Alexandra Basin Redevelopment 2

Bringing Dublin Port To 2040

Environmental Impact Assessment Report

Appendix 10-1 Air Quality Data

Volume 3

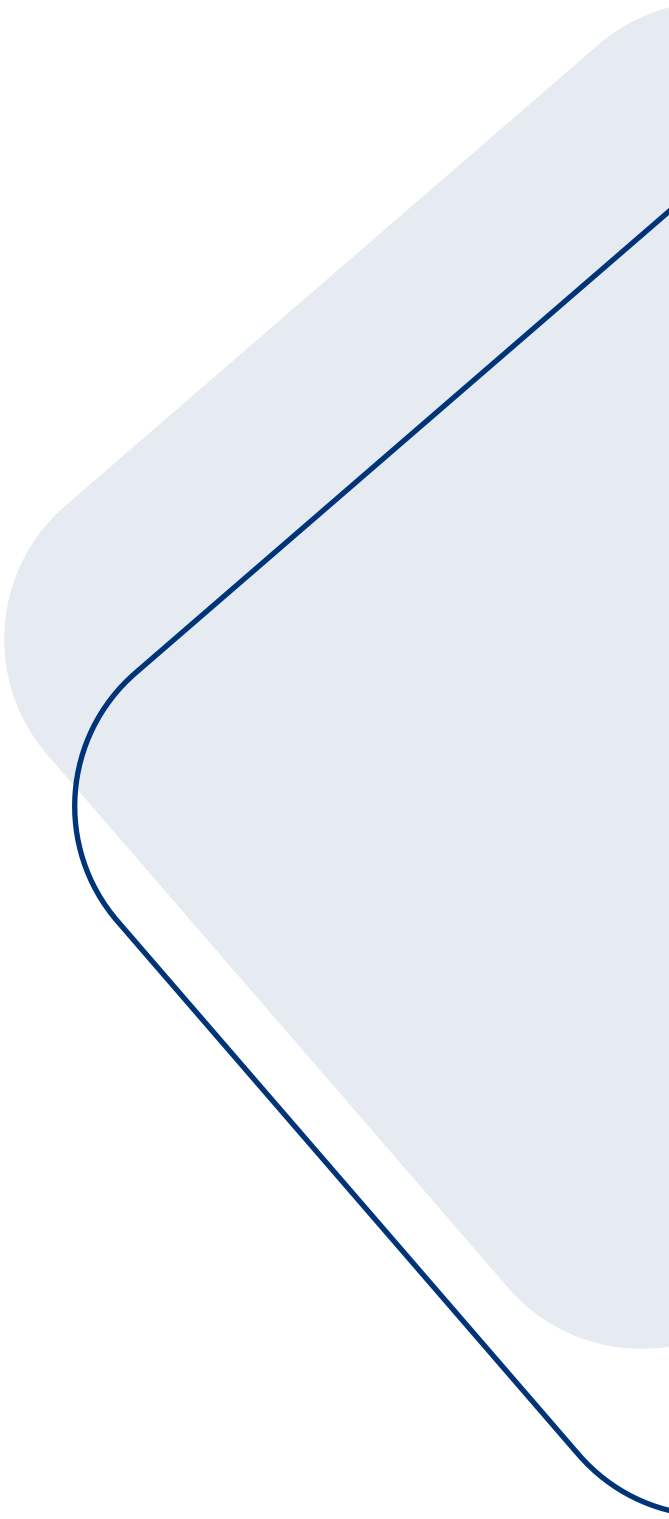


CALAFORT ÁTHA CLIATH
DUBLIN PORT

TETRA TECH

Appendix 10-1

Air Quality Data from 2014- 2023



CONTENTS

1.0 DUBLIN PORT AIR QUALITY MONITORING RESULTS 2014 – 2015 1

1.1 Results from 2014 – 2015 3

1.1.1 Nitrogen Dioxide 3

1.1.2 Sulphur Dioxide 5

1.1.3 Total Depositional Dust 7

1.1.4 Particulate Matter (PM10/2.5) 8

2.0 DUBLIN PORT AIR QUALITY MONITORING RESULTS 2016 9

2.1 Results 11

2.1.1 Nitrogen Dioxide 11

2.1.2 Comparison Between Average Monitoring Data Collected in Event 1 Year 2014/2015 and Event 2 (2016) for NO_2 13

2.1.3 Sulphur Dioxide 15

2.1.4 Comparison Between Average Monitoring Data Collected in Event 1 Year 2014/2015 and Event 2 (2016) for SO_2 17

2.1.5 Total Depositional Dust 19

2.1.6 Particulate Matter (PM10/2.5) 20

3.0 DUBLIN PORT AIR QUALITY MONITORING RESULTS 2017 - 2018 21

3.1 Results 23

3.1.1 Nitrogen Dioxide 23

3.1.2 Comparison between average monitoring data collected in Event 1 Year 2014/2015, Event 2 Year 2016 and Event 3 Year 2017 for NO_2 25

3.1.3 Sulphur Dioxide 27

3.1.4 Comparison between average monitoring data collected in Event 1 Year 2014/2015, Event 2 Year 2016 and Event 3 Year 2017 for SO_2 29

3.1.5 Total Depositional Dust 31

3.1.6 Particulate Matter (PM10/2.5) 32

3.1.7 Ammonia 33

3.1.8 BTEX 34

4.0 DUBLIN PORT AIR QUALITY MONITORING RESULTS 2019 37

4.1 Results 39

4.1.1 Nitrogen Dioxide 39

4.1.2 Comparison between average monitoring data collected in Event 1 Year 2014/2015, Event 2 Year 2016, Event 3 Year 2017, Event 4 Year 2018 and Event 5 2019 for NO_2 41

4.1.3 Sulphur Dioxide 43

4.1.4 Comparison between average monitoring data collected in Event 1 Year 2014/2015, Event 2 Year 2016 and Event 3 Year 2017 for SO_2 45

4.1.5 Total Depositional Dust 47
4.1.6 Particulate Matter (PM10/2.5) 48
4.1.7 Ammonia 49
4.1.8 BTEX 51
4.1.9 Lead 55
5.0 DUBLIN PORT AIR QUALITY MONITORING RESULTS 2020 56
5.1 Results 58
5.1.1 Nitrogen Dioxide 58
5.1.2 Comparison between average monitoring data collected in Event 1 Year 2014/2015, Event 2 Year 2016, Event 3 Year 2017, Event 4 Year 2018, Event 5 Year 2019 and Event 6 Year 2020 for NO_2 60
5.1.3 Sulphur Dioxide 62
5.1.4 Comparison between average monitoring data collected in Event 1 Year 2014/2015, Event 2 Year 2016, Events 3 Year 2017, Event 4 Year 2018, Event 5 2019 and Event 6 2020 for SO_2 64
5.1.5 Total Depositional Dust 66
5.1.6 Particulate Matter (PM10/2.5) 67
5.1.7 Ammonia 68
5.1.8 BTEX 70
5.1.9 Lead 74
6.0 DUBLIN PORT AIR QUALITY MONITORING RESULTS 2021 75
6.1 Results 77
6.1.1 Nitrogen Dioxide 77
6.1.2 Comparison between average monitoring data collected in Event 1 Year 2014/2015, Event 2 Year 2016, Event 3 Year 2017, Event 4 Year 2018, Event 5 Year 2019, Event 6 Year 2020 and Event 7 Year 2021 for NO_2 ..... **Error! Bookmark not defined.**
6.1.3 Sulphur Dioxide 81
6.1.4 Comparison between average monitoring data collected in Event 1 Year 2014/2015, Event 2 Year 2016, Event 3 Year 2017, Event 4 Year 2018, Event 5 Year 2019, Event 6 Year 2020 and Event 7 Year 2021 for SO_2 83
6.1.5 Total Depositional Dust 85
6.1.6 Particulate Matter (PM10/2.5) 86
6.1.7 Ammonia 87
6.1.8 BTEX 89
6.1.9 Lead 94
7.0 DUBLIN PORT AIR QUALITY MONITORING RESULTS 2022 95
7.1 Results 97
7.1.1 Nitrogen Dioxide 97
7.1.2 Comparison between average monitoring data collected in Event 1 Year 2014/2015, Event 2 Year 2016, Event 3 Year 2017, Event 4 Year 2018, Event 5 Year 2019, Event 6 Year 2020 and Event 7 Year 2021for NO_2 99

7.1.3 Sulphur Dioxide 101
7.1.4 Total Depositional Dust 105
7.1.5 Particulate Matter (PM10/2.5) 106
7.1.6 Ammonia 107
7.1.7 BTEX 109
7.1.8 Lead 114

Figures

Figure 1: Overview of Ambient Air Monitoring Locations Located Within Dublin Port and Surrounding Environs for Nitrogen Dioxide, Sulphur Dioxide, Total Depositional Dust and PM10/2.5 from 2014 - 2015 2
Figure 2: Plot of NO_2 Concentrations for each Monitoring Event R1 to R6 at each Monitoring Station A1 to A18 4
Figure 3: Plot of SO_2 Concentrations for Each Monitoring Event R1 to R6 at Each Monitoring Station A1 to A18 6
Figure 4: Total Depositional Dust Monitoring Results for the Dublin Port Estate and Environs 7
Figure 5: Particulate Matter 10 and 2.5 µm Monitoring Results for Dublin Port Estate Monitoring Stations 8
Figure 6: Overview of Ambient Air Monitoring Locations Located Within Dublin Port and Surrounding Environs for Nitrogen Dioxide, Sulphur Dioxide, Total Depositional Dust and PM10/2.5 10
Figure 7: Plot of NO_2 Concentrations for Each Monitoring Event R1 to R6 at Each Monitoring Station A1 to A18 12
Figure 8: Graphical Comparison Between Average NO_2 Concentration Values for Event 1 Year 2014/2015 and Event 2 2016 14
Figure 9: Plot of SO_2 Concentrations for Each Monitoring Event R1 to R6 at Each Monitoring Station A1 to A18 16
Figure 10: Comparison Between Average SO_2 Concentration Values for Event 1 Year 2014/2015 and Event 2 2016 18
Figure 11: Total Depositional Dust Monitoring Results for the Dublin Port Estate and Environs 19
Figure 12: Particulate Matter 10 and 2.5 µm Monitoring Results for Dublin Port Estate Monitoring Stations 20
Figure 13: Overview of Ambient Air Monitoring Locations Located Within Dublin Port and Surrounding Environs for Nitrogen Dioxide, Sulphur Dioxide, BTEX, Ammonia, Total Depositional Dust and PM10/2.5 22
Figure 14: Plot of NO_2 Concentrations For Each Monitoring Event R1 to R4 at Each Monitoring Station A1 to A18 24
Figure 15: Graphical Comparison Between Average NO_2 Concentration Values for Event 1 Year 2014/2015, Event 2 Year 2016 and Event 3 Year 2017 26
Figure 16: Plot of SO_2 Concentrations For Each Monitoring Event R1 to R4 at Each Monitoring Station A1 to A18 28
Figure 17: Comparison Between Average SO_2 Concentration Values For Event 1 Year 2014/2015, Event 2 Year 2016 and Event 3 Year 2017 30
Figure 18: Total Depositional Dust Monitoring Results for the Dublin Port Estate and Environs 31
Figure 19: Particulate Matter 10 and 2.5 µm Monitoring Results for Dublin Port Estate Monitoring Stations 32
Figure 20: NH3 Monitoring Results at Each of the 7 Monitoring Stations R1 - 28/08/2017 to 25/09/2017 (µg/m3) 33
Figure 21: NH3 Monitoring Results at Each of the 7 Monitoring Stations R2 - 28/11/17 to 24/01/2018 (µg/m3) 33
Figure 22: BTEX monitoring results at each of the 7 monitoring stations over R1 - 28/08/2017 to 25/09/2017 35
Figure 23: BTEX monitoring results at each of the 7 monitoring stations over R2 - 28/11/17 to 24/01/2018 36
Figure 24: Overview of Ambient Air Monitoring Locations Located Within Dublin Port and Surrounding Environs for Nitrogen Dioxide, Sulphur Dioxide, BTEX, Ammonia, Total Depositional Dust, PM10/2.5.and Lead 38

Figure 25: Plot of NO_2 Concentrations For Each Monitoring Event R1 to R6 at Each Monitoring Station A1 to A18 40
Figure 26: Graphical Comparison Between Average NO_2 Concentration Values for Event 1 Year 2014/2015, Event 2 Year 2016, Events 3 Year 2017, Event 4 Year 2018 and Event 5 2019 42
Figure 27: Plot of SO_2 Concentrations For Each Monitoring Event R1 to R6 at Each Monitoring Station A1 to A18 44
Figure 28: Comparison Between Average SO_2 Concentration Values For Event 1 Year 2014/2015, Event 2 Year 2016, Event 3 Year 2017, Event 4 Year 2018 and Event 5 Year 2019 46
Figure 29: Total Depositional Dust Monitoring Results for the Dublin Port Estate and Environs 47
Figure 30: Particulate Matter 10 and 2.5 µm Monitoring Results for Dublin Port Estate Monitoring Stations ... 48
Figure 31: NH3 Monitoring Results at Each of the 7 Monitoring Stations Over 3 Monitoring Events 50
Figure 32: BTEX monitoring results at each of the 7 monitoring stations over R1 - 13/02/2019 to 08/03/2019 52
Figure 33: BTEX monitoring results at each of the 7 monitoring stations over R3 - 08/04/2019 to 07/05/2019 53
Figure 34: BTEX monitoring results at each of the 7 monitoring stations over R4 - 21/06/2019 to 19/07/2019 54
Figure 35: Lead Monitoring Results at each of 3 Monitoring Stations Over 3 Monitoring Events 55
Figure 36: Overview of Ambient Air Monitoring Locations Located Within Dublin Port and Surrounding Environs for Nitrogen Dioxide, Sulphur Dioxide, BTEX, Ammonia, Total Depositional Dust, PM10/2.5.and Lead 57
Figure 37: Plot of NO_2 Concentrations For Each Monitoring Event R1 to R6 at Each Monitoring Station A1 to A18 59
Figure 38:Graphical Comparison Between Average NO_2 Concentration Values for Event 1 Year 2014/2015, Event 2 Year 2016, Event 3 Year 2017, Event 4 Year 2018, Event 5 Year 2019 and Event 6 Year 2020 61
Figure 39: Plot of SO_2 Concentrations For Each Monitoring Event R1 to R6 at Each Monitoring Station A1 to A18 63
Figure 40: Comparison Between Average SO_2 Concentration Values For Event 1 Year 2014/2015, Event 2 Year 2016, Events 3 Year 2017, Event 4 Year 2018, Event 5 2019 and Event 6 2020 65
Figure 41: Total Depositional Dust Monitoring Results for the Dublin Port Estate and Environs 66
Figure 42: Particulate Matter 10 and 2.5 µm Monitoring Results for Dublin Port Estate Monitoring Stations ... 67
Figure 43: NH3 Monitoring Results at Each of the 7 Monitoring Stations Over 3 Monitoring Events 69
Figure 44: BTEX monitoring results at each of the 7 monitoring stations over R1 – 27/01/2020 to 02/03/2020 71
Figure 45: BTEX monitoring results at each of the 7 monitoring stations over R5 – 10/06/2020 to 10/07/2020 72
Figure 46: BTEX monitoring results at each of the 7 monitoring stations over R6 – 15/10/2020 to 23/11/2020 73
Figure 47: Lead Monitoring Results at each of 3 Monitoring Stations Over 3 Monitoring Events 74
Figure 48: Overview of Ambient Air Monitoring Locations Located Within Dublin Port and Surrounding Environs for Nitrogen Dioxide, Sulphur Dioxide, BTEX, Ammonia, Total Depositional Dust, PM10/2.5.and Lead 76
Figure 49: Plot of NO_2 Concentrations For Each Monitoring Event R1 to R9 at Each Monitoring Station A1 to A22 78
Figure 50: Graphical Comparison Between Average NO_2 Concentration Values for Event 1 Year 2014/2015, Event 2 Year 2016, Event 3 Year 2017, Event 4 Year 2018, Event 5 Year 2019, Event 6 Year 2020 and Event 7 Year 2021 80
Figure 51: Plot of SO_2 Concentrations For Each Monitoring Event R1 to R9 at Each Monitoring Station A1 to A22 82
Figure 52: Comparison Between Average SO_2 Concentration Values For Event 1 Year 2014/2015, Event 2 Year 2016, Event 3 Year 2017, Event 4 Year 2018, Event 5 Year 2019, Event 6 Year 2020 and Event 7 Year 2021 84
Figure 53: Total Depositional Dust Monitoring Results for the Dublin Port Estate and Environs 85
Figure 54: Particulate Matter 10 and 2.5 µm Monitoring Results for Dublin Port Estate Monitoring Stations ... 86
Figure 55: NH3 Monitoring Results at Each of the 7 Monitoring Stations Over 3 Monitoring Events 88

Figure 56: BTEX monitoring results at each of the 7 monitoring stations over R3 - 21/05/2021 to 18/06/2021 90
Figure 57: BTEX monitoring results at each of the 7 monitoring stations over R5 - 23/07/2021 to 20/08/2021 91
Figure 58: BTEX monitoring results at each of the 7 monitoring stations over R7 - 17/09/2021 to 18/10/2021 92
Figure 59: BTEX monitoring results at each of the 7 monitoring stations over R9 - 19/11/2021 to 15/12/2021 93
Figure 60: Lead Monitoring Results at each of 3 Monitoring Stations Over 3 Monitoring Events 94
Figure 61: Overview of Ambient Air Monitoring Locations Located Within Dublin Port and Surrounding Environs for Nitrogen Dioxide, Sulphur Dioxide, BTEX, Ammonia, Total Depositional Dust, PM10/2.5.and Lead 96
Figure 62: Plot of NO_2 Concentrations For Each Monitoring Event R1 to R12 at Each Monitoring Station A1 to A22..... 98
Figure 63: Graphical Comparison Between Average NO_2 Concentration Values for Event 1 Year 2014/2015, Event 2 Year 2016, Event 3 Year 2017, Event 4 Year 2018, Event 5 Year 2019, Event 6 Year 2020 and Event 7 Year 2021 100
Figure 64: Plot of SO_2 Concentrations For Each Monitoring Event R1 to R12 at Each Monitoring Station A1 to A22..... 102
Figure 65: Comparison Between Average SO_2 Concentration Values For Event 1 Year 2014/2015, Event 2 Year 2016, Event 3 Year 2017, Event 4 Year 2018, Event 5 Year 2019, Event 6 Year 2020 and Event 7 Year 2021 104
Figure 66: Total Depositional Dust Monitoring Results for the Dublin Port Estate and Environs 105
Figure 67: Particulate Matter 10 and 2.5 µm Monitoring Results for Dublin Port Estate Monitoring Stations. 106
Figure 68: NH3 Monitoring Results at Each of the 7 Monitoring Stations Over 4 Monitoring Events 108
Figure 69: BTEX monitoring results at each of the 7 monitoring stations over R3 - 11/03/2022 to 12/04/2022 110
Figure 70: BTEX monitoring results at each of the 7 monitoring stations over R7 - 07/07/2022 to 05/08/2022 111
Figure 71: BTEX monitoring results at each of the 7 monitoring stations over R11 - 01/01/2022to 05/12/2022 112
Figure 72: BTEX monitoring results at each of the 7 monitoring stations over R12 - 05/12/2022 to 09/01/2023 113
Figure 73: Lead Monitoring Results at each of 3 Monitoring Stations Over 3 Monitoring Events 114

1.0 DUBLIN PORT AIR QUALITY MONITORING RESULTS 2014 – 2015

Air monitoring data from 18 monitoring stations over a period of 6 monitoring event was assessed against legislative limits and target values for the protection of human health and vegetation. Monitoring was carried out for NO_2, SO_2, PM_{10}, $PM_{2.5}$ and Total depositional dust.

A total of 18 individual monitoring locations (A1 to A18) were selected across the port estate area in order to monitor ambient air concentrations of Nitrogen dioxide and Sulphur dioxide. A further 4 locations were chosen for Bergerhoff total dust deposition monitoring (D1 to D4) while a further two locations were chosen for PM_{10} and $PM_{2.5}$ monitoring (D5 and D6). **Figure 1** presents an overview of each monitoring locations located with the Dublin Port and its environs.



Figure 1: Overview of Ambient Air Monitoring Locations Located Within Dublin Port and Surrounding Environs for Nitrogen Dioxide, Sulphur Dioxide, Total Depositional Dust and PM10/2.5 from 2014 - 2015

1.1 RESULTS FROM 2014 – 2015

1.1.1 Nitrogen Dioxide

The NO_2 diffusion tubes were deployed for a period of 6 x 1 month periods between Nov 2014 and Dec 2015. Monitoring was carried out at 18 monitoring stations spatially distributed across the port estate. Monitoring was carried out in the four main seasons of Winter, Spring, Summer and Autumn. The results of the monitoring graphically represented in **Figure 2**.

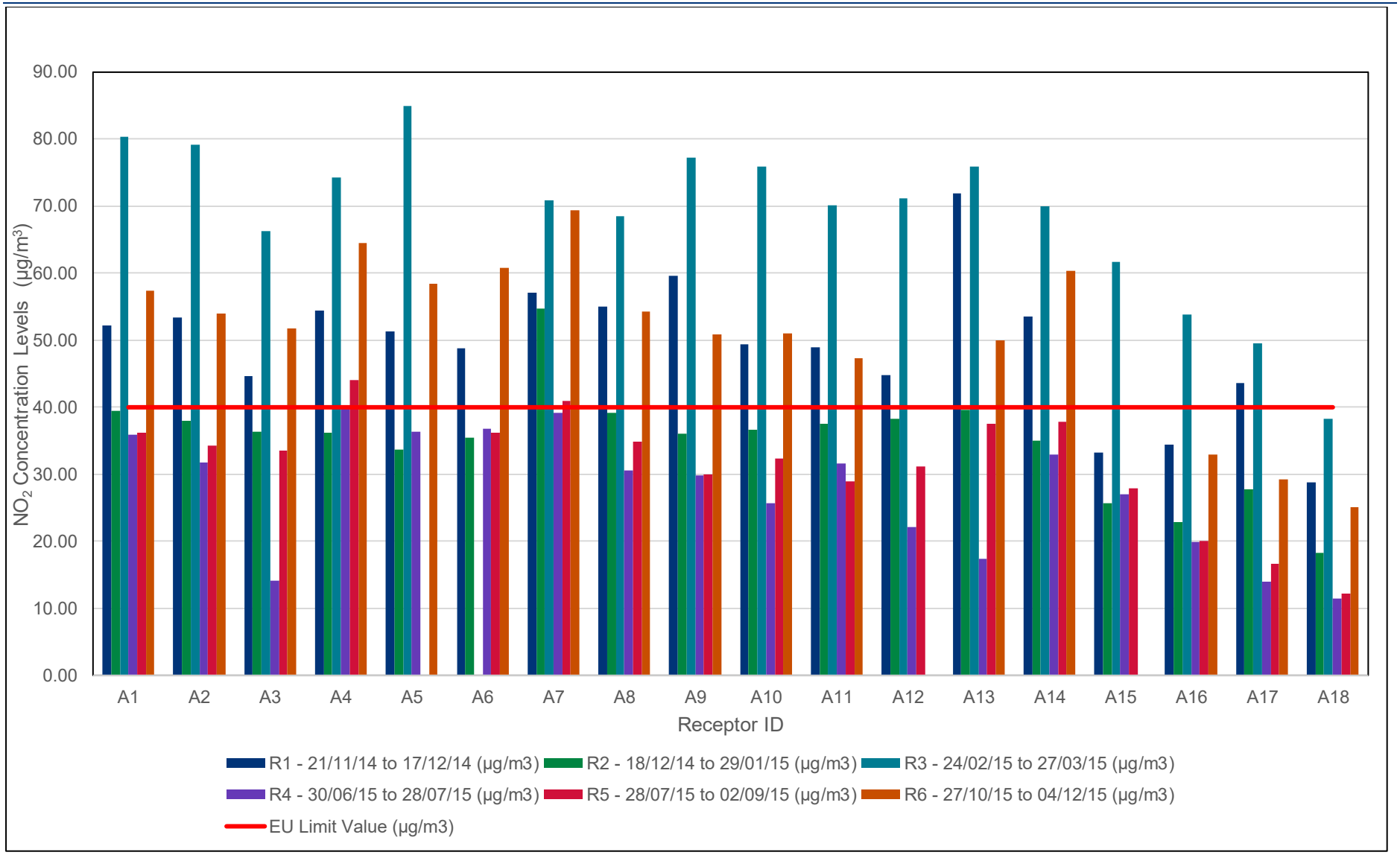


Figure 2: Plot of NO_2 Concentrations for each Monitoring Event R1 to R6 at each Monitoring Station A1 to A18

1.1.2 Sulphur Dioxide

The SO_2 diffusion tubes were deployed for a period of 6 x 1 month periods between Nov 2014 and Dec 2015. Monitoring was carried out at 18 monitoring stations spatially distributed across the port estate. Monitoring was carried out in the four main seasons of Winter, Spring, Summer and Autumn. The results of the monitoring are graphically represented in **Figure 3**.

.

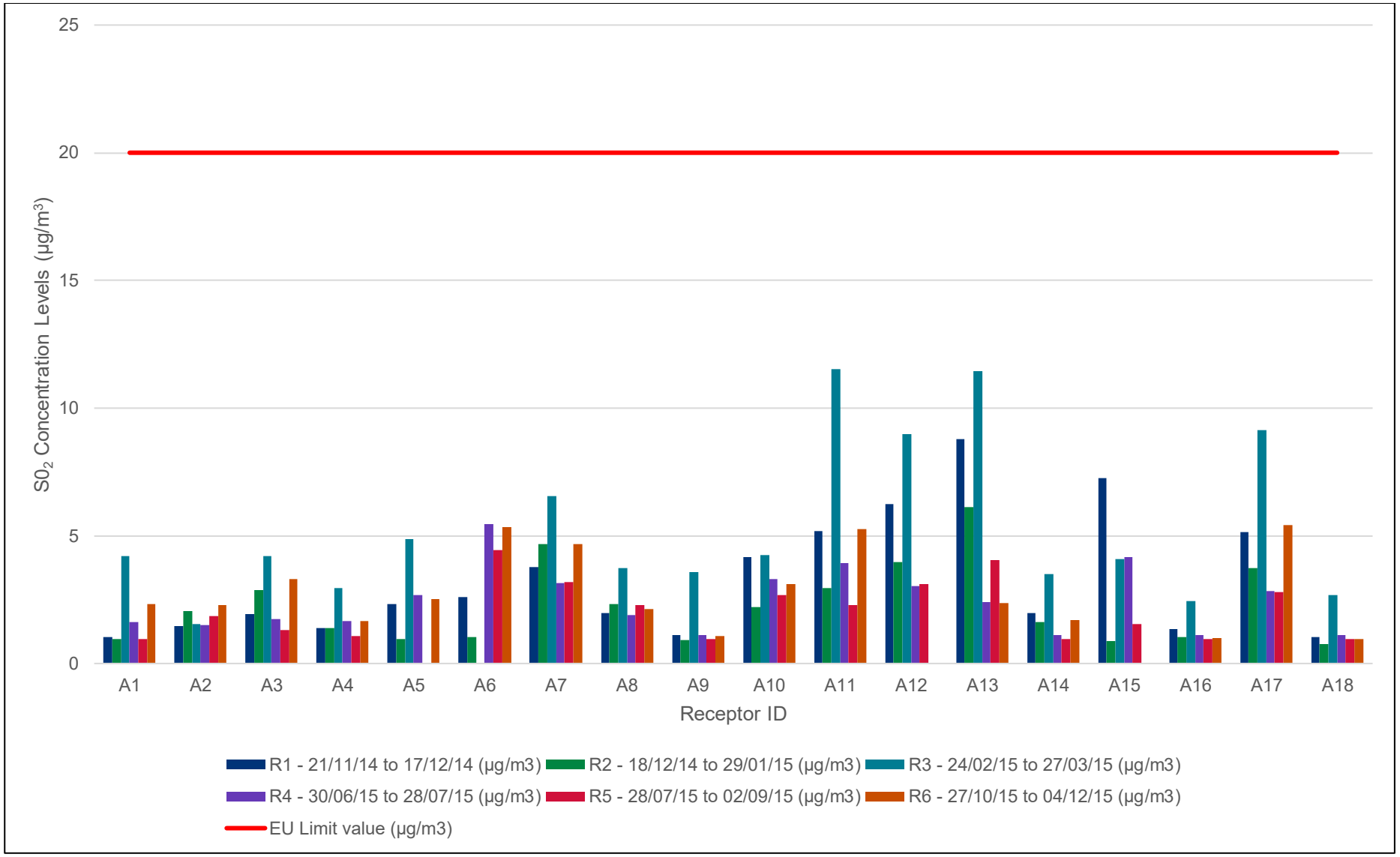


Figure 3: Plot of SO_2 Concentrations for Each Monitoring Event R1 to R6 at Each Monitoring Station A1 to A18

1.1.3 Total Depositional Dust

The Total depositional dust monitoring stations were deployed for a period of 4 x 1 month periods between Nov 2014 and July 2015. Monitoring was carried out at 4 monitoring stations located in close proximity to locations or activities know to give rise to fugitive dust emissions. The results of the monitoring are graphically represented in **Figure 4**.

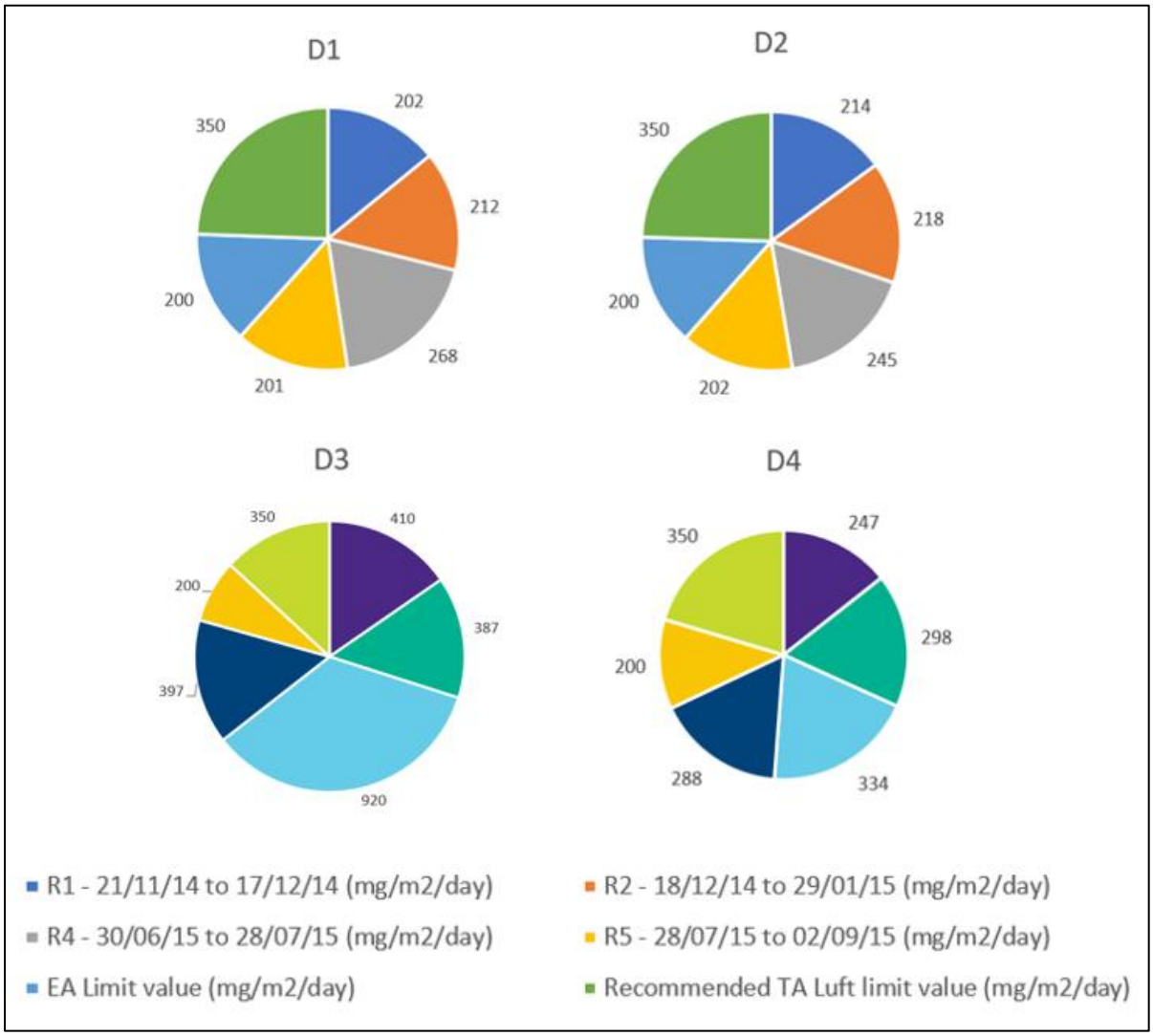


Figure 4: Total Depositional Dust Monitoring Results for the Dublin Port Estate and Environs

1.1.4 Particulate Matter (PM10/2.5)

Particulate matter 10 and 2.5 µm monitoring stations were deployed for a period of approximately 5 and 3 week periods between Sept 2015 and Oct 2015. Monitoring was carried out at 2 monitoring stations. The results of the monitoring are graphically represented in **Figure 5**.

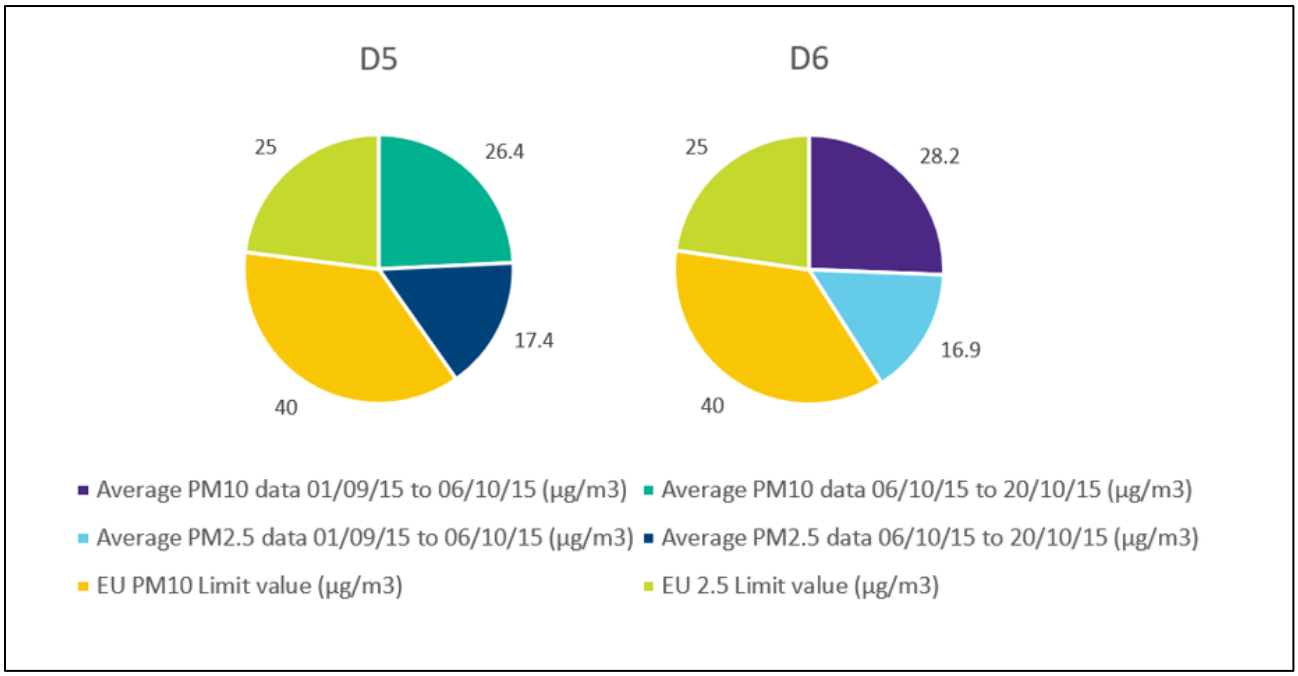


Figure 5: Particulate Matter 10 and 2.5 µm Monitoring Results for Dublin Port Estate Monitoring Stations

2.0 DUBLIN PORT AIR QUALITY MONITORING RESULTS 2016

Air monitoring data from 18 monitoring stations over a period of 6 monitoring event was assessed against legislative limits and target values for the protection of human health and vegetation. Monitoring was carried out for NO_2, SO_2, PM_{10}, $PM_{2.5}$ and Total depositional dust.

