Final Assessment Report

SERVICE TENDER FOR THE ANALYTICAL TESTING & EVALUATION OF WASTEWATER QUALITY IN THE MALTESE ISLANDS FOR THE WATER SERVICES CORPORATION

November 2023

SUNLAB GROUP Ltd – LS 2.0.12 - Sir Temi Buildings, Malta Life Sciences Park, San Gwann SGN 3000 (Malta) VAT N° MT 1900-7727, Mob. (+356) 79598726, Tel. (+356) 21381391, www.sunlabgroup.com

Sunlab Group Ltd and **C.A.D.A. s.n.c.** participate as a joint venture - **SC** - in carrying out the activities envisaged in the **WSC/T/125/2021** - SERVICE TENDER FOR THE ANALYTICAL TESTING & EVALUATION OF WASTE WATER QUALITY IN THE MALTESE ISLANDS FOR THE WATER SERVICES CORPORATION- tender, assuming joint and several liabilities for the execution of the contract. Sunlab Group Ltd is authorized to bind and receive instructions for and on behalf of all partners within "SC" individually and collectively, while any Performance Guarantee (if required) may be issued by CADA. The joint venture includes the same partners, C.A.D.A. s.n.c. and Sunlab Group Ltd, for the entire contract execution period other than that permitted or required by law.

Sunlab Group Ltd
Life Science Park,
Industrial Estate,
San Gwann, Malta
Mob. (+356) 79598726
Tel. (+365) 21381391
www.sunlabgroup.com

***C**himica*
***A**pplicata*
***D**epurazione*
***A**cque s.n.c.*
di Filippo Giglio & C

C. A. D. A. s.n.c.
Via Pio La Torre n° 13
Area PIP, 92013
Menfi (AG)
Tel 0925/71148-73138
Fax 0925/72079
www. cadaonline.it

Summary

SUNLAB GROUP Ltd – LS 2.0.12 - Sir Temi Buildings, Malta Life Sciences Park, San Gwann SGN 3000 (Malta) VAT N° MT 1900-7727, Mob. (+356) 79598726, Tel. (+356) 21381391, www.sunlabgroup.com

INTRODUCTION

1. In October 2021, **Water Services Corporation** (hereafter '**WSC**) issued a call for tenders titled "SERVICE TENDER FOR THE ANALYTICAL TESTING & EVALUATION OF WASTEWATER QUALITY IN THE MALTESE ISLANDS FOR THE WATER SERVICES (Reference number no. **WSC/T/125/2021**) hereafter referred to as "the Tender". The scope of this tender is the monitoring, analysis and reporting of Wastewater from twenty-two (22) points around the Maltese Archipelago, managed and operated by WSC.

2. A joint bid for this tender was submitted by the consortium **Sunlab Group Ltd** and **C.A.D.A. s.n.c.** (**SC** consortium). This was accepted by WSM by Letter of Award dated 26th November 2021 and the contract was entered into force on January 2022.

3. Sampling and analysis activities are carried out in compliance with international, ISO, European or national standards to ensure a high level of quality of the monitoring results. These methods enable the collection of representative samples and the provision of valid, accurate, reliable, and representative scientific data that best identifies the environmental conditions at the time of sampling. The periodic and frequent analysis makes possible the evaluation of the trend over time of the required parameters, therefore, these would help WSC to identify appropriate mitigation measures.

4. Sampling is requested for twenty (20) wastewater sampling points per session, 19 industrial sites and 1 residential, out of three possible, is chosen each session by WSC. The number of points monitored in each session may change due to the sewage collector status.

5. Each point will be reached by Sunlab technical staff in compliance with safety regulations, wearing the appropriate PPE, including an H_2S detector, and not being an obstacle to the normal operation of the sites where sapling points are situated.

6. Figure 1 shows a map of the location of the points.

Figure 1: Sampling points locations.

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7. WSC requires sampling and analysis of wastewater on a two-month basis. The parameters listed in **Annex 1** of the tender are the chemical and physical parameters that must be determined by the SC.

8. The parameters reported in the aforementioned annex are listed in the next chapter together with the sampling method and the LOD.

9. As per Tender **WSC/T/125/2021 Clause 4.1.1** "Project Description", a "Repeated Analysis request" can be done by the Customer after receiving the draft report (Excel spreadsheet) with samples analysis results.

10. This Final Technical Report presents the results of all **nine sessions** carried out between years **2022 and 2023.**
The object of this Final Assessment report is the comparation of results obtained during the 9 nine sessions with a verification of specific any trends present (both within individual points and also between different points), presence of persistent pollutants, seasonal variations in results and also an overall classification of all the sampling points based on the overall quality of the waste water over the whole length of the contract.

11. *Table 1* shows the names of all points analyzed during the nine sessions and their GPS coordinates:

Table 1 - GPS coordinates of the sampling points

Sampling Point	Location	GPS Coordinates	
		N	E
B1 – Attard (Residential)	Malta	**35°53'17.30"**	**14°26'8.38"**
B2 - Zurrieq (Residential)	Malta	**35°50'20.37"**	**14°28'28.57"**
B3 - Xaghra – Gozo (Residential)	Gozo	**36°2'25.76"**	**14°15'33.64"**
MT1 - Bulebel South	Malta	**35°51'39.51"**	**14°31'21.54"**
MT2 - Hal Far	Malta	**35°48'36.38"**	**14°30'44.52"**
MT3 - Mriehel	Malta	**35°53'17.42"**	**14°28'1.17"**
MT4 – Hard Rock Industrial Estate	Malta	**35°55'51.68"**	**14°25'48.38"**
MT5 – Wied il-Ghasel	Malta	**35°54'51.39"**	**14°25'23.67"**
MT6 – Marsa GSD	Malta	**35°52'19.8"**	**14°29'29.68"**
MT7 – Marsa Garibaldi	Malta	**35°52'15.34"**	**14°29'47.25"**
MT8 – Mosta Technopark	Malta	**35°54'21.36"**	**14°26'16.33"**
MT9 – Handaq	Malta	**35°52'23.47"**	**14°28'15.75"**
MT10 – Pwales (PS)	Malta	**35°56'44,46"**	**14°22'44.45"**
MT11 – Cumnija Mellieha	Malta	**35°58'2.64"**	**14°20'16.05"**
MT12 - Corradino (PS)	Malta	**35°52'41.04"**	**14°30'5.32"**
MT13 – Ta'Barkat	Malta	**35°52'50.30"**	**14°33'15.18"**
MT14 – Gzira (PS)	Malta	**35°54'10.46"**	**14°29'30.37"**
MT15 – Marsa (PS)	Malta	**35°52'37.61"**	**14°29'45.62"**
GZ1 – Ras il-Hobz	Gozo	**36°1'9.86"**	**14°16'38.43"**
GZ2 – Xewkija West	Gozo	**36°2'19.65"**	**14°15'11.89"**
GZ3 – Xewkija East	Gozo	**36°2'12.42"**	**14°15'31.54"**
GZ4 – Xewkija Old DP	Gozo	**36°2'19.64"**	**14°15'3.64"**

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12. The Methodology chapter describes in detail the sampling procedure that was carried out to collect the samples, the methods used to analyse the physical and chemical parameters, and the respective declared LODs.

13. The Conclusion chapter shows the comparation of results obtained during the 9 nine sessions.

14. All anticipation test reports did during different sessions for each point are shown in a file excel in Annex A.

15. All the graphs obtained from the comparison of the results of the most frequently encountered and most representative parameters (also at the level of chemical indications) for each point during the various sessions are shown in Annex B.

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METHODOLOGY

16. **Sunlab Group Ltd.** is an environmental chemical analysis laboratory accredited according to EN ISO/IEC 17025: 2017 by the Maltese accreditation body NAB, n°18.

17. **C.A.D.A. s.n.c.** is an Italian environmental chemical analysis laboratory accredited according to UNI CEI EN ISO/IEC 17025: 2018 by the Italian accreditation body Accredia, n°439L.

18. The two laboratories constitute the **SC** joint venture, in which, at the same time as the tender subject of this Technical Report, Sunlab Group ltd is responsible for sampling and determining the physical parameters on-site, whilst C.A.D.A. s.n.c. is responsible for the analysis of all other required chemical parameters.

19. Sampling is carried out by Sunlab Group technicians who are qualified and trained for sampling and testing wastewater on-field.

20. At each sampling point, the technician, equipped with the appropriate PPE, assesses whether the sampling can take place in safe conditions and proceeds in such a way as not to be an obstacle to the work that takes place in plants eventually interested and such as to safeguard his health and that of others.

21. Should problems arise, the technicians proceed to promptly communicate them to WSC Staff.

22. Regarding water samples, the technician proceeds following the ISO 5667-10:2020 method by using a bailer, i.e., a pipe open to the upper end, with a ball valve at the lower end. During the descent into the liquid element, the valve is pushed upwards and kept open by the liquid pressure. During the ascent phase, it is the sample's weight that keeps the valve closed, with the pressure exerted by the upper liquid layers through the opening at the top. The bailer allows taking samples of up to 1 L at the time, which is used to fill the different containers suitably cleaned and rinsed with part of the same sample. In the case of surface waters, the use of a telescopic rod is also envisaged.

23. Once the containers have been filled, the Sunlab technician proceeds with the determination of the physical parameters on field. Before measurement, the probes are properly cleaned and calibrated.

24. Parameters, determination standard methods and LOD (limit of Detection) are listed in *Table 2*.

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Table 2 – Parameters to be analysed according to Annex 1 of the Tender for all sessions

Parameters	Method	Unit	LOD
Sampling	ISO 5667-10:2020	///	///
Determination of conductivity	APAT CNR IRSA 2030 Man 29 2003	µS/cm	///
Determination of temperature	APAT CNR IRSA 2100 Man 29 2003	°C	///
Determination of pH	APAT CNR IRSA 2060 Man 29 2003	Unit	///
Determination of BOD*	APHA Standard Methods for the Examination of Water and Wastewater ed 23nd 2017, 5210 D	mg O2/l	< 5
Determination of COD*	APAT CNR IRSA 5130 Man 29 2003	mg O2/l	< 5
Determination of turbidity*	APAT CNR IRSA 2110 Man 29 2003	NTU	< 0,4
Determination of total suspended solids*	APAT CNR IRSA 2090 B Man 29 2003	mg/l	< 0,01
Determination of settleable solids*	APAT CNR IRSA 2090 C Man 29 2003	ml/l	< 0,1
Determination of total dissolved solids*	APAT CNR IRSA 2090 A Man 29 2003	mg/l	< 20
Determination of TOC*	UNI EN 1484:1999	mg/l	< 0,1
Determination of phosphorus*	ISO 15923-1:2013	mg P /l	< 0,04
Determination of total Kjeldahl nitrogen*	APAT CNR IRSA 5030 Man 29 2003	mg N/l	< 0,5
Determination of surfactants*	APAT CNR IRSA 5170 Man 29 2003	mg/l	< 0,01
Determination of aluminium*	UNI EN ISO 17294-2:2016	µg/l	< 20
Determination of antimony*	UNI EN ISO 17294-2:2016	µg/l	< 1
Determination of silver*	UNI EN ISO 17294-2:2016	µg/l	< 1
Determination of arsenic*	UNI EN ISO 17294-2:2016	µg/l	< 1
Determination of barium*	UNI EN ISO 17294-2:2016	µg/l	< 5
Determination of beryllium*	UNI EN ISO 17294-2:2016	µg/l	< 0,5
Determination of boron*	UNI EN ISO 17294-2:2016	µg/l	< 0,05
Determination of cadmium*	UNI EN ISO 17294-2:2016	µg/l	< 1
Determination of cobalt*	UNI EN ISO 17294-2:2016	µg/l	< 1
Determination of chromium*	UNI EN ISO 17294-2:2016	µg/l	< 1
Determination of iron*	UNI EN ISO 17294-2:2016	µg/l	< 20
Determination of gadolinium*	UNI EN ISO 17294-2:2016	µg/l	< 5
Determination of manganese*	UNI EN ISO 17294-2:2016	µg/l	< 1
Determination of mercury*	UNI EN ISO 17294-2:2016	µg/l	< 0,1
Determination of molybdenum*	UNI EN ISO 17294-2:2016	µg/l	< 1
Determination of nickel*	UNI EN ISO 17294-2:2016	µg/l	< 10
Determination of lead*	UNI EN ISO 17294-2:2016	µg/l	< 1
Determination of copper*	UNI EN ISO 17294-2:2016	µg/l	< 5
Determination of selenium*	UNI EN ISO 17294-2:2016	µg/l	< 10
Determination of silica*	UNI EN ISO 11885:2009	mg/l	< 0,5
Determination of tin*	UNI EN ISO 17294-2:2016	µg/l	< 1
Determination of thallium*	UNI EN ISO 17294-2:2016	µg/l	< 1
Determination of tellurium*	UNI EN ISO 17294-2:2016	µg/l	< 10
Determination of titanium*	UNI EN ISO 17294-2:2016	µg/l	< 10
Determination of vanadium*	UNI EN ISO 17294-2:2016	µg/l	< 1
Determination of zinc*	UNI EN ISO 17294-2:2016	µg/l	< 20
Determination of ammonia*	ISO 15923-1:2013	mg NH4/l	< 0,04
Determination of calcium*	UNI EN ISO 14911:2001	mg/l	< 1
Determination of magnesium*	UNI EN ISO 14911:2001	mg/l	< 1
Determination of potassium*	UNI EN ISO 14911:2001	µg/l	< 100
Determination of sodium*	UNI EN ISO 14911:2001	µg/l	< 100
Determination of bicarbonate*	APAT CNR IRSA 2010 B Man 29 2003	mg/l	< 1

