPI values | SI Values | Ecological status of biocenosis (desired/expert assessment) |
|---|---|---|---|---|
| I | Very clean | 10-9 | <1,0 | Background (reference) - AB (F) |
| II | Clean/lightly polluted | 8-7 | 1.1–1.5 | Background (good) - AB |
| III | Moderately polluted | 6-5 | 1.6–2.5 | Fair - AB |
| IV | Polluted | 4 | 2.6–3.5 | Unsatisfactory - AB-Ab |
| V | Dirty | 3-2 | 3.6–4.0 | Bad - Ab |
| VI | Very dirty | 1-0 | > 4.0 | Invalid - ab |

The BPI value grading scale (10-0) given in Table 3 can be considered as a specific ecological spectrum of states of periphyton biocenoses with varying degrees of degradation of their initial ecological structure. As a first approximation, this allows to make a conclusion about the ecological state of periphyton and, indirectly, about the ecological quality of a canal.

The class of water quality by periphyton was determined on the basis of the values of both indices, as well as taking into account the structure of the species composition, the presence in the dominant complex of characteristic species of organisms, and their ecological and geographical characteristics. In the final conclusion pollution level and the general sanitary and ecological condition of the water bodies, apart from the calculated indices, the real situation in the water body was taken into account, e.g. outbreak of growth of certain species and entire groups of organisms confined mainly to contaminated sites, depauperization of the species composition, and general inhibition of growth of producers, the growth of brackish and halophilic species of organisms. Also taken into account were various visual signs of pollution of the water mass and bottom sediments, morphological diversity or monotony of aquatic biocenoses.

In addition, the table shows the characteristics of the ecological invariant states of biocenoses, which are codified in the form of alphabetic characters:

***AB (F)*** - the background ecological state in which the biocenoses are in a state of metabolic and ecological progress and are represented by a complex of species that reflect the natural (undisturbed) gene pool of the region;

***AB*** is a satisfactory ecological state characterized by metabolic and ecological progress of biocenoses;

***AB-Ab*** - a transitional ecological state associated with a noticeable change in the taxonomic and functional structure of biocenoses;

***Ab*** - unsatisfactory ecological state, pronounced degradation of the ecological structure of the initial biocenoses;

***ab*** - absolutely unacceptable ecological state, complete degradation of biocenoses (Talskih, 2015).

Definitions of alphabetic characters:

***A*** - metabolic progress of biocenoses (active metabolism of aquatic biocenoses);

***a*** - the state of metabolic regression of biocenoses (inhibition of the metabolism of aquatic biocenoses);

***B*** - the state of the ecological progress of biocenoses (complication of the ecological structure of aquatic biocenoses);

***b*** - the state of ecological regression of biocenoses (simplification of the ecological structure of aquatic biocenoses).

The above evaluation methods using SI and BPI indices are considered as basic indicators and their application reflects the actual ecological landscape.

# 5. The results of the analysis of phytoplankton and periphyton samples

## Phytoplankton

During the reconnaissance survey and selection of sampling points on YG canal on March 20, 2020, 4 phytoplankton samples were taken, which revealed 111 species, varieties and forms of algae, among which 13 species of cyanobacteria (*Cyanophyta*) and diatoms (*Bacillariophyta*) – 85 species, green (*Chlorophyta*) - 10 species and euglen (*Euglenophyta*) - 3 species (Table 4). The taxonomic structure of spring phytoplankton in YG canal is presented in Table 4.

*Table 4 Taxonomic composition of the phytoplankton and periphyton communities of the studied sections of the YG canal (March, 20)*

| Taxon / No. of samples | Phytoplankton | | | | | Periphyton | | |
|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | | 1 | 2 | 3 |
| Cyanophyta | 8 | 11 | 4 | 7 | | 12 | 10 | 6 |
| Bacillariophyta | 66 | 55 | 36 | 57 | | 76 | 61 | 53 |
| Euglenophyta | 1 | 3 | - | 1 | | - | - | - |
| Chlorophyta | 7 | 6 | 2 | 4 | | 5 | 5 | 4 |
| **Total number of species** | **82** | **75** | **42** | **69** | | **93** | **76** | **63** |

The dominant complex of phytoplankton communities in YG canal was represented mainly by producers, the most developed and the most diverse of which are diatoms, blue-green and green algae, as well as a small diversity of euglena species.

Samples taken in the canal on March 20, 2020, revealed 13 species (11.71%) of blue-green algae (*Cyanophyta*), forms and varieties of which are represented by widespread ***b-***, ***ba-*** and ***a-***saprobic planktonic colonial and filamentous forms of algae from genera *Microcystis, Merismopedia, Dactylococcopsis, Gloeocapsa, Oscillatoria, Phormidium, Lyngbya, Spirulina* (Table 6).

In spring samples of phytoplankton, the number of blue-green algae varied from 187,500*$10^3$ cells/l to 1456,250*$10^3$ cells/l, and the biomass, respectively, from 1.988 mg/l to 39.188 mg/l (Fig. 9).

*Table 5 Quantitative development of spring phytoplankton (March, 20) at sampling points at YG canal (population: cells*$10^3$/biomass mg/l)*

| **Taxon / No. of samples** | **1** | **2** | **3** | **4** |
|---|---|---|---|---|
| Cyanophyta | 1075,00<br>13.288 | 1456,250<br>39.188 | 187,500<br>1.988 | 893,750<br>8.456 |
| Bacillariophyta | 2181,250<br>2574.706 | 1162,500<br>1403.538 | 462,500<br>388.350 | 1262,500<br>1366.163 |
| Euglenophyta | 6,250<br>1.800 | 18,750<br>71.088 | - | 6,250<br>3.513 |

| | | | | |
|---|---|---|---|---|
| Chlorophyta | 162,500<br>1965.288 | 237,500<br>991.013 | 100,00<br>28.550 | 50,00<br>6.075 |
| Total number/Biomass | **3425,00**<br>**4555.082** | **2875,00**<br>**2504.827** | **750,00**<br>**418.888** | **2212,500**<br>**1384.207** |

According to taxonomic diversity, diatoms (*Bacillariophyta*) dominate in the phytoplankton samples of researched locations on YG canal – 85 species, which accounted for 76.58% of the total number of species, forms and varieties. Diatoms are represented mainly by widespread freshwater ***o- o-b-***, ***b-*** saprobic planktonic forms from the genera *Melosira, Cyclotella, Synedra*, Fragilaria, *Diatoma (D.elongatum)*, *Asterionella* and freshwater-brackish-water *ba*-mesosaprobic forms from phytobenthos genus *Cocconeis, Achnanthes*, *Amphora, Navicula, Rhoicosphenia, Surirella*, as well as *a*-*b*-, *a*-saprobic brackish-water and brackish-marine species, characteristic of reservoirs with slightly increased water salinity (*Gyrosigma acuminatum, G. spenseri, Navicula Kolbei, N. spicula, Hantzschia virgata, Nitzschia sigma, N. sigmoidea, N.palea, Amphora proteus, Amphiprora paludosa, Surirella Capronii*, etc.).

Diatoms usually have large cell sizes. Therefore with a single occurrence they create an increased number. The number of diatoms in spring samples varies from 462,500*10³ cells/l to 2181,250*10³ cells/1, the biomass was from 388.350 mg/l to 2574.706 mg/l (Fig. 9).

Green algae (Chlorophyta) in the surveyed points had poor growth and represented by 10 species or 9.01% of the total number of species, forms and varieties, which are mainly represented by widespread *b*-mesosaprobic species from the genera *Ankistrodesmus, Oocystis, Chlorella, Chlamidomonas, Dictyosphaerium, Scenedesmus, Cosmarium*, filament from the genera *Cladophora*, *Spirogyra*, etc. The number of green algae in spring samples ranges from 50.00*10³ cells/liter to 237, 500*10³ cells/liter, the biomass was from 6.075 mg/liter to 1965.288 mg/l (Fig. 9).

Euglenophytes (Euglenophyta) algae, which are mainly represented by the genera *Euglena*, *Phacus, and Astasia*, were also observed in the phytoplankton samples with a single occurrence. The number of euglena algae in spring samples ranges from 6.250*10³ cells/l to 18.750*10³ cells/l, the biomass is from 1.800 mg/l to 71.088 mg/l (Fig. 9).

The diagram in Figure 9 illustrates the fluctuations in the number of algae of spring phytoplankton in the surveyed points at YG canal.

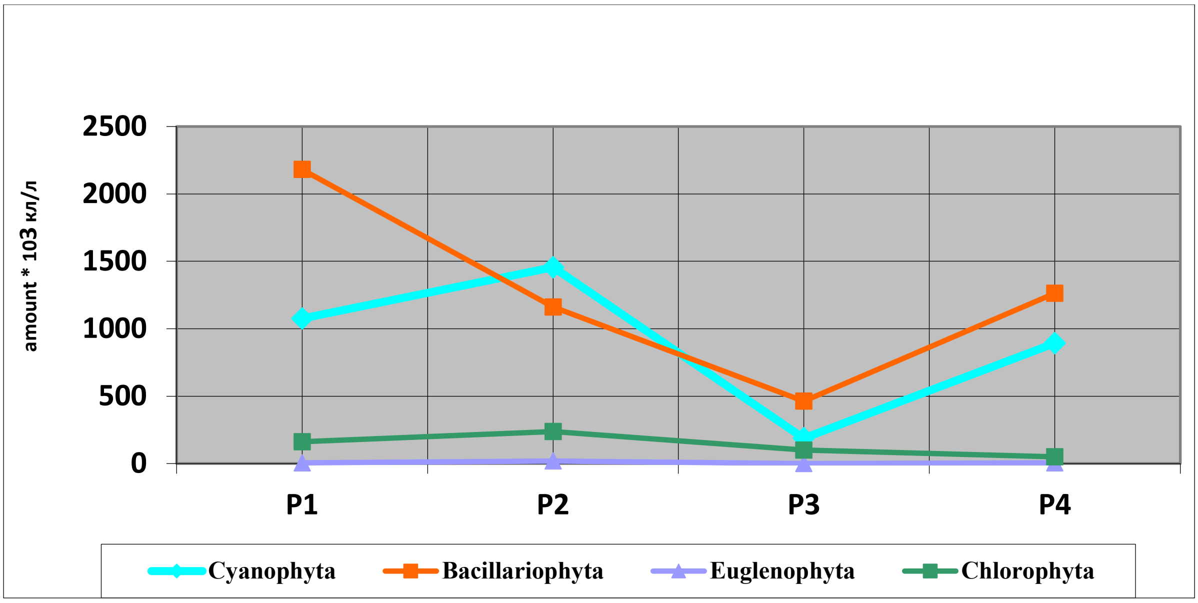


*Figure 9 Diagram of fluctuations in the phytoplankton abundance (*10³ cells/l) in YG canal samples, March 20, 2020.*

The species composition of the phytoplankton and periphyton communities of the surveyed points at YG canal is shown in the table below.

*Table 6 Summary of the species composition of the phytoplankton and periphyton communities of the surveyed points at the YG canal (March, 20)*

| № | Taxon/No. of samples | S | Phytoplankton | | | | Periphyton | | |
|---|---|---|---|---|---|---|---|---|---|
| | ***CYANOPHYTA*** | | 1 | 2 | 3 | 4 | 2 | 3 | 4 |
| 1 | Dactylococcopsis acicularis Lemm. | b | + | + | + | + | + | + | - |
| 2 | Merismopedia glauca (Ehr.) Nag. | b | - | + | + | - | + | - | - |
| 3 | M.punctata Meyen | b-a | - | C | - | - | - | + | - |
| 4 | M.tenuissima Lemm. | b-a | - | C | - | - | + | - | - |
| 5 | Microcystis aeruginosa Woron. | b-a | D | - | - | D | C | + | + |
| 6 | Gloeocapsa alpina Nag. end. Brend. | b | - | - | + | + | + | + | - |
| 7 | Gl.turgida (Kütz.) Hollerb. | b | + | + | - | + | - | - | - |
| 8 | Gl.minima (Kütz.) Hollerb. | b | + | + | - | - | - | - | - |
| 9 | Oscillatoria limosa Ag. | b-a | + | - | - | - | C | + | + |
| 10 | Osc.formosa Bory | a-b | + | + | - | - | C | + | - |
| 11 | Spirulina major Kütz. | b | - | C | - | - | C | - | + |
| 12 | Phormidium ambiguum Gom. | b | - | - | - | - | + | + | + |
| 13 | Ph.uncinatum (Ag.) Gom. | b-a | - | + | - | + | C | + | + |
| 14 | Ph.papillaterminatum Kissel. | b | C | C | - | + | + | + | - |
| 15 | Lyngbya Kuetzingiana (Kütz.) Kirchn. | b | C | D | + | C | C | C | C |
| | ***BACILLARIOPHITA*** | | | | | | | | |
| 1 | Melosira varians Ag. | o-b | C | + | + | + | D | D | C |
| 2 | Cyclotella kuetzingiana Thw. | b | - | - | + | + | + | + | - |
| 3 | C.meneghiniana Kütz | b-a | + | + | + | + | + | + | + |
| 4 | C.comta (Ehr.) Kütz. | b-a | - | + | - | - | + | + | - |
| 5 | Coscinodiscus sp. | b | - | + | + | - | + | - | + |
| 6 | Asterionella gracilissima (Hantzsch.) Heib. | o-b | D | C | + | D | D | + | C |
| 7 | Diatoma elongatum Ag. | o-b | + | + | - | + | + | + | - |
| 8 | D.elongatum v.tenue (Ag.) V.H. | o-b | + | + | + | + | C | C | - |
| 9 | D.vulgare Bory. | b | - | - | - | - | + | - | + |

| № | Taxon/No. of samples | S | Phytoplankton | | | | Periphyton | | |
|---|---|---|---|---|---|---|---|---|---|
| 10 | D.vulgare v.productum Grun. | b | - | - | - | - | + | - | + |
| 11 | Fragilaria crotonensis Kitt. | o-b | D | C | + | C | D | D | C |
| 12 | Fr.capucina Desm. | o-b | C | + | + | + | C | C | C |
| 13 | Fr.construens (Ehr.) Grun. | b | D | C | C | C | D | D | D |
| 14 | Synedra acus Kütz. | o-b | + | + | + | - | C | + | - |
| 15 | S. capitata Ehr. | b | - | + | - | - | - | + | - |
| 16 | S. minuscula Grun. | b | + | - | + | - | + | - | - |
| 17 | S. pulchella (Ralfs) Kütz. | b | + | + | - | - | + | + | - |
| 18 | S. tabulate (Ag.) Kütz. | b-a | - | - | - | + | - | - | - |
| 19 | S. ulna (Nitzsch.) Ehr. | b | + | + | + | + | D | D | D |
| 20 | S.ulna v.amphirhynshus (Ehr.) Grun. | b | - | - | - | + | C | C | - |
| 21 | S.Vaucheria Kütz. | b | - | - | + | - | - | + | - |
| 22 | Eunotia arcus Ehr. | o-b | + | + | - | + | + | + | - |
| 23 | Cocconeis pediculus Ehr. | b | C | C | + | + | D | + | D |
| 24 | C.placentula Ehr. | o-b | - | + | - | - | - | - | C |
| 25 | C. placentula v. euglypta Ehr. | o-b | + | - | - | - | + | C | C |
| 26 | Achnanthes sp.(nodosa?) | o | + | + | + | + | + | + | - |
| 27 | Ach.affinis Grun. | o | + | + | + | + | + | C | - |
| 28 | Ach.minutissima Kütz. | o-b | + | - | - | + | + | C | - |
| 29 | Rhoicosphenia curvata (Kütz.) Grun. | b | C | C | + | + | C | D | C |
| 30 | Diploneis Smithii v. pumilla (Grun.) Hust. | b-a | - | + | - | - | - | + | + |
| 31 | Navicula anglica Ralfs | b | + | - | - | + | + | - | - |
| 32 | N.bacillum Ehr. | b-a | - | + | - | - | - | - | + |
| 33 | N.cryptocephala Kütz. | a-b | + | + | + | + | D | C | D |
| 34 | N.cryptocephala v. intermedia Grun. | b-a | + | + | - | + | C | D | C |
| 35 | N.cryptocephala v.veneta (Kütz.) Grun. | b-a | + | + | - | - | + | + | + |
| 36 | N.cincta (Ehr.) Kütz. | b-a | + | - | - | - | + | + | + |
| 37 | N.gracilis Ehr. | b-o | + | - | + | + | + | + | - |
| 38 | N.kolbei Poretzky et Anissimova | b-a | - | - | + | + | - | - | - |
| 39 | N.microcephala Grun. | b-o | + | + | - | + | + | + | + |
| 40 | N.radiosa Kütz. | o-b | - | + | + | + | - | - | + |
| 41 | N.protracta v. subcapitata Woronichin | a-b | - | - | - | - | + | - | + |
| 42 | N.pygmaea Kütz. | a | - | + | - | - | - | - | + |
| 43 | N.pupula Kütz. | b | - | - | - | - | + | + | - |
| 44 | N.spicula Hickie | a | + | + | - | - | - | - | - |
| 45 | Pinnularia viridis (Nitzsch.) Ehr. | b | + | - | - | - | + | - | - |
| 46 | P.microstauron (Ehr.) Cl. | o | - | - | - | - | + | - | - |
| 47 | Caloneis silicula (Ehr.) Cl. | o-b | + | - | - | - | + | - | - |
| 48 | Caloneis amphisbaena (Bory) Cl. | b | + | + | + | + | + | - | C |
| 49 | Gyrosigma attenuatum (Kütz.) Rabenh. | b | + | - | - | + | + | + | C |
| 50 | G.acuminatum (Kütz.) Rabenh. | b | C | + | - | + | D | + | D |
| 51 | G.scalproides (Rabenh.) Cl. | b | + | - | - | + | + | - | C |
| 52 | G.spenceri (W.Sm.) Cl. | b-a | + | - | - | - | + | - | C |
| 53 | Pleurosigma elongatum W.Sm. | b-a | + | - | - | - | + | - | C |
| 54 | Amphora ovalis Kütz. | b-o | C | C | + | + | C | C | C |
| 55 | A.proteus Greg. | a | - | - | - | + | - | - | + |
| 56 | A. veneta Kütz. | a-b | + | + | - | + | + | + | - |
| 57 | Cymbella affinis Kütz. | b-o | C | + | + | + | C | D | D |
| 58 | C.amphicephala Nag. | o | + | - | - | - | + | + | + |
| 59 | C.cistula (Hemp.) Grun. | b | C | + | + | + | C | D | D |
| 60 | C.cymbiformis (Ag.?, Kütz.) V. H. | o | - | - | - | - | - | + | - |
| 61 | C.helvetica Kütz. | o-x | - | - | - | - | + | + | - |
| 62 | C.helvetica v.curta Cl. | b-o | - | - | - | - | + | C | - |
| 63 | C.lanceolata (Ehr.) V.H. | b | C | C | + | C | C | D | C |
| 64 | C.tumida (Breb.) V.H. | b | C | + | + | + | C | D | C |
| 65 | C.ventricosa Kütz. | o-b | + | - | - | + | + | D | C |

| № | Taxon/No. of samples | S | Phytoplankton | | | | Periphyton | | |
|---|---|---|---|---|---|---|---|---|---|
| 66 | C.ventricosa v.ovata Grun. | o-b | - | - | - | + | - | C | C |
| 67 | Gomphonema olivaceum (Lyng.) Kütz. | b | + | + | + | + | C | D | C |
| 68 | G.olivaceum v.calcareum Cl. | b | + | + | - | + | + | - | - |
| 69 | Epithemia acrus Kütz. | b | + | + | - | - | - | + | - |
| 70 | E.turgida (Ehr.) Kütz. | b | + | - | - | - | + | + | - |
| 71 | Rhopalodia gibba v.ventricosa (Ehr.) Grun | o-b | - | - | - | - | + | - | - |
| 72 | Anomoneoneis sphaerophora (Kütz.) Pfitz. | b-a | - | - | + | - | - | + | - |
| 73 | Amphiprora palludosa W.Sm. | b-a | - | - | - | - | + | - | - |
| 74 | Hantzschia virgata (Roper) Grun. | b-a | - | - | - | - | + | - | - |
| 75 | Bacillaria paradoxa Gmelin | b-a | C | + | + | C | D | C | D |
| 76 | Nitzschia acicularis W.Sm. | a | + | + | + | + | - | + | - |
| 77 | N.capitellata Hust. | b | + | + | + | C | + | + | D |
| 78 | N.dissipata (Kütz.) Grun. | o-b | + | - | - | + | + | + | + |
| 79 | N.filiformis (W.Sm.) Hust. | b | + | + | + | + | C | + | C |
| 80 | N.linearis W.Sm. | o-b | - | - | - | + | - | - | - |
| 81 | N.lorenziana v.incurta Grun. | b | - | + | - | - | - | + | - |
| 82 | N.obtusa W.Sm. | b | + | - | - | + | + | - | - |
| 83 | N.obtusa v.scalpelliformis Grun. | b-a | - | - | - | + | + | - | - |
| 84 | N.palea (Kütz.) Grun. | a | + | + | - | + | + | + | C |
| 85 | N.punctata v.aralensis Borzsczow | a | + | - | - | - | - | - | - |
| 86 | N.sigma (Kütz.) W.Sm. | a-b | + | + | - | + | C | - | + |
| 87 | N.sigmoidea (Ehr.) W.Sm. | b | + | + | + | + | D | + | D |
| 88 | N.spectabilis (Ehr.) W.Sm. | b-a | + | - | - | - | C | - | + |
| 89 | N.tryblionella Hanzsch | a-b | + | + | - | + | + | - | + |
| 90 | N.tryblionella v.levidensis (W.Sm.) Grun. | a-b | + | - | - | + | - | - | - |
| 91 | N.vermicularis (Kütz.) Grun. | b | C | + | + | C | D | C | C |
| 92 | Cymatopleura solea (Breb.) W.Sm. | b-a | + | + | - | + | C | + | + |
| 93 | C.elliptica (Breb.) W.Sm. | b | + | - | - | - | C | - | - |
| 94 | Surirella Capronii Breb. | b-a | + | + | - | + | C | + | + |
| 95 | S.ovata Kütz. | b | + | + | + | C | C | + | + |
| 96 | S.linearis W.Sm. | b | - | + | - | + | - | - | - |
| 97 | S.robusta Ehr. | b-a | + | + | - | - | + | - | - |
| | EUGLENOPHYTA | | | | | | | | |
| 1 | Euglena sp. | b-a | - | + | - | + | - | - | - |
| 2 | Phacus sp. | b | - | + | - | - | - | - | - |
| 3 | Astasia sp. | a-b | + | + | - | - | - | - | - |
| | ***CHLOROPHYTA*** | | | | | | | | |
| 1 | Ankistrodesmus falcatus (Corda) Ralfs. | b | + | + | + | + | + | + | + |
| 2 | Ank.minimum Korsch. | b | - | + | - | - | + | - | - |
| 3 | Chlorella sp. (vulgaris?) | b | - | - | - | + | - | - | - |
| 4 | Oocystis sp. (natans Lemm.) | b | + | - | - | - | - | - | - |
| 5 | Chlamidomonas sp. | b | + | - | - | + | - | - | - |
| 6 | Dictyosphaerium ehrenbergianum Naeg. | b | - | C | + | - | - | + | - |
| 7 | Cosmarium formulosum Hofm. | b | - | + | - | - | - | + | + |
| 8 | Scenedesmus quadricauda (Turp.) Breb. | b | + | - | - | + | - | + | - |
| 9 | Algae sp. | b | + | + | - | - | - | - | - |
| 10 | Cladophora glomerata (L.) Kütz. | b-o | + | - | - | - | C | + | - |
| 11 | Ulothrix zonata Kütz. | o-b | - | - | - | - | C | - | - |
| 12 | Spirogyra porticalis (Hass.) Kütz. | b-o | + | + | - | - | + | - | + |
| 13 | Enteromorpha intestinalis (L.) Link. | a-b | - | - | - | - | - | - | D |
| | **Total species of microalgae** | | **82** | **75** | **42** | **69** | **93** | **76** | **63** |
| | ***Consumers:*** | | | | | | | | |

| № | Taxon/No. of samples | S | Phytoplankton | | | | Periphyton | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Amoeba sp. | a | | + | | | | | |
| 2 | Bodo sp. | a-b | | | | | + | + | + |
| 3 | Colurella colurus | o-b | | | | | | | + |
| 4 | C.uncilla | b-a | | | | | | + | + |
| 5 | Chilodonella uncinata | b-a | | + | | | | + | |
| 6 | Rotaria sp. | b-a | | | | | + | + | + |
| 7 | Proalis sp. | b | | | | | + | + | |
| 8 | Baetis sp. | b | | | | | + | | + |
| 9 | Nematoda gen.sp. | a | | | | + | C | + | C |
| 10 | Oligochaeta sp. | a | | + | | | + | | + |
| 11 | spicullu -Spongilla lacustris gemmula | b-a | | + | + | | + | | |
| 12 | Arcella sp. | b-a | | | | | + | | + |
| 13 | Cyphoderia ampulla | b-a | + | | | + | + | | |
| 14 | Euglypha sp. | b-a | | + | | | + | + | + |
| 15 | molluscus | b-a | | | | | | + | |
| 16 | Micota sp. | | | | | | + | + | |

*NB: mass (D-dominant) species forming the dominant complex is considered to be those with an abundance of 5–9 points; subdominant (C) - those with an abundance of 3 points; single (+) - an abundance of 1-2 points.*
*S - saprobity index, which is used to determine the level of organic pollution of water canals, is a description of the symbolism of the index is given in sections below.*

**None of the above-mentioned species are listed neither International Red list nor Red Book of Uzbekistan.**

## Periphyton

The following characteristics were determined from the periphyton indices: taxonomic and species composition (Table 7), description of mass species, saprobity indices, and water quality class (Table 7).

During a one-year reconnaissance spring survey of the YG canal, 3 samples (S1-S3) were taken according to periphyton indices, in which 112 species, varieties and forms of microalgae were found, where 13 were blue-green (Cyanophyta), 90 were diatomic (Bacillariophyta) and 9 green (Chlorophyta) species of algae (Table 6).

The dominant complex of periphyton communities, as well as the dominant complex of the phytoplankton community, during the research period was represented mainly by producers, the most developed and diverse among which are diatoms, blue-green and green algae. Organisms from the consumer group were also observed with low occurrence in individual samples.

*Table 7 The taxonomic structure of the periphyton of the researched sections of YG canal (March, 20)*

| Taxon / No. of samples | S1 | S2 | S3 |
|---|---|---|---|
| Cyanophyta | 12 | 10 | 6 |
| Bacillariophyta | 76 | 61 | 53 |
| Euglenophyta | - | - | - |
| Chlorophyta | 5 | 5 | 4 |
| **Number of species** | **93** | **76** | **63** |
| SI min-max | 1.87 | 1.79 | 1.98 |
| BPI (Biotic peripheral index) | 6 | 6 | 6 |
| Class of water quality | III | III | III |

| Ecological state | AB | SB | AB[2] |
|---|---|---|---|

Biofouling was mainly collected from stalks of higher aquatic vegetation (reed thickets, reeds) or flooded macrophytes of the bottom layers (crested beds, chara), in which the most abundant and diverse are planktonic freshwater-brackish-water and brackish-water colonial, filamentous and brackish-water marine species characteristic of water bodies with slightly increased salinity.

13 species of the blue-green algae (*Cyanophyta*) samples were observed among the blue-green algae in periphyton which amounted to 11.61% of the total number of species and forms of algae. The dominant complex of blue-green algae is represented by nearly the same complex of widespread planktonic freshwater-brackish-water and brackish colonial and filamentous forms as the phytoplankton community.

*Microcystis aeruginosa Woron.*, *Oscillatoria limosa Ag., Osc.formosa Bory, Phormidium ambiguum Gom., Ph.uncinatum (Ag.) Gom., Spirulina major Kütz., Lyngbya Kuetzingii (Kütz.) Schmidle* and others are the most abundant and massive in the fouling.

In samples, diatoms are represented by 90 species, which amounted to 80.36% of the total number of forms and varieties. The most widespread species in periphyton were planktonic forms of diatoms: *Melosira varians Ag., Cyclotella meneghiniana Kütz., Diatoma elongatum v.tenue (Ag.) VH, Fragilaria crotonensis Kitt., Fr.capucina Desm., Fr.construens (Ehr.) Grun., Synedra acus Kütz., S.ulna (Nitzsch.) Ehr., S.ulna v. Amphirhynchys (Ehr.) Grun., As well as species characteristic of phytobenthos: Cocconeis pediculus Ehr., C.placentula Ehr., Rhoicosphenia curvata (Kütz.) Grun., Gomphonema olivaceum (Lyng.) Kütz., N. cryptocephala Kütz. N. cryptocephala v. intermedia Grun. Amphora ovalis Kütz., Bacillaria paradoxa Gmelin, Nitzschia palea (Kütz.) Grun., N.spectabilis (Ehr.) Ralfs. N.sigma (Kütz.) W.Sm., N.sigmoidea (Ehr.) W.Sm., N.vermicularis (Kütz.) Grun., Cymatopleura solea (Breb.) W.Sm., C.elliptica (Breb.) W.Sm., Surirella capronii Breb., S.ovata Kütz.*

Green algae (Chlorophyta) in the surveyed areas had poor growth and represented by 9 species, or 8.03% of the total number of species, forms and varieties, which are mainly represented by widespread *b*-mesosaprobic species from the genera *Ankistrodesmus, Dictyosphaerium*, *Scenedesmus, Cosmarium*, filamentous from the genera *Cladophora, Spirogyra, Ulothrix, Enteromorpha*, etc.

Some samples of periphyton revealed organisms representing the group of consumers (amoeba, protozoa, rotifers, nematodes, chironomid larvae and oligochaetes). Samples S1 and S2, on the stems of macrophytes (chara, reed) had marked formations in dark brown to brownish-olive in color, leathery, hard deposits from shell organisms of the genera *Arcella, Cyphoderia, Euglypha*, and also spicules *Spongilla lacustris* gemmule.

The water quality in the surveyed sections of canal mainly corresponds to class III — moderately polluted water; less often – transitional III-IV class (which is associated with increased mineralization). The BPI values are basically 6 points and the SI ranges between 1.79-1.98, which corresponds to ***o-b-***, ***b-*** and ***b-a-*** mesosaprobic conditions, the ecological state is mainly ***AB***.

[2] Water quality class corresponds to III in terms of indicators and BPI - 6 points, the environmental status of AB

The comparative characteristics of phytoplankton and periphyton species at samples taken at the YG canal is shown in the figure below.

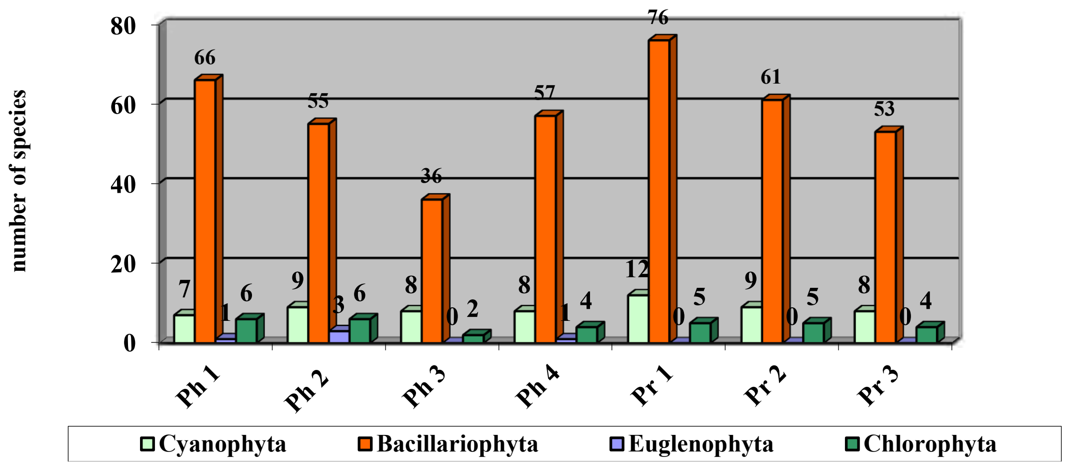


*Figure 10 Comparative characteristics of the number of species found in samples of phytoplankton (Ph. 1-4) and periphyton (Pr. 1-3) at the YG canal, March 20, 2020.*

## 6. Zooplankton communities at the surveyed sections of YGC

Zooplankton is a “soaring” component of aquatic ecosystems, consisting of animals that can travel short distances through their muscular organs. Representatives of zooplankton vary significantly in size: nanoplankton (unicellular simplest: foraminifera, radiolarians, ciliates - 100nm), microzooplankton (annelids: rotifers up to 50$\mu$m) and mesoplankton (0.2-20mm) copepods - copepods and cladocerans - cladodes. In this research, we consider rotifers — Rotifera, and crustaceans (cladocerans — Cladocers and copepods — Copepods). Many representatives of crustaceans have very well-developed filtering apparatuses, and are a kind of “orderlies” of canals: filtering out a large number of bacteria, particles of detritus and phytoplankton as a nutrient mixture, they reduce the level of pollution of reservoirs and lower its trophic level (organic load). Therefore, during the flowering of phytoplankton, there is also a “flash” of the development of zooplankton. Depending on the type of ecosystem and the abundance of zooplankton, the daily filtration activity of these animals can range from 9% to 90% of the reservoir volume. Filterer-zooplankton are the most vital link in the pasture food chain in the ecosystem, the main consumers of primary products.