A total of 18 individual monitoring locations (A1 to A18) were selected across the port estate area in order to monitor ambient air concentrations of Nitrogen dioxide and Sulphur dioxide. These locations were established during the 2014/2015 monitoring program and data collected in 2016 will facilitate comparison between the data sets in terms of improvement/dis-improvements in ambient air quality within the port environs. A further 4 locations were chosen for Bergerhoff total dust deposition monitoring (D1 to D4) while a further two locations were chosen for PM_{10} and $PM_{2.5}$ monitoring (D5 and D6). **Figure 6** presents an overview of each monitoring locations located with the Dublin Port and its environs.



Figure 6: Overview of Ambient Air Monitoring Locations Located Within Dublin Port and Surrounding Environs for Nitrogen Dioxide, Sulphur Dioxide, Total Depositional Dust and PM10/2.5

2.1 RESULTS

2.1.1 Nitrogen Dioxide

The NO_2 diffusion tubes were deployed for a period of 6 x circa 1 month periods between Feb and Nov 2016. Monitoring was carried out at 18 monitoring stations spatially distributed across the port estate. Monitoring was carried out in the four main seasons of Winter, Spring, Summer and Autumn. The results of the monitoring are graphically represented in **Figure 7**.

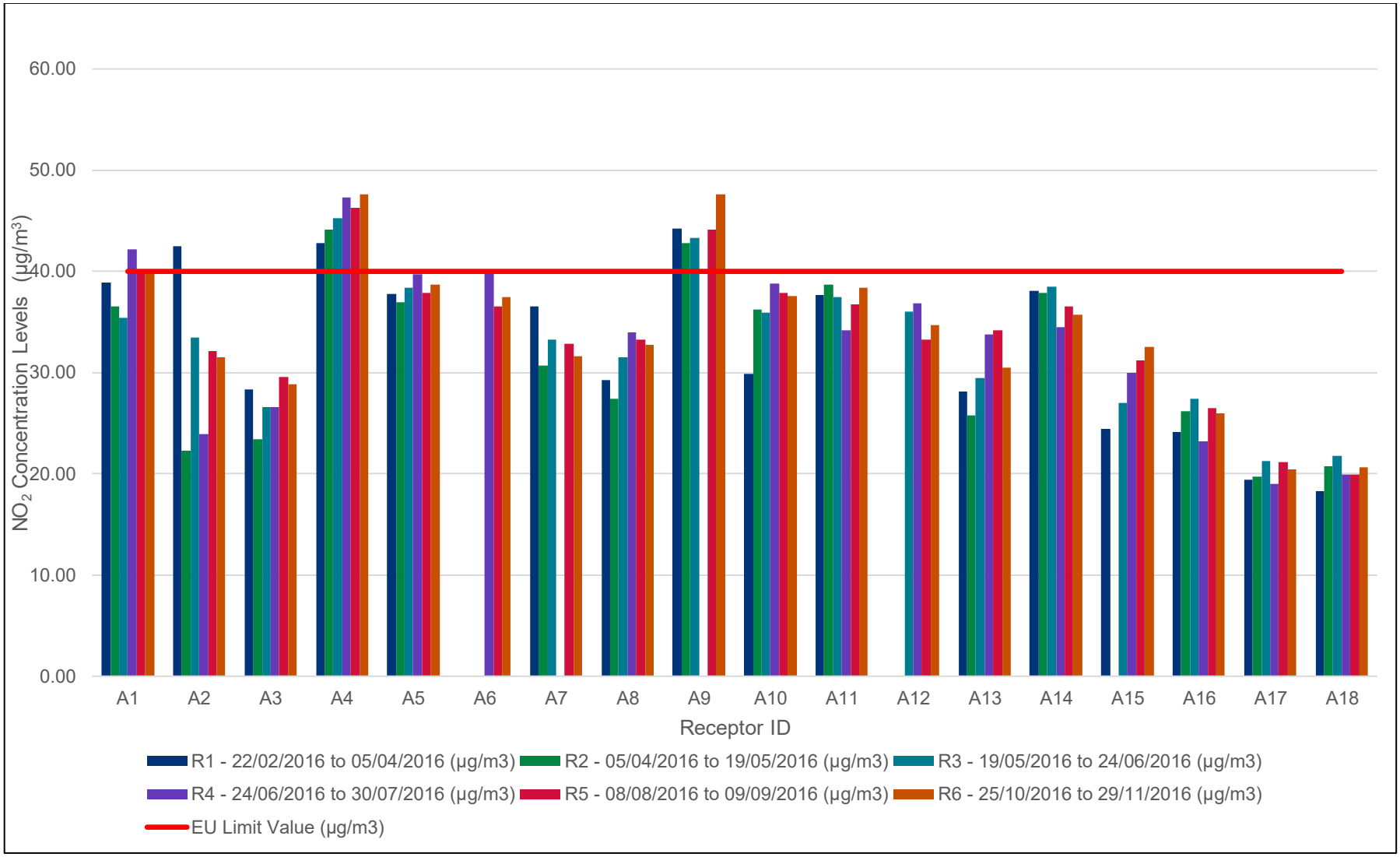


Figure 7: Plot of NO_2 Concentrations for Each Monitoring Event R1 to R6 at Each Monitoring Station A1 to A18

2.1.2 Comparison Between Average Monitoring Data Collected in Event 1 Year 2014/2015 and Event 2 (2016) for NO_2

Figure 8 present the comparison between the average monitoring data collected over the 6 monitoring events in Event 1 Year 2014/2015 and Event 2 Year 2016 for both NO_2.

As can be observed for NO_2 average monitoring data, there is a significant improvement in the average monitoring data for average NO_2 concentrations across each of the monitoring stations over the monitoring period.

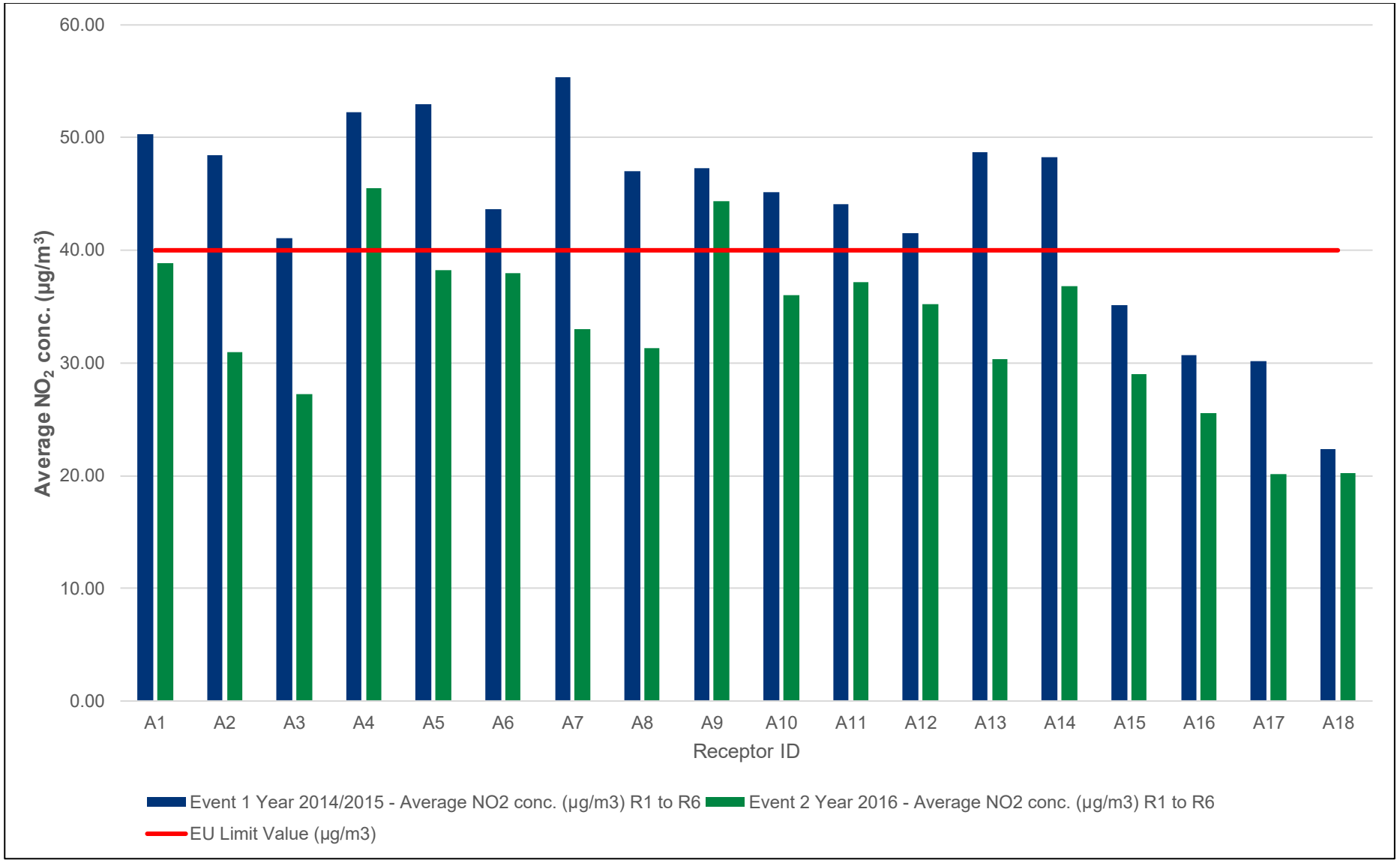


Figure 8: Graphical Comparison Between Average NO_2 Concentration Values for Event 1 Year 2014/2015 and Event 2 2016

2.1.3 Sulphur Dioxide

The SO_2 diffusion tubes were deployed for a period of 6 x circa 1 month periods between Feb and Nov 2016. Monitoring was carried out at 18 monitoring stations spatially distributed across the port estate. Monitoring was carried out in the four main seasons of Winter, Spring, Summer and Autumn. The results of the monitoring are graphically represented in **Figure 9**.

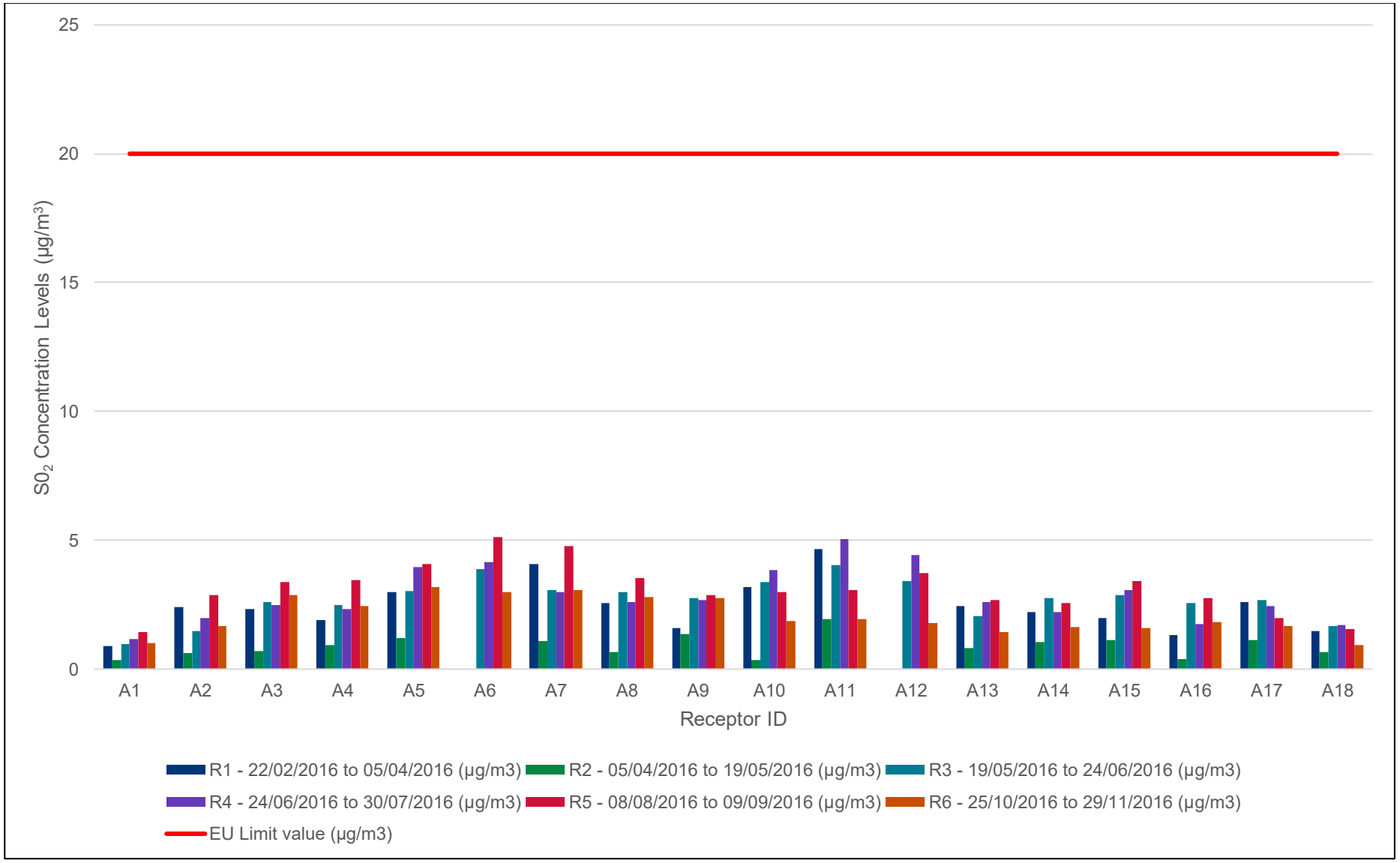


Figure 9: Plot of SO_2 Concentrations for Each Monitoring Event R1 to R6 at Each Monitoring Station A1 to A18

2.1.4 Comparison Between Average Monitoring Data Collected in Event 1 Year 2014/2015 and Event 2 (2016) for SO_2

Figure 10 present the comparison between the average monitoring data collected over the 6 monitoring events in Event 1 Year 2014/2015 and Event 2 Year 2016 for both SO_2.

With regards to SO_2 monitoring data, monitoring data collected during Event 2 Year 2016 were similar in nature across the monitoring area in comparison to Event 1 Year 2014/2015. Nine monitoring stations were lower while nine monitoring stations were higher. All monitoring stations were well in compliance with the statutory limit value of 20 µg/m^3 with the highest value recorded only 20.2% of the limit value.

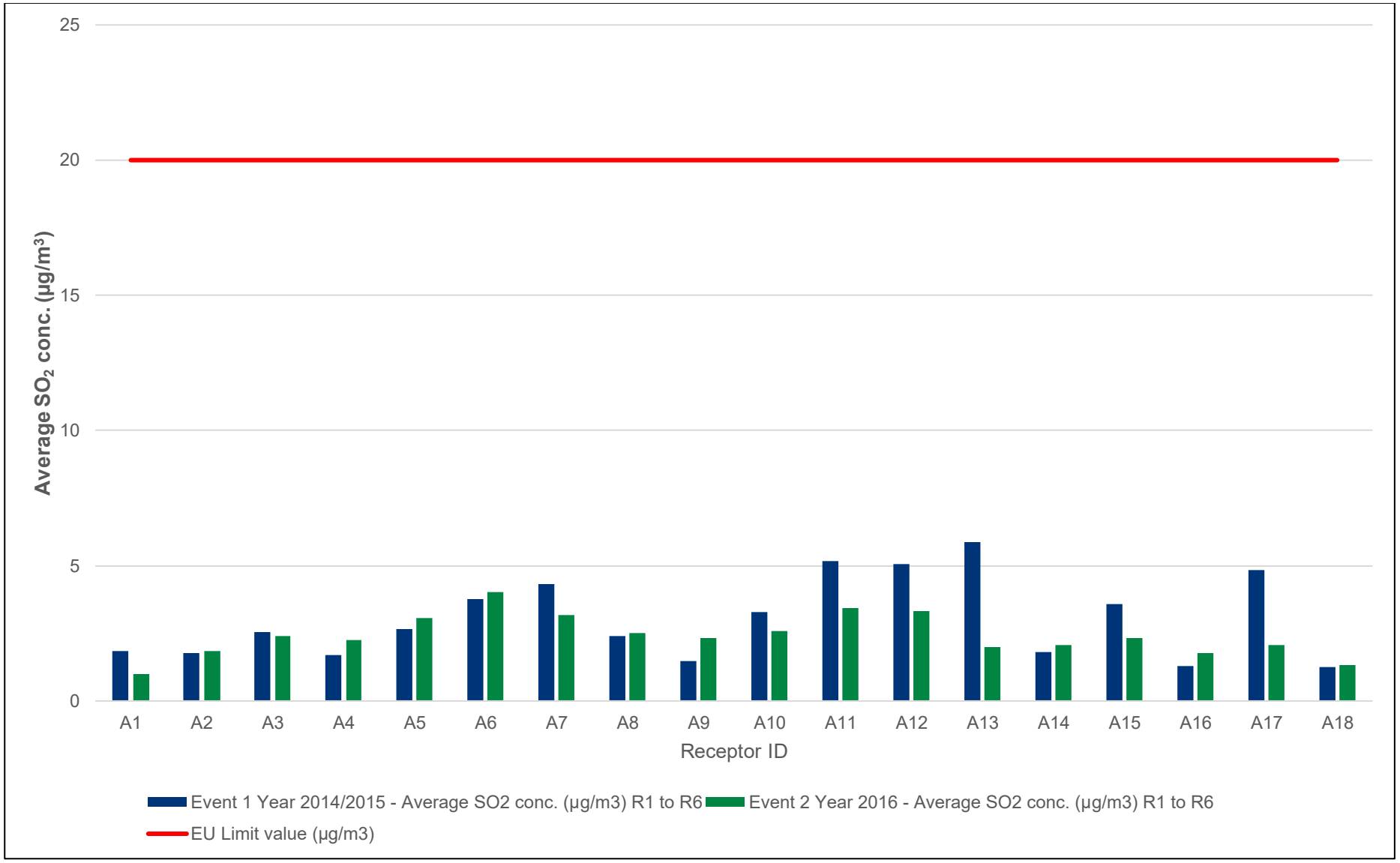


Figure 10: Comparison Between Average SO_2 Concentration Values for Event 1 Year 2014/2015 and Event 2 2016

2.1.5 Total Depositional Dust

The Total depositional dust monitoring stations were deployed for a period of 4 x 1 month periods between Feb 2016 and Nov 2016. Monitoring was carried out at 4 monitoring stations located in close proximity to locations or activities know to give rise to fugitive dust emissions. The results of the monitoring are graphically shown in **Figure 11**.

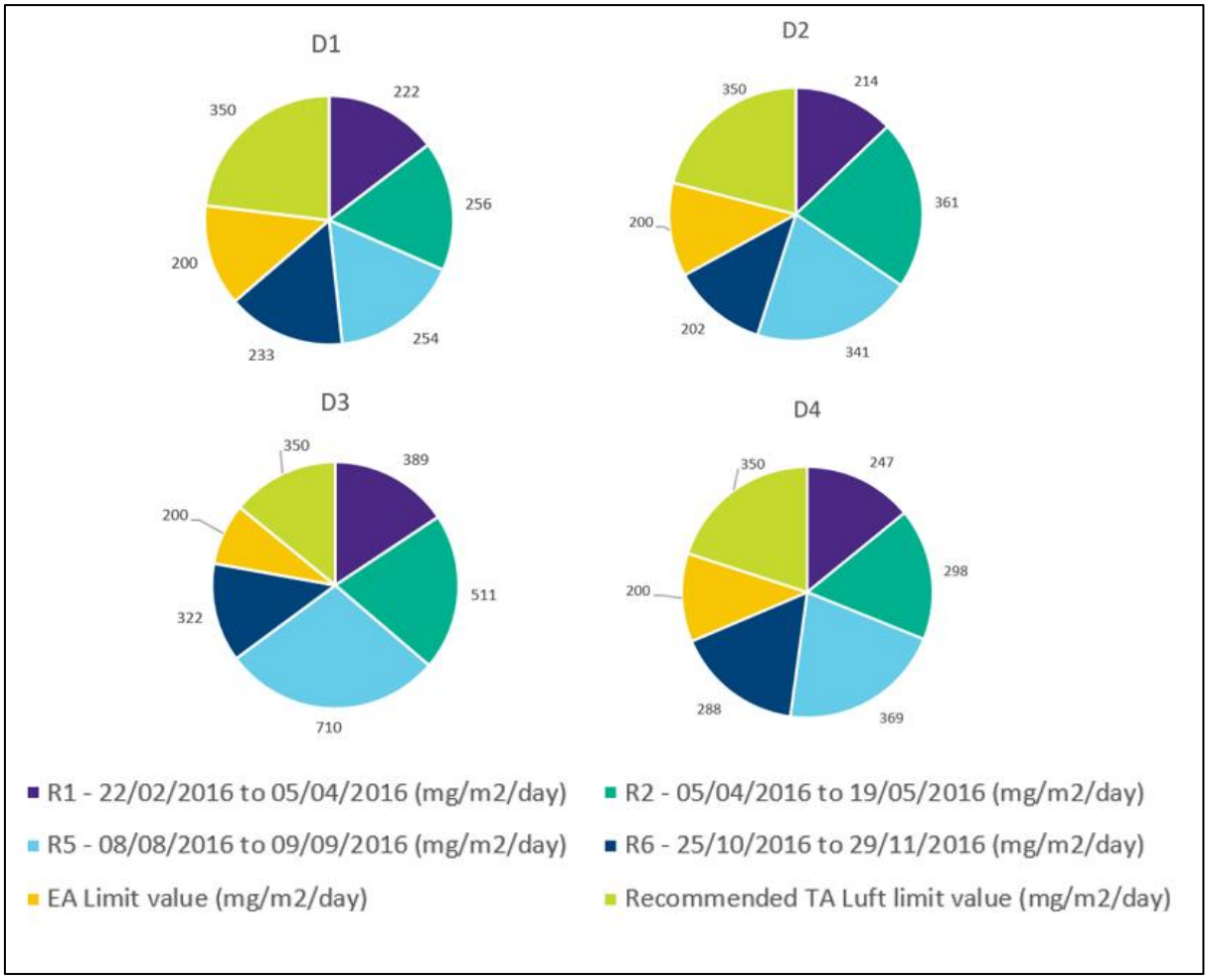


Figure 11: Total Depositional Dust Monitoring Results for the Dublin Port Estate and Environs

2.1.6 Particulate Matter (PM10/2.5)

Particulate matter 10 and 2.5 µm monitoring stations were deployed for a period of approximately 1 week period between 12/04/2016 and 19/02/2016. Monitoring was carried out at 2 monitoring stations. The results of the monitoring are graphically shown in **Figure 12**.

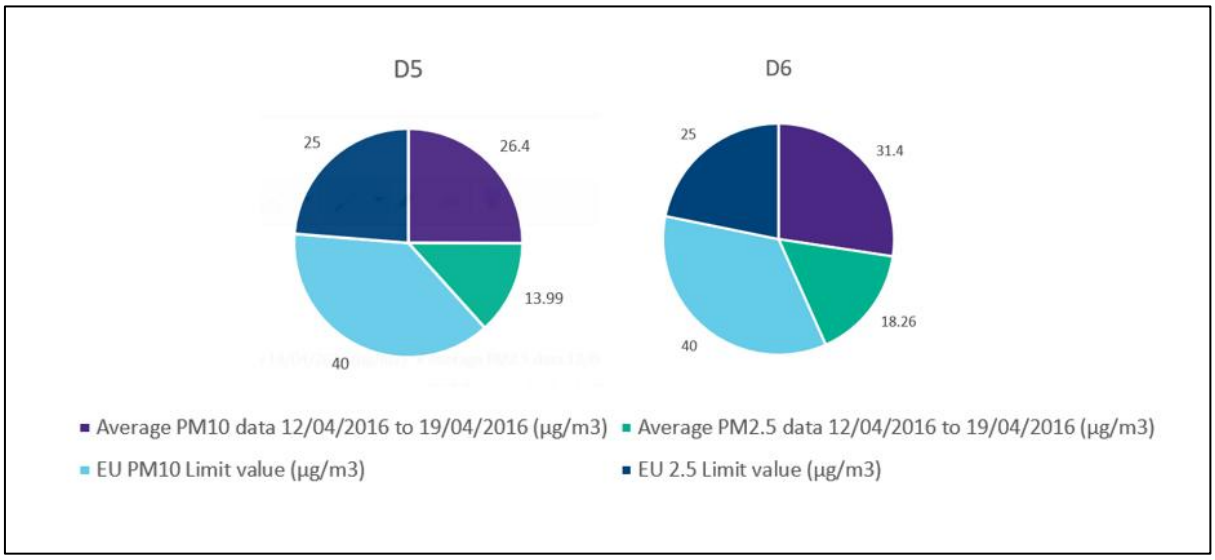


Figure 12: Particulate Matter 10 and 2.5 µm Monitoring Results for Dublin Port Estate Monitoring Stations

3.0 DUBLIN PORT AIR QUALITY MONITORING RESULTS 2017 - 2018

Air monitoring data from 18 monitoring stations over a period of 4 monitoring event was assessed against legislative limits and target values for the protection of human health and vegetation. Monitoring was carried out for NO_2 and SO_2 at 18 locations over 4 monitoring events. Monitoring for PM_{10} and $PM_{2.5}$ was carried out at 2 locations over 1 monitoring event while monitoring for Benzene, Toluene, Ethylbenzene, Xylene isomers and Ammonia was carried on 7 locations over 2 monitoring events. Total depositional dust was carried out on 4 locations over 1 monitoring event.

A total of 18 individual monitoring locations (A1 to A18) were selected across the port estate area in order to monitor ambient air concentrations of Nitrogen dioxide and Sulphur dioxide. These locations were established during the 2014/2015 monitoring program and data collected in 2017 will facilitate comparison between the data sets in terms of improvement / dis-improvements in ambient air quality within the port environs.

A total of 7 individual monitoring locations (A1, A2, A3, A8, A9, A12, A13, A15, A16, A17 and A18) were chosen from the stated location for the monitoring of BTEX and Ammonia. This monitoring only commenced in 2017 and therefore no comparison can be made between the collected dataset and previous results.

A total of 4 locations were chosen for Bergerhoff total dust deposition monitoring (D1 to D4) while a further two locations were chosen for PM_{10} and $PM_{2.5}$ monitoring (D5 and D6). **Figure 13** presents an overview of each monitoring locations located with the Dublin Port and its environs.



Figure 13: Overview of Ambient Air Monitoring Locations Located Within Dublin Port and Surrounding Environs for Nitrogen Dioxide, Sulphur Dioxide, BTEX, Ammonia, Total Depositional Dust and PM10/2.5

3.1 RESULTS

3.1.1 Nitrogen Dioxide

The NO_2 diffusion tubes were deployed for a period of 4 x circa 1 month periods between Aug and Dec 2017. Monitoring was carried out at 18 monitoring stations spatially distributed across the port estate. The results of the monitoring are and graphically represented in **Figure 14**.

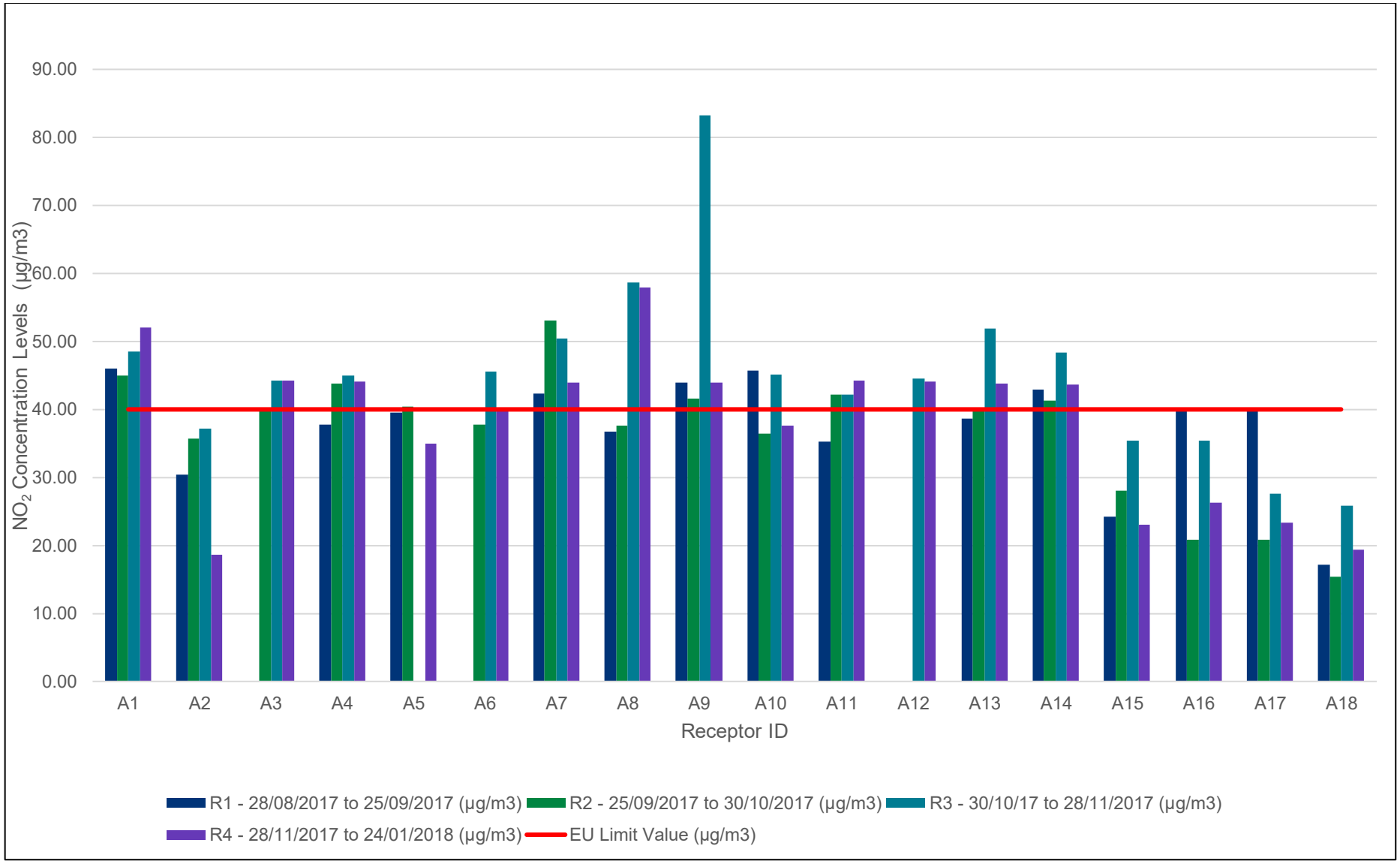


Figure 14: Plot of NO_2 Concentrations For Each Monitoring Event R1 to R4 at Each Monitoring Station A1 to A18

3.1.2 Comparison between average monitoring data collected in Event 1 Year 2014/2015, Event 2 Year 2016 and Event 3 Year 2017 for NO_2

Figure 15 present the comparison between the average monitoring data collected over the 6 monitoring events in Event 1 Year 2014/2015, Event 2 Year 2016 and Events 3 Year 2017 for NO_2.

As can be observed for NO_2 average monitoring data, comparison between Event 3 Year 2017 and Event 2 Year 2016 demonstrates a marked dis-improvement in the average monitoring data for average NO_2 concentrations across each of the monitoring stations over the monitoring period. In terms of monitoring data, a total of 12 monitoring stations were in excess of the annual average limit value of 40µg/m3. When compared with monitoring event 1 Year 2014/2015, there is a net overall improvement with two fewer stations in excess of the annual average limit value of 40µg/m3.

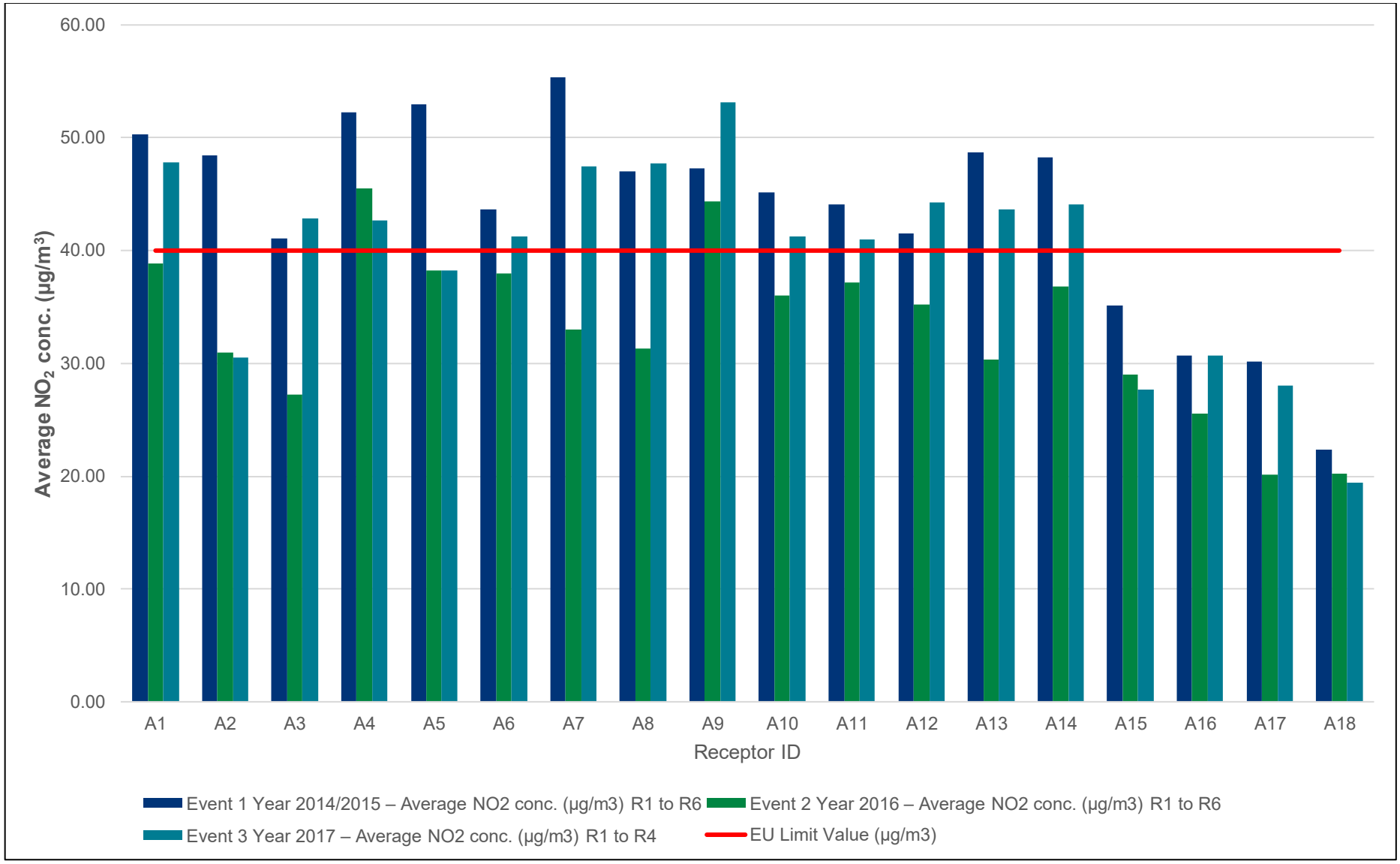


Figure 15: Graphical Comparison Between Average NO_2 Concentration Values for Event 1 Year 2014/2015, Event 2 Year 2016 and Event 3 Year 2017

3.1.3 Sulphur Dioxide

The SO_2 diffusion tubes were deployed for a period of 4 x circa 1 month periods between Aug and Dec 2017. Monitoring was carried out at 18 monitoring stations spatially distributed across the port estate. The results of the monitoring are graphically represented in **Figure 16**.

