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Energy & Environment

Analysis of Existing Air Quality Monitoring Stations in the National Ambient Air Quality Network

Analysis of existing air quality monitoring stations in the national ambient air quality monitoring network, compilation and reporting of metadata

Report for Environmental Protection Agency, Ireland

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Executive summary

Ricardo Energy & Environment were commissioned by the Environmental Protection Agency to carry out an assessment of the National Ambient Air Quality Network with regard to metadata requirements specified in the Air Quality Directive (2008/50/EC) and the Implementing Provisions for Reporting (IPR) guidance documents. During October 2016 and October 2017 Ricardo Energy & Environment carried out field surveys of the air quality network to collect the following information:

- Location of sampling inlet(s)
- Site altitude
- Monitoring area classification
- Monitoring site classification
- Building height
- Sample inlet height
- Assessment of local dispersion situation
- Building distance
- Kerb distance
- Relevant emissions
- Predominant emissions
- An analysis of the spatial representativeness of locations based on current site classification
- Assess suitability of air quality instrumentation, *including inlets*, as per EN methods specified in the EU air quality Directives (2004/107/EC, 2008/50/EC and the amendments contained within 2015/1480)
- Instrument type, make, model

During each site visit a site specific hazard check list was completed to determine the physical status and report on observed hazards, if present.

Thirty-three monitoring stations in total were visited and a site specific report for each has been produced. Two field surveys were conducted – the first conducted in October 2016 and the second October 2017. The second field survey involved revisiting two stations, Dublin Winetavern Street and Limerick Shannon Estuary and two additional visits to stations at Dublin Ringsend and Galway Ragoon Road.

This report summarises the information collected at each monitoring station and includes a commentary on the networks compliance with Directive requirements. From the field surveys, it was not possible to assess monitoring requirements in relation to the 4th Daughter Directive (2004/107/EC) but subsequently we have been informed that these were carried out in accordance with European Standard Methods. However, it was not possible to determine to what extent PM_{2.5} was speciated for elemental carbon and organic carbon or major ions.

After the first field survey it was found that the majority of stations were compliant with the requirements of the Air Quality Directive. However, there were two that were not – these are the Cork South Link Road Landfill because it was within 25 m of a major junction; and the gaseous pollutants sampled at Dublin Rathmines Wynnefield Road because the inlets were sampling within a void between two buildings.

A revisit of the stations at Dublin Winetavern Street and Limerick Shannon Estuary showed that the former station is too close to a major junction and does not meet siting criteria for a traffic station (it is within 25 m of a major junction), while the latter was classified as a background location.

Of the two new stations, Dublin Ringsend and Galway Ragoon Road both are traffic type stations. However, the proposed site at Galway Ragoon Road is adjacent to a bus stop and may not meet the siting criteria required for traffic stations (traffic stations are required to be representative of a 100m section of road).

It is recommended that a monitoring regime assessment (MRA) is carried out to determine the minimum number of monitoring stations required for each pollutant under the requirements of the Air Quality Directive and 4th Daughter Directives.

From the safety survey, it was observed that many safety features are not observed at the monitoring locations. These include a lack of ladder restraints, rail guards, safety goggles when working with compressed gas, first aid kits and signage that hazards are present.

It is recommended that these safety features are implemented as soon as possible.

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1 Introduction

Ricardo Energy & Environment were commissioned by the Environmental Protection Agency to carry out an assessment of the National Ambient Air Quality Network with regard the metadata requirements specified in the Air Quality Directive (2008/50/EC), the 4th Daughter Directive (2004/107/EC) and the Implementing Provisions for Reporting (IPR) guidance documents.

Thirty three stations were visited during two field campaigns – the vast majority of these (thirty one) were conducted during October 2016. The thirty-one stations visited during the original campaign are listed in Table 1-1. During the second field survey in October 2017 two potential new sites were inspected. During the second field survey the stations at Dublin Winetavern Street and Limerick Shannon Estuary were revisited to confirm the original findings.

Table 1-1 List of air quality monitoring stations in National Ambient Air Quality Network.

Code	Station name
101	Clare Ennis Simms Lane
102	Cork Ballinlough Heatherton Park
103	Cork Institute of Technology (CIT)
104	Cork South Link Road Landfill
105	Dublin Ballyfermot Library
106	Dublin Blanchardstown River Road
107	Dublin Clonskeagh Road Richview
108	Dublin Clonskeagh Rosemount
109	Dublin Coleraine Street
110	Dublin Dun Laoghaire The Glen
111	Dublin Finglas Mellowes Road
112	Dublin Inchicore Davitt Road
113	Dublin Marino Brian Road
114	Dublin Phoenix Park Ordnance Survey Road
115	Dublin Rathmines Wynnefield Road
116	Dublin Swords Watery Lane
117	Dublin Tallaght Old Bawn Road
118 ¹	Dublin Winetavern Street
119	Galway City Bodkin Roundabout
120	Galway Mace Head
121	Kerry Valentia Observatory
122	Kilkenny Seville Lodge
123	Laois Emo Court
124	Laois Portlaoise Dublin Road
125 ¹	Limerick Shannon Estuary
126	Longford Town Dublin Road Railway
127	Mayo Castlebar John Moore Road
128	Mayo Claremorris
129	Monaghan Kilkitt Waterworks
130	Wexford Enniscorthy Parnell Road
131	Wicklow Bray Wurzburg Road

The additional sites visited during the second campaign are listed in Table 1-2.

¹ The monitoring stations at Dublin Winetavern Street and Limerick Shannon Estuary were revisited during the October 2017 field survey

Table 1-2 Additional sites visited during second field survey

Code	Station name
132	Dublin Ringsend
133	Galway Ragoon Road

The following information was collected during the field survey of the air quality network:

- Location of sampling inlet(s) and geometry with co-ordinates in decimal format
- Site altitude
- Monitoring area classification (as detailed in EU air quality directives and IPR guidance documents)
- Monitoring site classification (as detailed in EU air quality directives and IPR guidance documents)
- Building height (as detailed in IPR guidance documents)
- Sample inlet height (as detailed in IPR guidance documents)
- Assessment of local dispersion situation (as detailed in IPR guidance documents)
- Building distance (as detailed in IPR guidance documents)
- Kerb distance (as detailed in IPR guidance documents)
- Relevant emissions (as detailed in IPR guidance documents)
- Predominant emissions (as detailed in IPR guidance documents)
- An analysis of the spatial representativeness of locations based on current site classification
- Assess suitability of air quality instrumentation, *including inlets*, as per EN methods specified in the EU air quality Directives (2004/107/EC, 2008/50/EC and the amendments contained within 2015/1480)
- Instrument type, make, model

During each site visits a site specific hazard check list was completed to determine the physical status and report on the observed hazards.

Altogether thirty-three monitoring stations were visited and a site specific report produced for each.

This report summarises the information observed in each case and will include commentary on the networks compliance with Directive requirements and gaps identified during the survey.

2 Compliance with requirements of EU Directives

The process of assessing compliance of the monitoring network with the requirements of the Air Quality Directive (2008/50/EC) and the Commission Directive (2015/1480) amending annexes to the AQD and the 4th Daughter Directive (2004/107/EC) relied on various sources of information. These included:

- Descriptions of the macro and micro siting criteria provided in Sections B and C of Annex III (for SO₂, NO₂, PM_{2.5}, PM₁₀, CO, benzene and ozone) and Commission Directive (2015/1480). These are presented in Appendix 1.
- The IPR guidance documents (IPR Guidance 1 and IPR Guidance 2)
- Assessment and photographs taken by field team during visit to site.
- Google Earth Maps.

During the field trips we were unable to assess compliance for pollutants measured as part of the 4th Daughter Directive but have since been informed that all sampling methods for the 4th DD pollutants are carried out using European Standard Methods. These are listed in Table 2-1

Table 2-1 Sampling methods used to collect samples for 4th Daughter Directive pollutants

Site	Sampling Method	PM10		Deposition	
		Metals	PAH	Metals	PAH
Rathmines, Dublin	EN12341	✓	✓		
Winetavern St., Dublin	EN12341	✓	✓		
Heatherton Park, Cork	EN12341	✓	✓		
Kilkitt, Monaghan	EN12341	✓	✓		
Bodkin Road, Galway*	EN12341	✓	✓		
Rosemount (UCD), Dublin	EN 15841			✓	
Shannon Estuary, Limerick	EN 15841			✓	
Valentia, Kerry	EN 15841			✓	
Rosemount (UCD), Dublin	EN 15980				✓
Shannon Estuary, Limerick	EN 15980				✓

* Site not operational

2.1 Metadata collected

Most of the required information was collected during the site visit. However, there were some metadata elements for which this was not possible. These are indicated by '*NA from site visit*' in Table 2-2.