Thus, zooplankton is one of the most important functional units in the ecosystem of any water body. They play the role of natural biofilters and actively influence the formation of water quality. Its composition, structure and level of growth determine the direction and intensity of the flow of matter and energy in streams and reservoirs. Many planktonic animals make vertical migrations, which contributes to the transfer of matter to depths on the surface. Zooplankton organisms, by type of nutrition, are predominantly filtering agents (phytoplankton, bacteria), sedimentators (detritus) and predators (rotifers, ciliates). Zooplankton is also a good fodder for zoobenthos and fish. Knowledge of the structural and functional characteristics of zooplankton allows it to be used as a system of biocenotic level for indicative purposes in diagnosing ecosystems as stages of their natural development and in assessing changes in this process under the influence of anthropogenic factors.

## Materials and methods

### Zooplankton Sampling Technique

The aim of this work was to assess the ecological state of the YG canal by generally accepted methods for studying zooplankton, as well as to determine the trophic state of these reservoirs using bioindication methods, i.e. to determine the saprobity and trophicity of water.

Zooplankton samples were taken using Jedi conical nets: medium d=18.5cm, gauze size No.68 and small d=14cm, gauze size No.72, and processed according to the methods. The methods of collecting zooplankton involved a combination of separate water scooping and subsequent separation of plankton from water, which is carried out either by filtering the water delivered to the surface using 10L, filtering through a small Jedi net (from the shore) or dividing a certain amount of water while vertically pulling the middle Jedi net with boats (the volume of filtered water was determined by the formula: $V = \pi R2 * h$, where $R$ is the radius of the inlet of the net, $h$ is the length / depth of the fished layer of water).

Samples were fixed with 40% formalin, bringing the sample concentration to 4% and labeled in accordance with the entries in the Field Journal. Materials after identification and processing of samples were prepared for storage.

The technique for preparation and microscopy of specimens included: when processing a fixed material, specimens were prepared in a drop of water, in aqueous glycerin — formalin (1-part glycerol per 1 part of formalin). To preserve the specimen for a long period, the material is enclosed in a solid medium: glycerin – gelatin, Canadian balsam.

Identification of organisms: during identification of the sample, we used triocular and binocular microscopes (Meiji, Japan), using conventional determinants, specimen needles, slides and coverslips (Kutikova, 1970; Mochenko, 1974; Tsallolikhina et al, 1994).

Determination of the species composition of zooplankton was carried out under a binocular and a microscope using conventional determinants. In the presence of a small number of zooplankters in the sample (up to 500 specimens), the sample was completely calculated, pouring its contents in 2-3 portions into Bogorov chamber. In cases when the sample contained a large number of organisms, a part of it was counted, taking with the help of a pipette stamp V=1.25ml. Individual zooplankton weights (w, mg) were calculated using allometric growth formulas relating the length (l, mm) and weight (w) of crustaceans: w = q*l3 (Salazkin et al, 1984).

## Indication of water pollution by using zooplankton.

To characterize the level of water pollution, were used saprobity of zooplankton species (like in case of phytoplankton), which was determined in accordance with standardized methods (1977), herewith:

- the oligosaprobic zone ***(o)***, which is characterized by the absence of hydrogen sulfide and carbon dioxide $H_2S$ and $CO_2$, is very small, and has a normal oxygen content $O_2$, a minimum of dissolved organic substances, a low number of water inhabitants, but significant species diversity (saprobity index = 1.0);
- the mesosaprobic zone is divided into ***β-*** and ***α***-mesosaprobic subzones; The *β*-mesosaprobic subzone is characterized by the presence of ammonia, nitrous and nitric acids, there are no amino acids, $H_2S$ is very small, $O_2$ is sufficient for the complete oxidation of organic matter; the species diversity of aquatic organisms is

still high, their abundance and biomass are quite high, ammonia, amino acids, $O_2$ are still present in $\alpha$-mesosaprobic waters in noticeable amounts, $H_2S$ and $CO_2$ are greater than in the $\beta$-mesosaprobic subzone, but there are no undecomposed proteins; mineralization of organic matter is mainly due to its aerobic oxidation;

- the saprobity index of $\beta$-mesosaprobic waters is 1.1–2.0, and that of $\alpha$-mesosaprobic waters is 2.1–3.0; the polysaprobic zone ($\rho$) is characterized by the presence in the water of undecomposed proteins, traces of hydrogen sulfide, a low oxygen content, significant amounts of $CO_2$, and a reducing type of biochemical processes. Self-purification in these waters is mainly due to the activity of bacteria; the saprobity index is 3.1-4.5.

The calculation of the zooplankton saprobity index (SI) at the sampling points was determined according to the Pantle-Bucca method in the Sladecek modification, according to the formula: $S = \sum hs / \sum h$, where *h* is the frequency of occurrence of individuals of the species, which was characterized by the following estimates: 1 - single, 2 - rarely, 3- often, 5- often, 7-very often, 9-mass quantity, and where *s* is the indicator weight of each species, which was determined in accordance with the Unified methods[3].

The trophic level of the reservoir: oligo-meso-eutrophic is determined in accordance with the biomass of zooplankton (Table 8) or/and the level of soluble phosphorus in the reservoir.

*Table 8 Concentration of phosphorus, biomass of zooplankton and ichthyomass in water bodies of different trophic levels*

| Type of pond | Phosphorus concentration mg/m$^3$ | Biomass, g/m$^3$ | Ichthyomass, g/m$^2$ |
|---|---|---|---|
| Ultra oligotrophic | < 3 | < 0.5 | 1.25 |
| Oligotrophic | 1-10 | 0.5-1 | 1.25-2.5 |
| Mesotrophic | 4-40 | 1-4 | 2.5-10 |
| Eutrophic | 200-400 | 4-16 | 10-40 |
| Hypereutrophic | > 400 | > 16 | > 40 |

Besides, the ratio of the biomass of filterers and sedimentators (i.e. “peaceful” forms of zooplankton) to the biomass of “predatory” species of zooplankton is used to identify the water quality. The higher the biomass of “peaceful” species, and the smaller the biomass of “predatory” species, the better the ecological situation in aquatic ecosystems. Predatory (facultative predators) species usually include some Cyclops and rotifers of some genera *Brachionus*. All species of Cladocera are classified as peaceful species.

### The species composition of zooplankton.

For sample collection 4 locations at the YG canal were determined at a 250m distance from each other. Zooplankton and phytoplankton samples at locations 1, 2 and 3 were taken close to the clay coast, where the depth of the canal was 1-1.5 m. Locations’ biotopes were littoral with submerged higher vegetation and coastline overgrown with perennial land vegetation. The 4$^{th}$ location had a biotope different from the previous ones, which was characterized by

[3] Unified methods: water quality. Methods of biological analysis of water.

the absence of reed or cattail thickets and a depth of 3-4 m. Based on different types of the biotopes, identified species at samples 1, 2 and 3 were represented by plankton-benthic *Harpacticoida g.sp* and phytophilic littoral species *Alona rectangula, Chydorus sphaericus Megacyclops viridis*, and at the 4th station, an euplankton species, *Daphnia pulex*, was found as dominant. All identified species are represented by widespread, eurytopic species of the *Palaearctic* fauna. No unique (endemic) or rare / endangered species were found among determined zooplankton species.

During the analysis of collected samples, there were found such species as *Megacyclops viridis*, *Paracyclops affinis*, *Harpacticoida g.sp.*; 3 species of *Cladocera*: *Alona rectangula*, *Chydorus sphaericus, Daphnia pulex*; and 2 species of *Rotifera*: *Euchlanis dilatata*, *Brachionus quadridentatus*. Please note that there were species determined at sampling point 3. Overall, 8 species of zooplankton were identified (Table 9).

*Table 9 Species determined in 4 samples collected from the YG canal*

| **Location no.** | **Species** | **Abundance, ind./m$^3$ (N)** | **Biomass, thousand / m$^3$ (B)** | **Saprobity (s) and abundance (h) of species** |
|---|---|---|---|---|
| **№1** | *Megacyclops viridis* | 400 | 40 | β-o - 1,6(3) |
| | *Paracyclops affinis* | 4000 | 182.8 | o-β - 1,25(7) |
| | *Chydorus sphaericus* | 1600 | 56 | β-o - 1,75(5) |
| | *Alona rectangula* | 400 | 14 | o-β - 1,3 (3) |
| | *Euchlanis dilatata* | 5200 | 4.68 | β-o - 1,75 (7) |
| **Total:** | 5 Species | **11600** | **297.48** | **S=1.47** |
| **№2** | *Megacyclops viridis* | 350 | 34.5 | β-o - 1,6(3) |
| | *Paracyclops affinis* | 1600 | 720 | o-β - 1,25(7) |
| | *Harpacticoida g.sp.* | 410 | 20.6 | - |
| | *Euchlanis dilatata* | 800 | 0.8 | β-o - 1,75 (5) |
| | *Brachionus quadr.* | 380 | 0.36 | β -2.0 (3) |
| **Total:** | 5 species | **3600** | **132.76** | **S=1.57** |
| **№3** | No species were found in this location<br>**This sampling location had a large amount of detritus. Therefore, there were not determined any species of zooplankton.** | | | |
| **№4** | *Megacyclops viridis* | 300 | 42.1 | β-o - 1,6(3) |
| | *Paracyclops affinis* | 6100 | 252.9 | o-β - 1,25(7) |
| | *Daphnia pulex* | 8000 | 1360 | β -2.0 (9) |
| | *Euchlanis dilatata* | 750 | 0.85 | β-o - 1,75 (3) |
| **Total:** | 4 Species | **18000** | **1753.6** | **S=1.67** |

Despite having a small number of species (8 species diversity) it is a quite large amount for the YG canal.

The calculated indices of saprobity varied in the range of 1.47 (oligo saprobic-beta mesosaprobic zone) to 1.67 (beta mesosaprobic-oligosaprobic zone), that corresponded to a quality from slightly polluted to moderately polluted waters. Despite a large amount of dissolved organic substances (mesosaprobic zone), its decomposition occurs because of sufficient amount of oxygen (rapid flow). Besides, filter species of zooplankton (abundant development of the planktonic species Daphnia pulex) accumulate quick self-cleaning feature of the water body.

In addition to the true daphnia filter (filtering phytoplankton and plant and animal dead remains) determined from collected samples, there were found, a group of planktobenthic species

(*Chydorus sphaericus and Alona rectangula Harpacticoida g.sp.*) and cyclops; filter predators (*Megacyclops viridis and Paracyclops affinis*). These species are inhabitants of aqua flora and also contribute to a decrease in pollution of the water body.

According to the development of zooplankton biomass, the canal can be characterized as oligomesotrophic with a biomass of 0.32g/m$^3$ (oligotrophic level) to 1.75g/m$^3$ (mesotrophic) level, which contributes to the development of ichthyomass from 2.5 to 10g/m$^2$. From benthic organisms, there were found: mosquito larvae (Chironomidae), dragonfly larvae (Odonata). So, the biomass of chironomids was about 6 g/m$^2$.

It is important to highlight that a sufficient biomass of zooplankton and benthos retrieved from sampling points at the YG canal as well as good water quality may lead to the development of fishery.

## 7. Survey results and findings

The below findings were made based on the survey results:

*The phytoplankton species* of the surveyed area are represented by 111 species, forms and varieties of algae, 13 of which are blue-green, 85 are diatoms, 10 are algae. The dominant complex is composed of diatoms, blue-green and green microalgae, which are abundantly present in all the researched areas of the canal. In addition, there was also observed euglena microalgae with low diversity and abundance (up to 3 types of species). Furthermore, relatively low amount of consumer organisms such as protozoa, rotifers, sessile ciliates, bryozoans, and nematodes were found in phytoplankton samples.

The majority of detected phytoplankton species are widespread in moderate conditions and have wide ecological valence. Phytoplankton species are represented by freshwater, freshwater - brackish-water, brackish-water and brackish-water - marine forms of algae. True planktonic species are (P) - 16 species, plankton-benthic (P-B) - 43, phytobenthos (B) - 65, epiphytes (Ep) - 3 and saprophil (Sp) - 3 species (1).

*The periphyton species determined in collected samples from the YG canal*, are mainly represented by diatoms, blue-green, and green microalgae. Consumer organisms of zooplankers (protozoa, rotifers, chironomid larvae, nematodes, oligochaetes, shell amoebas, etc.), as well as representatives of the Fungi kingdom (mushrooms), are constantly present with low abundance in the fouling.

Sampling points are places with a shallow depth, respectively, well warmed up and heavily overgrown with macrophytes; therefore, species that prefer highly eutrophic and overgrown reservoirs (the canal littoral zone) are dominated. However, it can be concluded that there were decreased water level in canal at the time of sampling, that in turn affected the development of periphyton (slightly moderate development). There were observed stems of macrophytes (reeds, reeds, hara, urut, crested ridges), formations from dark brown to brownish-olive in color, leathery, hard deposits from shell organisms of the genera *Arcella, Cyphoderia, Euglypha*, as well as spicules *Spongilla lacustris* gemmule.

An analysis of the ecological characteristics of the detected periphyton species indicates that spring periphyton species mainly consist from o- (oligo), o-b- (oligo-beta), b (beta) -test freshwater, freshwater-brackish-water and ba (beta alpha) - mesosaprobic brackish water forms. The water quality of YG canal refers to class III - moderately-polluted water. The biotic periphyton index (BPI) is 6 points, the saprobity index (IS) is 1.79-1.98, and the ecological state is AB. The meaning of alphabetic characters: AB - a satisfactory ecological state, characterized by the metabolic and ecological progress of biocenoses. However, during widespread drop in water level, siltation as well as an increase in the level of trophicity and mineralization (in places with the smell of rotting vegetation) occurred α-saprobic brackish-water-marine forms of algae prevailed.

The calculated saprobity indices for zooplankton species correspond to the transitional quality of waters: from slightly polluted to moderately polluted waters. The presence of the dominant filter species *Daphnia pulex* indicates the high self-cleaning ability of the canal.

Neither rare nor endemic species were identified among the collected zooplankton samples. There were no species were found among the collected periphyton samples that may cause rapid fouling of mechanical surfaces, which can reduce the efficiency of used technologies.

The abundant quantitative reproduction of primary production (diatoms, green algae), as well as zooplankton and benthos, which are primary source of food for fish, are primary inhabitants of the YG canal.

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## 9. Annex 1

***Collected samples of zooplankton***

Collected samples of phytoplankton

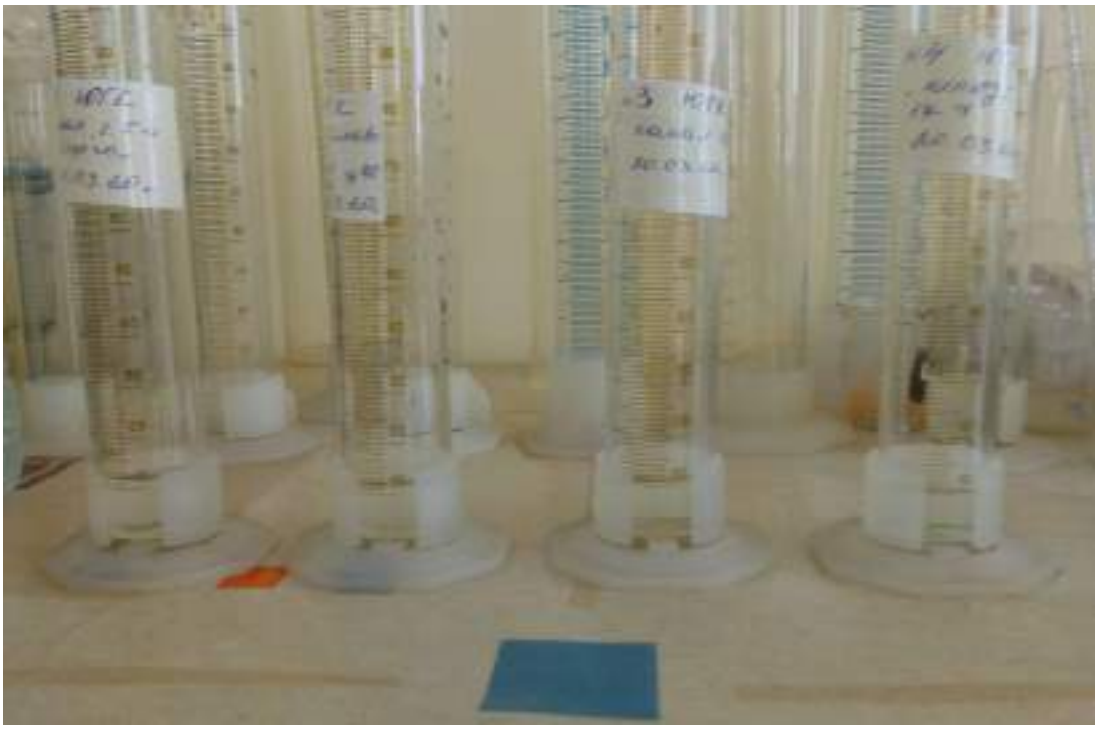
Phase I - 4 samples of phytoplankton (left) and 3 samples of periphyton (right)

Sedimentation of phytoplankton samples (7 days), sample volume 500 ml.

Phase II - Phytoplankton samples - sedimentation up to 100 ml

Settling samples of phytoplankton and bringing the volume to 100 ml (5 days)

Phase III –- Settling and bringing up to 10 ml



Settling of phytoplankton samples and increasing the volume to 10 ml (5 days)

Phytoplankton samples were prepared for qualitative and quantitative analysis and storage of sample sediment (sample volume 10 ml).

## 10. Annex 2

Photo report from sample collection

# APPENDIX O-1– MACROINVERTEBRATES & FISH SURVEY REPORT

# Macroinvertebrates and fish survey report

UZBEKISTAN COMBINED CYCLE POWER PROJECT:

LOCAL SUPPORT IN THE DEVELOPMENT, SUBMISSION AND APPROVAL OF ESIA

CLIENT: 5CAPITALS

Date: July 2020

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**Tashkent – 2020**

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**Abbreviations/Acronyms**

α- mezosaprobic zone characterizes the average (above moderate) water contamination

α-ρ-saprobic zone is characterized by severe water pollution

β-α- mesosaprobic zone is characterized by moderate water pollution

B- biomass

$D_{mn}$ – Menhinick's index

D- Simpson’s diversity index

N- number

S – saprobity of a species, an indicator of organic pollution of a reservoir

s - the indicator weight of the species usually takes values from 1-4 (the higher the indicator weight, the greater the contamination of the reservoir)

TPP – Thermal power plant

YG canal – Yujzno Golodnostepsky canal

## INTRODUCTION

The head section of the Yuzjno Golodnostepsky canal (YG) named after A.A. Sarkisov with a length of 14.5 km and a maximum flow rate of 350 $m^3$ / s. Base gauging locations on the Syrdarya - Kyzylkishlak, Nadezhdensky, Chinaz and Kokbulak, as well as at the head structures of the canals - Southnogolodnostepsky, "Dustlik", Verkhny Dalverzinsky, Nizhny Dalverzinsky, Begovat, at pumping location from the Syrdarya and distribution "sprinklers" from Yustlik

The bed of the canal consists of sands, often with loamy and sandy loam cover. The banks of the canal in the researched area are steep, mostly deep. The level regime of the YG canal is mainly determined both due to natural, seasonal changes in the amount of water inflow, as well as due to water discharges into the lower pool of the Farkhad HPP, as well as the water content of the year and the operation mode of the HPP fluctuates, but the general pattern of the level variation from year to year remains constant. Under the influence of strong stable winds blowing along the channel, surge level fluctuations are highly developed.

YG canal is located in the zone of temperate continental climate of Uzbekistan. The southern part of the Tashkent region is characterized by lower humidity and higher summer temperatures. The maximum air temperature in the YG canal zone is +45C°.

Macroinvertebrate and fish survey were performed on YG canal during 24-25 of June, 2020. The objectives of the research were to identify species composition of fish and macroinvertebrates as well as determine type of species that are listed in IUCN and red Book of Uzbekistan.

Furthermore, for fish survey were collected secondary related to the followings:

- Fishing seasons and allowed fishing volume per year/ month;
- Information regarding fishing groups (commercial/local) as well as their activities near the Project site;
- Closest fishing areas near the project site and within 2km form the intake and outfall as well as their locations on the map (if aviable);
- Information about fish kills in the past due to power plant cooling water (high temperature), deoxygenation or other causes.

## I. Macroinvertebrates

### 1.1. Visual characteristics of the main biotopes at macroinvertebrates sampling locations.

In littoral and central zone of the YG canal water transparency was low. Sediments in littoral zone, thickets of aquatic vegetation, were presented by a small amount of black or grey silt mixed with a large amount of clay. Sediments in the water were silted sand and clay. The water temperature on the surface layer was 26-27,5$^{o}$C.

In the water, near the littoral zone, there were pieces of submerged aquatic vegetation that apparently covered the depth of the littoral zone in early spring: watermilfoils, pondweed, etc. (genus Potamogeton – 3 species, genus Ceratophyllum -1 species, Myriophyllum spicatum). Cattails and reeds, whose fouling along the littoral zone was 60-70% in March, occupied almost the entire littoral zone (90-95%) in June, 2020.

By midday the temperature (14:00) reached 40°C. Visually, the water level was lower, and the turbidity (water color is dirty-greenish) was higher in comparison to the survey performed on March 2020. Near the bank of canal spots of oil products and foam were not observed. It worth to mention that water level in canal was significantly decreased (perhaps it occurred due to the dam broke in Sardoba on May 1$^{st}$). The littoral zone with submerged vegetation, which was typical for March 2020, was completely absent in June 2020. From an insignificant distance, about 0.1-0.3 meters of canal bank the deep-water part of the channel bed abruptly begins (5-8 m). YG canal banks were overgrowing by reeds (90-95%). These made a challenge to find a place with macrophytes.

There was a lack of available places for sampling benthos because it abruptly becomes deep, i.e. at a distance of 0.1-0.3 m from littoral zone the deep-water part of the canal bed with 3-8 m depth begins.

Macroinvertebrates sampling was performed from 6 location: 3 from canal banks and 3 from middle point of canal.

**Table 1: Sampling locations and description**

| Location | Coordinates | | Sampling depth | Water temperature (surface) | Notes |
|---|---|---|---|---|---|
| | Latitude | Longitude | | | |
| 1 (MB1)* | 40°13'35.53"N | 69° 6'38.57"E | 0.3 m | +26°C | Between the reeds |
| 2 (MB2) | 40°13'55.77"N | 69° 6'19.81"E | 0.5 m | +26°C | No macrophytes |
| 3 (MB3) | 40°14'0.73"N | 69° 6'11.53"E | 0.1 m | +27°C | Between the reeds[1] |
| 4 (MD1)[2] | 40°13'42.85"N | 69° 6'35.70"E | 8 m | +27°C | Average water flow,<br>Water color is<br>greenish-muddy |
| 5 (MD2)** | 40°13'48.68"N | 69° 6'29.48"E | 8 m | +28°C | Average water flow,<br>Water color is<br>greenish-muddy, depth is covered with hardened clay |
| 6(MD3) | 40°13'55.30"N | 69° 6'17.88"E | 8 m | +28°C | Average water flow,<br>Water color is<br>greenish-muddy |
| 7 (MB4)*** | 40°13'42.00"N | 69° 6'37.18"E | 0.5 m | +27°C | Between the reeds |

*MB- Macroinvertebrates Bank – samples collected from the canal banks;
**MD - Macroinvertebrates Depth – samples collected from the canal depth.

[1] YG canal banks were covered by reeds for 90-95% that made impossible to collect samples from place where there macrophytes
[2] MD1 location is differs from the initial Canal WQ 1 (control point). WQ1 was very hard clay soil

***MB4 – an additional location was selected during the sampling period to have more samples for the detailed study of macroinvertebrates because it was impossible to get the samples from MD2 and MD3.

By midday the temperature (14:00) reached 40°C. Visually, the water level was lower, and the turbidity (water color is dirty-greenish) was higher in comparison to the survey performed on March 2020. Near the bank of canal spots of oil products and foam were not observed. It worth to mention that water level in canal was significantly decreased (perhaps it occurred due to the dam broke in Sardoba on May 1st). The littoral zone with submerged vegetation, which was typical for March 2020, was completely absent in June 2020. From an insignificant distance, about 0.1-0.5 meters of canal bank, the deep-water part of the channel bed abruptly begins (5-8 m). YG canal banks were overgrowing by reeds (90-95%). These made a challenge to find a place with macrophytes.

Fig.1. Sampling at MB1 location – Between reeds

Fig.2. Sampling at MB2 location – No macrophytes

Fig.3. Sampling at MB3 location – Between the reeds

### 1.2. Sampling methodology

Standard macroinvertebrate net - D-frame dip net was used to collect samples from canal banks (MB1 -4). When sampling between reeds, D-frame dip net was immersed into its thicket and the areas between reeds were "swept" for 60-120 seconds. At the location 2 (MB2) there was softer clay silts. Therefore D-frame dip net was immersed in the soil to 10 cm depth and the soil surface was scraped with a cutting edge.

Petersen grab was used to collect macroinvertebrates samples from the depth of canal (MD1-3).

Collection of samples from the depth of canal was performed at three locations (MD1-3). At each location, the Peterson grab was lowered till depth to grab soil. On average, at each location, the Peterson grab was dropped up to 5 times. However, the depth of canal at the locations MD2 and MD3 were covered by hardened clay, that made impossible to grab samples. All attempts to grab samples from these locations were failed. It was only possible to get sample at the location MD1. Peterson grab fell into a pit from where the stream does not wash away organic residues. Thus, it was possible to find place which could give a valuable information about «depth» benthos.

For the purposes of hydrobiological monitoring, the most convenient and versatile sampling tool in water streams is a scraper: a metal frame like a net put on a stick, but with a flat cutting edge, with the help of which you can scrape the top layer of soil.

When sampling in rivers, the scraper is installed downstream relative to the substrate from which the sampling is carried out, so that the organisms and soil particles and substrate pieces are taken into the scraper net by the stream.

The saprobity index (organic pollution) of location s was calculated using the formula:

$$S = \frac{\sum sh}{\sum h} \quad (1)$$

where S – saprobity index; s – indicator significance; h – relative number of species.

Indicator significance (s): for oligosaprobic macroinvertebratesmacroinvertebrates organisms is compiled 1; for ß- mesosaprobics – 2; for α- mesosaprobics – 3; for polisaprobes – 4. The indicator significance of the species (numerical expression) of zoobenthous organisms were determined from literary sources: determinants, developments and experience of specialists of Uzhydromet under the Cabinet of Ministers (Talskikh, 1996).

**Table 2. Recalculating the number of benthic samples collected with scraper, for 1 m$^2$ according to the method of. Bulgakov G.P.**

| Number of species(h) | Frequency | Number of organisms detected in the sample volume: | | | | | | | Sample per m$^2$ |
|---|---|---|---|---|---|---|---|---|---|
| | | 1x | 1,5x | 2x | 2,5x | 3x | 4x | 5x | |
| 1 | Once | - | - | 1 | 1 | 1 | 1-2 | 1-3 | Up to 6 |
| 2 | Very rarely | 1 | 1-2 | 2 | 2 | 2-3 | 3-4 | 4-5 | 7-12 |
| 3 | Rarely | 2-5 | 3-7 | 3-10 | 3-13 | 4-15 | 5-20 | 6-25 | 13-62 |
| 5 | Quite often | 6-10 | 8-15 | 11-20 | 14-25 | 16-30 | 21-40 | 26-50 | 63-125 |
| 7 | Often | 11-20 | 16-30 | 21-40 | 26-50 | 31-60 | 41-80 | 51-100 | 126-250 |
| 9 | Very often | >20 | >30 | >40 | >50 | >60 | >80 | >100 | >250 |

### 1.3. The results of macroinvertebrates sampling analysis

Overall, there were collected 5 samples of macroinvertebrates (from MB1-4 and MD1). Representatives of Ephemeroptera, Odonata, Gastropoda, Bivalvia, Colembola, Trichoptera were observed in samples collected from banks, while Tubificidae, Chironomidae, Naididae – in sample taken from the depth (MD1).

According to preliminary data, rare dragonfly species such as Large dragonflies, damselflies, etc.were not observed in samples.

**Taxonomic characteristics of macroinvertebrates biocenoses**

In June 2020, 31 species of organisms from 7 taxonomic groups were found in macroinvertebrates of YG canal: faggot worms (Trichoptera) – 2 species, Odonata – 3 species, bedbugs (Hemiptera) – 1 species, beetles (Coleoptera) – 3 species, larvae and pupae of Diptera (Diptera) – 12 species, molluscs (Mollusca) – 7 species, smallworms (Oligochaeta) – 3 species. Thus, the greatest diversity of species was observed for Diptera, mainly due to the family Chironomidae, which was represented by 14 species.

**Table 3. Species composition and relative number of species (h) of the YG canal macroinvertebratesmacroinvertebrates (June, 2020); (* - empty shells and pelts)**

| Species | MB1 | MB2 | MB3 | MD1 | MB4 |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| ***Trichoptera*** | | | | | |
| Agrypnia sp. | 1 | | 1 | | |
| Orthotrichia sp. | | | 3 | | |
| ***Odonata*** | | | | | |
| Ophydogomphus cecilia | * | | | | |
| Ishnura pumilio L. | 1 | | 1 | | |
| Calopteryx virgo Linnaeus | 3 | | | | |
| ***Diptera*** | | | | | |
| Odontomyia sp. | 3 | | | | |
| Musca domestica Linnaeus | 1 | | | | |
| | | | | | |
| ***Chironomidae*** | | | | | |
| Corynoneura scutellata Winnertz | 5 | 3 | 3 | | 1 |
| Cricotopus trifascia | 3 | 3 | 3 | | 1 |
| Cricotopus gr. bicinctus Meigen | 5 | 5 | 3 | | 3 |
| Polypedilum scalaenum Schrank | 3 | | 3 | | |

| **Species** | **MB1** | **MB2** | **MB3** | **MD1** | **MB4** |
|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | **5** |
| Chironomus halophilus Kieffer | | | 3 | | |
| Chaetocladius sp. | | 3 | | 5 | 3 |
| Chironomus plumosus Linnaeus | | 3 | | | |
| Chironomus tummy | 5 | 3 | | | |
| Cryptochironomus gr. defectus Kieffer | | | 3 | | |
| Cladotanytartus sp. | | 3 | | | |
| chrysalis of Chironomidae | 3 | | | | |
| ***Hemiptera*** | | | | | |
| Plea minutissima Leach | | | 1 | | |
| ***Coleoptera*** | | | | | |
| Dryops ps. (larvae) | | | 1 | | |
| Laccophillus sp. (larvae) | | | 1 | | |
| Enochrus sp. (larvae) | 1 | | | | 1 |
| ***Mollusca*** | | | | | |
| Physa ocuta Draparnaud | 9 | 2 | | | |
| Planorbis planorbis Linnaeus | | * | | | |
| Anisus leavis | * | * | | | 1 |
| Lymnaea ovata Draparnaud | 3 | | 1 | | 3 |
| Lymnaea auricularis Linné | 2 | | | | |
| Physa fontinalis L. | 2 | | | | |
| Anodonta sp. | | * | | | |
| ***Oligochaeta*** | | | | | |
| Nais elinguis Müller | | 3 | | | 1 |
| Limnodrilus hoffmeisteri f. typica Claparede | | 3 | | 3 | |
| Ilyodrilus hammoniensis (Michaelsen) | 1 | 5 | | 5 | |
| **Total species:** | **18** | **14** | **15** | **3** | **8** |

Note: Species composition and relative number of species (h): for random finds (very rarely) – 1; very rarely-2; rarely-3; quite often-5; often-7; very often-9.

***None of determined macroinvertebrates species are listen in IUCN and Red Book of Uzbekistan.***

### 1.4. Quantitative growth of macroinvertebrates

As it was noted earlier, the macroinvertebratesmacroinvertebrates of the YG canal is developing unevenly in quantitative terms. Thus, the highest numbers during reconnaissance sampling were observed at the MB1 -1063 sample per $m^2$ and mainly due to chironomid larvae and mollusks Physa ocuta Draparnaud, the main contribution to which was made by Chironomus tummy and Corynoneura scutellata Winnertz. The highest biomass values are also typical for MB1-27,229 g/$m^2$, due to chironomid larvae and mollusks. Small numbers were recorded at the MB3-137 sample per $m^2$, but the samallest- 3 species was observed at the MD1. The lowest values of biomass were found at MD1 - 0.410 g/$m^2$. Analysis of main groups of macroinvertebratesmacroinvertebrates showed the dominance of representatives of Diptera at almost all points of the YG canal in terms of their overall quantitative indicators of benthic fauna.

