



PA 05909/17

PROPOSED MIXED USE COMPLEX, MELLIEHA

AIR QUALITY STUDY



Version 1: May 2018



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Quality Assurance

Proposed Mixed Use Complex, Mellieha
Air Quality Study
May 2018

Report for: **Town's End Mellieha Ltd**

Revision Schedule

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AIR QUALITY STUDY

INTRODUCTION

1. This study addresses the potential impacts of air emissions from the operational aspects of a proposed mixed use complex in Mellieha. The development is hereinafter referred to as 'the Scheme'.
2. The Scheme entitled '*Proposed construction of mixed use complex, comprising a Class 3B Hotel including amenities, Class 4B retail shops, 120 no. residential units with underlying basements for vehicle garaging*' is the subject of development application number PA 05909/17. The location of the Scheme site is shown in **Figure 1**.
3. The project is proposed by Town's End Mellieha Ltd, hereinafter referred to as 'the Applicant'.
4. The key issue for the assessment is:

Key Issue:

- **Effects of air emissions arising from operation of the Scheme on sensitive receptors**

Objectives of the Assessment

5. The objectives of the air quality study are to:
 - Quantify the expected air emissions from traffic resulting from operation of the Scheme, and assess their impact on air quality; and
 - Propose mitigation measures to reduce the impact, if any, of traffic emissions resulting from operation of the Scheme.
6. The air quality assessment focuses on the potential impacts on air quality as a result of vehicular traffic arising from the operation of the Scheme. Construction road traffic has been scoped out of this assessment since the Traffic Impact Assessment (TIA) indicates that the daily threshold of 200 heavy vehicle movements¹ will not be exceeded (28 daily trips during site clearance and excavation are estimated).

¹ Design Manual for Roads and Bridges (2007): Volume 11 Section 3.

Figure 1: Location of the Scheme site



Legislation and Guidance

7. Guidance on air quality related to traffic emissions in the Maltese context is available in the following national legislation:
 - **Legal Notice 478 of 2010: Ambient Air Quality Regulations**, as amended (S.L.549.59).
8. For PM₁₀, the legislation sets an annual limit value of 40 µg/m³, and a daily limit value of 50 µg/m³ not to be exceeded more than 35 times in a calendar year.
9. The annual mean limit for NO₂ is 40 µg/m³, whereas maximum hourly concentrations of NO₂ must not exceed 200 µg/m³ – this value cannot be exceeded more than 18 times annually.

ASSESSMENT METHODOLOGY

Terms of Reference

10. The Environment and Resources Authority (ERA) provided Terms of Reference (ToR) on air quality assessment; these are included as part of **Appendix I**.

Method Statement

11. A method statement was submitted to ERA in February 2018 and accepted by ERA; a copy is included in **Appendix I**.

Traffic Data

12. The traffic data used in this assessment was derived from a Traffic Impact Assessment (TIA) for the Scheme prepared by Adi Associates Environmental Consultants Ltd²; additional traffic readings (from additional roads) were also taken in March 2018.
13. The traffic figures used in this assessment are shown in **Table I**; the corresponding roads are labelled in **Figure 2**.

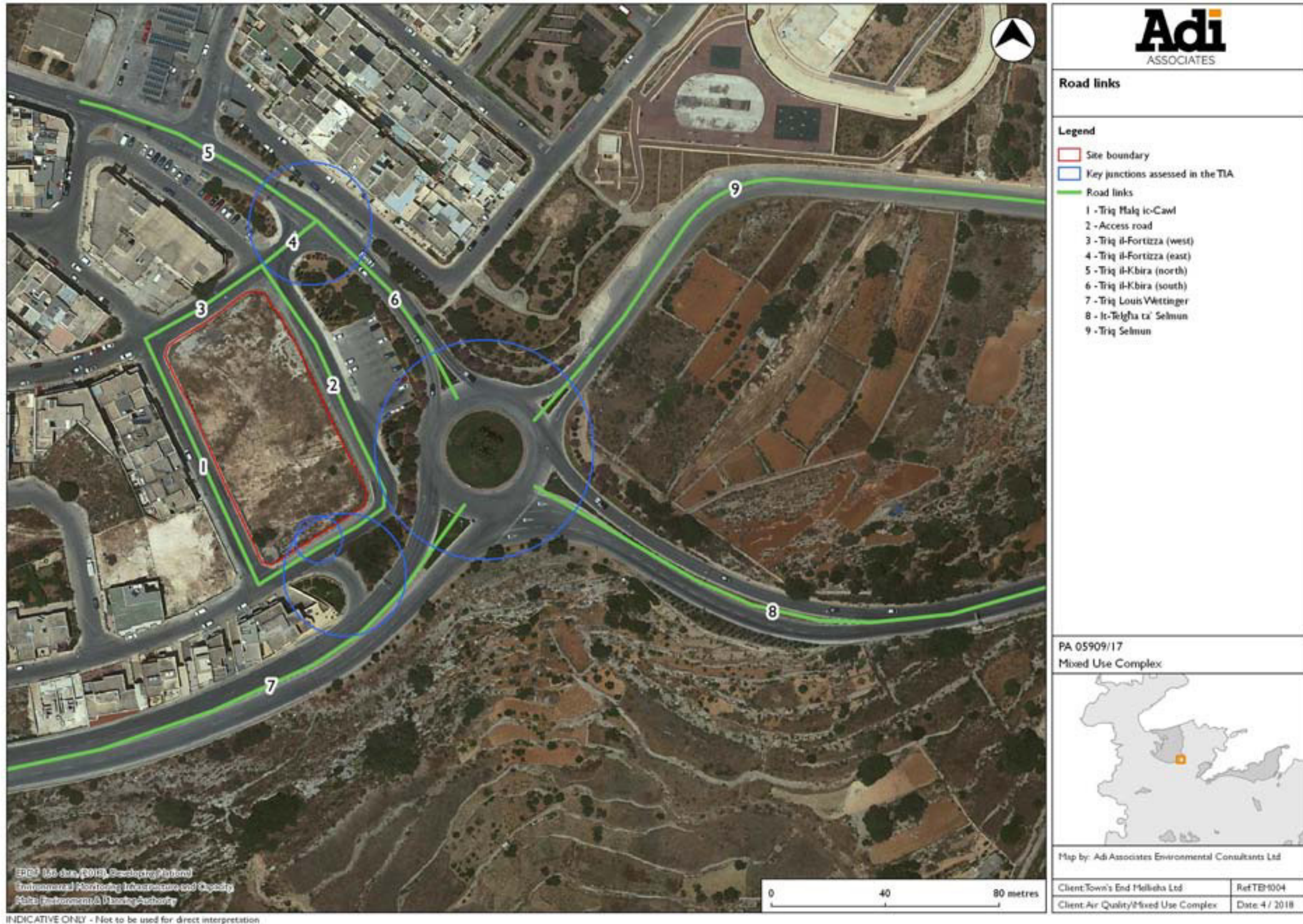
² Adi Associates Environmental Consultants Ltd, 2017. PA 05909/17: *Mixed Use Complex, Il-Mellieħa. Transport Impact Assessment*. San Ġwann, December 2017; viii + 54 pp. + 14 Appendices.

Table I: Predicted traffic growth

Ref.	Road link (Figure 2)	Current (2018) AADT ³	AADT (Base year) 2020		AADT (Base year + 5 years) 2025		% Heavy vehicles	Average vehicle speed (km/h)
			Scenario 1: Baseline	Scenario 2: Baseline plus Scheme	Scenario 1: Baseline	Scenario 2: Baseline plus Scheme		
1	Triq Halq ic-Cawl	815	840	1,510	883	1,553	4%	25
2	Access road	207	213	883	224	894	4%	25
3	Triq il-Fortizza (west-bound)	2,319	2,389	3,059	2,511	3,181	4%	25
4	Triq il-Fortizza (east-bound)	2,651	2,947	4,287	3,086	4,426	4%	25
5	Triq il-Kbira (north-bound)	9,874	10,238	10,888	10,757	11,407	12%	35
6	Triq il-Kbira (south-bound)	10,094	10,551	11,241	11,082	11,772	12%	35
7	Triq Louis Wettinger	9,870	10,169	10,169	10,688	10,688	8%	60
8	It-Telgha ta' Selmun	16,196	16,838	17,528	17,689	18,379	8%	50
9	Triq Selmun	690	711	711	747	747	4%	35

³ Annual average daily traffic.

Figure 2: Road links considered in this study



14. Two traffic scenarios were considered for the years 2020 (base year) and 2025 (base year plus five years), namely the baseline scenario (Scenario 1), and the baseline plus the traffic generated as a result of the Scheme (Scenario 2).
15. The baseline scenario (Scenario 1) excludes the Scheme but includes the traffic growth predicted as a result of other approved projects in the area. The only major development affecting the roads considered in the TIA is for the adjacent Belleview site, which is permitted by PA/02116/13: *To demolish existing premises, to construct underground parking spaces, supermarket on three floors (including Stores), proposed cafeteria [class 6] at ground floor, 18 apartments at first and second floor, 5 penthouse, proposed sign and proposed LPG bulk storage*⁴. The traffic generated by this approved development is already considered in the TIA, and will be included in the baseline scenarios (for both the years 2020 and 2025).

Baseline Air Quality Study

16. Knowledge of the current baseline air quality is principally required in order to calibrate the air dispersion model (as requested by ERA); dispersion modelling is used to predict future air quality at the Scheme and at the nearest sensitive receptors, both without and with the Scheme.
17. A baseline monitoring site was selected following site surveys in the area. The most appropriate location was identified as being the Selmun Wastewater Pumping Station (**Figure 3**); this location is close to a main road and some distance away from major construction sites, and the presence of soil in the immediate surroundings is not expected to lead to elevated PM₁₀ levels unless the soil is tilled.
18. The samplers were placed on top of the roof of the Pumping Station (**Figure 4**), which is at around 3 m height from ground level, at a distance of around 8 m from the edge of It-Telgħa ta' Selmun.
19. Monitoring was carried out for a period of six weeks for NO₂ and seven weeks⁵ for PM₁₀, starting on 28th February 2018 and ending on 12th April 2018 (for NO₂) and 19th April 2018 (PM₁₀).
20. NO₂ was measured using an automated gas analyser that can continuously measure NO and NO₂ by chemiluminescence according to EN 14211. The analyser's calibration certificate is included in **Appendix 3**. Measurements were made every 15 minutes.

⁴ The amendments approved subsequently (PA/02305/17 and PA/05369/17) are minor and would not affect traffic levels significantly.

⁵ PM₁₀ monitoring was extended by one week (to seven weeks) due to the incidences of Saharan dust episodes during the monitoring. Nevertheless, monitoring data from these days was not excluded in the assessment, and the ERA annualisation factor also included days with Saharan dust.