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Parameters	Method	Unit	LOD
Determination of cyanide*	UNI EN ISO 14403-2:2013	mg/l	< 0,005
Determination of chloride*	ISO 15923-1:2013	mg/l	< 0,1
Determination of fluoride*	EPA 300.1 1997 part A + EC 1999	mg/l	< 0,05
Determination of nitrate*	ISO 13395:1996	mg/l	< 0,3
Determination of nitrite*	ISO 15923-1:2013	mg/l	< 0,03
Determination of orthophosphate*	ISO 15923-1:2013	mg/l	< 0,1
Determination of sulphate*	ISO 15923-1:2013	mg/l	< 0,1
Determination of sulphide*	APAT CNR IRSA 4160 Man 29 2003	mg/l	< 0,1
Determination of free and emulsified grease*	APAT CNR IRSA 5160 B1-B2 Man 29 2003	mg/l	< 0,05
Determination of petroleum hydrocarbons*	APAT CNR IRSA 5160 B2 Man 29 2003	µg/l	< 50
Determination of benzene*	EPA 5030C 2003 + EPA 8260D 2018	µg/l	< 0,1
Determination of toluene*	EPA 5030C 2003 + EPA 8260D 2018	µg/l	< 0,1
Determination of ethylbenzene*	EPA 5030C 2003 + EPA 8260D 2018	µg/l	< 0,1
Determination of xylene*	EPA 5030C 2003 + EPA 8260D 2018	µg/l	< 0,1
Determination of styrene*	EPA 5030C 2003 + EPA 8260D 2018	µg/l	< 0,1
Determination of 1, 2, 4-Trimethilbenzene*	EPA 5030C 2003 + EPA 8260D 2018	µg/l	< 0,1
Determination of tert-butylmethylether*	EPA 5030C 2003 + EPA 8260D 2018	µg/l	< 0,1
Determination of benzo-a-pyrene*	EPA 3510C 1996 + EPA 8270E 2018	µg/l	< 0,01
Determination of benzo-b-fluoranthene*	EPA 3510C 1996 + EPA 8270E 2018	µg/l	< 0,01
Determination of benzo-ghi-perylene*	EPA 3510C 1996 + EPA 8270E 2018	µg/l	< 0,01
Determination of benzo-k-fluoranthene*	EPA 3510C 1996 + EPA 8270E 2018	µg/l	< 0,01
Determination of indeno-123cd-pyrene*	EPA 3510C 1996 + EPA 8270E 2018	µg/l	< 0,01
Determination of PAHs Σ (Benzo-a-pyrene, benzo-b-fluoranthene, benzo-ghi-perylene, benzo-k-fluoranthene, indeno-123cd-pyrene)*	EPA 3510C 1996 + EPA 8270E 2018	µg/l	< 0,01
Determination of 1, 2-Dichloroethane*	EPA 5030C 2003 + EPA 8260D 2018	µg/l	< 0,1
Determination of trichloromethane*	EPA 5030C 2003 + EPA 8260D 2018	µg/l	< 0,05
Determination of tetrachloroethylene*	EPA 5030C 2003 + EPA 8260D 2018	µg/l	< 0,1
Determination of pentachlorophenol*	EPA 3510C 1996 + EPA 8270E 2018	µg/l	< 0,01
Determination of P-Chloro-m-cresol*	EPA 3510C 1996 + EPA 8270E 2018	µg/l	< 0,01
Determination of chlorpyrifos-methyl*	EPA 3510C 1996 + EPA 8270E 2018	µg/l	< 0,01
Determination of perfluoro-n-octanoic acid (PFOA)*	MPI-106-2019 Rev. 2	µg/l	< 0,01
Determination of aniline*	EPA 3510C 1996 + EPA 8270E 2018	µg/l	< 0,01
Determination of diethylphthalate (DEP)*	EPA 3510C 1996 + EPA 8270E 2018	µg/l	< 0,1
Determination of glyphosate*	MPI-97-2019 Rev. 2	µg/l	< 0,01
Determination of acetone*	EPA 5021A 2014 + EPA 8260D 2018	µg/l	< 0,1

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Parameters	Method	Unit	LOD
Determination of formaldehyde*	APAT CNR IRSA 5010 A Man 29 2003	µg/l	< 1
Determination of cyclohexanone*	EPA 5021A 2014 + EPA 8260D 2018	µg/l	< 10
Determination of N-methyl-2-pyrrolidone*	EPA 3510C 1996 + EPA 8321B 2007	µg/l	< 10
Determination of propane-1, 2- diol*	UNICHIM 1367:1999	µg/l	< 100
Determination of EDTA*	MPI-258-2022 Rev. 0	µg/l	< 40
Determination of triisobutylphosphate*	EPA 3510C 1996 + EPA 8321B 2007	µg/l	< 1
Determination of methylbenzotriazole*	EPA 3510C 1996 + EPA 8321B 2007	µg/l	< 1
Determination of benzotriazole*	EPA 3510C 1996 + EPA 8321B 2007	µg/l	< 0,1
Determination of DEHP*	EPA 3510C 1996 + EPA 8270E 2018	µg/l	< 0,1
Determination of triphenyl phosphate*	EPA 3510C 1996 + EPA 8321B 2007	µg/l	< 0,01
Determination of bisphenol A*	MPI-257-2022 Rev. 0	µg/l	< 0,01
Determination of acesulpham K*	EPA 1694:2007	µg/l	< 1
Determination of fipronil*	EPA 3510C 1996 + EPA 8321B 2007	µg/l	< 0,01
Determination of azoxystrobin*	EPA 3510C 1996 + EPA 8321B 2007	µg/l	< 0,01
Determination of deltamethrin*	EPA 3510C 1996 + EPA 8321B 2007	µg/l	< 0,01
Determination of dimethomorph*	EPA 3510C 1996 + EPA 8321B 2007	µg/l	< 0,01
Determination of propamocarb*	EPA 3510C 1996 + EPA 8321B 2007	µg/l	< 0,01
Determination of imidacloprid*	EPA 3510C 1996 + EPA 8321B 2007	µg/l	< 0,01
Determination of diuron*	EPA 3510C 1996 + EPA 8321B 2007	µg/l	< 0,01
Determination of beta-estradiol*	EPA 1694:2007	µg/l	< 0,01
Determination of sulphamethoxazole*	UNI EN ISO 21676:2021	µg/l	< 0,01
Determination of carbamazepine*	UNI EN ISO 21676:2021	µg/l	< 0,01
Determination of atenolol*	UNI EN ISO 21676:2021	µg/l	< 0,01
Determination of amoxicillin*	UNI EN ISO 21676:2021	µg/l	< 0,01
Determination of trimethoprim*	UNI EN ISO 21676:2021	µg/l	< 0,01
Determination of diclofenac*	UNI EN ISO 21676:2021	µg/l	< 0,01
Determination of paracetamol*	UNI EN ISO 21676:2021	µg/l	< 0,01
Determination of toxicity (with Vibrio Fischeri)*	APAT CNR IRSA 8030 Man 29 2003 (excluding attachment C)	EC50 30min%	-
Determination of toxicity (with Daphna Magna) (A)*	ISO 6341:2012 (excluding attachment C)	% immobili/48 h	-

Note: (*) This analysis is carried out by CADA s.n.c.

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RESULTS

After the nine monitoring sessions carried out between 2022 and 2023 at the points indicated in Table 1, the considerations developed following the results found for the various parameters being monitored are reported below, with data processing and interpretations of the same as request in the tender document of WSC/T/125/2021.

A. Summary of the results obtained for each individual sampling point

In Annex A there are all results for each individual sampling point during the different session.

B. Comparison graphs

In Annex B were created graphs for the following analytes
-COD,
-BOD,
-Turbidity,
-Total Suspended Solids,
-Sedimentable Solids,
- TOC,
-Total Phosporous,
-Kjeldahl Nitrogen (TKN),
-Anionic Surfactant,
-Ammoniacal Nitrogen,
-Alluminium,
-Iron,
for single sampling point to identify the trends and possible of wastewater discharge.
The parameters indicated above were selected as they are representative of a possible wastewater discharge, also based on the relevant quantities found.
The values of the parameters are considerably variable in the different sampling points and in the different seasons. From the graphs shown in Annex B it is possible to identify any trends depending on the parameter and the seasons.

C. Ordered lists of polluting species and detection percentage

In Annex C there is the table highlights the parameters with Percentage detection greater than 50%.
The parameters found with Percentage Detection greater than 50 % are of different type:

I. Industrial Products:

- Formaldehyde,
- Acetone,
- Methylbenzotriazole,
- Benzotriazole,
- Bisfenolo A,

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- Metals.

II. artificial sweetener:

- Acesulfamate K

III. Drugs:

- Paracetamol,
- Diclofenac,
- Atenol,
- Amoxicillin,
- Sulfamethoxazole.

The presence of the aforementioned substances is probably due to industrial discharge and municipal wastewater.

D. Overall classification of sampling points

Based on the waste water quality data obtained from the 9 sampling lots was did a classification of the sampling points, in order to identify which are the most affected areas with the need for controls in relation to discharges into the sewer (see Annex A).

So the object of this Final report is the comparation of results obtained during the 9 nine sessions with a verification of specific any trends present (both within individual points and also between different points), presence of persistent pollutants, seasonal variations in results and also an overall classification of all the sampling points based on the overall quality of the waste water over the whole length of the contract.

Once the comparison criteria were defined, an evaluation model was developed that allows assigning a score to each parameter, with the aim of drawing up a final ranking of the wastewater quality at the different sampling points. The comparison between the 22 sampling points was performed on a seasonal basis, with the aim of identifying the point at which the quality of the analyzed wastewater is best and worst

The evaluation model involves the following steps:

1. assignment of a score between 1 and 5 to each significant parameter being evaluated;
2. calculation of a score between 1 and 5 to each parameter through the arithmetic mean of the scores calculated for each session;
3. calculation of a score between 1 and 5 at each sampling point, through the arithmetic mean of the scores calculated for each session and for each significant parameter.

The parameters being evaluated, are

- **Macroconstituent substances - present to annex 1 of the tender:**
  - *$BOD_{5;}$*
  - *COD;*
  - *Turbidity;*
  - *Total Suspended Solids;*
  - *Sedimentable Solids;*
  - *TOC;*
  - *Total Phosphorus;*
  - *Kjeldahl Nitrogen;*
  - *Anionic surfactants;*

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- *Alluminium;*
- *Iron;*
- *Ammoniacal Nitrogen;*
- *Animal and vegetable grease and oils;*
- *Total Petroleum Hydrocarbons.*

➢ **Parameters present in the list of priority substances of European directive 2013/39 and requested by WSC in this tender as parameters to determinate:**

- *Benzene;*
- *Cadmium;*
- *Mercury;*
- *Nickel;*
- *1,2-dichloroethane*
- *Lead;*
- *Trichloromethane;*
- *Pentachlorophenol;*
- *Summation of polycyclic aromatic hydrocarbons;*
- *DEHP;*
- *Diuron.*

The criteria for assigning scores for each significant parameter are shown in the following table:

Table 3 - Score assigned for the BOD5 parameter

Score	**Concentration [mgO_2/l]**
1	0-50
2	50-100
3	100-200
4	200-500
5	>500

Table 4 - Score assigned for the COD parameter

Score	**Concentration [mgO_2/l]**
1	0-100
2	100-200
3	200-500
4	500-1000

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5	>1000

Table 5 - Score assigned for the Turbidity parameter

Score	Nephelometric Turbidity Units [NTU]
1	0-50
2	50-100
3	100-200
4	200-400
5	>400

Table 6 - Score assigned for the Total Suspended Solids parameter

Score	Concentration [mg/l]
1	0-100
2	100-200
3	200-500
4	500-1000
5	>1000

Table 7 - Score assigned for the Sedimentable Solids parameter

Score	Concentration [ml/l]
1	0-50
2	50-100
3	100-200
4	200-500
5	>500

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Table 8 - Score Priority substances European Directive 2013/39

Score	Concentration
1	0-1
2	1-10
3	10-50
4	50-100
5	>100

Table 9 - Score assigned for the TOC parameter

Score	Concentration [mg/l]
1	0-50
2	50-100
3	100-200
4	200-500
5	>500

Table 10 - Score assigned for the Total Phosphorus parameter

Score	Concentration [mg P/l]
1	0-2
2	2-5
3	5-10
4	10-20
5	>20

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Table 11 - Score assigned for the Kjeldahl Nitrogen parameter

Score	Concentration [mg N/l]
1	0-5
2	5-20
3	20-80
4	80-200
5	>200

Table 12 - Score assigned for the Anionic surfactants parameter

Score	Concentration [mg/l]
1	0-2
2	2-5
3	5-10
4	10-20
5	>20

Table 13 - Score assigned for the Alluminium parameter

Score	Concentration [µg/l]
1	0-100
2	100-200
3	200-500
4	500-1000
5	>1000

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Table 14 - Score assigned for the Iron parameter

Score	Concentration [µg/l]
1	0-100
2	100-200
3	200-500
4	500-1000
5	>1000

Table 15 - Score assigned for the Ammoniacal Nitrogen parameter

Score	Concentration [mg NH_4/l]
1	0-2
2	2-10
3	10-50
4	50-100
5	>100

Table 16 - Score assigned for the Animal and vegetable grease and oils parameter

Score	Concentration [mg/l]
1	0-2
2	2-10
3	10-50
4	50-100
5	>100

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Table 17 - Score assigned for the Total Petroleum Hydrocarbons parameter