**Table 4. Quantitative characteristics and saprobity of YG canal macroinvertebrates species (June, 2020)**

Notes:

N- number;

B- biomass of species;

S – saprobity of species;

s – indicator weight;

| Date | Location № | Taxonomic group | Species | (N), Species number per $m^2$ | (B), g/$m^2$ | (S) | (s) |
|---|---|---|---|---|---|---|---|
| 24.06.2020 | MB1 | Trichoptera | Agrypnia sp. | 6 | 0,94 | β-α | 2,5 |
| | | Odonata | Ophydogomphus cecilia* | - | - | α-ρ | 3,5 |
| | | | Ishnura pumilio L. | 6 | 0,034 | α | 3 |
| | | | Calopteryx virgo Linnaeus | 25 | 0,072 | β-α | 2,5 |
| | | Diptera | Odontomyia sp. | 31 | 9,300 | α | 3 |
| | | | Musca domestica Linnaeus | 6 | 0,925 | α-ρ | 3,5 |
| | | Diptera (Chironomidae) | Chironomus tummy | 144 | 0,900 | ρ | 4 |
| | | | Cricotopus gr. bicinctus Meigen | 75 | 0,115 | α | 3 |
| | | | Cricotopus trifascia | 48 | 0,070 | α | 3 |
| | | | Corynoneura scutellata Winnertz | 119 | 0,167 | β-α | 2.5 |

| Date | Location № | Taxonomic group | Species | (N), Species number per m² | (B), g/m² | (S) | (s) |
|---|---|---|---|---|---|---|---|
| | | | Chaetocladius sp. (setosipennis) | 75 | 0,113 | α | 3 |
| | | | Polypedilum scalaenum Schrank | 56 | 0,09 | α | 3 |
| | | | *Chironomidae gen sp. (pupae)* | 31 | 0,194 | | |
| | | Coleoptera | Enochrus sp. (larvae) | 6 | 12,92 | α | 3 |
| | | Mollusca | Lymnaea ovata Draparnaud | 44 | 0,229 | α | 3 |
| | | | Lymnaea auricularis Linné | 13 | 0,135 | α | 3 |
| | | | Physa fontinalis L. | 13 | 0,068 | α-ρ | 3,5 |
| | | | Physa ocuta Draparnaud | 363 | 0,942 | β-α | 2,5 |
| | | | Anisus leavis* | - | - | β | 2 |
| | | Oligochaeta | Ilyodrilus hammoniensis (Michaelsen) | 6 | 0,015 | ρ | 4 |
| | | **6** | **18** | **1063** | **27,229** | **β-α** | **S=2,83** |
| 24.06.2020 | MB2 | Diptera (Chironomidae) | Chironomus tummy | 56 | 0,35 | ρ | 4 |
| | | | Cricotopus gr. bicinctus Meigen | 75 | 0,105 | α | 3 |
| | | | Cricotopus trifascia | 31 | 0,056 | α | 3 |
| | | | Corynoneura scutellata Winnertz | 44 | 0,048 | α | 3 |
| | | | Chaetocladius sp. (setosipennis) | 25 | 0,023 | α | 3 |
| | | | Cladotanytartus sp. | 25 | 0,045 | α | 3 |
| | | | Chironomus plumosus Linnaeus | 31 | 0,031 | ρ | 4 |
| | | Mollusca | Physa ocuta Draparnaud | 13 | 0,034 | β-α | 2,5 |
| | | | Planorbis planorbis Linnaeus* | - | - | α | 3 |

| Date | Location № | Taxonomic group | Species | (N), Species number per m² | (B), g/m² | (S) | (s) |
|---|---|---|---|---|---|---|---|
| | | | Anisus leavis* | - | - | β | 2 |
| | | | Anodonta sp.* | - | - | α-ρ | 3,5 |
| | | Oligochaeta | Ilyodrilus hammoniensis (Michaelsen) | 63 | 0,150 | ρ | 4 |
| | | | Limnodrilus hoffmeisteri f. typica Claparede | 13 | 0,033 | ρ | 4 |
| | | | Nais elinguis Müller | 19 | 0,002 | β-α | 2,5 |
| | | **3** | **14** | **395** | **0,877** | **α** | **S=3,11** |
| 24.06.2020 | MB3 | Trichoptera | Orthotrichia sp. | 56 | 0,112 | α | 3 |
| | | | Agrypnia sp. | 6 | 0,94 | β-α | 2,5 |
| | | Odonata | Ishnura pumilio L. | 6 | 0,03 | α | 3 |
| | | Coleoptera | Dryops ps. (larvae) | 6 | 0,035 | α | 3 |
| | | | Laccophillus sp. (larvae) | 6 | 0,042 | α | 3 |
| | | Hemiptera | Plea minutissima Leach | 6 | 0,03 | α-ρ | 3,5 |
| | | Diptera (Chironomidae) | Cricotopus gr. bicinctus Meigen | 38 | 0,068 | α | 3 |
| | | | Cricotopus trifascia Edwards | 25 | 0,038 | α | 3 |
| | | | Corynoneura scutellata Winnertz | 50 | 0,070 | α | 3 |
| | | | Chaetocladius sp. (setosipennis) | 63 | 0,094 | α | 3 |
| | | | Polypedilum scalaenum Schrank | 31 | 0,050 | α | 3 |
| | | | Chironomus tummy | 56 | 0,350 | ρ | 4 |
| | | | Chironomus halophilus Kieffer | 31 | 0,279 | ρ | 4 |
| | | | Cryptochironomus gr. defectus Kieffer | 25 | 0,063 | α | 3 |
| | | Mollusca | Lymnaea ovata Draparnaud | 6 | 0,031 | α | 3 |

| Date | Location № | Taxonomic group | Species | (N), Species number per m² | (B), g/m² | (S) | (s) |
|---|---|---|---|---|---|---|---|
| | | **6** | **15** | **411** | **2,232** | **β-α** | **S=2,78** |
| 24.06.2020 | MD1 | Diptera (Chironomidae) | Chaetocladius sp. (setosipennis) | 80 | 0,120 | α | 3 |
| | | Oligochaeta | Ilyodrilus hammoniensis (Michaelsen) | 80 | 0,190 | ρ | 4 |
| | | | Limnodrilus hoffmeisteri f. typica Claparede | 40 | 0,100 | ρ | 4 |
| | | **2** | **3** | **200** | **0,410** | **α-ρ** | **S=3,62** |
| 24.06.2020 | MB4 (additional point) | Diptera (Chironomidae) | Cricotopus gr. bicinctus Meigen | 19 | 0,027 | α | 3 |
| | | | Cricotopus trifascia Edwards | 6 | 0,013 | α | 3 |
| | | | Corynoneura scutellata Winnertz | 6 | 0,006 | α | 3 |
| | | | Chaetocladius sp. (setosipennis) | 44 | 0,055 | α | 3 |
| | | Mollusca | Lymnaea ovata Draparnaud | 44 | 0,308 | α | 3 |
| | | | Anisus leavis | 6 | 0,042 | β | 2 |
| | | Oligochaeta | Nais elinguis Müller | 6 | 0,001 | β-α | 2,5 |
| | | Coleoptera | Enochrus sp. (larvae) | 6 | 0,045 | α | 3 |
| | | **4** | **8** | **137** | **0,497** | **α** | **S=2,85** |

Based on number and biomass of each species in the sample, the indicators of species number (sample per m²), biomass (g/m²), as well as the saprobity index for each sampling locations were calculated.

**Table 5. Number and biomass of macroinvertebrates taxonomic groups**

| Date | Location№ | Taxonomic group | Species number in a group | Number | Biomass |
|---|---|---|---|---|---|
| 24.06.2020 | MB1 | Trichoptera | 1 | 6 | 0,94 |
| | | Odonata | 3 | 62 | 0,106 |
| | | Diptera | 8 | 585 | 11,874 |
| | | Coleoptera | 1 | 6 | 12,92 |

| Date | Location№ | Taxonomic group | Species number in a group | Number | Biomass |
|---|---|---|---|---|---|
| | | Mollusca | 5 | 433 | 1,374 |
| | | Oligochaeta | 1 | 6 | 0,015 |
| | | **6** | **18** | **1063** | **27,229** |
| 24.06.2020 | MB2 | Diptera | 7 | 287 | 0,658 |
| | | Mollusca | 4 | 13 | 0,034 |
| | | Oligochaeta | 3 | 95 | 0,185 |
| | | **3** | **14** | **395** | **0,877** |
| 24.06.2020 | MB3 | Trichoptera | 2 | 62 | 1,052 |
| | | Odonata | 1 | 6 | 0,03 |
| | | Diptera | 8 | 319 | 1,112 |
| | | Coleoptera | 2 | 12 | 0,077 |
| | | Mollusca | 1 | 6 | 0,031 |
| | | Hemiptera | 1 | 6 | 0,03 |
| | | **6** | **15** | **411** | **2,232** |
| 24.06.2020 | MD1 | Diptera | 1 | 80 | 0,120 |
| | | Oligochaeta | 2 | 120 | 0,290 |
| | | **2** | **3** | **200** | **0,410** |
| 24.06.2020 | MB4 (additional point) | Diptera | 4 | 75 | 0,101 |
| | | Coleoptera | 1 | 6 | 0,045 |
| | | Mollusca | 2 | 50 | 0,350 |
| | | Oligochaeta | 1 | 6 | 0,001 |
| | | **4** | **8** | **137** | **0,497** |

## II. Indices of saprobity and biodiversity of macroinvertebrates organisms of YG canal

### 2.1. Indices of saprobity of macroinvertebrates and pollution

According to macroinvertebrates indicators for June 2020, MB3 and MB2 correspond to the β-α-mesosaprobic zone, i.e. the saprobity indicators (S) are in the range between 2.5 and 3.00. This means that the water quality corresponds to class III-IV: transition from moderately polluted water to polluted water.

β-α-mesosaprobic zone is characterized by the presence of nitrogen compounds in the form of nitrates and nitrites in the water. Among other things, amino and amido acids can be noted, which is why the conditions of the hydro-environment tend to change into a semi-anaerobic mode. There is not as much dissolved oxygen in water as in the β-mesosaprobic zone, so the freezing at the bottom and at night due to the termination of photosynthesis is much more frequent. The presence of hydrogen sulphide in large quantities (layered grey and dark grey silts with the smell of hydrogen sulphide) was noted. The nature of biochemical processes is oxidizing-reducing. MB1 and MB4 correspond to the α-mesasaprobic zone, i.e. saprobity indicators (S) are in the range between 3.00 and 3.50. This means that the water quality corresponds to class IV - polluted water.

α-mesosaprobic zone is characterized by the presence of amino and amido acids in water. Hydro-environment conditions tend to change into semi-anaerobic mode. There is little oxygen dissolved in the water, which can cause freezing at the bottom and at night due to the termination of photosynthesis. Presence of hydrogen sulphide in large quantities (layered grey and dark grey, or even black silts with the smell of hydrogen sulphide) was noted. The nature of biochemical processes is oxidizing-reducing.

MD1 correspond to the α- ρ -saprobic zone, i.e. the saprobity indicators (S) are in the range between 3.50 and 4.00. This means that the water quality corresponds to class IV-V –transition from polluted to highly polluted water.

The α- ρ -saprobic zone is characterized by the presence of decomposing proteins, large amounts of hydrogen sulphide and methane in the water. Organisms are deficient in dissolved oxygen in water, because the environment is almost anaerobic. The nature of biochemical processes is regenerative.

### 2.2. Indices of species diversity of macroinvertebrates

To establish the structural characteristics of macroinvertebrates organisms were calculated diversity indices (Menhinick's indices) using the following formula:

$$D_{mn} = \frac{S}{\sqrt{N}} \quad (2)$$

where S – number of identified species; N – total number of all identified species.

A larger index value corresponds to a greater species diversity.

**Table 6. Diversity according to Menhinick's index**

| Date | Location № | number of identified species S | total number of all identified species N | Diversity index $D_{mn}$ |
|---|---|---|---|---|
| 24.06.2020 | MB1 | 18 | 1063 | 0,017 |
| 24.06.2020 | MB2 | 14 | 395 | 0,705 |
| 24.06.2020 | MB3 | 15 | 411 | 0,718 |
| 24.06.2020 | MD1 | 3 | 200 | 0,212 |
| 24.06.2020 | MB4 (additional point) | 8 | 137 | 0,684 |

According to Menhinick's index calculation, biodiversity prevails at MB2, where the value of Menhinick's index is 0.718; MB4 Menhinick's index is 0.705.

At MD1, where the value of Menhinick's index is equal to 0.212, the lowest species diversity is noted. Simpson's diversity index is a measure of biodiversity of habitat. It takes into account the number of species present, as well as the abundance of each species. Thus, a group that is dominated by one or two species is considered less diverse than a group in which the species present have similar numbers.
The measure of species concentration in sampled macroinvertebrates, according to the Simpson's diversity index, is calculated using the following formula:

$$D = \frac{\sum n(n-1)}{N(N-1)}$$

или

$$D = \sum (n/N)^2$$

where:

- n = the total number of organisms of a particular species;

- N = the total number of organisms of all species.

The value of **D** ranges between 0 and 1:

With this index, 0 represents infinite diversity and 1, no diversity.

**Table.7 A measure of species concentration in sampled macroinvertebrates, according to Simpson's diversity index**

| Date | Location № | Taxonomic group | Species | number of each species (n) | Concentration of species D |
|---|---|---|---|---|---|
| 24.06.2020 | MB1 | Trichoptera | Agrypnia sp. | 1 | 0,005 |
| | | Odonata | Ophydogomphus cecilia* | - | - |
| | | | Ishnura pumilio L. | 1 | 0,005 |
| | | | Calopteryx virgo Linnaeus | 4 | 0,023 |
| | | Diptera | Odontomyia sp. | 5 | 0,029 |
| | | | Musca domestica Linnaeus | 1 | 0,005 |
| | | Diptera (Chironomidae) | Chironomus tummy | 23 | 0,134 |
| | | | Cricotopus gr. bicinctus Meigen | 12 | 0,070 |
| | | | Cricotopus trifascia | 8 | 0,046 |
| | | | Corynoneura scutellata Winnertz | 19 | 0,111 |
| | | | Chaetocladius sp. (setosipennis) | 12 | 0,070 |
| | | | Polypedilum scalaenum Schrank | 9 | 0,052 |
| | | | *Chironomidae gen sp. (куколки)* | 5 | 0,029 |
| | | Coleoptera | Enochrus sp. (larvae) | 1 | 0,005 |
| | | Mollusca | Lymnaea ovata Draparnaud | 7 | 0,041 |
| | | | Lymnaea auricularis Linné | 2 | 0,012 |
| | | | Physa fontinalis L. | 2 | 0,012 |
| | | | Physa ocuta Draparnaud | 58 | 0,339 |
| | | | Anisus leavis* | - | - |
| | | Oligochaeta | Ilyodrilus hammoniensis (Michaelsen) | 1 | 0,005 |

| Date | Location № | Taxonomic group | Species | number of each species (n) | Concentration of species D |
|---|---|---|---|---|---|
| | | **6** | **18** | **171** | **0,993** |
| 24.06.2020 | MB4 | Diptera (Chironomidae) | Chironomus tummy | 9 | 0,142 |
| | | | Cricotopus gr. bicinctus Meigen | 12 | 0,190 |
| | | | Cricotopus trifascia | 5 | 0,079 |
| | | | Corynoneura scutellata Winnertz | 7 | 0,111 |
| | | | Chaetocladius sp. (setosipennis) | 4 | 0,063 |
| | | | Cladotanytartus sp. | 4 | 0,063 |
| | | | Chironomus plumosus Linnaeus | 5 | 0,079 |
| | | Mollusca | Physa ocuta Draparnaud | 2 | 0,031 |
| | | | Planorbis planorbis Linnaeus* | - | - |
| | | | Anisus leavis* | - | - |
| | | | Anodonta sp.* | - | - |
| | | Oligochaeta | Ilyodrilus hammoniensis (Michaelsen) | 10 | 0,159 |
| | | | Limnodrilus hoffmeisteri f. typica Claparede | 2 | 0,031 |
| | | | Nais elinguis Müller | 3 | 0,047 |
| | | **3** | **14** | **63** | **0,995** |
| 24.06.2020 | MB 2 | Trichoptera | Orthotrichia sp. | 9 | 0,136 |
| | | | Agrypnia sp. | 1 | 0,015 |
| | | Odonata | Ishnura pumilio L. | 1 | 0,015 |
| | | Coleoptera | Dryops ps. (larvae) | 1 | 0,015 |
| | | | Laccophillus sp. (larvae) | 1 | 0,015 |
| | | Hemiptera | Plea minutissima Leach | 1 | 0,015 |
| | | Diptera (Chironomidae) | Cricotopus gr. bicinctus Meigen | 6 | 0,090 |

| Date | Location № | Taxonomic group | Species | number of each species (n) | Concentration of species D |
|---|---|---|---|---|---|
| | | | Cricotopus trifascia Edwards | 4 | 0,060 |
| | | | Corynoneura scutellata Winnertz | 8 | 0,121 |
| | | | Chaetocladius sp. (setosipennis) | 10 | 0,151 |
| | | | Polypedilum scalaenum Schrank | 5 | 0,075 |
| | | | Chironomus tummy | 9 | 0,136 |
| | | | Chironomus halophilus Kieffer | 5 | 0,075 |
| | | | Cryptochironomus gr. defectus Kieffer | 4 | 0,060 |
| | | Mollusca | Lymnaea ovata Draparnaud | 1 | 0,015 |
| | | **6** | **15** | **66** | **0,927** |
| 24.06.2020 | MD1 | Diptera (Chironomidae) | Chaetocladius sp. (setosipennis) | 2 | 0,4 |
| | | Oligochaeta | Ilyodrilus hammoniensis (Michaelsen) | 2 | 0,4 |
| | | | Limnodrilus hoffmeisteri f. typica Claparede | 1 | 0,2 |
| | | **2** | **3** | **5** | **1,000** |
| 24.06.2020 | MB3 | Diptera (Chironomidae) | Cricotopus gr. bicinctus Meigen | 3 | 0,136 |
| | | | Cricotopus trifascia Edwards | 1 | 0,045 |
| | | | Corynoneura scutellata Winnertz | 1 | 0,045 |
| | | | Chaetocladius sp. (setosipennis) | 7 | 0,318 |
| | | Mollusca | Lymnaea ovata Draparnaud | 7 | 0,318 |

| Date | Location № | Taxonomic group | Species | number of each species (n) | Concentration of species D |
|---|---|---|---|---|---|
| | | | Anisus leavis | 1 | 0,045 |
| | | Oligochaeta | Nais elinguis Müller | 1 | 0,045 |
| | | Coleoptera | Enochrus sp. (larvae) | 1 | 0,045 |
| | | **4** | **8** | **22** | **0,997** |

## III. Fish fauna of the Syrdarya basin

Currently, 70-71 species belong to 55 genera, 17 families live in natural reservoirs of Uzbekistan. Among them, 48 species are indigenous (two species-Syrdarya sturgeon Pseudoscaphirhynchus fedtschenkoi (Kessler, 1872) and bastard sturgeon *Acipenser nudiventris* (Lovetsky, 1828), apparently disappeared from the fish fauna of Uzbekistan in the second half of the 20th century; it is also not clear whether it exists in the waters of the Republic common perch Perca fluviatilis, the same goes for ruffe Gymnocephalus cernuus and the minnow Phoxinus cf. brachyurus), 17 species (of 48) – endemic to the Aral sea basin, 26 species (of 70) – commercial fish and 25 species are alien species from the Caspian, Black and Baltic seas, Caucasus, the European part of Russia, lakes of Kyrgyzstan, rivers of the Far East; currently 22 species of fish disappeared, small are 7, common and even numerous – 18 types.The fish fauna of the Syrdarya basin includes 60 species of fish, 10 of them are endemic species (found only in the Syrdarya basin): *Pseudoscaphirhynchus fedtschenkoi, Aspiolucius esocinus, Barbus brachycephalus, Capoetobrama kuschakewitschi, Leuciscus lehmani, Leuciscus squalisculus, Nemacheilus kuschakewitschi, Cottus gobio jaxartensis, Cottus spinulosus u Alburnoides oblongus* (Salizov and Kamilov, 1995; Wundzettel, 1994).

Fish fauna of Syrdarya, starting from confluence of its components and up to the Chardari reservoir, including the Kairakkum reservoir, has almost a single composition. The difference is that within middle stream of the river there is Opsariichthys uncirostris-an inhabitant of sections of watercourses with stony-shingle soil, but Schizotorax intermedius is not marked.

Mass spawning migrations are typical for *Hypophthalmichthys molitri*, Ctenopharyngodon *idella*, *Aspiolucius esocinus*, *Cyprinus carpio*, *Abramis brama orientalis*, *Pelecus cultratus*, *Stizostedion lucioperca*, *Silurus glanis* and *Rutilus rutilus aralensis*.

The reservoir itself is also characterized by residential forms of phytophilic fish species. In fact, the reservoir and middlecourse of the river are inhabited by a single ichthyocenosis that uses the ecological advantages of the reservoir and the river (Salikhov and Kamilov, 1995; Wundzettel, 1994).

## IV. Fish fauna of YG canal

### 4.1. Methods for studying the species composition of fish in YG canal

As fishing tools for commercial fishing, we used fixed nets with a mesh of 25, 45 mm.

Fig.4. Starting point of fish observation on YG canal

Fish were planned to be measured according to the Pravdin scheme (1966): body length to the end of the scale cover (SL) with an accuracy of 1 mm, and body weight (W).

Fish survey was conducted by using non-lethal methods, i.e., netting (two fishing nets with cell size of 25 mm and 45 mm), observation method as well as fishermen survey. The species is determined using commonly accepted determinants. Fishing survey on YG canal was performed during a day time on 24 (day time)– 25 (night time), June.

**Fig. 5. Preparation and installation of fishing nets (25 and 45 mm) for 100 m along both canal banks**

Thus, the data on the species composition of fish in YG canal were given only after a survey of local fishermen.

When interviewing amateur fishermen if YG canal to determine the species of fish photos of fish fauna of the Syrdarya were used.

### 4.2. Results of the study of YG canal fish fauna

Fish survey started with observation of canal banks. During the observation the following species were determined:

- Korean sawbelly (Hemiculter leucisculus),
- rose bitterling (Rhodeus ocellatus),
- micropercops (Micropercops gen.sp.),
- amur goby (Rhinogobius bruneu),
- eastern gambusia (Gambusia affinis).

After canal observation, at 11 am two nylon fishing nets were set up across the canal. Nets (25 to 45 mm, the length of each net – 100 m). Nets were checked two times: at midnight and on in the morning (on 25$^{th}$ of June). During the night was strong wind, that blew one of the nets. Unfortunately, there were no fish was found in the remained net.

*All species except Gambusia affinis* are species accidentally fallen into reservoirs of Uzbekistan (with commercial species (M*ylopharyngodon piceus, Ctenopharyngodon idella* and other acclimatized commercial fish of the East Chinese complex)). *Gambusia affinis* is an acclimated species in Uzbekistan, in order to deal with malarial mosquito. The size of fry of 5 species of weed fish visually observed near the bank was 2-3 cm (the size of adult species reaches 10-15 cm).

According to the results of the survey of local fishermen, in amateur nets in YG canal were determined 23 species of fish (Table 8; indicated the types along with rare endangered species *Capoetobrama kuschakewitschi* that according to the survey cannot be found in nets of fishermen in YG canal).

Furthermore, survey resulted that among 23 species were determined such fish species as a roach-Rutilus rutilus (30%), carp - Cyprinus carpio (20%), carp (15%), snakehead (15%) - Channa argus, silver carp - Hypophthalmichthys molitrix, zander - Sander lucioperca, Amur triplelip - opsariichthys uncirostris (decrease in catches as they are located in the list). According to the fisherman, the average age of fish in YG canal is 2-3 years, while their weight is 1-2 kg. Furthermore, there are 2 endemic species listed in the red Book of Uzbekistan can be found in canal Aspiolucius esocinus, Barbus brachycephalus. Capoetobrama kuschakewitschi was not mentioned as a habitant of YG canal.

**Table. 8. The species composition of YG canal fish fauna determined according to the survey of fishermen**

| Latin name | English name | Stat us | Presence in YG canal |
|---|---|---|---|
| Pike family – Esocidae | | | |
| Esox lucius | Pike | * | + |
| Minnow family – Cyprinidae | | | |
| Abramis sapa aralensis | Aral white-eye bream | Ss | + |
| Alburnoides taeniatus | Striped bystranka | * | + |
| Aspiolucius esocinus | Pike asp | E R | + |
| Aspius aspius taeniatus | Aral asp | Ss | + |
| Barbus brachycephalus | Aral barbel | E R | + |

| | | | |
|---|---|---|---|
| Barbus capito conocephalus | Turkestan barbel | Ss | + |
| Varicorhynus capoeta heratensis | Samarkand khramulya | E | + |
| Capoetobrama kuschakewitschi | Sharpray | E R | - |
| Carassius auratus gibelio | Silver Prussian carp | * | + |
| Ctenopharyngodon idella | Grass carp | A | + |
| Cyprinus carpio | Common carp | * | + |
| Hemiculter leucisculus | Sharpbelly | I | + |
| Hypophthalmichthys molitrix | Silver carp | A | + |
| Opsariichthys uncirostris amurensis | Amur three-lips | I | + |
| Pelecus cultratus | Sabre carp or (sabrefish) | * | + |
| Rhodeus ocellatus ocellatus | Rosy bitterling | I | + |
| Rutilus rutilus aralensis | Aral roach | Ss | + |
| Catfish family – Siluridae | | | |
| Silurus glanis | Wels catfish | * | + |
| Livebearers family – Poecilidae | | | |
| Gambusia affinis | Mosquitofish | A | + |
| Perch family – Percidae | | | |
| Stizostedion lucioperca | Zander | * | + |
| Sleeper gobias family – Eleotrididae | | | |
| Micropercops cinctus | Freshwater sleeper | I | + |
| Goby family – Gobiidae | | | |
| Rhinogobius bruneus | Amur goby | I | + |
| Snakeheads family – Channidae | | | |
| Channa argus | Snakehead | I | + |

***Notes:***

**** - Aboriginal (indegious) species***

***– - almost extinct aboriginal species***

***E – Endemic species.***

***Ss – local subspecies.***

***E-R - endemic species listed in the Red Book of Uzbekistan (Red list of Uzbekistan endangered species of fish)***

***A – acclimated species***

***I – accidentally introduced species.***

More often than other commercial species are found: ***Rutilus rutilus*** (30%), ***Cyprinus carpio*** (20%), carp (15%), snakehead (15%) - ***Channa argus***, ***Opsariichthys uncirostris*** white carp - ***Hypophthalmichthys molitrix***, ***Sander lucioperca***, (decrease in nets as they are located in the list). The largest fish, most often found in fish nets, have a mass of 1-2 kg and an average age of 2-3 years.

According to the results of a survey of fishermen, 2 endemic species listed in the Red book of Uzbekistan are very rarely seen in YG canal: *Aspiolucius esocinus, Barbus brachycephalus*.

**Aral roach – *Rutilus rutilus aralensis* Berg.** In the last decade, roach has become one of the main commercial species not only in YG canal, but also throughout Uzbekistan.

**Carp – *Cyprinus carpio L.*** Common commercial fish that was widely spread earlier and up to now.

**Snakehead**- ***Channa argus warpachowskii* Berg.** In the 1960s, the snakehead accidentally fell into the reservoirs of Uzbekistan.

**Silver Prussian carp- Carassius auratus gibelio (Bloch).** It lived in Aral Sea basin, Amu Darya and Syrdarya downstreams.

## V. Fishing activities in the Republic of Uzbekistan

**Permissions and prohibitions.** Reservoirs that are used or can be used for commercial fishing or are important for the reproduction of fish stocks are considered fisheries. Commercial fishing (fishing) on fishery reservoirs is carried out by organizations and enterprises under contracts concluded in accordance with the established procedure which allow to conduct commercial fishing.

For commercial fisheries special contracts allow fishing year-round (excluding the restricted period from April 16 to May 31) and in unlimited quantities, but taking into account the size of fishing nets specified for each commercial species (and sometimes for a reservoir) (usually within the range of 24-55 mm) (from the Literary source: Decree of the Chairman of State committee of the Republic of Uzbekistan on ecology and environmental protection "On approval of the rules of hunting and fishing in the territory of the Republic of Uzbekistan, registration № 1569, Ministry of Justice from 2.05.2006)".

It is forbidden to engage in fishing gear and other structures more than 2/3 of the width of the riverbed, stream or canal, as well as simultaneously or alternately launch nets from opposite banks for fishing, fishing with the use of explosives, toxic or narcotic drugs, electric current and various electric fishing installations (including electric fishing rods), piercing fishing tools.

***Commercial fishing*** during the spawning period is prohibited:

a) in the Amudarya and Syrdarya from March 10 to May 31;

b) on reservoirs of the Republic of Karakalpakstan and Khorezm region from April 25 to June 10;

c) on other all reservoirs from April 16 to May 31.

***Sport and Amateur fishing*** is allowed on reservoirs of general use to all citizens free of charge (up to 5 kg), except for territories of reserves, fish nurseries, pond and other cultural fish farms, or for a fee on the assigned lands of fishing societies according to permits of these societies.

**Information about fishing groups (commercial) and their activities near the Project site**

There are no commercial fishing groups or fish farming organizations within a 2 km radius of project site. However, according to the survey of fishermen, in the near future it is planned to organize a pond farm (the area of the pond is about 0.7 ha), located 1 km above the Syrdarya TPP.

**Fig. 6. a branch of YG canal, 1 km above the Syrdarya TPP, next to the bridge (the place where fish farming is planned)**

**Information about fish kills**

There were no cases on fish kills due to the activities of TPP all around the Uzbekistan. However, as a result of changing flow of Syrdarya river, there were changes in the hydrological regime flow rate, as well as thermal regime of the YG canal, which affected the spawning time for such fish as carp, zander, and carp.

## VI. Possible impact of the TPPs on the fish fauna of the YG canal

So far, in Uzbekistan no scientific research has been conducted on the effect of power plants on fish species of derivation canals. However, in existing literature the following factors may affect fish fauna under the influence of TPP are:

1) Formation of fish fauna under the influence of thermification of reservoirs.

An increase in temperature in local biotopes of reservoirs makes significant changes, both in the composition of fish fauna and in the biological indicators of individual species. The impact of temperature factors on the fish fauna will be emerged in the following ways:

A) Cold-loving species will disappear from fish communities (in dumping areas).

B) There will be a shift in the phases of the life cycle, which will result in earlier maturation of fish and accelerated growth of fries of various species, but fish of a certain age will be smaller than usual;

C) There will be a violation of fish reproduction cycles (a mismatch between the readiness to spawning, the need for food and the state of the forage base in areas of heated waters).

Thermification impacts on hydroecosystems, by contributing to the increase of water mineralization, and slows down the activity of reducing bacteria and self-cleaning processes. This, in turn, results in interaction of heated water with storm drains and with aerotechnogenic pollution. For example, on thermification zones of a number of locations, there is an increase in the number of biogenic compounds and organic substances that indicate eutrophication processes. In the zones of thermification of reservoirs, there may be a noticeable increase in the amount of a number of pollutants with toxic effects for hydrobionts.

2) Apart from temperature factor, the number of fishes will be affected by such factors as the ingress of commercial carp into the water intakes, as well as the death and injury of fish on the barrier grids at the water intakes of locations.

**Forecast of the temperature factor influence on the fish fauna of YG canal**

During the June, 2020, the temperature of surface water of YG canal water was +28°C, in the Farkhad derivation canal (where the water comes to the YG canal), at the same time, the temperature was +33°C.

Constant increase of temperature in canal as well as discharge of Syrdarya TPP relatively change the natural temperature of YG canal. This, in turn, can cause early maturation and then cause the death of fish species. For instance, if the normal mature period of fish is April-May, it can occur in February-March. Furthermore, lack forage resources as well as sharp drops in temperature (up to 0°C in April) may lead to the fish death.

Furthermore, species composition prevailing at present in YG canal such as ***Hypophthalmichthys molitrix*** and ***Sander lucioperca a***re very sensitive to the temperature changes. It also will affect to the size and weight composition of the fish fauna i.e., if now the fish fauna of the canal is represented by 2-3-year-old species with a weight of 1-2 kg, under the influence of temperature, size-weight composition will tend to decrease.

## VII. Conclusion

Macroinvertebrates of YG canal is quite diverse in terms of species. The basis of benthic fauna on the above points of the canal (sediments of which are mainly dark grey, almost black silt, fine-grained sand and clay) consist of mollusks: Physa acuta and chironomids: several representatives of the genus Chironomus, as well as Cricotopus gr. bicinctus, Polypedilum scalaenum, Chaetocladius sp. (setosipennis) oligochaetes: Nais elinguis, Ilyodrilus hammoniensis, Limnodrilus hoffmeisteri f. typica.

Species that have a conservation status (for example, large beautiful dragonfly species) have not been found in the macroinvertebrates of YG canal.

In the fish fauna of YG canal (according to surveys of fishermen) there are 23 species of fish. The basis of ichthyocenosis currently consist of *Rutilus rutilus Cyprinus carpio, Channa argus, Opsariichthys uncirostris, Hypophthalmichthys molitrix, Sander lucioperca*. The largest species of fish fauna found in fishermen's nets are 1-2 kg of individuals, 2-3 years old. *Rutilus rutilus* is most often found in the nets, species of which weight 0.4-0.5 kg at the age of 2-3 years.

Rare, protected species found in nets of fishermenare *Aspiolucius esocinus, Barbus brachycephalus*, which have an international vulnerability status (IUCN status – 3.1 vulnerable species).