Table 2-2 Metadata elements and how their status is considered by the IPR guidance document.

Metadata element	Element code within IPR Guidance ²	Status of required metadata	How obtained?
Pollutant	D.4.4	Mandatory	From site visit
Longitude	D.5.2.7.1	Mandatory	From site visit
Latitude	D.5.2.7.2	Mandatory	From site visit
Altitude	D.5.2.7.3	Mandatory	From site visit
Area classification	D.5.2.10	Mandatory	From site visit
Station classification	D.5.1.5.1	Mandatory	From site visit
Building height, m	D.5.2.11.7	Conditional, mandatory for traffic stations	From site visit
Inlet height	D.5.1.7.1.2	Mandatory	From site visit
Assessment of local dispersion condition	D.5.2.11.1	Voluntary	NA from site visit
Distance to nearest building, m	D.5.1.7.1.3	Conditional, mandatory for traffic stations	From site visit
Distance from kerb	D.5.1.7.1.4	Conditional, mandatory for traffic stations	From site visit
Relevant Emissions	D.5.1.5.2	Conditional, mandatory if available	NA from site visit
Predominate emissions	D.5.1.5	Conditional, mandatory if available	NA from site visit
Analysis of spatial representativeness	D.5.1.7.2.2	Conditional, mandatory if available	NA from site visit
Instrument	D.5.1.6.3.3.1 or D.5.1.6.3.5.1	Conditional, mandatory if available	From site visit

² http://ec.europa.eu/environment/air/quality/legislation/pdf/IPR_guidance2.pdf

2.2 Station metadata

Table 2-3 presents the station metadata for the thirty three monitoring stations visited by the field team. It should be noted that the stations at Galway City Bodkin Roundabout³ and Limerick Shannon Estuary are currently awaiting relocation⁴. Five of the stations are mobile:

- Laois Portlaoise Dublin Road (mobile monitoring site)
- Longford Town Dublin Road Railway (mobile monitoring site)
- Mayo Claremorris (mobile monitoring site)
- Wexford Enniscorthy Parnell Road (mobile monitoring site)
- Dublin Ringsend (mobile monitoring site)

Based on guidance provided as part of Annex III of the Air Quality Directive, five of the stations in operation are considered traffic stations (Cork South Link Road Landfill, Dublin Inchicore Davitt Road, Dublin Tallaght Old Bawn Road, Longford Town Dublin Road Railway and Dublin Ringsend).

There was one traffic station (Dublin Ringsend) compliant for measuring the pollutant most relevant for traffic, nitrogen dioxide

The assessment of the stations in terms of compliance against the Directive requirements will be discussed in Section 2.4.

³ Galway Ragoon Road is a candidate station to replace that at Galway City Bodkin Roundabout

⁴ The station at Limerick Estuary is awaiting replacement to a nearby representative background location

Table 2-3 Station metadata within National Ambient Air Quality Network

Station in red font are currently closed and awaiting relocation

Code	Station names	Pollutants	Latitude	Longitude	Altitude	Area	Station type
101	Clare Ennis Simms Lane	PM ₁₀ , PM _{2.5} , SO ₂	52.8430528	-8.9888194	13	Urban	Background
102	Cork Ballinlough Heatherton Park	PM ₁₀ , PM _{2.5}	51.8818361	-8.4571333	4	Suburban	Background
103	Cork Institute of Technology (CIT)	CO, NO ₂ , O ₃ , SO ₂	51.8840917	-8.5330444	21	Suburban	Background
104	Cork South Link Road Landfill	CO, NO ₂ , PM ₁₀ , PM _{2.5} , O ₃ , SO ₂	51.8786194	-8.4650222	12	Suburban	Traffic
105	Dublin Ballyfermot Library	NO ₂ , PM ₁₀	53.340345	-6.352462	43	Suburban	Background
106	Dublin Blanchardstown River Road	NO ₂ , PM ₁₀	53.3856444	-6.3699250	51	Suburban	Background
107	Dublin Clonskeagh Road Richview	O ₃	53.3118500	-6.2352889	28	Suburban	Background
108	Dublin Clonskeagh Rosemount	Metals	53.3061556	-6.2323083	33	Suburban	Background
109	Dublin Coleraine Street	CO, NO ₂ , PM _{2.5} , SO ₂	53.3518361	-6.2730694	14	Urban	Background
110	Dublin Dun Laoghaire The Glen	NO ₂ , PM ₁₀	53.2857556	-6.1318222	28	Suburban	Background
111	Dublin Finglas Mellows Road	PM _{2.5}	53.3902750	-6.3052750	64	Suburban	Background
112	Dublin Inchicore Davitt Road	PM ₁₀	53.3362889	-6.3090056	27	Urban	Traffic
113	Dublin Marino Brian Road	PM ₁₀	53.3680667	-6.2278500	14	Urban	Background
114	Dublin Phoenix Park Ordnance Survey Road	PM ₁₀	53.3644417	-6.3489667	48	Urban	Background
115	Dublin Rathmines Wynnefield Road	PM ₁₀ , NO ₂ , PM ₁₀ , PM _{2.5} , O ₃ , SO ₂	53.3221000	-6.8004750	27	Urban	Background
116	Dublin Swords Watery Lane	NO ₂ , O ₃	53.4631361	-6.2232083	21	Suburban	Background
117	Dublin Tallaght Old Bawn Road	PM ₁₀ , SO ₂	53.2805333	-6.3560444	102	Urban	Traffic
118	Dublin Winetavern Street	CO, NO ₂ , PM ₁₀ , SO ₂	53.3442389	-6.2715250	10	Urban	Background

Code	Station names	Pollutants	Latitude	Longitude	Altitude	Area	Station type
119	Galway City Bodkin Roundabout ⁵	Not measuring	53.2817083	-9.0485944	-9	Suburban	Traffic
120	Galway Mace Head	O ₃	53.3278917	-9.8981944	5	Rural –remote	Background
121	Kerry Valentia Observatory	O ₃	51.9394694	-10.2423833	15	Rural –remote	Background
122	Kilkenny Seville Lodge	Benzene, NO ₂ , O ₃	52.6383194	-7.2675444	68	Suburban	Background
123	Laois Emo Court	NO ₂ , O ₃	53.1077056	-7.1980583	108	Rural –regional	Background
124	Laois Portlaoise Dublin Road (mobile monitoring site)	CO, NO ₂ , PM ₁₀ , SO ₂	53.0361500	-7.2887167	107	Urban	Background
125	Limerick Shannon Estuary	Metal deposition, PAH	52.6390250	-8.9555389	23	Rural –remote	Industrial
125	Limerick Shannon Estuary (revisit)	Proposed new location	52.639890	-8.954338	23	Rural –remote	Background
126	Longford Town Dublin Road Railway (mobile monitoring site)	PM _{2.5}	53.7256417	-7.7914611	32	Suburban	Traffic
127	Mayo Castlebar John Moore Road	NO ₂ , PM ₁₀ , O ₃	53.8509167	-9.3001194	30	Suburban	Background
128	Mayo Claremorris (mobile monitoring site)	PM ₁₀ , PM _{2.5}	53.6865889	-9.0133806	24	Rural –regional	Background
129	Monaghan Kilkitt Waterworks	NO ₂ , PM ₁₀ , O ₃ , SO ₂	54.0725167	-6.8859306	230	Rural –remote	Background
130	Wexford Enniscorthy Parnell Road (mobile monitoring site)	CO, NO ₂ , PM ₁₀ , SO ₂	52.5005139	-6.5702944	26	Suburban	Background
131	Wicklow Bray Wurzburg Road	PM ₁₀ , PM _{2.5} , O ₃	53.1872444	-6.1219667	49	Suburban	Background
132	Dublin Ringsend	NO ₂ and PM ₁₀	53.3418750	-6.2140750	12	Suburban	Traffic
133	Galway Ragoon Road	Not yet commissioned	53.2735630	-9.0860840	7	Suburban	Traffic

⁵ Site at Galway City Bodkin Roundabout has been decommissioned before the October 2016 field survey

2.3 Sampling points

A list of sampling points including inlet heights, distance to kerb, distance to nearest building (for traffic stations only) and sampling instrument (for active sampling methods) or instrument (for automatic methods) is presented in Appendix 2. Most inlet heights are within the prescribed heights of between 1.5 m and 4 m and heights greater than this presumably to avoid vandalism.