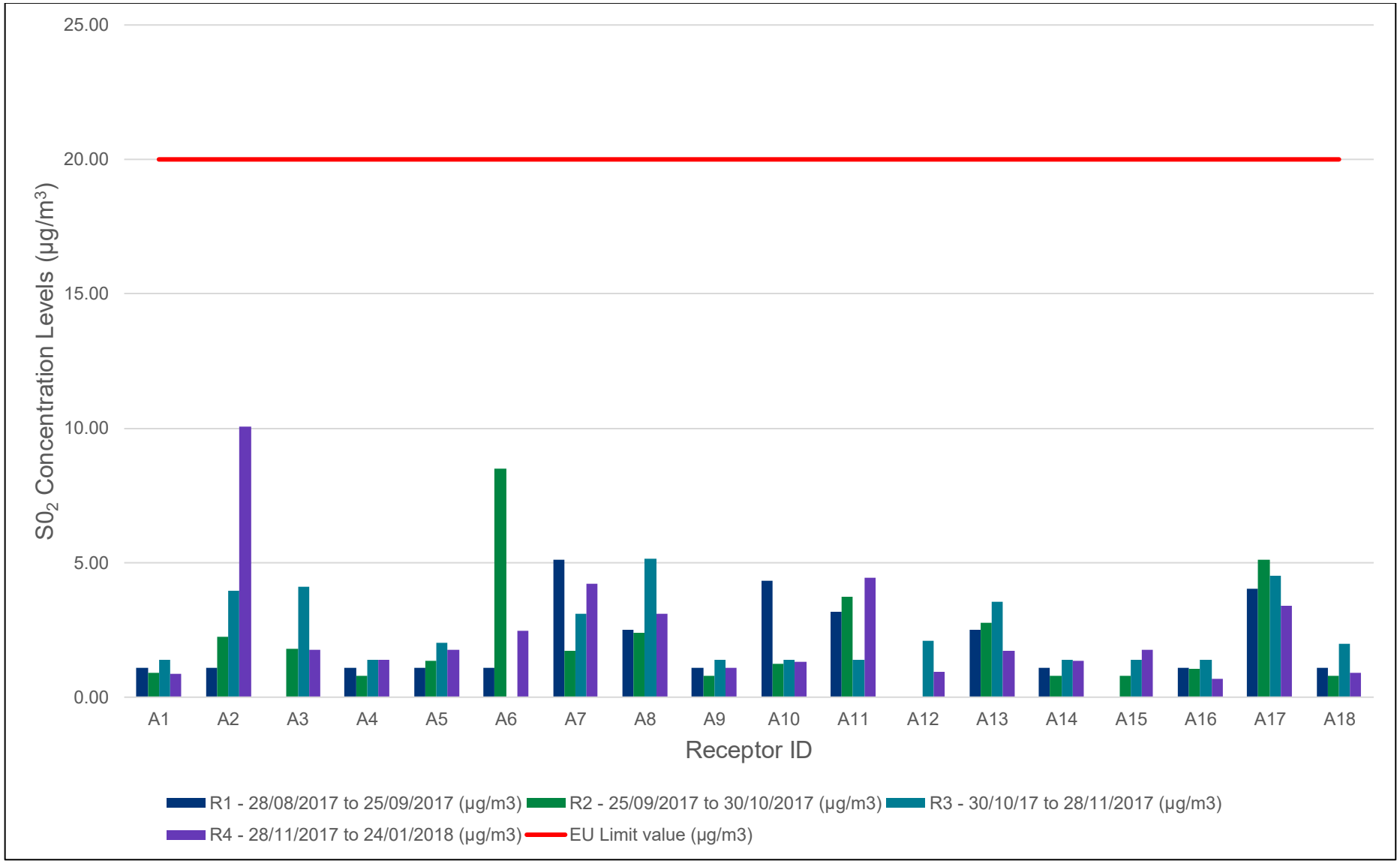


Figure 16: Plot of SO_2 Concentrations For Each Monitoring Event R1 to R4 at Each Monitoring Station A1 to A18

3.1.4 Comparison between average monitoring data collected in Event 1 Year 2014/2015, Event 2 Year 2016 and Event 3 Year 2017 for SO_2

Figure 17 present the comparison between the average monitoring data collected over the 6 monitoring events in Event 1 Year 2014/2015, Event 2 Year 2016 and Events 3 Year 2017 for ^{2}.

With regards to SO_2 monitoring data, monitoring data collected during Event 3 Year 2017 all stations were similar in nature across the monitoring area in comparison to Event 1 Year 2014/2015 and Event 2 Year 2016. Eleven monitoring stations were lower for SO_2 concentrations in comparison to Event 2 Year 2016 while seven monitoring stations were higher. When Event 3 Year 2017 is compared against Event 1 Year 2014/2015, fourteen locations were lower while 4 locations were higher. All monitoring stations were well in compliance with the statutory limit value of 20 µg/m3 with the highest value recorded only 29.37% of the limit value.

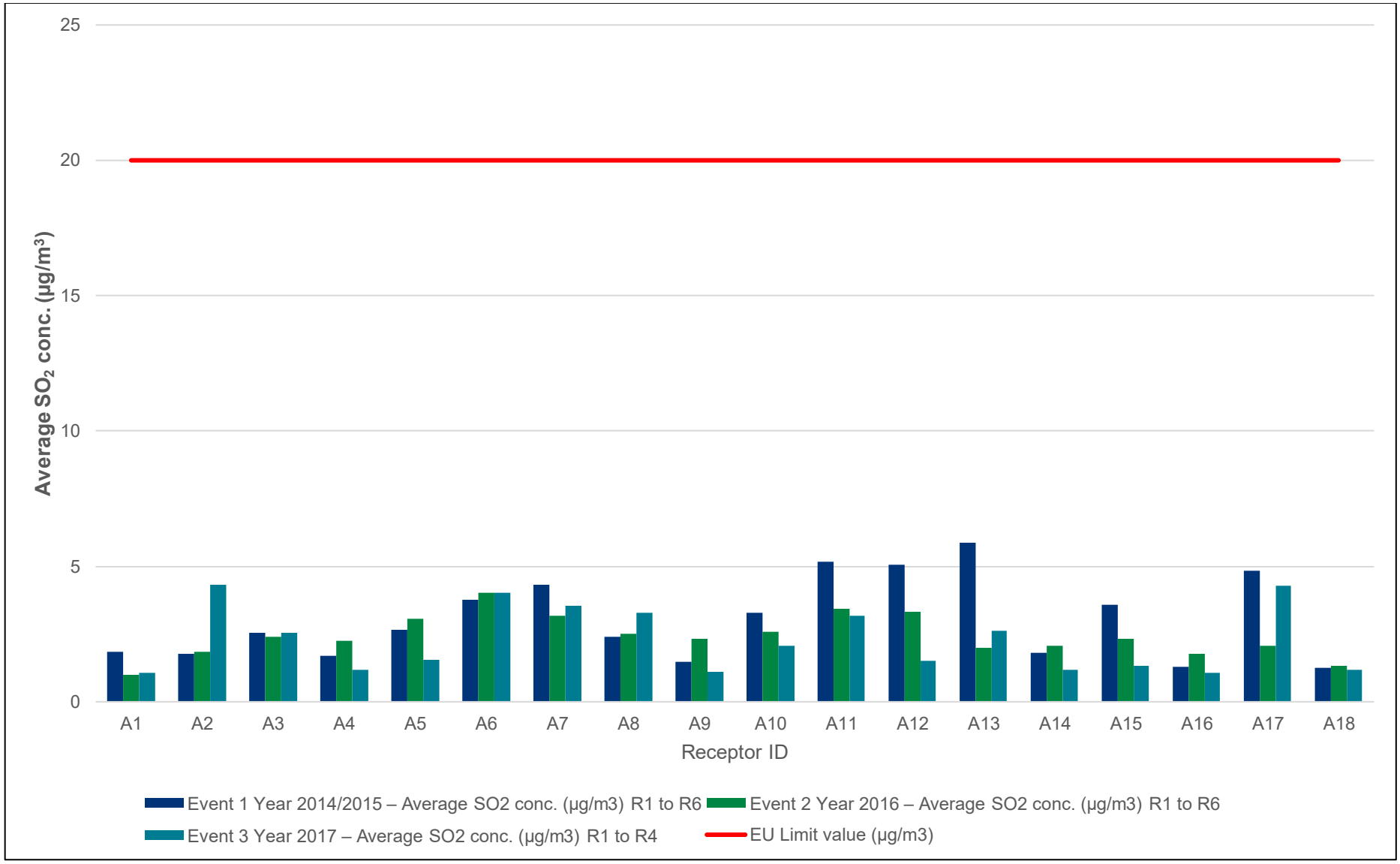


Figure 17: Comparison Between Average SO_2 Concentration Values For Event 1 Year 2014/2015, Event 2 Year 2016 and Event 3 Year 2017

3.1.5 Total Depositional Dust

The Total depositional dust monitoring stations were deployed for a period of 1 x 1 month periods between Sept 2017 and Oct 2017. Monitoring was carried out at 4 monitoring stations located in close proximity to locations or activities know to give rise to fugitive dust emissions. The results of the monitoring are graphically shown in **Figure 18**.

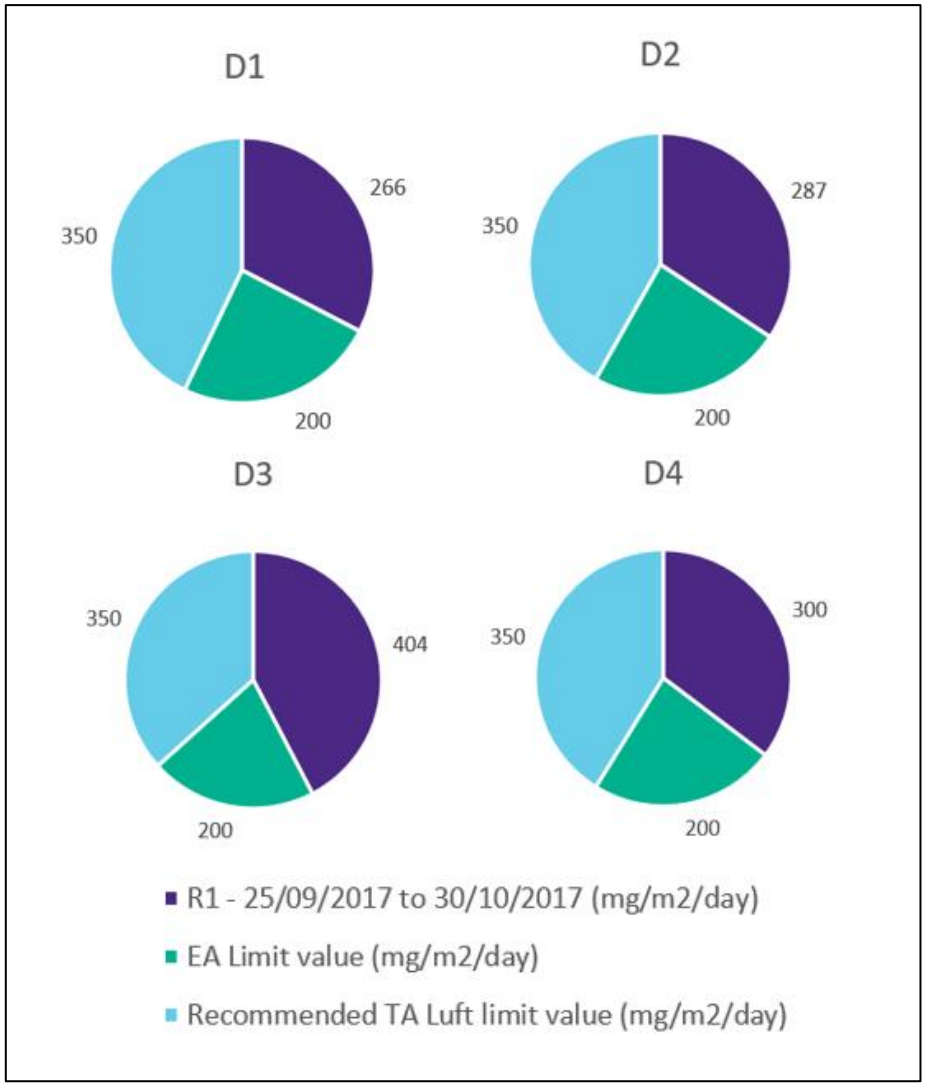


Figure 18: Total Depositional Dust Monitoring Results for the Dublin Port Estate and Environs

3.1.6 Particulate Matter (PM10/2.5)

Particulate matter 10 and 2.5 µm monitoring stations were deployed for a period of approximately 2 week period between 25/06/2017 and 10/10/2017. Monitoring was carried out at 2 monitoring stations. The results of the monitoring are graphically shown in **Figure 19**.

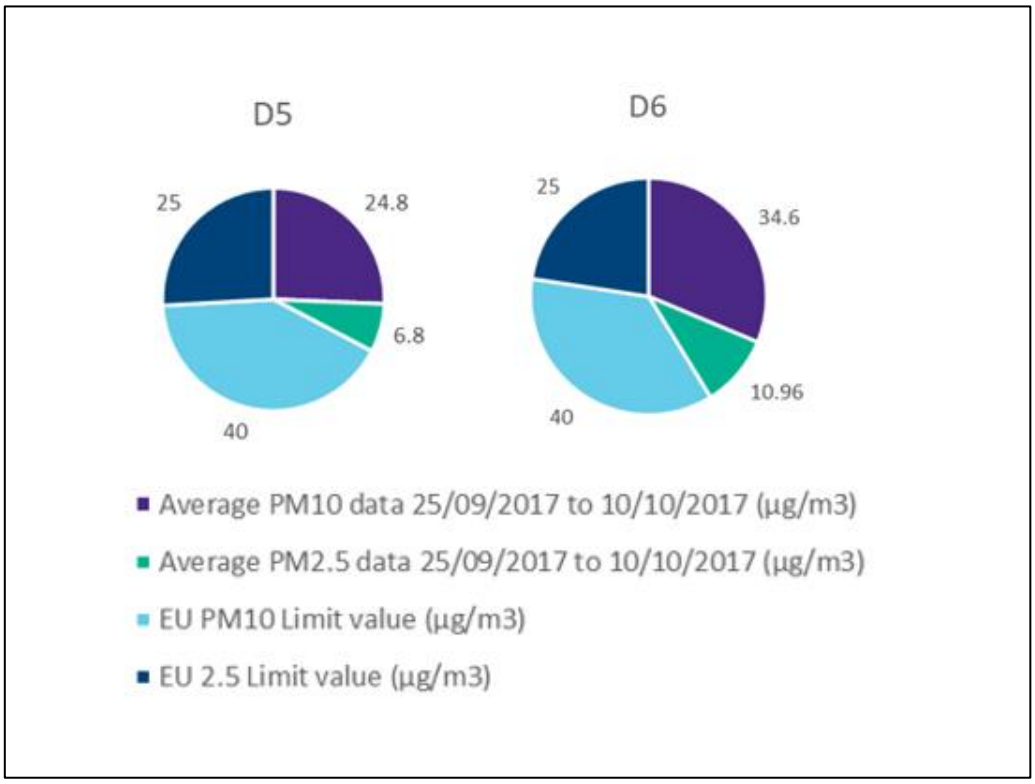


Figure 19: Particulate Matter 10 and 2.5 µm Monitoring Results for Dublin Port Estate Monitoring Stations

3.1.7 Ammonia

The NH3 diffusion tubes were deployed for a period of 2 x circa 1 month periods between August and December 2017. Monitoring was carried out at 7 monitoring stations spatially distributed across the port estate. The results of the monitoring are graphically shown in **Figure 20** and **Figure 21**.

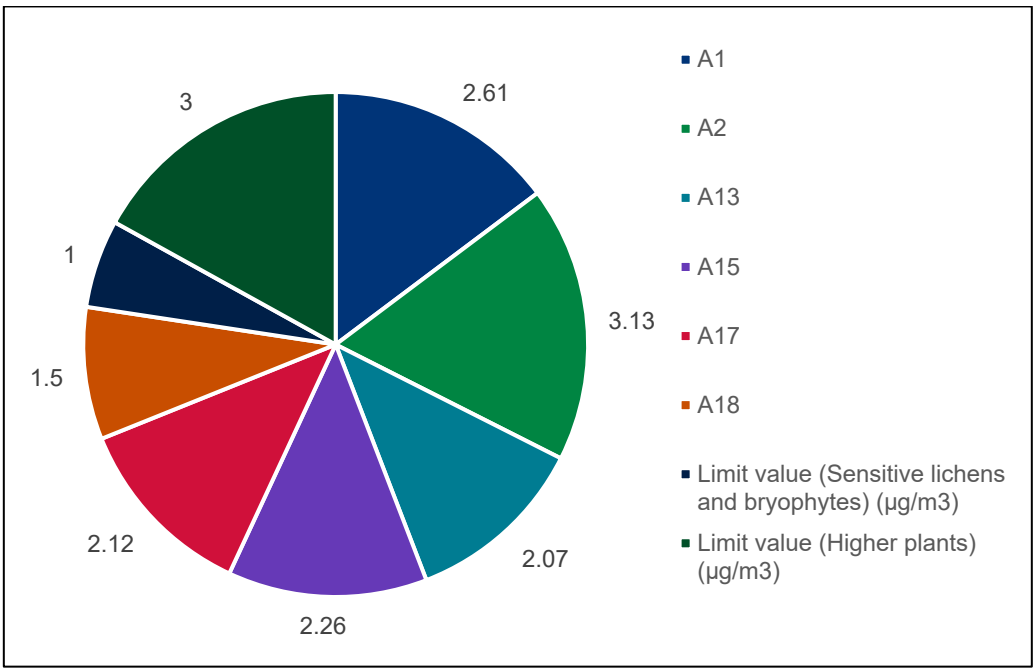


Figure 20: NH3 Monitoring Results at Each of the 7 Monitoring Stations R1 - 28/08/2017 to 25/09/2017 (µg/m3)

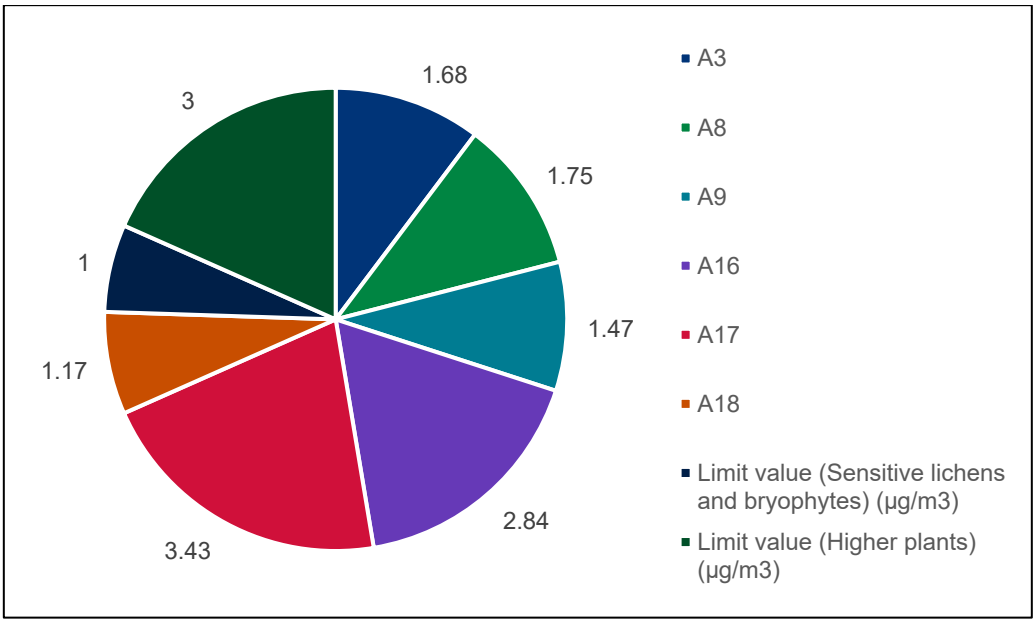


Figure 21: NH3 Monitoring Results at Each of the 7 Monitoring Stations R2 - 28/11/17 to 24/01/2018 (µg/m3)

3.1.8 BTEX

The BTEX diffusion tubes were deployed for a period of 2 x circa 1 month periods between Aug and Dec 2017. Monitoring was carried out at 7 monitoring stations spatially distributed across the port estate. The results of the monitoring are graphically shown in **Figure 22**– **Figure 23**.

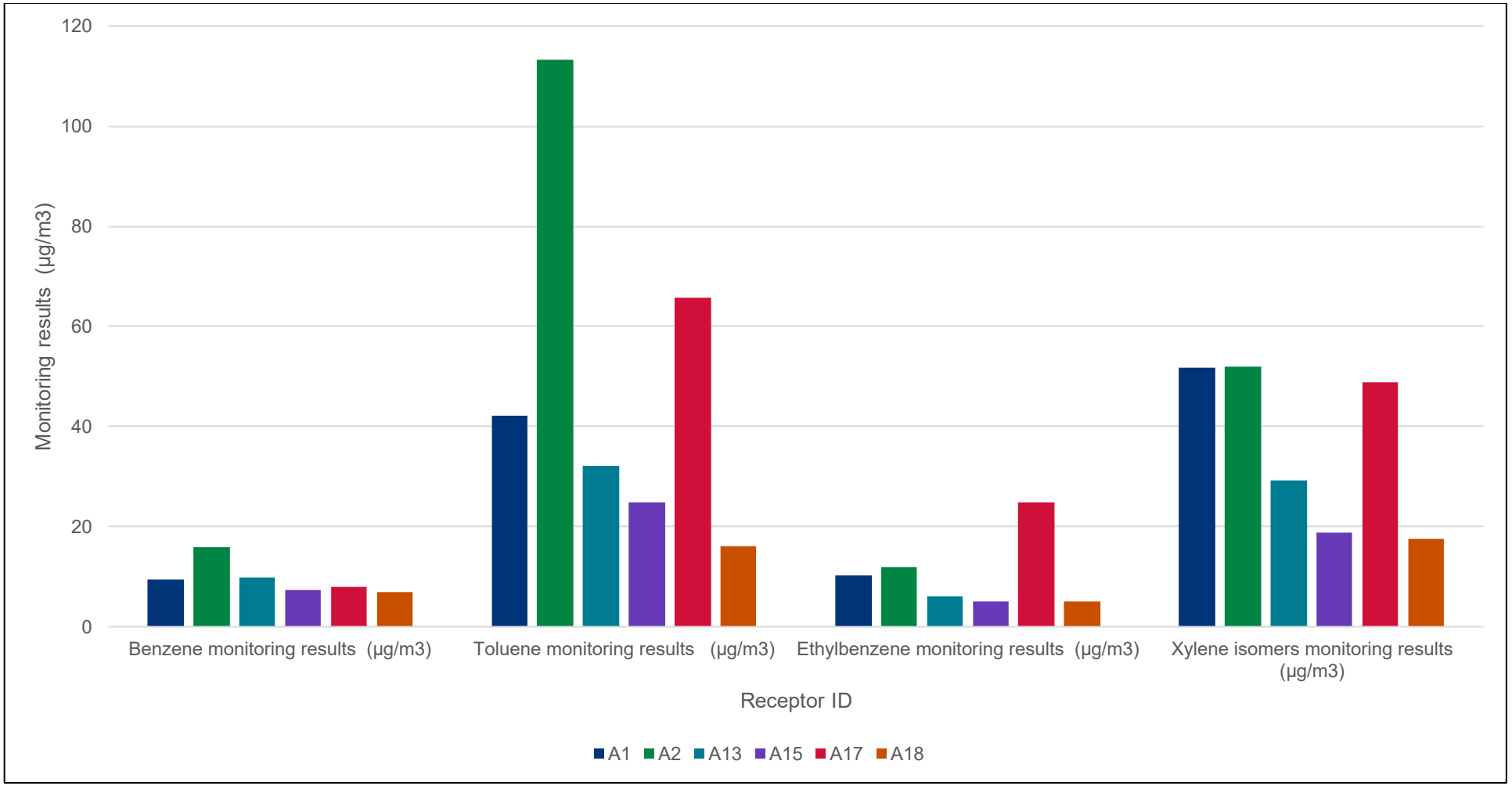


Figure 22: BTEX monitoring results at each of the 7 monitoring stations over R1 - 28/08/2017 to 25/09/2017

**Note – Limit Values Include:

Benzene <5.0 (µg/m3), Toluene 1,920 (µg/m3), Ethylbenzene 2,210 (µg/m3), Xylene 4,420 (µg/m3)

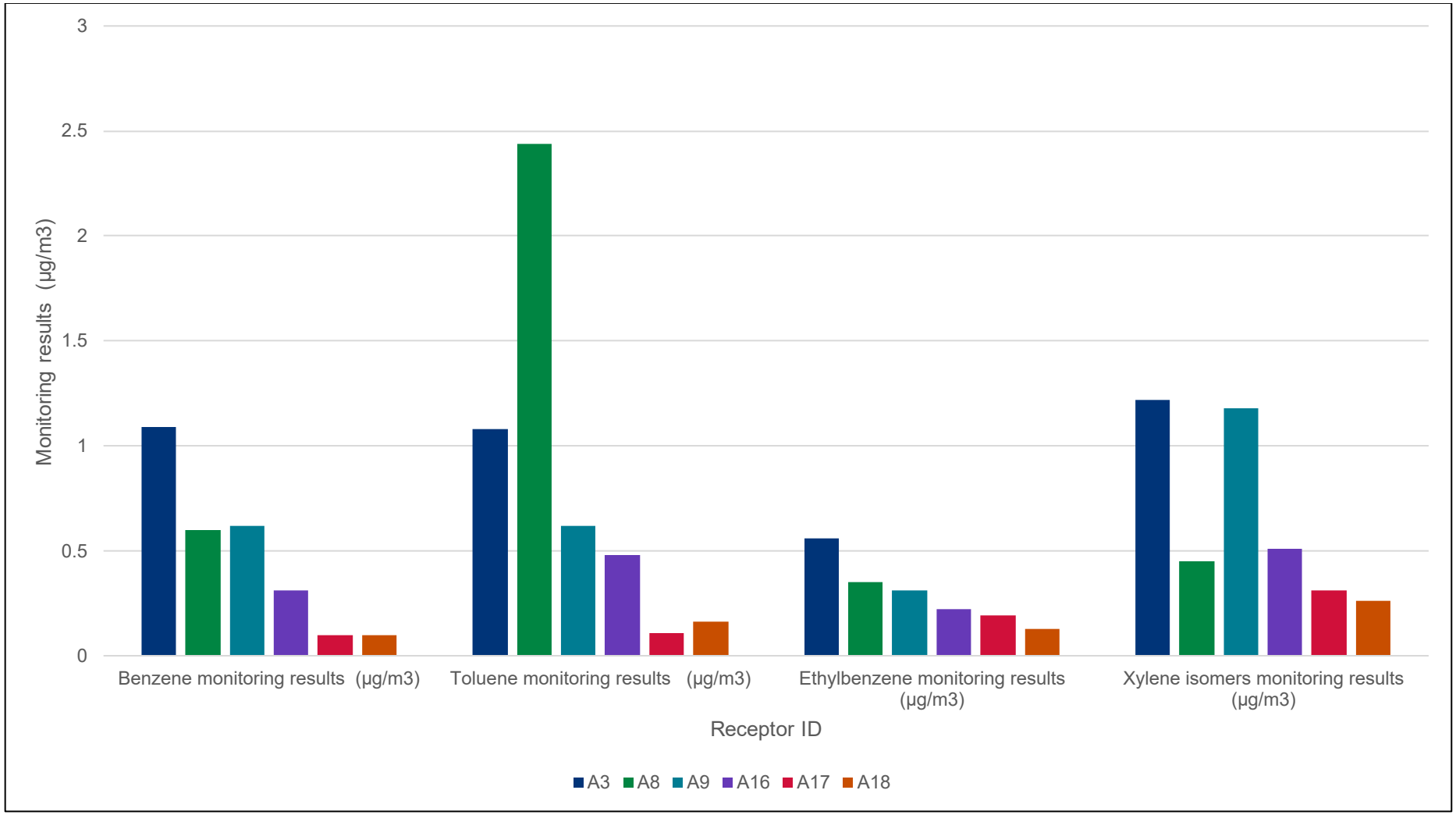


Figure 23: BTEX monitoring results at each of the 7 monitoring stations over R2 - 28/11/17 to 24/01/2018

**Note – Limit Values Include:

Benzene <5.0 (µg/m3), Toluene 1,920 (µg/m3), Ethylbenzene 2,210 (µg/m3), Xylene 4,420 (µg/m3)

4.0 DUBLIN PORT AIR QUALITY MONITORING RESULTS 2019

Air monitoring data from 18 monitoring stations over a period of 6 monitoring event was assessed against legislative limits and target values for the protection of human health and vegetation. Monitoring was carried out for NO_2 and SO_2 at 18 locations over 6 monitoring events. Monitoring for PM_{10} and $PM_{2.5}$ was carried out at 2 locations over 2 monitoring event while monitoring for Benzene, Toluene, Ethyl Benzene, Xylene isomers and Ammonia was carried at 7 locations over 3 monitoring events. Total depositional dust was carried out at 4 locations over 2 monitoring event while Lead monitoring was carried out at 3 locations over 3 monitoring events.

A total of 18 individual monitoring locations (i.e. A1 to A18) were selected across the port estate area in order to monitor ambient air concentrations of Nitrogen dioxide and Sulphur dioxide. These locations were established during the 2014/2015 monitoring program and data collected in 2019 will facilitate comparison between the data sets in terms of improvement / dis-improvements in ambient air quality within the port environs.

A total of 7 individual monitoring locations (i.e. A2, A3, A4, A8, A15, A17 and A18) were chosen from the stated location for the monitoring of BTEX and Ammonia.

A total of 4 locations were chosen for Bergerhoff total dust deposition monitoring (i.e. D1 to D4) while a further two locations were chosen for PM_{10} and $PM_{2.5}$ monitoring (i.e. D5 and D6). A total of three monitoring locations were chosen for Lead (i.e. D1, D2 and D6). **Figure 24** presents an overview of each monitoring locations located with the Dublin Port and its environs.



Figure 24: Overview of Ambient Air Monitoring Locations Located Within Dublin Port and Surrounding Environs for Nitrogen Dioxide, Sulphur Dioxide, BTEX, Ammonia, Total Depositional Dust, PM10/2.5.and Lead

4.1 RESULTS

4.1.1 Nitrogen Dioxide

The NO_2 diffusion tubes were deployed for a period of 6 x circa 1 month periods between Jan and Dec 2019. Monitoring was carried out at 18 monitoring stations spatially distributed across the port estate. The results of the monitoring are and graphically represented in **Figure 25**.

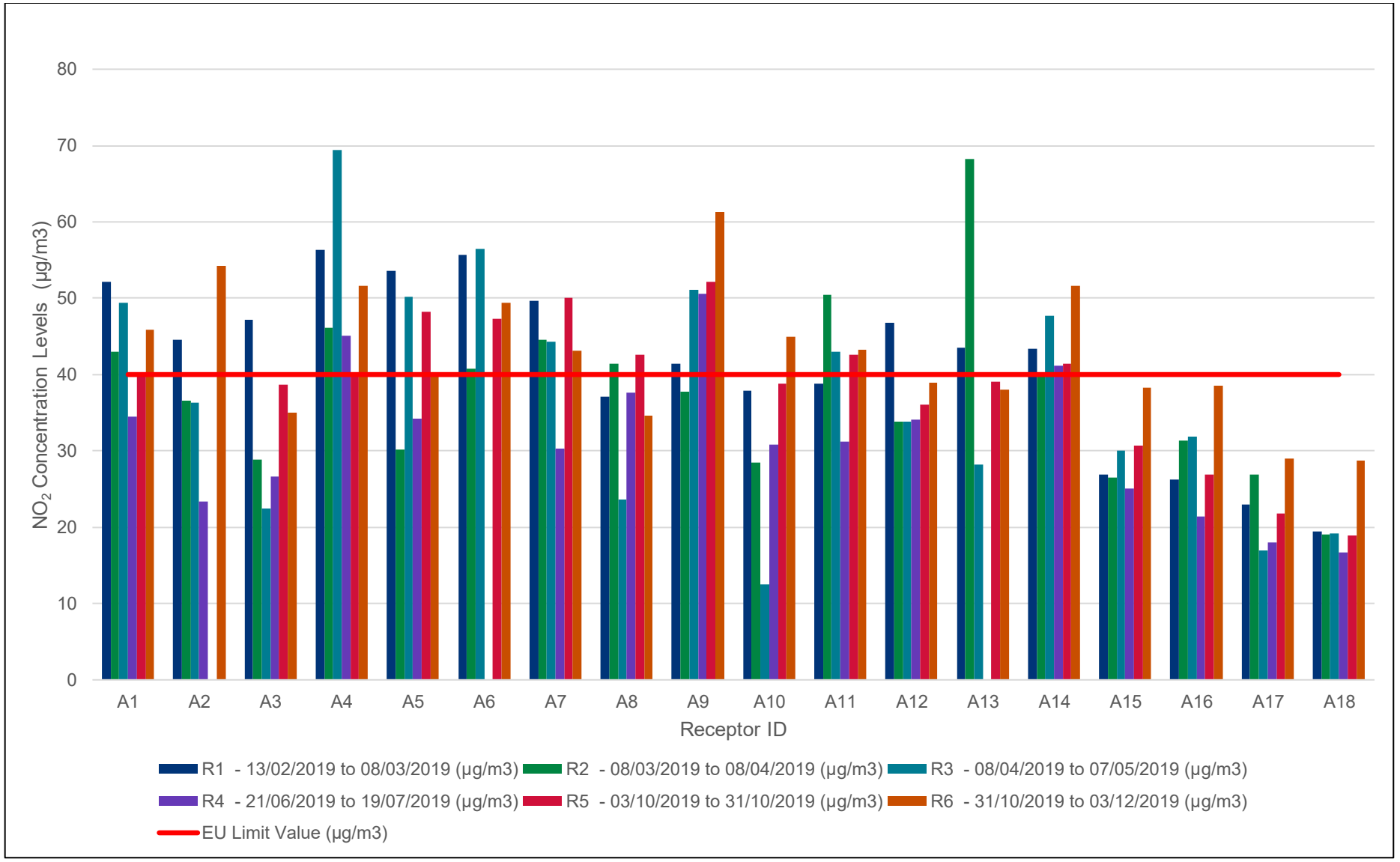


Figure 25: Plot of NO_2 Concentrations For Each Monitoring Event R1 to R6 at Each Monitoring Station A1 to A18

4.1.2 Comparison between average monitoring data collected in Event 1 Year 2014/2015, Event 2 Year 2016, Event 3 Year 2017, Event 4 Year 2018 and Event 5 2019 for NO_2

Figure 26 present the comparison between the average monitoring data collected over the 6 monitoring events in Event 1 Year 2014/2015, Event 2 Year 2016, Events 3 Year 2017, Event 4 Year 2018 and Event 5 2019 for NO_2.

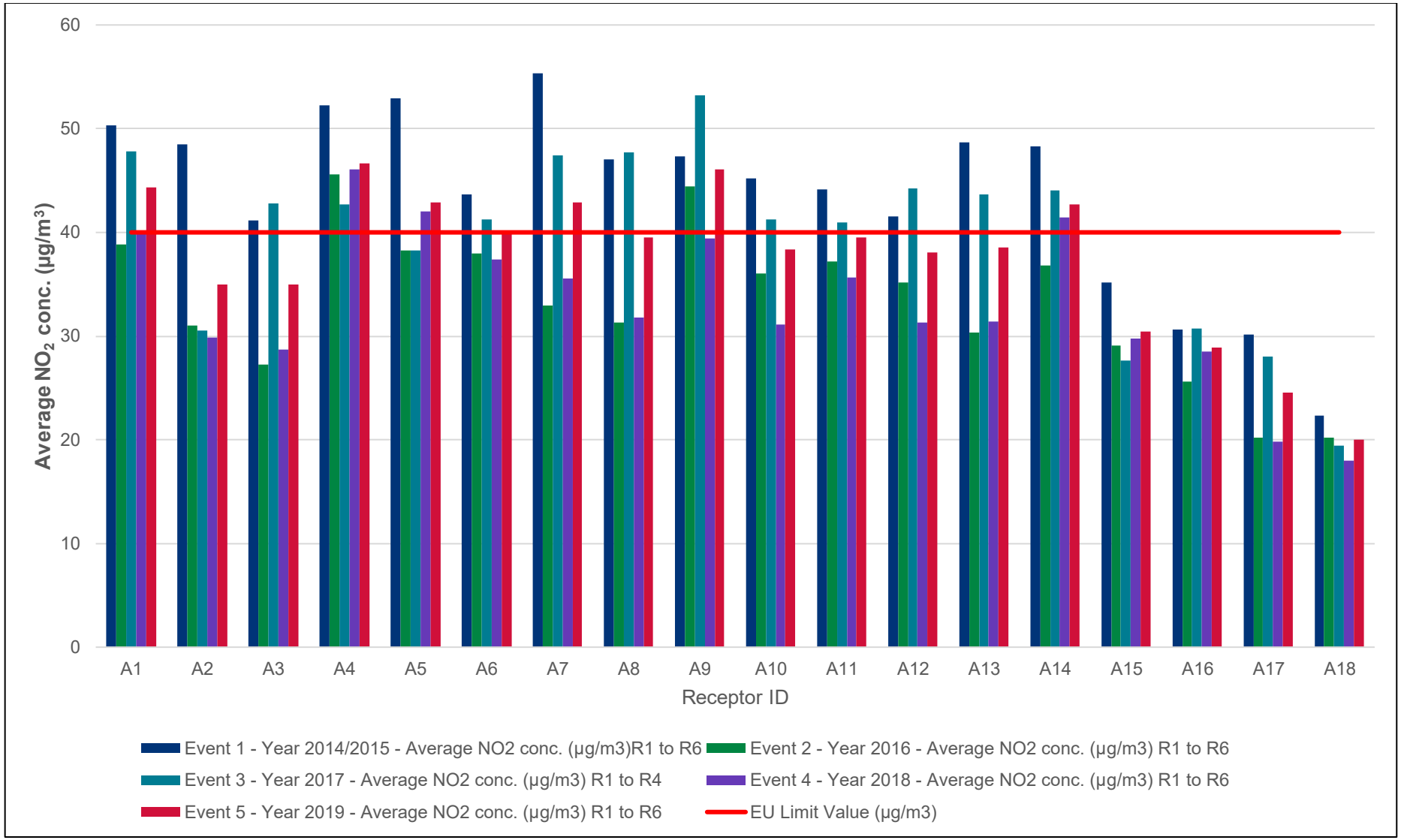


Figure 26: Graphical Comparison Between Average NO_2 Concentration Values for Event 1 Year 2014/2015, Event 2 Year 2016, Events 3 Year 2017, Event 4 Year 2018 and Event 5 2019

4.1.3 Sulphur Dioxide

The SO_2 diffusion tubes were deployed for a period of 6 x circa 1 month periods between Jan and Dec 2019. Monitoring was carried out at 18 monitoring stations spatially distributed across the port estate. The results of the monitoring are graphically represented in **Figure 27**.