Score	Concentration [µg/l]
1	0-50
2	50-100
3	100-200
4	200-500
5	>500

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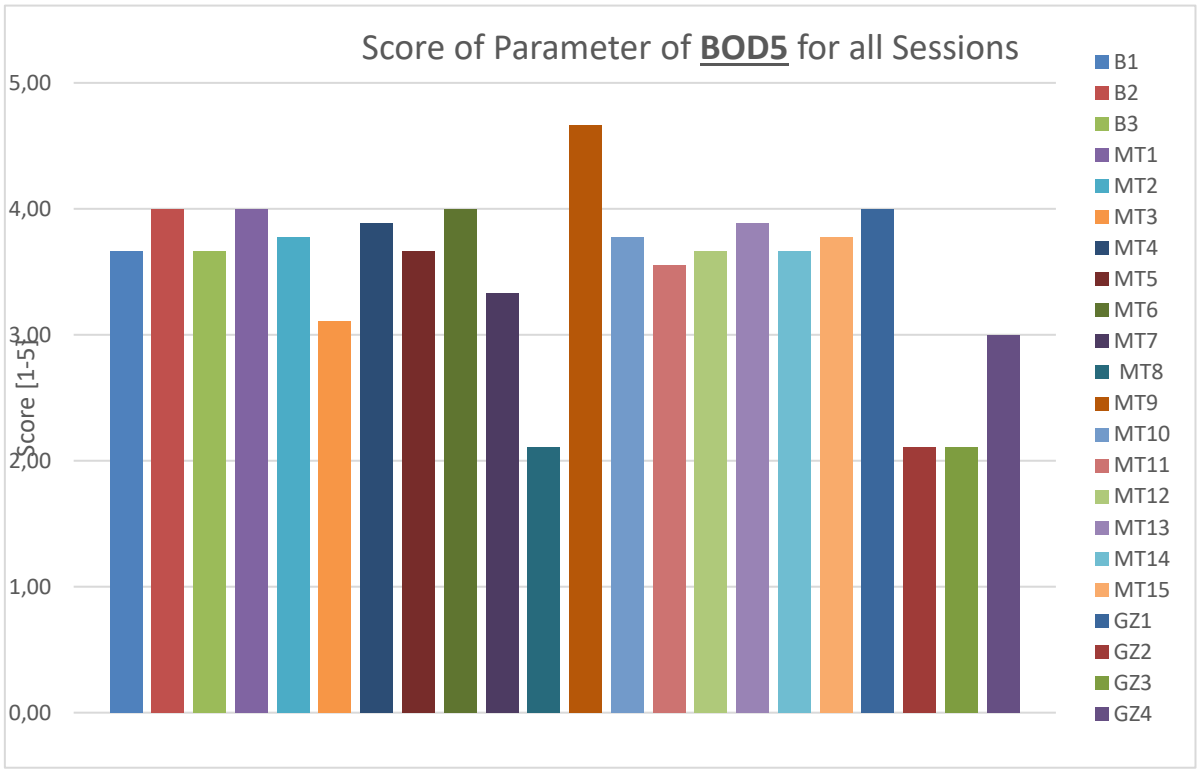
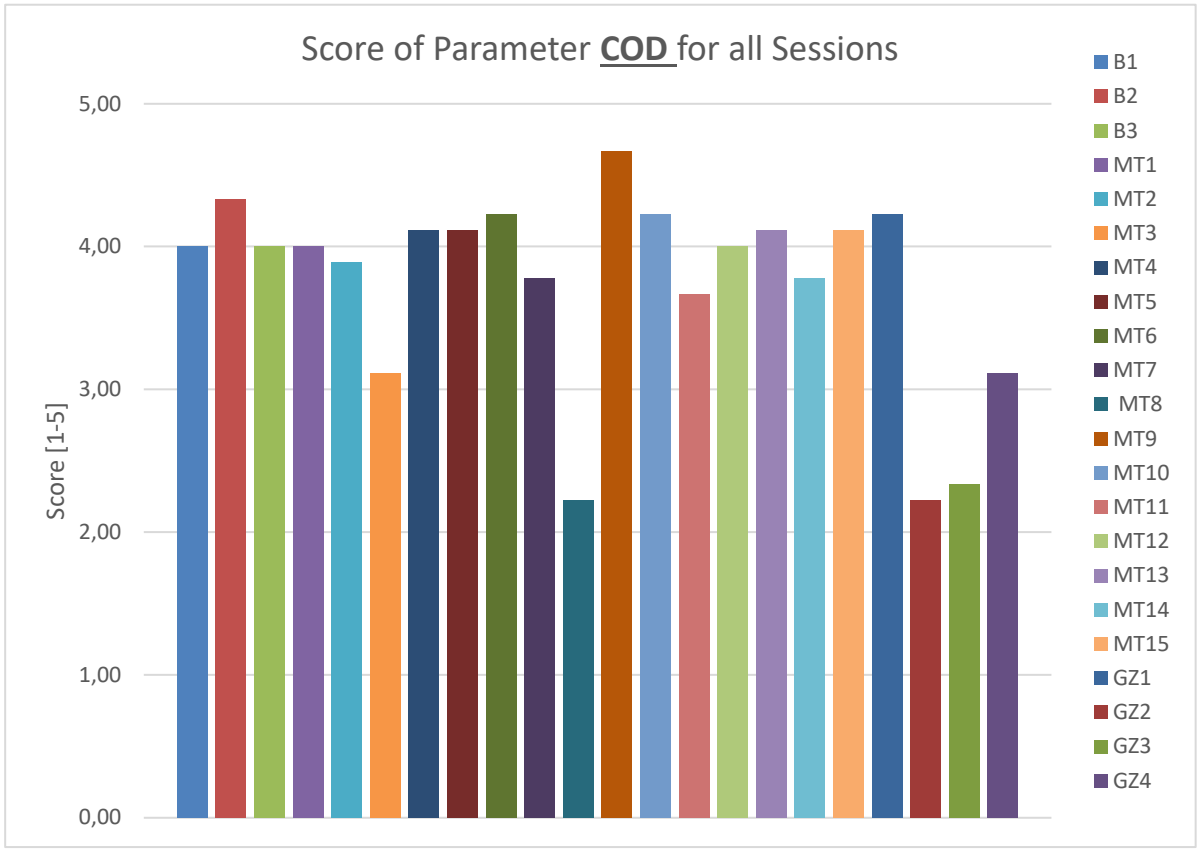
The results obtained for each parameter in the 9 sessions are reported below:





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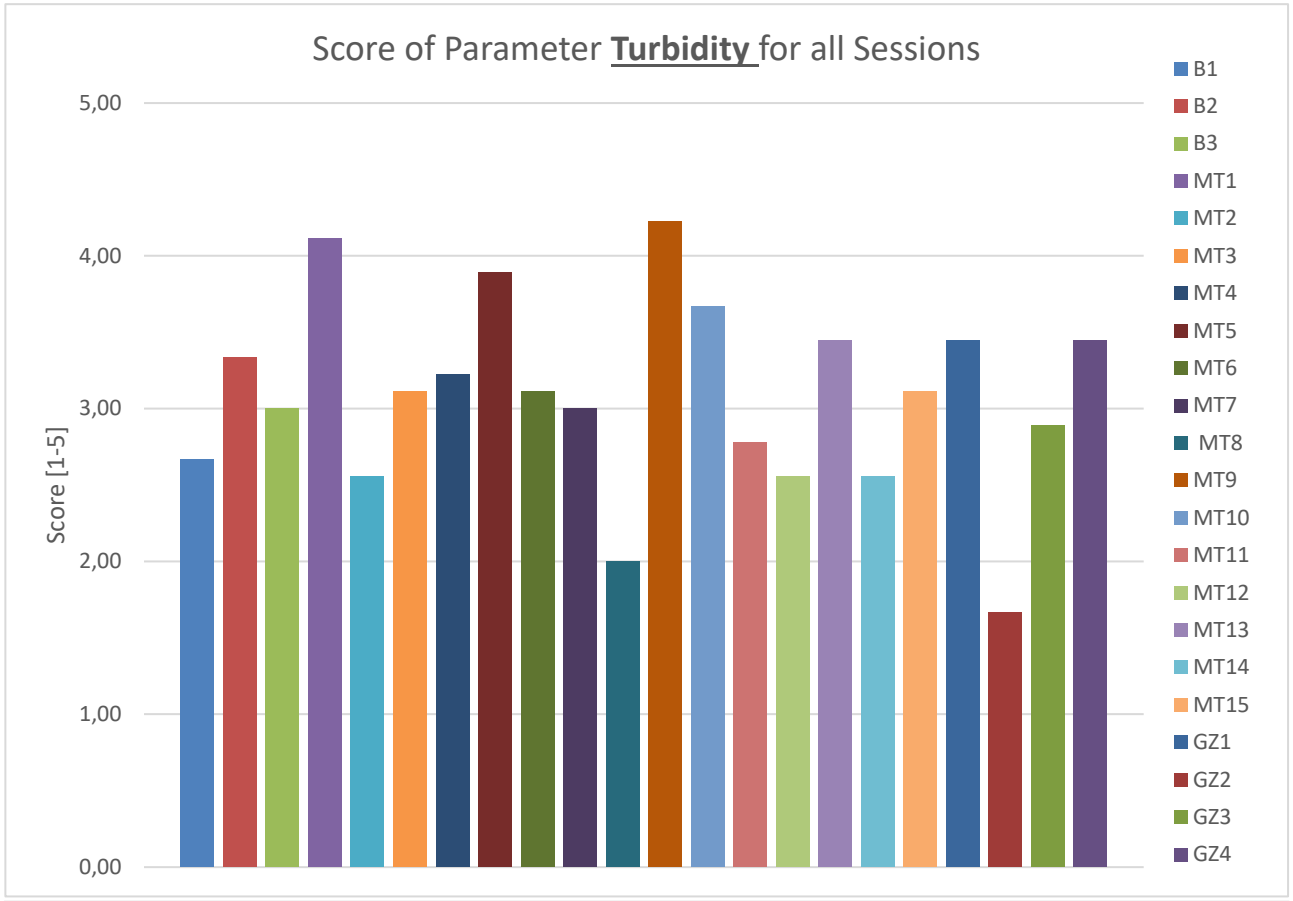

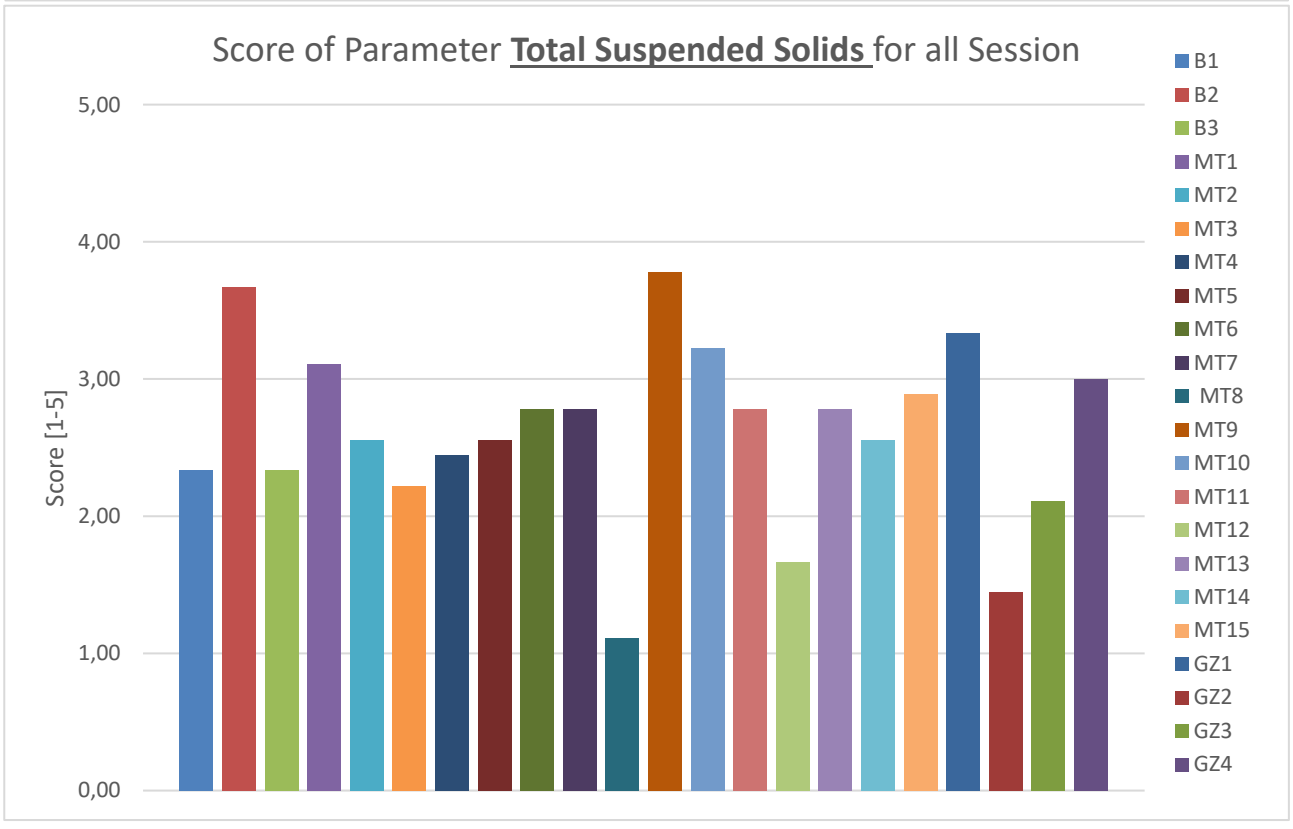

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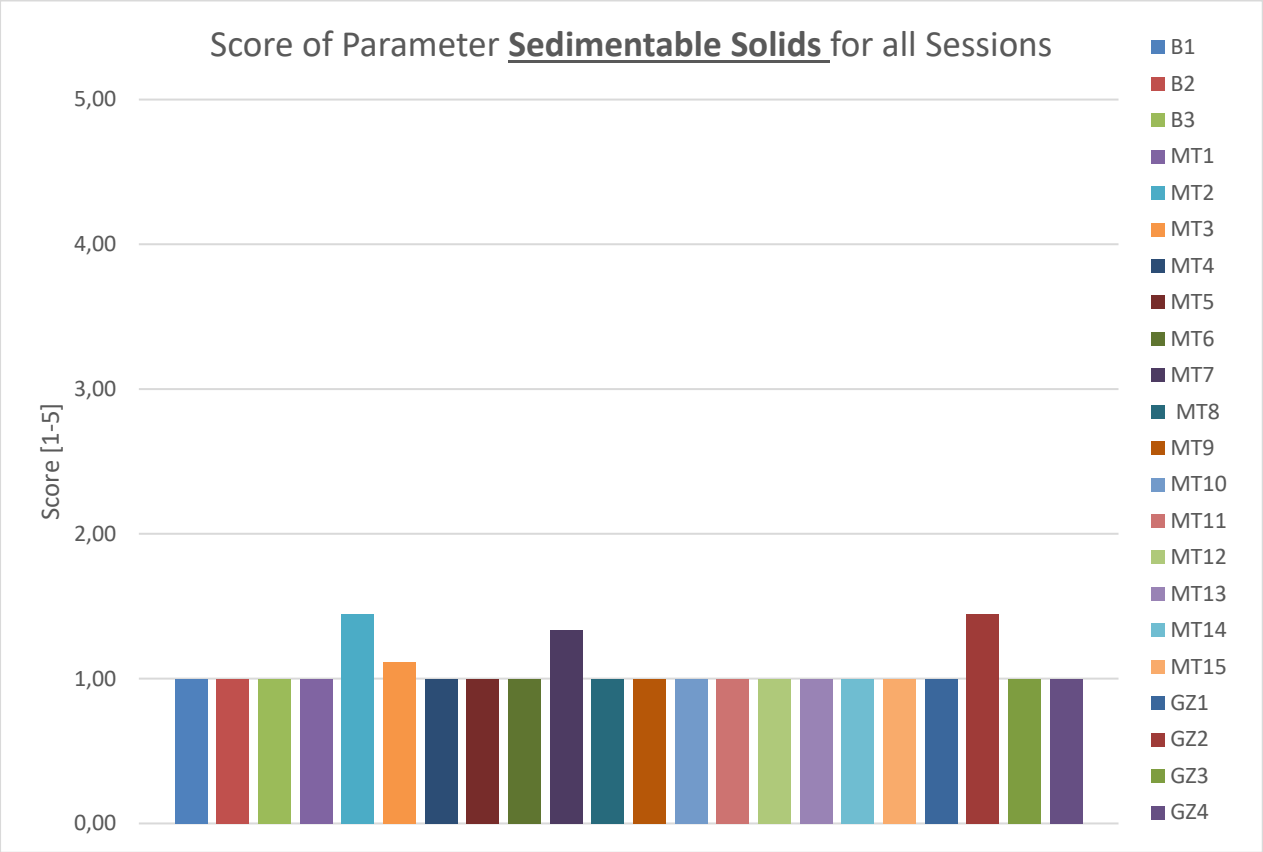

