



Department
for Environment
Food & Rural Affairs

Report on measures for 2021 exceedance of the Target Value for Nickel in South Wales non-agglomeration zone (UK0041)

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Contents

1. Introduction	4
1.1 Context.....	4
1.2 Status of zone	4
2 Exceedance situation South Wales [Ni_UK0041_2021_1] related to industrial emissions	6
2.1 Description of exceedance	6
2.2 Source apportionment.....	10
2.3 Measures	12

1. Introduction

1.1 Context

Under the Air Quality Standards Regulations 2010¹, the target value (TV) for nickel (Ni) is an annual mean concentration of 20 nanograms (a nanogram is one billionth of a gram (10^{-9})) per cubic metre (m^{-3}) of ambient air or lower. The regulation requires the UK to report on measures in place to address the exceedance of the TV and that all reasonable measures that do not entail disproportionate cost should be taken to ensure this target is not exceeded.

Exceedance of the TV was reported in 2013, 2014, 2015, 2016, 2018, 2019 and 2020 in the South Wales zone and a report on measures was published detailing the exceedance and the measures in place².

This document reports the exceedance situation for 2021 reflecting the more recent assessment and updating the 2013, 2014, 2015, 2016, 2018, 2019 and 2020 report on measures.

1.2 Status of zone

This is the report on measures required for exceedances of the TV for Ni within the South Wales non-agglomeration zone identified within the 2021 UK air quality assessment. Exceedances within this zone were identified on the basis of model data. Model results on a 1 km x 1 km grid resolution provided supplementary information for the assessment in addition to the results from fixed monitoring stations. Fine scale modelling on a 20 m x 20 m grid resolution located around an identified industrial source provided a more detailed local assessment. This exceedance was reported via e-Reporting dataflow G³ on attainment for the compliance assessment in 2021 and Air Pollution in the UK⁴.

Table 1 summarises the spatial extent and associated resident population for the exceedances identified in this zone, as reported via e-Reporting.

¹ [The Air Quality Standards Regulations 2010 \(legislation.gov.uk\)](https://www.legislation.gov.uk)

² <https://uk-air.defra.gov.uk/library/bap-nickel-measures>

³ <https://uk-air.defra.gov.uk/data/compliance-xml-files>

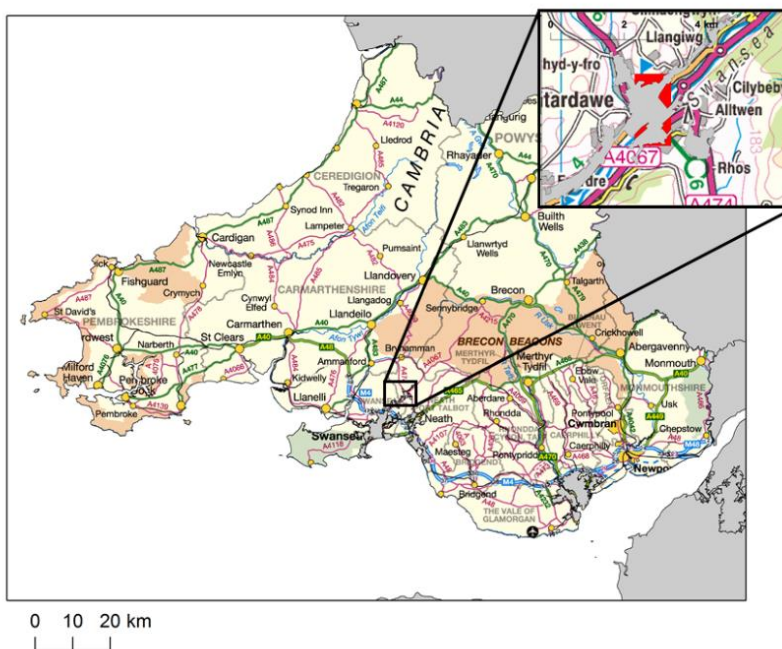
⁴ <https://uk-air.defra.gov.uk/library/annualreport/index>

Table 1. Area exceeding Ni target value in 2021 and associated resident population for exceeding areas within South Wales non-agglomeration zone UK0041

Zone code	Zone Name	Area exceeding TV (km ²)	Population exceeding TV
UK0041	South Wales	1	1,844

Figure 1 shows the locations of the exceedances in the context of the zone.

Figure 1. Location of exceedance of the Ni target value during 2021 in South Wales non-agglomeration zone UK0041. Areas of the zone in exceeding grid squares are marked red.