Figure 3: Monitoring location for air quality baseline study

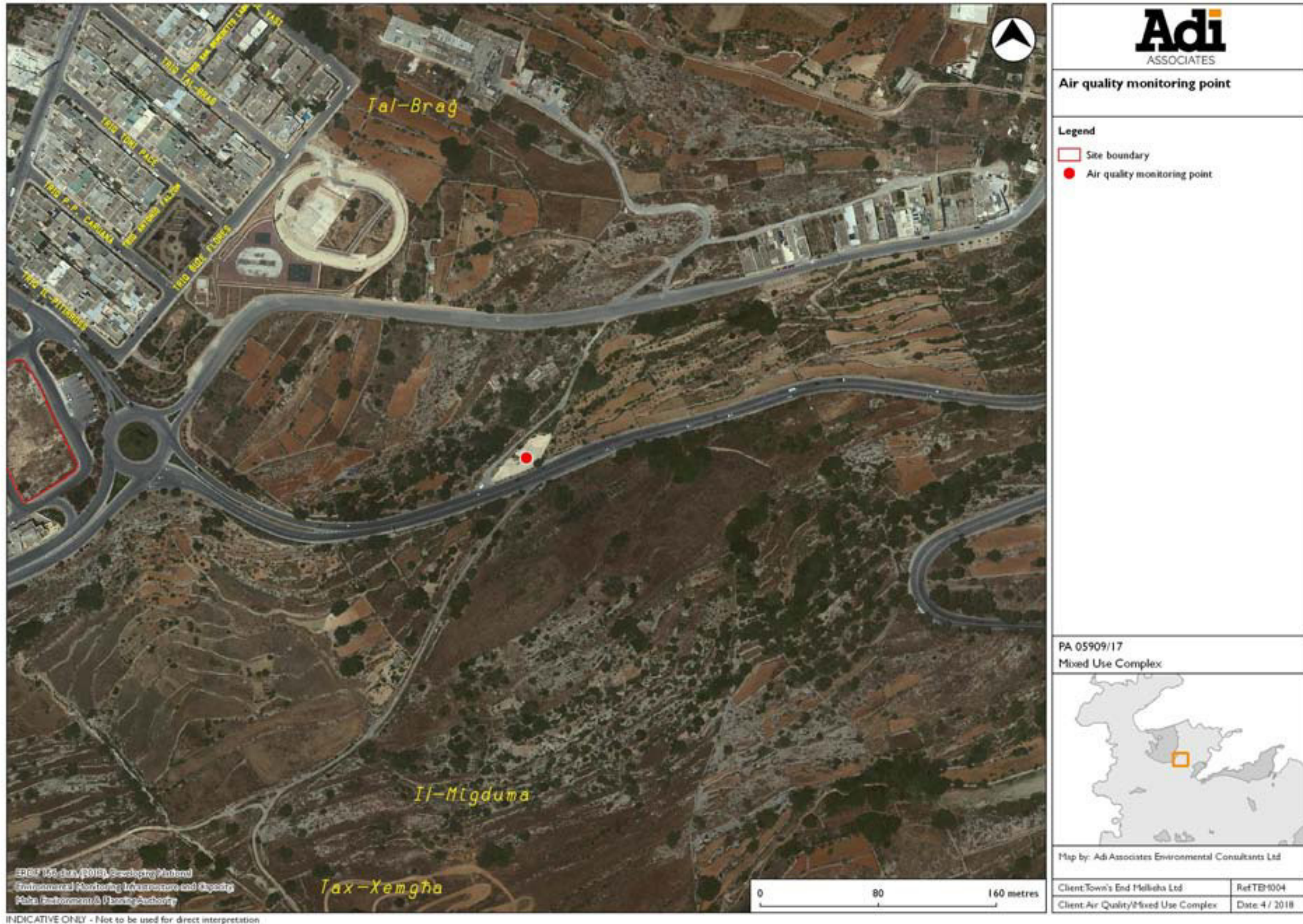


Figure 4: Placement of the air monitoring samplers



21. Measurement of PM₁₀ was carried out in accordance with the reference method SM EN 12341: 2014. Sampling was carried out using a low-volume sampler equipped with a size selective inlet and drawing in ambient air with a constant flow rate of 2.3 m³/h over a period of 24 hours per sample. The sampler is a reference sampler for PM₁₀ according to EN 12341; its calibration certificate is included in **Appendix 2**. Samples were collected on pre-weighed quartz fibre filters supplied by a laboratory accredited to both EN ISO IEC 17025 and EN 12341:2014. After sampling, the filters were also conditioned and weighed at the same accredited laboratory.
22. Meteorological data (wind speed and direction) was also collected.

Modelling

Dispersion Model

23. BREEZE Roads was used to model emissions of NO_x and PM₁₀ from traffic under both baseline conditions and conditions when the Scheme is operational. The years 2020 (base year of operation) and 2025 were used as the reference years.
24. BREEZE Roads was developed in the US and is used extensively in the UK and other countries. It is an air dispersion modelling suite that predicts air quality impacts of a number of pollutants including NO_x and PM. It is specifically designed to model pollutant concentrations that are emitted from moving and idling motor vehicles at or alongside roadways and roadway intersections.

Background Values

25. Urban background values are required since BREEZE Roads only predicts impacts on air quality occurring due to the emissions from traffic. These traffic emissions then need to be added to background air quality levels to predict the overall level of emissions.
26. Background values were obtained using data from ERA's urban background monitoring station at Žejtun⁶, which was deconvoluted by ERA into its constituent concentration ranges using the method described by Gomez Losada et al. (2015) and Gomez Losada et al. (2016) in order to obtain background values. The background was assumed to remain constant throughout the years modelled.

⁶ As agreed with Mark Scerri (ERA) following a review of the baseline monitoring results, email dated 8th May 2018.

Traffic Emission Factors

27. Emission factors are required to predict emissions from future vehicle fleet compositions. It is assumed that vehicle emission rates are similar to those in the UK and hence the same emissions factors were used. These factors are based on a toolkit published by Defra⁷ that mirrors the past and present vehicle fleet in the UK. The factors were however, adjusted in line with the age distribution of Maltese fleet compared to the UK fleet.
28. The UK average vehicle age is 8 years, compared to Malta's 15 years (as per NSO data⁸). This implies that currently, the Maltese emission factors are 7 years behind those of the UK. Therefore the emission factors of the current fleet (2018) are equivalent to the UK emission factors of 2011.
29. Therefore two scenarios were considered for the 2020 and 2025 predictions: the first scenario assumed an average vehicle age of fifteen years (therefore assuming that the current average vehicle age in Malta remains constant), whereas the second scenario assumed that the average age has been reduced to ten years.
30. The percentage of the predicted concentration of NO_x that is in the form of NO₂ was estimated using UK guidance⁹ that takes account of the prevailing background pollutant concentrations.

Meteorological Data

31. Meteorological data for the most recent full year available (2017) was obtained from the Malta International Airport.

Sensitive Receptors

32. The nearest air sensitive receptors along the road links considered, taking into account the applicability of air quality objectives (as per UK guidance¹⁰) are shown in **Figure 5**. These are mainly residential, but also include two bus stops (C and D); these were included because the hourly NO₂ limit value applies at such locations¹¹.

⁷ The toolkit makes use of emission factors published by the UK Department for Transport (derived from actual vehicle emissions) together with information on fleet composition on different road types. The toolkit is developed by the Highways Agency, AEA, Bureau Veritas and air quality consultants, together with contributions from CERC.

⁸ NSO (2017), *Transport Statistics 2016*

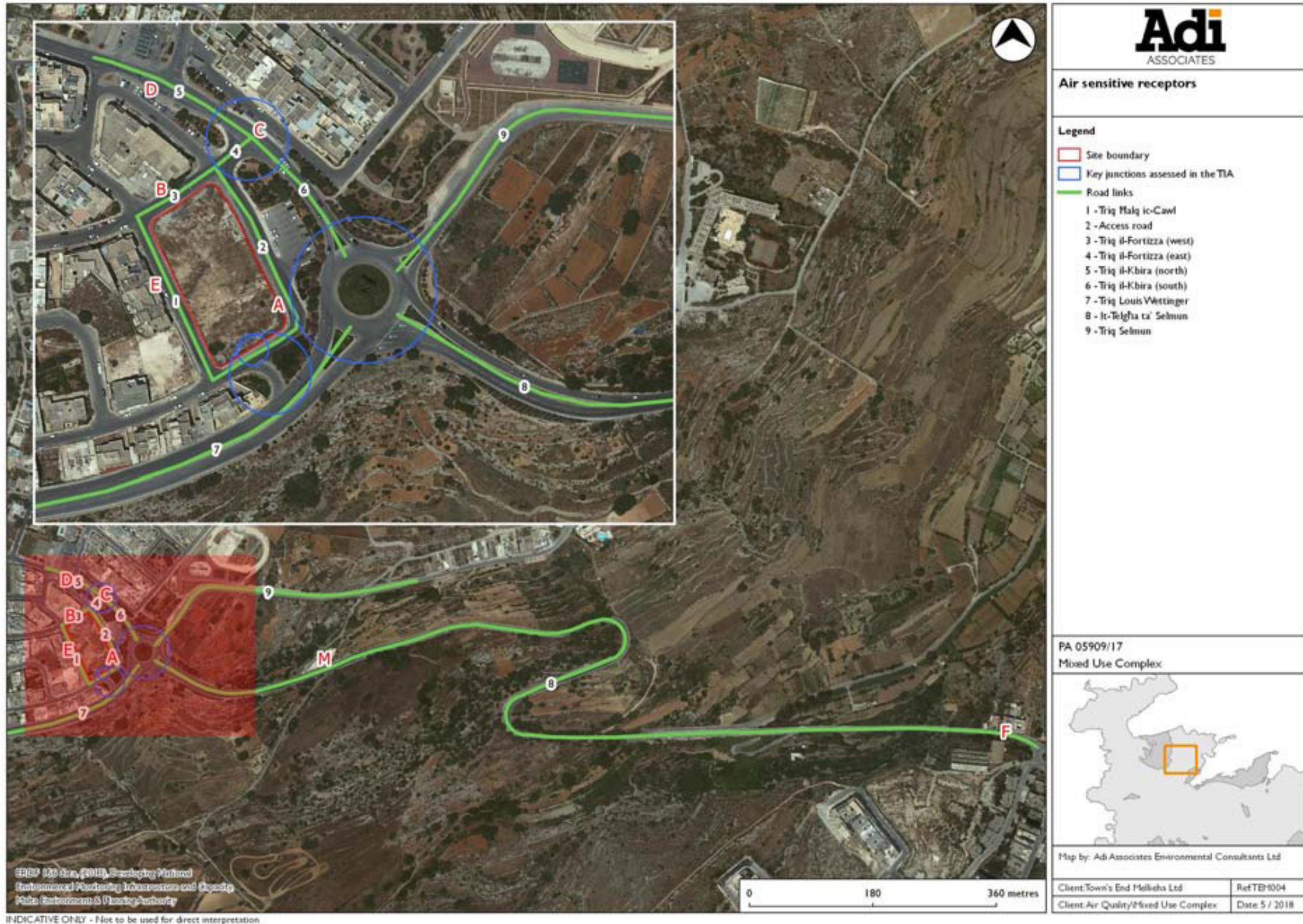
https://nso.gov.mt/en/publications/Publications_by_Unit/Documents/B3_Environment_Energy_Transport_Agriculture_Statistics/Transport_Statistics_2016.pdf, section 3.28.

⁹ Defra. *Local Air Quality Management (LAQM) Support*. <http://laqm.defra.gov.uk/>.

¹⁰ Defra (2018) *Local Air Quality Management Technical Guidance LAQM.TG16* <https://laqm.defra.gov.uk/documents/LAQM-TG16-February-18-v1.pdf> (Box 1.1).

¹¹ When a residential receptor was available at approximately the same distance from the road centre as a bus stop, such as in the case of receptor F, only the residential receptor was considered (since the results of the model would be the same).

Figure 5: Air sensitive receptors



Model Calibration

33. The model was calibrated against the monitoring data, in accordance with ERA guidance. This aims to ensure that the resulting total concentration (road traffic plus background) matches the measured concentration at a location that is similar to where predictions are being made.
34. Provided that the model calibration factor used is appropriate for the location of the development, and for future years, this method will provide reliable estimates of the impacts on air quality from the Scheme and reduce uncertainties.

BASELINE AIR QUALITY

Monitoring Data

35. The results of the monitoring over the six / seven-week period are presented in **Appendix 3** and **Appendix 4**, and yielded a daily average of:
 - NO₂: 5.8 µg/m³; and
 - PM₁₀: 47.2 µg/m³.
36. During this period, the NO₂ hourly limit value of 200 µg/m³ was never exceeded (the permitted number of exceedances is 18 in one year). However, the PM₁₀ daily limit value of 50 µg/m³ was exceeded on 16 days (the permitted number of exceedances is 35 in one year). Nevertheless, as shown in **Appendix 4**, nine of the exceedances coincided with Saharan dust events, bringing the net exceedances to seven.
37. Using the scaling factors provided by ERA¹², the following annual averages were calculated:
 - NO₂: 5.9 µg/m³; and
 - PM₁₀: 38.7 µg/m³.
38. By comparison, the annual limit value for NO₂ and PM₁₀ is 40 µg/m³. Therefore the measured data indicates that the monitoring location is compliant with the annual limit value for NO₂ and PM₁₀.
39. For NO₂ it is assumed that if the annual mean limit value is not exceeded then the short term limit value, which allows for 18 exceedances of 200 µg/m³ as an hourly mean, will also be achieved. Therefore, since the annual mean limit value is not exceeded, it is assumed that the allowed number of hourly exceedances is not exceeded either.
40. To predict whether the allowed number of daily exceedances of the PM₁₀ limit value

¹² Mark Scerri (ERA), 25th April 2018. NO₂ factor: 1.01; PM₁₀ factor: 0.82.

is exceeded, the equation provided by ERA ($PCT = (1.46 \times CAA) - 0.03$) was used¹³. This gives a calculated 90.4th percentile of $56.5 \mu\text{g}/\text{m}^3$, which indicates that at the monitoring location under baseline conditions, the allowed 35 exceedances are already exceeded.

Background Data

41. The background values used (obtained as explained above) were as follows:
 - NO_2 : $3.3 \mu\text{g}/\text{m}^3$; and
 - PM_{10} : $20.8 \mu\text{g}/\text{m}^3$.¹⁴
42. The background values are compliant with the annual and hourly limits for NO_2 , and the annual and daily limits for PM_{10} .

Model Calibration

43. The outputs of the dispersion model were added to the background values, and the results calibrated against the on-site monitoring data.
44. A comparison of the model output to the measured baseline monitoring data reveals a slight overprediction of NO_2 emissions by the dispersion model ($6.3 \mu\text{g}/\text{m}^3$ modelled vs $5.9 \mu\text{g}/\text{m}^3$ measured at the monitoring location). As the modelled value was still within 20% of that measured (as per the ERA ToR) no calibration factor was applied for NO_2 . This is a conservative approach, since model calibration would have led to a reduction in the modelled emissions.
45. For PM_{10} a value of $17.7 \mu\text{g}/\text{m}^3$ was added to all PM_{10} predictions, bring the modelled value up to the value measured at the baseline monitoring location.

¹³ For the site to have not more than 35 exceedances of the daily limit value in a year, 90.4% of the daily readings in a year should be $<50 \mu\text{g}/\text{m}^3$.

¹⁴ This excludes the contribution from Saharan dust episodes.

DETERMINING IMPACT SIGNIFICANCE

46. The significance criteria in **Table 2** and **Table 3** were used to assess the significance of impacts arising from traffic generated by the Scheme on air quality.