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**Annex 1 The species composition of the modern fish fauna of the Syrdarya river**

| Latin name | English name | Notes |
|---|---|---|
| Sturgeon family – Acipenseridae | | |
| Pseudoscaphirhynchus fedtschenkoi | Syrdarya sturgeon | E R |
| Ray finned fish family – Salmonidae | | |
| Salmo gairdneri | Rainbow trout | A |
| Salmo ischchan issikogegarkuni | Salmo ischchan issikogegarkuni | A |
| Freshwater whitefish family – Coregonidae | | |
| Coregonus lavaretus | Common whitefish | I |
| Coregonus peled | Peled | A |
| Coregonus sardinella | Least cisco | I |
| Pike family – Esocidae | | |
| Esox lucius | Pike | * |
| Minnow family – Cyprinidae | | |
| Abbottina rivularis | Chinese false gudgeon | I |
| Abramis brama orientalis | Freshwater beam | * |
| Abramis sapa aralensis | Aral white-eye bream | Ss |
| Alburnoides bipunctatus eichwaldi | South Caspian sprilin | * |
| Alburnoides oblongus | Tashkent Riffle Bleak | E |
| Alburnoides taeniatus | Striped bystranka | * |

| | | |
|---|---|---|
| Aristichthys nobilis | Bighead carp | A |
| Aspiolucius esocinus | Pike asp | E R |
| Aspius aspius taeniatus | Aral asp | Ss |
| Barbus brachycephalus | Aral barbel | E R |
| Barbus capito conocephalus | Turkestan barbel | Ss |
| Varicorhynus capoeta heratensis | Samarkand khramulya | |
| Capoetobrama kuschakewitschi | Sharpray | E R |
| Carassius auratus gibelio | Silver Prussian carp | * |
| Chalcalburnus chalcoides aralensis | Danube bleak | Ss |
| Ctenopharyngodon idella | Grass carp | A |
| Cyprinus carpio | Common carp | * |
| Diptychus dybowskii | Scaleless osman | * |
| Diptychus maculatus | Scaly osman | * |
| Diptychus sewerzowi | Svercovy osman | * |
| Gobio gobio lepidolaemus | Linnaeus | Ss |
| Hemiculter leucisculus | Sharpbelly | I |
| Hypophthalmichthys molitrix | Silver carp | A |
| Leuciscus idus oxianus | Turkestan ide | Ss |

| | | |
|---|---|---|
| Leuciscus lehmani | Zeravshan dace | E |
| Leuciscus squalisculus | Syrdarya dace | E |
| Mylopharyngodon piceus | Black carp | I |
| Opsariichthys uncirostris amurensis | Amur three-lips | I |
| Pelecus cultratus | Sabre carp or (sabrefish) | * |
| Pseudogobio rivularis | Amur false gudgeon | I |
| Pseudorasbora parva | Stone moroko | I |
| Rhodeus ocellatus ocellatus | Rosy bitterling | I |
| Rutilus rutilus aralensis | Aral roach | Ss |
| Scardinius erythrophthalmus | Rudd | * |
| Schizothorax intermedius | Sattar snowtrout | * |
| Cobitidae | | |
| Cobitis aurata aralensis | Sabanejewia aurata | Ss |
| Nemacheilus dorsalis | Kessler | * |
| Nemacheilus kuschakewitschi | Kuschakewitsch loach | E |
| Nemacheilus labiatus | Plain thicklip loach | I |
| Nemacheilus stoliczkai | Triplophysa stoliczkai | * |

| | | |
|---|---|---|
| | | |
| Nemacheilus strauchi | Spotted thicklip loach | I |
| Catfish family – Siluridae | | |
| Silurus glanis | Wels catfish | * |
| Ictaluridae | | |
| Ictalurus punctatus | Channel catfish | A |
| Sisoridae | | |
| Glyptosternum reticulatum | Turkestan catfish | * |
| Oryziatidae | | |
| Oryzias latipes sinensis | Chinese rice fish | I |
| Livebearers family – Poecilidae | | |
| Gambusia affinis | Mosquitofish | A |
| Percidae | | |
| Gymnocephalus cernua | Ruffe | * |
| Perca fluviatilis | European perch | * |
| Stizostedion lucioperca | Zander | * |
| Eleotrididae | | |
| Micropercops cinctus | Micropercops | I |
| Goby family – Gobiidae | | |
| Rhinogobius bruneus | Amur goby | I |

| Snakeheads family – Channidae | | |
|---|---|---|
| Channa argus | Snakehead | I |
| Cottus gobio jaxartensis | Chatkal sculpin | E |
| Cottus spinulosus | Turkestan sculpin | E |

Note:

* - Aboriginal species

– - almost extinct aboriginal species

E – Endemic species.

Ss – local subspecies.

R - endemic species listed in the Red Book of Uzbekistan

A – acclimated species

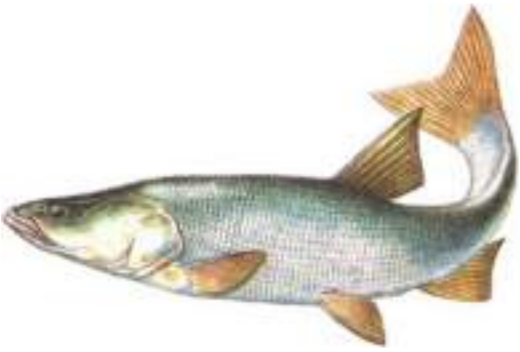
I – accidentally introduced species.

**Annex 2. Fish species of Syrdarya river listed in Red Book of Uzbekistan**

**Fish species of the middle stream of Syrdarya listed in the Red book of Uzbekistan (2006)**

As mentioned above, *Pseudoscaphirhynchus fedtschenkoi* is a completely extinct endemic species, 3 other rare species: *Aspiolucius esocinus, Barbus brachycephalus, Capoetobrama kuschakewitschi*, are on the verge of extinction.

*Aspiolucius esocinus* - spreading area is Aral sea basin. Length up to 60 cm, weight up to 5 kg, maximum age up to 10 years. It breeds in February-March at a temperature of 5-10°C. The species is listed in the International Red Book (2000), the Red book of Kyrgyzstan (2006), Kazakhstan (1999), and Uzbekistan (2006).



***Aspiolucius esocinus-*** Pike asp

IUCN status – 3.1 vulnerable species.

*Barbus brachycephalus brachycephalus* – Aral barbel

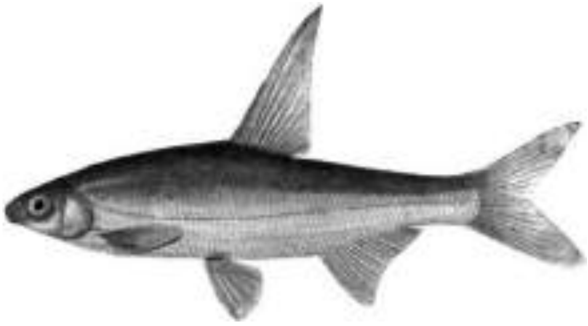
The body length of mature individuals can reach 103 cm with a weight of 21 kg. Lives about 9-10 years (the maximum age of this species is 13 years). Migratory fish. Matures at 5-6 years of life. It migrates to rivers 10-12 months before spawning. The species was listed in the Red book of Uzbekistan in 2006.

***Barbus brachycephalus brachycephalus -*** Aral barbel

IUCN status – 3.1 vulnerable species.

*Capoetobrama kuschakewitschi*

The length reaches 25 cm, weight up to 150 grams. Maturity reaches 3 years with a body length of 10-14 cm. Spawning takes place in April-June at a shallow depth.



***Capoetobrama kuschakewitschi* -** Sharpray

Listed in the Red book of Uzbekistan (2006).

**Information about commercial fish.**

**Aral roach – *Rutilus rutilus aralensis* Berg.** In the last decade, roach has become one of the main commercial species not only in YG canal, but also throughout Uzbekistan.

**Carp – *Cyprinus carpio L.*** Common commercial fish that was widely spread earlier and up to now.

**Snakehead**- ***Channa argus warpachowskii* Berg.** In the 1960s, the snakehead accidentally fell into the reservoirs of Uzbekistan. Currently, the snakehead is widely spread in the reservoirs of the Syrdarya and Amu Darya basins. The snakehead is numerous in reservoirs that are richly overgrown with vegetation throughout the system of reservoirs of these rivers. Although it is a predator, and therefore an undesirable participant in the ichthyofauna for ponds and reservoirs where other aquaculture objects are cultivated, fish have been used in commercial fishing in the last decade.

**Silver Prussian carp- Carassius auratus gibelio (Bloch).** In the Aral sea basin, it lived in the lower reaches of the Amu Darya and Syrdarya. In the 1950s, silver carp were introduced to the fish farms of the Tashkent region and the Kattakurgan reservoir from the Moscow region (Savino fish farm), which independently and through the settlement of pond cultivated fish spread across most of the reservoirs of all the rivers of Uzbekistan, and also occurs in the foothills of the Charvak reservoir. Although the fish was not previously commercial, now its share in the fishery has increased enough to be considered commercial. **Species listed in the red book of Uzbekistan.**

# APPENDIX O-2– LABORATORY ANALYSIS RESULTS (SEDIMENT, WATER, GROUNDWATER, SOIL)

Государственный комитет Республики Узбекистан
по экологии и охране окружающей среды
Центр специализированного аналитического контроля
в области охраны окружающей среды (ЦСАК)

# И Н Ф О Р М А Ц И О Н Н Ы Й   О Т Ч Ё Т
## о выполнении работ по отбору и лабораторному исследованию проб поверхностных вод и донных отложений в районе строительства парогазовой установки (ПГУ) мощностью 1500 МВт в Сырдарьинской области

Руководитель работ
Директор ЦСАК при
Госкомэкологии РУз

Файзиев Р.Х.

ТАШКЕНТ – 2020

**Таблица 3.4.1 - Результаты физико-химического анализа поверхностных вод Южно-Голодностепского канала им. Саркизова**

| Наименование параметров (требований) | Место отбора и содержание Южно-Голодностепский канал им. Саркизова | | | | Норма по НД (ОБУВ) | Соответствие параметров (требований) | Предел обнаружения (диапазон измерений O'z O'U) |
|---|---|---|---|---|---|---|---|
| | №1 | №2 | №3 | №4 | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| pH | 8,42 | 8,38 | 8,37 | 8,37 | 6,5-8,5 | Соответствует | от 1 до 14 |
| Взвешенные вещества, мг/л не более | **94** | **102** | **84** | **86** | 15 | Не соответствует | от 5-500 мг/дм$^3$ |
| Ионы аммония, мг/л не более | 0,10 | 0,15 | 0,20 | 0,15 | 0,5 | Соответствует | от 0,2-2,0 мг/дм$^3$ |
| Нитраты, мг/л не более | 7,9 | 6,2 | 6,9 | 6,75 | 40 | Соответствует | от 0,4-80 мг/дм$^3$ |
| Нитриты, мг/л не более | **0,109** | **0,081** | **0,082** | **0,085** | 0,08 | Не соответствует | от 0,02-0,60 мг/дм$^3$ |
| Натрий, мг/л не более | 62,100 | 86,50 | 59,300 | **146,50** | 120 | Не соответствует гр.5 | 0,02 ppm |
| Хлориды мг/л, не более | 134,99 | 120,45 | 116,9 | 120,4 | 300 | Соответствует | от 10-500 мг/дм$^3$ |
| Сульфаты, мг/л не более | **310** | **300** | **283,0** | **292,2** | 100 | Не соответствует | от 25-500 мг/дм$^3$ |
| Сульфиды, мг/л не более | не обн. | не обн. | не обн. | не обн. | - | Соответствует | от 0 до 1 мг/дм$^3$ |
| Минерализация, мг/л не более | 810 | 720 | 675 | 697,5 | 1000 | Соответствует | от 20-10000 мг/дм$^3$ |
| ХПК, мг0/л не более | **80** | **60** | **100** | **40** | 15 | Не соответствует | от 10 до 100 мг0/дм$^3$ |
| БПК, мг0/л не более | **7,2** | **5,4** | **8,9** | **3,7** | 3 | Не соответствует | от 0,1 до 15 мг0/дм$^3$ |
| Фосфаты мг/л, не более | не обн. | не обн. | не обн. | не обн. | 0,3 | Соответствует | от 0,01-0,80 мг/дм$^3$ |
| Алюминий, мг/л не более | 0,008 | 0,007 | 0,008 | 0,006 | 0,2 | Соответствует | от 0,02-0,2 мг/дм$^3$ |
| Барий, мг/л не более | не обн. | не обн. | не обн. | не обн. | 2 | Соответствует | от 1-10 мг/дм$^3$ |
| Ванадий, мг/л не более | не обн. | не обн. | не обн. | не обн. | 0,001 | Соответствует | от 0,005-0,20 мг/дм$^3$ |
| Калий, мг/л не более | **106,100** | **70,071** | 14,400 | 17,510 | 50 | Не соответствует гр.2, 3 | 0,04 ppm |
| Кадмий, мг/л не более | 0,00388 | 0,00445 | 0,0039 | **0,00538** | 0,005 | Не соответствует гр.5 | 0,02 ppm |
| Свинец, мг/л не более | **0,0177** | **0,0185** | **0,0235** | **0,0360** | 0,01 | Не соответствует | 0,2 ppm |
| Марганец, мг/л не более | 0,00408 | 0,00300 | 0,00738 | **0,0116** | 0,01 | Не соответствует гр.5 | 0,05 ppm |
| Медь, мг/л не более | **0,00379** | **0,00358** | **0,00368** | **0,0074** | 0,001 | Не соответствует | от 0,001-0,01 мг/дм$^3$ |
| Никель, мг/л не более | 0,00373 | 0,00270 | 0,00338 | 0,00388 | 0,01 | Соответствует | 0,1 ppm |
| Ртуть, мг/л не более | не обн. | не обн. | не обн. | **0,000025** | 0,00001 | Не соответствует гр.5 | 0,1-10 ppb |
| Хром (+3), мг/л не более | 0,00638 | 0,00503 | 0,00625 | 0,0120 | - | - | 0,09 ppm |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Хром (+6), мг/л не более | 0,001 | **0,0015** | **0,00175** | **0,00175** | 0,001 | Не соответствует гр.3, 4 и 5 | от 0,001-0,25 мг/дм$^3$ |
| Цинк, мг/л не более | 0,00700 | 0,00508 | 0,00840 | **0,0105** | 0,01 | Не соответствует гр.5 | от 0,01 до 0,64 мг/дм$^3$ |
| Железо, мг/л не более | **0,132** | **0,118** | **0,141** | **0,195** | 0,05 | Не соответствует | от 05 до 2 мг/дм$^3$ |

**Таблица 3.4.2 - Результаты физико-химического анализа поверхностных вод (№№1-3)**

| Наименование параметров (требований) | Место отбора и содержание | | | Норма по НД (ОБУВ) | Соответствие параметров (требований) |
|---|---|---|---|---|---|
| | Поверхностные воды | | | | |
| | №1 | №2 | №3 | | |
| 1 | 2 | 3 | 4 | 5 | 6 |
| pH | 8,04 | 7,89 | 7,78 | 6,5-8,5 | Соответствует |
| Взвешенные вещества, мг/л не более | **190** | **160** | **216** | 15 | Не соответствует |
| Ионы аммония, мг/л не более | 0,07 | 0,32 | 0,36 | 0,5 | Соответствует |
| Нитраты, мг/л не более | 1,20 | 0,70 | 0,75 | 40 | Соответствует |
| Нитриты, мг/л не более | 0,0405 | 0,0502 | 0,040 | 0,08 | Соответствует |
| Натрий, мг/л не более | **133,300** | **145,300** | 100,600 | 120 | Не соответствует гр.2 и 3 |
| Хлориды мг/л, не более | 236,24 | 202,49 | 134,99 | 300 | Соответствует |
| Сульфаты, мг/л не более | **425** | **376** | **326** | 100 | Не соответствует |
| Сульфиды, мг/л не более | не обн. | не обн. | не обн. | - | Соответствует |
| Минерализация, мг/л не более | **1530** | **1395** | **1170** | 1000 | Не соответствует |
| ХПК, мг0/л не более | **100** | **100** | **120** | 15 | Не соответствует |
| БПК, мг0/л не более | **7,9** | **7,9** | **9,4** | 3 | Не соответствует |
| Фосфаты мг/л, не более | 0,046 | 0,046 | не обн. | 0,3 | Соответствует |
| Алюминий, мг/л не более | 0,006 | 0,007 | 0,005 | 0,2 | Соответствует |
| Барий, мг/л не более | не обн. | не обн. | не обн. | 2 | Соответствует |
| Ванадий, мг/л не более | не обн. | не обн. | не обн. | 0,001 | Соответствует |
| Калий, мг/л не более | 10,800 | 16,610 | 18,990 | 50 | Соответствует |
| Кадмий, мг/л не более | **0,00818** | **0,00573** | 0,00228 | 0,005 | Не соответствует гр.2 и 3 |
| Свинец, мг/л не более | **0,0556** | **0,0424** | **0,0357** | 0,01 | Не соответствует |
| Марганец, мг/л не более | **0,0329** | **0,0356** | **0,0477** | 0,01 | Не соответствует |
| Медь, мг/л не более | **0,00760** | **0,00546** | **0,00523** | 0,001 | Не соответствует |
| Никель, мг/л не более | 0,00440 | 0,00310 | 0,00543 | 0,01 | Соответствует |
| Ртуть, мг/л не более | не обн. | не обн. | **0,000038** | 0,00001 | Не соответствует гр.5 |
| Хром (+3), мг/л не более | 0,0140 | 0,0125 | 0,0142 | - | - |
| Хром (+6), мг/л не более | **0,0023** | **0,0022** | **0,0024** | 0,001 | Не соответствует |
| Цинк, мг/л не более | **0,0124** | **0,0105** | **0,0111** | 0,01 | Не соответствует |
| Железо, мг/л не более | **0,124** | **0,131** | **0,138** | 0,05 | Не соответствует |

**Таблица 3.4.3 - Результаты физико-химического анализа подземных вод (№№1-2)**

| Наименование параметров (требований) | Место отбора и содержание | | Норма по НД O'z DSt 950:2011 | Соответствие параметров (требований) |
|---|---|---|---|---|
| | Подземные воды | | | |
| | №1 | №2 | | |
| 1 | 2 | 3 | 4 | 5 |
| pH | 8,05 | 8,32 | 6-9 | Соответствует |
| Взвешенные вещества, мг/л не более | 276 | 134 | - | - |
| Ионы аммония, мг/л не более | 0,30 | 0,32 | - | - |

| | | | | |
|---|---|---|---|---|
| Нитраты, мг/л не более | 0,60 | 0,55 | 45 | Соответствует |
| Нитриты, мг/л не более | 0,02 | 0,0403 | - | - |
| Натрий, мг/л не более | 111,30 | 151,700 | - | - |
| Хлориды мг/л, не более | 67,49 | 134,99 | 250 | Соответствует |
| Сульфаты, мг/л не более | **418** | **520** | 400 | Не соответствует |
| Сульфиды, мг/л не более | не обн. | не обн. | - | - |
| Минерализация, мг/л не более | 742,5 | **1125** | 1000 | Не соответствует гр.3 |
| ХПК, мг0/л не более | **60** | **80** | - | - |
| БПК, мг0/л не более | **5,4** | **7,2** | - | - |
| Фосфаты мг/л, не более | не обн. | не обн. | 3,5 | Соответствует |
| Алюминий, мг/л не более | 0,006 | 0,007 | 0,2 | Соответствует |
| Барий, мг/л не более | не обн. | не обн.. | 0,1 | Соответствует |
| Ванадий, мг/л не более | не обн. | не обн. | - | Соответствует |
| Калий, мг/л не более | 13,42 | 15,280 | - | - |
| Кадмий, мг/л не более | **0,00163** | **0,00198** | 0,001 | Не соответствует |
| Свинец, мг/л не более | **0,0364** | **0,0453** | 0,03 | Не соответствует |
| Марганец, мг/л не более | 0,0349 | 0,0455 | 0,1 | Соответствует |
| Медь, мг/л не более | 0,00475 | 0,00510 | 1 | Соответствует |
| Никель, мг/л не более | 0,00550 | 0,00610 | 0,1 | Соответствует |
| Ртуть, мг/л не более | 0,000011 | не обн. | 0,0005 | Соответствует |
| Хром (+3), мг/л не более | 0,00988 | 0,0124 | - | - |
| Хром (+6), мг/л не более | 0,0015 | 0,00175 | 0,05 | Соответствует |
| Цинк, мг/л не более | 0,0138 | 0,00852 | 3 | Соответствует |
| Железо, мг/л не более | 0,169 | 0,171 | 0,3 | Соответствует |

**Таблица 3.5.1 – Результаты химического анализа почв**

| № | Наименование параметров (требований) | Место отбора | | | | | | Почва №7 (Фоновый пункт наблюдений) | Соответствие параметров (требований) | Предел обнаружения (диапазон) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Почва №1 | Почва №2 | Почва №3 | Почва №4 | Почва №5 | Почва №6 | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 1 | pH | 7,70 | **8,0** | 7,80 | **8,05** | 7,75 | 7,53 | 7,81 | Не соответствует гр.4, 6 | 0-14 |
| 2 | Гумус, мг/кг | 13000,0 | **14200** | 10300,0 | 10800,0 | 11100,0 | 12200,0 | 12400,0 | Не соответствует гр.4 | 0-3% и выше |
| 3 | Хлориды Cl, мг/кг | 130,0 | 180,0 | **590,0** | 240,0 | **1330,0** | **4800,0** | 270,0 | Не соответствует гр.5, 7 и 8 | 0-0,36 ppm и свыше |
| 4 | Сульфаты $SO_4$, мг/кг | **2840,0** | 1290,0 | **2970,0** | 1120,0 | **2320,0** | **3160,** | 1570,0 | Не соответствует гр.3, 5, 7 и 8 | 0-0,48 ppm и свыше |
| 5 | Оксид фосфора(V) $P_2O_5$, мг/кг | **16,5** | 4,9 | **36,0** | **49,0** | **28,0** | **34,2** | 5,2 | Не соответствует гр.3, 5, 6, 7 и 8 | 0-30 ppm и свыше |
| 6 | Нитраты $NO_3$, мг/кг | 14,0 | **38,2** | **21,2** | **28,5** | **202,4** | **53,0** | 16,0 | Не соответствует гр.4, 5, 6, 7 и 8 | 0-5 ppm и свыше |
| 7 | Кальций Ca, мг/кг | **1420,0** | 680,0 | **1720,0** | 660,0 | **1840,0** | **2280,0** | 1020,0 | Не соответствует гр.3, 5, 7 и 8 | 0- 0,2 ppm и свыше |
| 8 | Магний Mg, мг/кг | **1330,0** | 520,0 | **1650,0** | 590,0 | **1660,0** | **2040,0** | 760,0 | Не соответствует гр.3, 5, 7 и 8 | 0- 0,2 ppm и свыше |
| 9 | Натрий Na, мг/кг | **1420,0** | 680,0 | **1720,0** | 660,0 | **1840,0** | **2280,0** | 1020,0 | Не соответствует гр.3, 5, 7 и 8 | 0,02 ppm |
| 10 | Калий K, мг/кг | **1330,0** | 520,0 | **1650,0** | 590,0 | **1660,0** | **2040,0** | 700,0 | Не соответствует гр.3, 5, 7 и 8 | 0,04 ppm |
| 11 | Свинец Pb, мг/кг | 20,770 | 20,722 | 25,370 | 22,371 | 40,686 | 37,064 | 80,180 | Соответствует | 0,2 ppm |
| 12 | Марганец Mn, мг/кг | **412,000** | **342,000** | **342,000** | **388,000** | **340,000** | **338,000** | 319,000 | Не соответствует | 0,05 ppm |
| 13 | Медь Cu, мг/кг | **23,200** | **20,310** | **23,170** | **22,360** | **23,030** | **22,870** | 19,080 | Не соответствует | 0,09 ppm |
| 14 | Цинк Zn, мг/кг | **66,110** | **54,150** | 51,370 | **60,110** | **67,000** | **66,320** | 52,900 | Не соответствует гр.3, 4, 6, 7 и 8 | 0,02 ppm |
| 15 | Хром Cr, мг/кг | **17,815** | **18,636** | **16,415** | **19,796** | **15,597** | 14,642 | 15,124 | Не соответствует гр.3, 4, 5, 6 и 7 | 0,09 ppm |
| 16 | Железо Fe, мг/кг | **17998,900** | **19204,800** | **16989,000** | **21871,000** | 15425,000 | 15797,600 | 16972,000 | Не соответствует гр.3, 4, 5, 6 | 0,1 ppm |
| 17 | Ртуть Hg, мг/кг | **0,0093** | 0,0067 | **0,0082** | **0,0075** | 0,0073 | 0,0070 | 0,0073 | Не соответствует гр.3, 5, 6 | 0,1-10 ppb |

| № | Наименование параметров (требований) | Место отбора | | | | | | Почва №7 (Фоновый пункт наблюдений) | Соответствие параметров (требований) | Предел обнаружения (диапазон) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Почва №1 | Почва №2 | Почва №3 | Почва №4 | Почва №5 | Почва №6 | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 18 | Никель Ni, мг/кг | **29,383** | **23,616** | **27,244** | **28,631** | **26,470** | **26,463** | 22,280 | Не соответствует | 0,1 ppm |
| 19 | Кадмий Cd, мг/кг | **1,730** | **1,636** | **1,704** | **1,714** | **1,988** | **1,872** | 1,618 | Не соответствует | 0,02 ppm |
| 20 | Алюминий Al, мг/кг | **4,48** | **4,44** | **4,24** | **4,42** | 3,42 | **4,32** | 4,19 | Не соответствует гр.3, 4, 5, 6 и 8 | 0-10,8 ppm и свыше |

**Таблица 3.5.2 – Результаты химического анализа донных отложений**

| № | Наименование параметров (требований) | Место отбора | | | |
|---|---|---|---|---|---|
| | | Донные №1 | Донные №2 | Донные №3 | Донные №4 |
| 1 | 2 | 3 | 4 | 5 | 6 |
| 1 | pH | 8,12 | 8,12 | 8,15 | 8,07 |
| 2 | Гумус, мг/кг | 16800,0 | 18100,0 | 15100,0 | 19000,0 |
| 3 | Хлориды Cl, мг/кг | 420,0 | 28,0 | 28,0 | 28,0 |
| 4 | Сульфаты $SO_4$, мг/кг | 680,0 | 490,0 | 400,0 | 780,0 |
| 5 | Оксид фосфора(V) $P_2O_5$, мг/кг | 4,0 | 6,0 | 3,4 | 4,2 |
| 6 | Нитраты $NO_3$, мг/кг | 11,8 | 11,8 | 16,5 | 12,5 |
| 7 | Кальций Ca, мг/кг | 560,0 | 280,0 | 260,0 | 400,0 |
| 8 | Магний Mg, мг/кг | 300,0 | 200,0 | 210,0 | 340,0 |
| 9 | Натрий Na, мг/кг | 560,0 | 280,0 | 260,0 | 400,0 |
| 10 | Калий K, мг/кг | 300,0 | 200,0 | 210,0 | 340,0 |
| 11 | Свинец Pb, мг/кг | 34,154 | 31,074 | 31,730 | 34,782 |
| 12 | Марганец Mn, мг/кг | 254,000 | 270,000 | 272,000 | 268,000 |
| 13 | Медь Cu, мг/кг | 24,750 | 30,710 | 30,260 | 33,780 |
| 14 | Цинк Zn, мг/кг | 58,360 | 53,580 | 67,290 | 70,430 |
| 15 | Хром Cr, мг/кг | 15,348 | 15,070 | 16,164 | 16,672 |
| 16 | Железо Fe, мг/кг | 17362,400 | 18204,000 | 15016,000 | 1975,200 |
| 17 | Ртуть Hg, мг/кг | 0,0065 | 0,0065 | 0,0062 | 0,0063 |

| № | Наименование параметров (требований) | Место отбора | | | |
|---|---|---|---|---|---|
| | | Донные №1 | Донные №2 | Донные №3 | Донные №4 |
| 1 | 2 | 3 | 4 | 5 | 6 |
| 18 | Никель Ni, мг/кг | 19,615 | 17,761 | 23,637 | 24,097 |
| 19 | Кадмий Cd, мг/кг | 2,066 | 2,226 | 2,094 | 1,984 |
| 20 | Алюминий Al, мг/кг | 3,71 | 4,19 | 4,20 | 4,27 |

**Таблица 3.5.3 – Результаты химического анализа почв и донных отложений хлорорганическими пестицидами ДДТ и его метаболитами**

| № | Место отбора | Контролируемые ингредиенты | | | | |
|---|---|---|---|---|---|---|
| | | α-ГХЦГ (альфа-изомер гесахлорциклогексана) | γ-ГХЦГ (гамма-изомер гесахлорциклогексана) | ДДЕ ($C_{14}H_9Cl_4$) - 4,4'-Дихлордифенилдихлорэтилен | ДДД ($C_{14}H_{10}Cl_4$) - 4,4'-Дихлордифенилдихлорэтан | ДДТ ($C_{14}H_9Cl_5$) - 4,4'-Дихлордифенилтрихлорэтан |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 1 | Почва №1 | 0,001 | н/о | 0,027 | н/о | н/о |
| 2 | Почва №2 | н/о | н/о | 0,006 | н/о | н/о |
| 3 | Почва №3 | 0,001 | н/о | 0,005 | н/о | н/о |
| 4 | Почва №4 | 0,001 | н/о | н/о | н/о | н/о |
| 5 | Почва №5 | н/о | н/о | н/о | н/о | н/о |
| 6 | Почва №6 | н/о | н/о | н/о | н/о | н/о |
| 7 | Почва №7 | 0,001 | н/о | н/о | н/о | н/о |
| 8 | Донные №1 | н/о | н/о | 0,002 | н/о | 0,001 |
| 9 | Донные №2 | 0,002 | 0,001 | 0,002 | н/о | 0,004 |
| 10 | Донные №3 | н/о | н/о | н/о | н/о | н/о |
| 11 | Донные №4 | н/о | 0,002 | 0,001 | н/о | н/о |
| ПДК по СанПиН РУз №0191-05 | | Сумма изомеров – 0,1 мг/кг | | ДДТ и его метаболиты (сумма) – 0,5 мг/кг | | |

| | | | | |
|---|---|---|---|---|
| Нитраты, мг/л не более | 0,60 | 0,55 | 45 | Соответствует |
| Нитриты, мг/л не более | 0,02 | 0,0403 | - | - |
| Натрий, мг/л не более | 111,30 | 151,700 | - | - |
| Хлориды мг/л, не более | 67,49 | 134,99 | 250 | Соответствует |
| Сульфаты, мг/л не более | **418** | **520** | 400 | Не соответствует |
| Сульфиды, мг/л не более | не обн. | не обн. | - | - |
| Минерализация, мг/л не более | 742,5 | **1125** | 1000 | Не соответствует гр.3 |
| ХПК, мг0/л не более | **60** | **80** | - | - |
| БПК, мг0/л не более | **5,4** | **7,2** | - | - |
| Фосфаты мг/л, не более | не обн. | не обн. | 3,5 | Соответствует |
| Алюминий, мг/л не более | 0,006 | 0,007 | 0,2 | Соответствует |
| Барий, мг/л не более | не обн. | не обн.. | 0,1 | Соответствует |
| Ванадий, мг/л не более | не обн. | не обн. | - | Соответствует |
| Калий, мг/л не более | 13,42 | 15,280 | - | - |
| Кадмий, мг/л не более | **0,00163** | **0,00198** | 0,001 | Не соответствует |
| Свинец, мг/л не более | **0,0364** | **0,0453** | 0,03 | Не соответствует |
| Марганец, мг/л не более | 0,0349 | 0,0455 | 0,1 | Соответствует |
| Медь, мг/л не более | 0,00475 | 0,00510 | 1 | Соответствует |
| Никель, мг/л не более | 0,00550 | 0,00610 | 0,1 | Соответствует |
| Ртуть, мг/л не более | 0,000011 | не обн. | 0,0005 | Соответствует |
| Хром (+3), мг/л не более | 0,00988 | 0,0124 | - | - |
| Хром (+6), мг/л не более | 0,0015 | 0,00175 | 0,05 | Соответствует |
| Цинк, мг/л не более | 0,0138 | 0,00852 | 3 | Соответствует |
| Железо, мг/л не более | 0,169 | 0,171 | 0,3 | Соответствует |

# APPENDIX P– LIST OF ARCHAEOLOGICAL & CULTURAL SITES WITHIN SYRDARYA REGION

**O'ZBEKISTON RESPUBLIKASI**
**MADANIYAT VAZIRLIGI**
O'zbekiston, Toshkent, 100029, Taras Shevchenko, 1-uy
Tel.: +998 71 256-44-72, 256-44-82
e-xat: madaniyat.devon@exat.uz, www.madaniyat.uz

**MINISTRY OF CULTURE**
**REPUBLIC OF UZBEKISTAN**
1, T.Shevchenko, Tashkent city, 100029, Republic of Uzbekistan
Tel.: +998 71 256-44-72, 256-44-82
e-xat: madaniyat.devon@exat.uz, www.madaniyat.uz

2020 у. «21» 03 № 01-12-03-1580 «__» ________ 20__ г.

**"Juru Energy Ltd."**
**компаниясига**

*2020 йил 19 мартдаги*
*UZB-ACWA-CCGT-20/20/12-сонли хатингизга*

Сирдарё вилоятида 1500 Мвт қувватга эга буғ-газ қурилмасини қуриши режалаштирилаётган ҳудудлар яъни Ширин шаҳри ва Боёвут туманидаги маданий мерос объектларининг рўйхати ва маълумоти иловага мувофиқ юборилмоқда.

Ўзбекистон Республикасининг 2001 йил 30 августдаги 269-II-сонли Қонунининг 36-моддасига мувофиқ:

- маданий мерос объектларини муҳофаза қилиш ва улардан фойдаланиш тўғрисидаги қонун ҳужжатларининг бузилишида айбдор шахслар белгиланган тартибда жавобгар бўладилар.