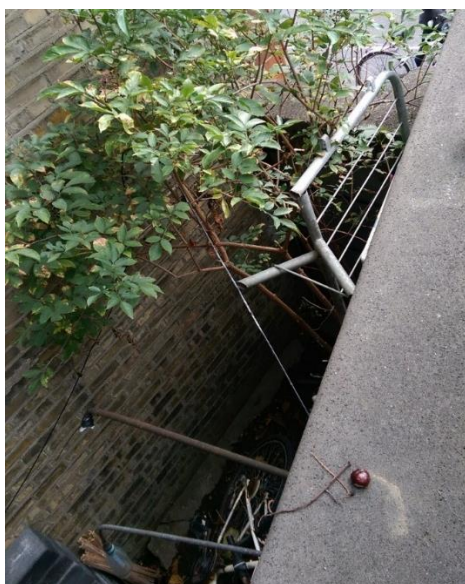
2.4 Assessment of station classifications

Table 2-4 justifies the area classification or source type assigned to each of the sampling points. As discussed in Section 2.2, there was one traffic station (Dublin Ringsend) measuring nitrogen dioxide currently operating within the network. To qualify as a traffic station, it must be within 10 m of the nearest kerb.

There were three stations considered non-compliant due to the micro siting criteria within the Air Quality Directive (Annex III). These were:

- The gaseous sample inlets at Dublin Rathmines Wynnefield Road which were sampling a void (see Figure 2-1). We suggest that the datasets from this station should be treated as not representative of ambient air concentration and should be used with caution
- The station at Cork South Link Road Landfill which is located within 25 m of a major junction⁶.
- The station at Dublin Winetavern Street⁷ which is located within 25 m of a major junction. Figure 2-2 shows the junction box outside the Dublin City Council carpark exit.

Figure 2-1 Gas sampling inlets at Dublin Rathmines Wynnefield Road



⁶ According to the COMMISSION DIRECTIVE (EU) 2015/1480 A 'major junction' is a junction which interrupts the traffic flow and causes different emissions (stop&go) from the rest of the road.

⁷ This site qualifies as an urban background site due to the fact that the sampling points are greater than 10 m from the kerb side. Winetavern Street is an access route to O'Donovan Rossa Bridge across the River Liffey.

Figure 2-2 View northwards along Winetavern Street showing junction box and queuing traffic (photo taken around 11:30 to 12:00 24th October 2017)



We were informed by the local site operator that the traffic station - Dublin Tallaght Old Bawn Road – is considered an industrial station (and this is why it is measuring sulphur dioxide). However, we have assigned it as traffic.

Galway Ragoon Road.

A location at Galway Ragoon Road was visited as a potential station to replace that at Galway City Bodkin Roundabout. The proposed station is to be located adjacent to a bus stop (see Figure 2-3). The macro siting criteria within the Air Quality Directive⁸ requires a traffic station to be located at a road section representative of a 100m road length and this would normally rule out the locations adjacent to bus stops as idling buses might create a pollution hotspot.

Care should be taken when siting the station to ensure it is located away from the trees to the left of the bus stop so that the sampling point remain outside the drip line of the trees for years to come.

⁸ Sampling points shall in general be sited in such a way as to avoid measuring very small micro-environments in their immediate vicinity, which means that a sampling point must be sited in such a way that the air sampled is representative of air quality for a street segment no less than 100 m length at traffic-orientated sites

Figure 2-3 Proposed location of monitoring station at Galway Ragoon Road.



Revisit to Limerick Shannon Estuary

Based on the most recent visit and the likely location where the station would be relocated we would consider the site as a rural-remote background station.

Table 2-4 Assessment of station classifications for thirty one sites in National Ambient Air Quality Network

Station name	Pollutants	Area	Station type	Compliance with Annex III Section B Macroscale	Comments	Compliance with Annex III Section C Microscale	Comments	Compliance with Annex VIII Ozone	Comments	
101	Clare Ennis Simms Lane	PM ₁₀ , PM _{2.5} , SO	Urban	Background	Yes	OK	Yes	Idling vehicles observed	N/A	N/A
102	Cork Ballinlough Heatherton Park	PM ₁₀ , PM _{2.5}	Suburban	Background	yes	Residential/ Closeby major landfill	yes	Large belt of trees nearby	N/A	N/A
103	Cork Institute of Technology (CIT)	CO, NO ₂ , O ₃ , SO ₂	Suburban	Background	yes	Busy college	yes	No smoking signs installed to stop people smoking nearby	Yes	OK
104	Cork South Link Road Landfill	CO, NO ₂ , PM ₁₀ , PM _{2.5} , O ₃ , SO ₂	Suburban	Traffic	yes	OK	No	Within 25 m of junction. Gas inlets very dirty need cleaning as soon as possible.	Yes	OK
105	Dublin Ballyfermot Library	NO ₂ , PM ₁₀	Suburban	Background	Yes	OK	Yes	OK	N/A	N/a
106	Dublin Blanchardstown River Road	NO ₂ , PM ₁₀	Suburban	Background	Yes	OK	yes	The large fence would cause dispersion of pollutants. Distance to N3> 10m	N/A	N/A
107	Dublin Clonskeagh Road Richview Dublin	O ₃	Suburban	Background	yes	OK	yes	OK	yes	OK
108	Dublin Clonskeagh Rosemount	Metals	Suburban	Background	Yes	OK	YES	OK	N/A	N/A
109	Dublin Coleraine Street	CO, NO ₂ , PM _{2.5} , SO ₂	Urban	Background	yes	OK	Yes	Greater than 10 m from kerb (17.3 m). Also, large wall that would cause dispersion of pollutants	N/A	N/a

Station name	Pollutants	Area	Station type	Compliance with Annex III Section B Macroscale	Comments	Compliance with Annex III Section C Microscale	Comments	Compliance with Annex VIII Ozone	Comments	
110	Dublin Dun Laoghaire The Glen	NO ₂ , PM ₁₀	Suburban	Background	Yes	OK	Yes	Sampler in cul de sac. Not continuous flowing traffic	N/A	N/A
111	Dublin Finglas Mellows Road	PM _{2.5}	Suburban	Background	Yes	OK	Yes	Not within 10 of kerb (43 m making it a background site).	N/A	N/A
112	Dublin Inchicore Davitt Road	PM ₁₀	Urban	Traffic	yes	OK	Yes	OK	N/A	N/A
113	Dublin Marino Brian Road	PM ₁₀	Urban	Background	yes	OK	Yes	OK	N/A	N/A
114	Dublin Phoenix Park Ordnance Survey Road	PM ₁₀	Urban	Background	Yes	OK	Yes	OK	N/A	N/A
115	Dublin Rathmines Wynnefield Road	Dublin CC - PM ₁₀ NO ₂ , PM ₁₀ , PM _{2.5} , O ₃ , SO ₂	Urban	Background	No	Gas inlets appear to be sampling microclimate.	No	Flow not unrestricted. Road appears to be a side road.	No	Inlet not in a location with well mixed air
116	Dublin Swords Watery Lane	NO ₂ , O ₃	Suburban	Background	yes	OK	Yes	OK	yes	OK
117	Dublin Tallaght Old Bawn Road	PM ₁₀ , SO ₂	Urban	Traffic	Yes	OK	Yes	But need to check bush stays small. SO ₂ measured as a requirement for industrial	N/A	N/A
118	Dublin Winetavern Street	CO, NO ₂ , PM ₁₀ , SO ₂	Urban	Background	Yes	OK	No	Not within 10 of kerb (17 m making it a background site).	N/A	N/A
119	Galway City Bodkin Roundabout	Not measuring	Suburban	Traffic	Yes	OK	yes	OK	N/A	N/A
120	Galway Mace Head	O ₃	Rural –remote	Background	yes	OK	yes	OK	yes	OK
121	Kerry Valentia Observatory	O ₃	Rural –remote	Background	yes	OK	yes	OK	yes	OK