An initial source apportionment was carried out and this analysis identified one exceedance situation within this zone related to industrial emissions:

- South Wales [Ni_UK0041_2021_1] related to industrial emissions (area of exceedance: 1 km²)

This report describes the exceedance situation in the zone. The sections below provide a description of the exceedance situation, including maps, information on source apportionment and a list of measures already taken or to be taken. This exceedance situation is adjacent to and shares common sources with the exceedance situation Ni_UK0027_2021_1 and, where appropriate, this document refers to the content of the Report on measures for 2021 exceedance of the TV for Ni in Swansea Urban Area agglomeration zone (UK0027), henceforth referred to as the report on measures for Swansea UK0027.

2 Exceedance situation South Wales [Ni_UK0041_2021_1] related to industrial emissions

2.1 Description of exceedance

This exceedance situation has an area of exceedance of 1 km² and is located in the Swansea valley within the South Wales non-agglomeration zone. The resident population associated with this exceedance situation is 1,844. This exceedance situation is adjacent to and shares common sources with the exceedance situation for Swansea [Ni_UK0027_2021_1].

Table 2 lists measured annual mean concentrations of Ni from the monitoring site in South Wales non-agglomeration zone from 2004 to 2022. There is one monitoring station in the South Wales non-agglomeration zone, Cwmystwyth (GB08544A) located towards the north of the zone (277138, 274242) approximately 70 km from the modelled exceedance situation for South Wales [Ni_UK0041_2021_1]. No exceedance of the Ni TV was measured at this monitoring site in 2021 or in previous years.

The exceedance situation for South Wales [Ni_UK0041_2021_1] is located adjacent to Swansea Urban Area agglomeration zone. The report on measures for UK0027, Section 2.1, presents measured annual mean concentrations of Ni from monitoring sites in Swansea Urban Area agglomerations zone. These sites are located closer to the exceedance situation than the Cwmystwyth site in the South Wales zone. There is one measured exceedance at Pontardawe Tawe Terrace (GB1016A) in 2021. Figure 2 shows the location of the exceedance situation in detail. This map also shows the locations of the monitoring sites in the vicinity of the exceedance situation and the locations of local industrial sources. The map shows that Pontardawe Tawe Terrace is located within the adjacent exceedance situation for Swansea [Ni_UK0027_2021_1]. The measured concentrations of Ni at other national monitoring sites within the Swansea Urban Area agglomeration zone were all below the TV in 2021.

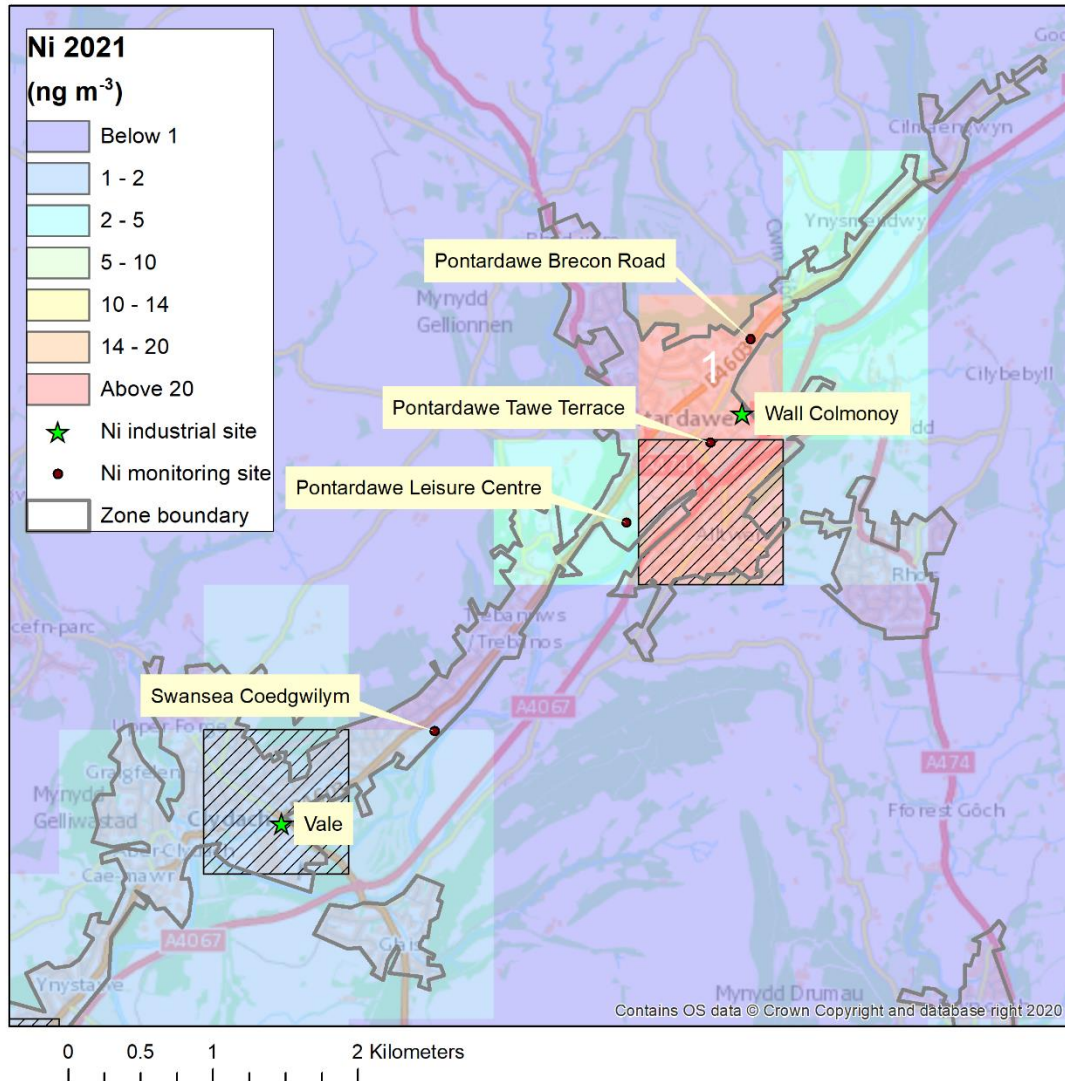
Figure 2 shows the high-resolution zone boundary used to assign the locations of monitoring sites in grey and the zone boundaries for the 1 km grid used to assign exceedance situations and associated populations as black hatching. The local topography and locations of settlements results in the Swansea Urban Area Agglomeration zone extending up the Swansea Valley but only the larger urban areas are assigned to the agglomeration zone within the 1 km gridded data.