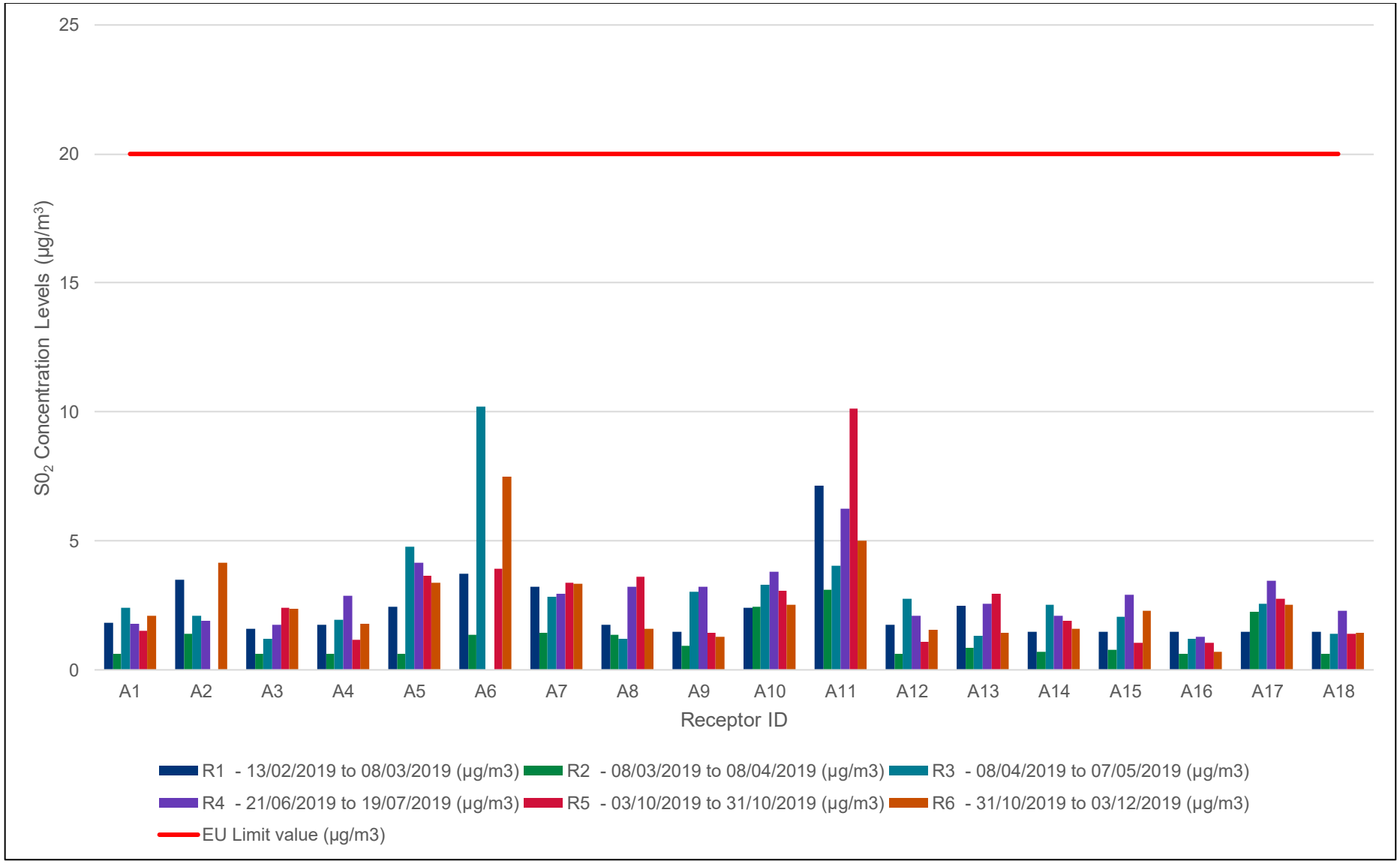


Figure 27: Plot of SO_2 Concentrations For Each Monitoring Event R1 to R6 at Each Monitoring Station A1 to A18

4.1.4 Comparison between average monitoring data collected in Event 1 Year 2014/2015, Event 2 Year 2016 and Event 3 Year 2017 for SO_2

Figure 28 present the comparison between the average monitoring data collected over the 6 monitoring events in Event 1 Year 2014/2015, Event 2 Year 2016, Events 3 Year 2017, Event 4 Year 2018 and Event 5 2019 for SO_2.

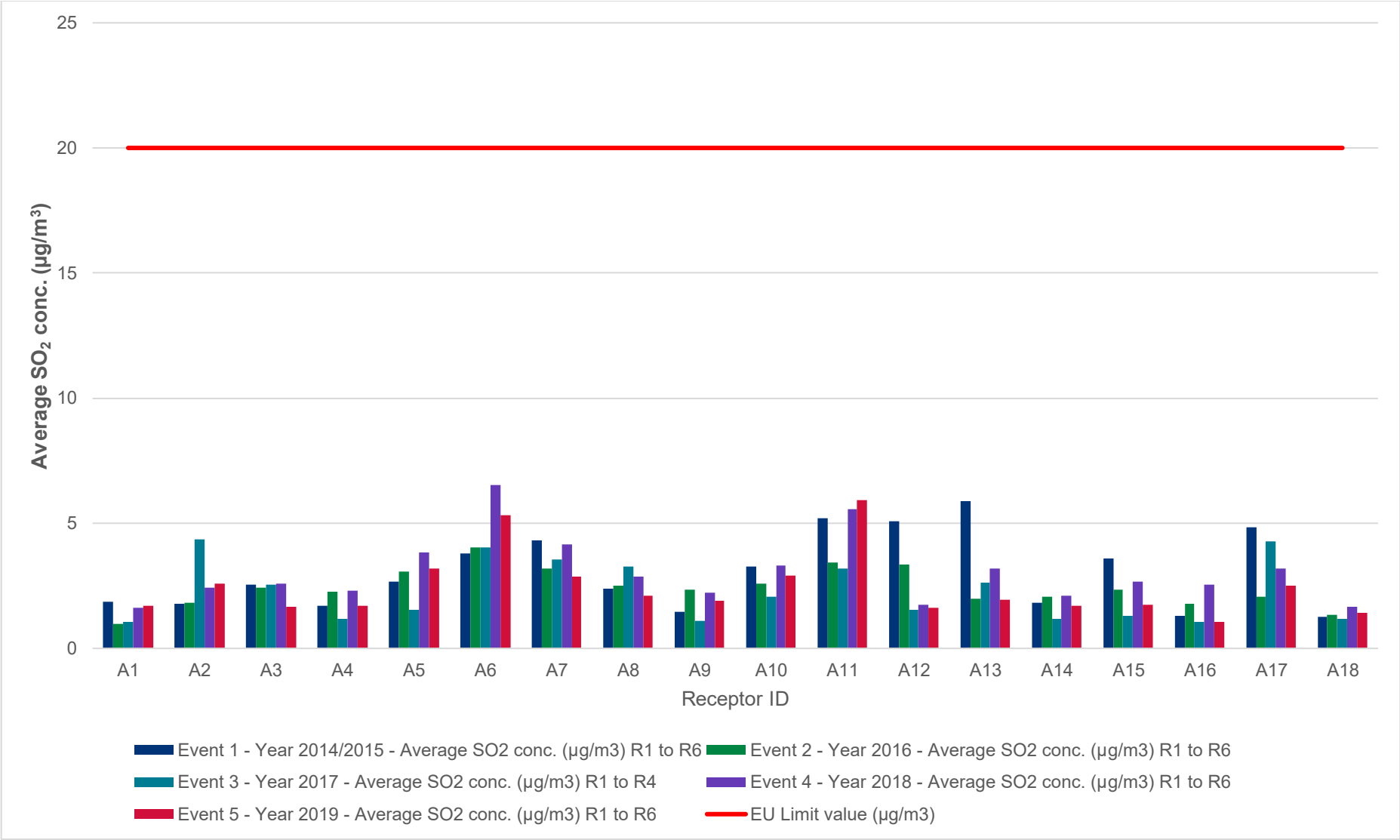


Figure 28: Comparison Between Average SO_2 Concentration Values For Event 1 Year 2014/2015, Event 2 Year 2016, Event 3 Year 2017, Event 4 Year 2018 and Event 5 Year 2019

4.1.5 Total Depositional Dust

The Total depositional dust monitoring stations were deployed for a period of 4 x 1 month periods between February 2019 and December 2019. Monitoring was carried out at 4 monitoring stations located in close proximity to locations to activities know to give rise to fugitive dust emissions. The results of the monitoring are graphically shown in **Figure 29**.

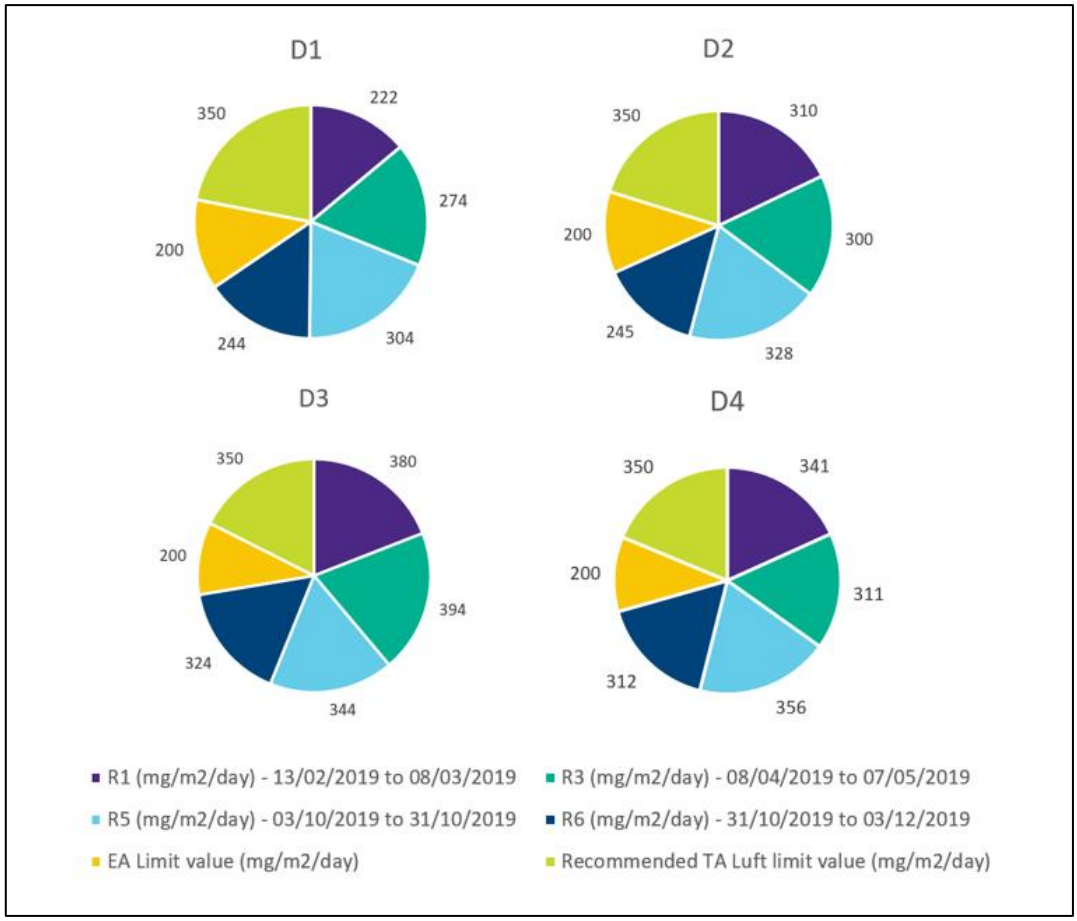


Figure 29: Total Depositional Dust Monitoring Results for the Dublin Port Estate and Environs

4.1.6 Particulate Matter (PM10/2.5)

Particulate matter 10 and 2.5 µm monitoring stations were deployed for a period of approximately 2 off 2 week periods 08/04/2019 and 07/05/2019 and 03/10/2019 to 31/10/2019. Monitoring was carried out at 2 monitoring stations. The results of the monitoring are graphically shown in **Figure 30**.

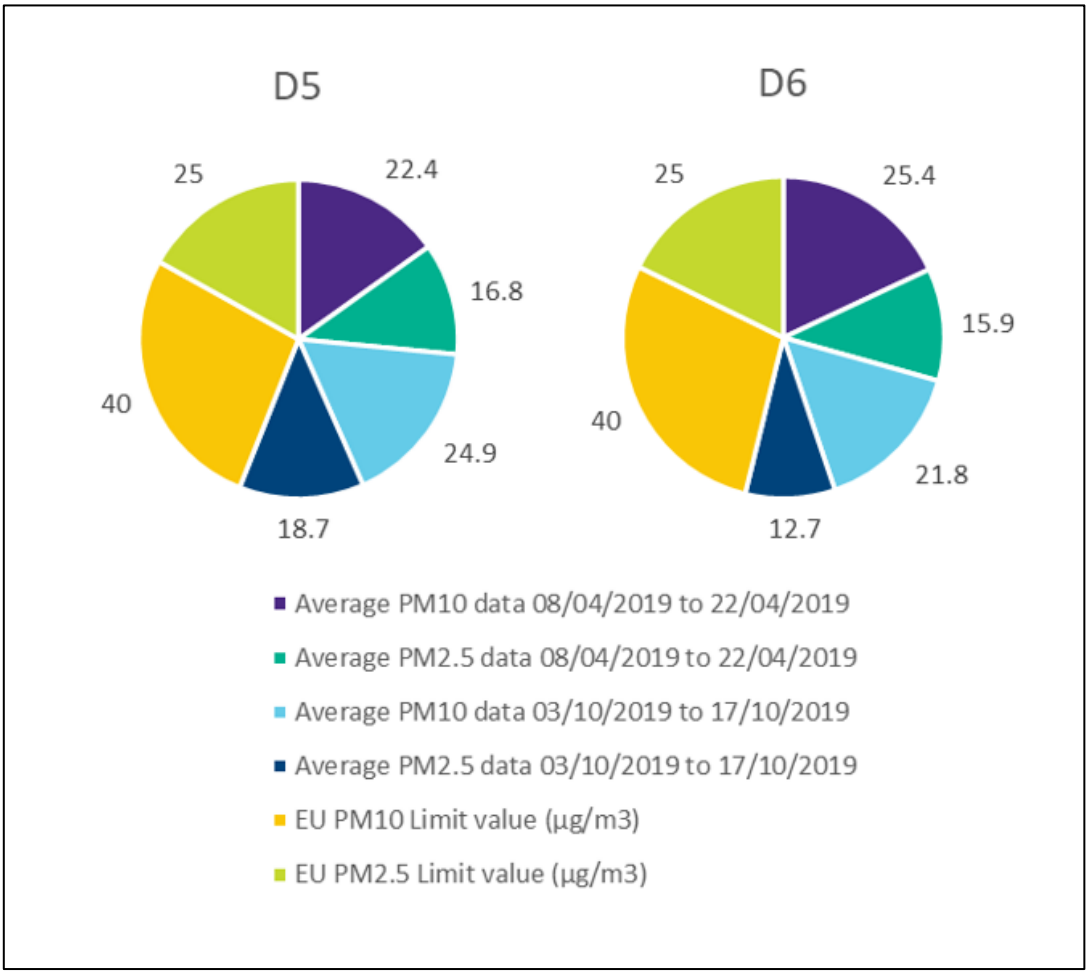


Figure 30: Particulate Matter 10 and 2.5 µm Monitoring Results for Dublin Port Estate Monitoring Stations

4.1.7 Ammonia

The NH3 diffusion tubes were deployed for a period of 3 x circa 1 month periods between February and July 2019. Monitoring was carried out at 7 monitoring stations spatially distributed across the port estate. The results of the monitoring are graphically shown in **Figure 31**.

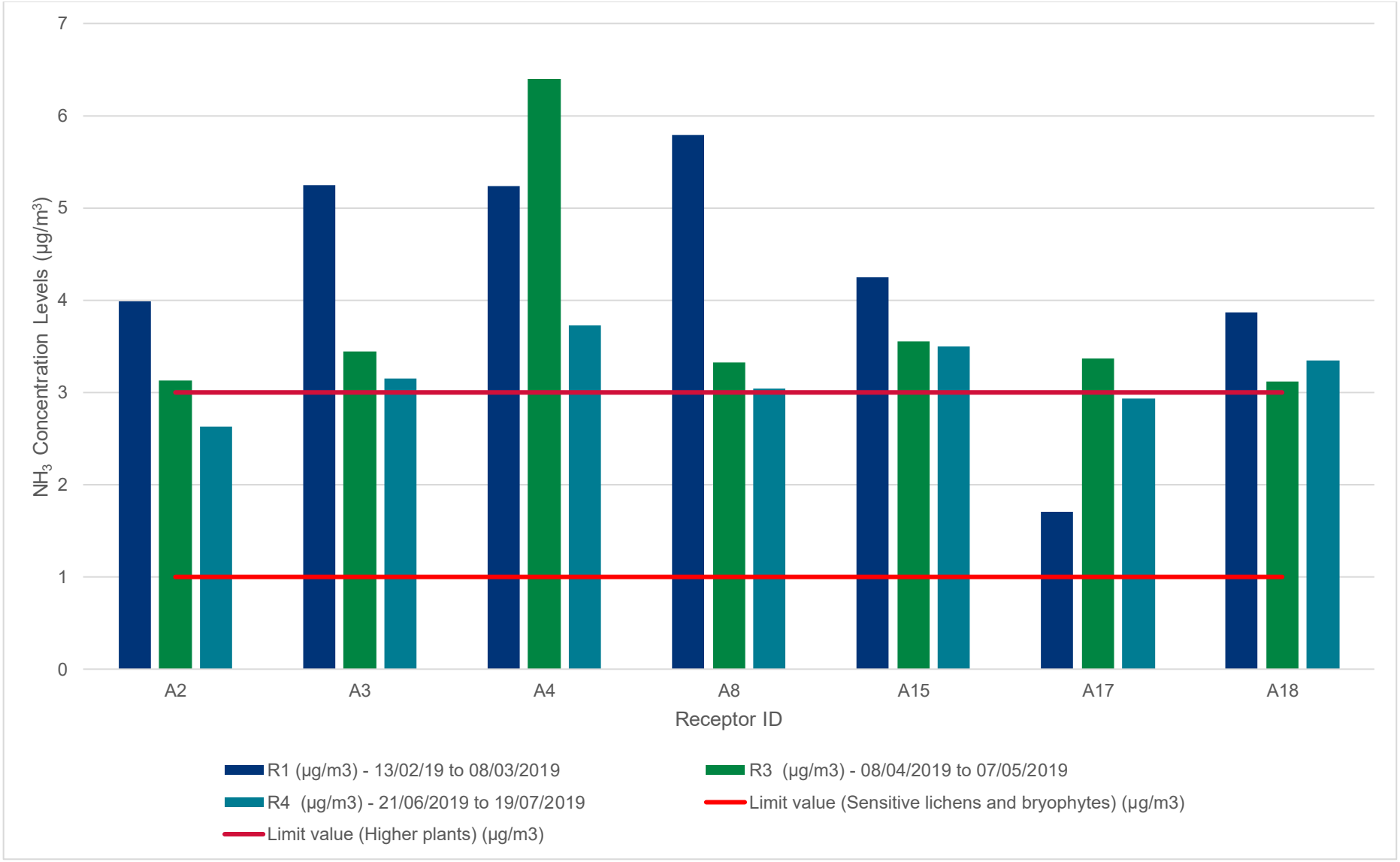


Figure 31: NH3 Monitoring Results at Each of the 7 Monitoring Stations Over 3 Monitoring Events

4.1.8 BTEX

The BTEX diffusion tubes were deployed for a period of 3 x circa 1 month periods between February and July 2019. Monitoring was carried out at 7 monitoring stations spatially distributed across the port estate. The results of the monitoring are graphically shown in **Figure 32** to **Figure 34**.

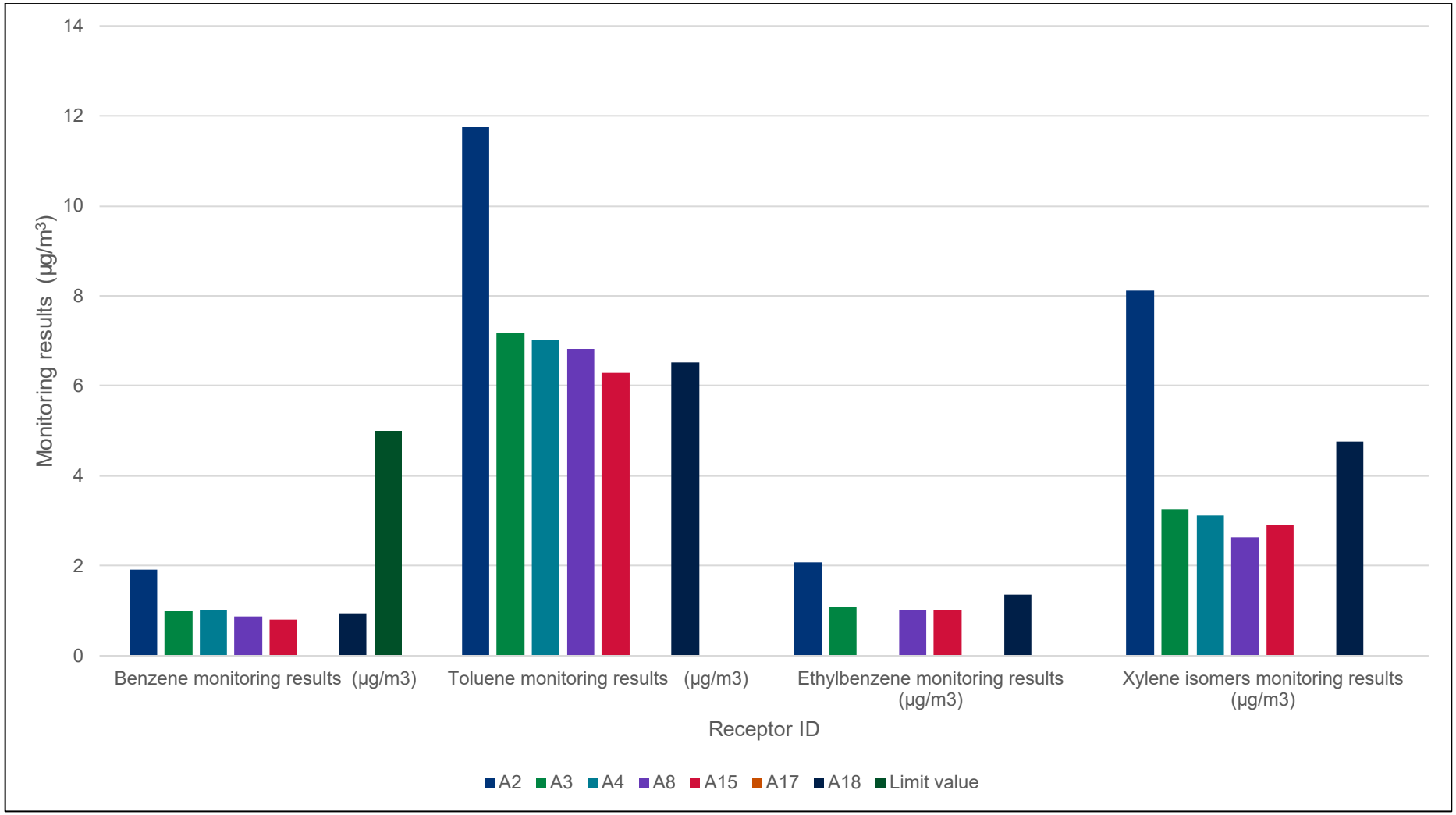


Figure 32: BTEX monitoring results at each of the 7 monitoring stations over R1 - 13/02/2019 to 08/03/2019

**Note – Limit Values Include:

Benzene <5.0 (µg/m3), Toluene 1,920 (µg/m3), Ethylbenzene 2,210 (µg/m3), Xylene 4,420 (µg/m3)

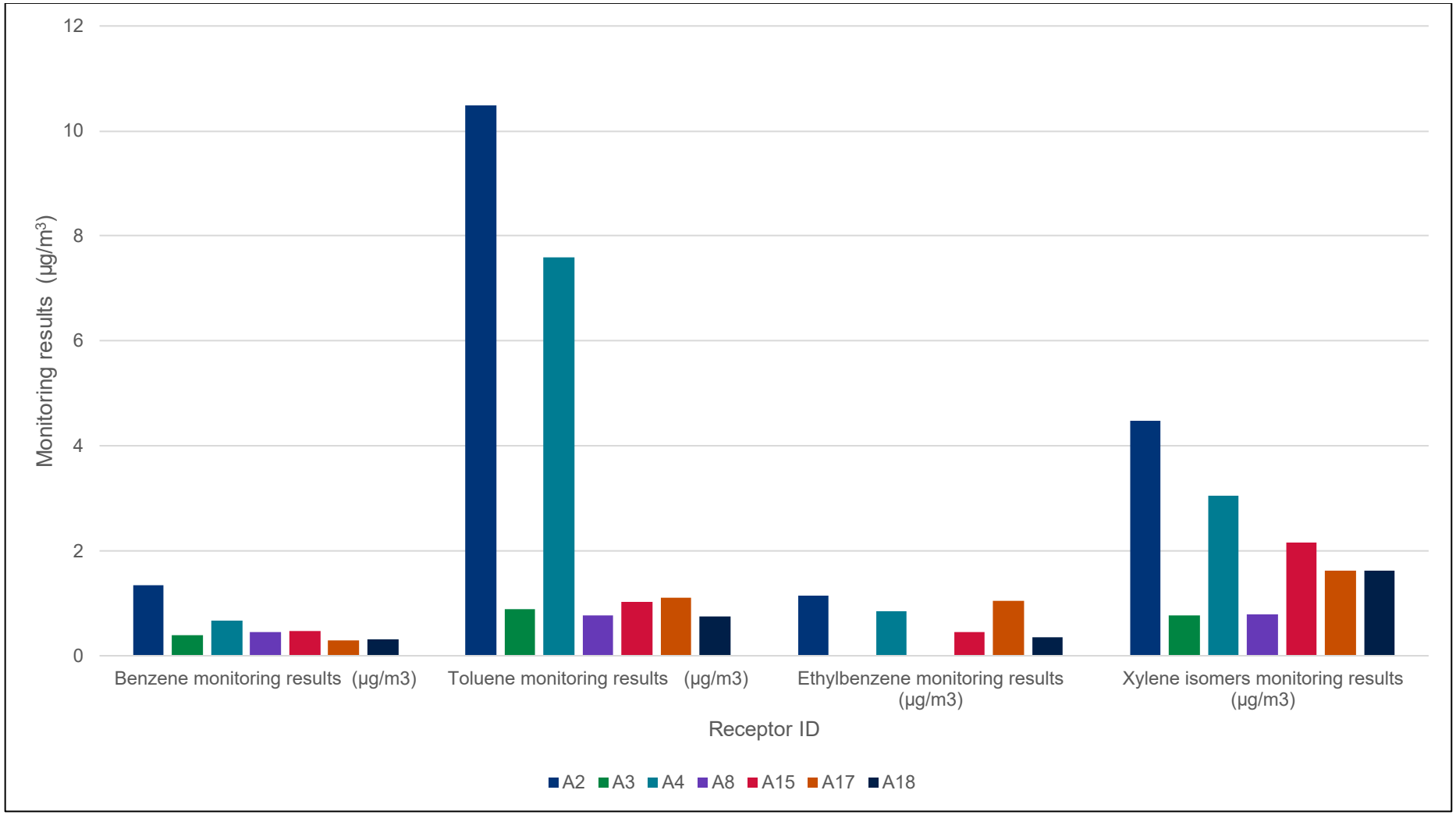


Figure 33: BTEX monitoring results at each of the 7 monitoring stations over R3 - 08/04/2019 to 07/05/2019

**Note – Limit Values Include:

Benzene <5.0 (µg/m3), Toluene 1,920 (µg/m3), Ethylbenzene 2,210 (µg/m3), Xylene 4,420 (µg/m3)

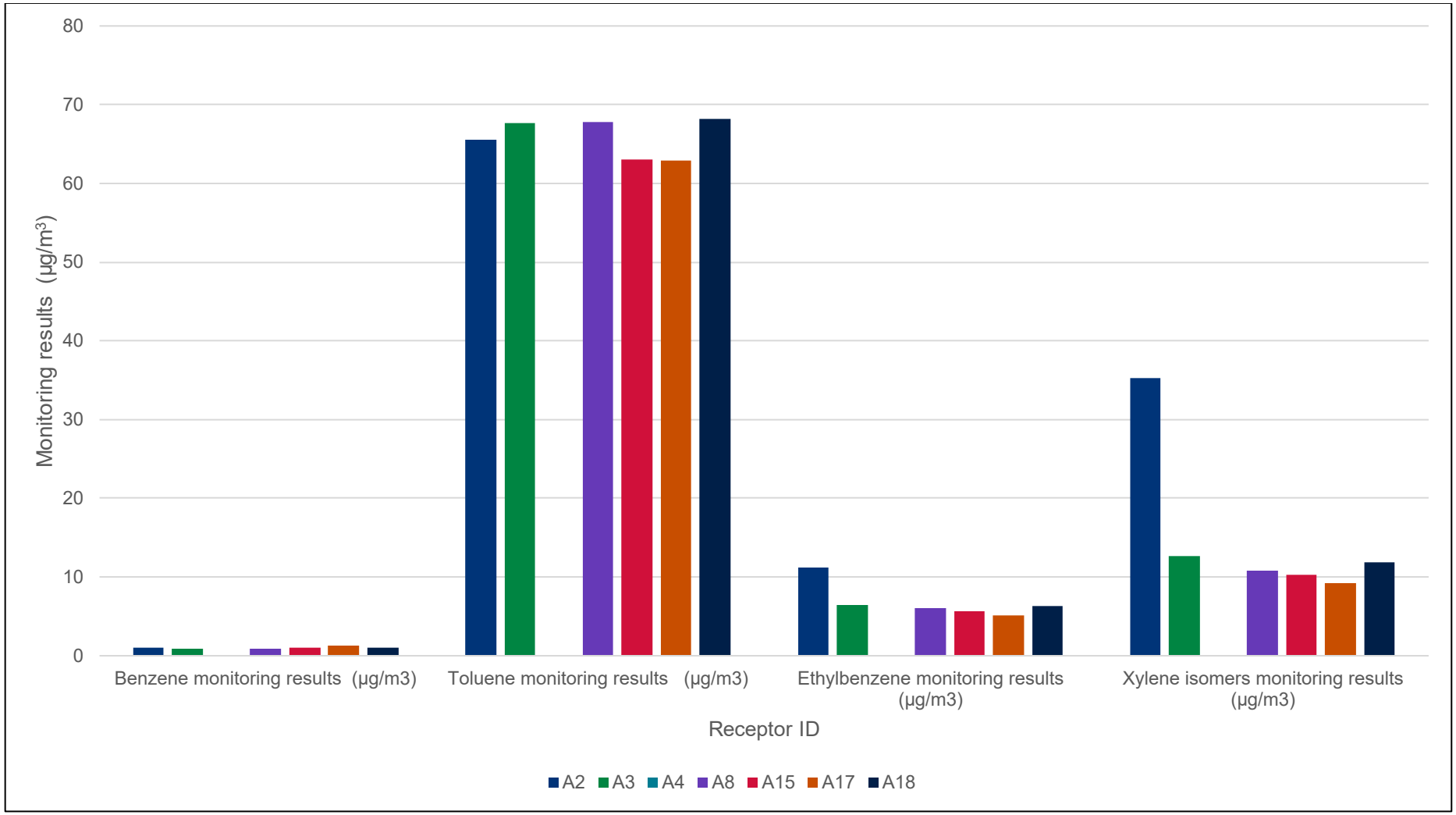


Figure 34: BTEX monitoring results at each of the 7 monitoring stations over R4 - 21/06/2019 to 19/07/2019

**Note – Limit Values Include:

Benzene <5.0 (µg/m3), Toluene 1,920 (µg/m3), Ethylbenzene 2,210 (µg/m3), Xylene 4,420 (µg/m3)

4.1.9 Lead

The Lead samplers were deployed for a period of 3 times between February and December 2019. Monitoring was carried out at 3 monitoring stations spatially distributed across the port estate. The results of the monitoring are graphically shown in **Figure 35**.

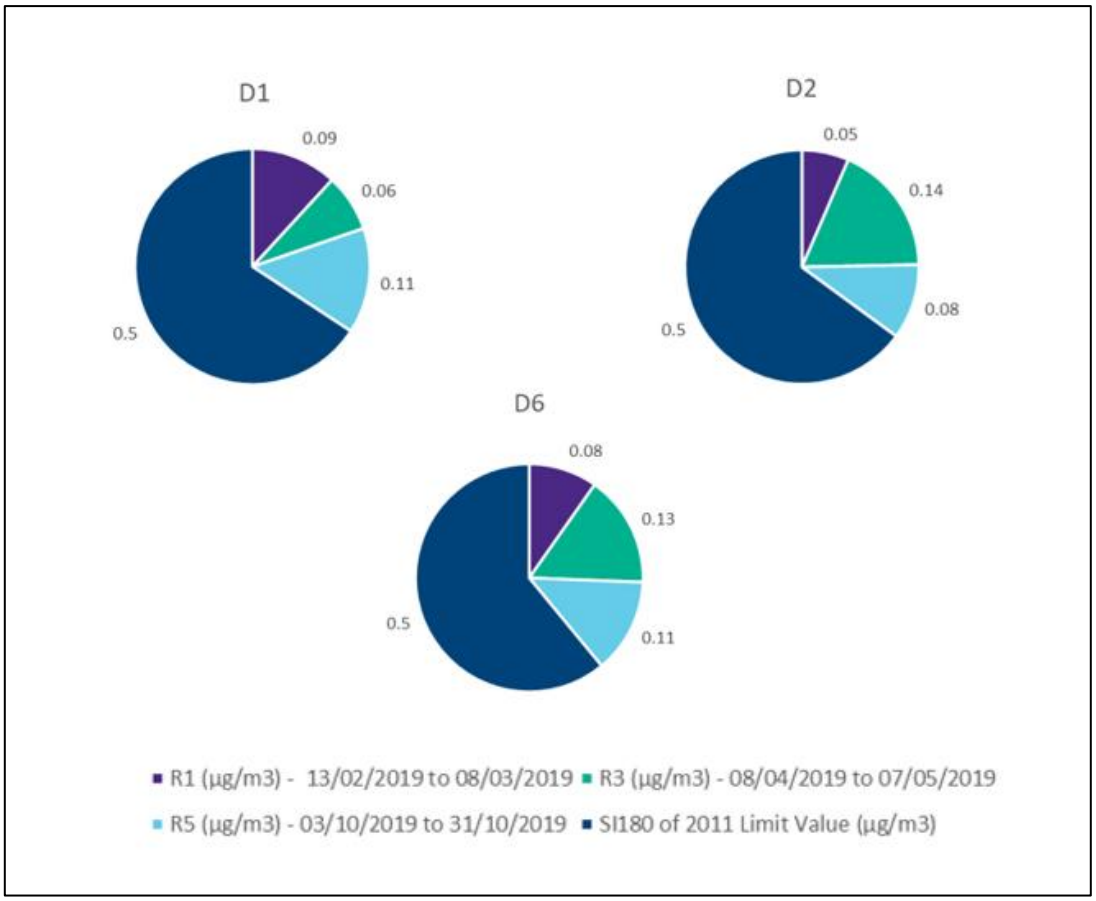


Figure 35: Lead Monitoring Results at each of 3 Monitoring Stations Over 3 Monitoring Events

5.0 DUBLIN PORT AIR QUALITY MONITORING RESULTS 2020

Air monitoring data from 18 monitoring stations over a period of 6 monitoring event was assessed against legislative limits and target values for the protection of human health and vegetation. Monitoring was carried out for NO_2 and SO_2 at 18 locations over 6 monitoring events. Monitoring for PM_{10} and $PM_{2.5}$ was carried out at 2 locations over 2 monitoring event while monitoring for Benzene, Toluene, Ethyl Benzene, Xylene isomers and Ammonia was carried at 7 locations over 3 monitoring events. Total depositional dust was carried out at 4 locations over 2 monitoring event while Lead monitoring was carried out at 3 locations over 3 monitoring events.