Station name	Pollutants	Area	Station type	Compliance with Annex III Section B Macroscale	Comments	Compliance with Annex III Section C Microscale	Comments	Compliance with Annex VIII Ozone	Comments	
122	Kilkenny Seville Lodge	Benzene, NO ₂ , O ₃	Suburban	Background	yes	OK	Yes	OK	Yes	OK
123	Laois Emo Court	NO ₂ , O ₃	Rural –regional	Background	yes	OK	yes	OK	Yes	OK
124	Laois Portlaoise Dublin Road (mobile monitoring site)	CO, NO ₂ , PM ₁₀ , SO ₂	Urban	Background	yes	OK	yes	OK	Yes	OK
125	Limerick Shannon Estuary	Metals, SO ₂	Rural –remote	Industrial	yes	Reclassified as remote-rural background		Site awaiting commissioning	N/A	N/A
126	Longford Town Dublin Road Railway	PM _{2.5}	Suburban	Traffic	yes	OK	yes	OK	Yes	OK
127	Mayo Castlebar John Moore Road	NO ₂ , PM ₁₀ , O ₃	Suburban	Background	yes	OK	yes	OK	Yes	OK
128	Mayo Claremorris	PM ₁₀ , PM _{2.5}	Rural –regional	Background	yes	OK	yes	OK	Yes	OK
129	Monaghan Kilkitt Waterworks	NO ₂ , PM ₁₀ , O ₃ , SO ₂	Rural –remote	Background	yes	OK	yes	OK	Yes	OK
130	Wexford Enniscorthy Parnell Road (mobile monitoring site)	CO, NO ₂ , PM ₁₀ , SO ₂	Suburban	Background	yes	OK	yes	OK	Yes	OK
131	Wicklow Bray Wurzburg Road	PM ₁₀ , PM _{2.5} , O ₃	Suburban	Background	yes	OK	yes	OK	Yes	OK
132	Dublin Ringsend	PM ₁₀ , NO ₂ , SO ₂	Suburban	Traffic	yes	OK	yes	OK	Yes	OK
133	Galway Rahoon Road	Planning for NO ₂ and PM ₁₀	Suburban	Traffic	no	Not recommended. Potential for hotspot	yes	OK	Yes	OK

3 Assessment of hazards sheets

3.1 List of hazards considered

A comprehensive assessment of the physical status of each station from a health and safety perspective was carried out using a check list (see Appendix 3 for copy of form used by the field team). Altogether thirty separate hazards were assessed and are listed in Table 3-1.

Table 3-1 Hazards assessed during site visits

Hazards	
1	Is lone working a hazard at this site? (remote location or no other people in vicinity)
2	Are workplace conditions suitable?
3	Is the site working space suitable? (insufficient space for all equipment/staff, etc.)
4	Is there a significant assault or security risk?
5	Are there unsafe storage/structures?
6	Does the site contain hazardous materials?
7	Are there issues moving equipment/ manual handling?
8	Is safe access to PM sampling heads possible?
9	Is there any specific fire/explosion risk?
10	Is electrical installation safe? Please look for exposed or damaged wires, water leaking into electrical equipment, overloaded sockets
11	Is there any significant environmental risk?
12	CO ₂ fire extinguisher installed Y/N
12a	Correct Signage displayed for Fire Extinguisher
12b	Date on Fire Extinguisher
13	First aid kit present and in date? Y/N
13a	Date on the First Aid Kit
14	Ladder present ? Y/N/NA
14a	Ladder in good working order? Y/N/NA
15	Access to the roof safe (ladder restraints/roof barriers installed)? Y/N/NA
16	General tidiness of housing acceptable (No slip/trip hazard, fire hazards)? Y/N
17	PAT labels evident on cables? Y/N
17a	Date on PAT labels closest to today?
17b	PAT labels evident on all analysers? Y/N
17c	Date on PAT labels closest to today?
18	Housing condition acceptable (collapsed floor? roof leaks? external damage? doors/locks)
19	Calibration lines & electrical cables installed safely? Y/N
20	Access to the site unimpeded? Y/N
21	Vegetation suitably kept under control? Y/N
22	A/C operational & cooling sufficiently? Y/N
22a	Is external aircon unit positioned at head height? Y/N
23	Site regulators in good condition? Y/N
23a	Are cylinders properly restrained? Y/N

Hazards	
23b	Is there a zero filter on the zero cylinder?
24	If PM analyser present, note if flat or bevelled plates are fitted or note as NA
25a	Confirm if there are compressed gas signs outside of the housing Y/N
25	Confirm if safety goggles signs present on the inside of the housing Y/N
26	Are there any items of unused equipment (analysers, ZAG, A/C) at site to be removed?
27	Check to make sure all analyser lids are secured properly to the analyser
28	Safety goggles or glasses present on site?

3.2 Review of safety information collected

The safety assessment showed that:

- There were no unsafe storage or structures
- There were no specific fire or explosion risk
- All electrical installations were safe
- There were no significant environment risks

Other hazard categories are listed in prevalence order in Table 3-2. Appendix 4 identifies the individual station assigned to the risk. The most commonly assigned hazards were:

- Safety goggles or first aid kits were not present on site (at twenty nine stations).
- CO₂ fire extinguishers were not installed (at twenty stations).
- Access to roofs using ladders could be a hazard when working alone (seventeen stations). It is recognised that Dublin CC working instruction for servicing stations requires that two people attend so that the ladder can be held when access to roofs is required.
- Issues with signage. For example, need signs to indicate hazards such as compressed gas where located on site

Table 3-2 Most frequently occurring hazards within National Ambient Air Quality Network

Hazard	Number of stations with issues	Hazard listing number
Confirm if safety goggles signs present on the inside of the housing Y/N	28	25
Safety goggles or glasses present on site?	28	28
First aid kit present and in date? Y/N	23	13
CO2 fire extinguisher installed Y/N	19	12
Access to the roof safe (ladder restraints/roof barriers installed)? Y/N/NA	17	15
Confirm if there are compressed gas signs outside of the housing Y/N	16	25a
Ladder present? Y/N/NA	15	14
Is safe access to PM sampling heads possible?	11	8
Is external aircon unit positioned at head height? Y/N	10	22a

Hazard	Number of stations with issues	Hazard listing number
PAT labels evident on cables? Y/N	9	17
PAT labels evident on all analysers? Y/N	9	17b
Ladder in good working order? Y/N/NA	7	14a
Are there issues moving equipment/ manual handling?	5	7
Correct Signage displayed for Fire Extinguisher	5	12a
Date on the First Aid Kit	4	13a
Housing condition acceptable (collapsed floor? roof leaks? external damage?)	4	18
Site regulators in good condition? Y/N	4	23
Date on Fire Extinguisher	3	12b
Is lone working a hazard at this site? (remote location or no other people in	2	1
Is there a significant assault or security risk?	2	4
Does the site contain hazardous materials?	2	6
Access to the site unimpeded? Y/N	2	20
Vegetation suitably kept under control? Y/N	2	21
Are cylinders properly restrained? Y/N	2	23a
General tidiness of housing acceptable (No slip/trip hazard, fire hazards)? Y/N	1	16
A/C operational & cooling sufficiently? Y/N	1	22
Is there a zero filter on the zero cylinder?	1	23b
Are there any items of unused equipment (analysers, ZAG, A/C) at site to be	1	26
Check to make sure all analyser lids are secured properly to the analyser	1	27

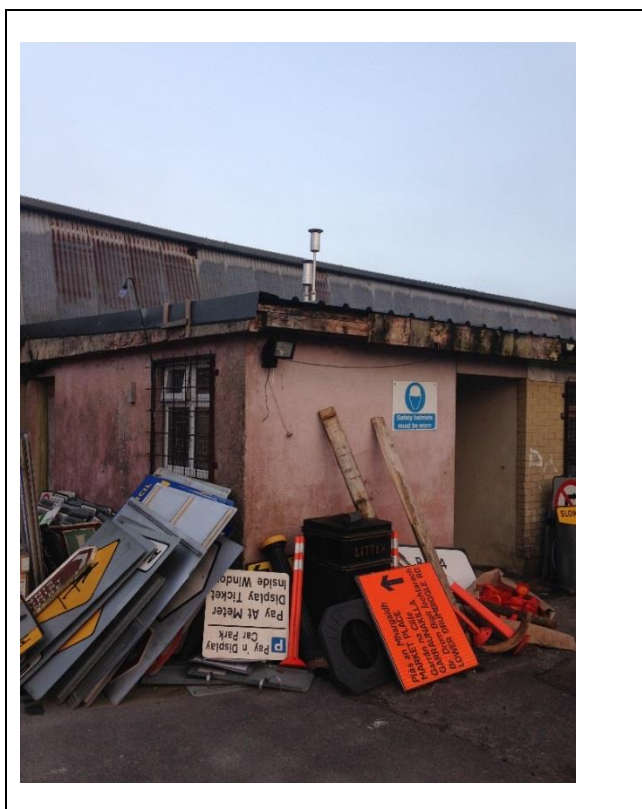
3.3 Site specific issues

While Section 3.2 summarises the number of hazards this section illustrates a number of stations which were of particular concern, the stations and issues are listed in the following sections.