Table 2: Criteria of significance: NO₂ / PM₁₀ annual levels

Baseline annual levels of NO ₂ /PM ₁₀	Change in annual NO ₂ /PM ₁₀ levels due to Scheme			
	≤0.4 µg/m ³ ⁽¹⁵⁾	≥0.8 to <2 µg/m ³	≥2.4 to <4.0 µg/m ³	>4.0 µg/m ³
≥44 µg/m ³	Moderate	Substantial	Substantial	Substantial
41.2 to 43.6 µg/m ³	Moderate	Moderate	Substantial	Substantial
38.0 to 40.8 µg/m ³	Slight	Moderate	Moderate	Substantial
30.4 to 37.6 µg/m ³	Negligible	Slight	Moderate	Moderate
≤30 µg/m ³	Negligible	Negligible	Slight	Moderate

Table 3: Criteria of significance: PM₁₀ daily limit exceedances

Baseline PCT ¹⁶	Change in PCT due to Scheme			
	≤0.5 µg/m ³ ⁽¹⁵⁾	1.0 to 2.5 µg/m ³	3.0 to 5.0 µg/m ³	>5.0 µg/m ³
≥55 µg/m ³	Moderate	Substantial	Substantial	Substantial
51.5 to 54.5 µg/m ³	Moderate	Moderate	Substantial	Substantial
47.5 to 51.0 µg/m ³	Slight	Moderate	Moderate	Substantial
38.0 to 47.0 µg/m ³	Negligible	Slight	Moderate	Moderate
≤37.5 µg/m ³	Negligible	Negligible	Slight	Moderate

ASSESSMENT OF IMPACTS

47. **Table 4** to **Table 6** compare the predicted air quality in 2020 and 2025 at the sensitive receptors in the baseline scenario (Scenario 1, without the Scheme) to the air quality with the Scheme (Scenario 2).
48. The data in the above tables is based on the calibrated model, and includes background air quality levels. The output of the dispersion model is presented in **Appendix 5**.
49. The results show that the impact from Scheme traffic on NO₂ annual ambient air concentrations, using the significance criteria provided by ERA, is negligible under all scenarios considered. It is noted that the increase in NO₂ concentrations as a result of the Scheme is not more than 0.02 µg/m³ under any scenario; this is well below the lower threshold for significance.
50. Additionally, since the annual mean limit value of 40 µg/m³ for NO₂ is not exceeded under any scenario, it is likely that the allowed number of hourly exceedances will

¹⁵ In accordance with ERA guidance (Mark Scerri, email dated 15th April 2018), changes of <0.3% of the limit value (i.e. <0.12 µg/m³ for NO₂ and PM₁₀ annual levels, and <0.15 µg/m³ for PM₁₀ PCT) are described as negligible.

¹⁶ PCT: 90.4th percentile of the daily PM₁₀ averages.

not be exceeded either.

51. With respect to PM_{10} ambient air concentrations, the results show that the impact from Scheme traffic on the PM_{10} annual average and the number of exceedances of the PM_{10} daily average limit value is also negligible under all scenarios considered. The 90.4th percentile of the PM_{10} daily levels already exceeds the $50 \mu\text{g}/\text{m}^3$ threshold in the baseline scenario (without the Scheme), however, the predicted increase as a result of the Scheme is not more than $0.03 \mu\text{g}/\text{m}^3$ at any receptor, and therefore the increase in the number of exceedances of the PM_{10} daily limit value is negligible.

MITIGATION

52. Since the results show a negligible impact on ambient air quality, no mitigation measures are considered necessary.

RESIDUAL IMPACTS

53. There are unlikely to be significant traffic-related air quality residual impacts following the completion of the Scheme.
54. Impacts on air quality are summarised in **Table 7**.

Table 4: Predicted NO₂ annual average concentrations (µg/m³)

Year:	2020 (base year of operation)								2025 (base year + 5 years)							
Average vehicle age:	15 years				10 years				15 years				10 years			
Receptor	Baseline	Baseline plus Scheme	Change as a result of Scheme	Impact	Baseline	Baseline plus Scheme	Change as a result of Scheme	Impact	Baseline	Baseline plus Scheme	Change as a result of Scheme	Impact	Baseline	Baseline plus Scheme	Change as a result of Scheme	Impact
A: Residence (Scheme) on the Scheme's access road	3.77	3.78	0.01	Negligible	3.78	3.80	0.01	Negligible	3.76	3.77	0.01	Negligible	3.77	3.78	0.01	Negligible
B: Residence on Triq il-Fortizza (west-bound)	3.74	3.75	0.01	Negligible	3.76	3.77	0.01	Negligible	3.74	3.75	0.01	Negligible	3.75	3.75	0.01	Negligible
C: Bus stop on Triq il-Kbira (south-bound) ¹⁷	3.90	3.92	0.02	Negligible	3.95	3.98	0.02	Negligible	3.89	3.90	0.02	Negligible	3.91	3.93	0.02	Negligible
D: Bus stop on Triq il-Kbira (north-bound) ¹⁷	3.88	3.89	0.01	Negligible	3.93	3.94	0.02	Negligible	3.87	3.88	0.01	Negligible	3.89	3.90	0.01	Negligible
E: Residence on Triq Halq iċ-Ċawl	3.73	3.73	0.01	Negligible	3.74	3.74	0.01	Negligible	3.72	3.73	0.01	Negligible	3.73	3.74	0.01	Negligible
F: Residence on It-Telgħa ta' Selmun	4.03	4.05	0.01	Negligible	4.11	4.12	0.02	Negligible	4.02	4.03	0.01	Negligible	4.05	4.06	0.01	Negligible

Table 5: Predicted PM₁₀ annual average concentrations (µg/m³)

Year:	2020 (base year of operation)								2025 (base year + 5 years)							
Average vehicle age:	15 years				10 years				15 years				10 years			
Receptor	Baseline	Baseline plus Scheme	Change as a result of Scheme	Impact	Baseline	Baseline plus Scheme	Change as a result of Scheme	Impact	Baseline	Baseline plus Scheme	Change as a result of Scheme	Impact	Baseline	Baseline plus Scheme	Change as a result of Scheme	Impact
A: Residence (Scheme) on the Scheme's access road	38.60	38.61	0.01	Negligible	38.62	38.63	0.02	Negligible	38.59	38.60	0.01	Negligible	38.60	38.61	0.01	Negligible
B: Residence on Triq il-Fortizza (west-bound)	38.57	38.58	0.01	Negligible	38.58	38.60	0.01	Negligible	38.56	38.57	0.01	Negligible	38.57	38.58	0.01	Negligible
C: Bus stop on Triq il-Kbira (south-bound) ¹⁷	38.76	38.78	0.02	Negligible	38.83	38.86	0.03	Negligible	38.75	38.77	0.02	Negligible	38.77	38.80	0.02	Negligible
D: Bus stop on Triq il-Kbira (north-bound) ¹⁷	38.74	38.75	0.02	Negligible	38.80	38.82	0.02	Negligible	38.72	38.74	0.01	Negligible	38.75	38.76	0.02	Negligible
E: Residence on Triq Halq iċ-Ċawl	38.55	38.56	0.01	Negligible	38.56	38.57	0.01	Negligible	38.54	38.55	0.01	Negligible	38.55	38.56	0.01	Negligible
F: Residence on It-Telgħa ta' Selmun	38.93	38.94	0.02	Negligible	39.02	39.04	0.02	Negligible	38.91	38.93	0.02	Negligible	38.95	38.97	0.02	Negligible

¹⁷ Only the hourly NO₂ limit value applies at bus stops.

Table 6: Predicted PM₁₀ 90.4th percentile of daily PM₁₀ levels¹⁸

Year:	2020 (base year of operation)								2025 (base year + 5 years)							
Average vehicle age:	15 years				10 years				15 years				10 years			
Receptor	Baseline	Baseline plus Scheme	Change as a result of Scheme	Impact	Baseline	Baseline plus Scheme	Change as a result of Scheme	Impact	Baseline	Baseline plus Scheme	Change as a result of Scheme	Impact	Baseline	Baseline plus Scheme	Change as a result of Scheme	Impact
A: Residence (Scheme) on the Scheme's access road	56.32	56.34	0.02	Negligible	56.35	56.38	0.02	Negligible	56.31	56.33	0.02	Negligible	56.33	56.34	0.02	Negligible
B: Residence on Triq il-Fortizza (west-bound)	56.28	56.29	0.01	Negligible	56.30	56.32	0.02	Negligible	56.27	56.29	0.01	Negligible	56.28	56.30	0.02	Negligible
C: Bus stop on Triq il-Kbira (south-bound) ¹⁷	56.56	56.59	0.03	Negligible	56.66	56.70	0.04	Negligible	56.54	56.57	0.03	Negligible	56.58	56.61	0.03	Negligible
D: Bus stop on Triq il-Kbira (north-bound) ¹⁷	56.52	56.55	0.02	Negligible	56.61	56.64	0.03	Negligible	56.50	56.52	0.02	Negligible	56.54	56.56	0.02	Negligible
E: Residence on Triq Halq iċ-Ċawl	56.25	56.26	0.01	Negligible	56.26	56.28	0.02	Negligible	56.25	56.26	0.01	Negligible	56.25	56.27	0.01	Negligible
F: Residence on It-Telgħa ta' Selmun	56.80	56.83	0.02	Negligible	56.94	56.97	0.03	Negligible	56.78	56.81	0.02	Negligible	56.83	56.86	0.03	Negligible

¹⁸ Using the equation provided by ERA: PCT = (1.46×CAA) - 0.03.

Table 7: Summary of impacts on air quality

Predicted Impact	Beneficial / Adverse / Neutral	Nature, scale and type of impact						Policy importance (Internat. / National / Local)	Probability of impact occurring (Likely / Unlikely / Remote / Uncertain)	Significance of impact (Major / Minor / Not significant)	Proposed mitigation measures	Significance of residual impact (Major / Minor / Not significant)
		Const'n / Oper'n	Extent of impact (Nat / Local / Site)	Direct / Indirect	S-term / L-term	Perm / Temp	Revers / Irrevers					
Impact of vehicle emissions on sensitive receptors – change in NO ₂ annual average	Adverse	Oper'n	Local	Direct	L-term	Perm	Revers	National	Likely	Not significant	None	Not significant
Impact of vehicle emissions on sensitive receptors – change in PM ₁₀ annual average	Adverse	Oper'n	Local	Direct	L-term	Perm	Revers	National	Likely	Not significant	None	Not significant
Impact of vehicle emissions on sensitive receptors – change in number of daily PM ₁₀ exceedances	Adverse	Oper'n	Local	Direct	L-term	Perm	Revers	National	Likely	Not significant	None	Not significant

Appendix I: Method Statement

AIR QUALITY STUDY FOR PROPOSED MIXED USE COMPLEX, MELLIEHA

AIR QUALITY METHOD STATEMENT

INTRODUCTION

1. This method statement outlines the methodology for the air quality assessment required by the Environment & Resources Authority (ERA) for the proposed construction of a mixed use complex in Mellieha. The development is hereinafter referred to as 'the Scheme'.
2. The Scheme is entitled '*Proposed construction of mixed use complex, comprising a Class 3B Hotel including amenities, Class 4B retail shops, 120 no. residential units with underlying basements for vehicle garaging*' and is the subject of development application number PA 05909/17.

TERMS OF REFERENCE

3. The ToR on air quality assessment provided by the ERA are included in **Appendix I**.

ASSESSMENT METHODOLOGY

Scope of Assessment

4. The air quality assessment will focus on the potential impacts on air quality from vehicular traffic arising from the operation of the Scheme.
5. Construction road traffic has been scoped out of this assessment since the Traffic Impact Assessment (TIA) indicates that the daily threshold of 200 heavy vehicle movements¹ will not be exceeded (28 daily trips during site clearance and excavation are estimated).

Traffic Data

6. A Traffic Impact Assessment (TIA) for the Scheme has been prepared by Adi Associates Environmental Consultants Ltd².
7. Data from the TIA will be used to identify the predicted network (without the Scheme) and operational traffic growth (with the Scheme) in the vicinity of the Scheme site in the base year of operation and in the base year of operation plus five

¹ Design Manual for Roads and Bridges (2007): Volume 11 Section 3.

² Adi Associates Environmental Consultants Ltd, 2017. *PA 05909/17: Mixed Use Complex, Il-Mellieħa. Transport Impact Assessment*. San Ġwann, December 2017; viii + 54pp + 14 Appendices.

years. This data will be used to identify the predicted change in air quality as a result of the Scheme.

8. Both years' (base year, and base year + five years) traffic data will be used, since even if traffic flows are predicted to be greater after five years of operation, traffic levels in the base year may have a higher impact on air quality given that emissions from vehicles are reducing with time.