A total of 18 individual monitoring locations (i.e. A1 to A18) were selected across the port estate area in order to monitor ambient air concentrations of Nitrogen dioxide and Sulphur dioxide. These locations were established during the 2014/2015 monitoring program and data collected in 2020 will facilitate comparison between the data sets in terms of improvement / dis-improvements in ambient air quality within the port environs.

A total of 7 individual monitoring locations (i.e. A2, A3, A4, A8, A15, A17 and A18) were chosen from the stated location for the monitoring of BTEX and Ammonia.

A total of 4 locations were chosen for Bergerhoff total dust deposition monitoring (i.e. D1 to D4) while a further two locations were chosen for PM_{10} and $PM_{2.5}$ monitoring (i.e. D5 and D6). A total of three monitoring locations were chosen for Lead (i.e. D1, D2 and D6). **Figure 36** presents an overview of each monitoring locations located with the Dublin Port and its environs.



Figure 36: Overview of Ambient Air Monitoring Locations Located Within Dublin Port and Surrounding Environs for Nitrogen Dioxide, Sulphur Dioxide, BTEX, Ammonia, Total Depositional Dust, PM10/2.5.and Lead

5.1 RESULTS

5.1.1 Nitrogen Dioxide

The NO_2 diffusion tubes were deployed for a period of 6 x circa 1 month periods between Jan and Dec 2020. Monitoring was carried out at 18 monitoring stations spatially distributed across the port estate. The results of the monitoring are and graphically represented in **Figure 37**.

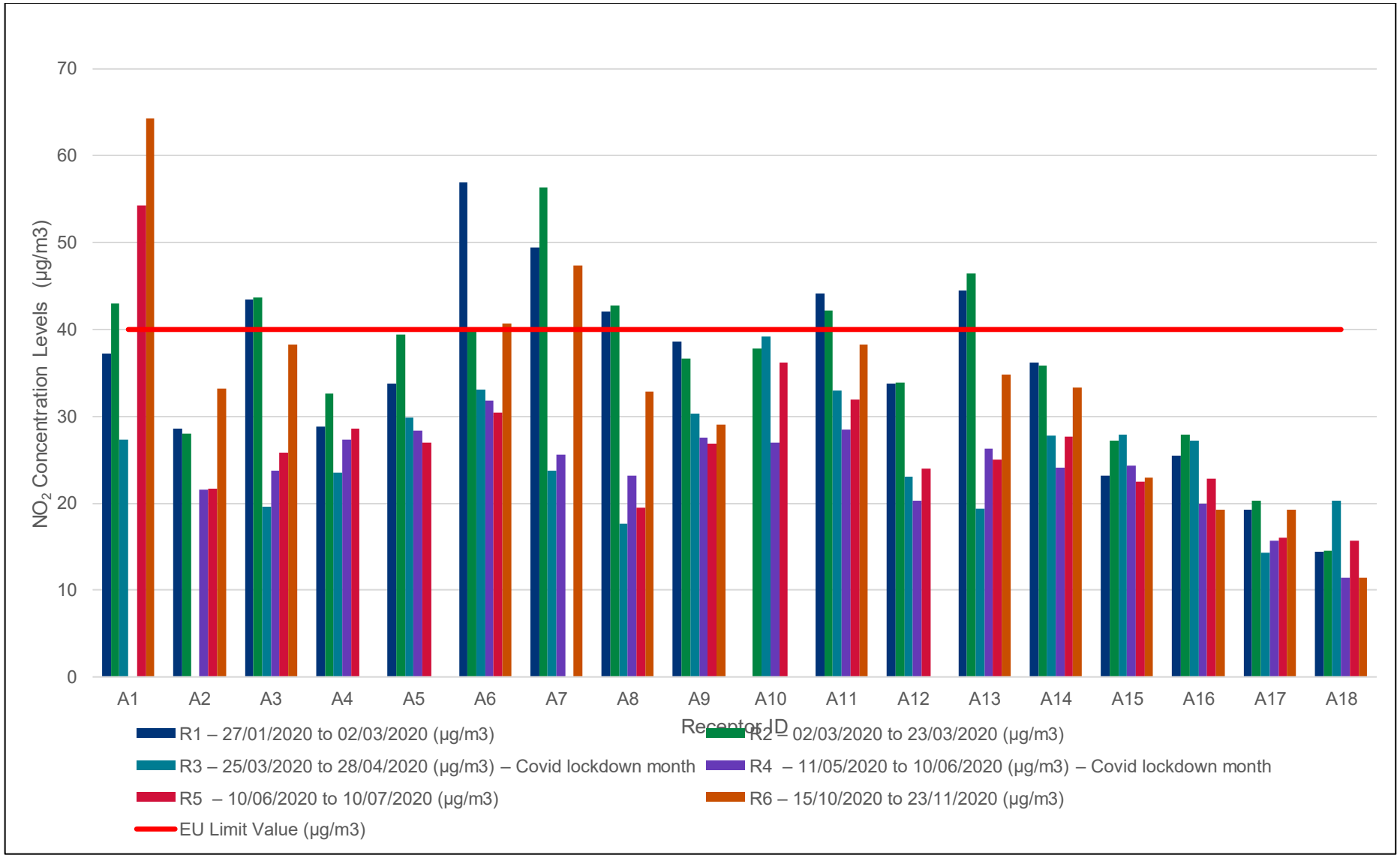


Figure 37: Plot of NO_2 Concentrations For Each Monitoring Event R1 to R6 at Each Monitoring Station A1 to A18

5.1.2 Comparison between average monitoring data collected in Event 1 Year 2014/2015, Event 2 Year 2016, Event 3 Year 2017, Event 4 Year 2018, Event 5 Year 2019 and Event 6 Year 2020 for NO_2

Figure 38 presents the comparison between the average monitoring data collected over the 6 monitoring events in Event 1 Year 2014/2015, Event 2 Year 2016, Event 3 Year 2017, Event 4 Year 2018, Event 5 Year 2019 and Event 6 Year 2020 for NO_2.

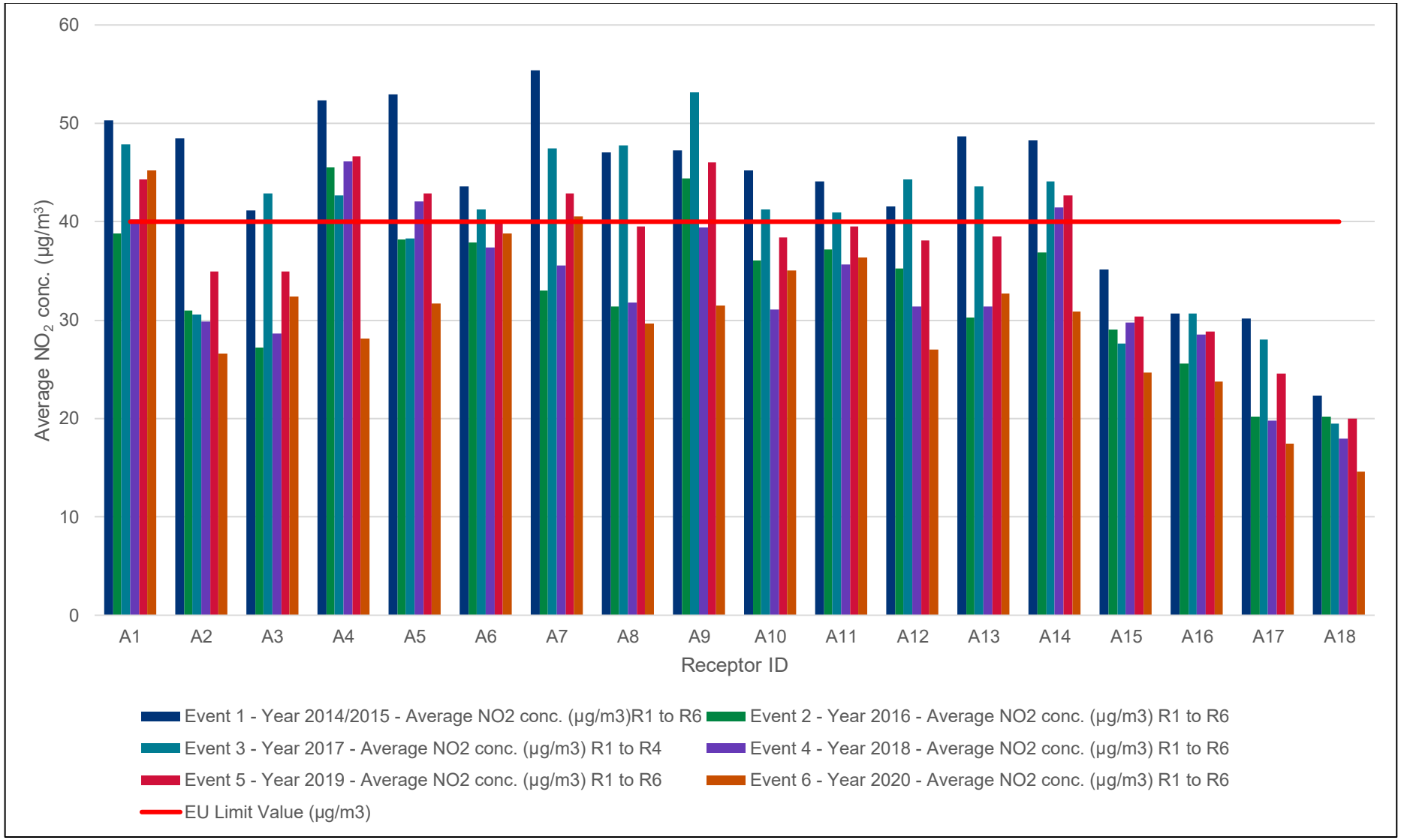


Figure 38:Graphical Comparison Between Average NO_2 Concentration Values for Event 1 Year 2014/2015, Event 2 Year 2016, Event 3 Year 2017, Event 4 Year 2018, Event 5 Year 2019 and Event 6 Year 2020

5.1.3 Sulphur Dioxide

The SO_2 diffusion tubes were deployed for a period of 6 x circa 1 month periods between Jan and Dec 2020. Monitoring was carried out at 18 monitoring stations spatially distributed across the port estate. The results of the monitoring are graphically represented in **Figure 39**.

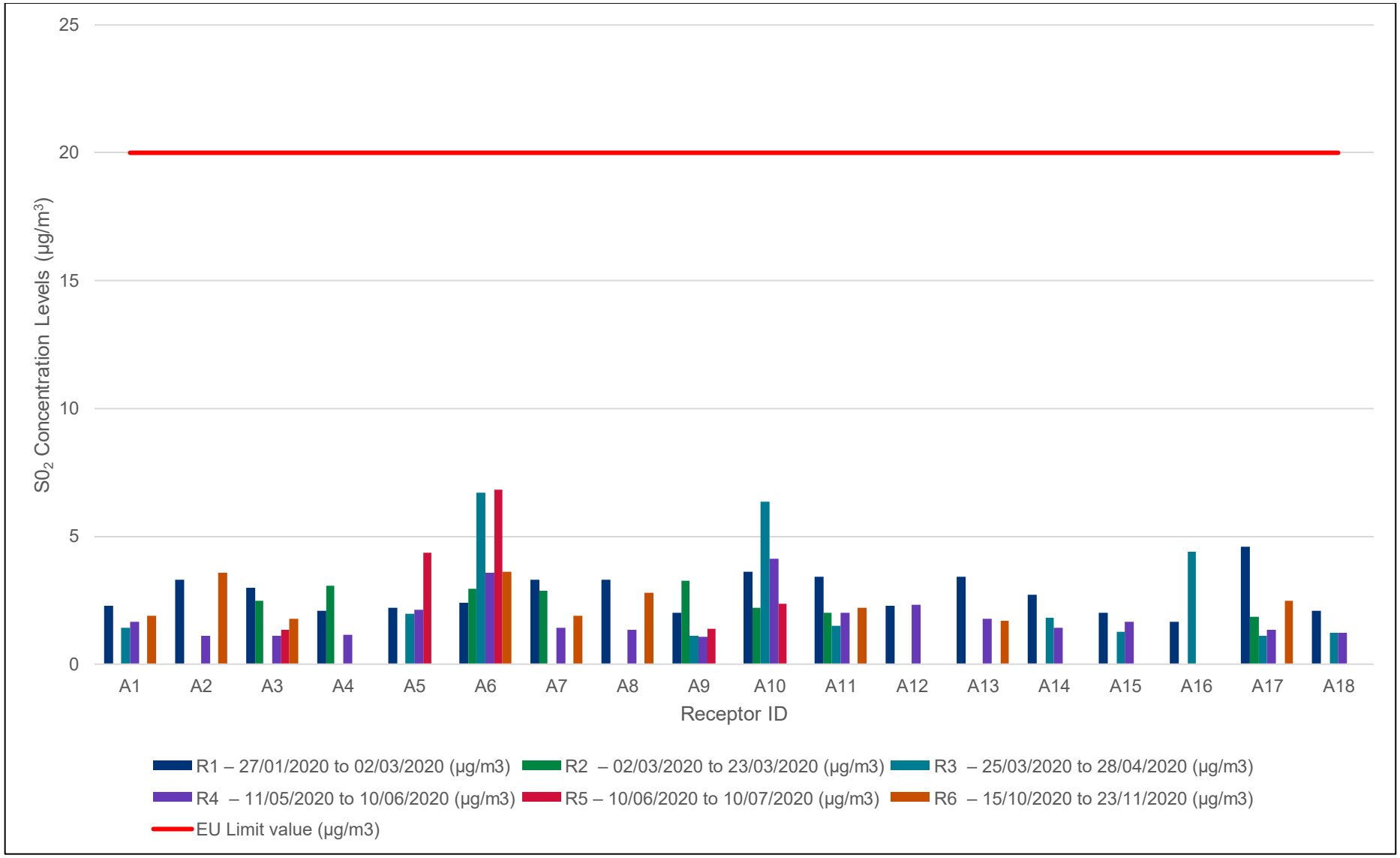


Figure 39: Plot of SO_2 Concentrations For Each Monitoring Event R1 to R6 at Each Monitoring Station A1 to A18

5.1.4 Comparison between average monitoring data collected in Event 1 Year 2014/2015, Event 2 Year 2016, Events 3 Year 2017, Event 4 Year 2018, Event 5 2019 and Event 6 2020 for SO_2

Figure 40 presents the comparison between the average monitoring data collected over the 6 monitoring events in Event 1 Year 2014/2015, Event 2 Year 2016, Events 3 Year 2017, Event 4 Year 2018, Event 5 2019 and Event 6 2020 for SO_2.

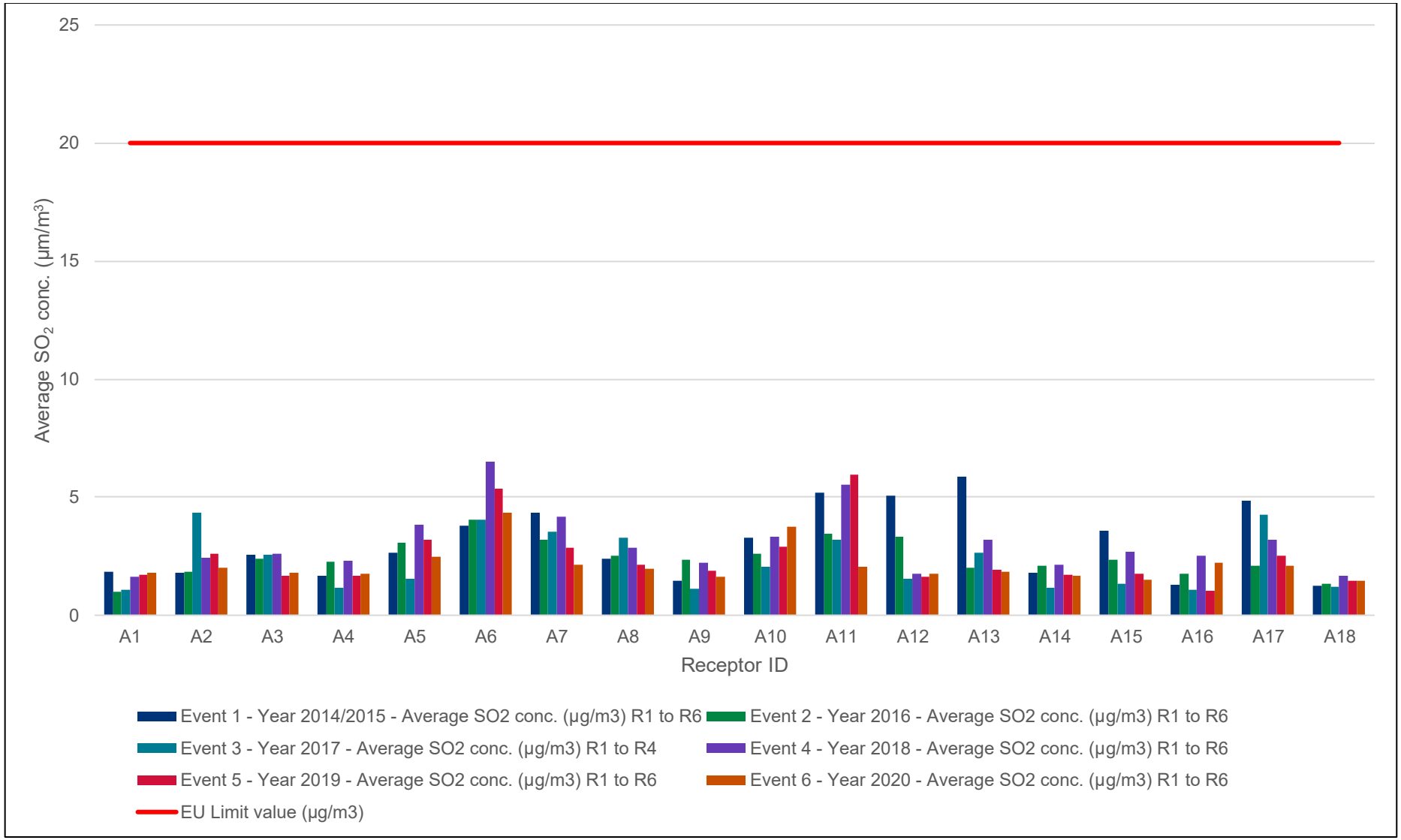


Figure 40: Comparison Between Average SO_2 Concentration Values For Event 1 Year 2014/2015, Event 2 Year 2016, Events 3 Year 2017, Event 4 Year 2018, Event 5 2019 and Event 6 2020

5.1.5 Total Depositional Dust

The Total depositional dust monitoring stations were deployed for a period of 4 x 1 month periods between January 2020 and November 2020. Monitoring was carried out at 4 monitoring stations located in close proximity to locations / activities know to give rise to fugitive dust emissions. The results of the monitoring are graphically shown in **Figure 41**.

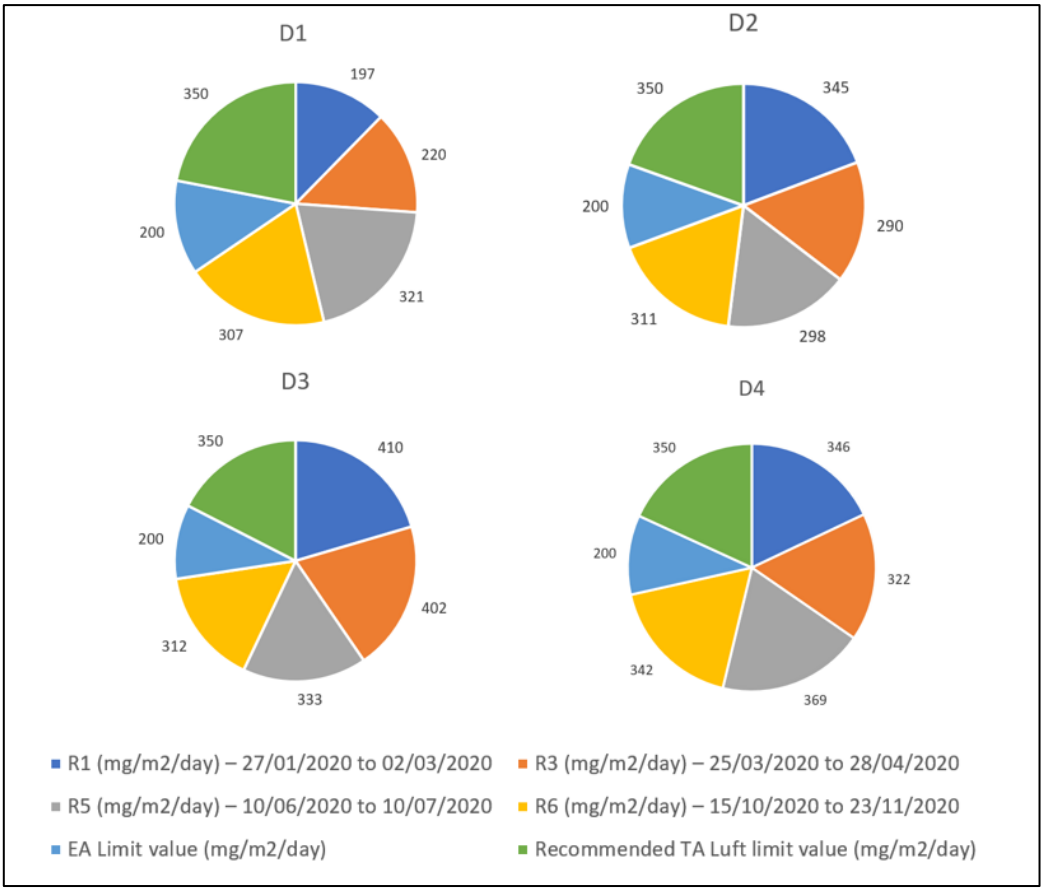


Figure 41: Total Depositional Dust Monitoring Results for the Dublin Port Estate and Environs

5.1.6 Particulate Matter (PM10/2.5)

Particulate matter 10 and 2.5 µm monitoring stations were deployed for a period of approximately 2 off 2 week periods 25/03/2020 and 08/04/2020 and 15/10/2020 to 29/10/2020. Monitoring was carried out at 2 monitoring stations. The results of the monitoring are graphically shown in **Figure 42**.

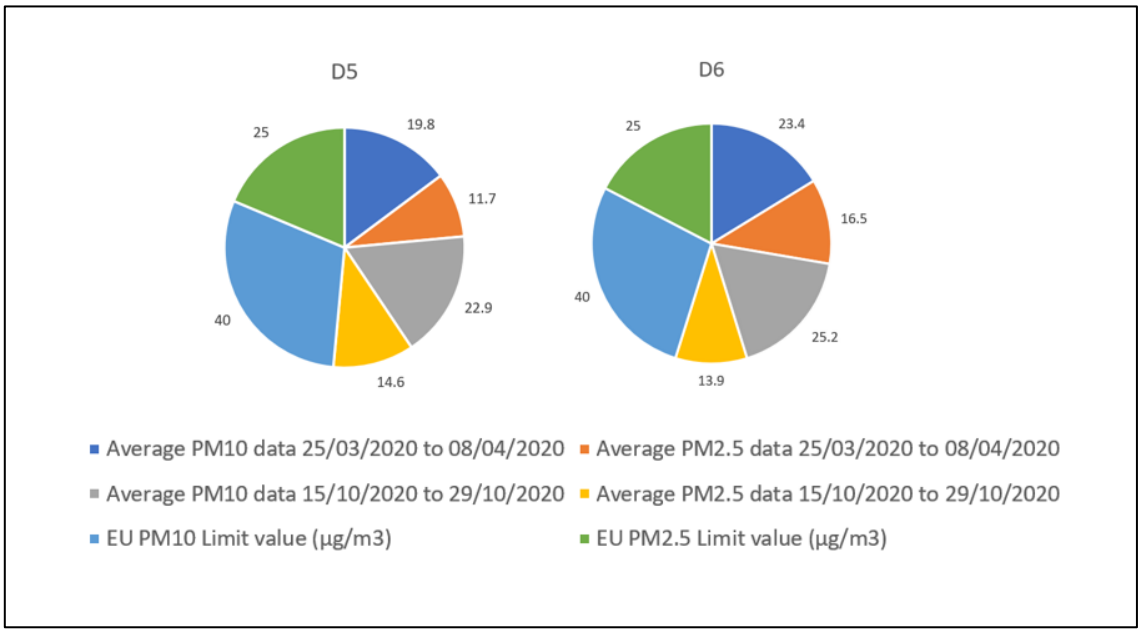


Figure 42: Particulate Matter 10 and 2.5 µm Monitoring Results for Dublin Port Estate Monitoring Stations

5.1.7 Ammonia

The NH3 diffusion tubes were deployed for a period of 3 x circa 1 month periods between January and November 2019. Monitoring was carried out at 7 monitoring stations spatially distributed across the port estate. The results of the monitoring are graphically shown in **Figure 43**.

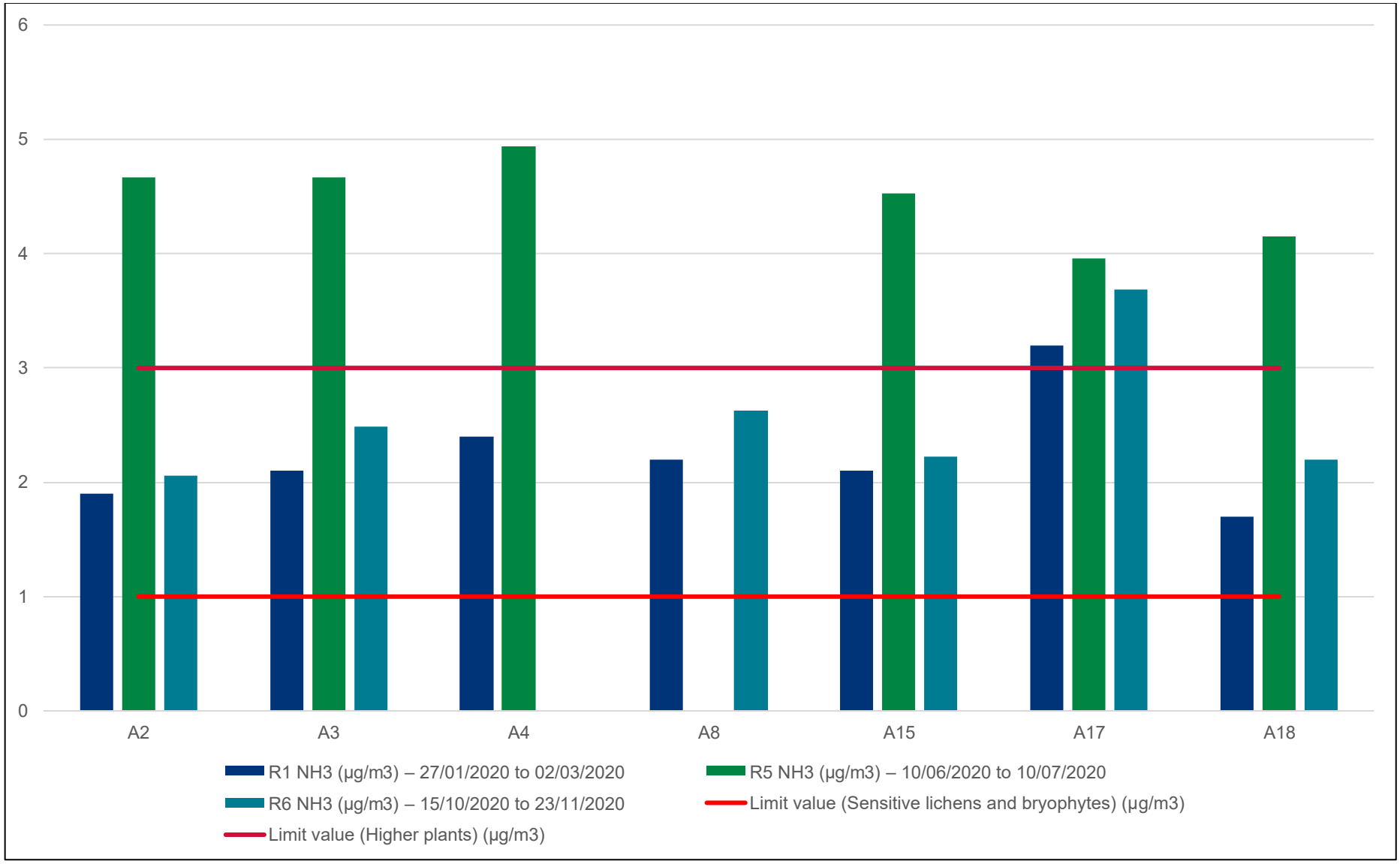


Figure 43: NH3 Monitoring Results at Each of the 7 Monitoring Stations Over 3 Monitoring Events

5.1.8 BTEX

The BTEX diffusion tubes were deployed for a period of 3 x circa 1 month periods between January and November 2020. Monitoring was carried out at 7 monitoring stations spatially distributed across the port estate. The results of the monitoring are graphically shown in **Figure 44** to **Figure 46**.

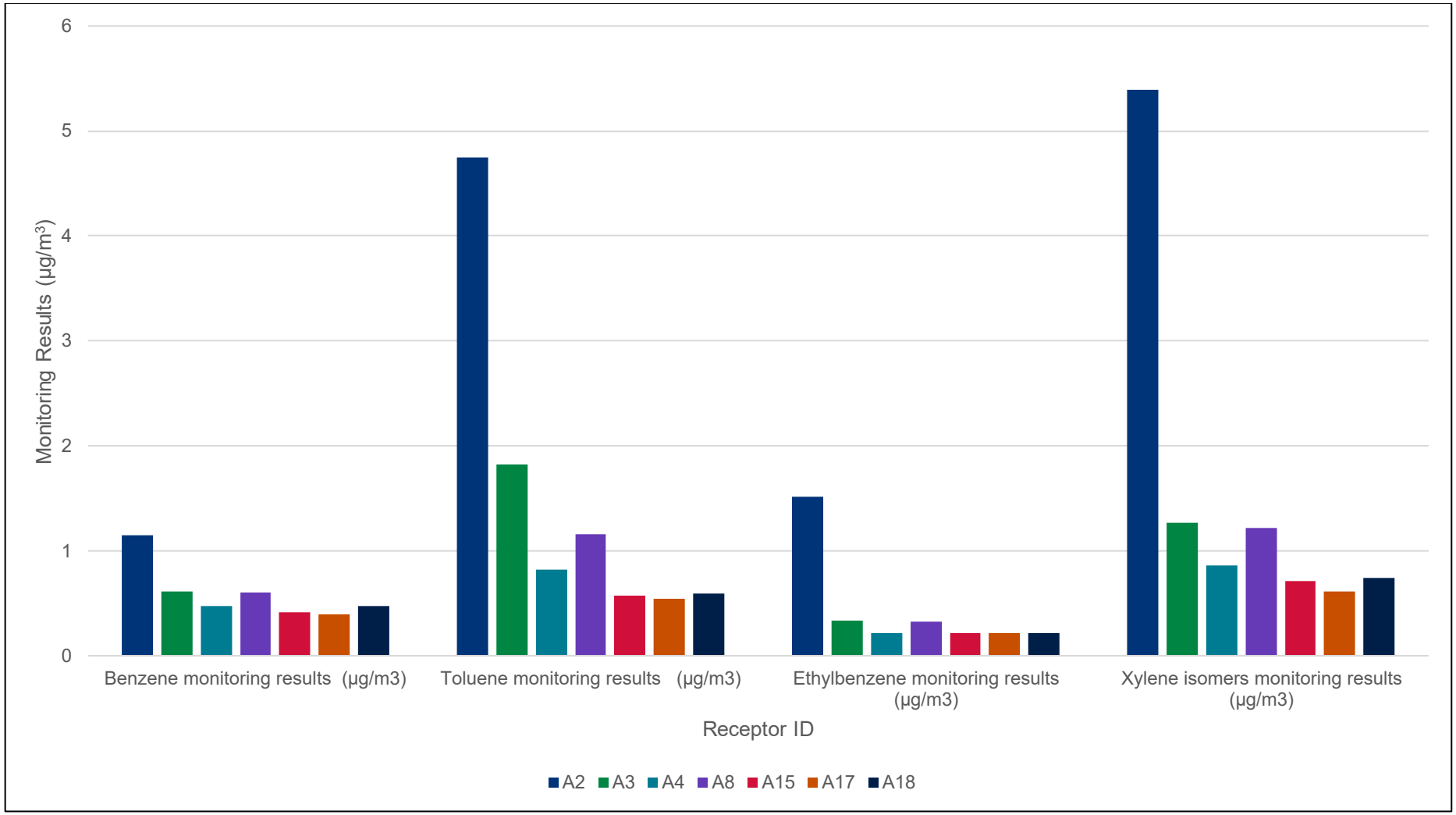


Figure 44: BTEX monitoring results at each of the 7 monitoring stations over R1 – 27/01/2020 to 02/03/2020

**Note – Limit Values Include:

Benzene <5.0 (µg/m3), Toluene 1,920 (µg/m3), Ethylbenzene 2,210 (µg/m3), Xylene 4,420 (µg/m3)

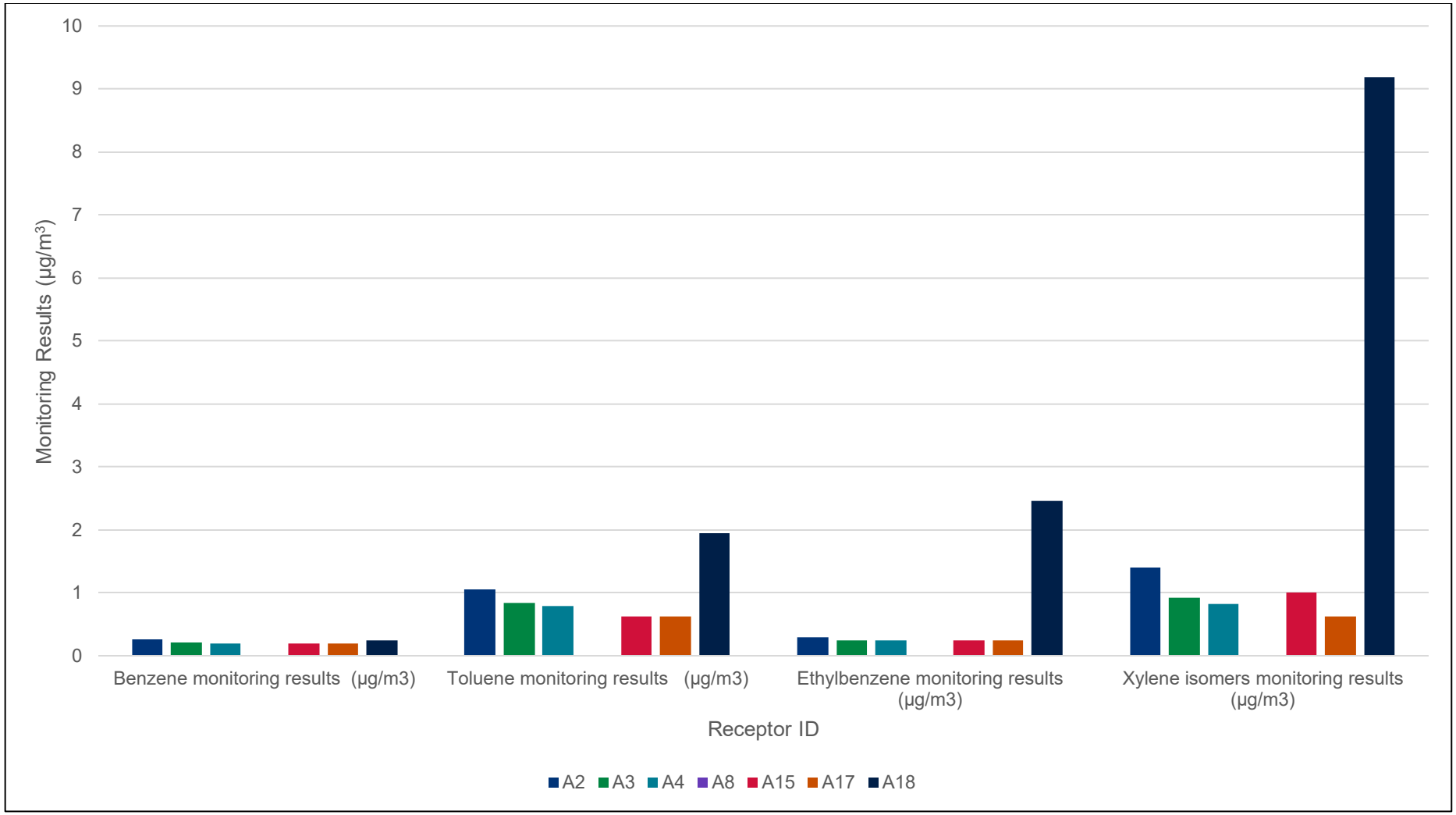


Figure 45: BTEX monitoring results at each of the 7 monitoring stations over R5 – 10/06/2020 to 10/07/2020

**Note – Limit Values Include:

Benzene <5.0 (µg/m3), Toluene 1,920 (µg/m3), Ethylbenzene 2,210 (µg/m3), Xylene 4,420 (µg/m3)

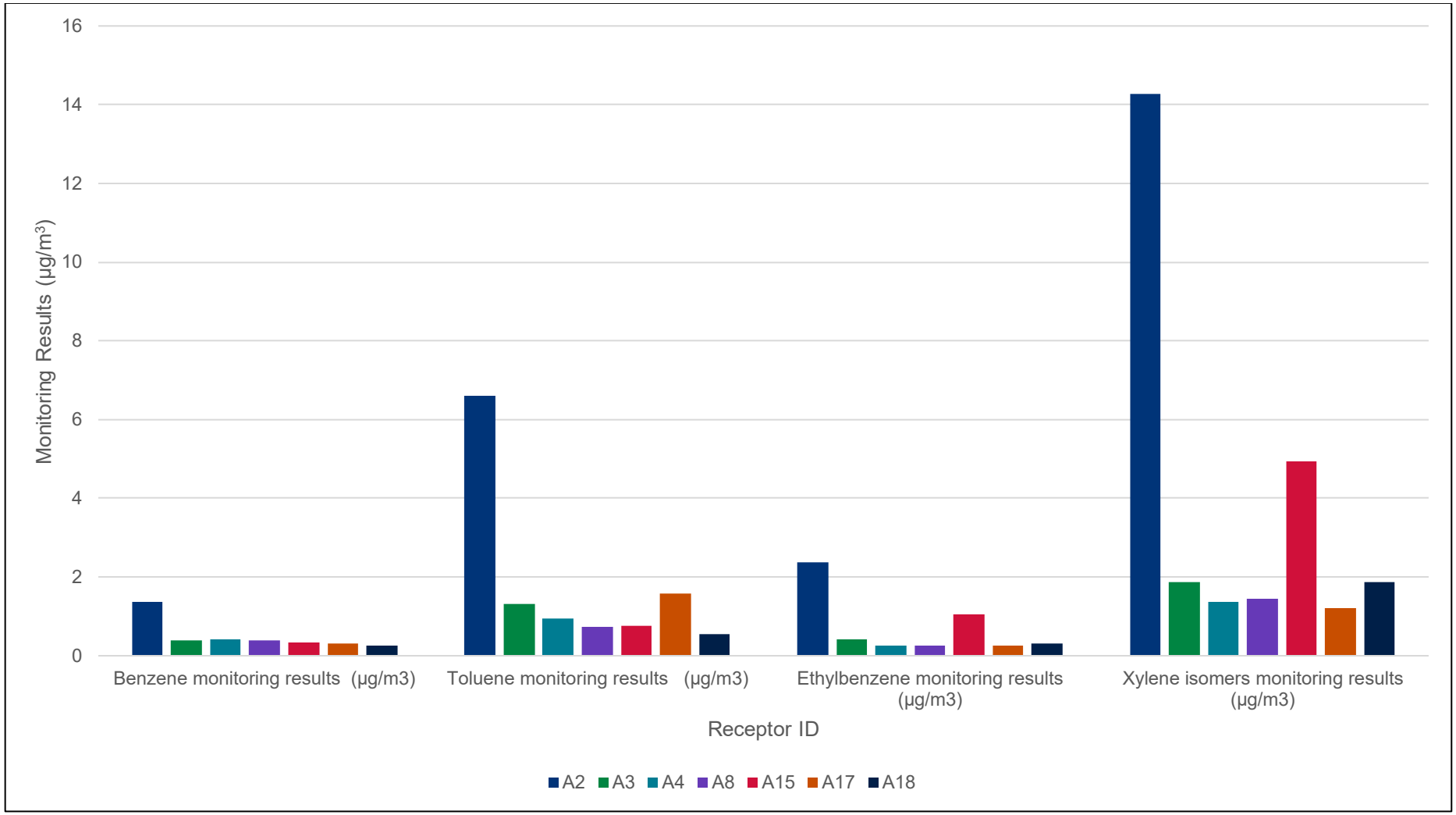


Figure 46: BTEX monitoring results at each of the 7 monitoring stations over R6 – 15/10/2020 to 23/11/2020

**Note – Limit Values Include:

Benzene <5.0 (µg/m3), Toluene 1,920 (µg/m3), Ethylbenzene 2,210 (µg/m3), Xylene 4,420 (µg/m3)

5.1.9 Lead

The Lead samplers were deployed for a period of 3 times between January and July 2020. Monitoring was carried out at 3 monitoring stations spatially distributed across the port estate. The results of the monitoring are graphically shown in **Figure 47**.