3.3.1 Clare Ennis Simms Lane

The ladder was reported as broken and there was no restraints on roof to allow safe access to the PM sampling heads.

Figure 3-1 No evidence of ladder supports at Clare Ennis Simms Lane



3.3.2 Cork Ballinlough Heatherton Park

Rotting wood holding sampler at Heatherton Park. Brace has slipped at back (see Figure 3-2).

Figure 3-2 Rotting wood supporting brace



3.3.3 Cork South Link Road Landfill

This site was located close to a major junction at the entrance to a landfill site. Parking to access the site was considered dangerous. Figure 3-3 illustrates a number of other issues including: an unrestrained ladder, a rusty site hut (Groundhog) and unsupported calibration gas cylinders.

Figure 3-3 Photographs illustrating safety issues at Cork South Link Road

<p>Unsupported ladder. Spiked metal fencing below</p>	<p>Unsupported ladder.</p>
	
<p>Rusty Groundhog</p> 	<p>Cylinders not restrained</p> 

3.3.4 Dublin Ballyfermot Library

This site had no guard rail or ladder restraints. The roof was flat and there would be a risk of slipping in cold weather. There was no restraint on the calibration gas cylinder, see Figure 3-4.

Figure 3-4 No restraint on cylinder



3.3.5 Dublin Rathmines Wynnefield Road

This site was considered unsafe by field team – particularly in regard to ladder straddling the public pavement and the small surface area of roof which on three sides lead to restricted areas.

Ladder used to gain access to PM inlet



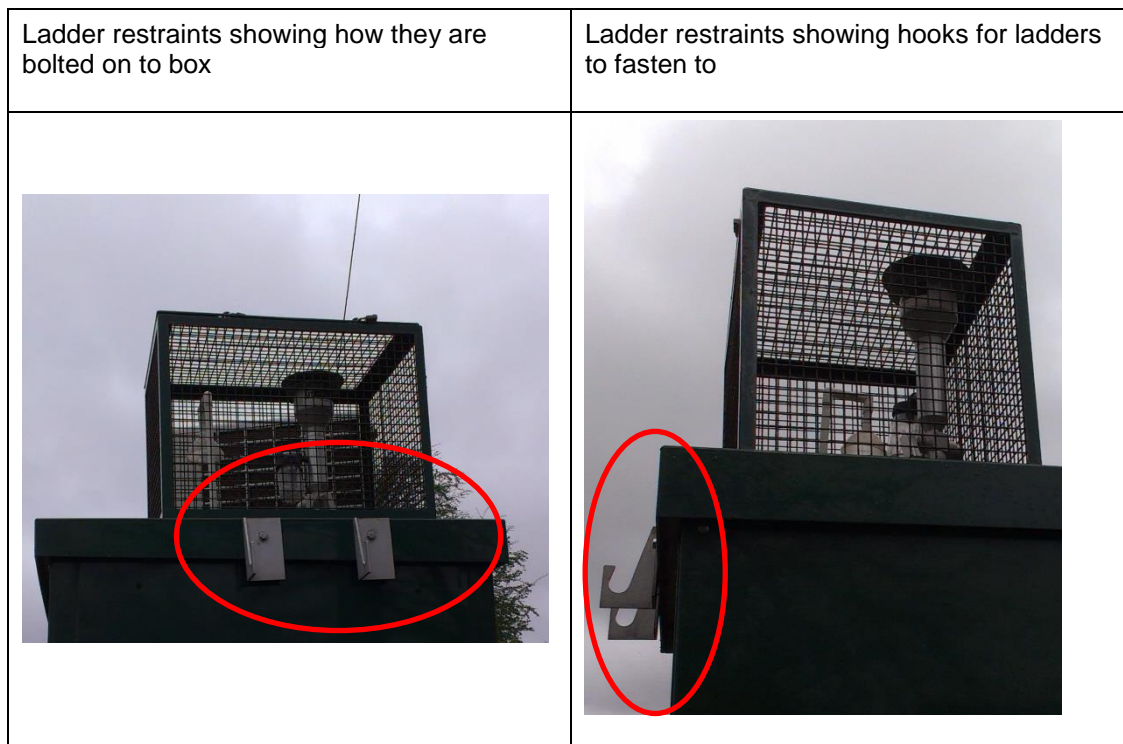
Roof of building used to house monitoring



3.3.6 Recommendation for ladder restraints

We would recommend that all site servicing that requires work at height should have ladder restraints installed. An example is shown in Figure 3-5 for sampling box at Blackpool Marton in Lancashire.

Figure 3-5 Example of ladder restraint being added to sampling box



Appendices

Appendix 1: Macro and micro siting criteria used to inform siting of sampling points

Appendix 2: List of sampling points

Appendix 3: Site Specific Field Hazard Checklist

Appendix 4: Lists of stations with hazard risk assigned

Appendix 1 – Macro and micro siting criteria used to inform site of sampling points

Appendix 2 Macro and micro criteria used to inform siting of sampling points

PART 2: Macroscale and microscale site criteria

<i>Directive requirement</i>	Comment	Compliant?
Health Effects		
<i>Sampling points directed at the protection of human health shall be sited in such a way as to provide data on the following:</i>		
<i>the areas within zones and agglomerations where the highest concentrations occur to which the population is likely to be directly or indirectly exposed to the highest concentrations averaged over a calendar year</i>	There must be relevant population exposure on a timescale appropriate to the averaging period for that pollutant. The site must be in an area where the highest concentrations may be expected, but not influenced by specific sources-see below	
<i>levels in other areas within the zones and agglomerations which are representative of the exposure of the general population,</i>	Sites must be in areas where people spend a significant period of time. Site should not be on a central reservation of a dual carriageway unless population exposure is significant.	
<i>Sampling points shall in general be sited in such a way as to avoid measuring very small micro-environments in their immediate vicinity, which means that a sampling point must be sited in such a way that the air sampled is representative of air quality for</i>	The site must not be influenced by a local source (eg exhaust from combustion source). For traffic oriented sites, the site must not be located close to a major junction.	

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<p><i>a street segment no less than 100 metre length (Pb) or 200 m² (Ni, As and Cd) at traffic-orientated sites and at least 250 x 250 metres at industrial sites, where feasible;</i></p>		
<p><i>Urban background locations shall be located so that their pollution level is influenced by the integrated contribution from all sources upwind of the station. The pollution level should not be dominated by a single source unless such a situation is typical for a larger urban area. Those sampling points shall, as a general rule, be representative for several square kilometres;</i></p>	<p>Sites should be positioned sufficiently far from specific sources to avoid the measured concentrations being unduly influenced by that source. The site should be in a location which is similar in character to the surrounding area (eg residential). Background sites should not be close to busy roads or significant emission sources.</p>	
<p><i>(d) Where the objective is to assess rural background levels, the sampling point shall not be influenced by agglomerations or industrial sites in its vicinity, i.e. sites closer than five kilometres;</i></p>	<p>Rural sites must be several kilometres from any significant source. Any roads nearby must be minor.</p>	
<p><i>(e) Where contributions from industrial sources are to be assessed, at least one sampling point shall be installed downwind of the source in the nearest residential area. Where the background concentration is not known, an additional sampling point shall be situated within the main wind direction;</i></p>	<p>Where possible, a site shall be located in a residential area where any impact of emissions from the industrial activity might reasonably be expected.</p>	

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<p><i>(f) Sampling points shall, where possible, also be representative of similar locations not in their immediate vicinity;</i></p>	<p>Sites should be in areas typical of the surrounding environment, such as topography, land use</p>	
<p><i>(g) Account shall be taken of the need to locate sampling points on islands where that is necessary for the protection of human health.</i></p>	<p>Not likely be relevant in Irish EPA study</p>	
<p><i>Sampling points targeted at the protection of vegetation and natural ecosystems shall be sited more than 20 kilometres away from agglomerations or more than 5 kilometres away from other built-up areas, industrial installations or motorways or major roads with traffic counts of more than 50 000 vehicles per day, which means that a sampling point must be sited in such a way that the air sampled is representative of air quality in a surrounding area of at least 1000 square kilometres. A Member State may provide for a sampling point to be sited at a lesser distance or to be representative of air quality in a less extended area, taking account of geographical conditions or of the opportunities to protect particularly vulnerable areas.</i></p>	<p>Remote and rural sites should not be influenced by emissions from specific sources.</p>	