Baseline Air Quality

9. Knowledge of the current baseline is principally required in order to calibrate the air dispersion model (as requested by ERA); dispersion modelling is used to predict future air quality at the Scheme and at the nearest sensitive receptors, both without and with the Scheme.
10. Site surveys were carried out in January and February 2018 to identify a suitable monitoring location. The main locations considered for the survey and relevant limitations are summarised in **Figure 1**. It is noted that the Scheme site itself as well as the road on which the highest traffic impacts due to the Scheme are expected are unsuitable for baseline monitoring as they are located right next to a construction site; the Scheme site is also currently being used for stockpiling potentially dusty construction material.
11. As a result, the most appropriate location for the baseline monitoring survey was identified as being the Selmun Wastewater Pumping Station (**Figure 1**); this location is close to a main road and some distance away from major construction sites, and the presence of soil in the immediate surroundings is not expected to lead to elevated PM₁₀ levels unless the soil is tilled. The site also meets ERA's criteria regarding distance from the edge of a road junction and from the kerbside, as shown in **Figure 2**.
12. The PM₁₀ sampler and the NO₂ inlet will be placed on top of the roof of the Pumping Station (**Figure 3**), which is at around 3 m height from ground level.

Figure 1: Key locations considered for baseline monitoring study

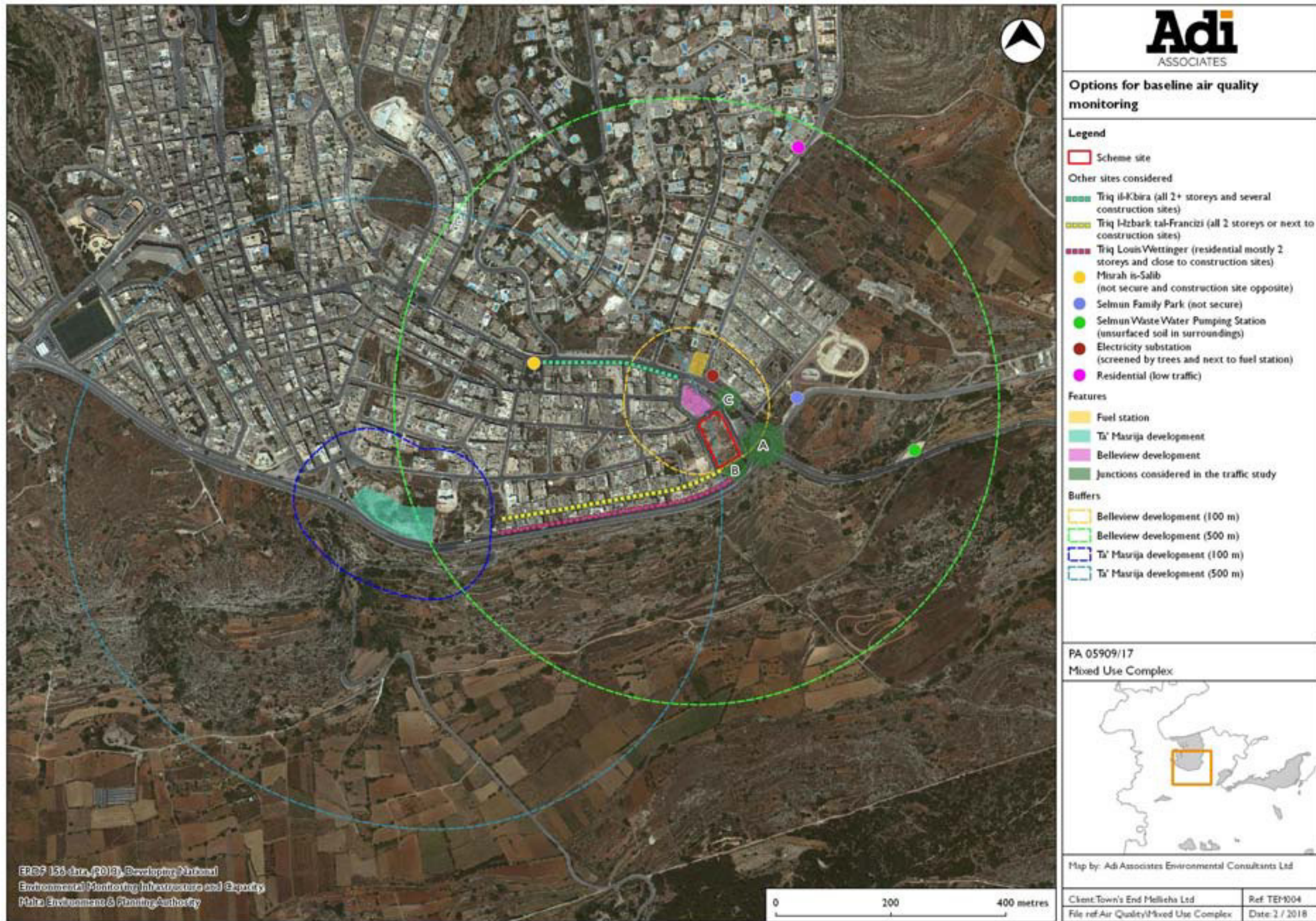
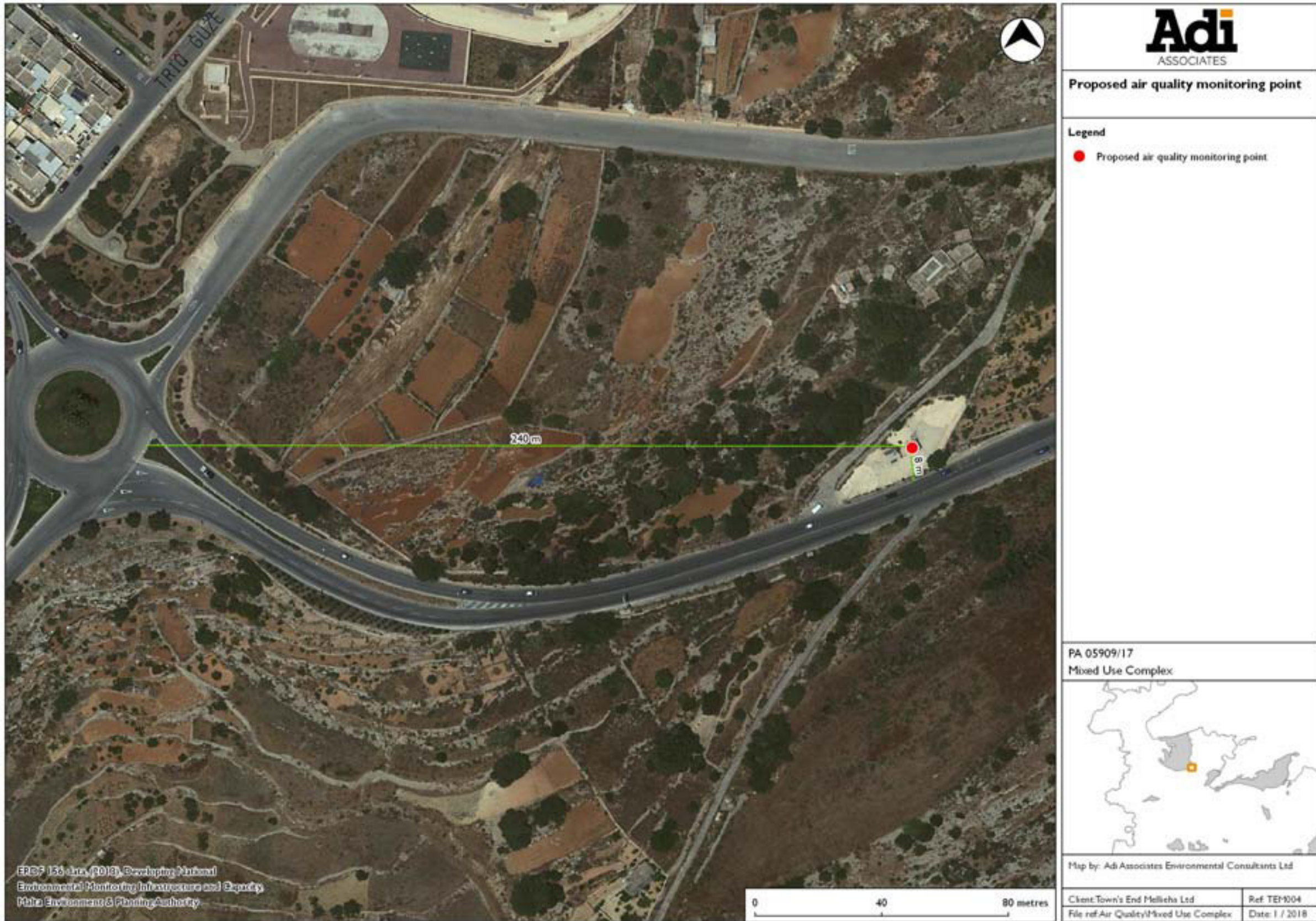


Figure 2: Baseline monitoring location



INDICATIVE ONLY - Not to be used for direct interpretation

Figure 3: Selmun Wastewater Pumping Station



PM₁₀

13. Measurement of PM₁₀ will be carried out in accordance with the reference method SM EN 12341: 2014. Sampling will be carried out using a low-volume sampler equipped with a size selective inlet and drawing in ambient air with a constant flow rate of 2.3 m³/h. The sampler is a reference sampler for PM₁₀ according to EN 12341.
14. Samples will be collected on pre-weighed quartz fibre filters supplied by a laboratory accredited to both EN ISO IEC 17025 and EN 12341:2014. After sampling, the filters will also be conditioned and weighed at the same accredited laboratory.
15. 24-hour samples will be collected over the specified period of 6 weeks (42 days).
16. The results will be scaled to a yearly average based on a factor to be forwarded by ERA.

NO₂

17. Real-time measurements over six weeks will be made using an automated gas analyser that can continuously measure NO and NO₂ by chemiluminescence according to EN 14211. Measurements will be made every 15 minutes to obtain continuous sampling.
18. The results will be scaled up to a yearly average based on a scaling factor to be forwarded by ERA.
19. Data from the closest monitoring locations in ERA's diffusion tube network will also be included in the report, in order to provide an indication of the sensitivity of the area to changes in traffic flows and air pollution levels.

Meteorology

20. Meteorological data will also be collected (wind speed and direction) to assist in the interpretation of results.

Modelling

21. Modelling will be used to assess the impact from vehicular traffic during the operational phase of the Scheme.

Dispersion Model

22. BREEZE Roads will be used to model emissions of NO₂ and PM₁₀ traffic emissions under baseline conditions, the construction phase (if required) and the operational phase. The reference years during operation will be the base year and base year plus five years.
23. Urban background values are required since BREEZE Roads only predicts impacts on air quality occurring due to the emissions from traffic included in the model. These traffic emissions then need to be added to background air quality levels to predict the

overall level of emissions.

24. It is proposed to derive background values as follows:
- NO₂: Value derived by kriging ERA's diffusion tube data, corrected to the reference method (if necessary) and with arterial and distributor roads removed to eliminate the traffic component;
 - PM₁₀: Value obtained from ERA's rural monitoring station at Għarb, corrected to the reference method and with Saharan dust episodes removed.
25. The background will be assumed to remain constant throughout the years modelled.

Emission Factors

26. Emission factors are required to predict emission from future vehicle fleet compositions. It will be assumed that vehicle emissions rates are similar to those in the UK and hence the same emissions factors will be used. These factors are based on a toolkit published by Defra³ that mirrors the past and present vehicle fleet in the UK. The factors will however, be adjusted to the Maltese scenario in line with the age distribution of Maltese fleet, and taking into consideration the percentage HGVs and average vehicle speed applicable to the specific road under assessment.⁴
27. The UK average vehicle age is 7 years, compared to Malta's 15 years (as per NSO data⁵). This implies that currently, the Maltese emission factors are 8 years behind those of the UK. Therefore the emission factors of the current fleet are equivalent to the UK emission factors of 2010.
28. For traffic during operation, the assessment will consider two vehicle age scenarios – one where the average age has remained 15 years and one where the average vehicle age has been reduced to 10 years.

Meteorological Data

29. Meteorological data for the most recent year available will be obtained from the Malta International Airport.

³ The toolkit makes use of emission factors published by the UK Department for Transport (derived from actual vehicle emissions) together with information on fleet composition on different road types. The toolkit is developed by the Highways Agency, AEA, Bureau Veritas and Air Quality Consultants, together with contributions from CERC.

⁴ Any possible remaining differences with regard to the Maltese fleet (in comparison to the Defra toolkit) are taken account of in the calibration factor used to bring the predictions in line with the measured data.

⁵ NSO (2017), *Transport Statistics 2016*

https://nso.gov.mt/en/publicatons/Publications_by_Unit/Documents/B3_Environment_Energy_Transport_Agriculture_Statistics/Transport_Statistics_2016.pdf, section 3.28.

Sensitive Receptors

30. Air quality will be modelled at the principal air sensitive receptors along the affected road links considered in the TIA. The area of study to be considered in this assessment is shown in **Figure 4**, where the increase in annual average daily traffic (AADT) at these junctions as a result of the Scheme is also indicated in **Figure 4**. It is noted that at most of these junctions the increase in traffic is already below the 1,000 AADT threshold applied for air quality assessment⁶; below this threshold the impact on air quality is considered negligible. Therefore the approach taken in selecting the area of study is a conservative one.
31. Receptors will be selected taking into account the applicability of air quality objectives, as per UK guidance.^{7,8} Receptors will include residences.