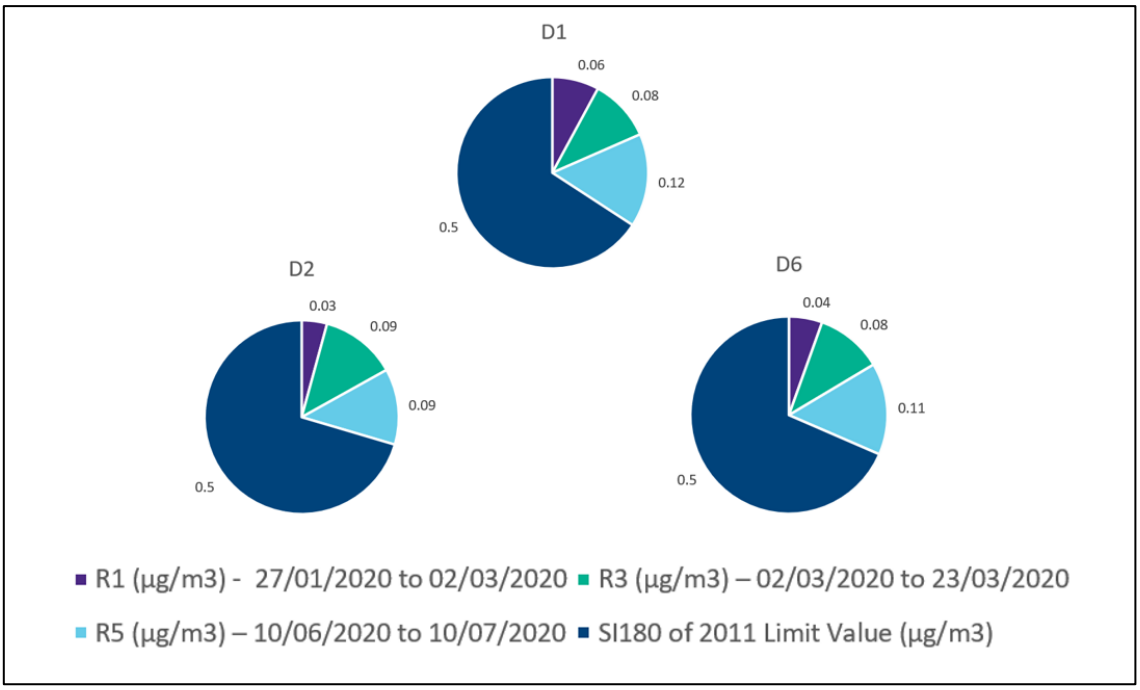


Figure 47: Lead Monitoring Results at each of 3 Monitoring Stations Over 3 Monitoring Events

6.0 DUBLIN PORT AIR QUALITY MONITORING RESULTS 2021

Air monitoring data from 22 monitoring stations over a period of 9 monitoring event was assessed against legislative limits and target values for the protection of human health and vegetation. Monitoring was carried out for NO_2 and SO_2 at 22 locations over 9 monitoring events in Year 2021. Monitoring for PM_{10} and $PM_{2.5}$ was carried out at 2 locations over 2 monitoring event while monitoring for Benzene, Toluene, Ethyl Benzene, Xylene isomers and Ammonia was carried at 7 locations over 4 monitoring events in Year 2021. Total depositional dust was carried out at 4 locations over 2 monitoring event while Lead monitoring was carried out at 3 locations over 3 monitoring events in Year 2021.

A total of 22 individual monitoring locations (i.e. A1 to A22) were selected across the port estate area in order to monitor ambient air concentrations of Nitrogen dioxide and Sulphur dioxide. These locations were established during the 2014/2015 monitoring program and data collected in 2020 will facilitate comparison between the data sets in terms of improvement / dis-improvements in ambient air quality within the port environs.

A total of 7 individual monitoring locations were taken from 10 locations (i.e. A1, A2, A3, A4, A8, A12, A15, A16, A17 and A18) were chosen from the stated location for the monitoring of BTEX and Ammonia.

A total of 4 locations were chosen for Bergerhoff total dust deposition monitoring (i.e. D1 to D4) while a further two locations were chosen for PM_{10} and $PM_{2.5}$ monitoring (i.e. D5 and D6). A total of three monitoring locations were chosen for Lead (i.e. D1, D2 and D6). **Figure 48** presents an overview of each monitoring locations located with the Dublin Port and its environs.



Figure 48: Overview of Ambient Air Monitoring Locations Located Within Dublin Port and Surrounding Environs for Nitrogen Dioxide, Sulphur Dioxide, BTEX, Ammonia, Total Depositional Dust, PM10/2.5.and Lead

6.1 RESULTS

6.1.1 Nitrogen Dioxide

The NO_2 diffusion tubes were deployed for a period of 9 x circa 1 month periods between March and Dec 2021. Monitoring was carried out at 22 monitoring stations spatially distributed across the port estate. The results of the monitoring are and graphically represented in **Figure 49**.

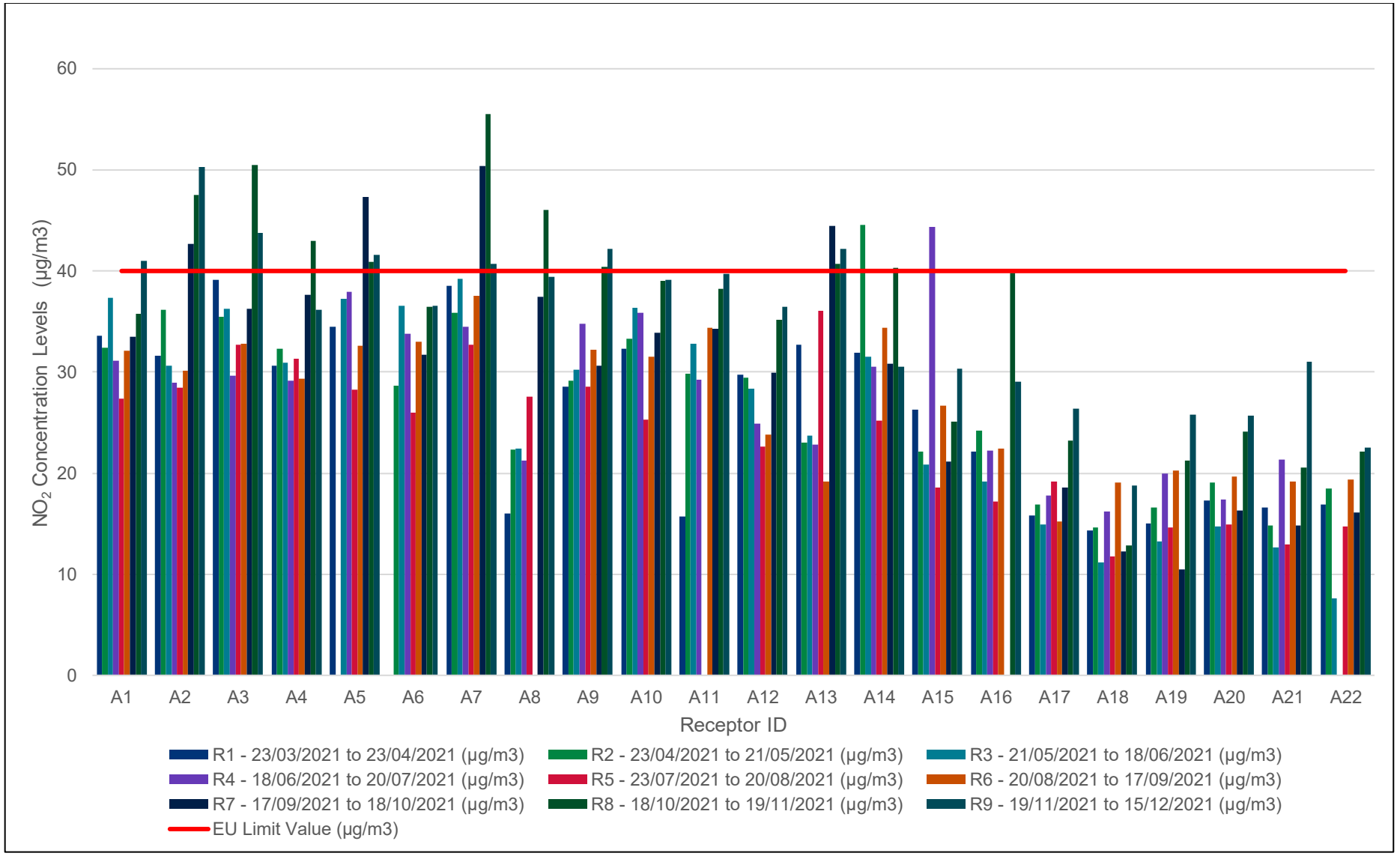


Figure 49: Plot of NO_2 Concentrations For Each Monitoring Event R1 to R9 at Each Monitoring Station A1 to A22

6.1.2 Comparison between average monitoring data collected in Event 1 Year 2014/2015, Event 2 Year 2016, Event 3 Year 2017, Event 4 Year 2018, Event 5 Year 2019, Event 6 Year 2020 and Event 7 Year 2021 for NO_2

Figure 50 presents the comparison between the average monitoring data collected over the 6 monitoring events in Event 1 Year 2014/2015, Event 2 Year 2016, Event 3 Year 2017, Event 4 Year 2018, Event 5 Year 2019, Event 6 Year 2020 and Event 7 Year 2021 for NO_2.

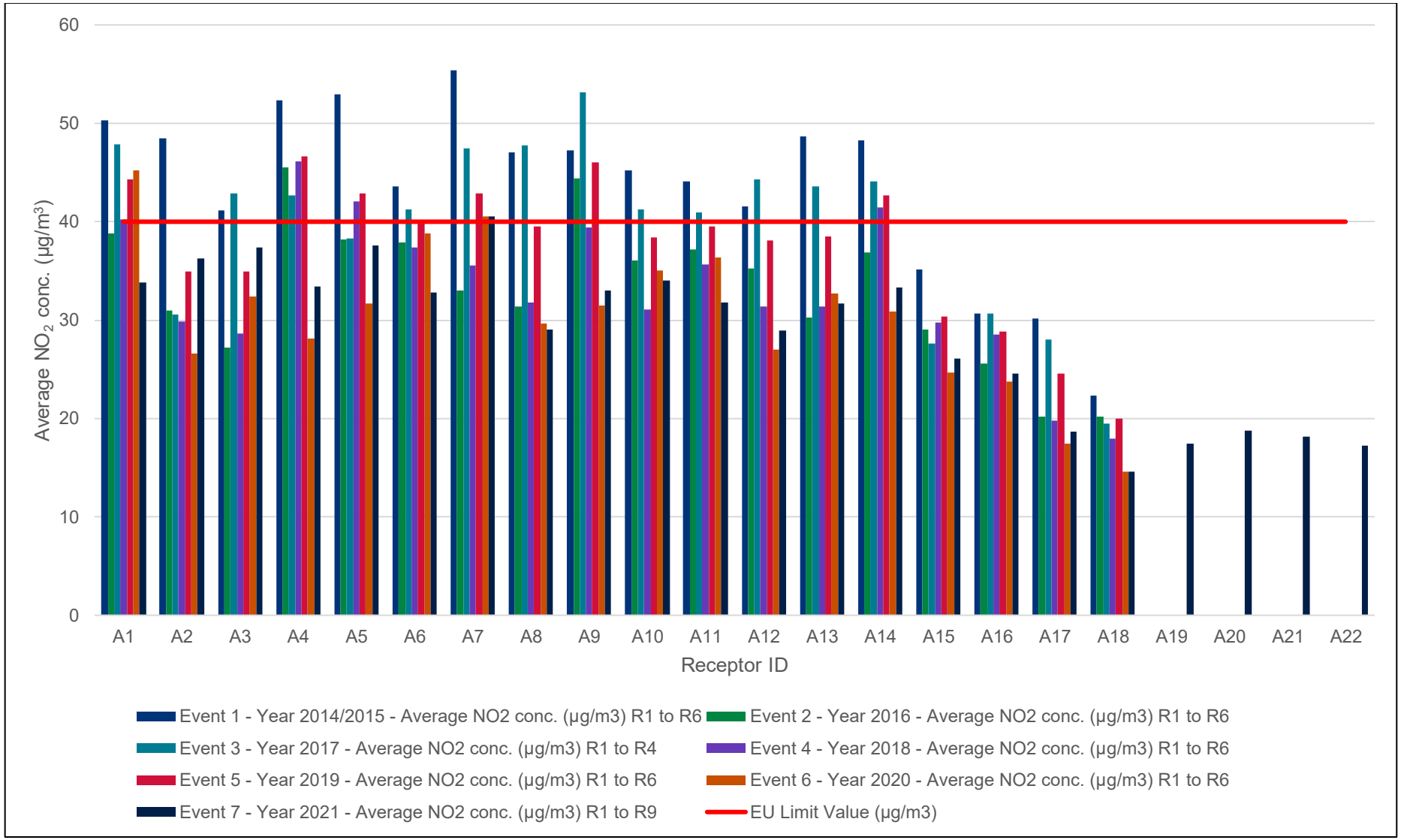


Figure 50: Graphical Comparison Between Average NO_2 Concentration Values for Event 1 Year 2014/2015, Event 2 Year 2016, Event 3 Year 2017, Event 4 Year 2018, Event 5 Year 2019, Event 6 Year 2020 and Event 7 Year 2021

6.1.3 Sulphur Dioxide

The SO_2 diffusion tubes were deployed for a period of 9 x circa 1 month periods between March and Dec 2021. Monitoring was carried out at 22 monitoring stations spatially distributed across the port estate. The results of the monitoring are graphically represented in **Figure 51**.

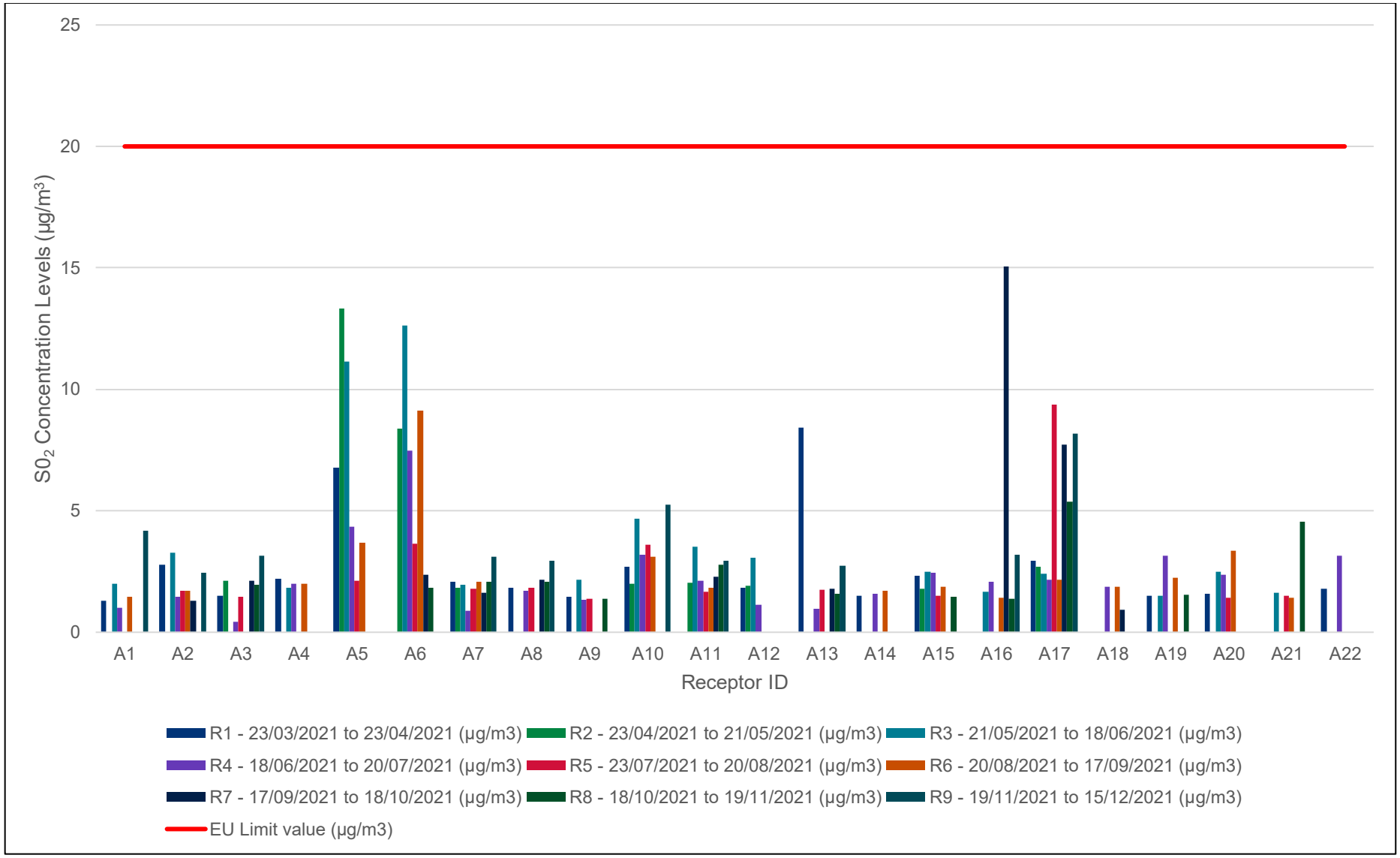


Figure 51: Plot of SO_2 Concentrations For Each Monitoring Event R1 to R9 at Each Monitoring Station A1 to A22

6.1.4 Comparison between average monitoring data collected in Event 1 Year 2014/2015, Event 2 Year 2016, Event 3 Year 2017, Event 4 Year 2018, Event 5 Year 2019, Event 6 Year 2020 and Event 7 Year 2021 for SO_2

Figure 52 presents the comparison between the average monitoring data collected over the 6 monitoring events in Event 1 Year 2014/2015, Event 2 Year 2016, Event 3 Year 2017, Event 4 Year 2018, Event 5 Year 2019, Event 6 Year 2020 and Event 7 Year 2021 for SO_2.

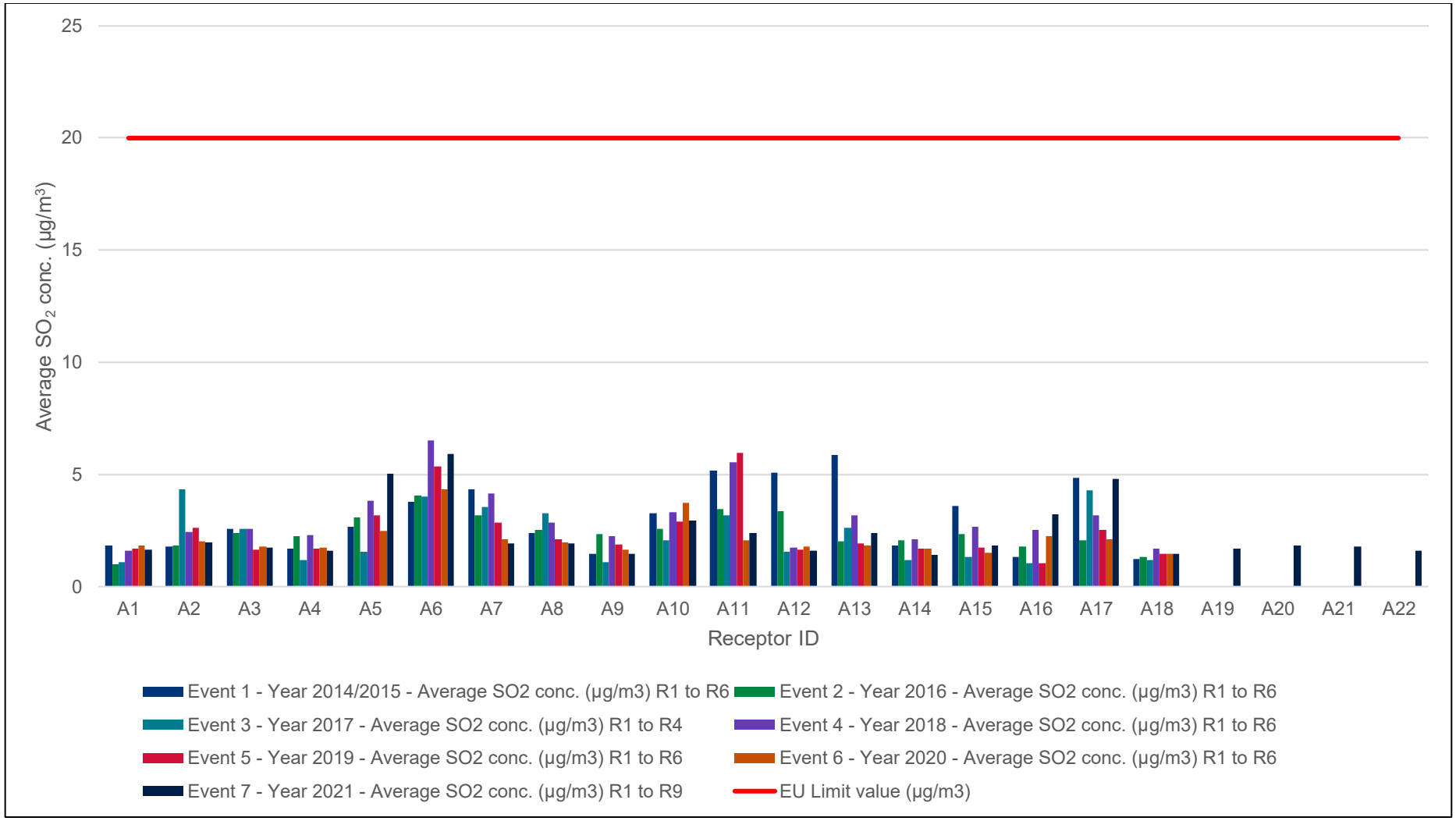


Figure 52: Comparison Between Average SO_2 Concentration Values For Event 1 Year 2014/2015, Event 2 Year 2016, Event 3 Year 2017, Event 4 Year 2018, Event 5 Year 2019, Event 6 Year 2020 and Event 7 Year 2021

6.1.5 Total Depositional Dust

The Total depositional dust monitoring stations were deployed for a period of 4 x 1 month periods between April 2021 and November 2021. Monitoring was carried out at 4 monitoring stations located in close proximity to locations / activities know to give rise to fugitive dust emissions. The results of the monitoring are graphically shown in **Figure 53**.

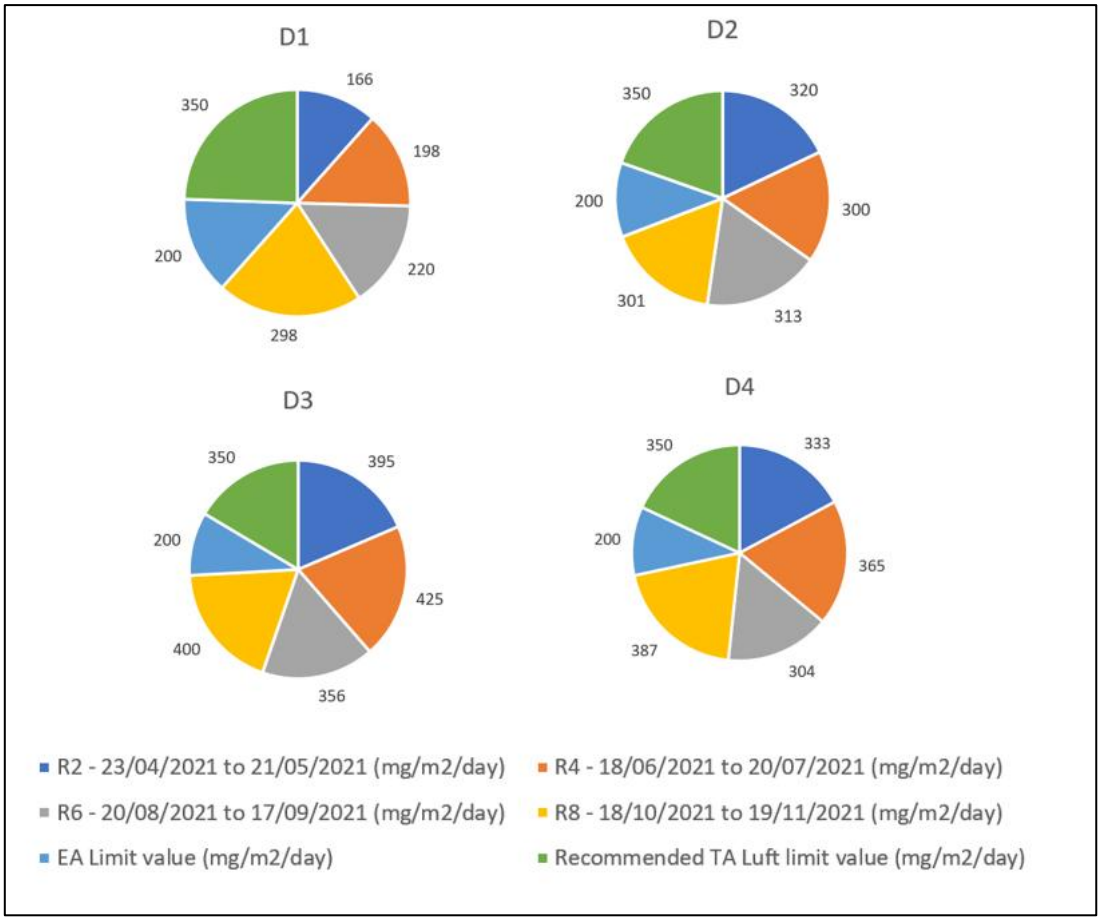


Figure 53: Total Depositional Dust Monitoring Results for the Dublin Port Estate and Environs

6.1.6 Particulate Matter (PM10/2.5)

Particulate matter 10 and 2.5 µm monitoring stations were deployed for a period of approximately 2 off 4/6 week periods 23/03/2021 to 18/06/2021 and 17/09/2021 to 15/11/2021. Monitoring was carried out at 2 monitoring stations. The results of the monitoring are graphically shown in **Figure 54**.

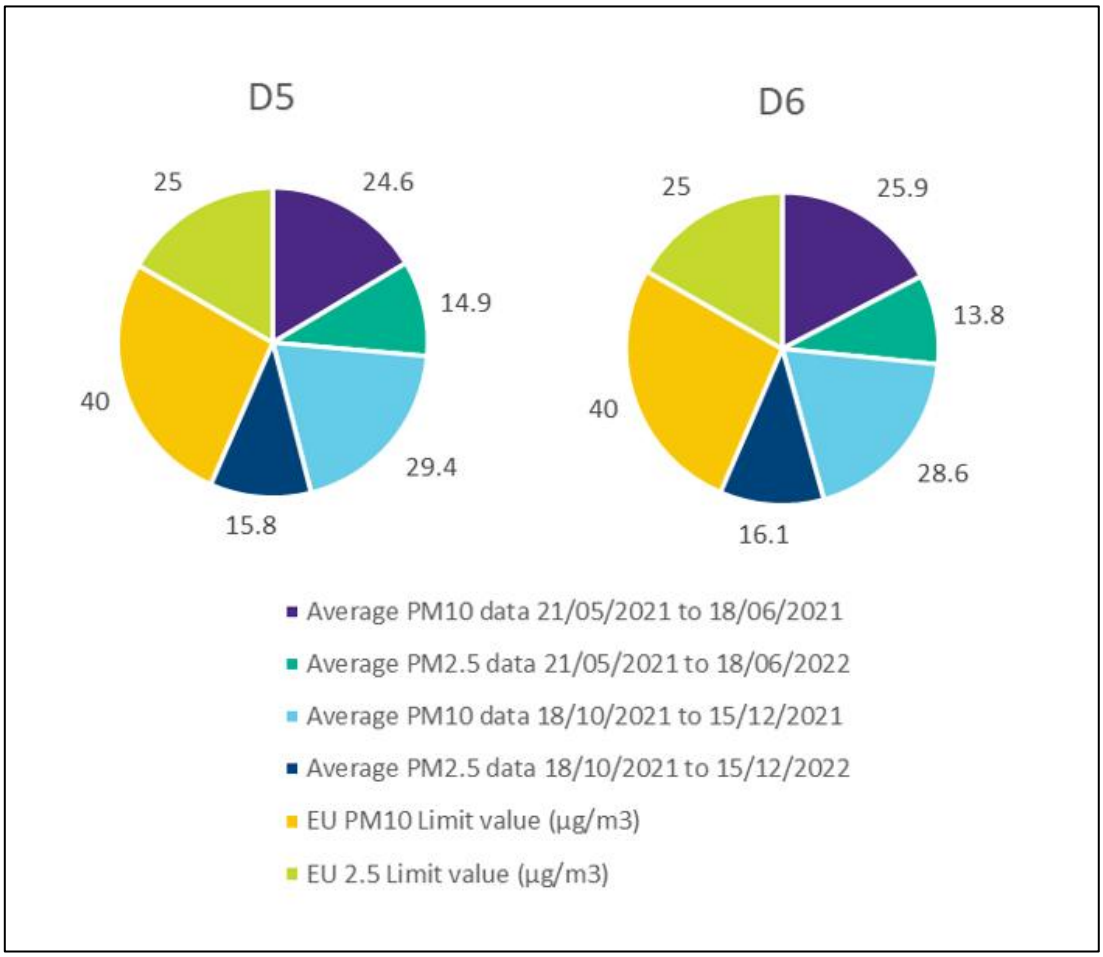


Figure 54: Particulate Matter 10 and 2.5 µm Monitoring Results for Dublin Port Estate Monitoring Stations

6.1.7 Ammonia

The NH3 diffusion tubes were deployed for a period of 4 x circa 1 month periods between May and December 2021. Monitoring was carried out at 7 monitoring stations spatially distributed across the port estate. The results of the monitoring are graphically shown in **Figure 55**.

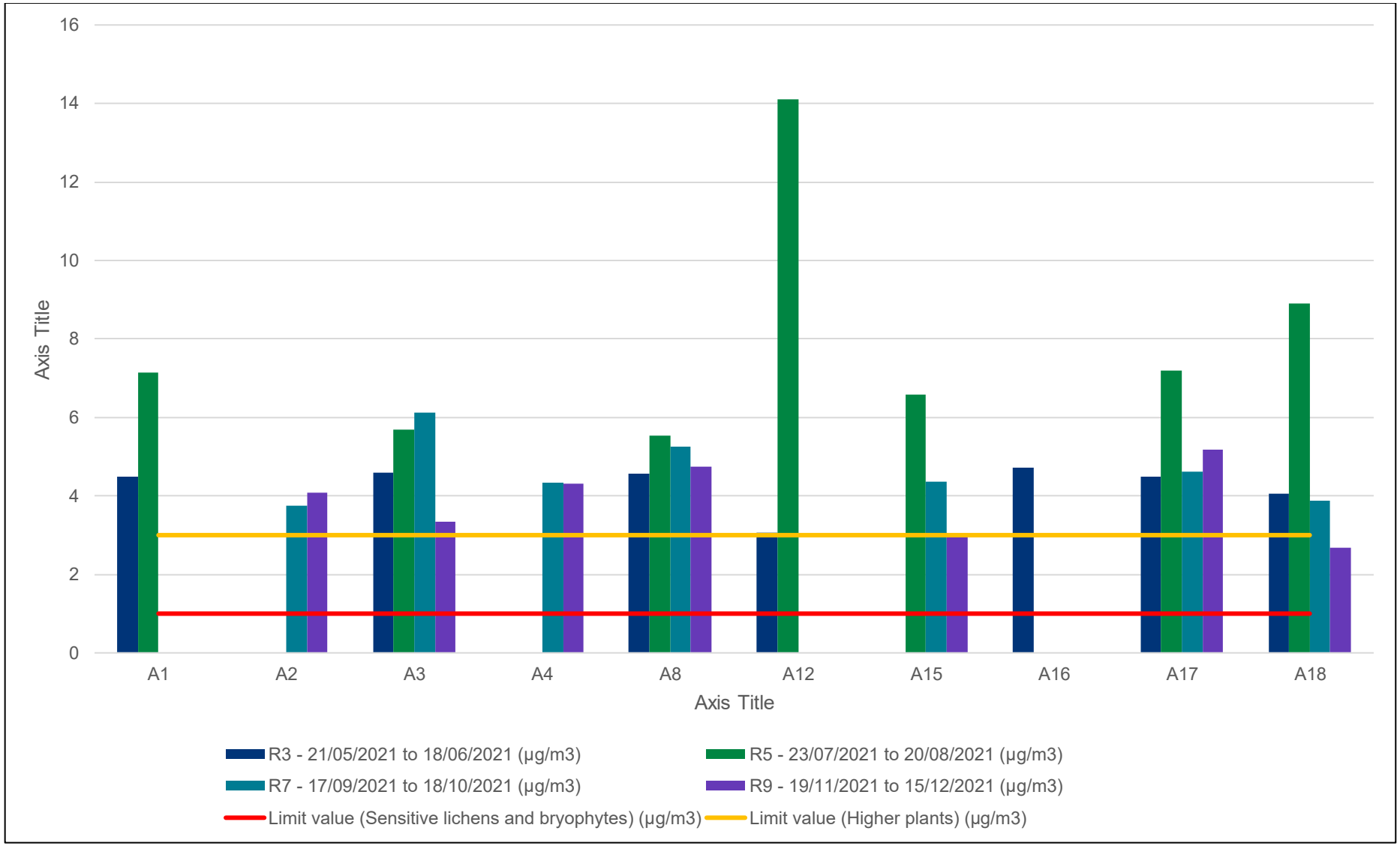


Figure 55: NH3 Monitoring Results at Each of the 7 Monitoring Stations Over 3 Monitoring Events

6.1.8 BTEX

The BTEX diffusion tubes were deployed for a period of 4 x circa 1 month periods between May and December 2021. Monitoring was carried out at 7 monitoring stations spatially distributed across the port estate. The results of the monitoring are graphically shown in **Figure 56** to **Figure 59**.