Microscale Requirements	Revision to criteria updated following Commission Decision 2015/1480 highlighted in blue blocking	
<i>In so far as is practicable, the following shall apply:</i>		
<p><i>'the flow around the inlet sampling probe shall be unrestricted (in general free in an arc of at least 270° or 180° for sampling points at the building line) without any obstructions affecting the airflow in the vicinity of the inlet (normally some metres away from buildings, balconies, trees and other obstacles and at least 0,5 m from the nearest building in the case of sampling points representing air quality at the building line)'</i></p>	<p>The sampling inlet must be open to airflow over 270 degrees. Where sites are close to continuing obstructions eg against building facades, the inlet must be mounted 0.5m away from the surface. This may be difficult in the case of traffic-orientated sites in narrow streets where other siting criteria are otherwise satisfied.</p> <p>The site must not be under the dripline of trees or under balconies</p>	
<p><i>in general, the inlet sampling point shall be between 1,5 m (the breathing zone) and 4 m above the ground. Higher siting may also be appropriate if the station is representative of a large area and any derogations should be fully documented</i></p>	<p>The sampling inlet must not be lower than 1.5m off the ground, but in many cases will be higher to reduce the risk of vandalism or very localised emissions affecting measured concentrations (eg vehicle exhaust)</p>	

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<p><i>the inlet probe shall not be positioned in the immediate vicinity of sources in order to avoid the direct intake of emissions unmixed with ambient air,</i></p>	<p>Locations should be selected to avoid direct sampling of local sources-see above</p>	
<p><i>the sampler's exhaust outlet shall be positioned so that recirculation of exhaust air to the sampler inlet is avoided,</i></p>	<p>Air conditioning units should be as far as possible from the inlet.</p>	
<p><i>for all pollutants, traffic-orientated sampling probes shall be at least 25 metres from the edge of major junctions and no more than 10 metres from the kerbside</i></p> <p><i>A "major junction" to be considered here is a junction which interrupts the traffic flow and causes different emissions (stop&go) from the rest of the road.'</i></p>	<p>Emissions from vehicles at junctions may be higher than at locations where traffic flow is less restricted. Concentrations drop rapidly with distance from the road.</p>	
<p>The following factors should be taken into account when assessing proposed monitoring site suitability, and general compliance with the relevant Air Quality Directive</p>		
<p><i>Interfering sources</i></p>		
<p><i>Security</i></p>		
<p><i>Access</i></p>		

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<i>Availability of electrical power and telephone communications</i>		
<i>Visibility of the site in relation to its surroundings</i>		
<i>Safety of the public and its operators</i>		
<i>The desirability of co-locating sampling points for different pollutants</i>		
<i>Planning requirements</i>		

Appendix 2 – List of sampling points

Station name	Pollutant	Inlet height, m	Distance to nearest building, m	Distance from kerb	Instrument
Clare Ennis Simms Lane	SO2	2.6			API 100E
Clare Ennis Simms Lane	PM10	3			SWAM 5a
Clare Ennis Simms Lane	PM2.5	3			SWAM 5a
Cork Ballinlough Heatherton Park	PM10	2.26			Leckel SEQ47/50
Cork Ballinlough Heatherton Park	PM2.5	2.57			Leckel SEQ47/50
Cork Institute of Technology (CIT)	SO2	2.57			API 100E
Cork Institute of Technology (CIT)	O3	2.57			Api T400
Cork Institute of Technology (CIT)	CO	2.57			API 300E
Cork Institute of Technology (CIT)	NO2	2.57			API 200E
Cork South Link Road Landfill	SO2	3.76		5.8	API 100E
Cork South Link Road Landfill	NO2	3.76		5.8	API 200E
Cork South Link Road Landfill	CO	3.76		5.8	API 300E
Cork South Link Road Landfill	O3	3.76		5.8	Api 400
Cork South Link Road Landfill	PM10	4.17		5.2	Leckel SEQ47/50
Cork South Link Road Landfill	PM2.5	4.1		4.15	BAM 1020
Cork South Link Road Landfill	Benzene, Toulene,	3.76		5.8	Syntec Spectras
Dublin Ballyfermot Library	NO2	2.94			API T200
Dublin Ballyfermot Library	PM10	2.89			Partisol 2025

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Station name	Pollutant	Inlet height, m	Distance to nearest building, m	Distance from kerb	Instrument
Dublin Blanchardstown River Road	PM10	2.01			Leckel SEQ47/50
Dublin Blanchardstown River Road	NO2	2.01			API 200E
Dublin Clonskeagh Road Richview	O3	2.45			Thermo 49i
Dublin Clonskeagh Rosemount	Metals	1.79			White collection bottle
Dublin Clonskeagh Rosemount	Metals	1.70			Brown Glass collection bottle
Dublin Coleraine Street	NO2	3.85			Thermo 42i
Dublin Coleraine Street	SO2	3.85			Thermo 43i
Dublin Coleraine Street	CO	3.85			Api 300
Dublin Coleraine Street	PM2.5	4.54			Leckel SEQ47/50
Dublin Dun Laoghaire The Glen	PM10	2			Leckel SEQ47/50
Dublin Dun Laoghaire The Glen	NO2	1.9			API 200E
Dublin Finglas Mellows Road	PM2.5	3.2			Partisol Plus 2025 (Analyser is a dichot, however Pm10 is not measured/sampled)
Dublin Inchicore Davitt Road	PM10	3.3	1.8	5	Leckel Plus 2025
Dublin Marino Brian Road	PM10	2.49			Partisol 2025
Dublin Phoenix Park Ordnance Survey Road	PM10	4.24			Leckel SEQ47/50
Dublin Rathmines Wynnefield Road	Dublin CC - PM10	3.48			Leckel SEQ47/50
Dublin Rathmines Wynnefield Road	SO2	2.24			API 100E
Dublin Rathmines Wynnefield Road	O3	2.24			API 400E

**Analysis of Existing Air Quality Monitoring Stations in the
National Ambient Air Quality Network**

Station name	Pollutant	Inlet height, m	Distance to nearest building, m	Distance from kerb	Instrument
Dublin Rathmines Wynnefield Road	NO2	2.24			API 200E
Dublin Rathmines Wynnefield Road	PM10	3.77			Teom 1405-df
Dublin Rathmines Wynnefield Road	PM2.5	3.77			Teom 1405-df
Dublin Swords Watery Lane	O3	3			API 400E
Dublin Swords Watery Lane	NO2	3			API T200
Dublin Tallaght Old Bawn Road	PM10	2		4	Leckel SEQ47/50
Dublin Tallaght Old Bawn Road	SO2	2		4	API 100E
Dublin Winetavern Street	CO	4.9			API 300E
Dublin Winetavern Street	SO2	4.9			Thermo 43i
Dublin Winetavern Street	NO2	4.9			API T200
Dublin Winetavern Street	PM10	4.2			Partisol 2025
Galway City Bodkin Roundabout	Not measuring		30	6	
Galway Mace Head	O3	10			Thermo 49i
Kerry Valentia Observatory	O3	1.68			API 400E
Kilkenny Seville Lodge	NO2	1.9			API 200E
Kilkenny Seville Lodge	O3	1.9			API 400E
Kilkenny Seville Lodge	Benzene	1.9			Syntech Spectras GC955
Laois Emo Court	NO2	2.4			API T200
Laois Emo Court	O3	2.4			API 400E

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Station name	Pollutant	Inlet height, m	Distance to nearest building, m	Distance from kerb	Instrument
Laois Portlaoise Dublin Road (mobile monitoring site)	SO2	2.7			API T100
Laois Portlaoise Dublin Road (mobile monitoring site)	NO2	2.7			API T200
Laois Portlaoise Dublin Road (mobile monitoring site)	CO	2.7			API T300
Laois Portlaoise Dublin Road (mobile monitoring site)	PM10	2.7			SWAM 5a
Limerick Shannon Estuary	SO2	2.04			API 100E
Limerick Shannon Estuary	Metals	1.87			White collection bottle
Limerick Shannon Estuary	Metals	1.67			Brown collection bottle
Longford Town Dublin Road Railway	PM2.5	2.9	40	8	SWAM 5a
Mayo Castlebar John Moore Road	O3	2.3			API 400E
Mayo Castlebar John Moore Road	NO2	2.3			API 200E
Mayo Castlebar John Moore Road	PM10	1.6			Leckel
Mayo Claremorris	PM10	2.35			SWAM 5a
Mayo Claremorris	PM2.5	2.3			SWAM 5a
Monaghan Kilkitt Waterworks	NO2	10			API T200
Monaghan Kilkitt Waterworks	SO2	10			API T100
Monaghan Kilkitt Waterworks	O3	10			API 400E
Monaghan Kilkitt Waterworks	PM10	1.3			Leckel.
Wexford Enniscorthy Parnell Road (mobile monitoring site)	NO2	2.84			API 300E
Wexford Enniscorthy Parnell Road (mobile monitoring site)	CO	2.84			API 200E