Model Output

32. The output of the model, including the urban background, will be presented in tabular format. It is noted that the use of contour plots in traffic modelling does not add value, as these only show that the highest concentrations are close to the road.
33. The expected concentrations at the sensitive receptors without the Scheme (baseline) and with the Scheme will be specified. As mentioned, two reference years (the base year, and the base year plus five years) and two average vehicle ages (10 years and 15 years) will be considered in the scenarios presented.
34. The modelled data, added to the urban background, will be compared to the measured data. If necessary, a calibration factor will be applied to the above scenarios to ensure that the predictions match the measured data.
35. To predict the likelihood of the site not being in compliance with the daily exceedances of PM₁₀ for both scenarios, if the annual PM₁₀ average levels are $\geq 29 \mu\text{g}/\text{m}^3$, this equation provided by ERA will be used:

$$\text{PCT} = (1.46 \times \text{CAA}) - 0.03$$

where:

- PCT = 90.4th percentile of the daily PM₁₀ averages (an indicator of the number of exceedances of the PM₁₀ daily limit value); and
- CAA = Annual PM₁₀ average (in both the baseline and with Scheme scenarios).

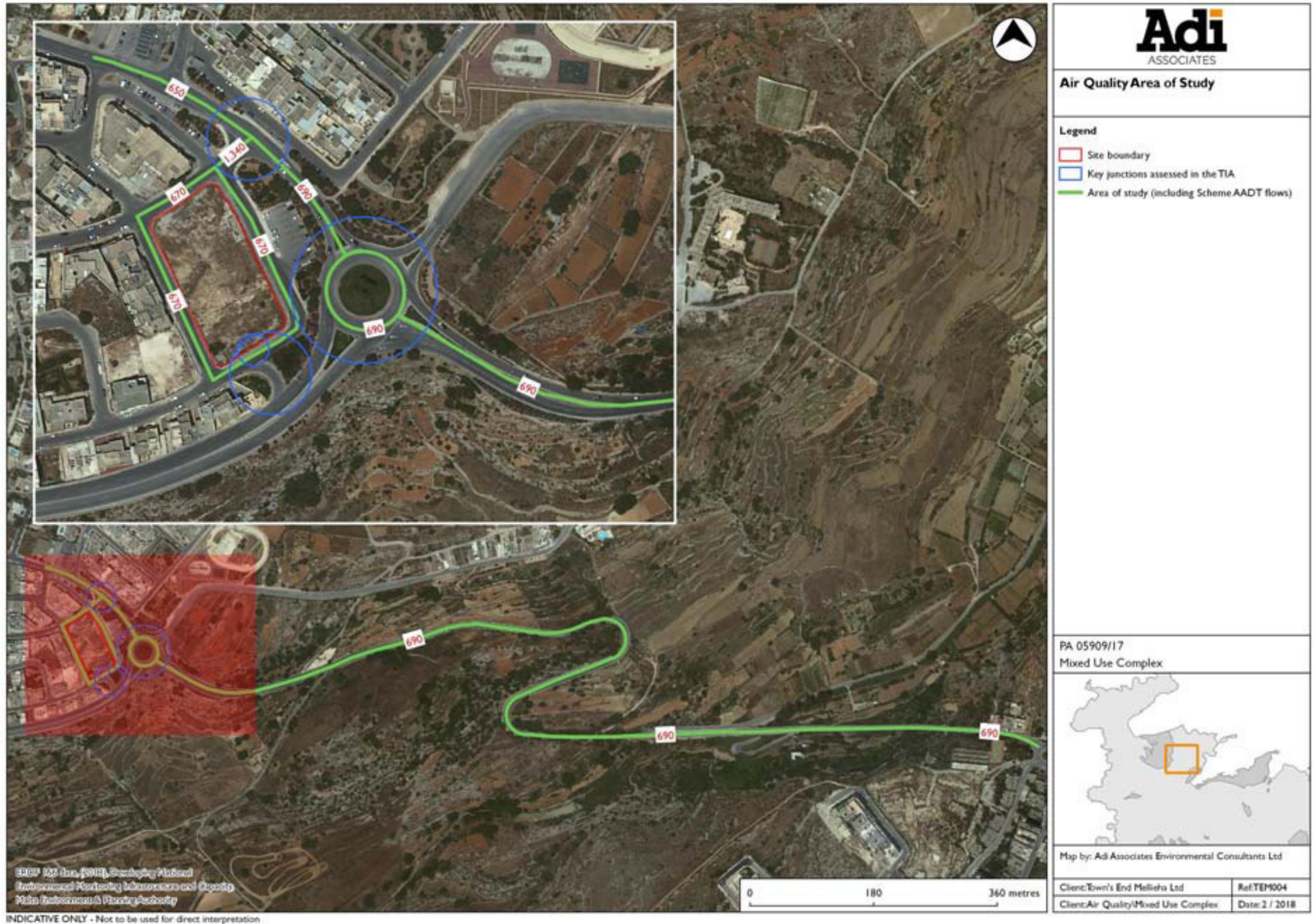
⁶ Design Manual for Roads and Bridges (2007): Volume 11 Section 3.

⁷ Defra (2009) *Local Air Quality Management Technical Guidance LAQM.TG(09)*

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69334/pb13081-tech-guidance-laqm-tg-09-090218.pdf (Box 1.4).

⁸ Environmental Protection UK (2010) *Development Control: Planning For Air Quality (2010 Update)* www.iaqm.co.uk/text/guidance/epuk/qa_guidance.pdf (Table 1).

Figure 4: Area of study



36. For NO₂ it will be assumed that the annual mean is always exceeded before the allowed number of hourly exceedances. Therefore if the annual mean is not exceeded, it will be assumed that the allowed number of hourly exceedances will not be exceeded either.

Consideration of Cumulative Impacts

37. The ToR require that all planned developments in the area of the Scheme site be considered in the air quality study.
38. The only major development affecting the roads considered in the TIA is for the adjacent Belview site, which is permitted by PA/02116/13: *To demolish existing premises, to construct underground parking spaces, supermarket on three floors (including Stores), proposed cafeteria [class 6] at ground floor, 18 apartments at first and second floor, 5 penthouse, proposed sign and proposed LPG bulk storage*⁹. The traffic generated by this approved development is already considered in the TIA, and will be included in the baseline scenario.

Impact Significance Criteria

39. The significance criteria in **Table 1** and **Table 2** will be used to assess the significance of impacts arising from traffic generated by the Scheme on air quality.

Table 1: Criteria of significance: NO₂/PM₁₀ annual levels

Baseline annual levels of NO ₂ /PM ₁₀	Change in annual NO ₂ /PM ₁₀ levels due to Scheme			
	≤0.4 µg/m ³	≥0.8 to <2 µg/m ³	≥2.4 to <4.0 µg/m ³	>4.0 µg/m ³
≥44 µg/m ³	Moderate	Substantial	Substantial	Substantial
41.2 to 43.6 µg/m ³	Moderate	Moderate	Substantial	Substantial
38.0 to 40.8 µg/m ³	Slight	Moderate	Moderate	Substantial
30.4 to 37.6 µg/m ³	Negligible	Slight	Moderate	Moderate
≤30 µg/m ³	Negligible	Negligible	Slight	Moderate

Table 2: Criteria of significance: PM₁₀ daily limit exceedances

Baseline PCT ¹⁰	Change in PCT due to Scheme			
	0.5 µg/m ³	1.0 to 2.5 µg/m ³	3.0 to 5.0 µg/m ³	>5.0 µg/m ³
≥55 µg/m ³	Moderate	Substantial	Substantial	Substantial
51.5 to 54.5 µg/m ³	Moderate	Moderate	Substantial	Substantial
47.5 to 51.0 µg/m ³	Slight	Moderate	Moderate	Substantial
38.0 to 47.0 µg/m ³	Negligible	Slight	Moderate	Moderate
≤37.5 µg/m ³	Negligible	Negligible	Slight	Moderate

⁹ The amendments approved subsequently (PA/02305/17 and PA/05369/17) are minor and would not affect traffic levels significantly.

¹⁰ 90.4th percentile of the daily PM₁₀ averages.

IMPACT MITIGATION AND MONITORING

40. If adverse impacts are identified, the air quality assessment will outline measures that can be put in place to prevent, minimise and, where possible, offset any significant adverse effects resulting from the Scheme. An outline monitoring programme will also be prepared, should this be required.
41. Should ERA require any modifications or alternatives to the project as a result of adverse impacts, including the preparation of a Green Travel Plan, these will be prepared separately.

Appendix I: ERA Terms of Reference



TERMS OF REFERENCE¹

FOR THE PREPARATION OF A

STUDY ON THE TRAFFIC IMPACT OF DEVELOPMENT

Introduction:

Increases in traffic flows will doubtlessly adversely affect the environment, particularly due to increased emissions of both air pollutants and noise. The aim of these terms of reference is to provide guidance to consultants on the estimation of the impacts of the increase in traffic flows due to a development on both air quality and noise.

For ease of use these terms of reference have been divided into two sections, Section A and Section B. Part A (sections 0 to 4) deals with the estimation of impact on air pollutant levels, while Part B (sections 5 to 11) deals with the estimation of the impact on noise levels.

The consultant is free to decide whether to present two separate reports or else a single report.

Legal background:

Regulation 29 of S.L. 549.59, grants ERA the power to issue guidance notes on the conduction of Air Quality Studies which are required by any Regulations issued under the Environment Protection Act including the EIA Regulations (S.L. 549.46).

Part II of Schedule 7 to S.L. 549.59 sets the following (legally binding limit values): an annual limit value of $40\mu\text{g}/\text{m}^3$ for PM_{10} , a daily limit value for PM_{10} of $50\mu\text{g}/\text{m}^3$ which can not be exceeded on more than 35 calendar days (90.4% of the daily readings in a calendar year should be $< 50 \mu\text{g}/\text{m}^3$), an annual limit value $40\mu\text{g}/\text{m}^3$ for NO_2 and an hourly limit value of $200\mu\text{g}/\text{m}^3$, which can not be exceeded more than 18 times per calendar year.

Regulations 19 and 20 of LN 78 of 2010 give ERA the responsibility to ensure that the above mentioned limits are complied with across Malta and Gozo.

0. Applicability

These terms of reference are applicable to all development applications irrespective of whether or not it qualifies for an Environmental Impact Assessment, as long as the expected increase in traffic flows due to the operation of the project is ≥ 1000 passenger cars AADT or ≥ 200 HDV AADT.

The Air Quality study shall be conducted as follows:

1. Content

The air quality study shall *inter alia* include the following sections:

- a) *The relevant details of the proposed development:* This should include an overview of the expected traffic changes when the project is FULLY operational. The report should also include a brief introduction to the sensitivity of the area to increases in traffic flows and changes in air pollution levels keeping in mind the NO_2 levels registered by the passive diffusion tubes (include in ERA's network) sited closest to the site.
- b) *Description of the relevant immission standards with reference to S.L. 549.59.*
- c) *The assessment methods:* This section shall include any relevant details on the methods used in order to monitor the base line levels of NO_2 and PM_{10} , including any proof of

equivalence to the reference method(s) as applicable (see 2.i and 2.n below). The section shall also include a part outlining the core details of the model (including version number) being used in order to predict the impact of the development. The consultants shall also include details on all the input data used and its source, including features of the traffic flows used, speeds, apportionment by vehicle type etc.

- d) *Site selection*: This section shall include the considerations made by the consultants in the selection of the monitoring site. The consultants shall also show how the selected site matches the site selection criteria in Annex I and the additional criteria Section 2 paragraph k). Prior to the commencement of the monitoring campaign the consultants shall together with the method statement include a map with the GIS location of the sampling point. The map shall include any measurements showing that the selected site complies with points v), vi), vii) and ix) of Annex I.; the identification of any sensitive receptor within a 3km radius as well as any available traffic counts for any thoroughfare within this radius. The monitoring campaign cannot start unless the site has been approved by ERA. The rationale behind the selection of the sampling site shall be clearly outlined explaining how the site meets all the site selection criteria especially the criterion in Section 2, paragraph k).
- e) *Model verification*: Model verification involves a comparison between the predicted and the measured values for both PM₁₀ and NO₂. Any errors between modeled and measured values should be adequately corrected. In addition consultants are expected to include estimates of the uncertainties in the traffic flows, vehicle emission factors and background concentrations. Any modeled concentrations should include a cumulative sensitivity analysis for these uncertainties (the effect of each uncertainty should be clearly outlined). The limitations of the model should be clearly stated e.g. the software's inability to model dispersion of air pollutants if the air flow is affected by trees or the inability to model pollutant concentrations in street canyons.
- f) *Identification of sensitive receptors*: The consultants will be required to identify the sensitive receptors within 3km radius around the site. Sensitive receptors include schools, retirement homes, residential units, hospitals, etc.
- g) *Description of the baseline conditions*: This section should details on location of the points at which the air quality monitoring was carried out, the reason for which this particular site was used, the sampling period, data capture, the scale up factors provided by ERA and if possible a break-up of the base line levels of the pollutant by the source.

- h) *Assessment of impact.* Results of the modeling for the "with development" scenario should be clearly set out in tables and also through the use of contour maps (which shall include the sensitive receptors identified in e) above), this should be compared to the "without development" scenario with respect to both the table and the contour map. The comparison between both scenarios shall also be applied to each of the sensitive receptors identified in e) above.
- i) *Determination of the significance of the impact.* The table in section 4 (and the tool made available through the ERA website) shall be used for each of the sensitive receptors identified in e) as well as for the modeled concentrations at the site where the monitoring was carried out.
- j) *Cumulative impacts.* If in the area there are other planned developments, which have already been granted development consent then the contribution of these developments should also be considered at a point in the future when these are fully operational.
- k) *Mitigation measures.* If the effect of the project is substantially adverse or worse, then the report shall include any mitigation measures, which have been identified and, which will reduce the impact of the project to at least slightly adverse. Non-quantifiable measures will not be expected.
- l) *Summary of the report.* The report should be written in clear, concise, grammatically correct English. If the English of the report is unacceptable, the report shall be sent to the consultants for correction and ERA will not take any responsibility for any delays in the process.