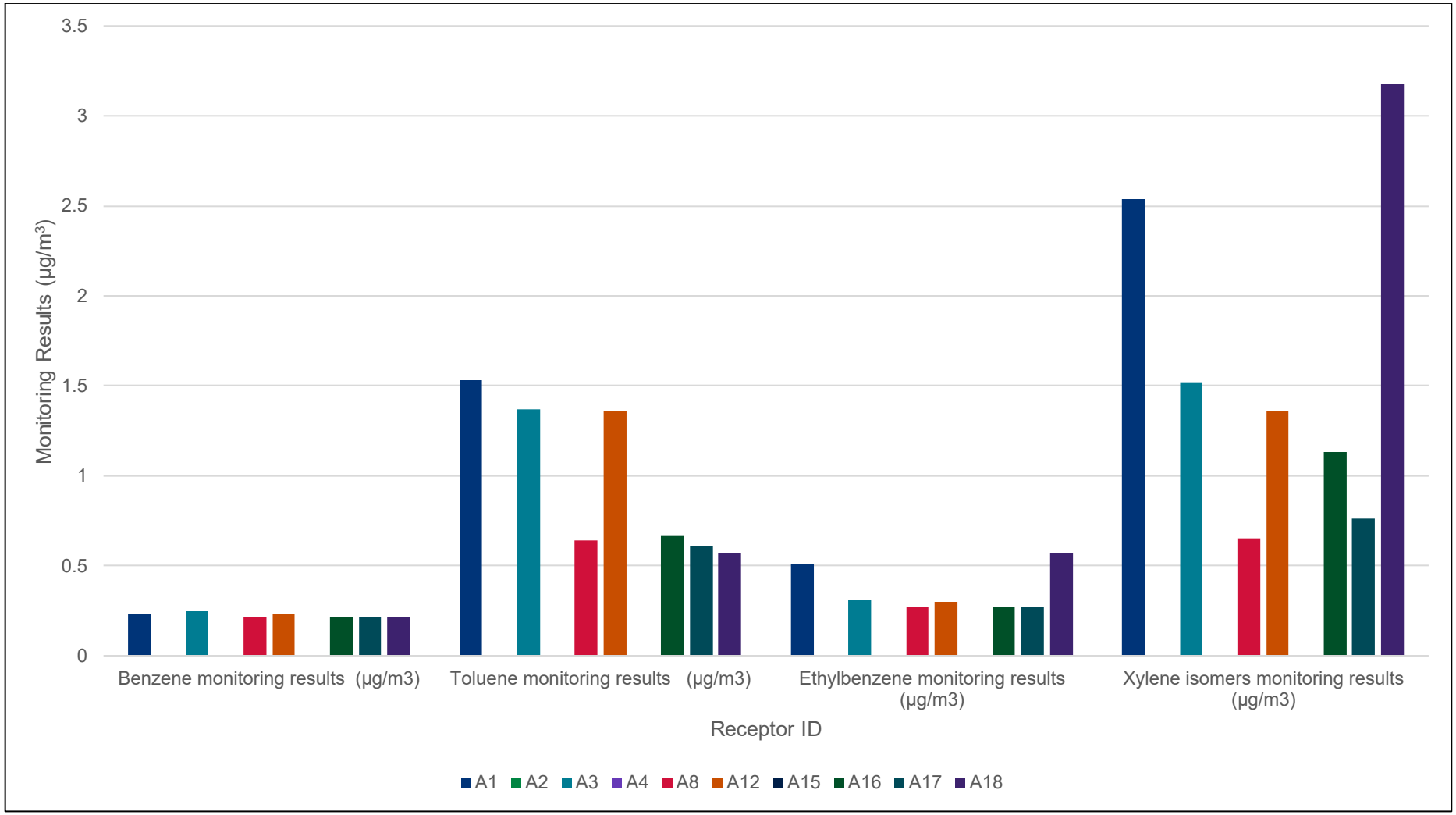


Figure 56: BTEX monitoring results at each of the 7 monitoring stations over R3 - 21/05/2021 to 18/06/2021

**Note – Limit Values Include:

Benzene <5.0 (µg/m3), Toluene 1,920 (µg/m3), Ethylbenzene 2,210 (µg/m3), Xylene 4,420 (µg/m3)

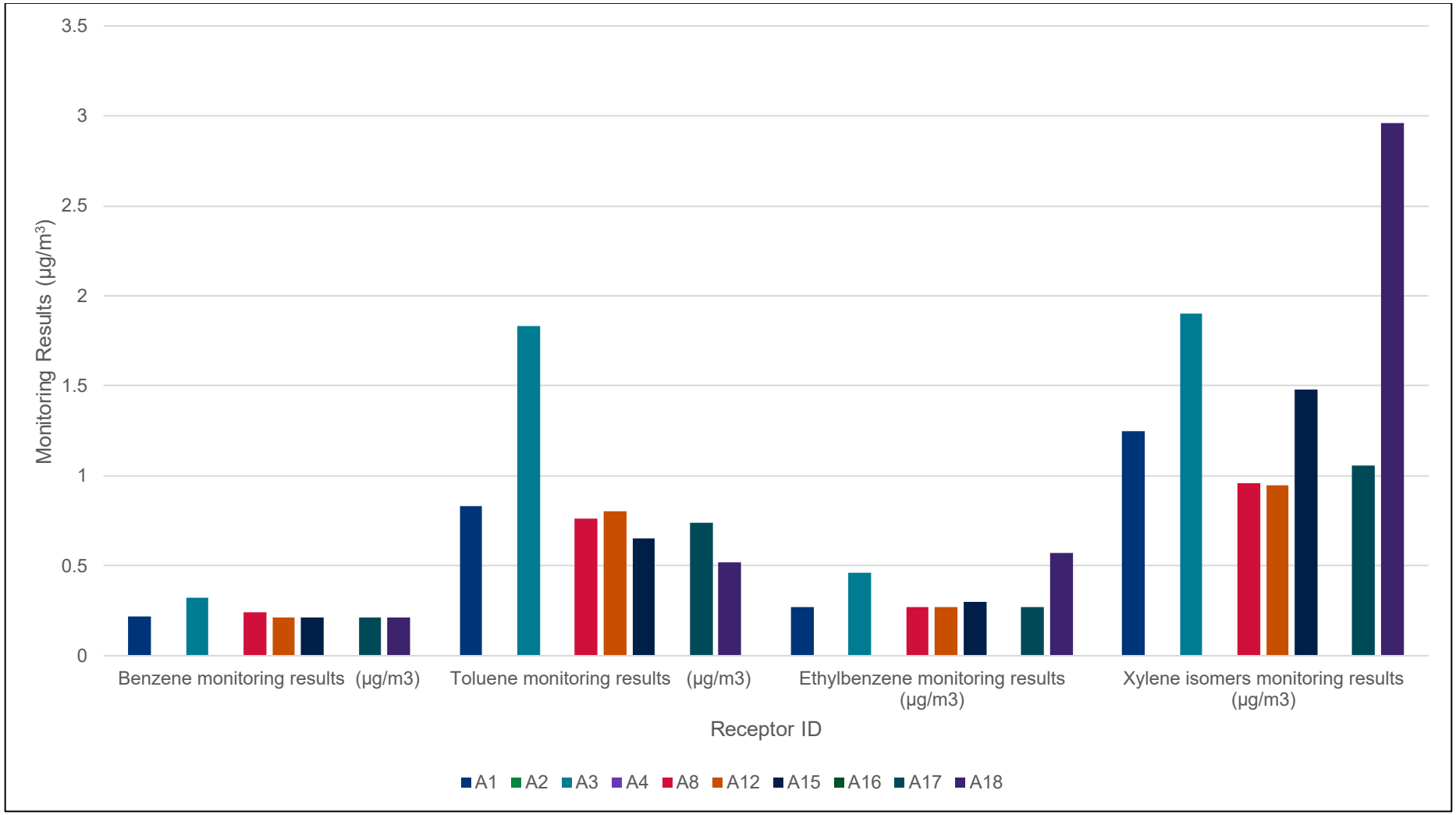


Figure 57: BTEX monitoring results at each of the 7 monitoring stations over R5 - 23/07/2021 to 20/08/2021

**Note – Limit Values Include:

Benzene <5.0 (µg/m3), Toluene 1,920 (µg/m3), Ethylbenzene 2,210 (µg/m3), Xylene 4,420 (µg/m3)

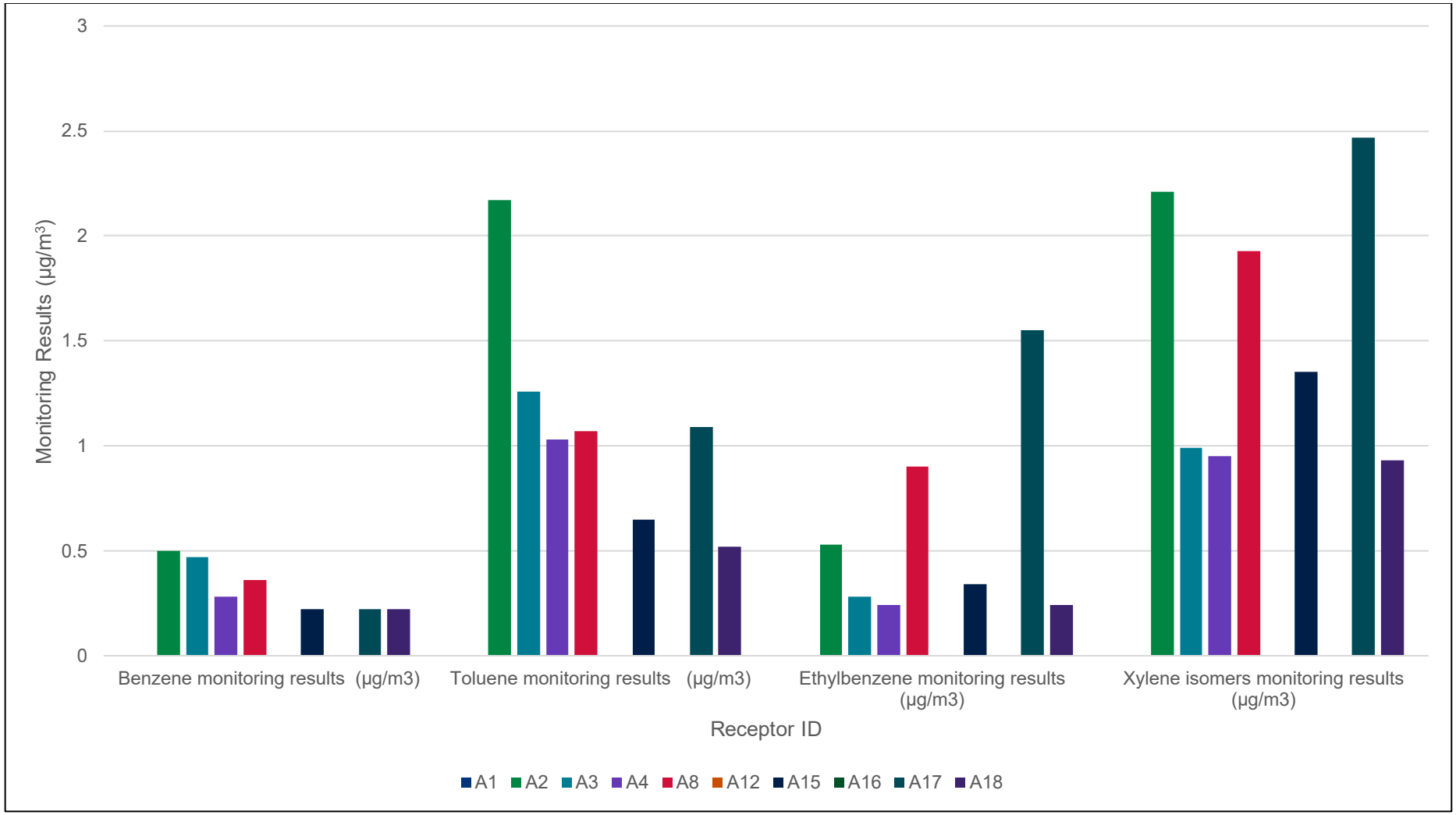


Figure 58: BTEX monitoring results at each of the 7 monitoring stations over R7 - 17/09/2021 to 18/10/2021

**Note – Limit Values Include:

Benzene <5.0 (µg/m3), Toluene 1,920 (µg/m3), Ethylbenzene 2,210 (µg/m3), Xylene 4,420 (µg/m3)

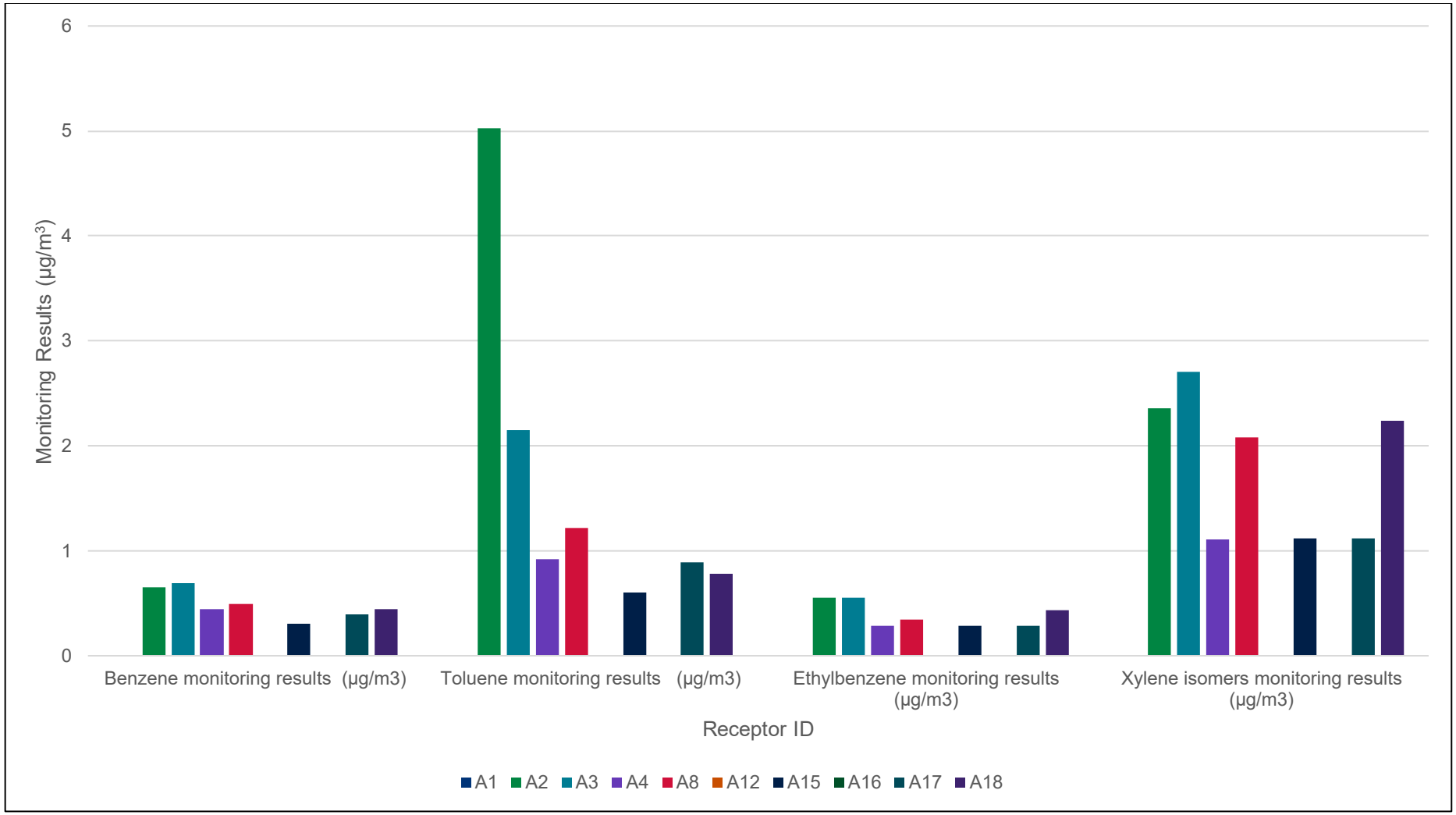


Figure 59: BTEX monitoring results at each of the 7 monitoring stations over R9 - 19/11/2021 to 15/12/2021

**Note – Limit Values Include:

Benzene <5.0 (µg/m3), Toluene 1,920 (µg/m3), Ethylbenzene 2,210 (µg/m3), Xylene 4,420 (µg/m3)

6.1.9 Lead

The Lead samplers were deployed for a period of 3 times between January and July 2020. Monitoring was carried out at 3 monitoring stations spatially distributed across the port estate. The results of the monitoring are graphically shown in **Figure 60**.

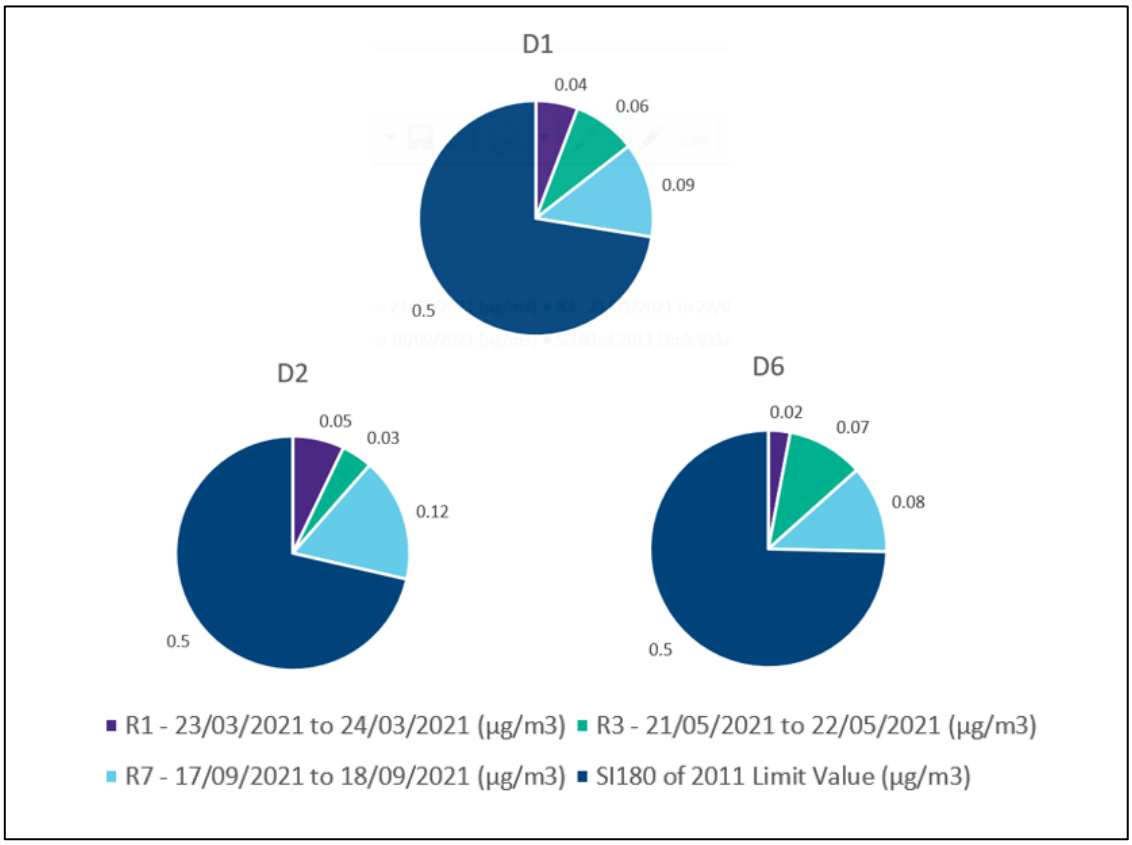


Figure 60: Lead Monitoring Results at each of 3 Monitoring Stations Over 3 Monitoring Events

7.0 DUBLIN PORT AIR QUALITY MONITORING RESULTS 2022

Air monitoring data from 22 monitoring stations located in the Dublin Port area over a period of 12 monitoring event were assessed against legislative limits and target values for the protection of human health and vegetation. Monitoring was carried out for NO_2 and SO_2 at 22 locations over 12 monitoring events in Year 2022. Monitoring for PM_{10} and $PM_{2.5}$ was carried out at 2 locations over 2 monitoring event while monitoring for Benzene, Toluene, Ethyl Benzene, Xylene isomers (BTEX) and Ammonia was carried at 7 locations over 4 monitoring events in Year 2022. Total depositional dust was carried out at 4 locations over 2 monitoring event while Lead monitoring was carried out at 3 locations over 3 monitoring events in Year 2022.

A total of 22 individual monitoring locations (i.e. A1 to A22) were selected across the port estate area in order to monitor ambient air concentrations of Nitrogen dioxide and Sulphur dioxide. These locations were established during the 2014/2015 monitoring program and data collected in 2022 will facilitate comparison between the data sets in terms of improvement / dis-improvements in ambient air quality within the port environs.

A total of 7 individual monitoring locations (i.e. as taken from 10 locations A1, A2, A3, A4, A8, A12, A15, A16, A17 and A18) were chosen from the stated location for the monitoring of BTEX and Ammonia.

A total of 4 locations were chosen for Bergerhoff total dust deposition monitoring (i.e. D1 to D4) while a further two locations were chosen for PM_{10} and $PM_{2.5}$ monitoring (i.e. D5 and D6). A total of three monitoring locations were chosen for Lead (i.e. D1, D2 and D6). **Figure 61** presents an overview of each monitoring locations located with the Dublin Port and its environs.



Figure 61: Overview of Ambient Air Monitoring Locations Located Within Dublin Port and Surrounding Environs for Nitrogen Dioxide, Sulphur Dioxide, BTEX, Ammonia, Total Depositional Dust, PM10/2.5.and Lead

7.1 RESULTS

7.1.1 Nitrogen Dioxide

The NO_2 diffusion tubes were deployed for a period of 12 x circa 1 month periods between January and Dec 2022. Monitoring was carried out at 22 monitoring stations spatially distributed across the port estate. The results of the monitoring are and graphically represented in **Figure 62**.

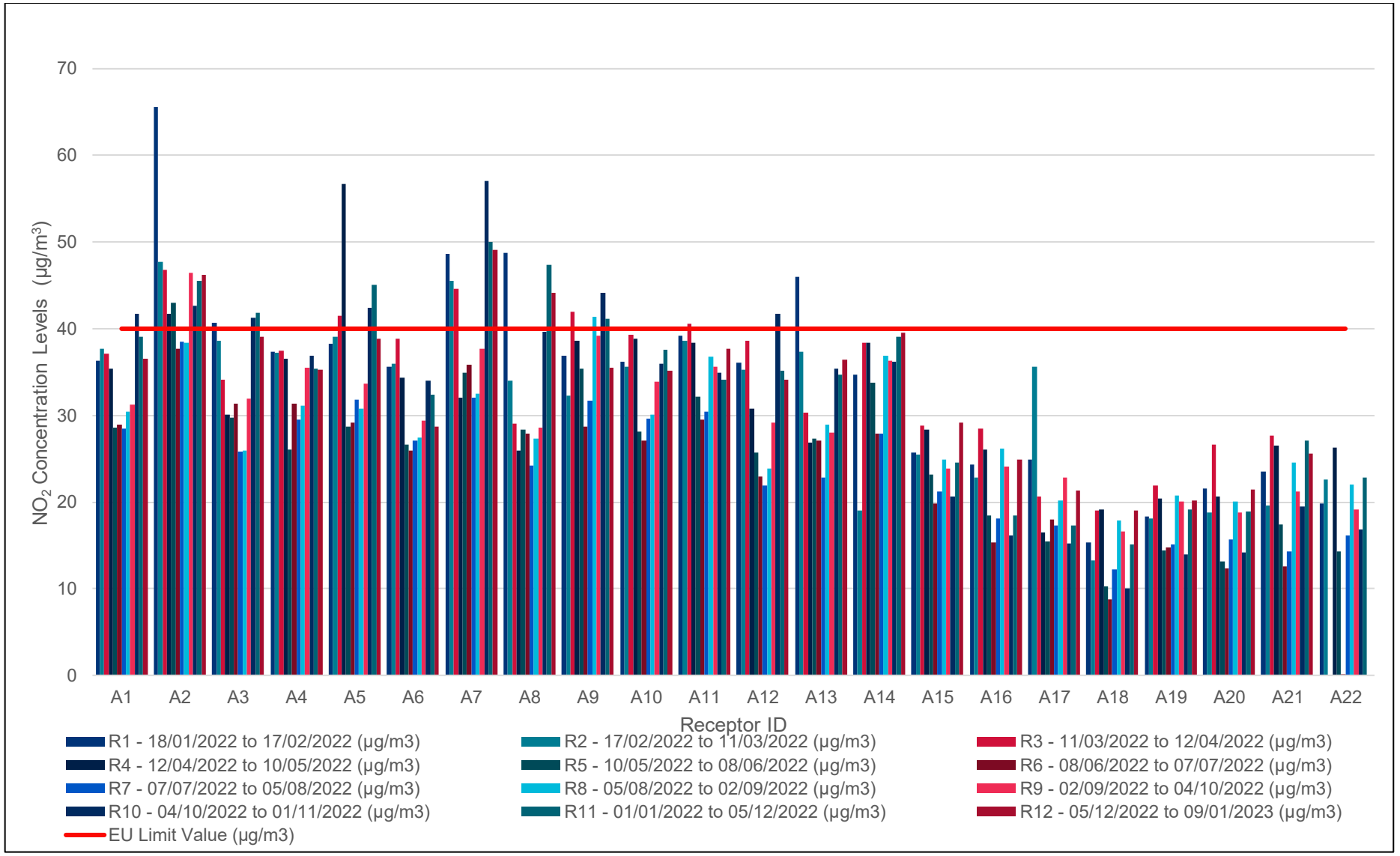


Figure 62: Plot of NO_2 Concentrations For Each Monitoring Event R1 to R12 at Each Monitoring Station A1 to A22

7.1.2 Comparison between average monitoring data collected in Event 1 Year 2014/2015, Event 2 Year 2016, Event 3 Year 2017, Event 4 Year 2018, Event 5 Year 2019, Event 6 Year 2020 and Event 7 Year 2021for NO_2

Figure 63 presents the comparison between the average monitoring data collected over the 6 monitoring events in Event 1 Year 2014/2015, Event 2 Year 2016, Event 3 Year 2017, Event 4 Year 2018, Event 5 Year 2019, Event 6 Year 2020 and Event 7 Year 2021 for NO_2.

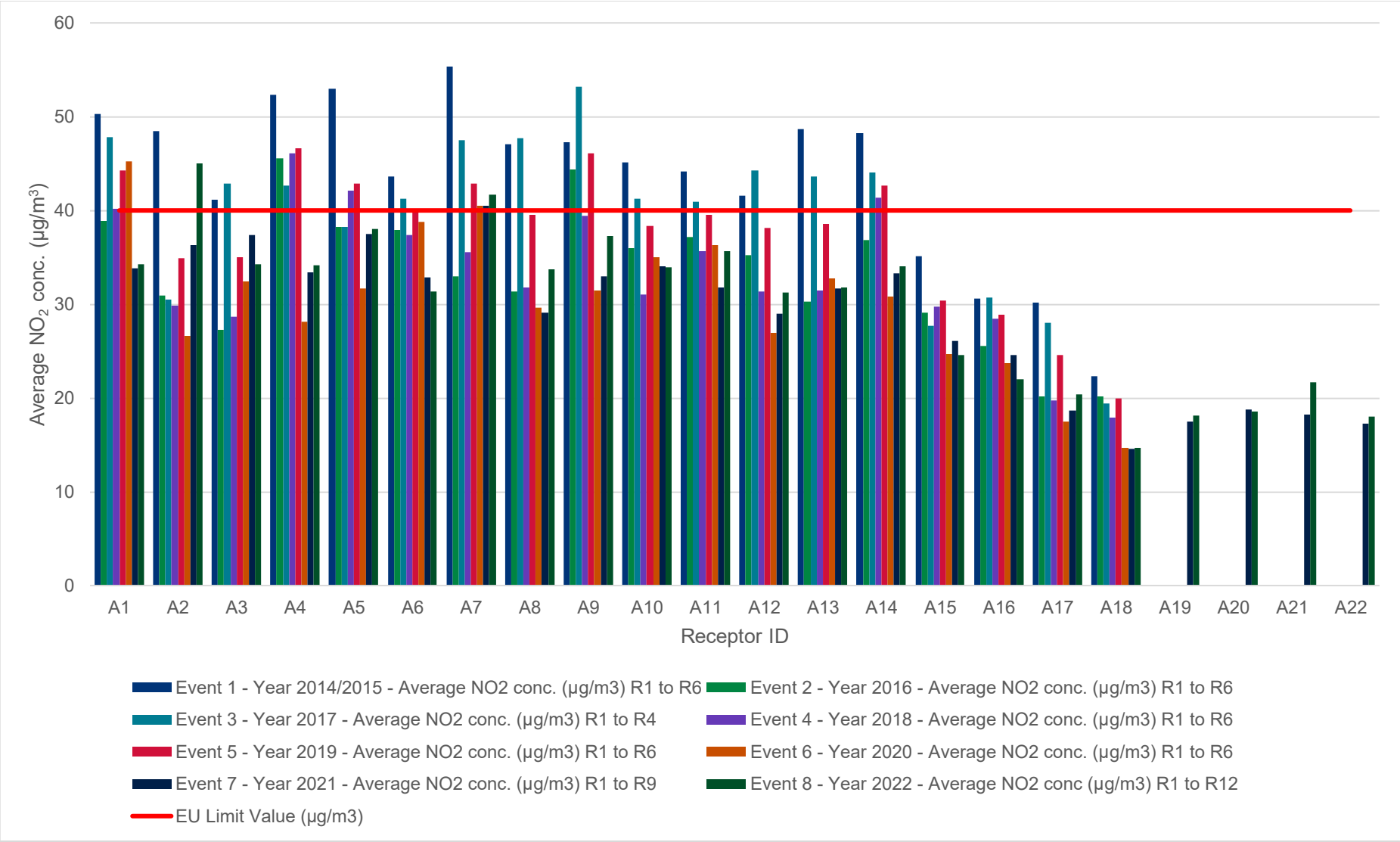


Figure 63: Graphical Comparison Between Average NO_2 Concentration Values for Event 1 Year 2014/2015, Event 2 Year 2016, Event 3 Year 2017, Event 4 Year 2018, Event 5 Year 2019, Event 6 Year 2020 and Event 7 Year 2021

7.1.3 Sulphur Dioxide

The SO_2 diffusion tubes were deployed for a period of 12 x circa 1 month periods between January and Dec 2022. Monitoring was carried out at 22 monitoring stations spatially distributed across the port estate. The results of the monitoring are graphically represented in **Figure 64**.

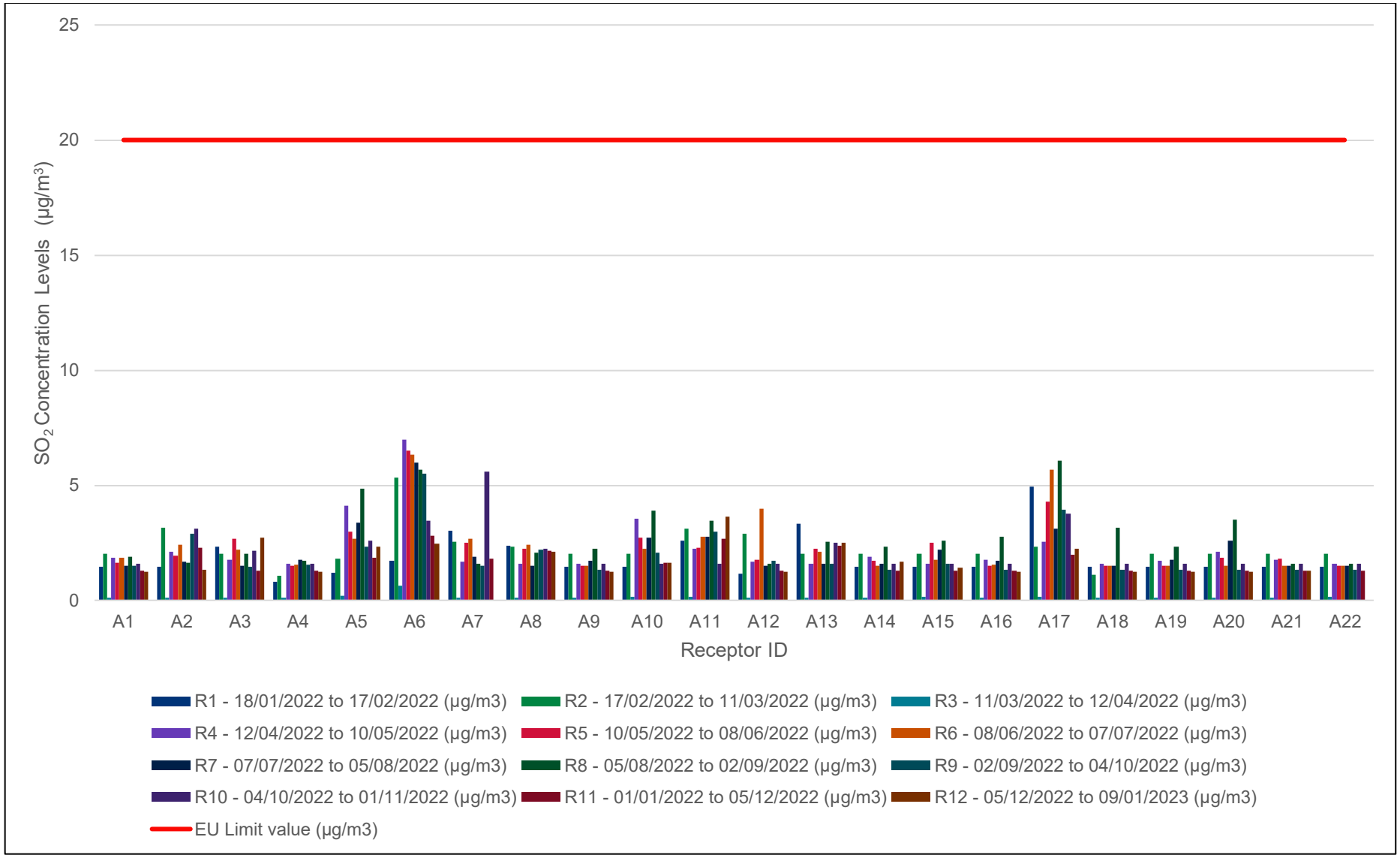


Figure 64: Plot of SO_2 Concentrations For Each Monitoring Event R1 to R12 at Each Monitoring Station A1 to A22

Comparison between average monitoring data collected in Event 1 Year 2014/2015, Event 2 Year 2016, Event 3 Year 2017, Event 4 Year 2018, Event 5 Year 2019, Event 6 Year 2020 and Event 7 Year 2021 for SO_2

Figure 65 present the comparison between the average monitoring data collected over the 6 monitoring events in Event 1 Year 2014/2015, Event 2 Year 2016, Event 3 Year 2017, Event 4 Year 2018, Event 5 Year 2019, Event 6 Year 2020 and Event 7 Year 2021 for SO_2.