**Analysis of Existing Air Quality Monitoring Stations in the
National Ambient Air Quality Network**

Station name	Pollutant	Inlet height, m	Distance to nearest building, m	Distance from kerb	Instrument
Wexford Enniscorthy Parnell Road (mobile monitoring site)	SO2	2.84			API 100E
Wexford Enniscorthy Parnell Road (mobile monitoring site)	PM10	3.32			SWAM 5a
Wicklow Bray Wurzburg Road	PM10	2.94			Teom fdms 1400 ^a 8500
Wicklow Bray Wurzburg Road	O3	1.93			Api T400
Wicklow Bray Wurzburg Road	PM2.5	3.1			SWAM 5a
Dublin Ringsend	PM10	3.1	12	5.5	BAM 1020
Dublin Ringsend	NO2	2.7	12	5.5	APIT200
Dublin Ringsend	SO2	2.7	12	5.5	API 100A
Galway Ragoon Road	PM10 and NO2 proposed			5.6	

Appendix 3 – Site Specific Field Hazard Checklist

SITE-SPECIFIC FIELD WORK HAZARD CHECKLIST				
<p>This form should be used by Ricardo Energy&Environment staff each time the site is visited, in order to record any specific hazards at the site. Subsequent staff attending should use this form to familiarise themselves with the hazards before the visit, and take any necessary precautions once there. Where appropriate, the site manager should be informed of specific risks. The project manager and/or the site manager should record any specific actions taken or recommended to minimise the risks identified. The assessment should be reviewed periodically, or where significant changes are made to the site infrastructure. Special attention should be given where other parties (eg general public, or customer's staff) may be affected by our activities at the site.</p> <p>For a detailed risk assessment and safety guidelines for site working, please refer to Procedure SEI/Amb01 - Procedures for off site working. Please make note of any important or unusual hazards at this site in the box below.</p>				
	Site: Please enter		Operator: Please enter	Date of assessment:
	Hazards	Y/N	Comments if necessary	Additional Precautions and Controls
1	Is lone working a hazard at this site? (remote location or no other people in vicinity)			Ensure mobile telephone operative. Always consider if a permit to work or visitor pass is required
2	Are workplace conditions suitable?			Check for adequate lighting, Slip/trip hazard, etc. Is site tidy?
3	Is the site working space suitable? (insufficient space for all equipment/staff, etc)			Wear hard hat if low ceiling. Ensure air conditioning is operational and work with the door open if possible
4	Is there a significant assault or security risk?			Consider if two people are required to carry out the work Consider postponing the audit

**Analysis of Existing Air Quality Monitoring Stations in the
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SITE-SPECIFIC FIELD WORK HAZARD CHECKLIST				
5	Are there unsafe storage/structures?			Do not put yourself under unnecessary risk. Phone for advice
6	Does the site contain hazardous materials?			Add comment if necessary. Consider if materials on site interfere with execution of duties safely. Do not work with materials you have not been trained to use. Familiarise yourself with the potential hazards and read COSHH information. Use PPE if necessary
7	Are there issues moving equipment/ manual handling?			Add comment if necessary. Consider if two people are required to carry out the work. Postpone audit if necessary
8	Is safe access to PM sampling heads possible?			Add comment if necessary. Take care in windy, wet or icy weather, or if visibility is poor. Where possible, minimise requirement to work at height
9	Is there any specific fire/explosion risk?			Identify the location of fire extinguisher. Remove flammable material; familiarise escape route and emergency procedures.
10	Is electrical installation safe? Please look for exposed or damaged wires, water leaking into electrical equipment, overloaded sockets			Please check that all equipment has been PAT tested within the last 12 months. Report non-compliances immediately to the PM. Report electrical safety issues immediately to the PM or Field Team Leader. Do not wait until you return to the office.
11	Is there any significant environmental risk?			Add comment if necessary. Leave work area clean & dispose of waste properly. Prevent release of material to environment.
12	CO ₂ fire extinguisher installed Y/N			Please state what type of extinguisher if it is not CO ₂
12a	Correct Signage displayed for Fire Extinguisher			If unsure please take a photo
12b	Date on Fire Extinguisher			Please enter the date printed on the extinguisher

**Analysis of Existing Air Quality Monitoring Stations in the
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SITE-SPECIFIC FIELD WORK HAZARD CHECKLIST				
13	First aid kit present and in date? Y/N			
13a	Date on the First Aid Kit			Please enter the date printed on the first aid kit
14	Ladder present ? Y/N/NA			
14a	Ladder in good working order? Y/N/NA			If N a comment MUST be entered
15	Access to the roof safe (ladder restraints/roof barriers installed)? Y/N/NA			If N a comment MUST be entered detailing the area of concern including which inlets are effected
16	General tidiness of housing acceptable (No slip/trip hazard, fire hazards)? Y/N			If N a comment MUST be entered detailing the area of concern
17	PAT labels evident on cables? Y/N			If N enter the instruments effected
17a	Date on PAT labels closest to today?			Please enter the date on the PAT label first to expire
17b	PAT labels evident on all analysers? Y/N			List any analysers without PAT labels
17c	Date on PAT labels closest to today?			Please enter the date on the PAT label first to expire
18	Housing condition acceptable (collapsed floor? roof leaks? external damage? doors/locks operation?)			If N marked a comment MUST be entered detailing the area of concern
19	Calibration lines & electrical cables installed safely? Y/N			Comment if necessary
20	Access to the site unimpeded? Y/N			If N a comment MUST be provided detailing the area of concern
21	Vegetation suitably kept under control? Y/N			If N a comment MUST be provided detailing the area of concern. Take a picture

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SITE-SPECIFIC FIELD WORK HAZARD CHECKLIST				
22	A/C operational & cooling sufficiently? Y/N			Comment if necessary
22a	Is external aircon unit positioned at head height? Y/N			Comment if it presents a risk to operators or general public
23	Site regulators in good condition? Y/N			Comment if necessary
23a	Are cylinders properly restrained? Y/N			If N a comment MUST be provided detailing the area of concern, including cylinder size
23b	Is there a zero filter on the zero cylinder?			Comment if necessary
24	If PM analyser present, note if flat or bevelled plates are fitted or note as NA			Describe flat or bevelled top plates
25a	Confirm if there are compressed gas signs outside of the housing Y/N			Comment if necessary
25	Confirm if safety goggles signs present on the inside of the housing Y/N			Comment if necessary
26	Are there any items of unused equipment (analysers, ZAG, A/C) at site to be removed?			Comment if necessary
27	Check to make sure all analyser lids are secured properly to the analyser			Comment if necessary
28	Safety goggles or glasses present on site?			Comment if necessary
	Field Team Member's Comments:			

Appendix 4 – Lists of stations with hazard risk assigned.

Number	Description	Y/N response	List of stations considered as Y/N to hazard risk																	
1	Is lone working a hazard at this site? (remote location or no other people in vicinity)	Yes for the following	115_EPA Dublin Rathmines	117_Dublin Tallaght																
2	Are workplace conditions suitable?	No for the following																		
3	Is the site working space suitable? (insufficient space for all equipment/staff, etc)	No for the following																		
4	Is there a significant assault or security risk?	Yes for the following	115_EPA Dublin Rathmines	117_Dublin Tallaght																
5	Are there unsafe storage/structures?	No for all																		
6	Does the site contain hazardous materials?	Yes for the following	103_Cork Institute of Technology	105_Dublin Ballyfermot																

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Number	Description	Y/N response	List of stations considered as Y/N to hazard risk										
7	Are there issues moving equipment/manual handling?	Yes for the following	104_Cork South Road Landfill	105_Dublin Ballyfermot	108_EPA Dublin Rosemount	112_Dublin Inchicore Davitt Road	117_Dublin Tallaght						
8	Is safe access to PM sampling heads possible?	No for the following	101_Ennis	102_Cork Heatherton Park	104_Cork South Road Landfill	105_Dublin Ballyfermot	112_Dublin Inchicore Davitt Road	114_Dublin Phoenix Park	115_EPA Dublin Rathmines	117_Dublin Tallaght	118_Dublin Winetavern Street	130_Enniscorthy	
9	Is there any specific fire/explosion risk?	None											
10	Is electrical installation safe? Please look for exposed or damaged wires, water leaking into electrical equipment, overloaded sockets	Yes for all											