2. **Baseline Studies**

- a) The baseline levels of PM₁₀ and NO₂ shall be established through *in-situ* monitoring;
- b) Baseline levels of PM₁₀ shall be determined using the reference method (EN 12341:2014) for the determination of PM₁₀;
- c) The consultants should use the reference method for the sampling and measurement of PM₁₀;

- d) The design criteria for the samplers shall be as per Annex B to the said standard and shall be as per Section IV of Annex IX: EN 12341: 2014;

Inlet Design	Flow rate		Filters
See Section 5.1.2 and Annex A of EN 12341:2014	To a nominal value of 2.3 m ³ .hr ⁻¹ see Section 5.1.5 of EN 12341:2014	The instantaneous value of the flow rate shall be kept within 5% of the nominal value. The volumetric flow rate averaged over the sampling period shall be within 2% of the nominal value, see Section 5.1.5	Circular: such that the diameter of the exposed area through which the sampled air passes is between 34mm and 44mm.

Figure 1.1 design criteria for the samplers.

- e) The resolution of the balance used for the weighing of filters sampled using an LVS shall be at least 10 µg, Section 5.2.2 of EN 12341:2014;
- f) The filters should be conditioned for at least 48 hours (Section 6.2 of EN12341:2014) at 50% relative humidity (+ or - 5%) with an uncertainty of ≤ 2% RH and at 20 °C (+ or - 1 °C) with an uncertainty of ≤ 0.2 °C, according Table 2, Section 5.2 of EN12341:2014.
- g) The filters should be weighed at least twice for concordance (the difference between successive readings shall ≤ 40µg, Section 6.2 of EN12341:2014) with a time lag of at least 12 hours between the two weightings;
- h) Flow rates are at ambient volumes not at normalised volumes. The weighing shall take place in the same climate controlled room at the same environmental conditions as in f);
- i) Consultants can use alternative sampling and measurement methods if they demonstrate to ERA's satisfaction, equivalence to the above mentioned method under the Maltese air pollution climate. Equivalence shall be determined using the [European Commission's method for the determination of equivalence](#); any other method shall be deemed unacceptable. ERA will accept certificates of equivalence issued by third parties, which have been based on the method herein;
- j) Compliance with non-European standards does not satisfy the requirements above;
- k) Regarding the siting of the sampler/diffusion tube, the consultant shall submit a method statement indicating the location of the sampler/diffusion tube. The sampling point(s)

should not be within the site to be developed or exactly adjacent to it, but should be sited at a location representative of the thoroughfare on which the highest traffic impacts (due to the project) are expected. In addition the consultant is obliged to use all the criteria in Annex I to determine the sampling location. In addition the ERA may at its discretion ask the consultant to change the location of the sampler;

- l) The sampling time shall be no less than 6 weeks and extendible by a further 3 weeks depending on the nature of the case and the consultant shall use a scale up factor to scale this up to a yearly average. The scale up factor shall be forwarded by ERA to the consultant;
- m) The consultants shall discard readings influenced by Saharan dust intrusions. These episodes are characterized by a marked spatial consistency, demonstrated by concomitant peaks in the levels of PM₁₀ (and PM_{2.5}) across the Maltese Islands (see Figure 1 below). The consultants shall use this in conjunction with following two tools to confirm the occurrence of these episodes a) [MACC ensemble](#) and b) [HYSPLIT back trajectory model](#).

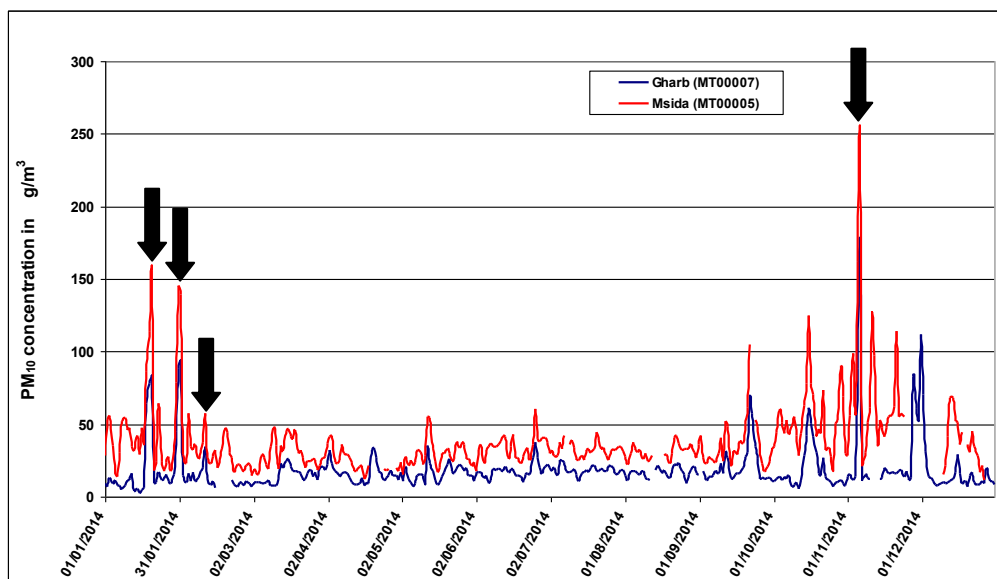


Figure 1: Comparison of the PM₁₀ levels in Għarb (blue) to the PM₁₀ levels in Msida (red) measured in 2014. The black arrows show some of the Saharan events throughout 2014.

- n) The PM₁₀ dataset shall in no case consist of <42 or <63 (depending on whether the baseline monitoring period has been set for 6 or 9 weeks) daily readings, excluding any discarded readings.

Baseline levels of NO₂.

- o) Baseline levels of NO₂ shall be determined using EN 14211:2005. The consultant may use passive diffusive tubes if it is shown that the latter are equivalent to the reference method.
- p) If the consultant opts for passive diffusion tubes, he shall forward at least 1 article in a peer reviewed journal e.g. Pfeffer *et al.* (2010) – *Gefahrstoffe-Reinhalt der Luft*. 70, 500-506, which shows that the equivalence of these tubes has been demonstrated for field trials (not exposure chambers) in at least 1 EU Member State. Equivalence should preferably, also have been demonstrated in Malta. The field trial shall include the comparison of at least 40 individual measurements taken throughout a whole calendar year. Equivalence shall be determined using a modification of European Commission’s method for the determination of equivalence for PM₁₀; any other method shall be deemed unacceptable
- q) The sampling point for NO₂ shall be the same as for PM₁₀.
- r) The sampling time shall be identical to the one for PM₁₀ (i.e. no less than 6 weeks and extendible by a further 3 weeks depending on the nature of the case). The consultant shall use a scale up factor to scale this up to a yearly average. The scale up factor shall be forwarded by ERA to the consultant.

Annualisation of the 6 (or 9) week averaged values for PM₁₀ and NO₂.

- s) The factor in l) and p) above shall be based on the use of the following equation (adapted from LAQM TG(16), April 2016 version:

$$CAA = \frac{p_{y+1}^{x \text{ weeks}}}{p_y^{x \text{ weeks}}} \times p_y^{52 \text{ weeks}}$$

Where:

CAA is the corrected annual average;

$p_{y+1}^{x \text{ weeks}}$ is the concentration of NO₂ or PM₁₀ measured by the consultants throughout the 6 (9) week (baseline) monitoring period;

$p_y^{x \text{ weeks}}$ is the concentration of NO₂ or PM₁₀ measured throughout the same 6 (9) week monitoring period of the preceding year at a comparable ERA fixed station; and

$p_y^{52 \text{ weeks}}$ is the annual average of NO₂ or PM₁₀ measured at the comparable ERA fixed station.

Traffic Counts.

- a) The consultant shall also take traffic counts at the main junctions near the monitoring site. The number and location of the counters are to be approved by ERA, (unless longer term traffic counts are already available).
- b) The traffic count shall take into consideration the vehicle type and the legislation class.
- c) The consultant shall use an appropriate model in order to scale the traffic counts obtained during the 6 (or 9) week period to AADT.

3. Modeling

- a) Once the baseline levels have been obtained the consultant shall determine the impact of the project on air quality through dispersion modeling.
- b) The following models are deemed acceptable by ERA:
IMMIS^{em}
BREEZE Roads.
ADMS-Urban
- c) The model used should use the logic outlined by e) below,
- d) The consultant shall use exclusively the emission factors in the latest version of the Handbook of emission factors for road transport emissions ([HBEFA v 3.2](#)). The average age of the Maltese vehicle fleet shall be taken as 13 years.
- e) The use of other emission factors is not acceptable.
- f) The consultant shall estimate the ambient background levels for both NO₂ and PM₁₀. The approach in Figure 2 below shall be deemed acceptable for both pollutants.

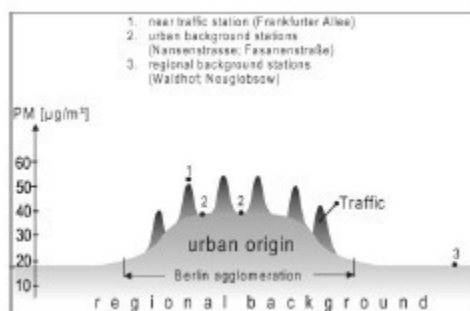


Figure 2: Horizontal profile for PM₁₀ concentration, Lenschow *et al.* (2001) – *Atmospheric Environment* 35, 29-33.

- g) The rural background can be captured through the use of the [EMEP](#) or [LOTOS-EUROS](#) model at a resolution of 50km × 50km (The [GAINS](#) model might have to be used for emissions data for the EU), the urban background can be captured through the use of a model such as [CHIMERE](#) at a resolution of 7km × 7km.
- h) The predictions of the model shall be assessed by comparing the modeled data to the monitoring data provided by the baseline studies. The modeled data must not deviate by more than ±20%.
- i) Other methods can be used in order to determine the background levels of NO₂ and PM₁₀, including statistical methods aimed at deriving “horizontal profiles” similar to the ones in Figure 1 (see e.g. Gómez-Losada et al., 2016 – *Atmospheric Environment* 127, 255-261) and based on a full year’s dataset, interpolation of data from the nearest ERA diffusion tubes, etc.
- j) The consultant should clearly explain the rationale behind the determination of the background levels.
- k) The consultant shall use the model to project the annual PM₁₀ and NO₂ levels into the future, when the project is fully operational taking into account the cumulative impact of projects in the area, which have been granted development consent.
- l) The consultant shall model two distinct scenarios: A) without the project and B) with the project.
- m) Results shall be displayed as a colour-coded contour map with the modelled annual concentrations of NO₂ and PM₁₀ as well as the calculated 90.4th percentiles for the daily PM₁₀ levels (calculated using the equation in q) within a 3km radius and especially at the sensitive receptors in point 1e. The position of the sensitive receptors shall be clearly labeled.
- n) For the annual averages of NO₂ and PM₁₀ as well as for the 90.4th percentile of the PM₁₀ levels, the contour maps shall show the situation with the scheme and without the scheme.
- o) Contour plots for the 90.4th percentile of the PM₁₀ levels shall include the error in the prediction of this value, which shall be calculated using the equation in q).

- p) For the three criteria above the consultants shall also draw colour-coded contour maps expressing the difference in the annual levels/90.4th percentile, between the two scenarios (with and without the scheme) in terms of the significance criteria in 4 b) and 4 c).

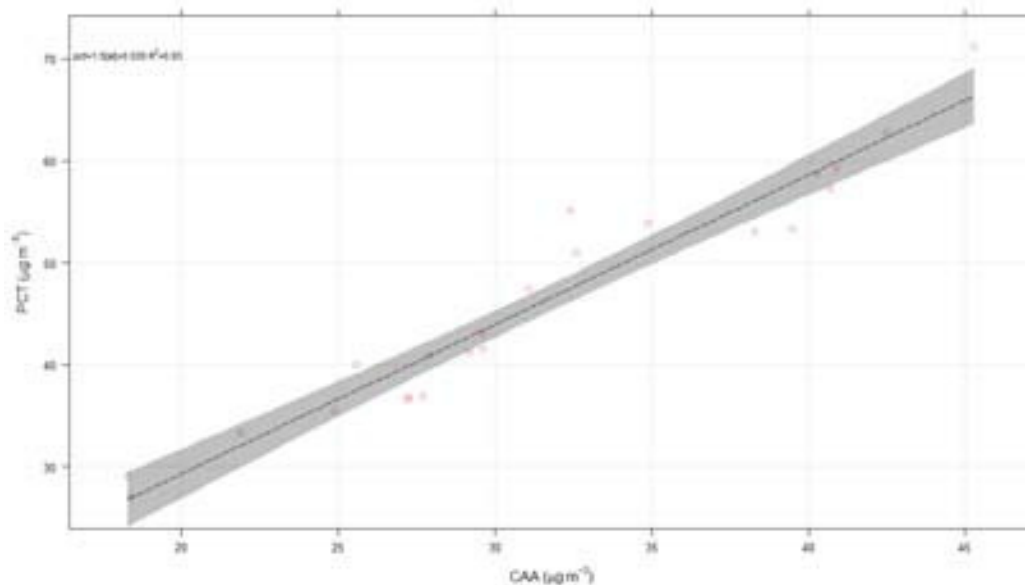


Figure 3: Plot of CAA vs PCT

see e.g. Querol *et al.* (2004) – *Journal of Aerosol Science* 35.9, 1151 – 1172.