Detailed dispersion modelling has been undertaken for the area in Swansea Urban Area where exceedances of the annual mean TV have been measured. This includes detailed modelling of Ni emissions from the Wall Colmonoy site, an industrial source located close to the Pontardawe Tawe Terrace monitoring site (see Figure 2). The Wall Colmonoy site is located close to the boundary of the Swansea Urban Area agglomeration zone and the South Wales zone and therefore the modelled exceedance area extends into both zones. The modelling has been used to assess the likely spatial scale of the exceedance. The conclusions from this dispersion modelling study were that it is likely there was an exceedance of Ni TV in both the South Wales and Swansea Urban Area zones in 2021 and this exceedance was likely to have extended over a spatial area of relevance to the regulation (at least 250 m x 250 m for industrial locations). The assessed exceedance of the TV in the South Wales zone based on modelling is less certain than the assessed exceedance of the TV in the Swansea Urban area zone, which is assessed based on measurements, for the reasons discussed in Appendix 1 of the report on measures for [Swansea UK0027](#).

Table 2. Measured annual mean Ni concentrations in South Wales non-agglomeration zone UK0041 from 2004 to 2022 (ngm⁻³). (Percentage data capture is shown in brackets).

Station (Eol code)	Zone	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Cwmystwyth (GB0854A)	UK0041			0.56 (100)	0.31 (89)	0.46 (87)	0.46 (2)	0.49 (72)	0.39 (89)	0.33 (48)	0.37 (80)	0.48 (98)	0.56 (100)	0.42 (100)	0.38 (96)	0.39 (100)	0.32 (100)	0.20 (100)	0.20 (100)	0.30 (99)

Figure 2. Exceedance situation South Wales [Ni_UK0041_2021_1]. Exceeding grid squares are marked red. Locations of local industrial sites Wall Colmonoy works at Pontardawe and Vale Europe Ltd Clydach refinery and the locations of local monitoring stations are also shown. Hatched grid squares are assigned to Swansea Urban Area agglomeration zone UK0027 and do not form part of this exceedance situation.



2.2 Source apportionment

Modelling has been used to determine the annual mean Ni source apportionment for the exceedance situation. National modelling on a 1 km x 1 km grid resolution apportions the Ni concentration to background sources. Additional fine scale modelling has also been carried out to characterise the impact of local industrial emissions for the Wall Colmonoy site located in the vicinity of the exceedance situation, this is described in Appendix 1 of the report on measures for Swansea UK0027.