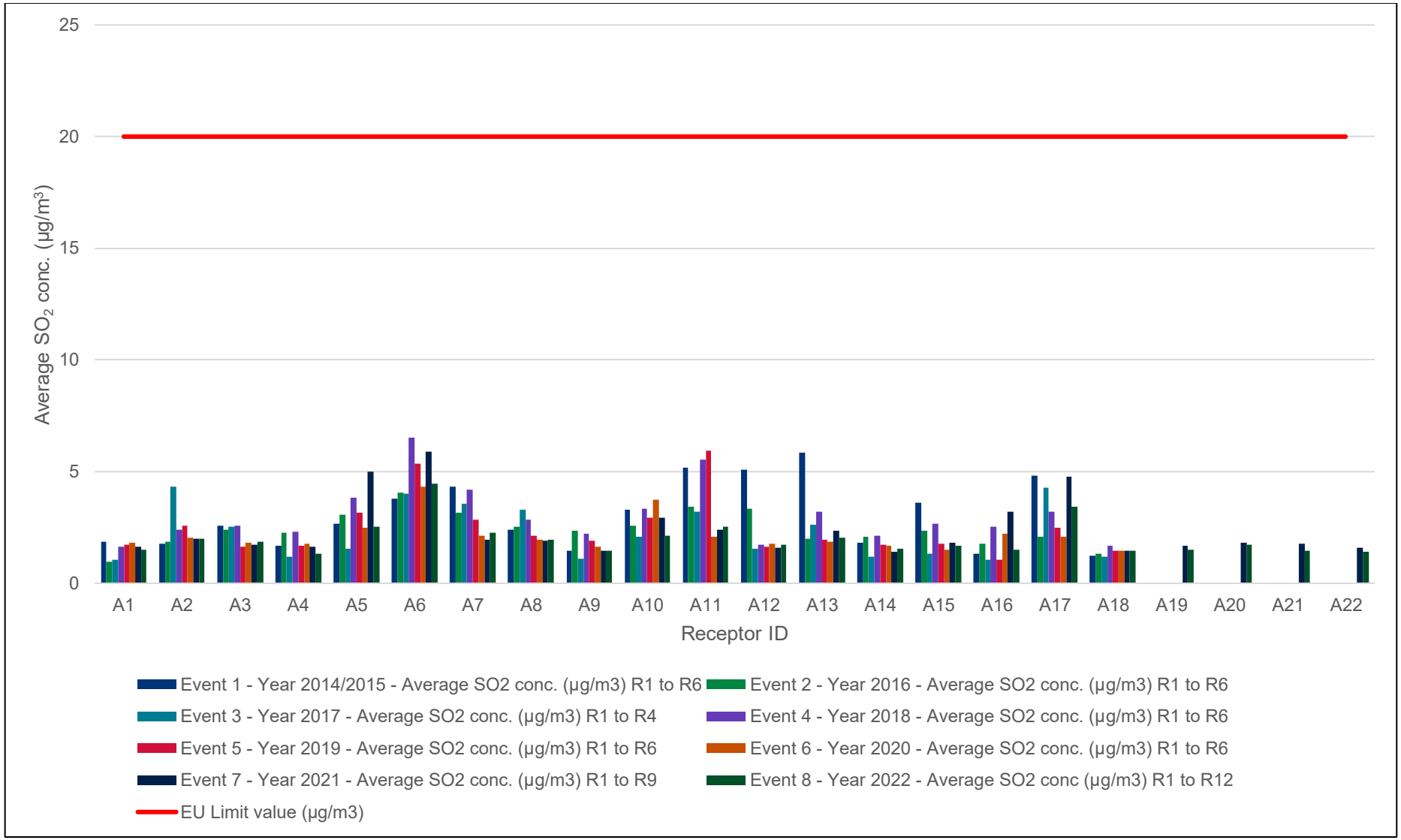


Figure 65: Comparison Between Average SO_2 Concentration Values For Event 1 Year 2014/2015, Event 2 Year 2016, Event 3 Year 2017, Event 4 Year 2018, Event 5 Year 2019, Event 6 Year 2020 and Event 7 Year 2021

7.1.4 Total Depositional Dust

The Total depositional dust monitoring stations were deployed for a period of 4 x 1 month periods between February 2022 and November 2022. Monitoring was carried out at 4 monitoring stations located in close proximity to locations / activities know to give rise to fugitive dust emissions.. The results of the monitoring are graphically shown in **Figure 66**.

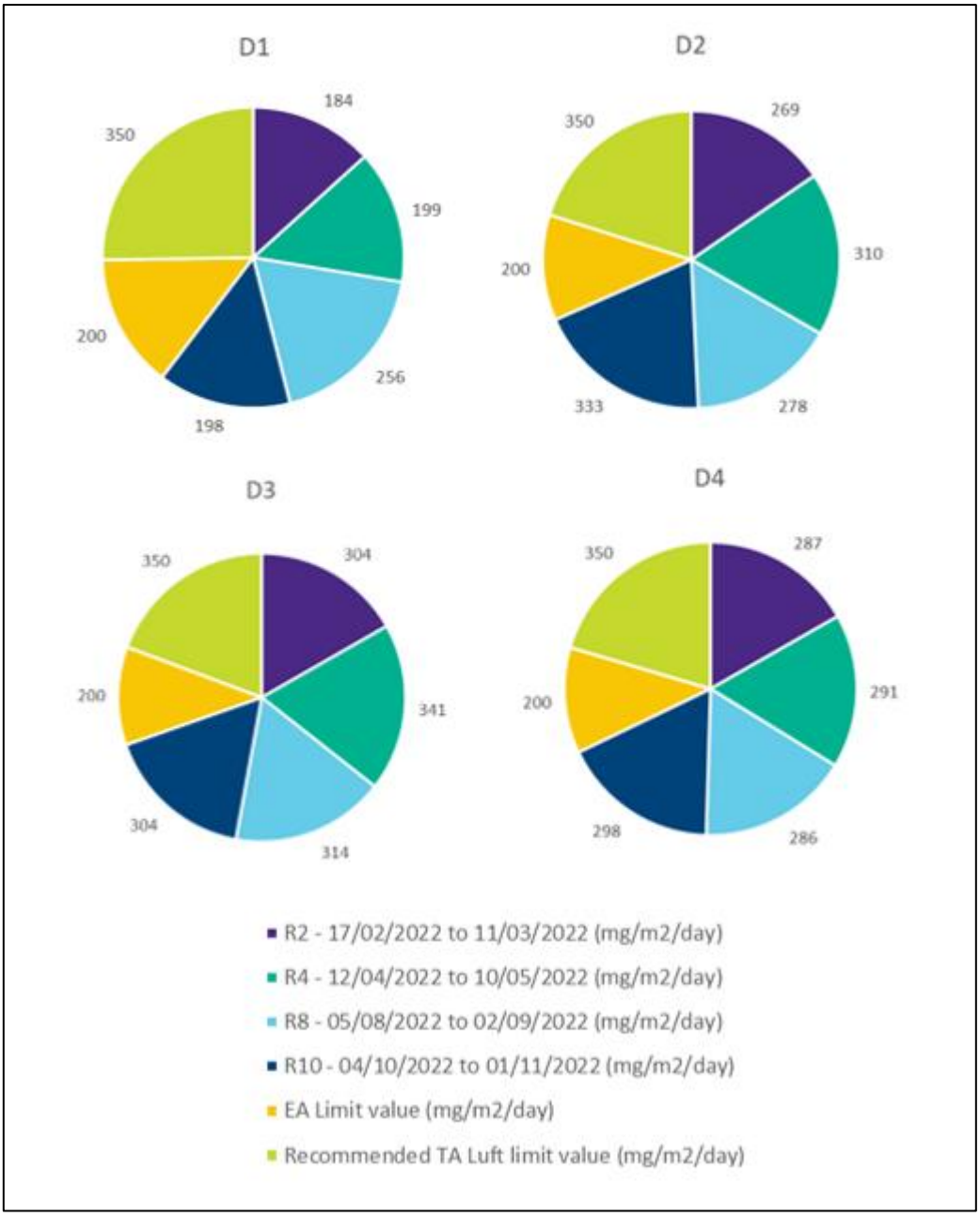


Figure 66: Total Depositional Dust Monitoring Results for the Dublin Port Estate and Environs

7.1.5 Particulate Matter (PM10/2.5)

Particulate matter 10 and 2.5 µm monitoring stations were deployed for a period of approximately 2 off 3 month periods. Monitoring was carried out at 2 monitoring stations. The results of the monitoring are graphically shown in **Figure 67**.

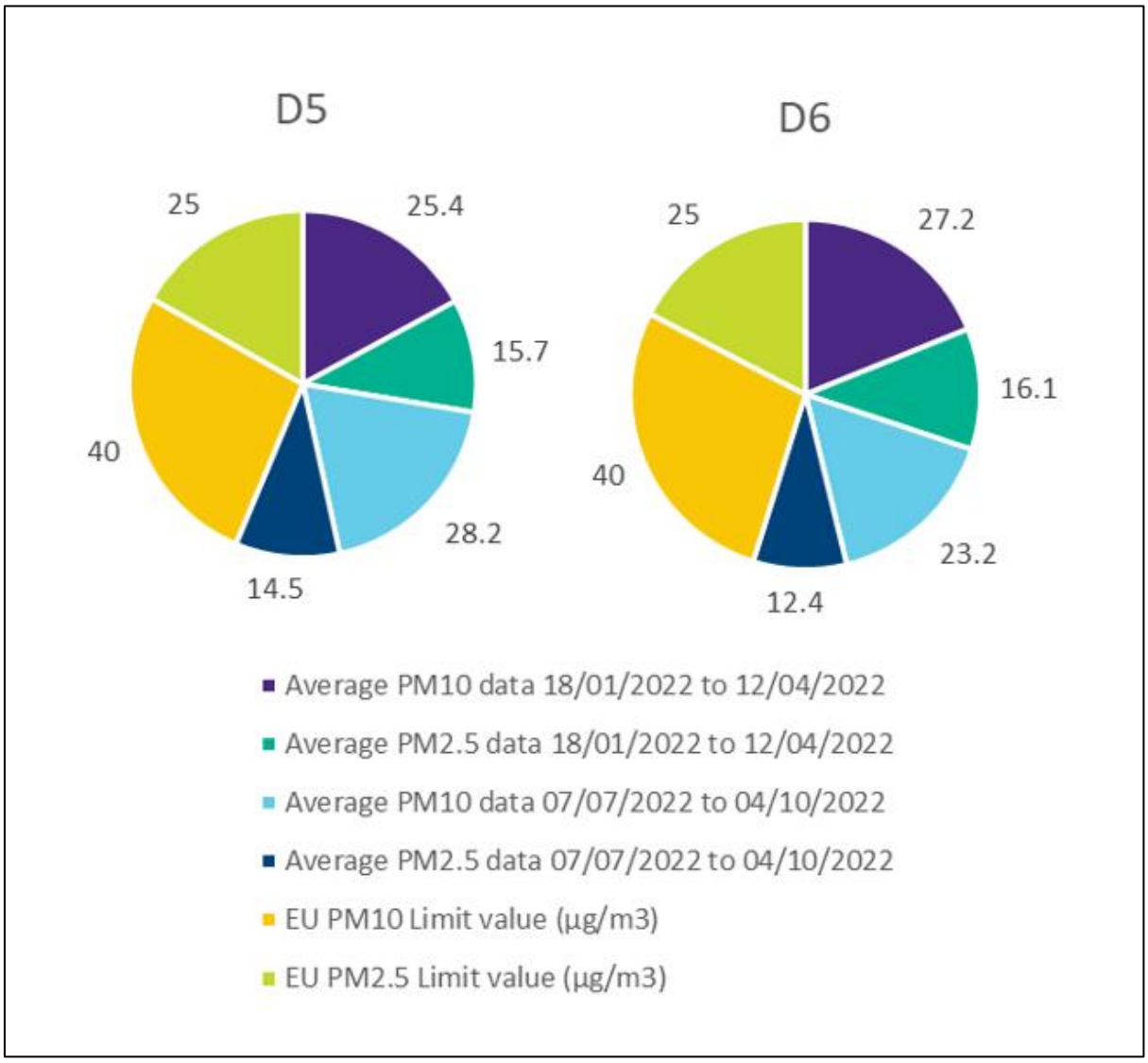


Figure 67: Particulate Matter 10 and 2.5 µm Monitoring Results for Dublin Port Estate Monitoring Stations

7.1.6 Ammonia

The NH3 diffusion tubes were deployed for a period of 4 x circa 1 month periods between March and December 2022. Monitoring was carried out at 7 monitoring stations spatially distributed across the port estate. The results of the monitoring are graphically shown in **Figure 68**.

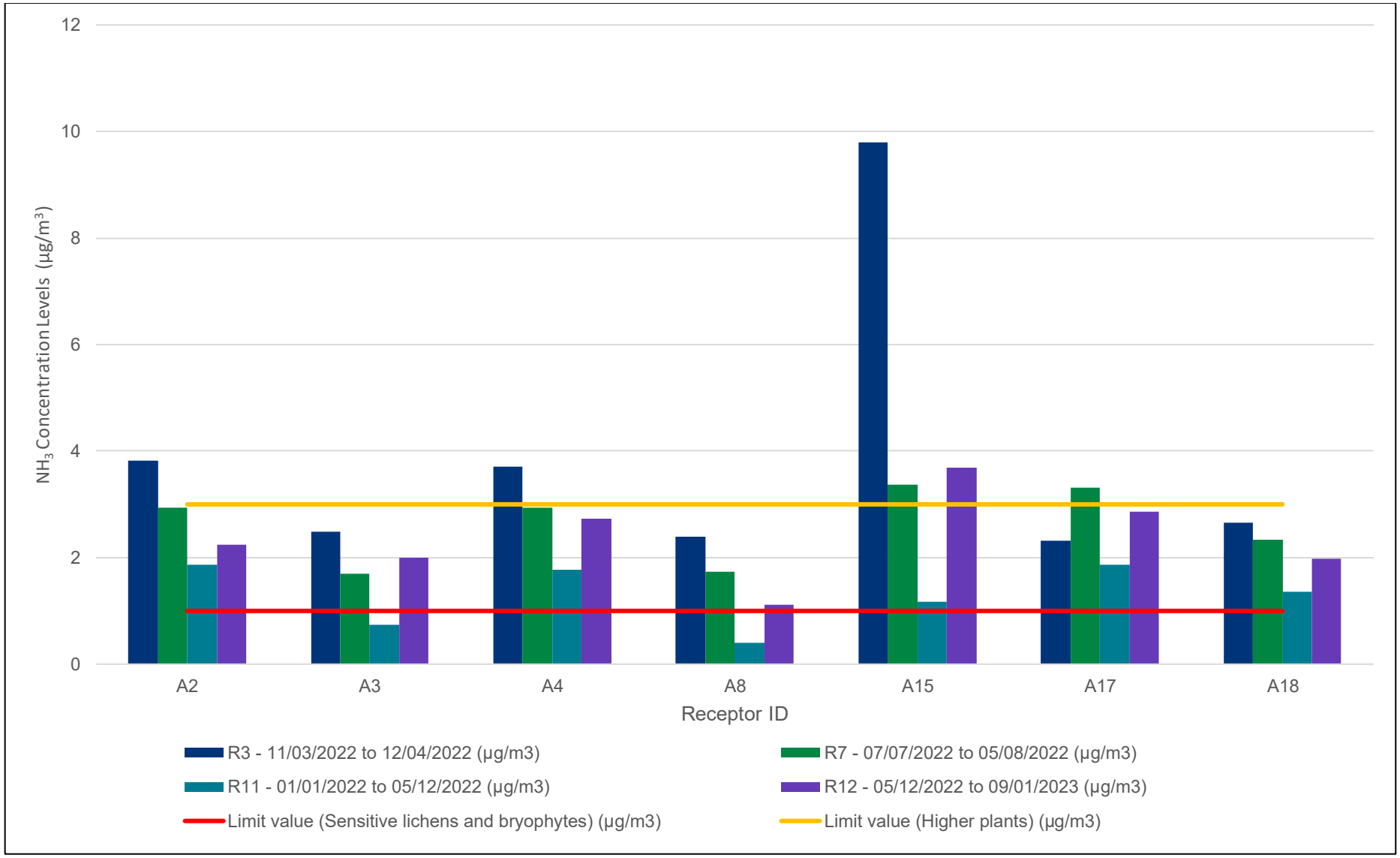


Figure 68: NH3 Monitoring Results at Each of the 7 Monitoring Stations Over 4 Monitoring Events

7.1.7 BTEX

The BTEX diffusion tubes were deployed for a period of 4 x circa 1 month periods between March and December 2022. Monitoring was carried out at 7 monitoring stations spatially distributed across the port estate. The results of the monitoring are graphically shown in **Figure 69** to **Figure 72**.

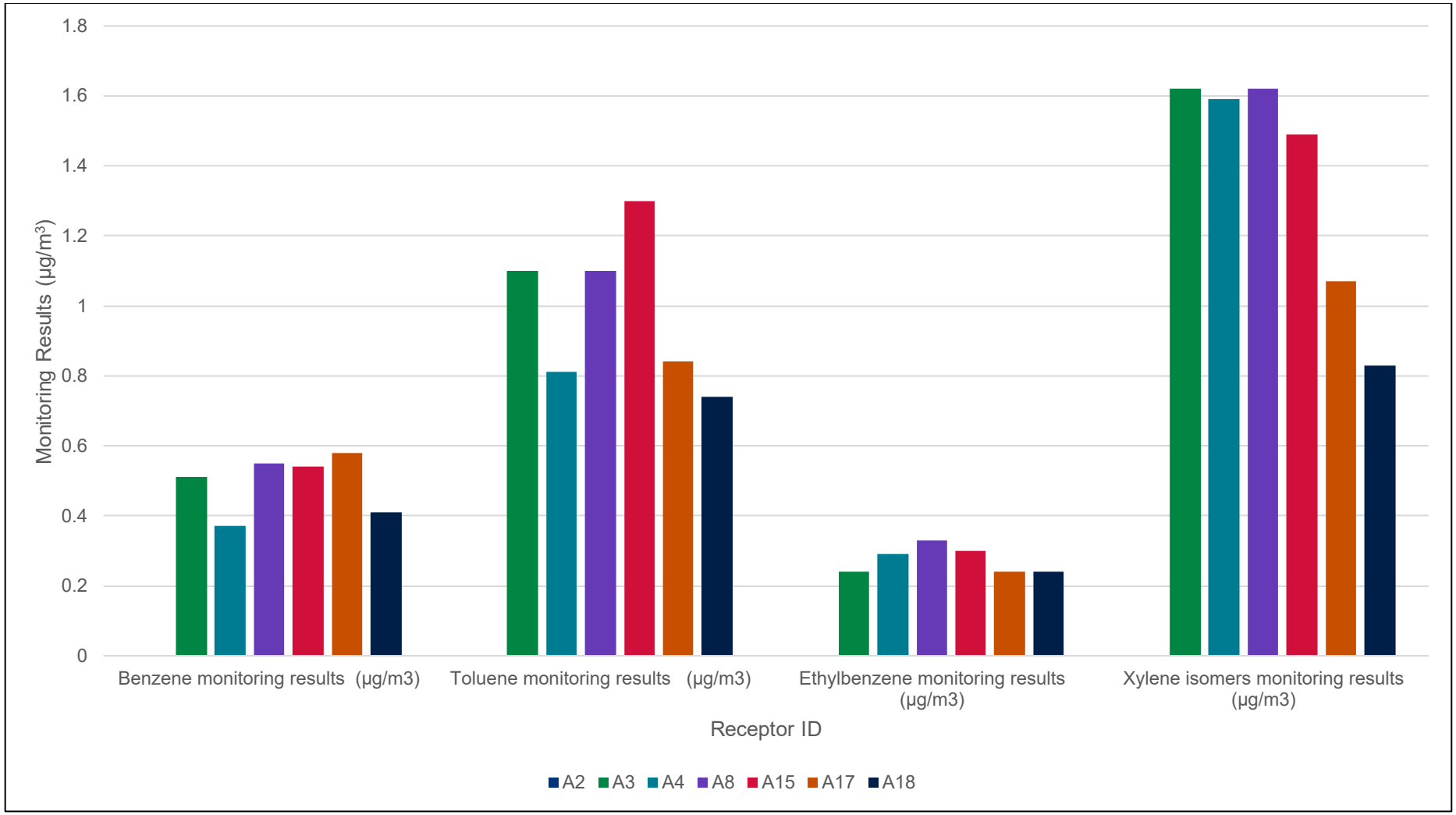


Figure 69: BTEX monitoring results at each of the 7 monitoring stations over R3 - 11/03/2022 to 12/04/2022

**Note – Limit Values Include:

Benzene <5.0 (µg/m3), Toluene 1,920 (µg/m3), Ethylbenzene 2,210 (µg/m3), Xylene 4,420 (µg/m3)

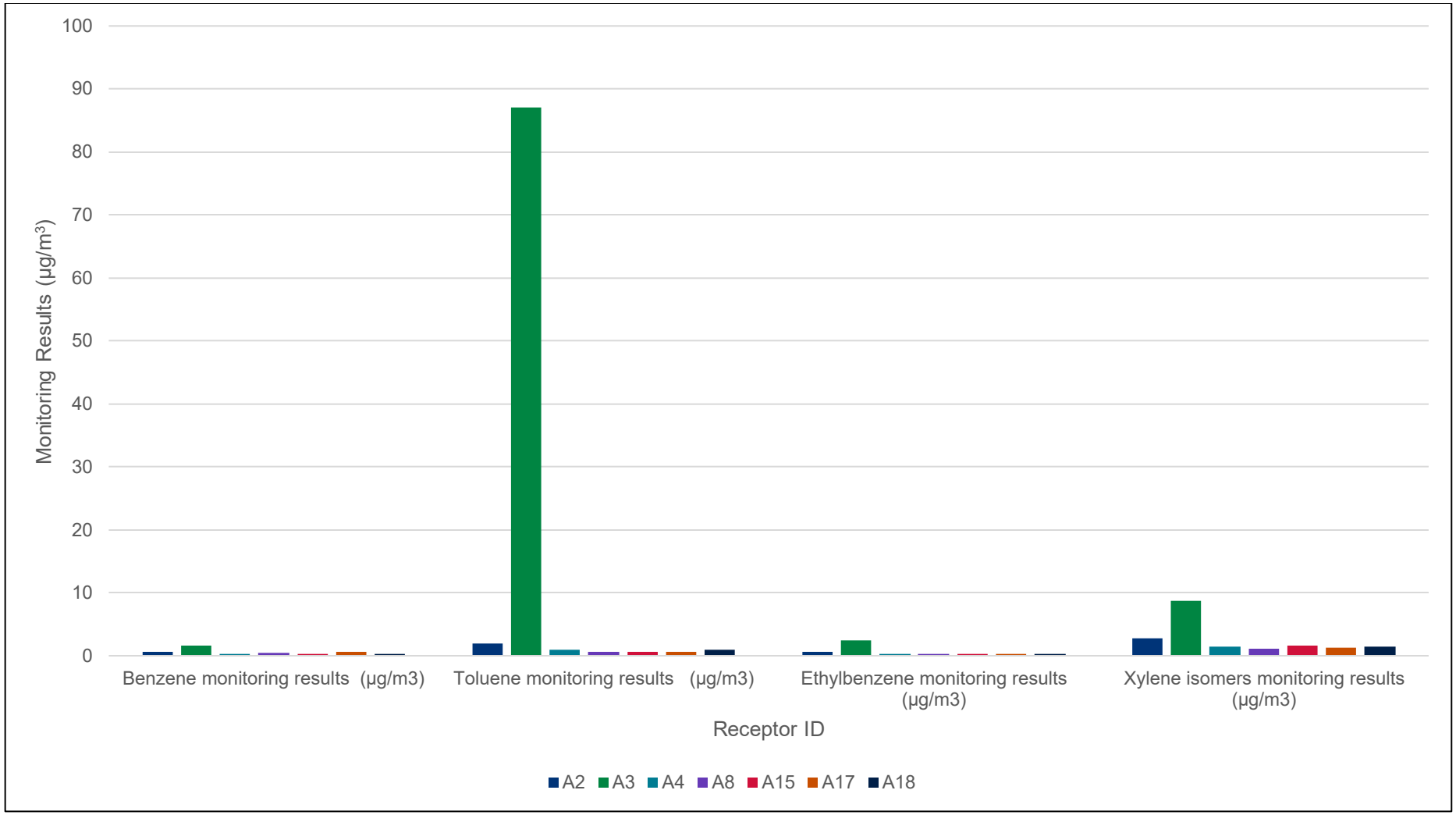


Figure 70: BTEX monitoring results at each of the 7 monitoring stations over R7 - 07/07/2022 to 05/08/2022

**Note – Limit Values Include:

Benzene <5.0 (µg/m3), Toluene 1,920 (µg/m3), Ethylbenzene 2,210 (µg/m3), Xylene 4,420 (µg/m3)

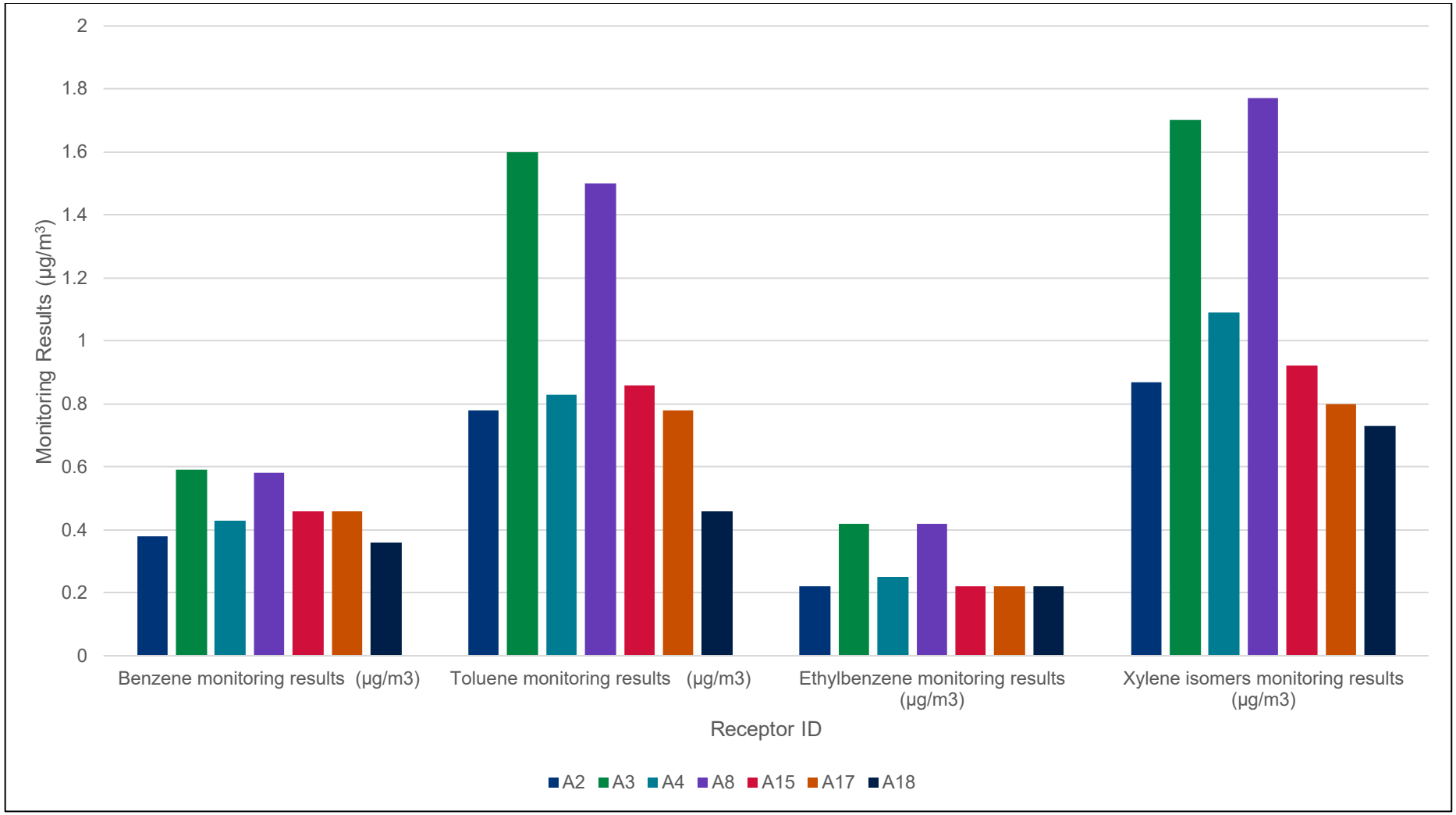


Figure 71: BTEX monitoring results at each of the 7 monitoring stations over R11 - 01/01/2022to 05/12/2022

**Note – Limit Values Include:

Benzene <5.0 (µg/m3), Toluene 1,920 (µg/m3), Ethylbenzene 2,210 (µg/m3), Xylene 4,420 (µg/m3)

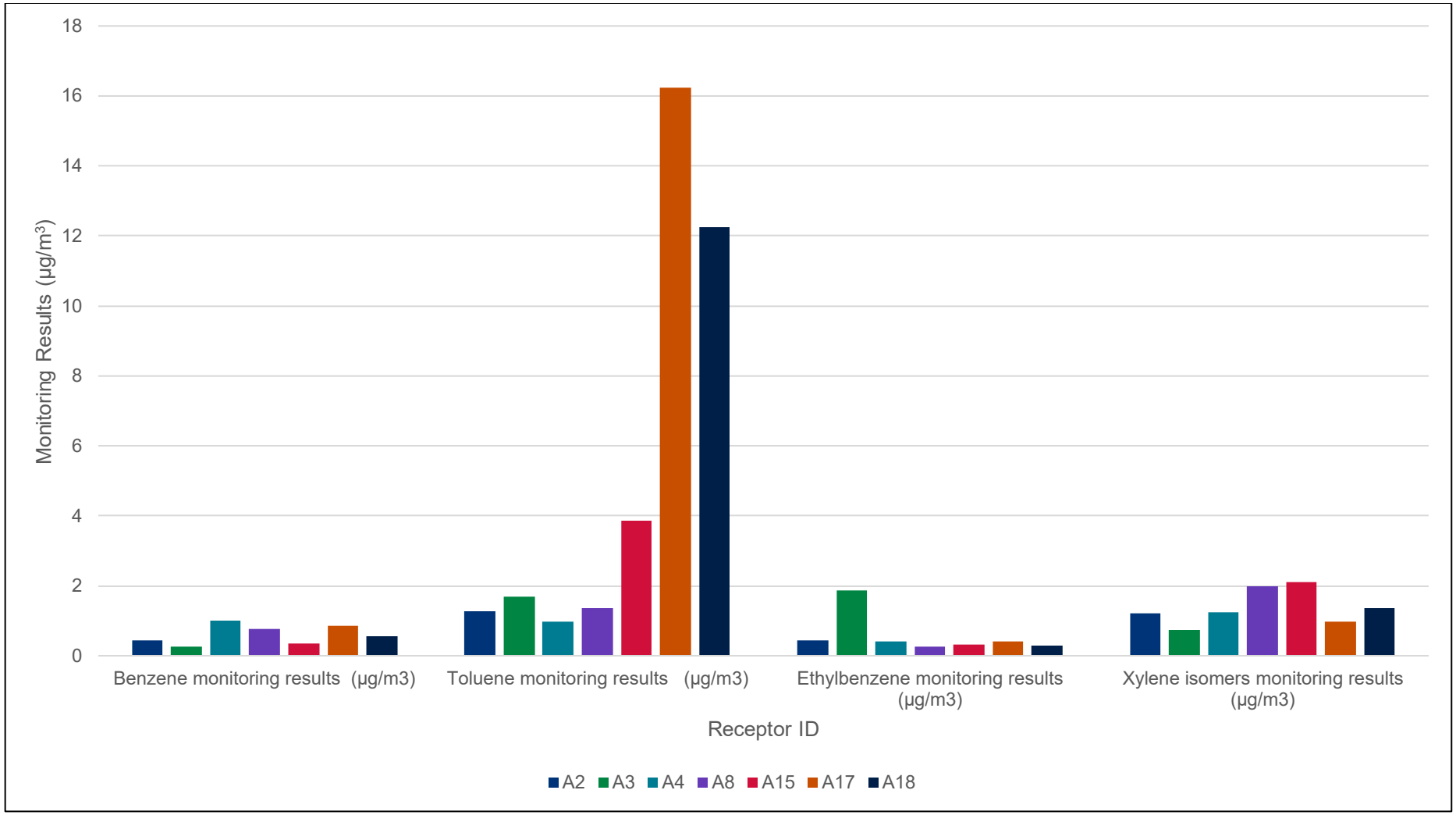


Figure 72: BTEX monitoring results at each of the 7 monitoring stations over R12 - 05/12/2022 to 09/01/2023

**Note – Limit Values Include:

Benzene <5.0 (µg/m3), Toluene 1,920 (µg/m3), Ethylbenzene 2,210 (µg/m3), Xylene 4,420 (µg/m3)

7.1.8 Lead

The Lead samplers were deployed for a period of 3 times between March and October 2022. Monitoring was carried out at 3 monitoring stations spatially distributed across the port estate. The results of the monitoring are graphically shown in **Figure 73**.

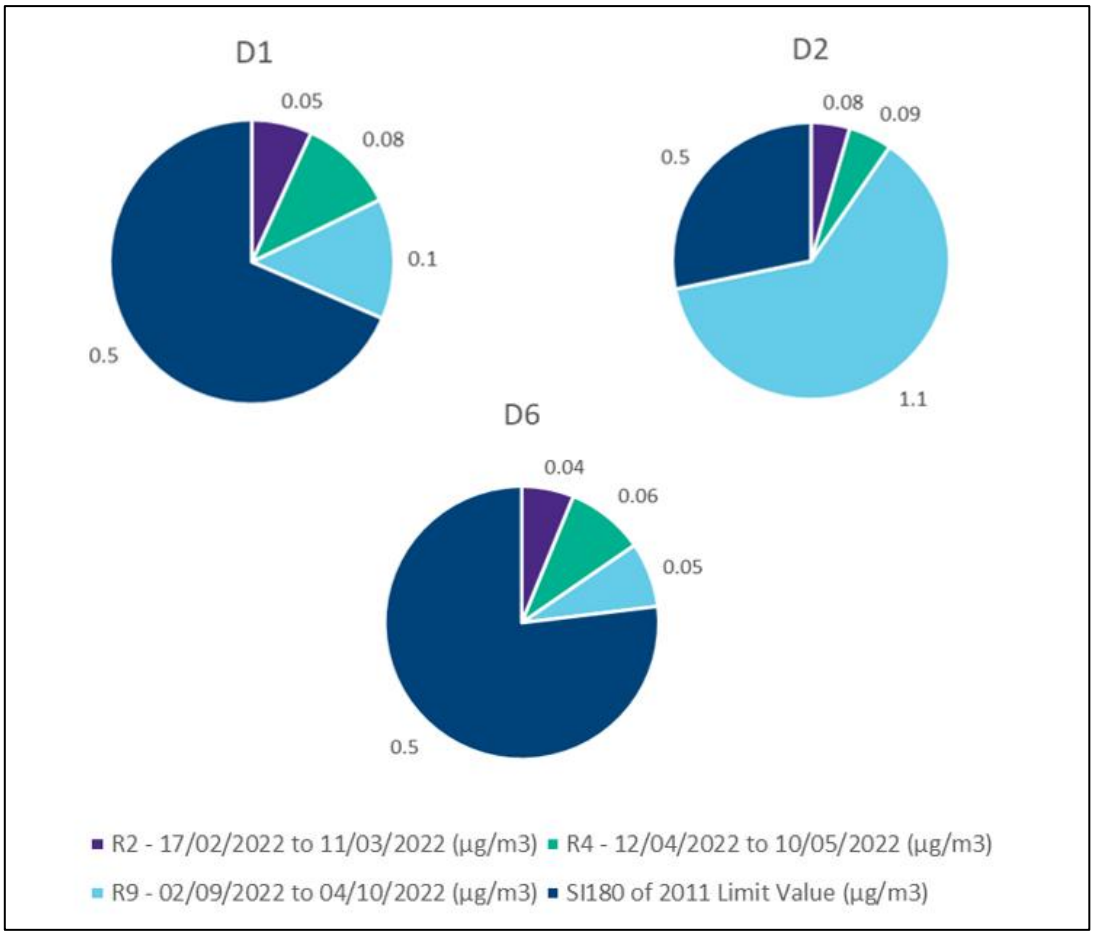


Figure 73: Lead Monitoring Results at each of 3 Monitoring Stations Over 3 Monitoring Events