- q) The consultant shall calculate the baseline of the 90.4th percentile of the daily PM₁₀ using the following equation:

$$PCT = (1.46 \times CAA) - 0.03$$

Where CAA (in µg/m³) is the average of the 6 (or 9) week monitoring period and corrected to an annual average using a factor, which shall be determined by ERA, PCT is the 90.4th percentile of the daily PM₁₀ averages in µg/m³. The equation above will be modified on a yearly basis by ERA.

- r) If PCT > 50 µg/m³ then it is likely that the site is not in compliance with the 90.4th percentile criterion.
- s) The consultant shall also use the modeled annual levels for PM₁₀ (AA) to calculate the PCT due to the project using the same equation as in n) but substituting AA for CAA.
- t) For scaled up annual averages (CAA) < 29 µg/m³ the consultants will not be obliged to analyse for compliance with the 90.4th percentile criterion.

- u) For NO₂ the consultant shall assume that the annual mean is always exceeded before the allowed number of hourly exceedances.

- v) Any assumptions must be clearly stated by the consultant.

4. Significance Criteria

- a) The following criteria of significance (adapted from IAQM’s Planning for Air Quality Guidance, January 2017 version) shall be used by the consultant to determine the significance of the impact at all sensitive receptors and at any point within the 3km radius at which the impact of the project on traffic increases is the highest.
- b) A significance criteria tool shall be made available on the ERA website, for guidance and interpretative purposes.
- c) For annual levels of $\text{NO}_2/\text{PM}_{10}$ in $\mu\text{g}/\text{m}^3$.

		<i>Change in the annual $\text{NO}_2/\text{PM}_{10}$ (dAA) levels due to scheme ($\mu\text{g}/\text{m}^3$).</i>			
		$\text{dAA} \leq 0.4 \mu\text{g}/\text{m}^3$	$0.8 \mu\text{g}/\text{m}^3 \leq \text{dAA} \leq 2.0 \mu\text{g}/\text{m}^3$	$2.4 \mu\text{g}/\text{m}^3 \leq \text{dAA} \leq 4.0 \mu\text{g}/\text{m}^3$	$\text{dAA} > 4.0 \mu\text{g}/\text{m}^3$
$\text{CAA for } \text{NO}_2/\text{PM}_{10} (\mu\text{g}/\text{m}^3)$	$\text{CAA} \geq 44 \mu\text{g}/\text{m}^3$	MODERATE	SUBSTANTIAL	SUBSTANTIAL	SUBSTANTIAL
	$43.6 \mu\text{g}/\text{m}^3 \leq \text{CAA} \leq 41.2 \mu\text{g}/\text{m}^3$	MODERATE	MODERATE	SUBSTANTIAL	SUBSTANTIAL
	$40.8 \mu\text{g}/\text{m}^3 \leq \text{CAA} \leq 38.0 \mu\text{g}/\text{m}^3$	SLIGHT	MODERATE	MODERATE	SUBSTANTIAL
	$37.6 \mu\text{g}/\text{m}^3 \leq \text{CAA} \leq 30.4 \mu\text{g}/\text{m}^3$	NEGLIGIBLE	SLIGHT	MODERATE	MODERATE
	$\text{CAA} \leq 30 \mu\text{g}/\text{m}^3$	NEGLIGIBLE	NEGLIGIBLE	SLIGHT	MODERATE

- d) For compliance with the 90.4th percentile criterion for PM_{10} .

		<i>Change in the PCT (dPCT) due to scheme ($\mu\text{g}/\text{m}^3$).</i>			
		$\text{dPCT} \leq 0.5 \mu\text{g}/\text{m}^3$	$1.0 \mu\text{g}/\text{m}^3 \leq \text{dPCT} \leq 2.5 \mu\text{g}/\text{m}^3$	$3.0 \mu\text{g}/\text{m}^3 \leq \text{dPCT} \leq 5.0 \mu\text{g}/\text{m}^3$	$\text{dPCT} > 5.0 \mu\text{g}/\text{m}^3$
$\text{PCT} (\mu\text{g}/\text{m}^3)$	$\text{PCT} \geq 55 \mu\text{g}/\text{m}^3$	MODERATE	SUBSTANTIAL	SUBSTANTIAL	SUBSTANTIAL
	$54.5 \mu\text{g}/\text{m}^3 \leq \text{PCT} \leq 51.5 \mu\text{g}/\text{m}^3$	MODERATE	MODERATE	SUBSTANTIAL	SUBSTANTIAL
	$51.0 \mu\text{g}/\text{m}^3 \leq \text{PCT} \leq 47.5 \mu\text{g}/\text{m}^3$	SLIGHT	MODERATE	MODERATE	SUBSTANTIAL
	$47.0 \mu\text{g}/\text{m}^3 \leq \text{PCT} \leq 38.0 \mu\text{g}/\text{m}^3$	NEGLIGIBLE	SLIGHT	MODERATE	MODERATE
	$\text{PCT} \leq 37.5 \mu\text{g}/\text{m}^3$	NEGLIGIBLE	NEGLIGIBLE	SLIGHT	MODERATE

- e) Whenever the impact of the project is determined to be “negligible” no further action will be required from the developer.

- f) If the impact of the project is classified as “substantially adverse” then ERA will not recommend approval unless the project is modified in such a way (including scaling down) that the significance of the impact is measurably lessened to at least “slightly adverse”. In this case a green travel plan will not be considered as sufficient.

- g) If the impact of the project is “moderate adverse” then the developer will be asked to modify the project. The modifications can include a green travel plan which has to include specific, measurable² and achievable objectives together with their respective implementation time-frames. The developer will be asked to finance at least in part, the implementation of the green travel plan. The implementation of the plan will have to be audited and eventually updated by the developer on a periodic basis. If the green travel plan does not lower the significance of the impact then the developer will be asked to take additional measures, which may include scaling-down the project.

- h) If the impact of the project is slightly adverse then the developer will be asked to consider alternatives, which will lessen the impact of the project.

² The term measurable in this context means that the green travel plan shall quantify the reduction in the pollutant levels (in $\mu\text{g}/\text{m}^3$), over the scenario leading to the classification of the impact as “moderately adverse”.

ANNEX I

This Annex is related to Air Quality Studies only.

Site selection Criteria mention in Section 1 d) and in Section 2 k).

- i. PM₁₀ samplers shall sited at least 500m from:
 - a) dust piles;
 - b) construction/demolition/excavation sites & quarries;
 - c) dirt tracks;
 - d) un-asphalted surfaces;
 - e) surfaces which are visibly covered with dust; and
 - f) any other surface or activity likely to lead to the entrainment of dust
- ii. There shall be absolutely no bends in between the PM₁₀ sampling head/sampling inlet for NO₂ and the analyser.
- iii. The height of the PM₁₀ sampling head/sampling inlet for the NO₂ analyser/NO₂ passive diffusive tube shall be $\geq 1.5\text{m}$ and $\leq 4\text{m}$ above the ground.
- iv. For active samplers, the exhaust outlet shall be positioned in such a way that recirculation of the exhaust air to the sampling inlet is avoided.
- v. The distance of the PM₁₀ sampling head/sampling inlet for the NO₂ analyser/NO₂ passive diffusive tubes from the edge of any road junction shall be $\geq 25\text{m}$.
- vi. The PM₁₀ sampling head/sampling inlets for the NO₂ analyser/NO₂ passive diffusive tube shall be placed at $\leq 10\text{m}$ from the kerbside.
- vii. The flow around the PM₁₀ sampling head/sampling inlets for the NO₂ analyser/NO₂ passive diffusive tube shall be unrestricted, without any obstructions in the vicinity of the sampler i.e. free in an arc of at least 270°.
- viii. The PM₁₀ sampling head/sampling inlets for the NO₂ analyser/NO₂ passive diffusive tube shall in no case be at < 0.5 from the nearest building.

Note: The selection of the site is solely the consultants' responsibility. ERA will not waive the requirement for in situ monitoring due to erroneous readings resulting from poorly chosen monitoring sites. The 6 (or 9) week monitoring period will apply regardless of any time constraint the consultants might have. ERA will therefore not assume responsibility for any delays caused by this issue.

Appendix 2: Low-volume sampler calibration certificate

test standard according to
CEN14907 (PM2.5)
CEN12341 (PM10)



Calibration Protocol

Small Filter Device

LVS/MVS

00850

Date: 12.07.2017

Reference Device

Tester: Taseski

Laminar Master Flow LFE EPM TC 20

ambient conditions	tested device	reference device	difference (ref-test)	maximum tolerance
pressure (mbar)	1002,7	1003,3	0,6	±2 mbar
temperature (°C)	24,6	24,5	-0,1	± 1,0 °C
relative humidity (%rH)	57,6	57,2	-0,4	±2,5 %rH
flowrate (m³/h)	2,30	2,31	0,01	± 2,0 %

tested device file:

Y:\Protokolle Staub\00850_2017-07-12.txt

reference device file:

Y:\Protokolle Staub\20170712-090720_000.erg

TF-Sensor Ser.No.:

17061023

The device LVS/MVS SerNo.: 00850 has passed the calibration

Appendix 3: NO₂ Baseline Monitoring Report



ecoserv Ltd
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Mosta, MALTA

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VAT Reg no: 1623-1407

Report Reference: 049-18

LABORATORY REPORT

Collection of Air Quality data in relation to an EIA for proposed development In Mellieha.

Client: Adi Associates Environmental Consultants Ltd.

Period of data collection: 28 February 2018 – 12 April 2018

Reporting date: 30 April 2018

DETAILS

Ecoserv Ltd has been commissioned by ADI Associates Environmental Consultants Ltd. (hereafter 'the Client') to collect data on air quality in connection with an EIA for a proposed development at a site in Mellieha. The parameters for which air quality data was required were NO_x and meteorological data as per correspondence between ADI and Ecoserv dated 30 January 2018.

The air quality survey undertaken involves the *in-situ* analysis of air for NO_x gases (NO and NO₂) and the collection of meteorological data from one station for a period of 6 weeks at the agreed site. The data gathered will be used by the client to establish baseline levels of the pollutants for the area. This report includes the results of this survey and analyses.

METHODOLOGY

Continuous monitoring of NO_x was carried out for 6 weeks (42 days) between 28 February and 12 April 2018. The monitoring equipment was installed according to the requirements of standard guidelines for air quality monitoring arising from the EU Air Quality Directive (2008/50/EC). The equipment used was regularly monitored throughout the duration of the sampling to ensure its proper operation. The sampling location is indicated in Figure 1, and equipment set-up is shown in Figure 2.

NO_x real-time monitoring

Real-time measurements were made from the station indicated in Fig. 1 using an automated gas analyser that can continuously measure NO and NO₂ by chemiluminescence according to the EN standard (EN 14211) that is the reference method stated in the EU Directive on Air Quality (2008/50/EC). Measurements were made at specific time intervals (every 15

minutes) to obtain data on NO_x levels continuously for the duration of the sampling. The calibration certificate for the instrument is provided in Appendix I to this report

Meteorological data

Data on meteorological and climatic conditions at the sampling location was collected throughout the period of study and logged at periodic intervals. The recorded parameters include: ambient temperature, relative ambient humidity, ambient pressure, wind speed and wind direction.



Figure 1. Location of the AQ monitoring station at Mellieha (marked with a red dot). (Source: Google Maps)



Figure 2. Photo showing the NO_x and weather monitoring equipment installed on site.

RESULTS

Ecoserv's sample reference codes for the results presented in this report bearing reference **049-18** are outlined in Table 1.

Table 1. Ecoserv sample reference codes.

Parameter	Sample reference	Sample type
NO _x	A-059-18	Real-time data
Meteorological data	A-060-18	Real-time data

NO_x results

Due to the extent of data points, the results of NO, NO₂ and NO_x are given in a separate digital (Excel) file submitted as a digital appendix with this report. This includes data points recorded every 15 minutes for the dates indicated above.

Meteorological results

Due to the extent of data points, the results of the ambient temperature, relative ambient humidity, ambient pressure, wind speed and wind direction are given in a separate digital (Excel) file submitted as a digital appendix with this report. This includes data points recorded every 15 minutes for the dates indicated above.

Appendices:

- Appendix I

Calibration Certificate of NO_x analyser

- Digital data (excel file)

A-059-18_Qormi_NO_x Data

A-060-18_Qormi_Meteorological Data



Report checked by:
Alberto Vigo BSc, MSc
Environmental Scientist



Report approved by:
Sarah Debono BSc (Hons), MSc
Project Manager

APPENDIX I

Calibration Certificate for the NO_x analyser



UNIVERSITY OF MALTA
L-Università ta' Malta

FACULTY OF SCIENCE
Department of Geosciences

Calibration Certificate

The University of Malta hereby certifies that the instrument referred to in this certificate has been calibrated by qualified personnel. The calibration was carried out in accordance with the University's Standard Operation Procedures, modelled on the instrumentation's manual.