Илова: 2 варақ

**Вазир ўринбосари-**
**Маданий мерос департаменти**
**бошлиғи** **К. Акилова**

*Ижрочи: Х. Холмуродов*
*Тел: 71) 227-05-86*

| Т/р | Объект тўлиқ номи | Объект даври | Объект манзили | Кўчмас мулкка бўлган ҳуқуқ |
|---|---|---|---|---|
| 60. | Николай Ильченко | 1999 йил | Навоий шоҳ кўчаси, 26-уй | Давлат мулки. Гулистон шаҳар ободонлаштириш бўлими оператив бошқарув ҳуқуқи асосида |
| 61. | Василий Корнейко | 1999 йил | Навоий шоҳ кўчаси, 26-уй | Давлат мулки. Гулистон шаҳар ободонлаштириш бўлими оператив бошқарув ҳуқуқи асосида |
| 62. | Фёдор Нишурин | 1999 йил | Навоий шоҳ кўчаси, 26-уй | Давлат мулки. Гулистон шаҳар ободонлаштириш бўлими оператив бошқарув ҳуқуқи асосида |
| 63. | Аскарни урушга жўнатиш ҳайкали | 1974 йил | Маданият ва истироҳат боғи | Давлат мулки. Сирдарё вилояти маданий мерос бошқармаси оператив бошқарув ҳуқуқи асосида |
| 64. | Алишер Навоий ҳайкали | 1987 йил | Навоий шоҳ кўчаси | Давлат мулки. Гулистон шаҳар ободонлаштириш бўлими оператив бошқарув ҳуқуқи асосида |
| **Боёвут тумани** | | | | |
| **Археология ёдгорликлари** | | | | |
| 65. | Қўрғонтепа 1 | Аниқланмаган | Чанговул қишлоғи | Давлат мулки. Сирдарё вилояти маданий мерос бошқармаси оператив бошқарув ҳуқуқи асосида |
| **Монументал санъат ёдгорликлари** | | | | |
| 66. | Елена Стемпковская бюсти | 1969 йил | 1-Боёвут | Давлат мулки. Сирдарё вилояти маданий мерос бошқармаси оператив бошқарув ҳуқуқи асосида |
| 67. | Усмон Юсупов бюсти | 1974 йил | 2-Боёвут | Давлат мулки. Сирдарё вилояти маданий мерос бошқармаси оператив бошқарув ҳуқуқи асосида |
| 68. | Алишер Навоий ҳайкали | 1989 йил | "А.Навоий" МФЙ | Давлат мулки. Сирдарё вилояти маданий мерос бошқармаси оператив бошқарув ҳуқуқи асосида |
| **Мирзобод тумани** | | | | |
| **Монументал санъат ёдгорликлари** | | | | |
| 69. | Райимжон Муҳаммадиев бюсти | 1990 йил | 21-сонли мактаб ҳудудида | Давлат мулки. Сирдарё вилояти маданий мерос бошқармаси оператив бошқарув ҳуқуқи асосида |

| Т/р | Объект тўлиқ номи | Объект даври | Объект манзили | Кўчмас мулкка бўлган ҳуқуқ |
|---|---|---|---|---|
| 70. | Турғун Аҳмедов бюсти | 1973 йил | Янги йўл маҳалласи | Давлат мулки. Сирдарё вилояти маданий мерос бошқармаси оператив бошқарув ҳуқуқи асосида |
| 71. | Турғун Аҳмедов бюсти | 1980 йил | "Навбахор" МФЙ ҳудудида | Давлат мулки. Сирдарё вилояти маданий мерос бошқармаси оператив бошқарув ҳуқуқи асосида |
| **Ширин шаҳар** | | | | |
| **Монументал санъат ёдгорликлари** | | | | |
| 72. | Амир Темур ҳайкали | 2002 йил | Шаҳардаги ҳарбий бўлинма ҳудудида | Давлат мулки. Ширин шаҳар ободонлаштириш бўлими оператив бошқарув ҳуқуқи асосида |
| 73. | Она ҳайкали | 1990 йил | Ширин шаҳри марказида | Давлат мулки. Ширин шаҳар ободонлаштириш бўлими оператив бошқарув ҳуқуқи асосида |

UNOFFICIAL TRANSLATION BY JURU ENERGY

**MINISTRY OF CULTURE OF THE REPUBLIC OF UZBEKISTAN**

**21$^{ST}$ of March, 2020**

**№01-12-03-1580**

**TO: “Juru Energy Ltd.”**

*In response to the Juru Energy’s request dated 19$^{th}$ of March, 2020 №UZB-ACWA-CCGT-20/20/12:*

As per your request, we are sending an information regarding cultural heritage in Shirin town and Bayavut district of Syrdarya region, where planned the construction of CCGT with a capacity of 1500 MV.

In accordance with the article 36 of the Law №269-II of the Republic of Uzbekistan, dated on 30$^{th}$ of August, 2001:

- Any violation of the law of the protection and use of the objects of cultural heritage will be prosecuted.

Annex to the letter in 2 pages.

**Deputy minister,**

**Head of cultural heritage department** **K.Akilova**

Executor: X.Kholmurodov

Tel: 71 227-05-86

| № | Name of object | Construction year | Location address | Real estate right |
|---|---|---|---|---|
| | | **Bayavut district** | | |
| **Archaeological heritage** | | | | |
| 1 | Kurgantepa 1 | Not determined | Changavul village | State property. Syrdarya regional department of cultural heritage on the basis of the right of operative management |
| **Monumental cultural heritage** | | | | |
| 2 | Bust of Helena Stempkovskaya | 1969 year | 1-Boyovut | State property. Syrdarya regional department of cultural heritage on the basis of the right of operative management |
| 3 | Bust of Usmon Yusupov | 1974 year | 2-Boyovut | State property. Syrdarya regional department of cultural heritage on the basis of the right of operative management |
| 4 | Monument of Alisher Navoi | 1989 year | Makhalla “A.Navoi” | State property. Syrdarya regional department of cultural heritage on the basis of the right of operative management |
| | | | **Shirin town** | |
| **Monumental cultural heritage** | | | | |
| 1 | Monument of Amir Temur | 2002 year | On the territory of military unit | State property. Shirin town landscaping department on the basis of operational management rights |
| 2 | Monument of mother | 1990 year | At the centre of Shirin town | State property. Shirin town landscaping department on the basis of operational management rights |

# APPENDIX Q– LIVELIHOOD RESTORATION PLAN TERMS OF REFERENCE

# ACWA Power Sirdarya 1,500MW CCGT Power Plant (IPP)

# Republic of Uzbekistan

## Livelihood Restoration Plan:

## Terms of Reference

Prepared for:

June 2020

# Document Information

| | |
|---|---|
| **Project Name** | ACWA Power Sirdarya 1,500MW CCGT Power Plant (IPP), Republic of Uzbekistan |
| **5Cs Project Number** | 1305/001/085 |
| **Document Title** | Livelihood Restoration Plan: Terms of Reference |
| **Client** | ACWA Power |
| **5Cs Project Manager** | Eva Muthoni Kimonye |
| **5Cs Project Director** | Ken Wade |

# Document Control

| Version | Date | Description | Author | Reviewer | Approver |
|---|---|---|---|---|---|
| 1 | 04/06/2020 | LRP | EMK | MKB | KRW |

| | |
|---|---|
| 1 | Financial Capital |
| 2 | Social Capital |
| 3 | Natural Capital |
| 4 | Manufactured Capital |
| 5 | Human Capital |

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# Disclaimer



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# CONTENTS

# 1 INTRODUCTION

## 1.1 The Project

The government of the Republic of Uzbekistan aims modernise and increase the electricity production in the country in order to foster economic growth. As part of this aim, the government plans to develop new gas fired Combined Cycle Gas Turbine (CCGT) plants on two adjacent plots of land near other existing power infrastructure near the settlement Shirin, a border town with Tajikistan. The eastern plot of land has been allocated to ACWA Power for development of a 1,500MW CCGT plant (the Project), whilst the western plot is being assessed separately for competitive bids by the IFC (part of the World Bank Group).

The Project scope also includes the design, development, construction, commissioning, testing and transfer of a 500/220kV switchgear station to the JSC National Electric Networks of Uzbekistan. This switchgear station will be a common facility between the ACWA Power Sirdarya Project and the adjacent CCGT project currently under the IFC tender. JSC National Electric Networks of Uzbekistan will be responsible for the operations and maintenance of the switchgear station once it has been constructed.

ACWA Power are seeking an amount of project finance from financial Institutions who have their own internal environmental & social investment policies/standards, or may be members of voluntary agreements such as the Equator Principles. At this stage, it is understood that the European Bank for Reconstruction and Development (EBRD), Asian Development Bank (ADB) and Deutsche Investitions-und Entwicklungsgesells (DEG) are involved in discussions relating to provisions of finance.

It is known that the land at the Project site was previously used and in some cases is still being used for agricultural purposes by local farmers, who leased the land from the local government under specific land lease agreements. It is our understanding that land lease termination orders have been issued to previous land users to release their agricultural land for the Project. However, it is not clear at this point whether those farmers who are still cultivating their land have been issued with the lease termination notice. ACWA Power is therefore required to identify what processes have been fully undertaken by the government concerning land acquisition and the impacts and impacts of displacement to any displaced farmers, including economic impacts and loss of livelihoods. Based on the process that have taken place, these will be analysed versus the lenders requirements to identify if there is need for a separate compensatory measure or livelihood restoration.

## 1.2 Background and Context

5 Capitals Environmental and Management Consulting (5 Capitals) has been engaged by ACWA Power to undertake the independent EIA and ESIA processes, as well as certain other environmental & social related scope which also include the Livelihood Restoration Plan (LRP). 5 Capitals has partnered with a locally based consultant, 'Juru Energy' (Tashkent, Uzbekistan) to undertake certain elements of the scope, which include provision of support in addressing issues relating to land acquisition, identification of affected farmers, valuation of assets etc.

Information obtained by ACWA Power from Shirin and Boyavut District shows that some farmers have received notification on termination of their land lease agreement between January and February 2020 to allow for the development of the Project. In addition, 5 Capitals has been provided with documents showing that the government of Uzbekistan has started the valuation of assets on the farms both on the ACWA Power and a IFC future project on adjacent land. This valuation data will need to be validated.

In order to determine the number of farmers that will be impacted by the involuntary land acquisition, 5 Capitals and Juru Energy are in consultation with the local government and local community leaders. At present, it is expected that between seven (7) to eleven (11) farmers will be impacted. Initial consultations were undertaken with eight (8) farmers between 22nd April and 1st May 2020 through telephone calls. This was due to movement restrictions imposed in Uzbekistan due to the COVID-19 pandemic.

Chapter 6 of the SanPin № 0350-17 national regulations requires the establishment of a health protection zone (HPZ) around a new thermal power plant with a radius of 500m around each air emissions stack structure. As a result, 5 Capitals via Juru Energy have written a letter to the Ministry of Health in Uzbekistan to determine the implication of this requirement on neighbouring farms and whether the famers located within a 500m radius can continue with their agricultural activities during the operations of the Project. Based on the feedback received from the Ministry, 5 Capitals and Juru Energy will be able to determine whether these lands also need to be included in the LRP.

## 1.3 Objectives of the Livelihood Restoration Plan

The main objectives of the LRP will include:

- Gain a full understanding of the current situation concerning land use and validation on what the government has done up to date;
- Identify the key differences and gaps between Uzbekistan land acquisition and compensation process and the lenders requirements.
- Provide accurate information about the project design, impacts, implementation and monitoring requirements to the project affected people:

- Ensure the people who are affected by the project are fully compensated and the livelihoods that are lost due to economic displacement are re-established, and their living standard is improved or at the level it was before the land acquisition and economic displacement at no cost to them;
- Ensure that the affected people are not impoverished as a consequence of the involuntary land acquisition or loss of livelihood as a result of the project development;
- Ensure that the affected people are informed and aware of the land acquisition process and livelihood restoration;
- Ensure that the affected people have access and are aware of the grievance resolution mechanism available for the project; and
- Provide, additional support and assistance to vulnerable groups where they exist.

# 2 LEGAL FRAMEWORK AND STANDARDS

## 2.1 National Regulations

**LAND RIGHTS, ACQUISITION AND RESETTLEMENT**

- Civil Code of the Republic of Uzbekistan "Civil code" (№ 163- I, 21.12.1995, as amended on 22.01.2020);
- Land Code (1998 as amended 2010) (№ 598-I, 30.04.1998, as amended on 28.08.2019);
- Law of the Republic of Uzbekistan on State Land Cadastre No.666-I of 28.08.1998
- Presidential Decree № UP-5742 "On Measures for The Efficient Use of Land and Water Resources in Agriculture"
- Resolution № 146 of the Cabinet of Ministers "On the Procedure for Compensation for Losses of Land Owners, Users, Tenants and Owners, As Well As Losses Of Agricultural And Forestry Production".
- SanPin № 0350-17, Chapter 6 "Sanitary-technical classification of production enterprises, thermal power plants, storage facilities and the sizes of the minimum sanitary protection zones (SPZ) for them"
  - Requires the establishment of a health protection zone ("HPZ") around any new TPP. The HPZ will have a radius of 500 m around each stack.

## 2.2 Lender Requirements

At this stage, it is understood that the European Bank for Reconstruction and Development (EBRD), Asian Development Bank (ADB) and Deutsche Investitions-und Entwicklungsgesells (DEG) are involved in discussions relating to provisions of finance. As a result, the project will be required to adhere to the following lender requirements in regards to involuntary land acquisition:

- ADB's SPS (2009), Safeguard Requirement 2: Involuntary Resettlement;
- EBRD's Land Acquisition and Livelihood Restoration requirements as laid out in the Performance Requirement 5; and
- Equator Principles IV (2020) requires projects to evaluate the specific risks of the project to determine the applicability of the IFC Performance Standards under Principle 3
  - IFC Performance Standard 5: Land Acquisition and Involuntary Resettlement

# 3 PROJECT OVERVIEW

The Project is a 1,500MW natural gas fired Combined Cycle Gas Turbine (CCGT) power plant, that will operate independently and offload power to the grid via a shared electrical switchgear station with a future CCGT project (being tendered by IFC), expected on adjacent land.

The main project facilities will include:

- Power block and stacks including 2 * Gas Turbines (GT), 2 * Heat Recovery Steam Generators (HRSG) and 1 * Steam Turbine (ST);
- Closed Loop Cooling Water system and Open Loop Cooling System;
- Gas receiving terminal;
- Intake and outfall;
- Water treatment (to be confirmed);
- Wastewater treatment; and
- Ancillary/support facilities (i.e. electrical system, site entrance and security building, laboratory, workshops etc).

Associated facilities will include:

- Gas pumping station and supply;
- 500/220kV switchgear station;
- Overhead transmission lines; and
- Access road.

**Figure 3-1 Project Location & Field Patterns**

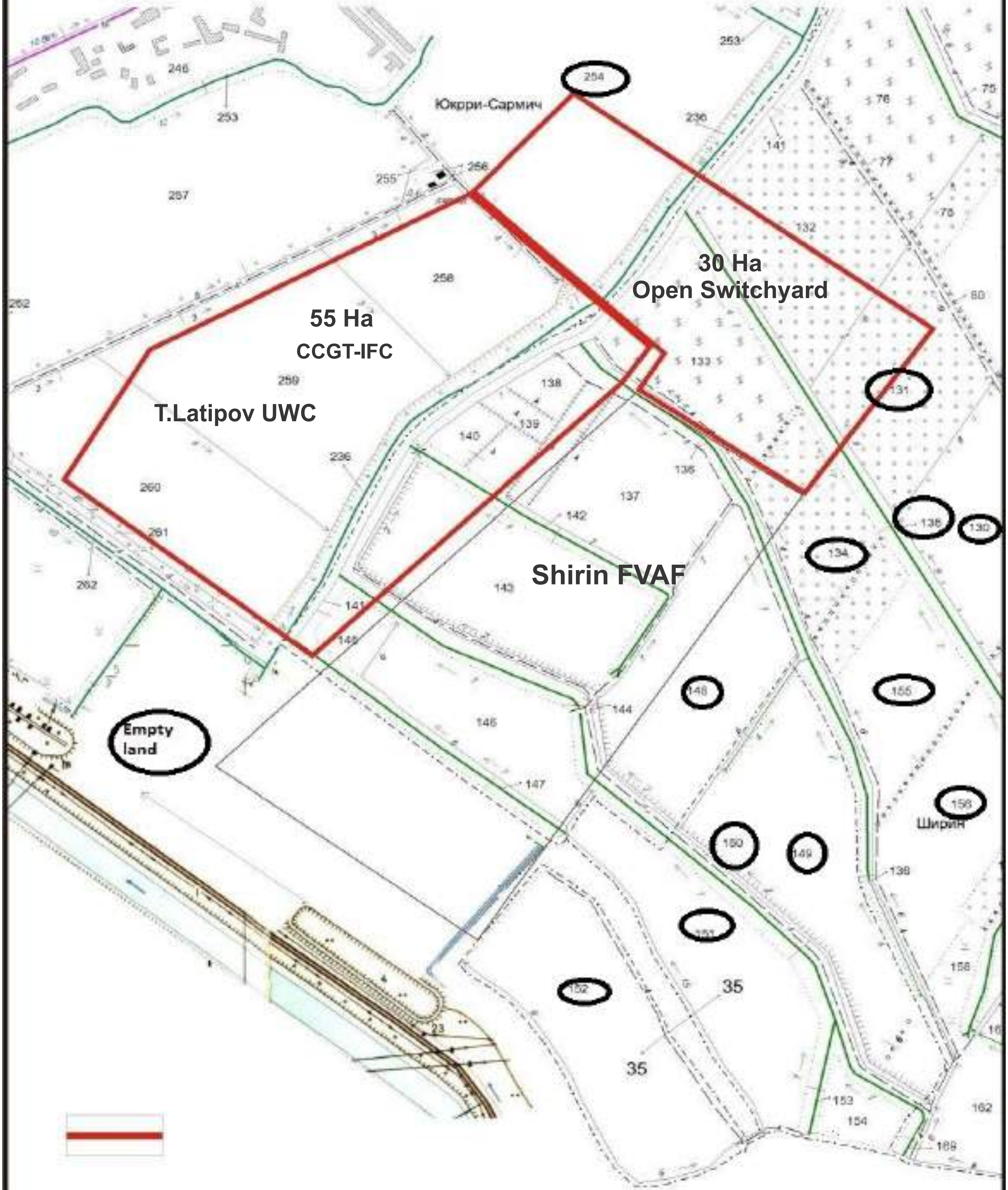
# 4 TERMS OF REFERENCE

The following Terms of Reference have been identified for the LRP:

| ELEMENT | TERMS OF REFERENCE |
|---|---|
| **Identification of current situation** | This will include:<br>• Consultation with relevant government authorities to determine what has been done in relation to notifying the impacted farmers on termination of their land lease agreement, asset valuation, compensation etc.<br>• Validation of data received from the relevant government authorities on the impacted farmers.<br>• Identify the location of land that will be used for the project associated facilities.<br>• Identify the exact number of farmers who are impacted by the development of the ACWA Power project.<br>• Determine the number of farmers who are no longer using their land vs those who are still farming. |
| **Gap Analysis between national and lender's requirements** | This section will seek to establish the gaps between the Uzbekistan national requirements for involuntary land acquisition and livelihood restoration and the lenders requirements in order to ensure that the project is in line with all the lender's requirements. |
| **Socio-Economic Survey** | This will include but not limited to the following components:<br>• Socio-economic survey of the affected people to include but not limited to demographic characteristics, sources of income, levels of income, distribution of income by income sources, education, health, community infrastructure etc.<br>• Identification of vulnerable households.<br>• Determination of the project land acquisition requirements and the land take.<br>• Announcement of the census and inventory to affected people.<br>• Implementation of census of affected people and assets inventory through field surveys.<br>• Valuation of land and assets.<br>• Disclosure of preliminary findings during meetings with the affected people.<br>• Validate the impact assessment and compensation strategy. |
| **Stakeholder consultation** | A series of stakeholder engagement activities will be undertaken in order to develop the LRP and complete the process. The consultations will be undertaken once the exact number of affected households is confirmed. Focus group consultations will be undertaken with women and vulnerable groups to ensure that their concerns are incorporated in the LRP. |
| **Land requirements and impact assessment** | This section of the LRP will include the following:<br>• Identify the need for land acquisition.<br>• Assess the impacts of the project land take on the affected people's means of livelihood and incomes.<br>• Consultation with the affected people on the impacts.<br>• Mitigation and management measures for the identified impacts. |
| **Eligibility and entitlement** | • Establish the eligibility criteria in accordance to lenders requirements.<br>• Establish a cut off data for the eligibility to the LRP measure as part of the census and assets inventory<br>• Public announcement of the cut off date |

| **Element** | **Terms of Reference** |
|---|---|
| | • Develop an entitlement matrix for the affected people which will include loss of land, crops, trees, structures on the land etc.<br>• Establish requirements for additional support for affected vulnerable households if applicable. |
| **Inventory and Valuation of property losses** | • The valuation of the assets will be undertaken by an independent valuator who will take into consideration the valuation exercise that has been carried out by the government in the past and existing assets in the impacted farms.<br>• Establish a methodology to determine compensation rates for the lost assets.<br>• The asset inventory will be endorsed by the affected people by signing an inventory form in which they agree to the list of affected assets.<br>• Valuation will be discussed with them during the negotiation of the compensation package. |
| **Institutional arrangements** | Identify the stakeholders who will be responsible for the implementation and monitoring of the LRP i.e.<br>• ACWA Power<br>• Government ministries<br>• Local officials in Shirin<br>• EPC Contractor etc. |
| **Implementation of the LRP** | This will establish the main steps that will be followed in the implementation of the LRP prior to access of the land for the start of the main construction activities. |
| **Information disclosure, consultation and participation** | • Information regarding the land acquisition principles and eligibility for compensation will be provided to the affected communities.<br>• The draft LRP will be disclosed to the project affected communities after which any comments will be integrated in the final LRP.<br>• Establish a transparent and open communication process with the affected communities |
| **Grievance Mechanism** | A grievance mechanism will be established in the LRP by which the project affected persons will be able to submit their grievances and/or comments regarding the project. This procedure will be clearly outlined in the LRP and will be in line with the project grievance procedure established as part of the Stakeholder Engagement Plan. |
| **Monitoring and Reporting** | This will include the project monitoring and audit requirements of the land acquisition process at different stages including the progress made by vulnerable groups. |

Syrdaya region Boyavut district T.Latipov UWC and Shirin FVAF
land parcels territory for construction
CCGT 1200-1400 MW based on Public Private Agreement.
History
Scale 1:10000



# APPENDIX R– MINUTES OF CONSULTATION MEETINGS

# APPENDIX R-1– MINUTES MEETING AT BAYAVUT DISTRICT

**MINUTES OF MEETING**

**Public consultation in Bayavut district**

To assist 5 Capitals in conducting ESIA baseline surveys for Uzbekistan CCGT project, on May 28, 2020, Juru Energy (Juru) arranged and held public consultations with the people from Directly Affected Communities (DAC) living in Bayavut district, Syrdarya region. These communities are closest to the project site with potential ecological influence from the project. Meeting agenda included discussion of issues related to the environmental impact from the project. Summary of the consultations is provided below.

| | |
|---|---|
| **Stakeholder group:** | Directly Affected Communities |
| **Number of participants from local community** | 12 people from Sarmich community[1]<br>6 farmers |
| **Representatives of local administration** | Mr. Muzaffar Khomidjonov – Deputy Mayor of Bayavut district<br>Mr. Rustam Kurbanov – Head of investments department |
| **Representatives of the Project** | Mr. Sherzod Onarkulov – ACWA Power Syrdarya LLC (Tashkent)<br>Ms. Umida Rozumbetova – Juru<br>Mr. Aziz Shoraimov – Juru<br>Mr. Abdullo Adkhamov – Juru |
| **Meeting language:** | Uzbek |
| **Date:** | **28.05.2020** |
| **Start time:** | **9:40** |
| **End time:** | **11:00** |
| **Method of engagement:** | Formal letter (invitation) to the local municipality on 27.05.2020 |
| **Venue:** | Yard of school no. 45 |
| **Used materials and visual aids** | Project presentation |

## I. Agenda for meeting

1. General overview of the CCGT construction:
   - Purpose, nature and scale of construction
   - Timeline and schedule of construction

2. Impacts of CCGT
   - Positive (e.g., opportunities for new job placements, cheaper electricity and etc)
   - Negative (noise, air pollution, and etc.)
   - Measures for negative impact mitigation
   - Safeguard measures (that will be taken to reduce impact on environment and communities)

3. Discussions

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[1] Sarmich community was labelled as H1 in Scoping report (Table **Error! No text of specified style in document.-Error! Main Document Only.** Sensitive Receptors)

1. Starting the public consultation on behalf of ACWA Power, Mr. Sherzod Onarkulov congratulated the local community with Eid al-Fitr and expressed condolences over the Sardoba tragedy.

Then he briefed the participants on the goals and main objectives of the project as well as the timeline of the project. He underlined that construction of ACWA CCGT with a total capacity of 1500 MWt was a part of national reforms implemented in the energy sector of Uzbekistan.

Mr. Onarkulov mentioned about that there will be used the latest modern technologies of the world class both during the construction and operational phases. And for this reason, the efficiency coefficient of CCGT will be more than 60%.

He also said that on August, 2020 there will be official opening ceremony for construction works on the allocated land. The whole construction process will start on September/October, 2020.

2. Following the opening speech, Ms. Umida Rozumbetova (Juru) gave the project presentation where she explained the main project features and details, including:

1. Geographical location;
2. Planned technology type;
3. Positive and possible negative impacts of the project;
4. On-going activities at the current stage of the project;
5. Measures for mitigation of negative impact.

3. Q&A session followed the presentation, where local community asked questions related to the socio-economic impact from the project on the district. Affected farmers were mainly concerned about the compensation for the losses of agricultural crops.

| Question | Answer |
|---|---|
| ***Yoldashev Bahtiyor, farmer:***<br>Could you please clarify what should farmers expect regarding the compensation for agricultural crops loses? My farm land was returned back to the administration. But I have around 3 000 fruit trees remaining on the farm. | ***M.Khomidjonov:***<br>Your farm land was returned back because according to the Land Code, State owns all land in our Republic, and State has a right to return it back under urgent reasons. As for the compensation, there strict regulations for performing valuation and compensation processes. Compensation will be paid by developer of the Project. In close cooperation with ACWA power, Bayavut district administration will evaluate farm land. All actions and decisions taken for this issue will be announced to farmers. At the moment, the process is going on, and we are dealing with legal issues. You are welcome to give any feedback regarding the project.<br>***Sh.Onarkulov***<br>Before to proceed with compensation process, first of all we need to get the State Resolution for implementation of this Project. After that, Project developer will make a land lease agreement with Bayavut district administration. The compensation process will be performed according to the national as |

| | |
|---|---|
| | well as international requirements. Each farmer, who has been affected by the Project, will take a part in this process. We will evaluate the land and agricultural crops in close cooperation with farmers. |
| **Kurbonali Mavlonov: local resident**<br>I wonder if there is enough water in the canal to support the operation of new CCGT and existing Syrdarya TPP? | ***<u>Sh.Onarkulov</u>***<br>After the modernisation of 6 power units at existing Syrdarya TPP, the water consumption will be decreased. Moreover, the new CCGT will use modern water supply system, which allows to reach zero discharge of technical water to canal, except treated sanitary and rainfall water |
| **Asatulla Djamilov, Leader of community**<br>Does the project include improving social infrastructure or building a new one in local area? I mean schools, kindergartens, residential buildings and etc? | ***<u>Sh.Onarkulov</u>***<br>First of all the local infrastructure is the direct responsibility of local municipality which means that local municipality usually has long term plans and schedule for the development of infrastructure. Therefore the issues related to the infrastructure development first of all should be addressed to the Boyovut district khokimiyat. From our side currently we preparing curriculum for 4 new specialisations and we aim to implement them in College of Energy of Shirin town as well as training courses for retraining specialists. With this, we aim to prepare high qualified specialist in accordance with international standards. Furthermore, while the Project construction as well as its operation phases, we will be able to help to improve local infrastructure. |
| **Asatulla Djamilov, Leader of community**<br>Does the Project envisage any safety measures? | ***<u>Sh.Onarkulov</u>***<br>During construction and operational phases, the Project will strictly follow all safety measures required by national and international standards. Besides, the Project will work in close collaboration with State Committee on ecology and environmental protection as well as with other relevant governmental organisations. ACWA Power implemented similar projects in different countries such as Saudi Arabia, UAE, Jordan, Turkey and etc. Therefore, ACWA Power has a rich experience in this field, especially for health and safety measures. |
| **Asatulla Djamilov, Leader of community**<br>Will the Project offer employment opportunities for local experts? | ***<u>Sh.Onarkulov</u>***<br>Yes, of course. The Project will offer employment opportunities both during construction and operational phases. This means, there will be a chance for skilled and unskilled workforce to get a job. We will closely collaborate with local administration in order to provide job opportunities for local residents. Moreover the local khokimiyat is working on preparing the list of local companies and workforce that can be considered during the construction and operation of the plant. |

Furthermore, during the discussion Mr. Onarkulov explained the technical and operational process of ACWA CCGT and how effective it will be for energy production. In addition, he mentioned that the aim of Project is not only the construction of CCGT, but it means close collaboration with local authorities and communities at least for 25 years. Moreover it was stressed out several times that ACWA POWER will be a neighbour not a business entity and local community should take an active part on monitoring the execution of the project.

Mr. Muzaffar Khomidjonov – Deputy Mayor of Bayavut district asked if it possible to provide a banner with the information on project so that it can be presented in the district khokimiyat building as well as on the site so that people can have information on the project. Mr. Onarkulov answered that it is indeed possible and will be done after the Presidential Resolution.

Mr. Onarkulov underlined, that ACWA Power Syrdarya 1500 MW CCGT is the first Independent Power Plant in Uzbekistan.

Overall, local community was interested very much in Project. Participants expressed their positive opinions regarding the Project, especially for employment opportunities.

It is important to highlight, that participants of meeting were glad to hear that the project involves measures for minimising the impact on environment and reducing the pollution.

# APPENDIX R-2– MINUTES MEETING AT SHIRIN TOWN

**MINUTES OF MEETING**

**Public consultation in Shirin town**

To assist 5 Capitals in conducting ESIA baseline surveys for Uzbekistan CCGT project, on May 28, 2020, Juru Energy (Juru) arranged and held public consultations with the people from Directly Affected Communities (DAC) living in Shirin town, Syrdarya region. These communities are closest to the project site with potential ecological influence from the project. Meeting agenda included discussion of issues related to the environmental impact from the project. Summary of the consultations is provided below.

| | |
|---|---|
| **Stakeholder group:** | Directly Affected Communities |
| **Number of participants from local community** | 15 participants, including 7 City council deputies |
| **Representatives of local administration** | Mr. Shukur Tojibayev – Mayor<br>Mr. Javokhir Urolov – Head of investment department |
| **Representatives of the Project** | Mr.Sherzod Onarkulov – "ACWA Power Syrdarya LLC"<br>Miss Umida Rozumbetova – Juru Energy<br>Mr. Aziz Shoraimov – Juru Energy<br>Mr. Abdullo Adkhamov – Juru Energy |
| **Meeting language:** | The Uzbek language |
| **Date:** | **28.05.2020** |
| **Start time:** | **12:10** |
| **End time:** | **14:00** |
| **Method of engagement:** | formal letter-invitation to the local municipality on 27.05.2020 |
| **Venue:** | Conference hall of Shirin town administration |
| **Used materials and visual aids** | Project presentation |

## I. Agenda for meeting

1. General overview of the CCGT construction:
   - Purpose, nature and scale of construction
   - Timeline and schedule of construction

2. Impacts of CCGT
   - Positive (e.g., opportunities for new job placements, cheaper electricity and etc)
   - Negative (noise, air pollution, and etc.)
   - Measures for negative impact mitigation
   - Safeguard measures (that will be taken to reduce impact on environment and communities)

3. Discussions

1. The meeting was moderated by mayor of Shirin town Mr. Shukur Tojibayev, who introduced ACWA Power and Juru teams to the participants. Mayor also briefly described the ongoing works in expanding construction of industrial facilities in Shirin town.

Starting the public consultation on behalf of ACWA Power, Mr. Sherzod Onarkulov congratulated the local community with Eid al-Fitr and expressed condolences over the Sardoba tragedy.

Then he briefed the participants on the goals and main objectives of the project as well as the timeline of the project. He underlined that construction of ACWA CCGT with a total capacity of 1500 MWt was a part of national reforms implemented in the energy sector of Uzbekistan.

Mr. Onarkulov mentioned about that there will be used the latest modern technologies of the world class both during the construction and operational phases. And for this reason, the efficiency coefficient of CCGT will be more than 60%.

He also said that on August, 2020 there will be official opening ceremony for construction works on the allocated land. The whole construction process will start on September/October, 2020.

2. Following the opening speech, Ms. Umida Rozumbetova (Juru) gave the project presentation where she explained the main project features and details, including:

1. Geographical location;
2. Planned technology type;
3. Positive and possible negative impacts of the project;
4. On-going activities at the current stage of the project;
5. Measures for mitigation of negative impact.