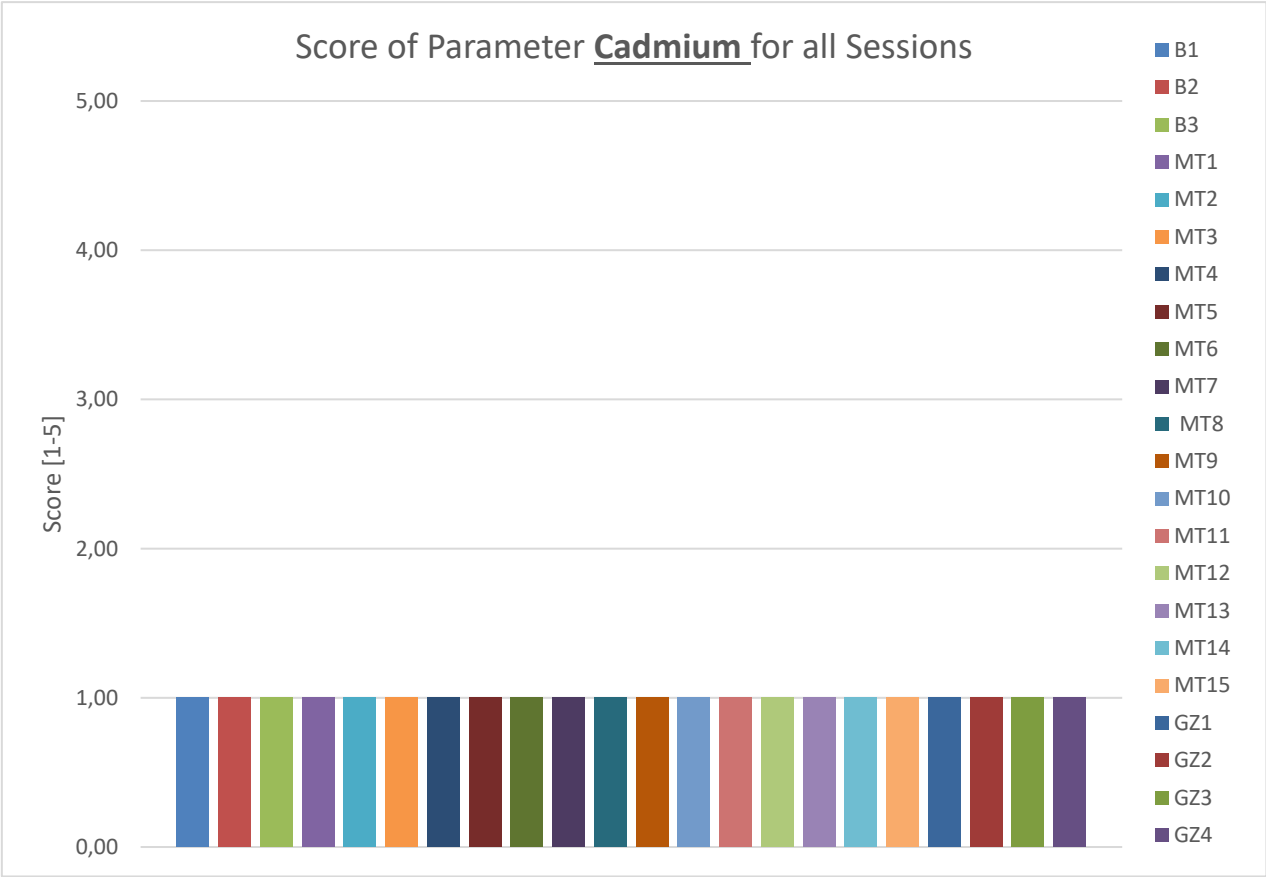

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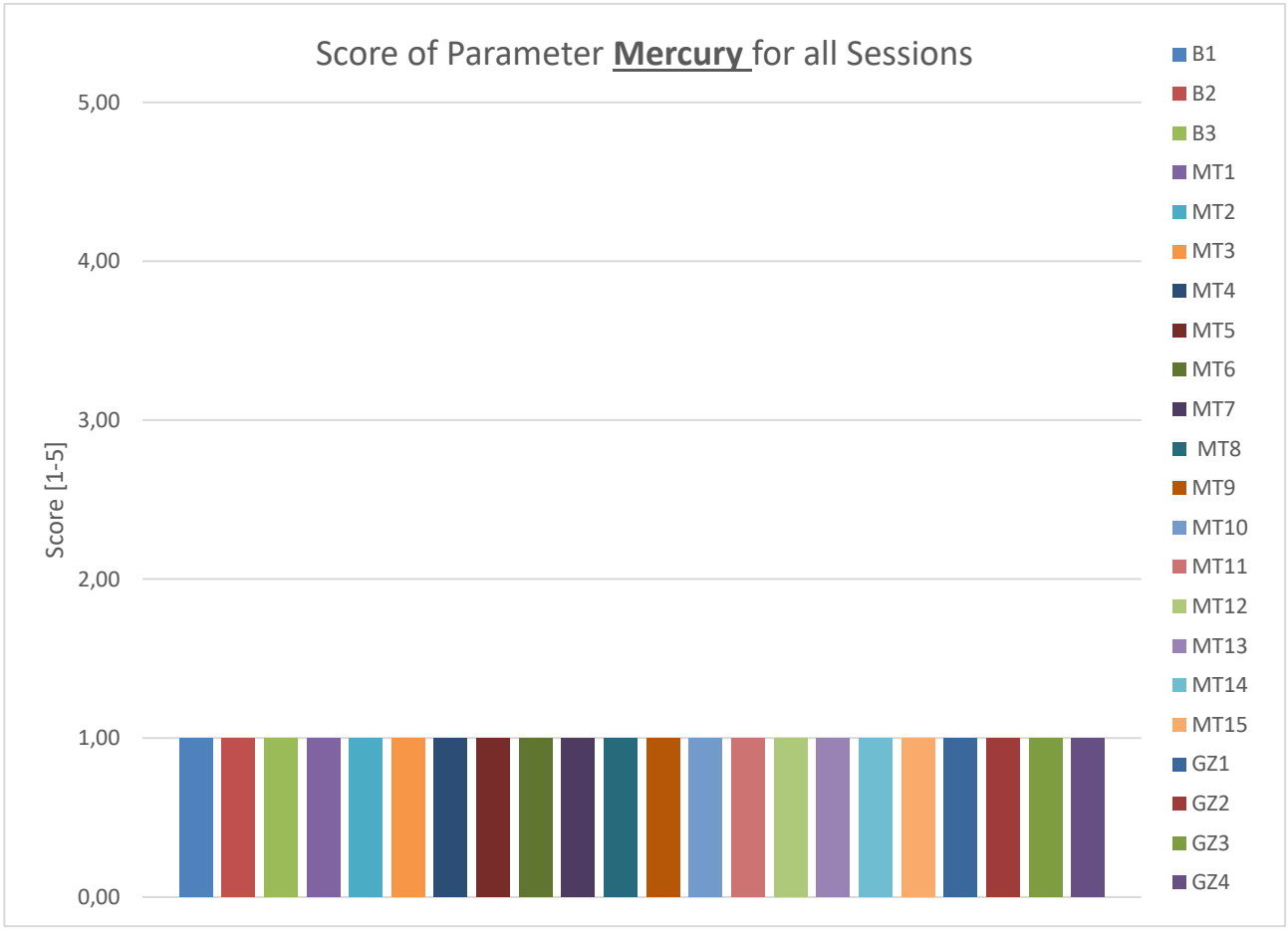

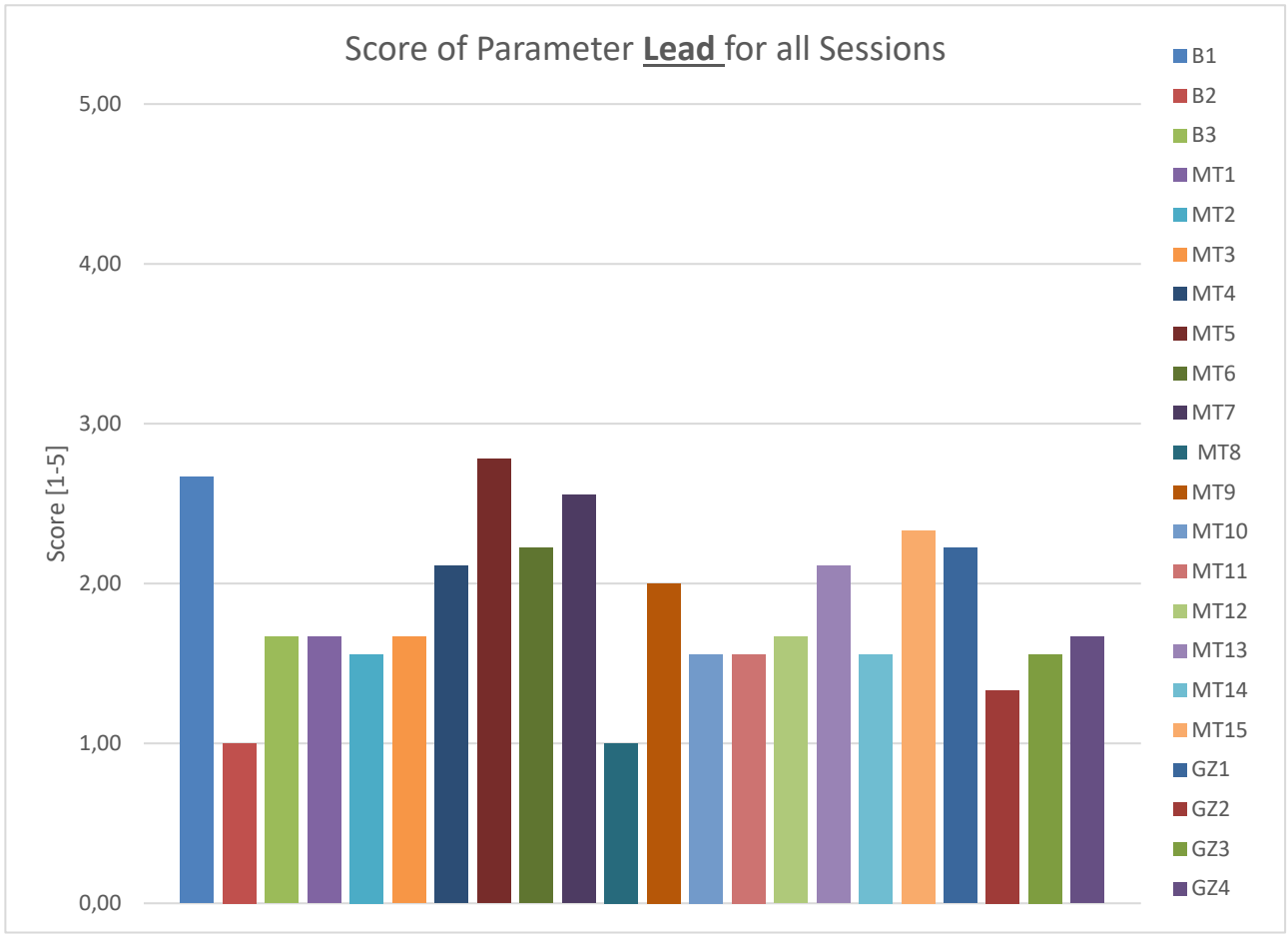

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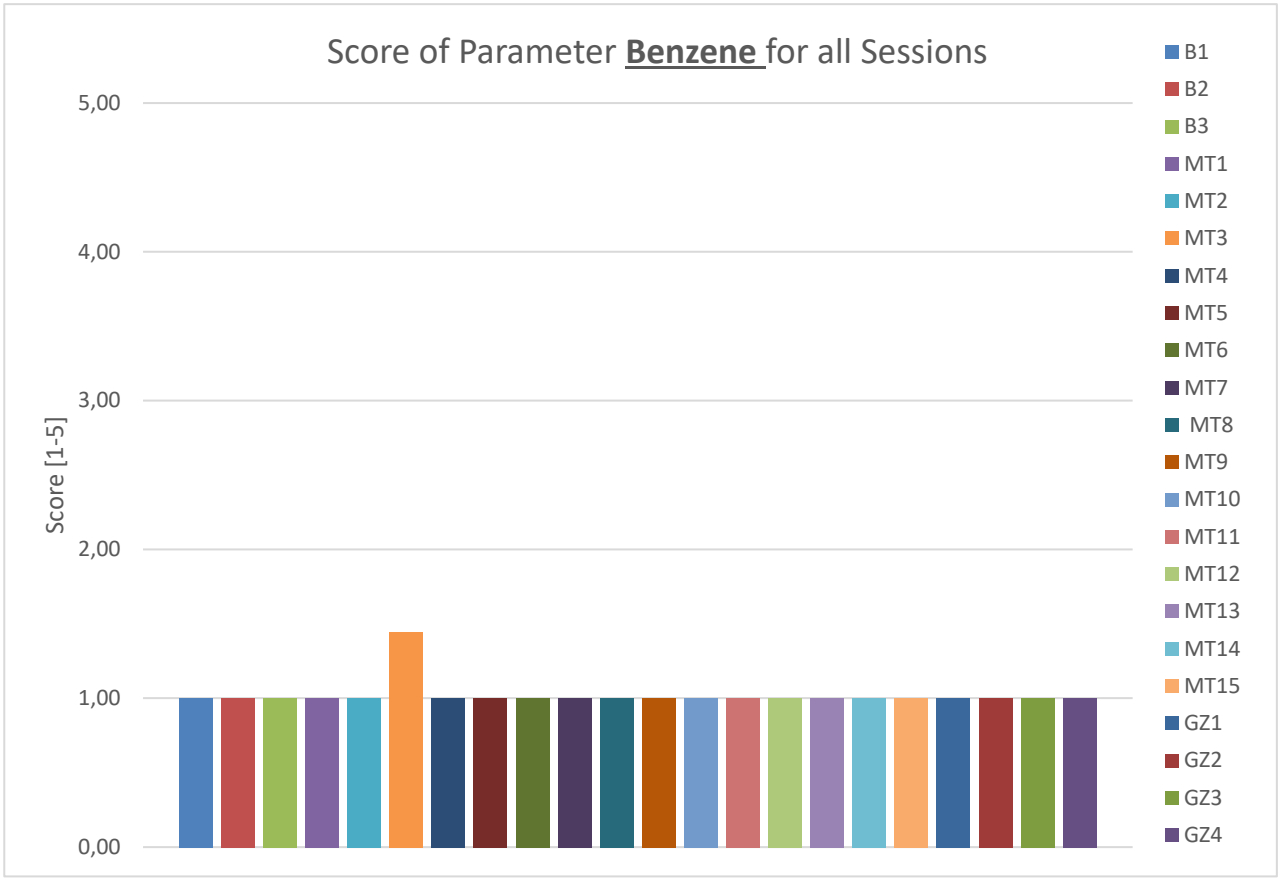