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Number	Description	Y/N response	List of stations considered as Y/N to hazard risk											
11	Is there any significant environmental risk?	None												
12	CO ₂ fire extinguisher installed Y/N	No for the following	101_Ennis	102_Cork Heatherton Park	104_Cork South Road Landfill	106_Dublin Blanchardstown	107_EPA Dublin Richview	108_EPA Dublin Rosemount	110_Dublin Dun Laoghaire	112_Dublin Inchicore Davitt Road	113_Dublin Marino	114_Dublin Phoenix Park	115_EPA Dublin Rathmines	
12	CO ₂ fire extinguisher installed Y/N	No for the following	117_Dublin Tallaght	123_Emo Court	126_Longford	128_Clairemorris	129_Monahgan Kilkitt	130_Enniscorthy	131_Bray					
12a	Correct Signage displayed for Fire Extinguisher	No for the following	105_Dublin Ballyfermot	106_Dublin Blanchardstown	109_Dublin Coleraine St	115_EPA Dublin Rathmines	116_Swords							
12b	Date on Fire Extinguisher	No for the following	106_Dublin Blanchardstown	115_EPA Dublin Rathmines	124_Portlaoise									
13	First aid kit present and in date? Y/N	No for the following	101_Ennis	102_Cork Heatherton Park	103_Cork Institute of Technology	104_Cork South Road Landfill	105_Dublin Ballyfermot	107_EPA Dublin Richview	108_EPA Dublin Rosemount	112_Dublin Inchicore Davitt Road	113_Dublin Marino	114_Dublin Phoenix Park	115_EPA Dublin Rathmines	
13	First aid kit present and in date? Y/N	No for the following	118_Dublin Winetavern Street	121_Valentia Observatory	122_Kilkenny	123_Emo Court	126_Longford	127_Castlebar	128_Clairemorris	129_Monahgan Kilkitt	130_Enniscorthy	131_Bray		

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13a	Date on the First Aid Kit	Yes for the following	103_Cork Institute of Technology	106_Dublin Blanchardstown	117_Dublin Tallaght	120_Mace Head							
14	Ladder present ? Y/N/NA	Not present for the following	104_Cork South Road Landfill	105_Dublin Ballyfermot	106_Dublin Blanchardstown	108_EPA Dublin Rosemount	110_Dublin Dun Laoghaire	112_Dublin Inchicore Davitt Road	113_Dublin Marino	116_Swords	117_Dublin Tallaght	118_Dublin Winetavern Street	
14	Ladder present ? Y/N/NA	Not present for the following	122_Kilkenny	123_Emo Court	129_Monahgan Kilkitt								
14a	Ladder in good working order? Y/N/NA	Yes for the following	120_Mace Head	124_Portlaoise	126_Longford	127_Castlebar	128_Clairemorris	130_Enniscorthy	131_Bray				
15	Access to the roof safe (ladder restraints/roof barriers installed)? Y/N/NA	No for the following	101_Ennis	102_Cork Heatherston Park	103_Cork Institute of Technology	104_Cork South Road Landfill	105_Dublin Ballyfermot	111_Dublin Finglas Mellows Rd	112_Dublin Inchicore Davitt Road	114_Dublin Phoenix Park	115_EPA Dublin Rathmines	116_Swords	117_Dublin Tallaght
15	Access to the roof safe (ladder restraints/roof barriers installed)? Y/N/NA	No for the following	118_Dublin Winetavern Street	123_Emo Court	126_Longford	127_Castlebar	129_Monahgan Kilkitt	130_Enniscorthy					
16	General tidiness of housing acceptable (No slip/trip hazard, fire hazards)? Y/N	No for the following											

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Number	Description	Y/N response	List of stations considered with Y/N to hazard risk									
17	PAT labels evident on cables? Y/N	No for the following	102_Cork Heatherton Park	103_Cork Institute of Technology	104_Cork South Road Landfill	108_EPA Dublin Rosemount	113_Dublin Marino	126_Longford	128_Clairemorris	130_Enniscorthy		
17a	Date on PAT labels closest to today?	See individual reports										
17b	PAT labels evident on all analysers? Y/N	No for the following	102_Cork Heatherton Park	103_Cork Institute of Technology	104_Cork South Road Landfill	108_EPA Dublin Rosemount	113_Dublin Marino	126_Longford	128_Clairemorris	130_Enniscorthy		
17c	Date on PAT labels closest to today?	See individual reports										
18	Housing condition acceptable (collapsed floor? roof leaks? external damage? doors/locks operation?)	No for the following	102_Cork Heatherton Park	104_Cork South Road Landfill	130_Enniscorthy							
19	Calibration lines & electrical cables installed safely? Y/N	All yes or N/A										
20	Access to the site unimpeded? Y/N	Yes for the following	104_Cork South Road Landfill									

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Number	Description	Y/N response	List of stations considered with Y/N to hazard risk											
21	Vegetation suitably kept under control? Y/N	No for the following	104_Cork South Road Landfill	117_Dublin Tallaght										
22	A/C operational & cooling sufficiently? Y/N	No for the following	129_Monaghan Kilkitt											
22a	Is external aircon unit positioned at head height? Y/N	No for the following	104_Cork South Road Landfill	106_Dublin Blanchardstown	108_EPA Dublin Rosemount	115_EPA Dublin Rathmines	116_Swords	124_Portlaoise	126_Longford	128_Claire morris				
23	Site regulators in good condition? Y/N	No for the following	104_Cork South Road Landfill	110_Dublin Dun Laoghaire	115_EPA Dublin Rathmines	129_Monaghan Kilkitt								
23a	Are cylinders properly restrained? Y/N	No for the following	104_Cork South Road Landfill	105_Dublin Ballyfermot										
23b	Is there a zero filter on the zero cylinder?	Yes for the following	103_Cork Institute of Technology											
24	If PM analyser present, note if flat or bevelled plates are fitted or note as NA	See individual reports												
25a	Confirm if there are compressed gas signs outside of the housing Y/N	No for the following	102_Cork Heatherton Park	103_Cork Institute of Technology	104_Cork South Road Landfill	105_Dublin Ballyfermot	107_EPA Dublin Richview	114_Dublin Phoenix Park	115_EPA Dublin Rathmines	116_Swords				

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Number	Description	Y/N response	List of stations considered with Y/N to hazard risk									
25	Confirm if safety goggles signs present on the inside of the housing Y/N	No for the following	120_Mace Head	121_Valentia Observatory	125_Shannon Estuary	126_Longford	127_Castlebar	128_Clairemorris	129_Monaghan Kilkitt			
			101_Ennis	102_Cork Heatherton Park	104_Cork South Road Landfill	105_Dublin Ballyfermot	106_Dublin Blanchardstown	107_EPA Dublin Richview	108_EPA Dublin Rosemount	109_Dublin Coleraine St		
			112_Dublin Inchicore Davitt Road	114_Dublin Phoenix Park	115_EPA Dublin Rathmines	116_Swords	117_Dublin Tallaght	118_Dublin Winetavern Street	120_Mace Head			
			123_Emo Court	113_Dublin Marino	126_Longford	127_Castlebar	128_Clairemorris	129_Monaghan Kilkitt	130_Enniscorthy			
26	Are there any items of unused equipment (analysers, ZAG, A/C) at site to be removed?	Yes for the following	115_EPA Dublin Rathmines									
27	Check to make sure all analyser lids are secured properly to the analyser	No for the following	104_Cork South Road Landfill									
28	Safety goggles or glasses present on site?	No for the following	101_Ennis	102_Cork Heatherton Park	105_Dublin Ballyfermot	106_Dublin Blanchardstown	107_EPA Dublin Richview	108_EPA Dublin Rosemount	109_Dublin Coleraine St	110_Dublin Dun Laoghaire		

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Number	Description	Y/N response	List of stations considered with Y/N to hazard risk									
			113_Dublin Marino	115_EPA Dublin Rathmines	116_Swords	117_Dublin Tallaght	118_Dublin Winetavern Street	120_Mace Head	121_Valentia Observatory	122_Kilken ny		
			126_Longford	114_Dublin Phoenix Park	127_Castlebar	128_Clairemorris	129_Monahgan Kilkitt	130_Enniscorthy	131_Bray			



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