3. Q&A session followed the presentation, where local community asked questions related to the socio-economic impact from the project on the district. Affected farmers were mainly concerned about the compensation for the losses of agricultural crops.

| Question | Answer |
|---|---|
| **Mr. Shukur Tojibayev:**<br>You mentioned that new Project is going to be much efficient in comparison with existing Syrdarya TPP for energy production as well for economising fuel. Could you please tell us how much fuel will be economised while the operation phase of the Project? | Sh.Onarkulov:<br>We know that existing Syrdarya TPP consumes 4,5 billion m³ of gas per year. ACWA Power Syrdarya 1500 MW CCGT and the projected plant meant to be built within the framework of IFC project with the capacity of 1500 MW which will have alike technology in total are expected to consume around 3 billion m³ of gas per year. |
| **Mr. Shukur Tojibayev:**<br>What kind of fuel will be used by Project? | Sh.Onarkulov:<br>The Project will use natural gas and filter it out with Gas Treatment Facility. ACWA Power Syrdarya 1500 MW CCGT<br>meets all international standards. |
| **Mr. Shukur Tojibayev:**<br>What is the efficiency of boilers and where are they made? | Sh.Onarkulov:<br>Boilers depend on main gas and steam turbines which are going to be either General Electrics or MHPS. After deciding on main components, we will think on boilers. |
| **Mr. Normatov, deputy**<br>1.Will ACWA Power Syrdarya 1500 MW CCGT have impact on infrastructure of our town? | Sh.Onarkulov:<br>First of all, the local infrastructure is the direct responsibility of local municipality which means that local municipality usually has long term plans and schedule for the |

| | |
|---|---|
| 2. Due to the rising speed of wind in our territory, do you plan to develop wind farms? | development of infrastructure. Therefore, the issues related to the infrastructure development first of all should be addressed to the Shirin town khokimiyat. We are discussing social projects with Ministry of Energy and our goal is to modernise local Collage of Energy which is a part of local infrastructure. We practise CSR in every country we operate.<br>2. ACWA Power is developing renewable energy projects. However, those projects are not located in Syrdarya region. Since those projects demand huge territory of land. Syrdarya region is geologically needed to be studied. |
| **Z. Abduvakhidov: deputy mayor**<br>You mentioned that 75 hectares will be allocated for ACWA Power CCGT. Will ACWA Power build both of planned stations or only one of them? | Sh.Onarkulov:<br>For now, ACWA Power signed with Government of Uzbekistan the agreement for construction of 1500 MW CCGT. The second CCGT Project will be developed by the winner of tender. 75 hectares are allocated for only ACWA Power Syrdarya 1500 MW CCGT |
| **R.Dadabayeva: local resident**<br>I have two sons working in Tashkent city, if it is possible, we could provide you with local employees? | Sh.Onarkulov:<br>We started cooperating with local authorities to help us to find local employees. ACWA Power is going to hire as many local people as possible based on their skills and capabilities. |
| | |

Furthermore, during the discussion Mr.Onarkulov explained the technical and operational process of ACWA CCGT and how effective it will be for energy production. In addition, he mentioned that the aim of Project is not only the construction of CCGT, but it means close collaboration with local authorities and communities at least for 25 years. Moreover, it was stressed out several times that ACWA Power will be a neighbour not a business entity and local community should take an active part on monitoring the execution of the Project.

Mr. Onarkulov underlined, that ACWA Power Syrdarya 1500 MW CCGT is the first Independent Power Plant in Uzbekistan.

Overall, local community was interested very much in Project. Participants expressed their positive opinions regarding the Project, especially for employment opportunities.

It is important to highlight, that participants of meeting were glad to hear that the project involves measures for minimising the impact on environment and reducing the pollution.

# APPENDIX R-3– MINUTES MEETING AT SHIRIN TOWN TARGETING VULNERABLE GROUPS

**MINUTES OF MEETING**

**Public consultation in Shirin town**

To assist 5 Capitals in conducting ESIA process for Uzbekistan CCGT Project, on June 5th, 2020, Juru Energy (Juru) arranged and held public consultations with the people from Directly Affected Communities (DAC) living in Shirin town, Syrdarya region. Meeting agenda included discussion of issues related to the environmental and social impact from the project. Summary of the consultations is provided below.

In order to determine the venue and inform participant on upcoming meeting Juru sent official request to Shirin town administration. To organize public consultation Juru collaborated with department on socio-economic affairs. This department contacted by phone with unemployed people and invited them for a meeting.

Consultation was performed with vulnerable groups; youth, unemployed and low-income families.

Vulnerable groups were identified by following criteria:

- Youth – age criteria. According to the Law "On State youth policy" (dated 1991 and amended in 2016), young generation in age group of 16 up to 31 are considered as youth.
- Unemployed – persons aged from sixteen years, which do not have paid work or occupation (in accordance with Law "About employment of the population" dated 1998, amended in 2019).
- Low income families – households whose income is low, relative to other households of the same size (in accordance with Law "About employment of the population" dated 1998, amended in 2019)

| | |
|---|---|
| **Stakeholder group:** | Vulnerable groups – youth, unemployed people, low income families |
| **Number of participants from local community** | 30 participants |
| **Representatives of local administration** | Mrs. Nasiba Alimova – deputy mayor of Shirin town<br>Mr. Al-Farobiy Khusanov – director of College of Energy |
| **Representatives of the Project** | Mr.Sherzod Onarkulov – "ACWA Power Sirdarya LLC"<br>Ms Umida Rozumbetova – Juru Energy<br>Ms. Dinara Omonova– Juru Energy<br>Mr. Abdullo Adkhamov – Juru Energy |
| **Meeting language:** | The Uzbek language |
| **Date:** | 05.06.2020 |
| **Start time:** | 10:15 |
| **End time:** | 11:40 |
| **Method of engagement:** | formal letter-invitation to the local municipality on 01.06.2020 |
| **Venue:** | Conference hall of School #3, Shirin town |
| **Used materials and visual aids** | Power point presentation "ACWA Power Syrdarya 1500 MW CCGT: Independent Power Plant" |

## I. Agenda for meeting

General overview of the CCGT construction:

- Purpose, nature and scale of construction
- Timeline and schedule of construction

Impacts of CCGT

- Positive (e.g., opportunities for new job placements, stable electricity and etc)
- Negative (noise, air pollution, and etc.)
- Measures for negative impact mitigation
- Safeguard measures (that will be taken to reduce impact on environment and communities)

Discussions

The meeting was moderated by deputy mayor of Shirin town Mrs. Nasiba Alimova, who introduced ACWA Power and Juru Energy teams to the participants. The Deputy mayor emphasized that this meeting was organized in order to provide information to young people, the unemployed, as well as low-income families, about the planned Project.
Starting the public consultation on behalf of ACWA Power, Mr. Sherzod Onarkulov briefed the participants on the goals and main objectives of the Project as well as the timeline of the project. He underlined that construction of ACWA CCGT with a total capacity of 1500 MWt was a part of national reforms implemented in the energy sector of Uzbekistan.

Mr. Onarkulov mentioned that there will be used the H-class GT which is a latest modern technology of the world class both during the construction and operational phases. And for this reason, the efficiency coefficient of CCGT will be more than 60%.

He also said that on August, 2020 the official opening ceremony for construction works on the allocated land is scheduled. The whole construction process will start on September/October, 2020.

Furthermore, Mr. Onarkulov underlined that in a framework of the Project it is planned to modernise and enlarge the curricula of College of Energy in Shirin town, in order to educate and prepare specialists who can work at the newly constructed CCGT plants throughout the Republic of Uzbekistan.

Mr. Onarkulov underlined, that ACWA Power Syrdarya 1500 MW CCGT is the first Independent Power Plant in Uzbekistan.

Following the opening speech, Ms. Umida Rozumbetova (Juru) gave the project presentation where she explained the main project features and details, including:

Geographical location;
Main and associated facilities of the project
Planned technology type;
Positive and possible negative impacts of the project;
On-going activities at the current stage of the project;
Measures for mitigation of negative impact.

GRM: contact details for sending feedbacks, suggestions, inquires and compliance

Q&A session followed the presentation, where local community asked questions related to the socio-economic impact from the project on the district. Young and unemployed people were mainly concerned about the employment opportunities and specific requirements for job applications.

| Question | Answer |
|---|---|
| B.Sultanov - teacher in College of Energy of Shirin town<br>1) What is the total size of land allocated for Project construction?<br>2) Could you tell about the efficiency of the Project? | Sh.Onarkulov:<br>1) There are 75 ha of land plot is allocated for the construction of CCGT as well as 10 ha for the new switchgear. The land allocated for the Project belongs to the T.Latipov WCA and Shirin FVAF. Previously these lands were used by farmers for cultivation of agricultural crops.<br>2) The efficiency of planned CCGT is expected to be more than 60% due to the H-class GT technology and equipment that will be used for the construction of Project. |
| B.Sultanov - teacher in College of Energy of Shirin town<br><br>You said that land was previously used for agricultural purposes. What will happen with farmers who are going to lose their lands? | Urolov Javohir – deputy head of investment department of Shirin town khokimiyat:<br>First of all, all farmers got written notification that their lands are going to be returned to the reserve fund of local administrations. According to the Land Code of the Republic of Uzbekistan all the lands belong to the State, therefore the government has the right to return the land if necessary. Besides, farmers will be able to collect the grain harvest for 2020 within June, and all of them will get compensation if they are eligible in accordance with the current legislation of the Republic of Uzbekistan. The issues of compensation will be closely worked with the developer. |
| J.Urolov - head of investment department in Shirin town administration<br>The construction and operation of each industrial facility involves an investment in the region. Do you plan to establish other industrial facilities that will provide technical support to the Project, i.e., plant for production of technical details to the CCGT and etc.? | Sh.Onarkulov:<br>As I mentioned before, we aim to construct the CCGT by using the latest technologies, manufactured in USA and Japan. Nowadays, these two countries are the ones that produce highly efficient and environmentally friendly technologies. Unfortunately, there are no local manufacturers or service providers which can provide technical support for CCGT. It worth noting that there is no such manufacturers or service providers not |

| | |
|---|---|
| | only in Uzbekistan but in whole Central Asian region as well. Moreover, during the first years of CCGT operation it will be necessary to involve some foreign specialist, because such modern technologies will be applied first time in Uzbekistan. That is why, we are highly motivated to enlarge the curricula of the College of Energy in order to prepare highly qualified specialist among the youth of Shirin town. |
| S.Mukhtdinov - leader of Youth union branch in Shirin town<br>How many work places are planned to open during the construction phase and what are the main requirement for the jobs that will be offered while operation phase? | Sh.Onarkulov:<br>The exact number of work –places that will be created is not fixed yet but for the same scale projects around maximum of 3000 workers will be needed during the peak load of the construction phase.<br>As for the operation phase we will need highly qualified specialist with good knowledge of English language. A specialist with good knowledge in the energy sector will not be able to communicate and work without knowledge of English. and conversely, a person who speaks English will not be able to understand the technical process. Therefore, language skills and knowledge in the field of energy are going to be the main criteria during the selection process. |

Furthermore, during the discussion the young people were interested in new programs, that are going to be added to the main curricula of College of Energy and admission processes. While answering to the questions of participants Mr. Onarkulov mentioned that the aim of Project is not only the construction of CCGT, but it means close collaboration with local authorities and communities at least for 25 years. He also mentioned that ACWA POWER's aim is to become a part of the local community. Moreover, it was stressed out several times that ACWA Power is planning to become a so-called neighbour and part of the local community. Therefore, the local community should take an active part on monitoring the execution of the Project.

**Photos from meeting**


БИЛАН МУЛОКОТ УЛУГВОР
МАКСАДЛАРИМИЗГА
УВЧИ ОЙДИН ЙЎЛДИР

**Official request**

# Juru Energy

Suite 1, First Floor, 41 Chalton Street, London, NW1 1JD, UK
+44 207 859 4028
+44 207 691 9406
info@juruenergy.com

**№ UZB-ACWA-CCGT-20/20/18**

**1.06.2020**

**Хакимияту города Ширин,**
**Сырдарьинской области.**

Компания ACWA Power при помощи ООО «ACWA Power Sirdarya» (Ташкент) заключила 25-летнее соглашение о покупке электроэнергии с АО «Национальные электрические сети Узбекистана» на разработку газовой турбины с комбинированным циклом мощностью 1500 МВт (ПГУ). Проект будет расположен примерно в 0,3 км к северо-востоку от города Ширин, напротив существующей нефтегазовой теплоэлектростанции мощностью 3000 МВт (Сырдарьинская ТЭС).

Исходя из требований, установленных действующим законодательством, ACWA Power должна сдать в Государственный комитет Республики Узбекистан по экологии и охране окружающей среды (регулирующий орган) отчет об оценке воздействии на окружающую среду (ОВОС), и получить экологическую лицензию до начала проекта. Вследствие этого, в рамках ОВОС корпоративные экологические и социальные консультанты ACWA Power «5 Capitals Environmental & Management Consulting» (Дубай, ОАЭ) назначили Juru Energy (Ташкент, Узбекистан) для проведения необходимых экологических и социальных исследований, а также сбор данных, включая представление ОВОС регулирующему органу.

В рамках проекта ОВОС Juru Energy планирует проведение консультаций с местными жителями. В связи с этим, просим Вас оказать содействие в организации встречи с представителями молодежи и временно безработных жителей, а также с пожилыми людьми и малообеспеченными семьями 5 мая 2020 года.

Учитывая условия карантинных мер, действующих по всей территории Республики Узбекистан, и избежать большого количества скопления людей, просим Вас организовать отдельно встречу с представителями молодежи и временно безработных людей и отдельно встречу с пожилыми людьми и малообеспеченными семьями.

**Хушнуджон Рахимберганов**

Hushnud R. Rahimberganov

**Директор**

LONDON, UK
JURU ENERGY
LIMITED
COMPANY No

Исполнитель: У.Розуибетова

Тел.: +99871 202 04 40

Моб.: +99890 348 75 23

**Translation**

**№ UZB-ACWA-CCGT-20/20/17**

**20.05.2020**

**To Shirin town administration**
**of Syrdarya region**

ACWA Power through "ACWA Power Sirdarya LLC (Tashkent)" has entered into a 25-year Power Purchase Agreement with JSC National Electric Networks of Uzbekistan for the development of a 1500MW gas fired Combined Cycle Gas Turbine (CCGT). The project will be located approximately 0.3km northeast of the city of Shirin opposite the existing 3000MW oil/gas Thermal Power Plant (Sirdarya TPP).

According to the Uzbekistan law under the State Committee of the Republic of Uzbekistan for Ecology and Environmental Protection (regulator), ACWA Power is required to obtain an Environmental license before the commencement of the project. Therefore, as part of the Environmental Impact Assessment (EIA), ACWA Power's corporate Environmental & Social Consultants '5 Capitals Environmental & Management Consulting' (Dubai, UAE), have appointed Juru Energy (Tashkent, Uzbekistan) to conduct certain environmental & social surveys and data collection, including submission of the EIA to the regulator.

As part of the ESIA, Juru Energy is assisting 5 Capitals in consulting with affected people to share the aviable information about the Project as well as receive their feedbacks or comments.

Considering the above, we kindly seek your support in arranging consultations with youth and low-income families on 5th of June, 2020.

Thank you very much for your assistance and we look forward to your response.

Yours Sincerely,

**Director**
**Signed/ stamped**

For further information please contact: Umida Rozumbetova

Phone.: +99871 202 04 40
Mob.: +99890 348 75 23

## Attendance list

05.06.2020 йил куни Ширин шахрида "Juru Energy" консалтинг компанияси вакиллари билан учрашувга ташриф буюрган фуқаролар РЎЙХАТИ

| № | Ф.И.Ш | Яшаш манзили (МФЙ номи) | Туғилган йили | Норасмий машғулоти | Фарзандлари сони | Имзо |
|---|---|---|---|---|---|---|
| 1 | Рустамова Рушана | М.Улугбек | 1991 йил | Ишсиз | 1 | |
| 2 | Қорешева Рўзигул | М.Улугбек | 1995 йил | Ишсиз | 0 | |
| 3 | Мустафоқулова Учкун | М.Улугбек | 1991 йил | Ишсиз | 2 | |
| 4 | Азизбекова Феруза | М.Улугбек | 1995 йил | Ишсиз | 1 | |
| 5 | Рустамов Аҳмад | М.Улугбек | 2020 | Ишсиз | 0 | |
| 6 | Қўчқоров Сирожиддин | М.Улугбек | 1991 йил | Ишсиз | 1 | |
| 7 | Абдусатторова Замира | М.Улугбек | 1998 йил | Ишсиз | 0 | |
| 8 | Каххорова Голиб | А.Темур МФЙ | 1993 йил | Ишсиз | 0 | |
| 9 | Исоев Нодирбек Баходир ўғли | А.Темур МФЙ | 06.12.1998 | Ишсиз | 0 | |
| 10 | Акбарова Гулсара Бахром қизи | А.Темур МФЙ | 20.07.1990 | Ишсиз | 2 | |
| 11 | Рўзиев Улуғбек Умид ўғли | А.Темур МФЙ | 28.10.1997 | Ишсиз | 0 | |
| 12 | Хусайнова Шахбоз | Дўстлик МФЙ | 01.10.1996 | Ишсиз | 0 | |
| 13 | Абдумўминова Муяссам | Дўстлик МФЙ | 11.07.1987 | Ишсиз | 0 | |
| 14 | Абдуганиева Мадина Усон қизи | Дўстлик МФЙ | 21.08.1999 | Ишсиз | 0 | |
| 15 | Тошпулатова Гулмира Фатхулла қизи | Дўстлик МФЙ | 1995 | Ишсиз | 1 | |
| 16 | Валибчая Мария Андреевна | Дўстлик МФЙ | 18.08.1993 | Ишсиз | 2 | |
| 17 | Бахромова Нилуфар | Дўстлик МФЙ | 02.02.1999 | Ишсиз | 0 | |
| 18 | Эгамова Умида Абдухолик қизи | Дўстлик МФЙ | 23.12.1992 | Ишсиз | 1 | |
| 19 | Эгамова Зелола Абдухалик қизи | Дўстлик МФЙ | 07.06.1996 | Ишсиз | 0 | |
| 20 | Алимжонова Нодира Акмал қизи | Дўстлик МФЙ | 09.03.2000 | Ишсиз | 0 | |
| 21 | Алибоева Азиза | Нуробод | 18.06.1992 | Ишсиз | 0 | |
| 22 | Мирзаева Дилшод | Фарход | 18.09.1991 | Ишсиз | 0 | |
| 23 | Мустафоқулова Учкун | Фарход | 29.06.1991 | Ишсиз | 1 | |
| 24 | Умарова Мохинур | Фарход | 17.12.1996 | Ишсиз | 1 | |
| 25 | Орлов Юрий | Фарход | 27.08.1996 | Ишсиз | 0 | |
| 26 | Нигматжонова Гулнора | Нуробод | 13.06.1990 | Ишсиз | 3 | |
| 27 | Якбова Азиза Маъруф қизи | Нуробод | 21.08.1995 | Ишсиз | 1 | |
| 28 | Азизбекзода Мавлуна | Нуробод | 29.09.1990 | Ишсиз | 2 | |
| 29 | Нормаматова Назокат | М.Улугбек | 31.05.1991 | Ишсиз | 2 | |
| 30 | Шерматова Шоира | Фарход | 09.04.1990 | Ишсиз | 2 | |
| 31 | Шакирова Дилара | Фарход | 01.07.1995 | Ишсиз | 3 | |
| 32 | Ким Виталий | Фарход | 04.02.1992 | Ишсиз | 0 | |
| 33 | Климова Екатерина Владимировна | Нуробод | 10.04.1990 | Ишсиз | 0 | |
| 34 | Абдуллаева Фазилат | М.Улугбек | 1997 | Ишсиз | 0 | |
| 35 | Шарипова Рухсатой | М.Улугбек | 06.10.1994 | Ишсиз | 0 | |
| 36 | Ашуралиева Насиба | Нуробод | 22.01.1992 | Ишсиз | 1 | |
| 37 | Ан Кристина | М.Улугбек | 17.12.1993 | Ишсиз | 1 | |
| 38 | Мамасолиева Севара | М.Улугбек | 20.06.1990 | Ишсиз | 2 | |

**Translation**

Attendance list

| № | Full name | Name of living community | Date of birth | Occupation | Number of children | Signature |
|---|---|---|---|---|---|---|
| 1 | Rustamova Rushana | M.Ulugbek | 1991 | unemployed | 1 | |
| 2 | Qoryog'diyeva Rozigul | M.Ulugbek | 1995 | unemployed | - | |
| 3 | Mustofoqulov Uchkun | M.Ulugbek | 1991 | unemployed | 2 | signed |
| 4 | Azizbekova Feruza | M.Ulugbek | 1995 | unemployed | 1 | signed |
| 5 | Rustamov Ahmad | M.Ulugbek | 2000 | unemployed | 0 | signed |
| 6 | Qoqonov Sirojitdin | M.Ulugbek | 1991 | unemployed | 1 | signed |
| 7 | Abdugapparova Zamira | M.Ulugbek | 1998 | unemployed | 0 | signed |
| 8 | Qaxxorov Golib | A.Temur | 1996 | unemployed | 0 | signed |
| 9 | Isaev Nodirbek Bakhodir ugli | A.Temur | 08.12.1996 | unemployed | | signed |
| 10 | Akbarova Gulkhayo Bakhrom kizi | A.Temur | 20.07.1990 | unemployed | 2 | |
| 11 | Ruziev Ulugbek Umid ugli | A.Temur | 28.10.1997 | unemployed | 0 | signed |
| 12 | Xusanov Shakhboz | Dustlik | 01.10.1996 | unemployed | 0 | signed |
| 13 | Abdunomonova Muazzam | Dustlik | 11.07.1997 | unemployed | 0 | signed |
| 14 | Abduganieva Madina Usan kizi | Dustlik | 21.06.1995 | unemployed | 0 | signed |
| 15 | Toshpulatova Gulhida Fathulla kizi | Dustlik | 1995 | unemployed | 1 | |
| 16 | Valebnaya Maria Andreevna | Dustlik | 18.08.1993 | unemployed | 2 | signed |
| 17 | Bojigitova Nilufar | Dustlik | 02.02.1999 | unemployed | 0 | |
| 18 | Egamova Umida Abduholiq kizi | Dustlik | 23.12.1992 | unemployed | 1 | signed |
| 19 | Egamova Zilola Abduholiq kizi | Dustlik | 07.06.1996 | unemployed | 1 | signed |
| 20 | Alijonova Nodira Akmal kizi | Dustlik | 09.02.2000 | unemployed | 0 | |
| 21 | Aliboyeva Aziza | Nurabod | 18.08.1992 | unemployed | 0 | signed |
| 22 | Mirzayev Dilshod | Farkhod | 18.02.1991 | unemployed | 0 | signed |
| 23 | Mustafakulov Uchkun | Farkhod | 29.08.1991 | unemployed | 1 | signed |
| 24 | Umarova Mokhinur | Farkhod | 17.12.1995 | unemployed | 1 | signed |

| | | | | | | |
|---|---|---|---|---|---|---|
| 25 | Orlov Yuriy | Farkhod | 27.06.1996 | unemployed | 0 | signed |
| 26 | Nigmatzyanova Gulnora | Nurabod | 13.05.1990 | unemployed | 3 | signed |
| 27 | Yakhyoyeva Aziza Maruf kizi | Nurabod | 21.08.1995 | unemployed | 1 | signed |
| 28 | Azizbekzoda Mavzuna | Nurabod | 29.09.1990 | unemployed | 2 | signed |
| 29 | Normatova Nazokat | M.Ulugbek | 31.05.1991 | unemployed | 2 | signed |
| 30 | Shermatova Shoira | Farkhod | 09.04.1990 | unemployed | 2 | signed |
| 31 | Shokirova Dinara | Farkhod | 01.07.1995 | unemployed | 3 | signed |
| 32 | Kim Vitaliy | Farkhod | 04.02.1992 | unemployed | 0 | signed |
| 33 | Klimova Ekaterina Vladimirovna | Nurabod | 10.04.1990 | unemployed | 0 | signed |
| 34 | Abdullayev Fayzillo | M.Ulugbek | 1997 | unemployed | 0 | signed |
| 35 | Sharipova Ruhsatoy | M.Ulugbek | 08.10.1994 | unemployed | 0 | |
| 36 | Ashuralieva Nasiba | Nurabod | 22.01.1992 | unemployed | 1 | signed |
| 37 | An kristina | M.Ulugbek | 17.12.1993 | unemployed | 1 | |
| 38 | Movlanova Sevara | M.Ulugbek | 20.06.1990 | unemployed | 2 | signed |

# APPENDIX R-4– MINUTES MEETING FROM ZOOM CONFERENCE CALL WITH WOMEN IN BAYAVUT DISTRICT

**MINUTES OF MEETING**

**Public consultation in Bayavut district – video conference via Zoom**

To assist 5 Capitals in conducting ESIA baseline surveys for Uzbekistan CCGT project, on July, 2nd, 2020, Juru Energy (Juru) arranged and held public consultations with the people from Directly Affected Communities (DAC), i.e., with women living in Bayavut district, Syrdarya region. Meeting agenda included discussion of issues related to the environmental and social impact from the project. Summary of the consultations is provided below.

Considering the restrictions in Republic of Uzbekistan due to the COVID-19 and following the EBRD briefing note on Stakeholders engagement (PR 10) suggestions this meeting was arranged via Zoom video conference. In order to determine the venue and inform participant on upcoming meeting Juru consulted with the administration of Bayavut district and district branch of Women committee in order to ask assistance for arranging venue and inform participants.

| | |
|---|---|
| **Stakeholder group:** | Directly Affected Communities – women |
| **Number of participants from local community** | 8 women from Sarmich community and Julangar communities of Bayavut district |
| **Representatives of local administration** | Mr. Rustam Kurbanov – Head of investments department |
| **Representatives of the Project** | Mr. Sherzod Onarkulov – ACWA Power Sirdarya LLC (Tashkent)<br>Ms. Umida Rozumbetova – Juru |
| **Meeting language:** | Uzbek |
| **Date:** | 02.07.2020 |
| **Start time:** | 10:45 |
| **End time:** | 11:50 |
| **Method of engagement:** | Request via phone call to the Bayavut district administration<br>Phone consultations with district branch of Women Committee on the organization of video conference via Zoom |
| **Venue:** | Conference hall of school 36 |
| **Used materials and visual aids** | Power point presentation “ACWA Power Syrdarya 1500 MW CCGT: Independent Power Plant” |

## I. Agenda for meeting

1. General overview of the CCGT construction:
   - Purpose, nature and scale of construction
   - Timeline and schedule of construction

2. Impacts of CCGT
   - Positive (e.g., opportunities for new job placements, cheaper electricity and etc)
   - Negative (noise, air pollution, and etc.)

- Measures for negative impact mitigation
- Safeguard measures (that will be taken to reduce impact on environment and communities)

3. Discussions
4. GRM: contact details for sending feedbacks, suggestions, inquires and compliance

1. Starting the public consultation on behalf of ACWA Power, Mr. Sherzod Onarkulov provided general background and description of the Project. He informed meeting participants about signed agreements between ACWA Power and Ministry of Energy on 5th of March as well as with Ministry of Investments and Foreign Trade on 6th of March for construction and operation of new ACWA Power Sirdarya 1500 MW CCGT in Syrdarya region. The total investments for this Project are 1,2 billons USD. It also was underlined that there will be used H-class GT modern technologies. Mr. Onarkulov also mentioned that Project assumes zero discharge of technical water to canal, and reduced air emissions.

Then he briefed the participants on the goals and main objectives of the project as well as the timeline of the project. He underlined that construction of ACWA Power Sirdarya 1500 MW CCGT was a part of national reforms implemented in the energy sector of Uzbekistan.

Furthermore, Mr. Onarkulov mentioned that ACWA Power has started the process for reconstruction the building of College of Energy in Shirin town. Besides, in order to educate and prepare specialists who can work at the newly constructed CCGT plants throughout the Republic of Uzbekistan ACWA Power prosed 4 new specializations to the existing curricula of College of Energy, that is currently under the revision of Ministry of Higher and secondary specialized education.

Following the opening speech, Ms. Umida Rozumbetova (Juru) gave the project presentation where she explained the main project features and details, including:

Geographical location;

Planned technology type;

Positive and possible negative impacts of the project;

On-going activities at the current stage of the project;

Measures for mitigation of negative impact.

GRM: contact details for sending feedbacks, suggestions, inquires and compliance

2. Q&A session followed the presentation, where participants of the meeting asked questions related to the socio-economic impact, i.e., about employment opportunities.

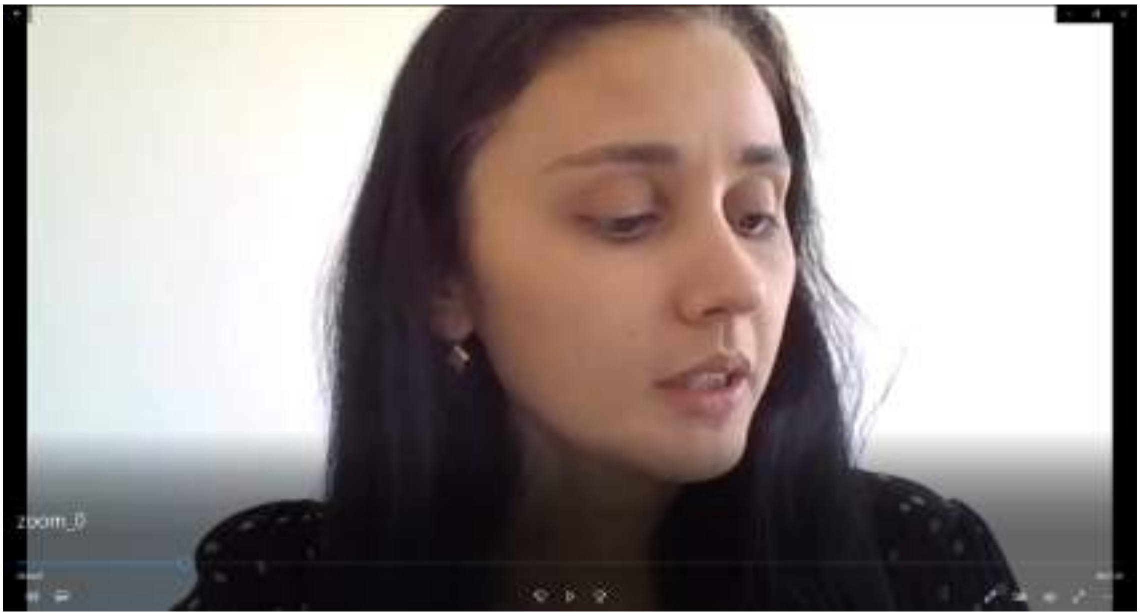
| Question | Answer |
|---|---|
| ***Isroilova Odina, unemployed:*** | ***Sh.Onarkulov*** |

| | |
|---|---|
| How Project may assist for unemployed women in Bayavut district? | In terms of employment, Project will offer equal job opportunities for women and men, based on their skills and qualifications, during the construction as well as operation phases of the Project. |
| **Khasanova Laylo, unemployed**<br>You mention about reconstruction work of College of Energy, as well as expansion of the College's curricula. My question is whether the graduates of this College will be supplied with job places after its graduation? | ***Sh.Onarkulov***<br>Thanks for a question. Of course, we aim to educate female and help them to become a specialist in the field of energy. Our proposed program for four new specialisations in College of Energy will be conducted in English. We expect that female graduates of this program will be able to work in ACWA Power Sirdarya 1500 MW CCGT as well as in other similar future Projects that may start all around the Uzbekistan. Active involvement of women to the energy sector is one of main aims of the Project as well as part of reforms for provision of equal rights and opportunities for women of the Government of Uzbekistan. |

It is important to highlight, that participants of meeting were glad to hear that the project involves measures for mitigating and managing environmental and social impacts.

**Annex 1**

**Photos from the meeting (extracts from Zoom video conference)**



Translation

1. Kurbanova Gulnora (employee of district branch of Women's committee) – - signed
2. Tashmatova Sabriniso (employee of district branch of Women's committee) –- signed
3. Ikromova Odina (teacher)– local resident
4. Abdukodirova Dilorom (teacher) – local resident
5. Xasanova Laylo (teacher) – local resident
6. Alinulova Gulhayo (unemployed) – signed
7. Rahimkulova Muazzam (unemployed)- local resident
8. Ikromova Yulduz (unemployed) – signed

Annex 2

Attendance list

**"ACWA Power" компанияси ҳамда "Juru Energy" компанияси томонидан ўтказилган видео кўргазмада иштирок этган хотин-қизлар рўйхати**

| № | Ф.И.Ш | Имзоси |
|---|---|---|
| 1 | Курбонова Гулнора | |
| 2 | Тошматова [illegible] | |
| 3 | Исмоилова [illegible] | |
| 4 | Абдурашидова Дилором | |
| 5 | Хасанова Лайло | |
| 6 | Аминова Гулхаё | |
| 7 | Рахимкулова Муаззам | |
| 8 | Исмоилова Юлдуз | |
| 9 | | |
| 10 | | |

# Appendix R-5– Letter from Agency of Sanitary & Epidemiology (Ministry of Health)

O`ZBEKISTON RESPUBLIKASI
SOG`LIQNI SAQLASH VAZIRLIGI
HUZURIDAGI SANITARIYA-
EPIDEMIOLOGIK OSOYISHTALIK
AGENTLIGI

100097. Toshkent, Bunyodkorko`chasi.46-uy.
Telefon: 71 276-59-28. Fax:71 276-59-28
e-mail: kancelyariyaresdsenm@minzdrav.uz

AGENCY OF SANITARY AND
EPIDEMIOLOGICAL WELL-BEING
UNDER THE MINISTRY OF
HEALTH OF THE REPUBLIC OF
UZBEKISTAN

46, Bunyodkor str., Tashkent, 100097
Phone: 71 276-59-28. Fax: 71 276-59-28
e-mail: kancelyariyaresdsenm@minzdrav.uz

26.06.20 № 04-8/71034

22.06.2020 № UZB-ACWA-CCGT-20/20/37ga

**JURU ENERGY LIMITED**
**ДИРЕКТОРУ РАХИМБЕРГАНОВУ Х.**

Агентство санитарно-эпидемиологического благополучия при Министерстве здравоохранения рассмотрело Ваше обращение и при этом установило следующее:

1. корпоративные экологические и социальные консультанты ACWA POWER “5 Capitals Environmental&Management Consulting” в рамках ОВОС назначили JURU ENERGY для проведения необходимых экологических и социальных исследований, а также сбор данных, необходимых для подготовки документа по процедуре ОВОС;
2. министерство здравоохранения Республики Узбекистан просят оказать содействие в представлении информации, которая может быть необходима для включения в процесс ОВОС.