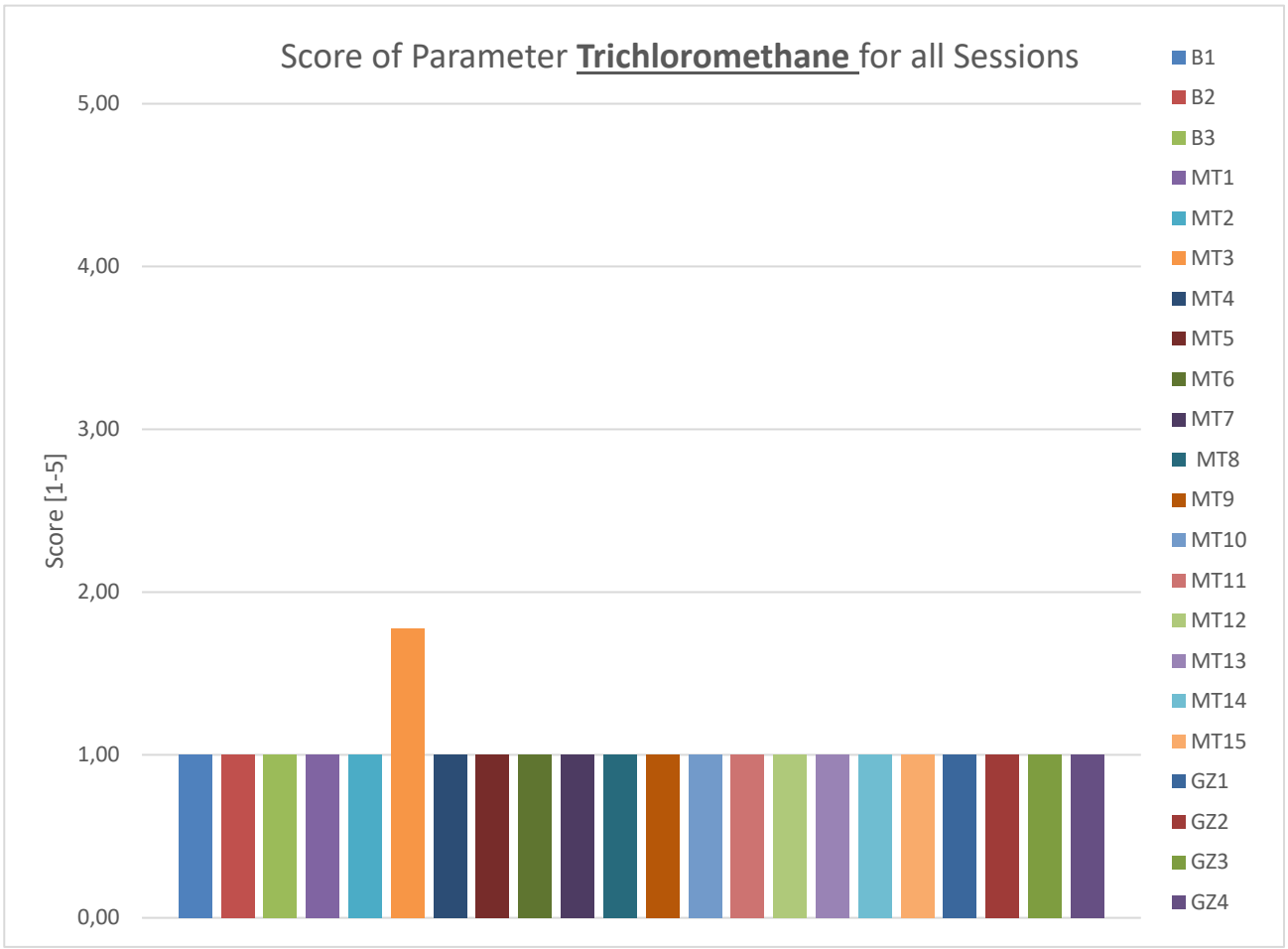

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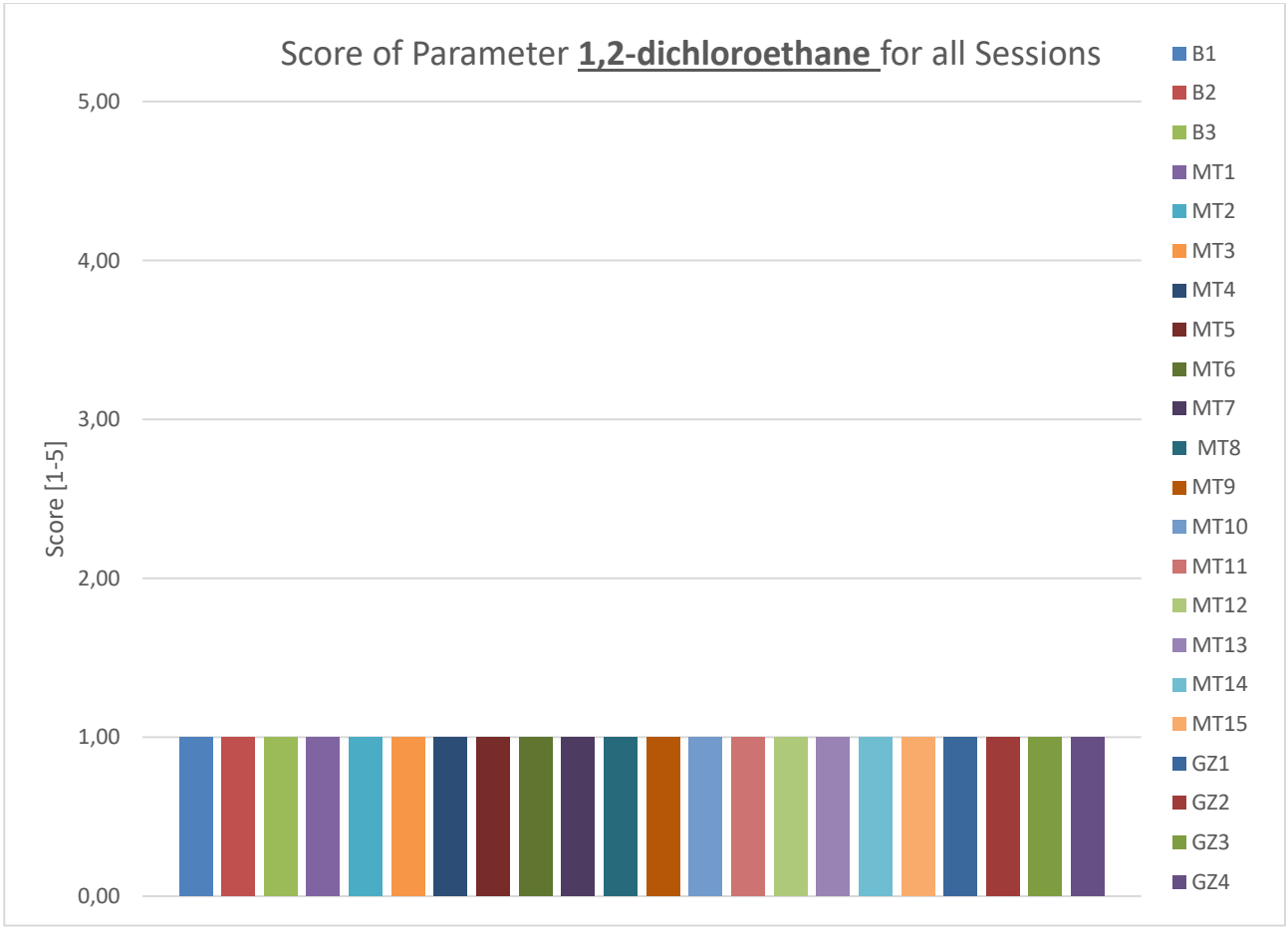

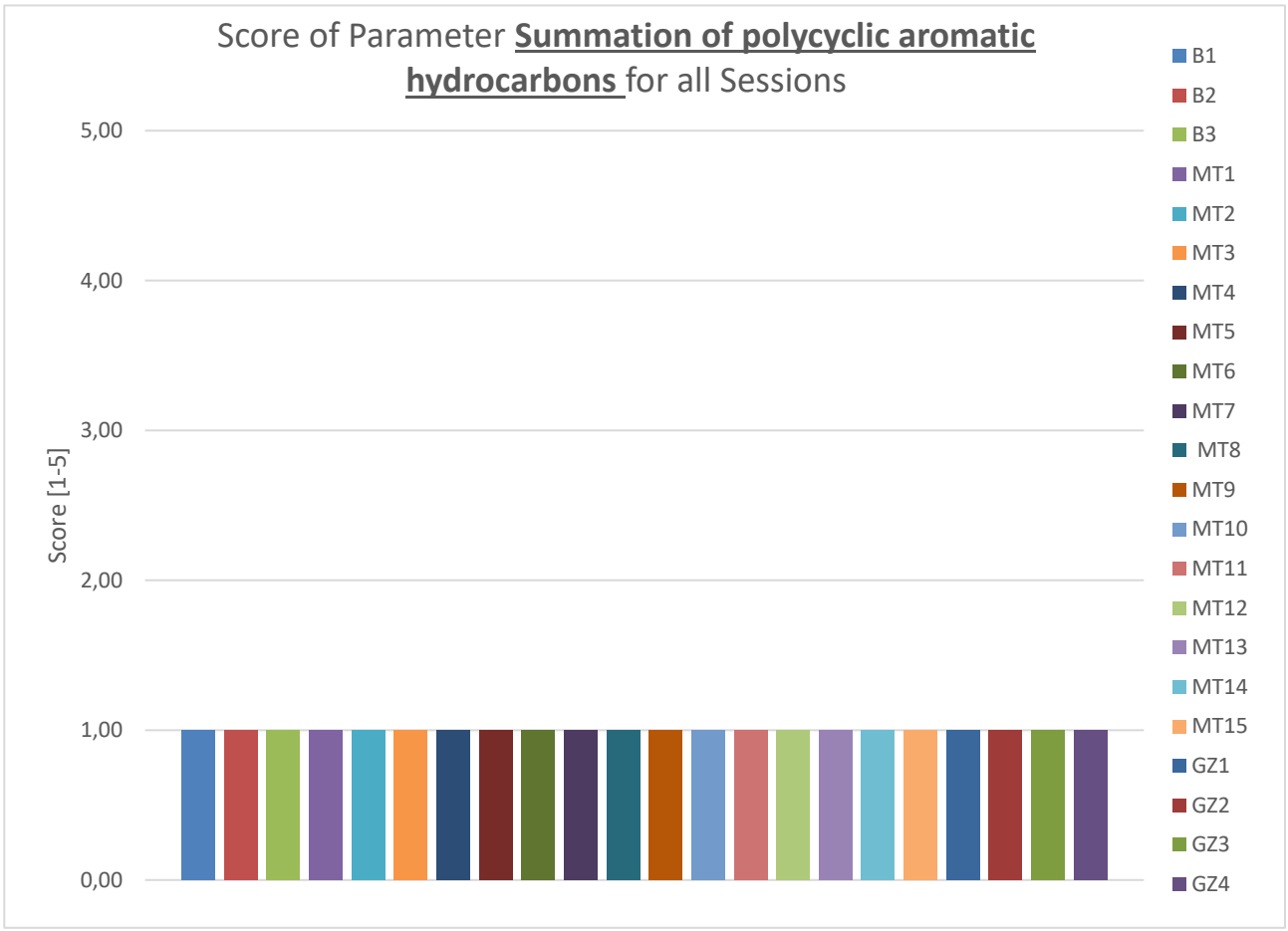

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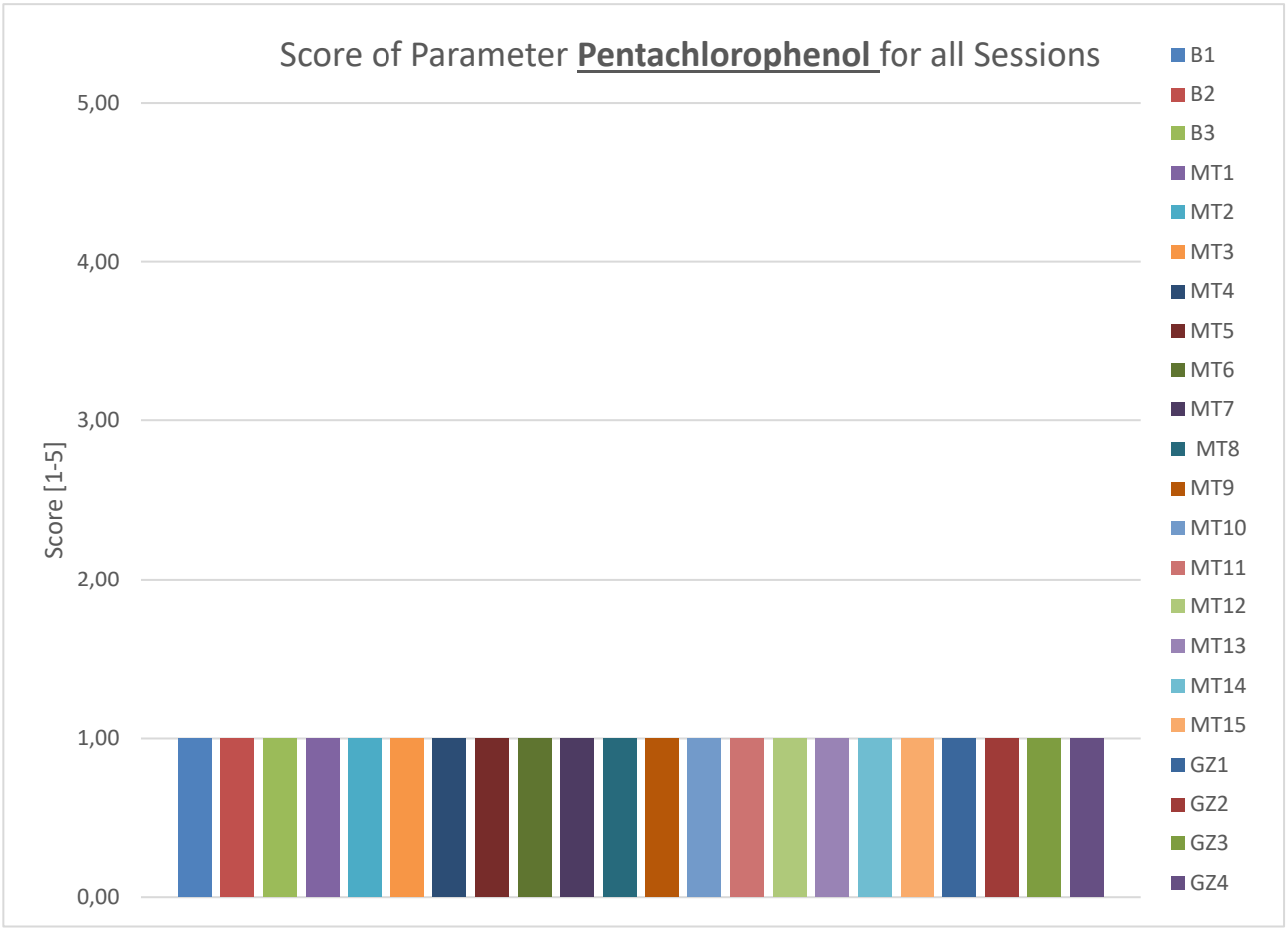