Table 3 provides a breakdown of the main emission sources (source apportionment) that have contributed to the grid square in this exceedance situation. It is clear that industrial sources are the main source associated with this exceedance situation. The penultimate column in the table is the total from all emissions sources. The values in this column have been rounded to integers for consistency with the values in the compliance assessment. The values in the other columns have not been rounded. The other shaded columns are the subtotals for the regional, urban background and local contributions.

Table 4 gives a more detailed source apportionment for the industry sector and shows that the main source associated with this exceedance situation are industrial emissions attributed to stack emissions from Wall Colmonoy. The emissions from Wall Colmonoy are regulated by the Neath Port Talbot County Borough Council and measures undertaken (see Section 2.3) describe how these stack emissions have changed recently.

In previous years, the Welsh Government have commissioned supplementary monitoring studies to improve the confidence in the source apportionment and identification of the predominant Ni sources. The sampling frequency at the Pontardawe Tawe Terrace measurement site was increased from weekly to daily sampling between August 2015 and February 2016. A subsequent study by King's College London measured the concentration of Nickel and other metals at hourly time resolution during November and December 2015. Both assessments looked at the relationship between local meteorological data, the levels of Ni compared with other metals and industrial activity to help identify Ni sources. Both studies indicated that Wall Colmonoy was a significant source of Ni at the Tawe Terrace monitoring station, although acknowledged that other sources were present. Details of both studies were provided in Appendix A1.2 of the 2015 Report on Measures for Swansea Urban Area.⁵

⁵https://uk-air.defra.gov.uk/assets/documents/reports/bap-nickel-measures/ni_swansea_UK0027_reportonmeasures_2015.pdf

Table 3. Source apportionment for exceedance situation Ni_UK0041_2021_1. Annual mean Ni concentration (ngm⁻³).

OS easting (m)	OS Northing (m)	Zone	Regional background: Total	Regional background: From within Member State	Urban background increment: Total	Urban background increment: Traffic	Urban background increment: Industry including heat and power production	Urban background increment: commercial and residential	Urban background increment: Shipping	Urban background increment: Off road mobile machinery	Urban background increment: Other	Local increment: Total	Local increment: Industry including heat and power production	Total for all emission sources	Resident population
272500	204500	41	0.46	0.46	0.57	0.05	0.12	0.35	0.00	0.04	0.00	26.45	26.45	27	1844

Table 4. Detailed source apportionment for industrial sources only for exceedance situation Ni_UK0041_2021_1. Annual mean Ni concentration (ngm⁻³)

OS easting (m)	OS Northing (m)	Grid square number	Zone	Wall Colmonoy stack emissions	Local increment: Industry including heat and power production	Total for all emission sources
272500	204500	1	41	26.45	26.45	27

2.3 Measures

Improving air quality is a high priority for the Welsh Government. The Clean Air Plan for Wales, published in August 2020, sets out the ambition to deliver compliance with the Target Value as soon as practicable. The Welsh Government brings together the regulators and local industrial operators with emissions of Ni to air through a ‘Nickel in the Air’ group in pursuit of this aim. Regular meetings have enabled: the Welsh Government to communicate to the industrial regulators and operators the extent of the issue and the seriousness with which it is taken; the regulators to demonstrate that the operators are applying all cost-effective measures, and in particular are applying best available techniques as required by The Environmental Permitting Regulations (England & Wales) aim to prevent or minimise pollution by placing stringent limits on emissions from industrial sources. the operators to cooperate and share best practice in managing their operations; and the development of the latest evidence in understanding the predominant sources.

The exceedance situation South Wales [Ni_UK0041_2021_1] shares common industrial sources with Swansea [Ni_UK0027_2021_1] and these sources are located in Swansea Urban Area agglomeration zone (UK0027). Measures to reduce Ni concentrations in air in the exceedance situation South Wales [Ni_UK0041_2021_1] target the identified common industrial sources. No additional sources of Ni have been identified for the exceedance situation in South Wales [Ni_UK0041_2021_1].

The Report on Measures for Swansea [UK0027, Section 2.3] details measures that have been taken and are to be taken at the Wall Colmonoy and Vale industrial sites. The regulator for the Vale site, Natural Resources Wales, has assessed that the has assessed the techniques and technologies adopted by the operators as a

requirement of their environmental permit constitute agreed and published Best Available Techniques (BAT) for reducing pollution.

The reported stack emissions for the Wall Colmonoy site decreased in 2021 compared to 2020. The measured annual mean concentrations of Ni at Pontardawe Tawe Terrace decreased between 2020 and 2021.