Следует отметить, что любые экологические и социальные исследования в рамках ОВОС проводятся в соответствии со стандартной программой. Результаты подобных исследований послужат в последующем основой как для начала финансирования проекта, так и для разработки проектов ЗВОС.

Агентство санитарно-эпидемиологического благополучия при МЗ РУз выражает готовность сотрудничать с JURU ENERGY в рамках ОВОС после оформления соответствующего документа (Договора/Соглашения) на проведение отдельных компонентов экологических и социальных исследований при наличии конкретного технического задания для сектора здравоохранения и условиях оплаты за фактически выполненный объем работы.

Первый заместитель директора Б.Ж. Курбанов

Исп. Ли Т.Б.
Тел. 276 75 92

Unofficial translation by Juru Energy

**Agency of sanitary and epidemiological well-being**

**under the Ministry of Health of the republic of Uzbekistan**

**26.06.20 №04-8/4034**

**22.06.2020 № UZB-ACWA-CCGT-20/20/37**

**To: Juru Energy Limited**

**Director Rakhimberganov Kh.**

The Agency for Sanitary and Epidemiological Well-Being under the Ministry of Health reviewed your letter and would like to inform on followings:

1. ACWA Power's corporate Environmental & Social Consultants '5 Capitals Environmental & Management Consulting', have appointed Juru Energy to conduct certain environmental & social surveys and data collection;
2. The Ministry of Health of the Republic of Uzbekistan has forwarded the letter of Juru Energy to Agency and asked to assist in providing relevant information for national EIA.

It should be noted that any environmental and social studies in the framework of the EIA should be carried out in accordance with the standard program. The results of such studies will serve as a basis for both the project financing and the development of national EIA.

The Agency for Sanitary and Epidemiological Welfare under the Ministry of Health of the Republic of Uzbekistan is ready to cooperate with JURU ENERGY for preparing and submitting national EIA by signing Agreement and determining scope of work for environmental and social aspects as well as agreeing on payment for these works.

**Signed by**

**First deputy director:**

**B.J.Kurbanov**

# APPENDIX R-6– PROJECT BROCHURES & LEAFLETS

## Kutilayotgan ijobiy ta’sirlar

- Elektr energiyasini ishlab chiqarishni kengaytirish;
- Yangi ish o’rinlari barpo etilishi(loyihaning qurilishi va ishlashi jarayonida);
- Shirin shahridagi Energetika kollejida texnik tayyorgarlikni oshirish bo'yicha o'quv dasturlarining tashkil etilishi;
- Xalqaro, milliy va mintaqaviy ahamiyatga ega bo’lgan tabiiy hududlarga ta’sir ko’rsatmaslik;
- O’simlik va hayvonot dunyosiga, ajratilgan qishloq xo’jaligi maqsadlarida foydalaniladigan yerlarga maksimal darajada salbiy ta’sir ko’rsatmaslik;
- Yuqori xavfsizlik va nazorat choralari tufayli tuproq va yer osti suvlarining ifloslanishini oldini olish;
- Havoga chiqariladigan gaz emissiyalarini nazorat qilish maqsadida eng yangi va xalqaro standartlarga jovob beradigan texnologiyalar qo’llanilishi;
- Xavfli materiallar, chiqindilar va va shu kabi moddalarni saqlashni qat’iy nazorat qilinishi;
- Kanalga tozalangan kanalizatsiva va yomg’ir suvlaridan tashqari texnik suv tashlanmasligini nazorat qilinishi;
- Manfaatdor tomonni jalb qilish rejasi va shikoyat qilish mexanizmi orqali jamoalar bilan doimiy muloqotni yo’lga qo’yilishi.

## Ehtimoli bo’lgan salbiy ta’sirlar va yechimlar

### Qurilish jarayonida

- Odatda qurilish jarayonida kelib chiqadigan muammolarga (masalan, chang, shovqin, yorug'lik, transport, bug’ hosil bo’lishi va h.k) milliy va ilg’or xalqaro amaliyotga muvofiq yechim topiladi;
- Ishchilar soni va oqimi kopayishi Madaniy va ijtimoiy ahamiyatga ega bo’lgan obyektlarga ta’sirini kamaytirish;
- Elektrostantsiyani qurish uchun yer olish jarayonida iqtisodiy ko’chish masalalari;
- Aholi salomatligi va xavfsizligi uchun potensial xavf-xatar, uni baholash va rejalashtirish orqali xavfsizlikni hisobga olgan holda boshqarilishi.

### Loyiha faoliyat ko’rsatishi davomida

- Loyihaning xavoni NOx,CO ni bilan ifloslanishi, Evropa Ittifoqi va O'zbekiston ifloslanish standartlarga mos ravishda monitoring qilinishi;
- Tozalangan vodoprvod suvini nazorat ostida Janubiy Mirzacho’l kanaliga qaytarilishini monitoring qilish;
- Shovqin (uzluksiz gumburlash) o'zbek standartlariga va JSST standartlariga rioya qilish orqali boshqarish;
- Favqulotda vaziyatlar mahalliy hokimiyat organlari va tegishli manfaatdor tomonlar bilan kelishilgan holda boshqariladi. Bundan tashqari, sanitariya himoya zonasi, ifloslanishi manbai va turar-joy maydoni o'rtasidagi maydon mahalliy aholi uchun eng yaqin >500m masofada bug’-gaz qurilmasi atrofida tashkil etiladi.

**Shikoyatlarni ko'rib chiqish mexanizmi.** Loyiha va savollar haqida qo'shimcha ma'lumot olish uchun telefon yoki elektron pochta orqali biz bilan bog'laning. Bu mutlaqo bepul va shaffof.

# Project Description

The Government of the Republic of Uzbekistan, in order to modernize the power supply system and increase production of electricity, plans to build new combined cycle gas turbine (CCGT) Thermal Power Plant and an switchgear substation 500/220 kV in cooperation with ACWA Power.

Realisation of this Project is a part of wide modernisation in the energy sector of Uzbekistan that will allow to increase energy production as well reduce the fuel consumption. In addition, Project will beneficial for environment and local society.

# ACWA Power Syrdarya 1500 MW CCGT Independent Plant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Sherzod Onarkulov
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For the further information, feedback and inquiries please contact us (+998) 71 202 04 40

## Expected positive impacts

- Increased production of electricity;
- Employment opportunities (during construction and operation phases);
- Training programs to enhance technical training in the College of Energy in Shirin city
- No direct impact on protected areas of international, national and regional significance;
- Minimum effect to flora and fauna as existing land is managed farmland and not natural habitats;
- Best practice control measures to prevent pollution to soil, ground and surface water;
- Decreased air emissions per unit of energy generated - due to the wider modernisation strategy;
- Strict control of  storage for hazardous materials, waste, wastewater;
- Zero liquid discharge to the canal, except treated sanitary and rainfall water.
- Ongoing dialogue with communities through a Stakeholder Engagement Plan and provision of a grievance mechanism.

## Possible negative impacts and solutions

### Temporary Construction

- Typical construction phase impacts (i.e. dust, noise, lighting, traffic, visual amenity, spills etc) managed in accordance to Uzbek regulation and international good practice with monitoring.
- Worker influx including workers from other regions and countries. Managed to minimise cultural and social disruptions.
- Economic displacement due to land take but with planned livelihood restoration.
- Potential health and safety risks for the community managed through risk assessment and planning with site-based security.

### Operation

- Project air emissions of NOx, CO complying with EU and Uzbekistan pollution standards with continuous monitoring.
- Discharges of treated sanitary water to YG canal managed, with monitoring.
- Operational noise (continuous humming) managed through compliance with Uzbek standards and WHO standarts.
- Potential emergency situations to be managed through suitable equipment and emergency response planning in coordination with local authorities and relevant stakeholders. Furthermore, Sanitary Protection Zone, an area between the source of pollution and residential area, will be established around the CCGT with a >500m distance to nearest to communities.

**Grievance mechanism.** For the further information regarding the Project, feedbacks as well as for inquiries please contact us via phone or email. It is absolutely free of charge, transparent and without any retribution.

# UMUMIY QUVVATI 1500 MVT BO'LGAN ACWA BUG' GAZ QURILMASI MUSTAQIL ELEKTR STANTSIYASI

**Ushbu bug' gaz loyihasini amalga oshirish O'zbekistonda energetika sohasini isloh qilish tadbirlaridan biri xisoblanadi. Buning natijasida energiya ishlab chiqarilishi kopayadi va yoqilg'ini tejash imkoni paydo bo'ladi. Bundan tashqari, loyiha atrof-muhit va mahalliy aholiga ijobiy ta'sir qiladi.**


**Qo'shimcha ma'lumot va savollar uchun iltimos, biz bilan bog'laning**
**(+998) 71 202 04 40**

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UMUMIY MA'LUMOT

- Mazkur loyiha O'zbekistonda elektr energiyasini ishlab chiqarish tizimini keng modernizatsiyalashning bir qismidir;
- Umumiy maydoni: 75 gektar (podstansiya bilan);
- Suv iste'molini kamaytirish va kanalga sanoat chiqindi suvlarini nolga tushirish uchun sovutish moslamalari;
- Quvvat bloklariga 2 ta gaz turbinasi, 2 ta issiqlikni tiklash bug' generatorlari va 1 ta bug' turbinasi kiradi;
- Elektrostantsiyaning samaradorligi >60 % bo'ladi;
- Yoqilg'i: faqat tabiiy gaz.

EKOLOGIK TA'SIR

- Tuproq, yer osti va yer usti suvlarining ifloslanishini oldini olish bo'yicha eng zamonaviy amaliy nazorat tadbirlari;
- O'zbekiston uchun hosil bo'lgan energiya chiqindilarining kamayib ketishiga hissa qo'shish;
- Mavjud yer xo'jaliklarining o'simlik va hayvonot dunyosiga minimal ta'sir ko'rsatadi;
- Xalqaro, milliy va mintaqaviy ahamiyatga ega muhofaza qilinadigan hududlarga ta'sir qilinmaydi;
- Sanitariya va yog'ingarchilik suvidan tashqari kanalga ortiqcha ifloslangan suv quyilmaydi.

IJTIMOIY TA'SIR

- Mahalliy aholi uchun bandlik imkoniyatlari (qurilish va ishlash bosqichlarida);
- Madaniy va arxeologik ahamiyatga ega obyektlarga ta'siri yo'q;
- Elektr energiyasi ishlab chiqarishni ko'paytiradi.

# ACWA Power Syrdarya 1500 MW CCGT Independent Plant

**Broad modernization in energy sector of Uzbekistan include putting this CCGT Project into realization. As an aftermath energy production will increase as well as reduction of fuel consumption. Moreover, local society and enviroment will get immense benefits from this Project.**


**For the further information, feedback and inquiries please contact us**
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GENERAL INFORMATION

- This Project is a part of broad modernization of power generation system of Uzbekistan
- Total area: 75 hectares (including substation)
- Cooling by cooling tower units to reduce water consumption and zero discharge of industrial wastewater to canal
- Power blocks will include 2 gas turbines, 2 heat recovery steam generators, and 1 steam turbine
- The efficiency of the plant will be >60%
- Fuel: natural gas only

ENVIROMENTAL IMPACTS

- Best practice control measures to prevent pollution to soil, ground and surface water
- Contribution to decreased air emissions per unit of energy generated for Uzbekistan
- Minimum effect to flora and fauna as existing land is managed farmland
- Zero impact on protected areas of international, national and regional significance
- Zero liquid discharge to the canal, except treated sanitary and rainfall water

SOCIAL IMPACTS

- Employment opportunities for local people (during construction and operation phases)
- No impact on objects of cultural and archeological importance
- Increased production of electricity

capitals ACWA POWER Juru Energy

# Loyiha Haqida Ma’lumot

O’zbekiston Respublikasi hukumati elektr ta'minoti tizimini modernizatsiya qilish va elektr energiyasini ishlab chiqarishni ko’paytirish maqsadida ACWA Power bilan hamkorlikda yangi bug’-gaz turbinali elektr stantsiyasi va 500/220 kV elektr uzatish podstansiyasini qurishni rejalashtirmoqda.

Ushbu loyiha O’zbekistonda energetika sohasini isloh qilishning bir qismi bo’lib, energiya ishlab chiqarishni kengaytirga va yoqilg’ini tejash imkonini beradi. Bundan tashqari, loyiha atrof-muhit va mahalliy aholi uchun ijobiy ta’sir ko’rsatadi

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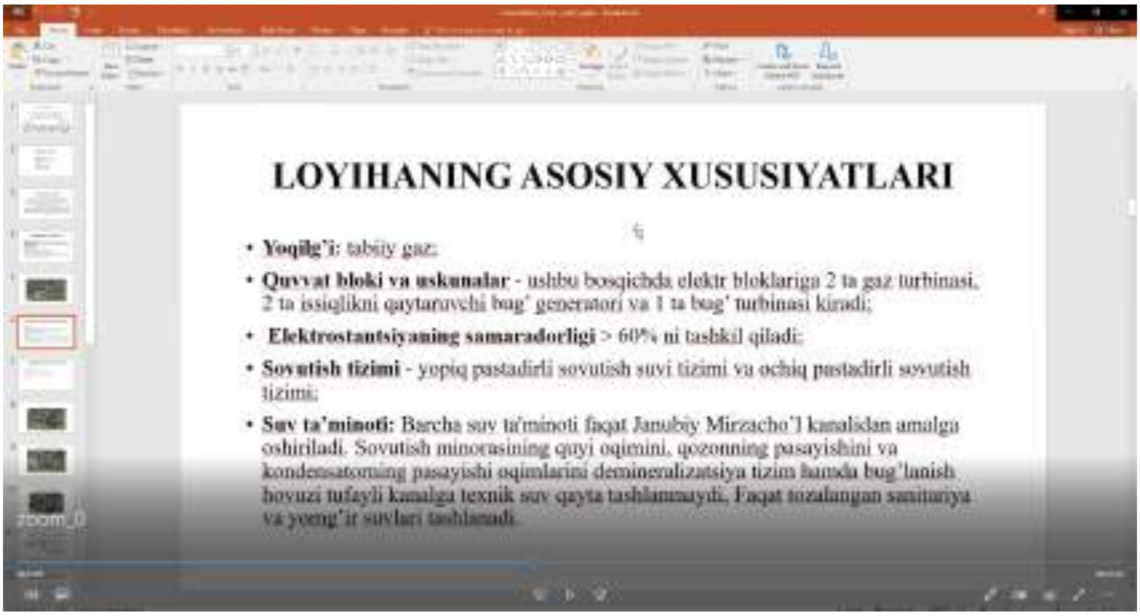
Qo'shimcha ma'lumot va savollar uchun iltimos, biz bilan bog'laning (+998) 71 202 04 40

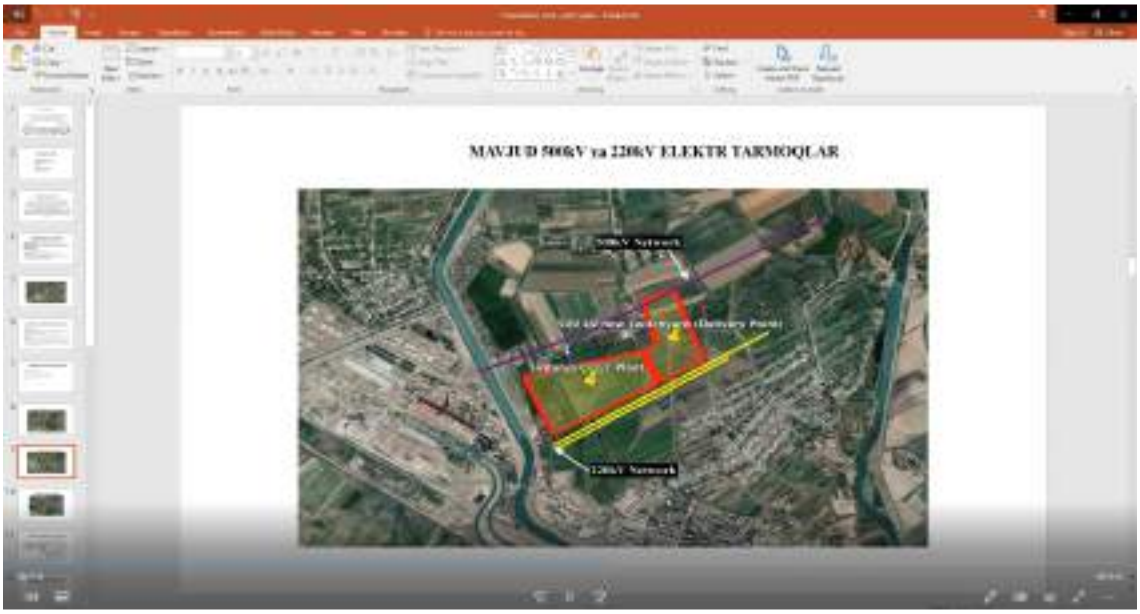
## UMUMIY QUVVATI 1500 MVT BO’LGAN ACWA BUG’ GAZ QURILMASI MUSTAQIL ELEKTR STANTSIYASI

# APPENDIX R-7–POWER POINT USED DURING CONSULTATION MEETINGS

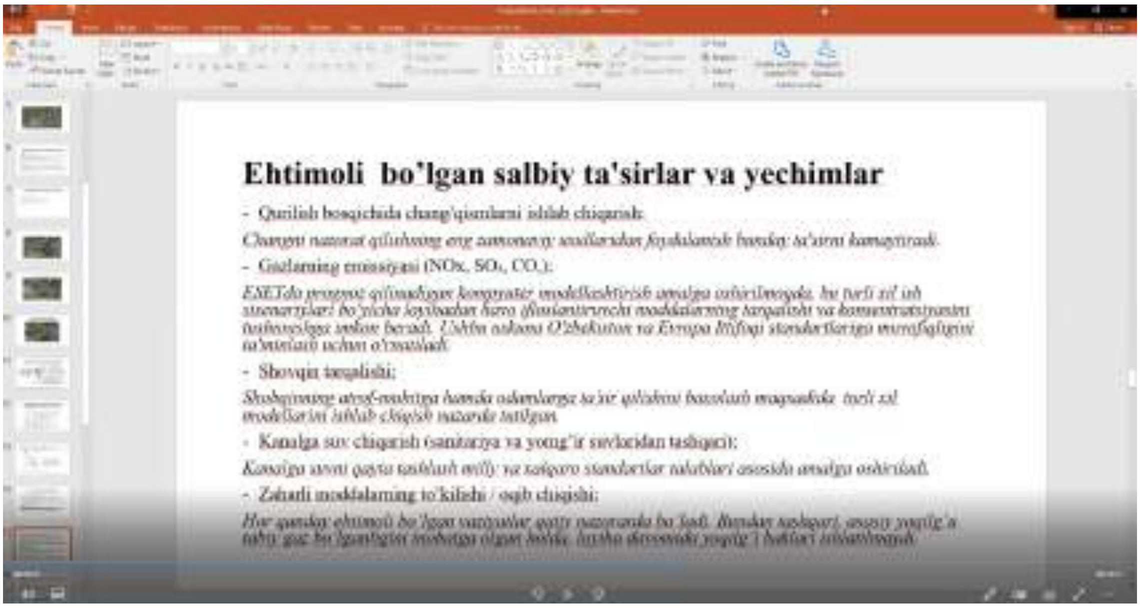

ACWA POWER
UMUMIY QUVVATI 1500 MVT BO'LGAN
ACWA BUG' GAZ QURILMASI
MUSTAQIL ELEKTR STANTSIYASI
5capitals
Juru Energy
zoom_0

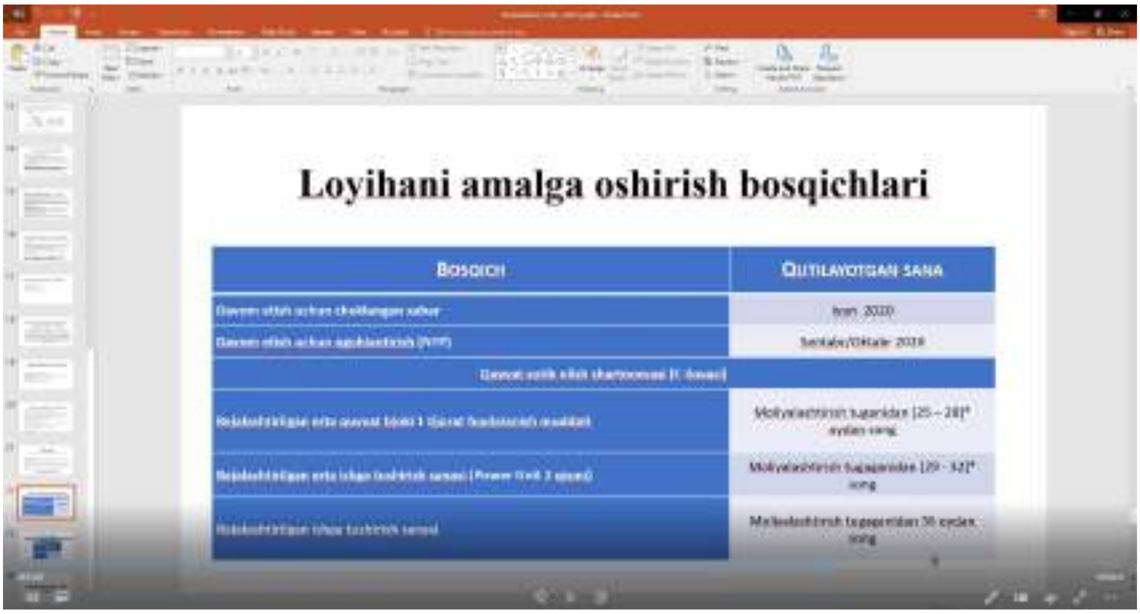

LOYIHANING ASOSIY XUSUSIYATLARI
• Yoqilg'i: tabiiy gaz;
• Quvvat bloki va uskunalar - ushbu bosqichda elektr bloklariga 2 ta gaz turbinasi, 2 ta issiqlikni qaytaruvchi bug' generatori va 1 ta bug' turbinasi kiradi;
• Elektrostantsiyaning samaradorligi > 60% ni tashkil qiladi;
• Sovutish tizimi - yopiq pastadirli sovutish suvi tizimi va ochiq pastadirli sovutish tizimi;
• Suv ta'minoti: Barcha suv ta'minoti faqat Janubiy Mirzacho'l kanalidan amalga oshiriladi. Sovutish minorasining quyi oqimini, qozonning pasayishini va kondensatorning pasayishi oqimlarini demineralizatsiya tizim hamda bug'lanish hovuzi tufayli kanalga texnik suv qayta tashlanmaydi. Faqat tozalangan sanitariya va yomg'ir suvlari tashlanadi.

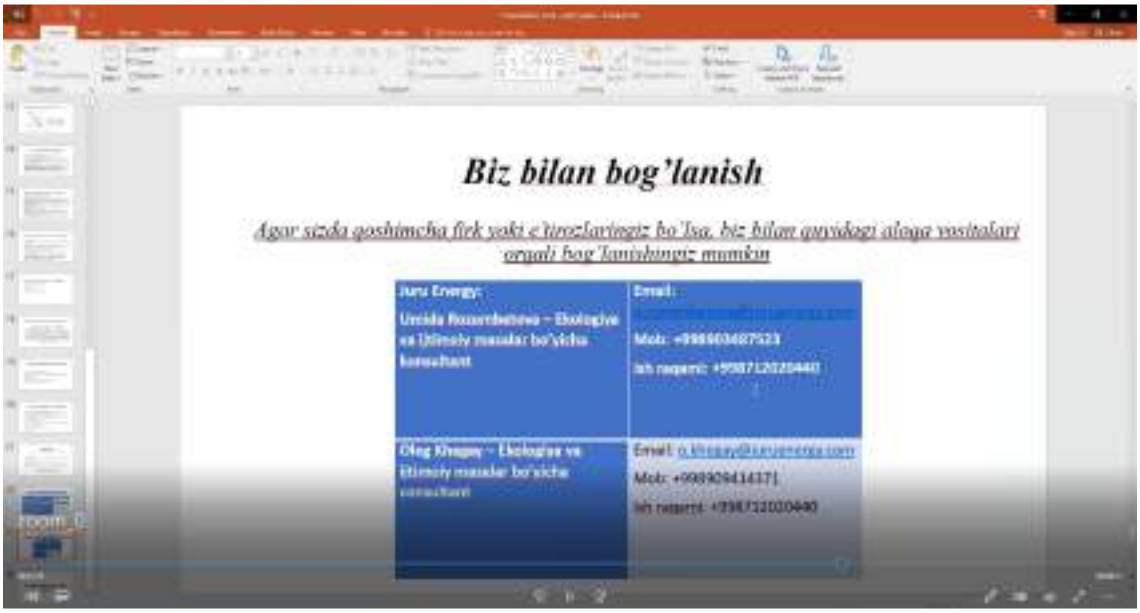

LOYIHANING NAZARDA TUTILGAN BOSH REJASI
Izoh: yakuniy tartib holi tasdiqlanmagan va berilgan chizma o'zgartirilishi mumkin


MAVJUD 500kV va 220kV ELEKTR TARMOQLAR
500kV Network
220kV Network


KUTILAYOTGAN IJOBIY TA'SIRLAR
- Elektr energiyasini ishlab chiqarishni ko'paytirish;
- Ishga joylashish imkoniyatlari (loyihaning qurilishi va ishlashi jarayonida);
- Xalqaro, milliy va mintaqaviy ahamiyatga ega bo'lgan tabiiy hududlarga ta'sir ko'rsatilmaydi;
- O'simlik va hayvonot dunyosiga minimal darajada ta'sir qiladi, chunki ajratilgan yerlar qishloq xo'jaligi maqsadlarida foydalaniladi;
- Yuqori xavfsizlik va nazorat choralari tufayli tuproq va yer osti suvlarining ifloslanishi kutilmaydi;
- Havoning ifloslanishi pasayadi;
- Xavfli materiallar, chiqindilar va va shu kabi moddalarni saqlashni qat'iy nazorat qilish.


Ehtimoli bo'lgan salbiy ta'sirlar va yechimlar
- Qurilish bosqichida chang'qismlarni ishlab chiqarish:
- Shovqin tarqalishi:
- Kanalga suv chiqarish (sanitariya va yong'ir suvlaridan tashqari):
- Zaharli moddalarning to'kilishi / oqib chiqishi:


Loyihani amalga oshirish bosqichlari
Bosqich
Qutilayotgan sana


Biz bilan bog'lanish
Agar sizda qoshimcha fikr yoki e'tirozlaringiz bo'lsa, biz bilan quyidagi aloqa vositalari orqali bog'lanishingiz mumkin
Juru Energy:
Email:

# APPENDIX R-8–CONSULTATIONS WITH FARMERS OVER THE PHONE

## Summary of consultations with farmers

The land allocated for the construction of ACWA CCGT is located in Shirin town, which is currently used by farmers for cultivating agricultural crops. In period of January-February, 2020, administrations of Bayavut district and Shirin town terminated land lease agreements with farmers. According to the data collected from Syrdarya region administration, construction of ACWA CCGT will have an impact on the land of 10 farmers.

In order to assess the level of impact and potential future income losses of local farmers, to assist the EIA process undertaken by 5 Capitals, Juru Energy carried out consultations with 8 out of 10 farmers. It was impossible to contact 2 farmers as one of them do not use phone and mobile number of another farmer was switched off.

Due to the lockdown caused by COVID-19 pandemic, consultations were conducted via individual phone interviews. We collected personal information of farmers as well as details of their farms. At the beginning of the interview, farmers were informed that these consultations are absolutely voluntarily, and farmers are not obliged to answer to the proposed questions. Upon their consent, all farmers 8 were interviewed over phone calls, while the remaining 4 farmers asked for arranging an official meeting after the lockdown period ends.

Agenda for consultations was specifically designed to address issues related to:

- Land use (i.e., purposes of land use, timeline of land use, income from farming, etc.);
- Legal aspects, such as notification on the termination of land lease agreement, land valuation and compensation process, presence of agricultural crops on farms at the moment;
- Future plans for the affected farms following the loss of land;
- Existing sites that have cultural importance.

Consultations were performed between 22 April – 1 May, 2020. Duration of each phone call ranged from 20 to 45 minutes, during which farmers responded to 15 questions designed for the interview. All consultations were conducted in Uzbek language.

*Land use*

So far, Juru Energy has contacted and interviewed 8 farmers. The farmers are represented by middle-aged and elderly people. For further details please refer to Annex 1.

All interviewed farmers responded that the farming is the single source of their income. Furthermore, given the large size of their farms, farmers used to engage their relatives as well as their families for planting and growing crops. In average, there were at least 3 families which benefited from farming activities. Majority of the farmers mentioned lack of people in their families who can be considered as vulnerable, except one farmer who mentioned that his daughter has II grade physical disability.

Regarding the total annual income from farming, the majority of interviewed farmers preferred not to disclose the income amount. However, they stated that the income received from farming is sufficient to cover all their daily expenses. Owners of two farms, Mavlon Eshbek and Mamurov Khamidjon, shared their income information, with stated average annual incomes of 278 million and 50 million Uzbek sums, respectively.

During the consultations, each farmer was asked to share the total size of the farm as well as the size of land that must be returned back to the reserve fund of local district administration. The detailed information is given in Annex 2. According to the collected data, 3 out of 8 farmers are obliged to return the whole farm land, while the other 5 farms – only part of it.

Farmers have been using these lands for cultivating agricultural crops for more than 5 years. For exact timeline please refer to Annex 2. If farmers move to another land, it will take at least 3-5 month cultivating vegetable crops, and 3-5 years for fruit trees.

Regarding the purpose of land use, all 8 farmers responded that until now the land has been used solely for agricultural crops. There are no records of land use for other purposes. At the moment 7 out of 8 farms are planted with crops, including vegetables (potato, wheat, tomato, cotton), fruit trees as well as decorative trees. Details of planted crops in farms is given in Annex 3. Some farmers provided photos of planted crops (attached in the report).

Farms are equipped with pathways for crossing the land and movement from one farm to another. In addition, there are no paved roads for transport. . Gas pipeline crosses the farm Joniqul.

*Legal aspects*

7 out of 8 farmers received neither written nor verbal notification about early termination of their land lease agreement. Only one farm owner (Mavlon Eshbek) confirmed receipt of written notification on December, 2019. On January, 2020, the administration of Bayavut district arranged a meeting with farmers to announce termination of land lease agreements, followed by issuance of formal order on land return.

Until now local administration has not yet performed the land valuation. As a result, compensation process has not started yet. Farmers are extremely worried about this, as the majority of them still have agricultural crops on the farms. In case compensation is not offered, farmers will be left at risk to lose the income for the next few months. During the calls, all farmers asked to inform them about when and how the compensation process will be performed.

None of the 8 farmers have yet been offered another plot of land to resume farming.

At the moment, all interviewed farmers stated their land was not under pending or ongoing legal action with other parties.

*Future plans for the affected farms following the loss of land*

Consultations also aimed to identify whether the farmers possess other qualifications or skills to continue working in another industry/sector following the loss of land. 3 out of 8 farmers had higher education diploma, yet they expressed their intention to invest compensation money into a different business. The remaining majority responded that they plan to resume farming on another land, because they don't see opportunities in other sectors.

*Existing cultural sites*

When asked "Are there known places of cultural/archaeological heritage on the Project site, specifically on your farm land?" all farmers responded that there are no sites on their farm that may present cultural importance.