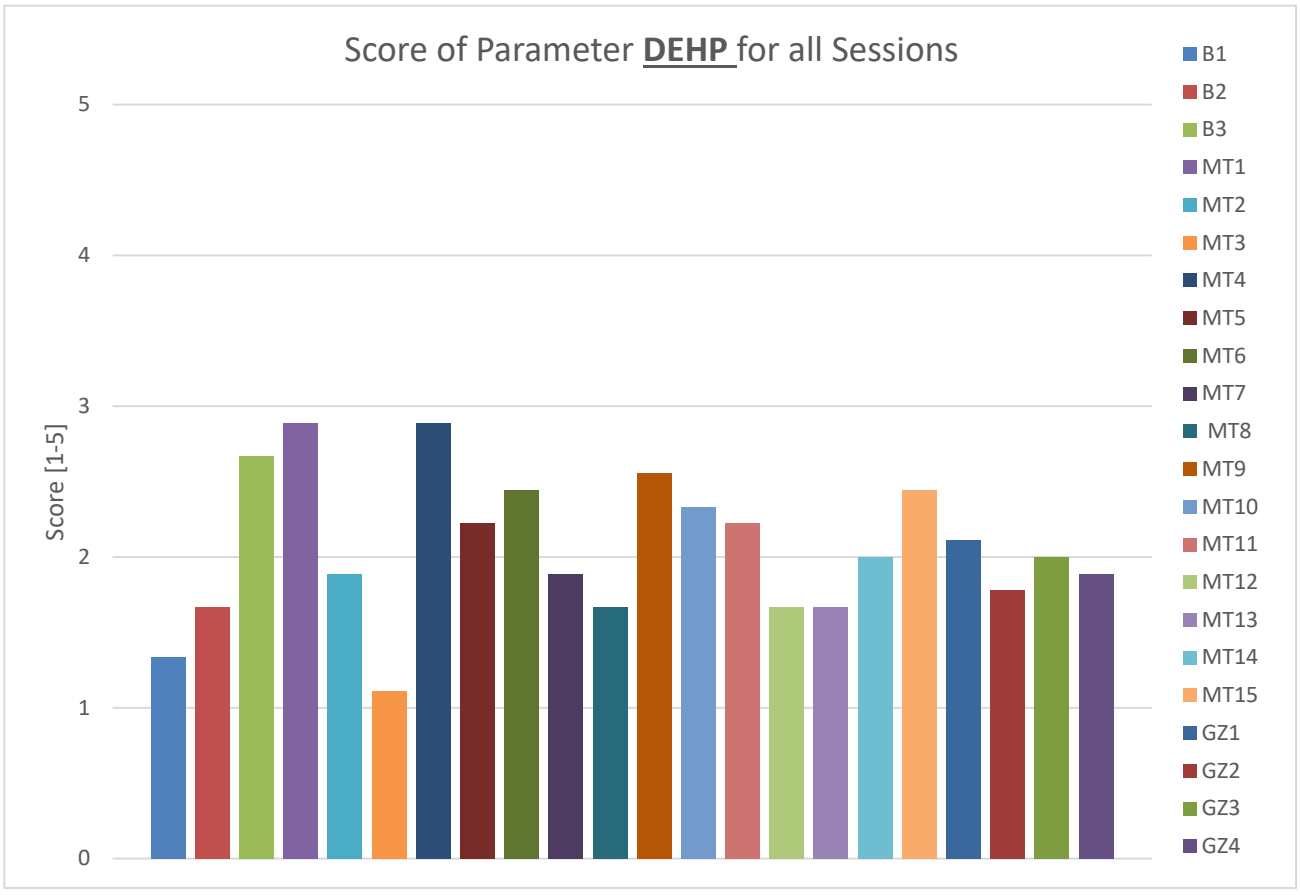

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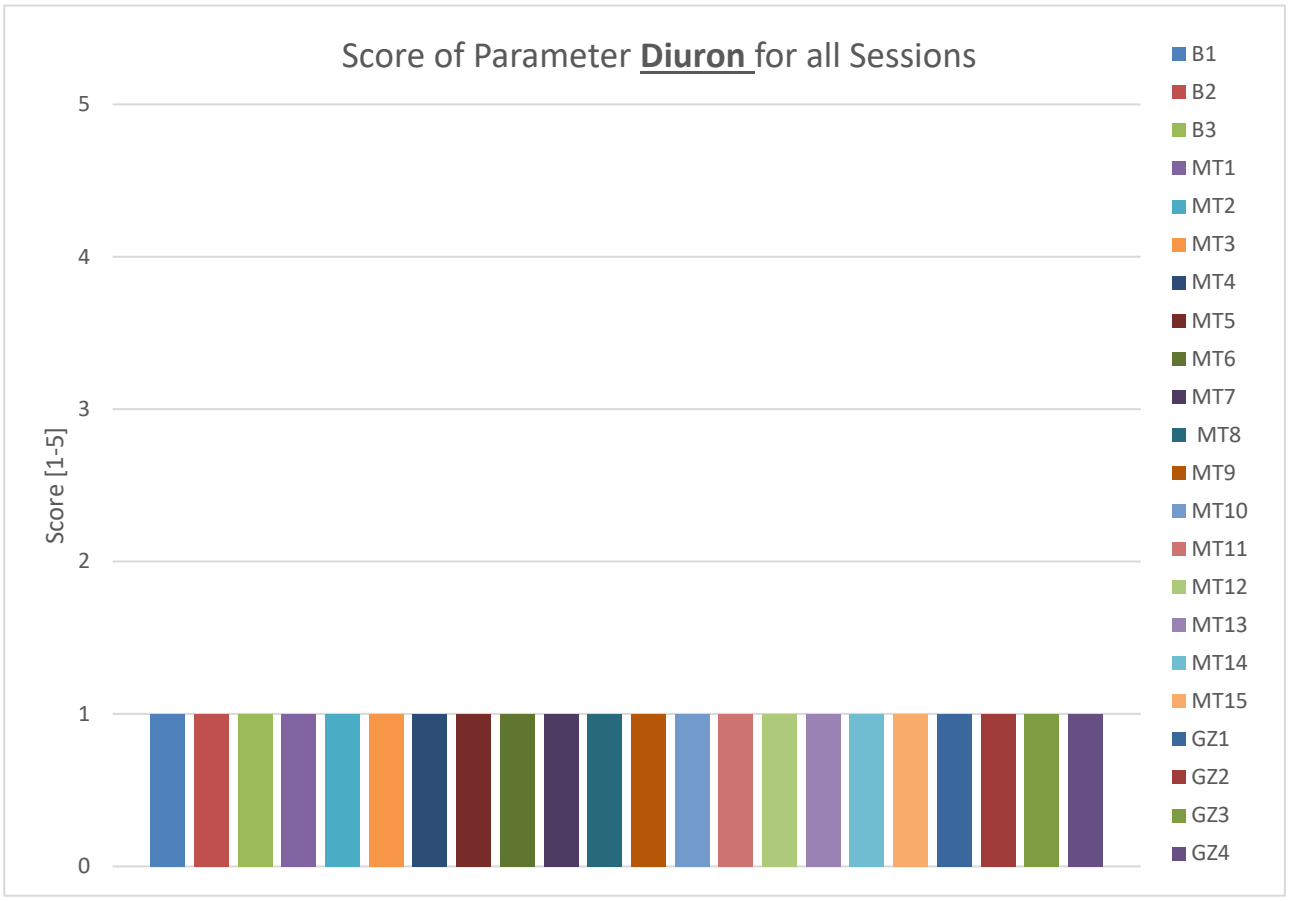

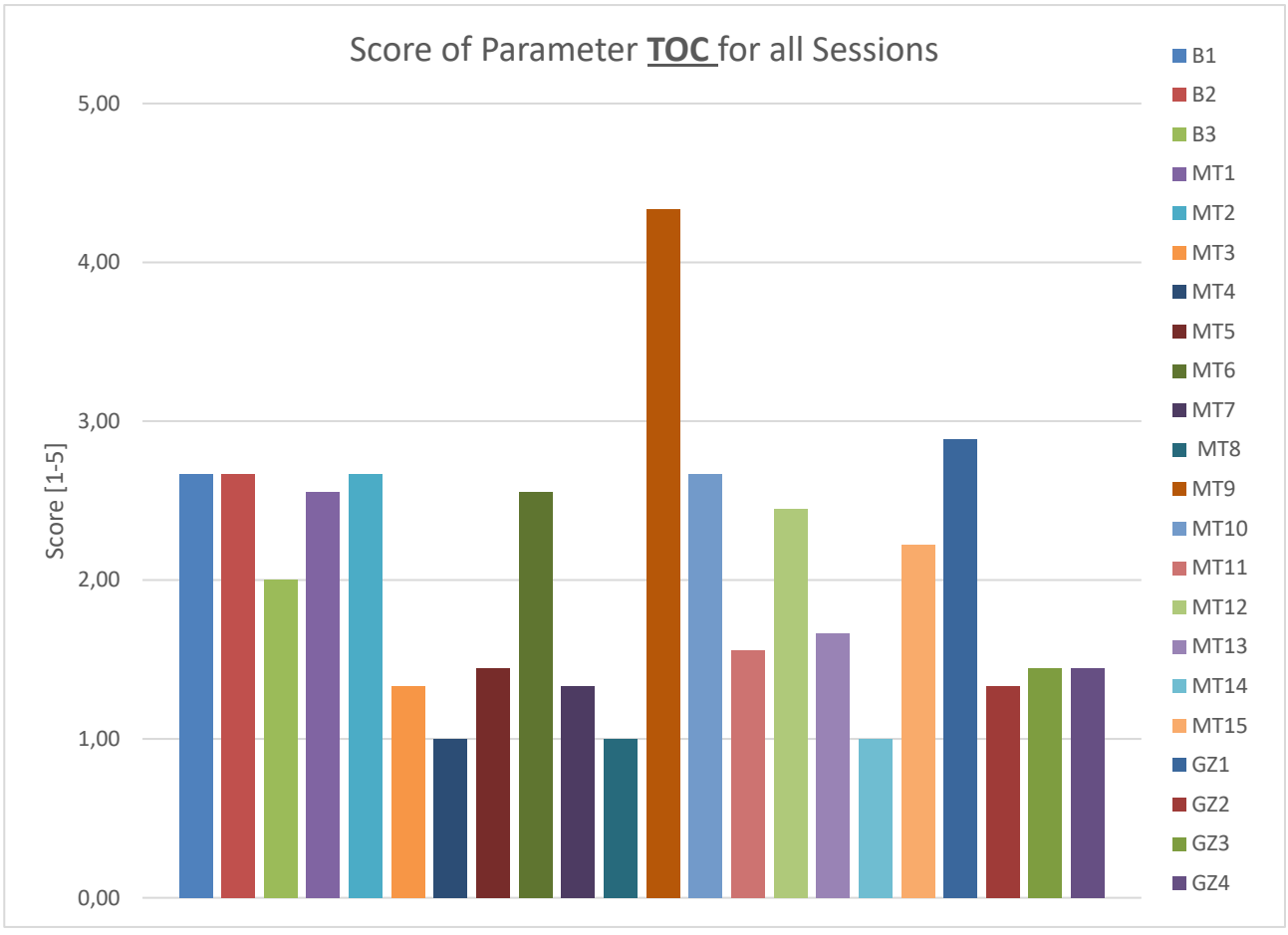

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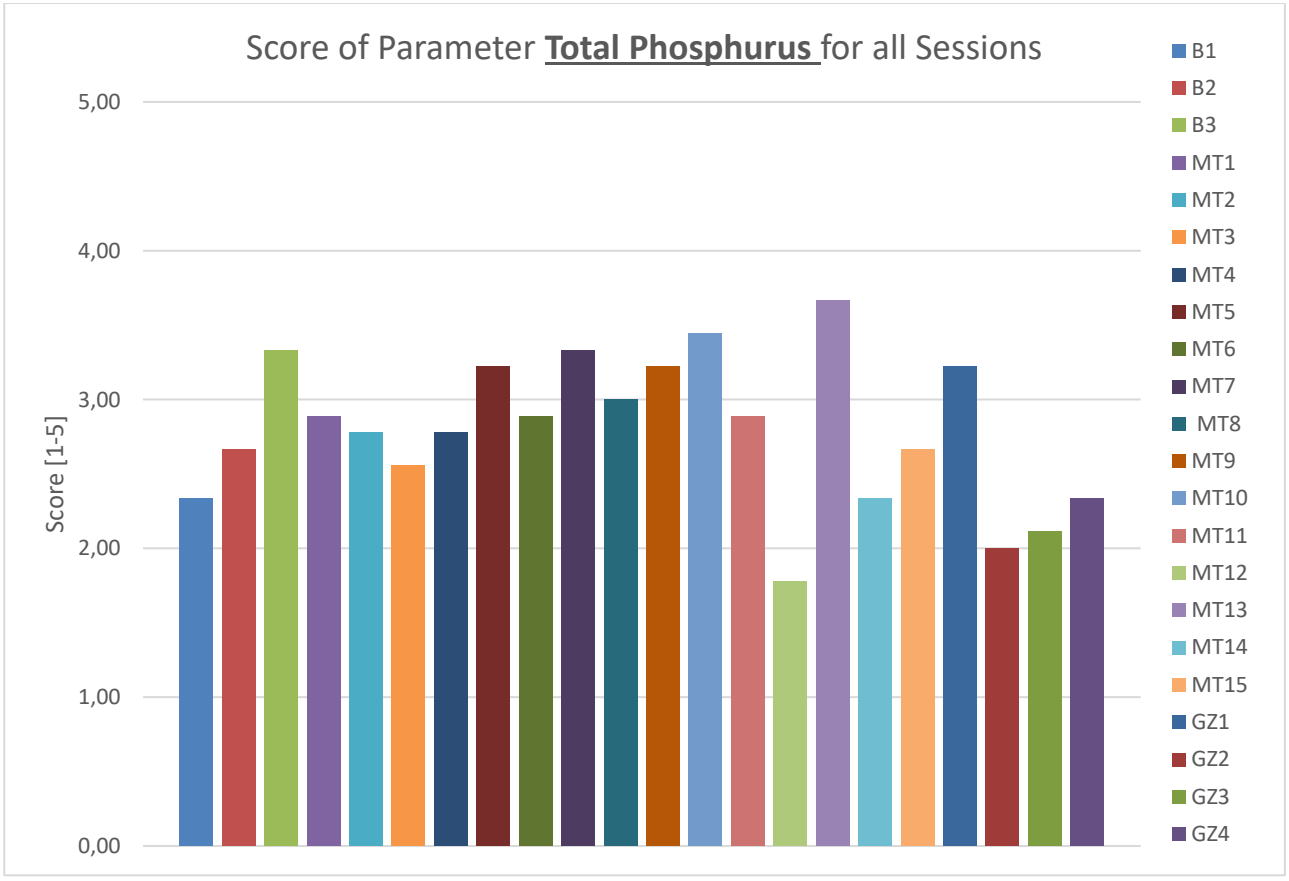

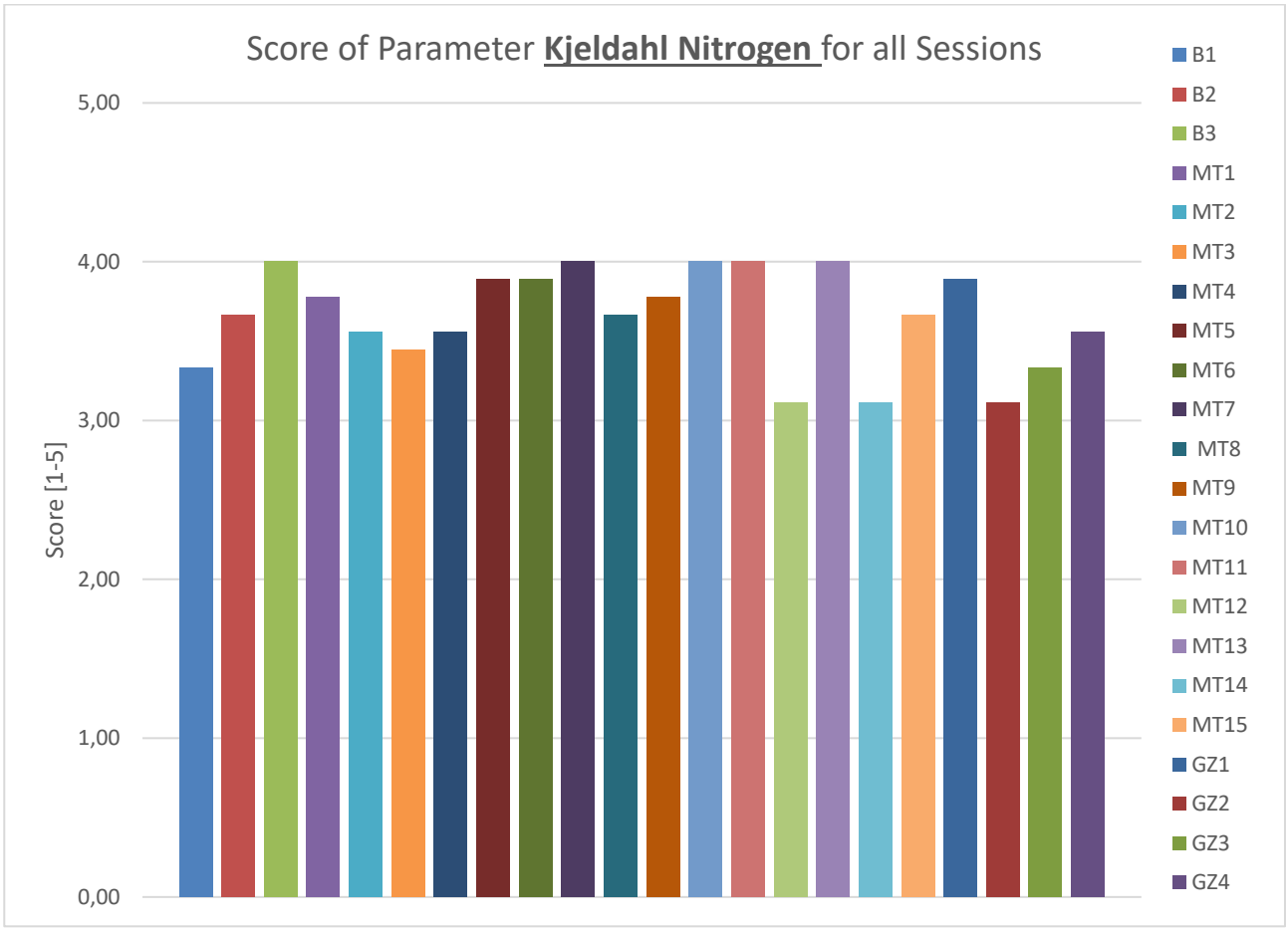

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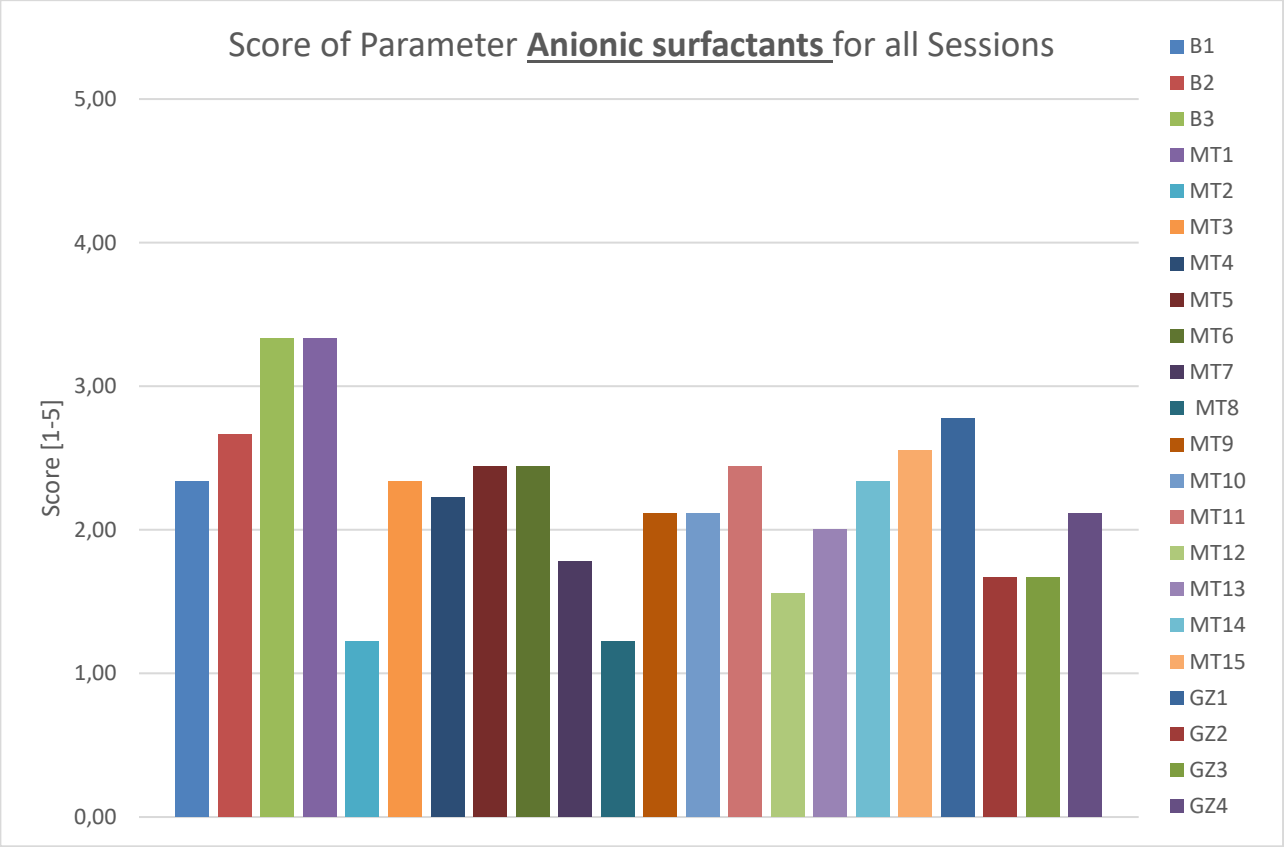

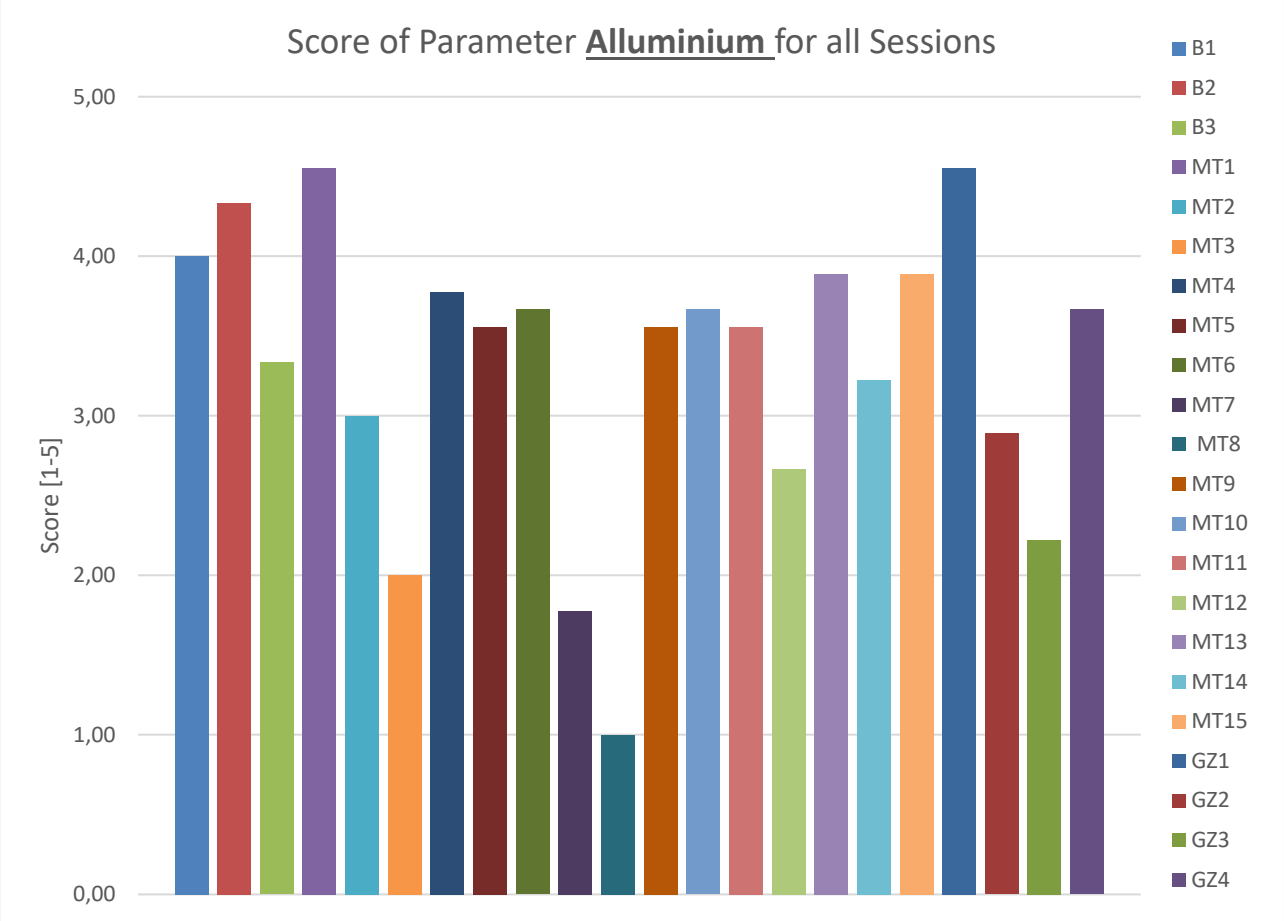

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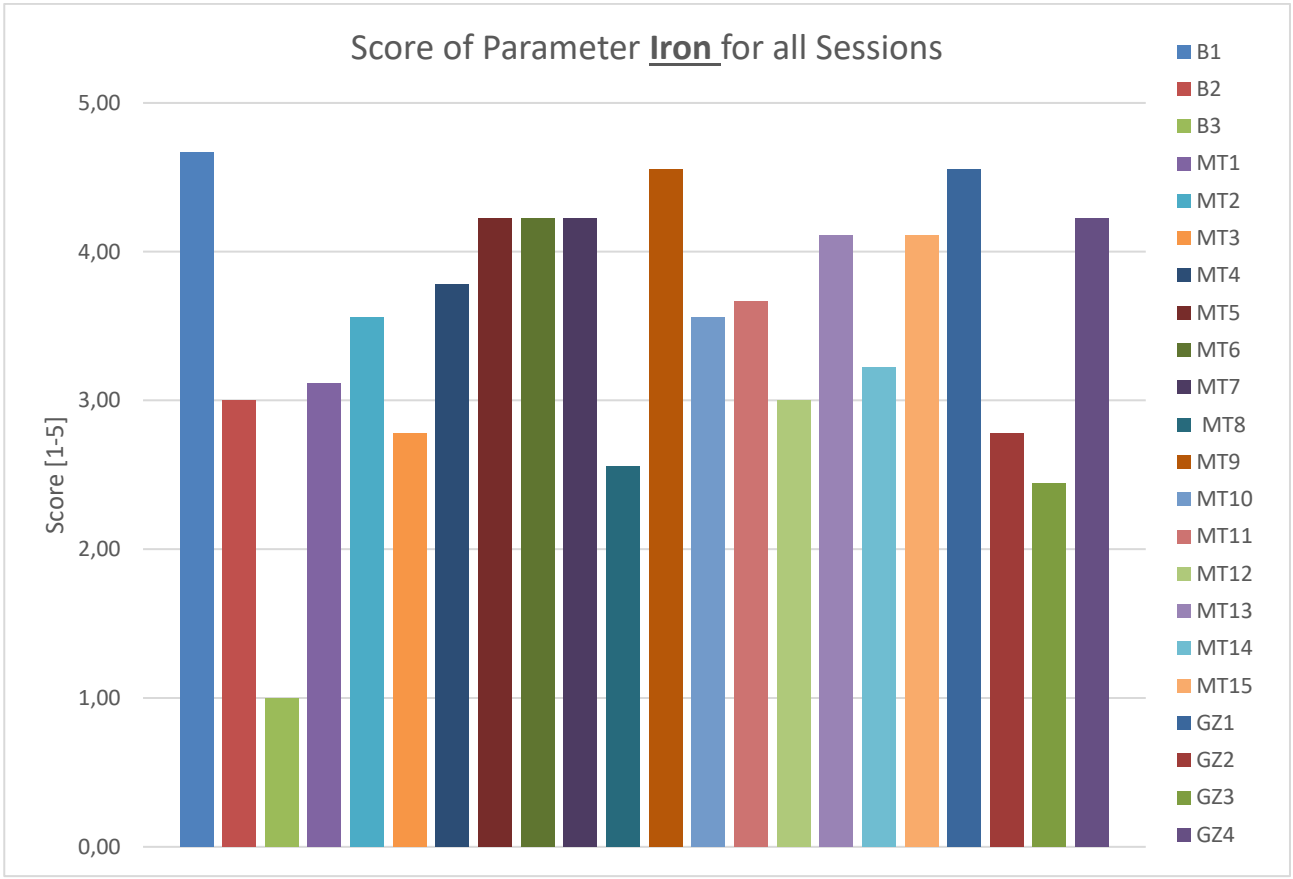