**Annex 1**

**Information about farmers**

| **№** | **Farm** | **Farmer's name** | **Age/ nationality** | **Date and time of consultations** | **Method of consultation/ Contact details** |
|---|---|---|---|---|---|
| 1 | "Mamurov Khamidjon" | Ma'murov Khamidjon Owner of the farm | 43 Uzbek | 22.05.2020 14:50- 15:30 | Individual call/ +99899 470 45 08 |
| 2 | "Usmon bobo avlodlari" | Radjabov Otamurod Owner of the farm | 66 Uzbek | 22.04.2020 16:35- 17:05 | Individual call/ +99897 247 33 47 |
| 3 | "Salimjon dalasi" | Usmonov Salimjon Owner of the farm | 53 Tadjik | 23.04.2020 17:00- 17:35 | Individual call/ +99891 503 75 73 |
| 4 | Mavlon Eshbek | Jahongir Xatamov Owner of the farm | 40 Uzbek | 29.04.2020 11:20- 11:45 | Individual call/ +99890 106 15 27 |
| 5 | Dilbar Davronova | Yoldashev Bakhtiyor Owner of the farm | 65 Uzbek | 30.04.2020 12:10 – 12:40 | Individual call/ +99897 245 07 55 |
| 6 | Isroilova Qutbiniso | Isroilova Qutbiniso Owner of the farm | 60: Uzbek | 25.04.2020 15:30-16:00 | Individual call/ +99899484 52 18 |
| 7 | Fayzullayev Tojikul | Fayzullayeva Norgul (manager of the farm) | 62 Uzbek | 23.04.2020 14:35 – 15:20 | Individual call/ +99890 109 22 58 |
| 8 | Joniqul | Qodirqul Rustam Owner of the farm | 65 Uzbek | 1.05.2020 11:10 – 11:45 | Individual call/ +99893 329 10 82 |
| 9 | Sportchilar | Did not respond | | | +99893 321 44 32 |
| 10 | Asilbek sonmas orzulari | Does not use phone | | | |

**Annex 2**

**Information on land use period, total size of farm and size of returned land**

| **№** | **Farm** | **Period of land use** | **Total size of farm land** | **Returned land** |
|---|---|---|---|---|
| 1 | "Mamurov Khamidjon" | Since 2006 | 9 ha | 9 ha |
| 2 | "Usmon bobo avlodlari" | Since 2010 | 34 ha | 34 ha |
| 3 | "Salimjon dalasi" | Since 2015 | 12 ha | 4 ha |
| 4 | Mavlon Eshbek | Since 2010 | 110 ha | 8 ha |
| 5 | Dilbar Davronova | Since 2005 | 4 ha | 4 ha |
| 6 | Isroilova Qutbiniso | Since 2006 | 11 ha | 7 ha |

| | | | | |
|---|---|---|---|---|
| 7 | Fayzullayev Tojikul | Since 2006 | 12,5 ha | 6 ha |
| 8 | Joniqul | Since 2020 | 115 ha | 10 ha |

**Annex 3**

**Information about existing crops on the farms**

| **№** | **Farm** | **Types and number of existing crops on land which is returned back to administration** |
|---|---|---|
| 1 | "Mamurov Khamidjon" | 9 ha – 2600 fruit trees and vegetable crops |
| 2 | "Usmon bobo avlodlari" | 34 ha – no crops |
| 3 | "Salimjon dalasi" | 4 ha – 1920 fruit trees |
| 4 | Mavlon Eshbek | 8 ha – planted with cotton |
| 5 | Dilbar Davronova | 4 ha. On the 3 ha there are 70 of fruit trees, 1000 decorative trees, besides on the 1 ha there are some potato, tomato, and wheat crops |
| 6 | Isroilova Qutbiniso | 7 ha – 700 of decorative trees, 1550 of fruit trees |
| 7 | Fayzullayev Tojikul | 6 ha – 1500 of fruit trees |
| 8 | Joniqul | 10 ha - wheat |

**Photos from farm “Isroilova Qutbiniso”**

**Photos from farm “Mamurov Khamdjon”**

# APPENDIX R-9–OFFICIAL RESPONSE TO GRIEVANCES RECEIVED

| Ref №1 | | |
|---|---|---|
| 1 | **Фамилия Исм Шариф (агар мурожаатчи номаълум (аноним) бўлиш истагини билдирган бўлса кўрсатинг)** | **Ф.И.Ш. (агар мумкин бўлса):** Уринбоев Анваржон Рахмонкулович<br>**Жинси:** Эркак<br>**Ёши:** 51<br>**Манзил:** Жулангра махалласи, Боявут тумани, Сирдарё вилояти<br>**Ишлаш жойи:** вақтинча ишсиз<br>**Мен шахсий маълумотларимни кўрсатилишини истамайман:** - |
| 2 | **Алоқа маълумотлари (мурожаатга жавоб бериш усулини аниқлаш учун)** | **Уяли алоқа:** +998933295533<br>**Факс:** -<br>**Email:** -<br>**Бошқа (ёзинг):** + |
| 3 | **Мурожаатга қандай шаклда жавоб олиш** | **Телефон орқали:** +<br>**Оғзаки жавоб:** -<br>**Email:** -<br>**Қабул қилди:** Умида Розумбетова |
| 4 | **Мурожаат мақсади** | **Шикоят қилиш:** -<br>**Фикр/таклиф билдириш:** -<br>**Маълумот сўраш:** +<br>**Бошқа (ёзинг):** - |
| 5 | **Мурожаат қабул қилинган сана** | **Сана:** 09.09.2020<br>**Соати:** 18.30 |
| 6 | **Мурожаат мазмуни** | Менинг исмим Анваржон Уринбоев Мен Жулангор маҳалласида истиқомат қиламан. Бизнинг маҳалламизда ишчилар сони кўп. Ахоли билан ўтказилган учрашувларда Лойиҳа вакиллари қурилиш жараёнида ишга кириш имконияти бўлади деб таъкидлагандилар. Мен 4 даражали темирчи (слесарь) ман. Олдин Сирдарё ИЭСда ишлаганман. Амма, ИЭСда ойлик маоши камлиги учун. Россия Федерациясида ишлаганман. Хозирги кунда иш излаяпман. Сизларга қуйидаги саволлар буйича мурожаат қилмоқчи эдим:<br>- Лойиҳани қуриш жараёнида темирчи (слесарь) керак бўладими?<br>- Қурилиш ишларини қачон бошланади? |
| 7 | **Мурожаат қабул қилинганлиги тўғрисида маълумот** | Ҳурматли Анваржон Уринбоев,<br>Сизнинг мурожаатингиз қабул қилинди ҳамда кўриб чиқиш учун юборилди. Мурожаатингизга икки, ёки бир, хафта ичида жавоб йўлланади.<br>Мурожаатингизга жавобни ёзма равишда олишингиз мумкин.<br>Мурожаат бўйича хабарларни сизга ўз вақтида етказиб турамиз. |

| | | |
|---|---|---|
| | | Хамкорлигингиз учун миннатдорчилик билдирамиз.<br>***Ушбу хабарнома телефон орқали мурожаат эгасига Умида Розумбетова томонидан 2020 15 сентябрь куни етказилди.*** |
| **8** | **Мурожаатга жавоб** | 1. Шартли Иш бошлаш Хабарномаси 2020 йил Октябрь ойига режалаштирилган. Иш бошлаш Хабарномаси эса камида бир ёки икки ой давомида эълон қилинсади (Ноябрь/Декабрь) Пудратчи Лойиҳа учун зарур бўлган жадвални янгилаганидан кейин ушбу маълумотлар тасдиқланади.<br>2. Лойиҳа қурилиши давомида малакали ва малакаси йуқ ишчи куч талаб этилади. ACWA Power-га тақдим этилган ишчилар руйхати Пудратчига ишчиларни малакаси ҳамда Лойиҳа талабларидан келиб чиққан ҳолда кўриб чиқиш учун тақдим қилинади. |

***Жавоб*** Ева Кимонс (5 Capitals) ***томонидан тайёрланди***

***Сана: 16.09.2020***

***Жавоб*** Умида Розумбетова (Juru Energy) ***томонидан етказилди***

***Сана: 17.09.2020***

# APPENDIX S- CONSULTATION LETTERS SUBMITTED TO THE MINISTRY OF HEALTH

Juru Energy

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info@juruenergy.com

**№UZB-ACWA-CCGT-20/20/19**

**02.05.2020**

**Ministry of Health of the Republic of Uzbekistan**

ACWA Power through “ACWA Power Sirdarya LLC (Tashkent)” has entered into a 25 year Power Purchase Agreement with JSC National Electric Networks of Uzbekistan for the development of a 1500MW gas fired Combined Cycle Gas Turbine (CCGT). The project will be located approximately 0.3km northeast of the city of Shirin opposite the existing 3000MW oil/gas Thermal Power Plant (Sirdarya TPP) (see Appendix 1).

According to the Uzbekistan law under the State Committee of the Republic of Uzbekistan for Ecology and Environmental Protection (regulator), ACWA Power is required to obtain an Environmental license before the commencement of the project. Therefore, as part of the Environmental Impact Assessment (EIA), ACWA Power’s corporate Environmental & Social Consultants ‘5 Capitals Environmental & Management Consulting’ (Dubai, UAE), have appointed Juru Energy (Tashkent, Uzbekistan) to conduct certain environmental & social surveys and data collection, including submission of the EIA to the regulator.

In particular, the project should address on sanitation and hygiene standards as required by the national legislation. The article 2.5 of the State Sanitary Rules SanPiN No. 0350-17 dated 25.10.2017 “On sanitary norms and rules for the protection of ambient air in residential areas of the Republic of Uzbekistan” requires establishment of a Sanitary Protection Zone (SPZ) for any industrial facility which is a potential source of air pollution. Chapter 6 of the Rules states that thermal power plants (TPP) with an equivalent electric capacity of 600 MW and above, operating on gas and gas-oil fuel are categorised as Class II with a preliminary SPZ size of 500m.

In order to comply with all SPZ requirements during project implementation, we seek your kind assistance to provide answers to the questions enclosed in Appendix No. 2.

Thank you very much for your assistance and we look forward to your response.

Yours Sincerely,

**Director**

For the further information please contact:

Umida Rozumbetova

Phone: +99871 202 04 40
Mob.: +99890 348 75 23

**Appendix No. 1 to the letter № UZB-ACWA-CCGT-20/20/19 dated on 02.06.2020**

**Appendix No. 2 to the letter № UZB-ACWA-CCGT-20/20/19 dated on 02.06.2020**

Questions:

1. As shown on the map in Appendix 1, the Project includes the construction of 500/220 kV switchgear. Should SPZ boundary account for the substation as well?
2. According to Chapter 6 of SanPiN No. 0350-17 Class II industrial facilities are required to establish a preliminary SPZ size of 500m. Can you please clarify and provide, if any, specific requirements and guidelines on the measurement of SPZ for Class II facilities?
3. Will farmers located in the SPZ territory be able to continue with their agricultural activities during the project operation?
4. If they can still be able to conduct agricultural activities in the SPZ what are the requirements that must be met by the project?
5. We welcome any additional comments in regards to the project and the application of the SPZ

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**№ UZB-ACWA-CCGT-20/20/27**

**17.06.2020**

**Директору Агентсва санитарно-эпидемиологического благополучия Министерства Здравоохранения Республики Узбекистан Б.И.Алматову**

***Уважаемый Бахром Ибрагимович!***

Компания ACWA Power посредством ООО «ACWA Power Sirdarya» (Ташкент) заключила 25-летнее соглашение о покупке электроэнергии с АО «Национальные электрические сети Узбекистана» на разработку газовой турбины с комбинированным циклом мощностью 1500 МВт (ПГУ). Проект будет расположен примерно в 0,3 км к северо-востоку от города Ширин, напротив существующей теплоэлектростанции мощностью 3000 МВт (Сырдарьинская ТЭС).

Исходя из требований, установленных действующим законодательством, ACWA Power должна сдать в Государственный комитет Республики Узбекистан по экологии и охране окружающей среды (регулирующий орган) отчет об оценке воздействии на окружающую среду (ОВОС), и получить экологическую лицензию до начала проекта. Вследствие этого, в рамках ОВОС корпоративные экологические и социальные консультанты ACWA Power «5 Capitals Environmental & Management Consulting» (Дубай, ОАЭ) назначили Juru Energy (Ташкент, Узбекистан) для проведения необходимых экологических и социальных исследований, а также сбор данных, включая представление ОВОС регулирующему органу.

В частности, проект должен учитывать санитарно-гигиенические стандарты, как того требует национальное законодательство. Статья 2.5 Государственных санитарных правил СанПиН № 0350-17 от 25.10.2017 г. «О санитарных нормах и правилах охраны атмосферного воздуха в жилых районах Республики Узбекистан» требует создания санитарно-защитной зоны (СЗЗ) для любого промышленного объекта, который является потенциальным источником загрязнения воздуха. Глава 6 гласит, что тепловые электростанции (ТЭС) с эквивалентной электрической мощностью 600 МВт и выше, работающие на газе, относятся к классу II с предварительным размером СЗЗ 500 м. На данном этапе разработке Проекта утверждено предварительное расположение дымовых труб высотой 60 метров, которые являются основным источником загрязнения. Расположение дымовых труб может измениться в ходе строительства.

В связи с вышеизложенным, просим Вас дать заключение по данному вопросу.

**Хушнуджон Рахимберганов**

Hushnud R. Rahimberganov

LONDON, UK
JURU ENERGY LIMITED
COMPANY No. 9677065

**Директор**

Исполнитель: У.Розумбетова, Тел.: +99871 202 04 40 Моб.: +99890 348 75 23

**Приложение No. 1 к письму от 17.06.2020 № UZB-ACWA-CCGT-20/20/27**


| Источник | Координаты |
|---|---|
| Дымовая труба №1 (высота 60 метр) | 40.235790°<br>69.111027° |
| Дымовая труба №2 (высота 60 метр) | 40.235564°<br>69.111638° |
| Подстанция | 40.241666°<br>69.116337° |

**Приложение No. 2 к письму от 17,06,2020 № UZB-ACWA-CCGT-20/20/27**

1. Как показано на карте в приложении 1, Проект включает в себя и постройку подстанции. Должна ли быть предусмотрена Санитарно -защитная зона и для территории подстанции?

2. Предусмотрены ли специальные требования при замерах установленных 500 метров для Санитарно -защитной зоны?

3. На территории, предусмотренной для СЗЗ расположены фермерские хозяйства. Смогут ли фермеры продолжать вести сельскохозяйственную деятельность в СЗЗ?

4. Если фермеры все еще могут вести сельскохозяйственную деятельность в СЗЗ, какие требования должны быть выполнены проектом?

5. Мы приветствуем любые дополнительные комментарии в отношении проекта и применения СЗЗ.

# Juru Energy

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**№UZB-ACWA-CCGT-20/20/26**

**16.06.2020**

**Сирдарё вилояти Боявут**
**тумани Санитария-**
**эпидемиология хизматига**

Ҳабарингиз бор, ACWA Power компанияси (Дубаи, БАА) "ACWA Power Сирдарё" МЧЖ орқали умумий қуввати 1500 МВт бўлган буғ газ қурилмасини қуриш мақсадида "Ўзбекистон Миллий электр тармоқлари" ОАЖ билан 25 йиллик шартнома тузди. Лойиҳага ажратилган ер майдони Сирдарё вилоятининг Ширин шаҳрида жойлашган (1-илова).

Амалдаги қонунчиликка биноан, ушбу лойиҳани қуриш ишларидан олдин Ўзбекистон Республикаси Экология ва атроф муҳитни муҳофаза қилиш давлат қўмитаси томонидан лойиҳани амалга ошириш учун рухсатнома олиш лозим. Шунга мувофиқ, ҳалқаро ва миллий стандартларга асосан лойиҳанинг атроф муҳитга экологик ва ижтимой таъсирлари тўғрисида хисобот (ОВОС) тайёрлаш мақсадида ACWA Power компанияси ҳалқаро маслаҳатчи сифатида "5 Capitals атроф-муҳит ва менеджмент" бўйича консалтинг компанияси (Дубаи, БАА) ҳамда маҳаллий маслаҳатчиси сифатида "Juru Energy" (Тошкент, Ўзбекистон) компаниясини йўллаган.

Хусусан, 2017 йил 25 октябрдаги "СанПиН"нинг 0350-17-сонли Давлат санитария қоидаларининг 2.5 моддасида "Ўзбекистон Республикасининг турар-жой массивларида атроф-мухит хавосини мухофаза қилиш қоидаларига" асосан Санитария Мухофаза Зонаси (СМЗ) ташкил этиш талаби мавжуд.

Шу муносабат билан, Сиздан, умумий қуввати 1500 МВт бўлган буғ-газ қурилмаси учун Санитария Мухофаза Зонасини ташкил этишда амалий ёрдам беришингизни сўраймиз.

Ҳурмат билан ,

**Директор**

**Хушнуджон Рахимберганов**

Hushnud. R. Rahimberganov

LONDON, UK
JURU ENERGY
LIMITED
COMPANY No [illegible]


Ижрочи У Розумбетова

Тел: +99871 232 04 40
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Juru Energy

**16.06.2020 даги №UZB-ACWA-CCGT-20/20/26- сонли хатга 1-Илова**


| Манба | Координатлар |
|---|---|
| Дымовая труба №1 (мури) (узунлиги 60 метр) | 40 235790°<br><br>69 111027° |
| Дымовая труба №2 (узунлиги 60 метр) | 40.235564°<br><br>69 111638° |
| Подстанция | 40 241666°<br><br>69 116337° |

**16.06.2020 даги №UZB-ACWA-CCGT-20/20/26- сонли хатга 2-Илова**

Саволлар:

1. 1-иловада кўрсатилганидек, Лойиҳа доирасида 500/220 kV электр узатиш подстанциясини қуришни режалаштирилган. Санитар химоя зонаси ушбу подстанция учун ҳам ўлчаниши лозимми?

2. СанПин № 0350-17, 2 боби 6-бўлимига биноан саъноат объектлари олдидан 500 метр Санитар химоя зонаси ташкил этиш белгиланган. Ушбу Санитария химоя зонасини ўлчаш жараёни бўйича белгиланган кўрсатмаларни аниқлаб бера оласизми?

3. Санитария химоя зонаси ҳудудида жойлашган фермер хўжаликлар ўз фаолиятини давом этира оладиларми?

4. Агар фермерлик хўжаликлари ўз фаолиятини давом эттирса, улар қандай қоида ёки мажбуриятларга риоя қилиши керак бўлади?

5. Лойиҳа учун Санитария химоя зонасини белгилашда қўшимча ва таклифларингизни беришингизни сўраймиз

O`ZBEKISTON RESPUBLIKASI
SOG`LIQNI SAQLASH VAZIRLIGI
HUZURIDAGI SANITARIYA-
EPIDEMIOLOGIK OSOYISHTALIK
AGENTLIGI

100097, Toshkent, Bunyodkorko`chasi,46-uy,
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AGENCY OF SANITARY AND
EPIDEMIOLOGICAL WELL-BEING
UNDER THE MINISTRY OF
HEALTH OF THE REPUBLIC OF
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25.08.20 № 04-8/4809

____________ № ____________ ga

**Директору Кампании**
**«JURU ENERGY LIMITED»**
**Рахимберганову Хушнуджону**

Агентство санитарно-эпидемиологического благополучия в соответствии с Вашим письмом за № UZB-ACWA-CCGT-20/20/27 от 17.06.2020 г. касательно санитарно-гигиенических стандартов по созданию санитано-защитных зон для промышленных предприятий, в соответствии с поставленными Вами вопросами, сообщает следующее.

В соотвествии с трбованиями СанПиН 0350-17 «По охране атмосферного воздуха населенных мест Республики Узбекистан» предприятия, учреждения, организации и др., независимо от форм собственности, вопросы создания и обеспечения санитарно-защитных зон должны предусматривать уже на стадии размещения, затем проектирования и затем уже в ходе строительства новых, реконструкции (техническом перевооружением) и при эксплуатации существующих предприятий, сооружений и других объектов, являющихся источниками загрязнения атмосферного воздуха. При этом, выбор площадки для строительства объектов осуществляется уже на стадии ТЭО (ТЭР).

В соотвестсвии с п.2.8 вышеназванного СанПиНа «Предприятия, их отдельные здания и сооружения с технологическими процессами, источниками выделений в атмосферу вредных и неприятно пахнущих веществ, а также являющихся источниками внешнего шума выше установленными нормами уровней для жилой застройки, не следует размещать с наветренной стороны для ветров преобладающего направления по отношению к жилой застройке.

Размещение предприятий с технологическими процессами, не выделяющими в атмосферу производственные вредности, с процессами, не создающими уровней внешнего шума и других вредных факторов, превышающих установленные нормы для жилой застройки, не требующих железнодорожных подъездных путей, допускается в пределах жилых районов.

Площадки для застройки предприятий должны выбираться с учетом аэроклиматической характеристики и рельефа местности, прямого солнечного облучения и естественного проветривания, а также с учетом условий рассеивания в атмосфере производственных выбросов и условий туманообразования».

В соотвествии с пунктами 2.16. «СЗЗ или какая-либо ее часть не могут рассматриваться как резервная территория предприятия и использоваться для расширения промышленной площадки».

Согласно п.2.17. В границах санитарно-защитной зоны и на территории промплощадок **запрещается размещать**:

- предприятия пищевой промышленности, а также по производству посуды, тары, оборудования т.д. для пищевой промышленности, склады готовой продукции, предприятия по производству воды и напитков для питьевых целей,

- комплексы водопроводных сооружений;

- оптовые склады продовольственного сырья и пищевых продуктов;

-жилые здания, детские дошкольные учреждения, другие образовательные учреждения;

- коллективные или индивидуальные дачные и садово-огородные участки;

-спортивные сооружения, парки, лечебно-профилактические и оздоровительные учреждения общего пользования.

Таким образом, по санитарно-гигиеническим требованиям фер4ерская деятельность не ограничена, однако, существуют еще и ветеринарно-санитарные требования. А значит Вам целесообразно по Вашим 3 и 4 вопросам получить дополнительные разъяснения у Вет.комитета.

По вопросу, касающемуся подстанции, то согласно п.3 примечания к п.6.2 класса III «Для электроподстанций размер санитарно-защитной зоны устанавливается в зависимости от типа (открытые, закрытые) и мощности на основании расчетов физического воздействия на атмосферный воздух, а также результатов натурных измерений».

**Зам.директор** **Б.И.Алматов**

Исп.:Миршина О.П.
Т-н:276-75-92

Unofficial translation

**From: Agency of Sanitary and Epidemiological Wellbeing under the Ministry of Health of the Republic of Uzbekistan**

25.08.20 №04-8/4809

**To: Director “Juru Energy Ltd”**

**Khushnudjon Rakhimberganov**

The Agency for Sanitary and Epidemiological Wellbeing in response to your letter No. UZB-ACWA-CCGT-20/20/27 dated June 17, 2020 regarding sanitary and hygienic standards for the establishment of Sanitary Protection Zones for industrial enterprises, would like to inform on followings.

In accordance with the requirements of SanPiN 0350-17 "For the protection of atmospheric air in populated areas of the Republic of Uzbekistan" enterprises, institutions, organizations, etc., regardless of the form of ownership, the establishment and provision of Sanitary Protection Zones should be provided at the stage of planning, then design and final establishment should take place then already during the construction of Project reconstruction (technical re-equipment) and during the operation of existing enterprises, structures and other objects that are sources of air pollution. At the same time, the selection of a site for the construction of facilities is carried out already at the stage of feasibility study.

In accordance with paragraph 2.8 of the above-mentioned SanPiN “Enterprises, their separate buildings and structures with technological processes, sources of emissions into the atmosphere, harmful and unpleasant smelling substances, as well as sources of external noise above the established norms for levels for residential buildings, should not be placed on the windward side for winds prevailing in relation to residential buildings.

The location of enterprises with technological processes that do not emit industrial hazards into the atmosphere, with processes that do not create levels of external noise and other harmful factors that exceed the established standards for residential buildings that do not require railway access roads, is allowed within residential areas.

The sites for the development of enterprises should be selected taking into account the climate conditions and terrain, direct solar irradiation and natural ventilation, as well as taking into account the conditions of dispersion in the atmosphere of industrial emissions and the conditions of fogging".

In accordance with paragraph 2.16. "The SPZ or any part of it cannot be considered as a reserve territory of the enterprise and used to expand the industrial site."

According to paragraph 2.17. It is prohibited to place within the boundaries of the sanitary protection zone and on the territory of industrial sites:

- food industry enterprises, containers, equipment, etc. for the food industry, warehouses for finished products, enterprises for the production of water and drinks for drinking purposes;

- complexes of water supply facilities;

- wholesalers of food raw materials and food products;

Unofficial translation
- residential buildings, preschool institutions, others

- educational institutions;

- collective or individual countryside houses and garden plots;

- sports facilities, parks, medical and preventive and health-improving institutions of general use.

Thus, according to sanitary and hygienic requirements, farming activities are not restricted, however, there are also veterinary and sanitary requirements. This means that it is advisable for you to get additional clarifications from the Veterinary Committee on your questions 3 and 4.

Regarding the switchgear, according to clause 3 of the note to paragraph 6.2 of class III "For electrical substations, the size of the sanitary protection zone is established depending on the type (open, closed) and capacity based on calculations of the physical impact on the atmospheric air, as well as the results full-scale measurements".

**Signed by**

**Deputy director**

**B.I.Almatov**

# APPENDIX S-1–CONSULTATION LETTER SUBMITTED TO VETERINARY COMMITTEE & THEIR RESPONSE

**ОБЩЕСТВО С ОГРАНИЧЕННОЙ ОТВЕТСТВЕННОСТЬЮ**

**JURU ENERGY CONSULTING**

100077, Tashkent, M.Ulugbek region, Chust Street, house # 10.
TIN: 303454532, BIC: 00974 Bank: «Kapitalbank» A/N: 20208000600502375001

**№UZB-ACWA-CCGT-20/20/43**
**03.09.2020**

**Государственный комитет ветеринарии Республики Узбекистан**

Компания ACWA Power посредством ООО «ACWA Power Sirdarya» (Ташкент) заключила 25-летнее соглашение о покупке электроэнергии с АО «Национальные электрические сети Узбекистана» на разработку газовой турбины с комбинированным циклом мощностью 1500 МВт (ПГУ). Проект будет расположен примерно в 0,3 км к северо-востоку от города Ширин, напротив существующей теплоэлектростанции мощностью 3000 МВт (Сырдарьинская ТЭС). Территория, выделенная для Проекта, является сельскохозяйственной и в настоящий момент используется фермерами (приложение №1).

В соответствии с существующим законодательством, для реализации данного Проекта было получено положительное заключение Государственного Комитета по экологии и охране окружающей среды по Проекту Заявления о Воздействия на Окружающей Среды (ПЗВОС) 13 июля, 2020 года №01-01/10-08-969.

Помимо этого, Проект должен отвечать санитарно гигиеническим стандартам, а именно главе 2,5 СанПиН № 0350-17 от 25.10.2017 г. «О санитарных нормах и правилах охраны атмосферного воздуха в жилых районах Республики Узбекистан», требует создания санитарно-защитной зоны (СЗЗ) для любого промышленного объекта, который является потенциальным источником загрязнения воздуха. Глава 6 гласит, что тепловые электростанции (ТЭС) с эквивалентной электрической мощностью 600 МВт и выше, работающие на газе, относятся к классу II с предварительным размером СЗЗ 500 м.

Мы получили от мнение Агентства санитарно-эпидемиологического благополучия Министерства Здравоохранения Республики Узбекистан относительно данного вопроса 28 августа текущего года № 048/4809. Агентство утверждает, что согласно СанПиН № 0350-17 от 25.10.2017 г. «О санитарных нормах и правилах охраны атмосферного воздуха в жилых районах Республики Узбекистан» фермерская деятельность не запрещена в Санитарно защитной зоны. Однако, Агентство посоветовало учесть, ветеринарные и санитарные требования.

Учитывая вышеизложенное, просим Вас оказать содействие в получении информации на вопросы согласно приложению №2 к данному письму.

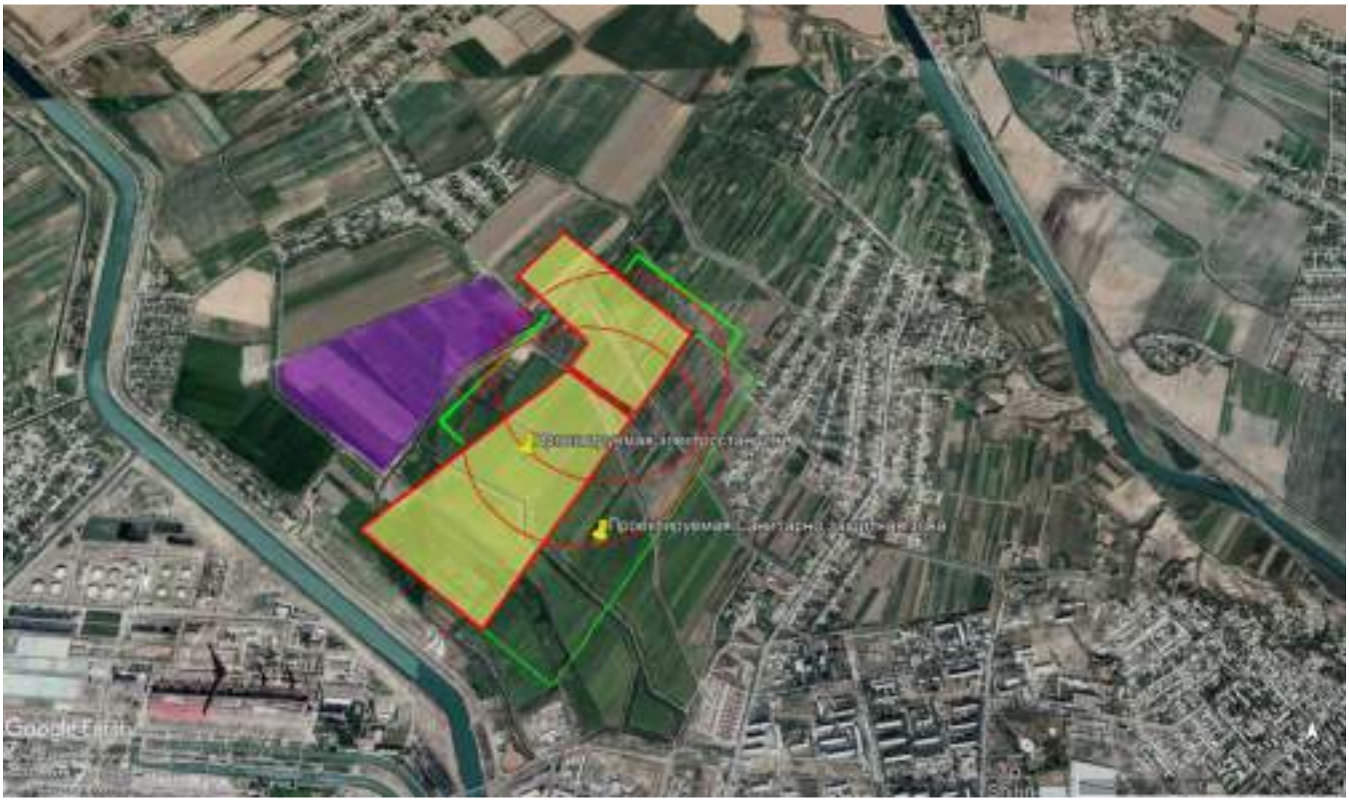
Выражаем свою благодарность за сотрудничество!

**Джахангир Якубов**

**Директор**

Исполнитель:
Гулчехра Нематуллаева
Тел: +99871 202 04 40
Моб: +99897 4459504

**Приложение No.1**
**к письму № UZB-**
**ACWA-CCGT-**
**20/20/43 от**
**03.09.2020**



**Приложение No.2 к письму № UZB-ACWA-CCGT-20/20/43 от 03.09.2020**

1. На данный момент предполагается, что в Санитарно Защитную Зону проекта войдут 4 участка земель местного военного отделения, а также 4 фермерских хозяйств. На данных участках земли выращивают сельскохозяйственные культуры, а также имеются фруктовые и декоративные деревья. Смогут ли фермеры, продолжать свою деятельность в Санитарно Защитной Зоне.
2. Если фермеры все еще могут вести сельскохозяйственную деятельность в СЗЗ, какие требования должны быть выполнены проектом?
3. Мы приветствуем любые дополнительные комментарии в отношении проекта и применения СЗЗ

Unofficial translation

**O'ZBEKISTON RESPUBLIKASI VETERINARIYA VA CHORVACHILIKNI RIVOJLANTIRISH DAVLAT QO'MITASI**

100123, Toshkent sh. Kichik halqa yo'li ko'chasi 21 a-uy,
Tel.: +998 71 202 12 00, e-mail: info@vetgov.uz
www.vetgov.uz

**STATE COMMITTEE OF VETERINARY AND LIVESTOCK DEVELOPMENT OF THE REPUBLIC OF UZBEKISTAN**

21a, Kichik khalka youli Str., Tashkent, 100123
Tel.: +998 71 202 12 00, e-mail: info@vetgov.uz
www.vetgov.uz

2020 y. «11» 09 №03/19-101 «___» ________ 20__ г.

**"JURU ENERGY CONSULTING"**
**масъулияти чекланган жамияти**
*(Тошкент ш., М.Улуғбек тумани, Чуст кўчаси, 10-уй.)*

Ветеринария ва чорвачиликни ривожлантириш давлат қўмитаси Сизнинг 2020 йил 3 сентябрдаги UZB-ACWA-CCGT-20/20/43-сон хатингизни ўрганиб чиқиб, қуйидагиларни маълум қилади.

Мурожаатингиздаги қайд этилган масалалар Ўзбекистон Республикасининг "Ветеринария тўғрисида"ги Қонунига мувофиқ давлат ветеринария хизматининг ваколатига кирмаслигини ҳамда "Жисмоний ва юридик шахсларнинг мурожаатлари тўғрисида"ги Қонунининг 25-моддасига мувофиқ тегишлилиги юзасидан муносабат билдириш учун мурожаатингизни Қишлоқ хўжалиги вазирлигига юборилганлигини маълум қиламиз.

**Раис ўринбосари** **А.Акбаров**

Unofficial translation

2020.11.09 №03-19-101

"JURU ENERGY CONSULTING" Ltd

(10A Chust Str., Mirzo Ulugbek district,Tashkent, Uzbekistan)

State Committee of Veterinary and Livestock Development having considered your letter No. UZB-ACWA-CCGT-20/20/43 dated September 3, 2020, informs the following.

Based on the Law of the Republic of Uzbekistan "On veterinary" we inform you that issues mentioned in your letter are not in the competence of the state Veterinary Committee. In accordance with article 25 of the law "On appeals of individuals and legal entities", we forwarded your appeal to the Ministry of Agriculture to obtain more detailed response.

**Signed**

**Deputy chairman**

**A.Akbarov**