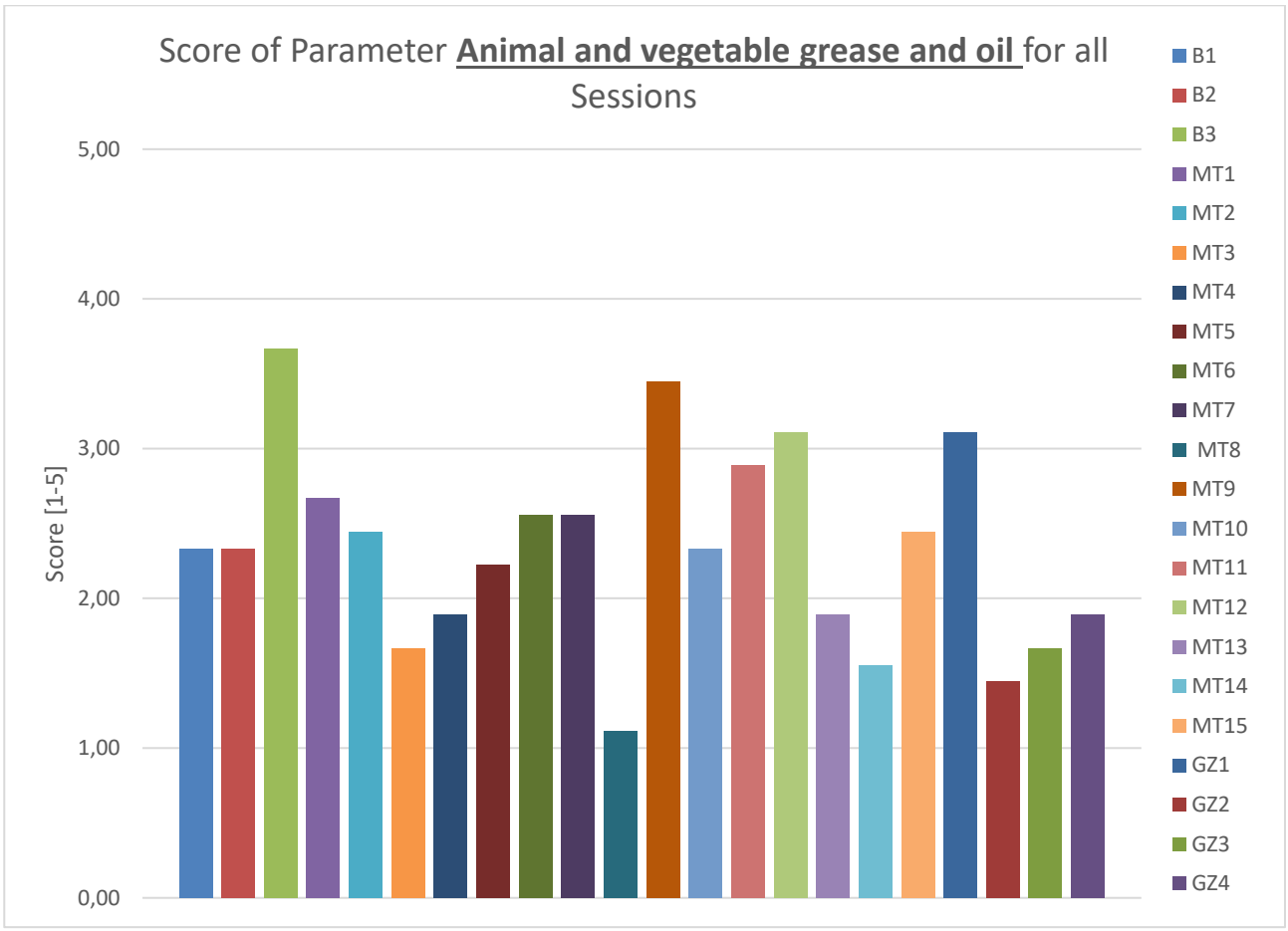

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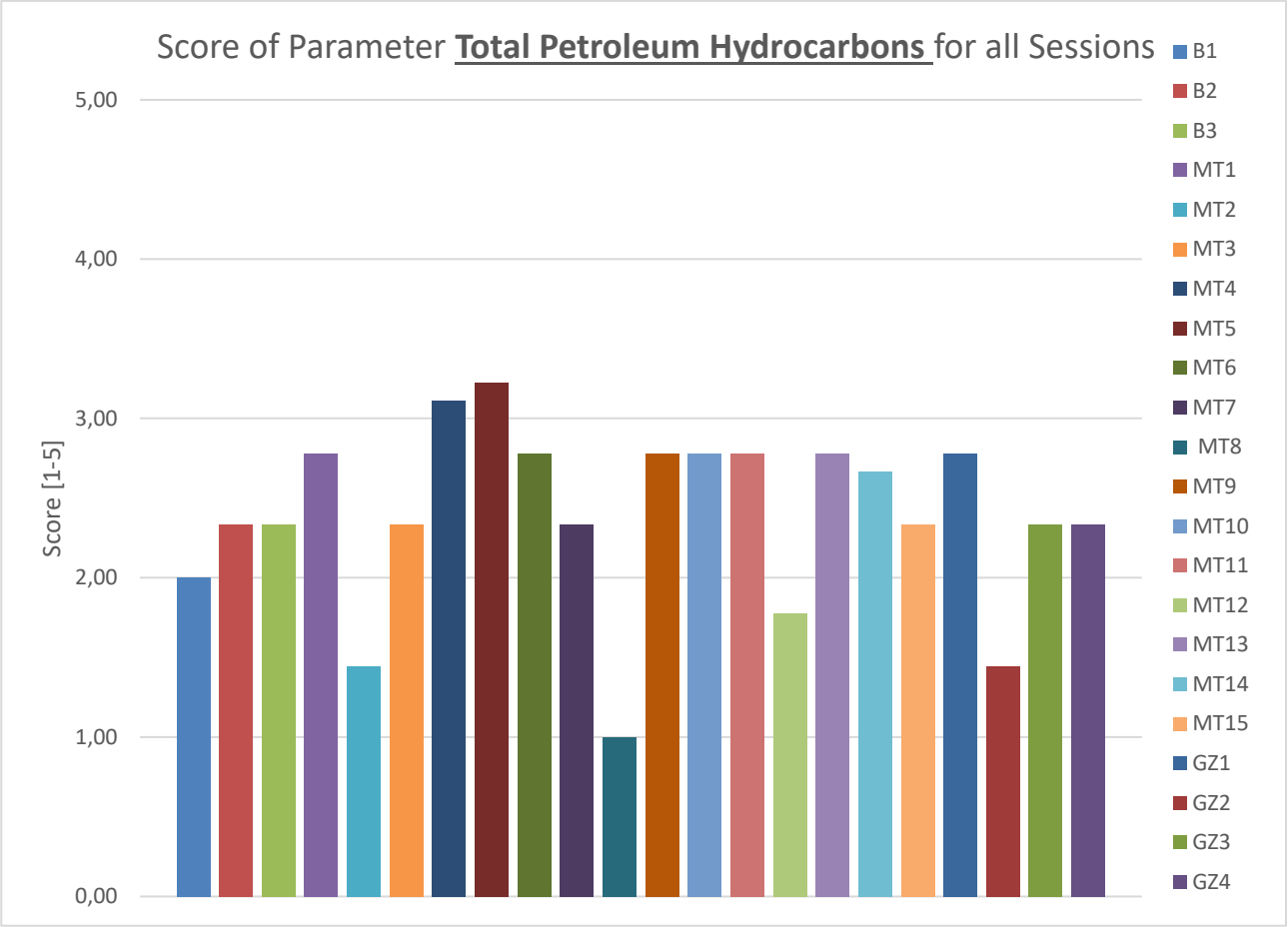

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In conclusion the graph with the score for each parameter and for each session, on a seasonal basis, are below indicated:

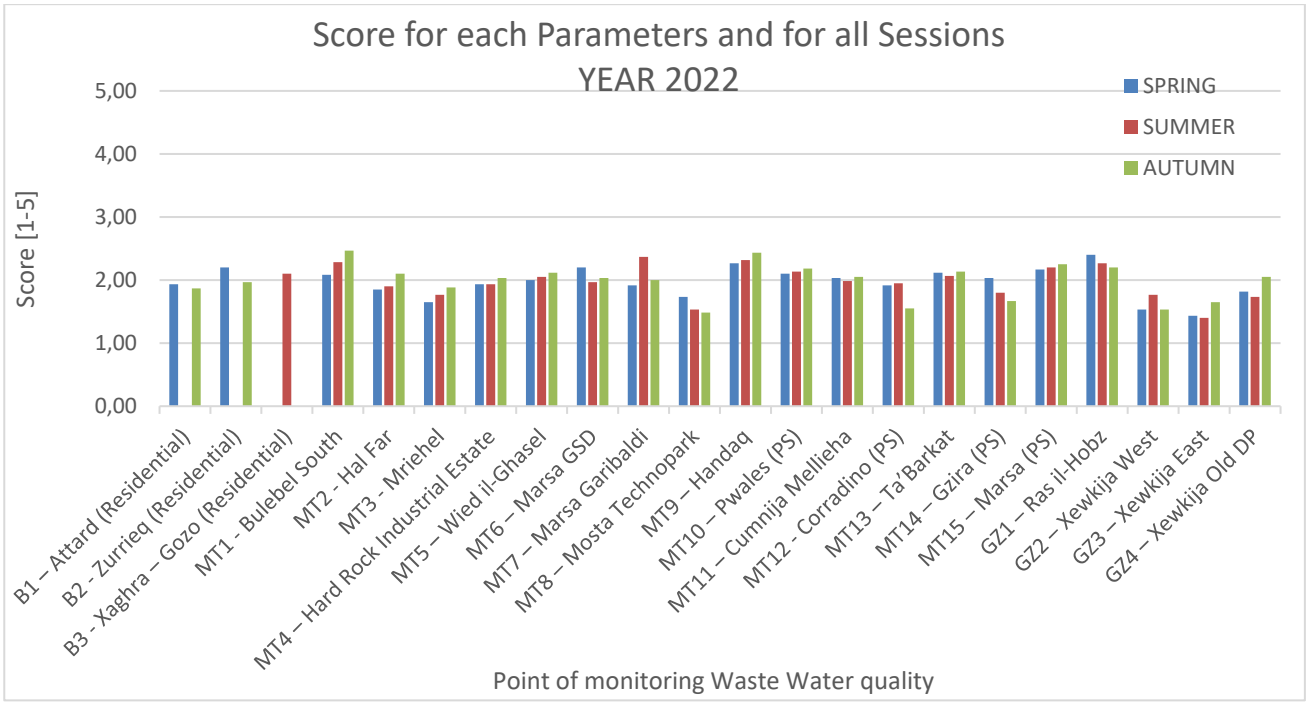

Table 18 -Score of n°22 Sampling points to Best to Worst- Year 2022

Waste water quality monitoring at point labelled	Score
B3 - Xaghra – Gozo (Residential)	0.70
B1 – Attard (Residential)	1.27
B2 - Zurrieq (Residential)	1.39
GZ3 – Xewkija East	1.49
MT8 – Mosta Technopark	1.58
GZ2 – Xewkija West	1.61
MT3 - Mriehel	1.77
MT12 - Corradino (PS)	1.81
MT14 – Gzira (PS)	1.83
GZ4 – Xewkija Old DP	1.87
MT2 - Hal Far	1.95
MT4 – Hard Rock Industrial Estate	1.97
MT11 – Cumnija Mellieha	2.02
MT5 – Wied il-Ghasel	2.06
MT6 – Marsa GSD	2.07
MT7 – Marsa Garibaldi	2.09
MT13 – Ta'Barkat	2.11
MT10 – Pwales (PS)	2.14
MT15 – Marsa (PS)	2.21
MT1 - Bulebel South	2.28
GZ1 – Ras il-Hobz	2.29
MT9 – Handaq	2.34

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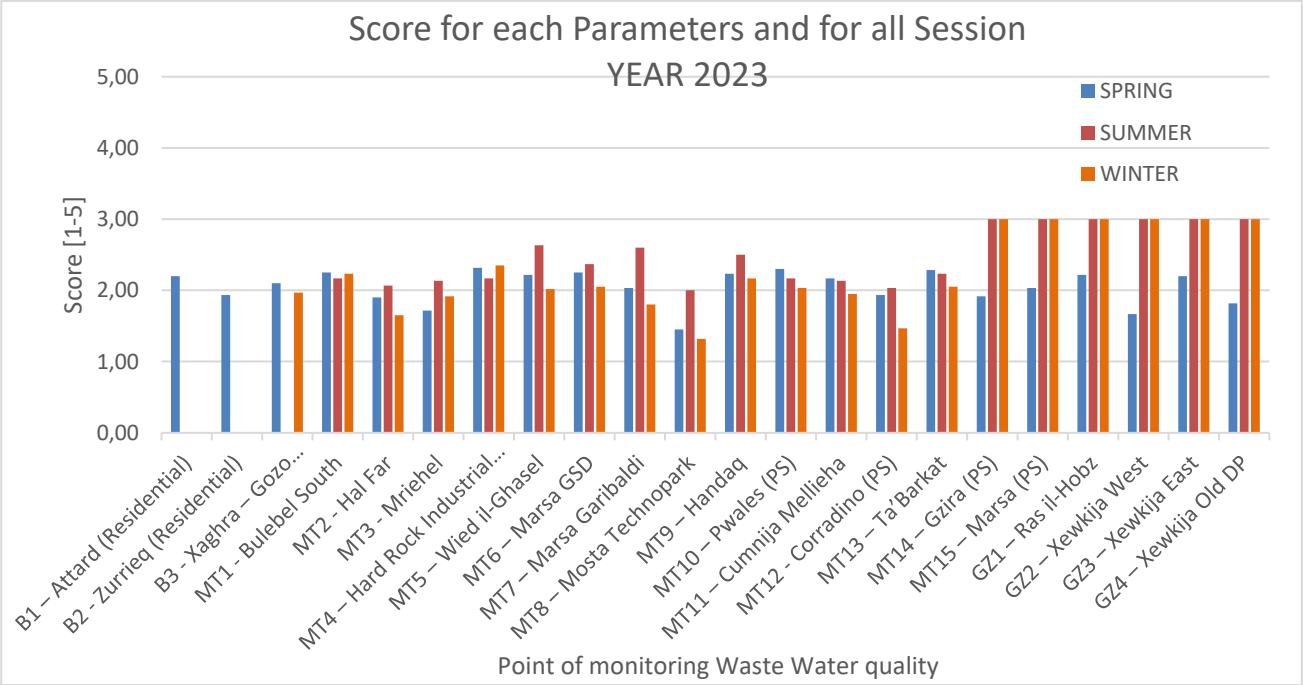

Table 19 -Score of n°22 Sampling points to Best to Worst- Year 2023

Waste water quality monitoring at point labelled	Score
B1 – Attard (Residential)	0.64
B3 - Xaghra – Gozo (Residential)	0.73
B2 - Zurrieq (Residential)	1.36
MT2 - Hal Far	1.59
MT6 – Marsa GSD	1.81
MT8 – Mosta Technopark	1.87
GZ2 – Xewkija West	1.92
MT5 – Wied il-Ghasel	2.08
GZ4 – Xewkija Old DP	2.14
MT11 – Cumnija Mellieha	2.17
MT7 – Marsa Garibaldi	2.19
GZ3 – Xewkija East	2.22
MT14 – Gzira (PS)	2.22
MT3 - Mriehel	2.28
MT12 - Corradino (PS)	2.29
MT4 – Hard Rock Industrial Estate	2.30
MT1 - Bulebel South	2.56
MT9 – Handaq	2.61
MT13 – Ta'Barkat	2.64
MT10 – Pwales (PS)	2.68
GZ1 – Ras il-Hobz	2.73
MT15 – Marsa (PS)	2.74

San Gwann, 27/02/2024

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