Instrument	airpointer
Manufacturer	recordum
Serial No.	2009-00254
Art. No.	A-H4V1S014MA1C2F1
Calibration Date	24/06/2016
SO ₂ Calibration Points	0 ppb & 50 ppb
NO _x Calibration Points	0 ppb & 50 ppb
SO ₂ Cylinder certificate	9466135001
NO Cylinder certificate	9466103001

Issue Date: 27th June 2016

Calibrated by
William Hicklin

Authorized Signatory
Pauline Galea

This calibration certificate may not be reproduced other in full except with the permission of the issuing laboratory. Calibration certificates without signature are not valid.

CERTIFICATE GSC-03-20160627-01

Appendix 4: PM₁₀ Baseline Monitoring Results

Part A: PM₁₀ monitoring results

Filter ID	Start date	Start time	End date	End time	Volume sampled (m ³)	PM ₁₀ concentration (µg/m ³) ¹⁹	Notes ²⁰
21501	28.02.2018	12:30:00	01.03.2018	12:29:00	55.156	24.7	
21502	01.03.2018	12:30:00	02.03.2018	12:29:00	55.159	<u>82</u>	Saharan dust event from 2 nd to 4 th March 2018.
21503	02.03.2018	12:30:00	03.03.2018	12:29:00	55.158	<u>58.6</u>	
21504	03.03.2018	12:30:00	04.03.2018	12:29:00	55.156	<u>142</u>	
21505	04.03.2018	12:30:00	05.03.2018	12:29:00	55.153	<u>80</u>	
21506	05.03.2018	12:30:00	06.03.2018	12:29:00	55.156	46.8	
21507	06.03.2018	12:30:00	07.03.2018	12:29:00	55.154	27.2	
21508	07.03.2018	12:30:00	08.03.2018	12:29:00	55.155	<u>67</u>	
21509	08.03.2018	12:30:00	09.03.2018	12:29:00	55.156	25	
21510	09.03.2018	12:30:00	10.03.2018	12:29:00	55.157	21	
21511	10.03.2018	12:30:00	11.03.2018	12:29:00	55.157	<u>63</u>	
21512	11.03.2018	12:30:00	12.03.2018	12:29:00	55.156	37.5	
21513	12.03.2018	12:30:00	13.03.2018	12:29:00	55.156	33.4	
21515	13.03.2018	14:40:00	14.03.2018	14:39:00	55.157	<u>52.9</u>	
21516	14.03.2018	14:40:00	15.03.2018	14:39:00	55.155	49.9	
21522	15.03.2018	14:40:00	16.03.2018	14:39:00	55.158	36.3	
21523	16.03.2018	14:40:00	17.03.2018	14:39:00	55.155	32.1	
21524	17.03.2018	14:40:00	18.03.2018	14:39:00	55.156	25.2	
21525	18.03.2018	14:40:00	19.03.2018	14:39:00	55.156	39.9	
21526	19.03.2018	14:40:00	20.03.2018	14:39:00	55.156	16.4	
21527	20.03.2018	14:40:00	21.03.2018	14:39:00	55.152	25.9	
21528	21.03.2018	14:40:00	22.03.2018	14:39:00	55.156	19.8	
21529	22.03.2018	14:40:00	23.03.2018	14:39:00	55.154	<u>53.1</u>	

¹⁹ Exceedances of the daily limit value of 50 µg/m³ are underlined.

²⁰ The method used for identifying Saharan dust events is described in Part B.

Filter ID	Start date	Start time	End date	End time	Volume sampled (m ³)	PM ₁₀ concentration (µg/m ³) ¹⁹	Notes ²⁰
21530	23.03.2018	14:40:00	24.03.2018	14:39:00	55.155	22.8	
21531	24.03.2018	14:40:00	25.03.2018	14:39:00	55.155	34.4	Clocks went forward 1 hour on this day. Winter time was retained on the sampler until 29 th March 2018.
21532	25.03.2018	14:40:00	26.03.2018	14:39:00	55.155	40.1	
21533	26.03.2018	14:40:00	27.03.2018	14:39:00	55.157	<u>63</u>	
21534	27.03.2018	14:40:00	28.03.2018	14:39:00	55.157	<u>65</u>	
21535	28.03.2018	14:40:00	29.03.2018	13:37:27	52.794	<u>61</u>	Time changed to summer time after this sample was taken.
3251	29.03.2018	14:55:00	30.03.2018	14:54:00	55.159	22.7	
3252	30.03.2018	14:55:00	31.03.2018	14:54:00	55.159	36.6	
3253	31.03.2018	14:55:00	01.04.2018	14:54:00	55.159	33.9	
3254	01.04.2018	14:55:00	02.04.2018	14:54:00	55.159	29	
3255	02.04.2018	14:55:00	03.04.2018	14:54:00	55.160	30.8	
3256	03.04.2018	14:55:00	04.04.2018	14:54:00	55.159	26.3	
3257	04.04.2018	14:55:00	05.04.2018	14:54:00	55.160	27.6	
3258	05.04.2018	14:55:00	06.04.2018	14:54:00	55.159	33	
3259	06.04.2018	14:55:00	07.04.2018	14:54:00	55.157	29.7	
3260	07.04.2018	14:55:00	08.04.2018	14:54:00	55.157	21.2	
3261	08.04.2018	14:55:00	09.04.2018	14:54:00	55.158	37.9	
3262	09.04.2018	14:55:00	10.04.2018	14:54:00	55.159	33.2	
3263	10.04.2018	14:55:00	11.04.2018	14:54:00	55.159	39.9	
3264	11.04.2018	14:55:00	12.04.2018	14:54:00	55.159	<u>54.9</u>	Saharan dust event from 12 th to 16 th April 2018.
3265	12.04.2018	15:10:00	13.04.2018	15:09:00	55.157	<u>68</u>	
3266	13.04.2018	15:10:00	14.04.2018	15:09:00	55.159	46.2	
3267	14.04.2018	15:10:00	15.04.2018	15:09:00	55.156	<u>98</u>	
3268	15.04.2018	15:10:00	16.04.2018	15:09:00	55.158	<u>199</u>	
3270	16.04.2018	15:10:00	17.04.2018	15:09:00	55.155	39.3	
3271	17.04.2018	15:10:00	18.04.2018	15:09:00	55.153	39.5	
3272	18.04.2018	15:10:00	19.04.2018	15:09:00	55.155	<u>67</u>	Saharan dust event on 19 th April 2018.
Seven-week average						47.2	
No. of exceedances of daily limit value						16	
No. of exceedances of daily limit value not due to Saharan dust events						7	

Part B: Saharan dust assessment

1. Assessment for Saharan dust episodes was made by considering:
 - The spatial consistency of exceedances at different ERA sites in Malta²¹; in the case of the Għarb monitoring station readings above 40 µg/m³ were considered to merit further assessment since this is a rural background station;
 - MACC Ensemble forecasts²² or NASA Terra MODIS satellite images when the former were not available²³; and
 - HYSPLIT back trajectory model²⁴ when the results of the forecast / satellite image was ambiguous.
2. The evidence considered when a Saharan dust episode was identified is presented in the following Table.



²¹ Data from Michael Nolle (ERA), email dated 16th May 2018.

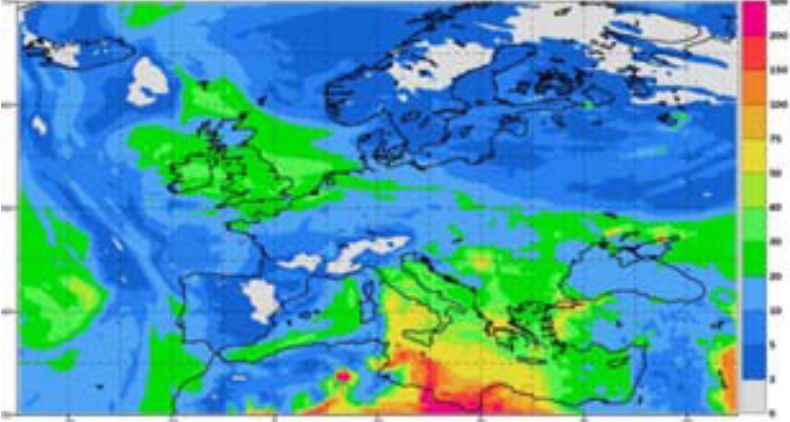
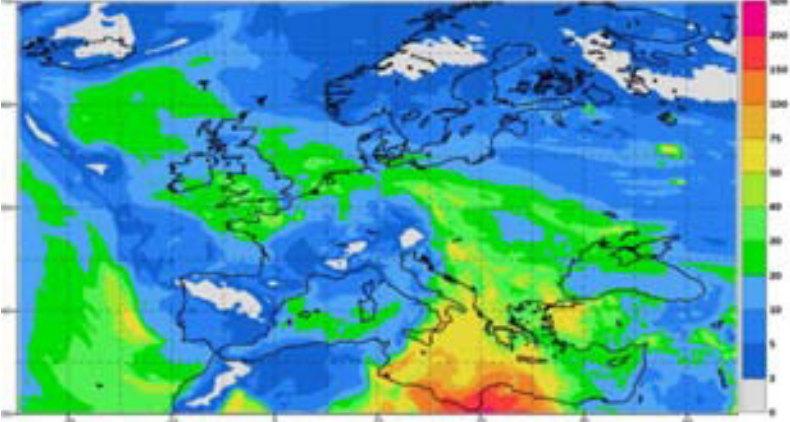
²² http://macc-raq.copernicus-atmosphere.eu/index.php?category=ensemble&subensemble=hourly_ensemble&date=LAST&calculation-model=ENSEMBLE&species=o3&level=SFC&offset=000.

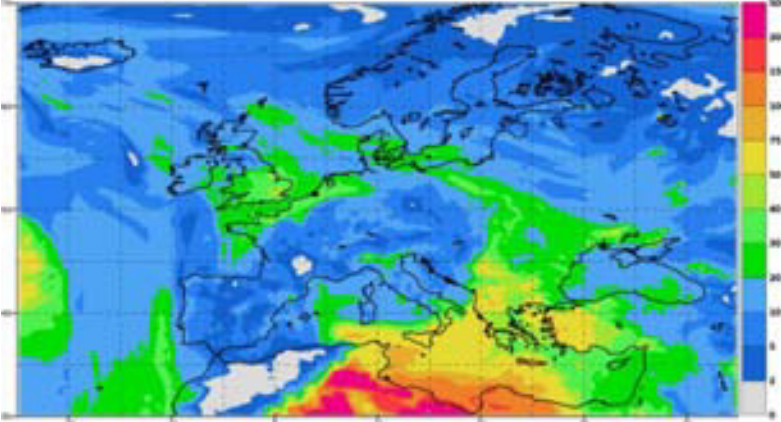
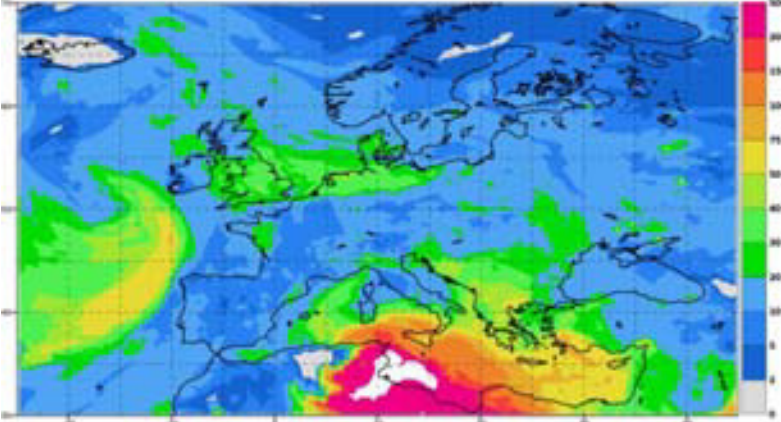
²³ https://lance.modaps.eosdis.nasa.gov/subsets/?subset=AERONET_ETNA.

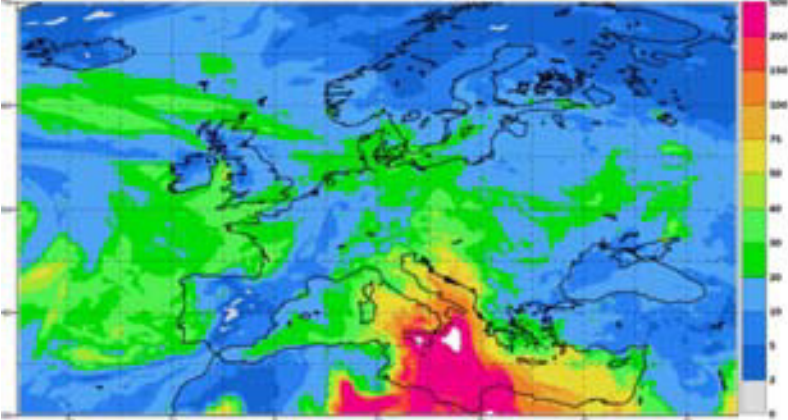
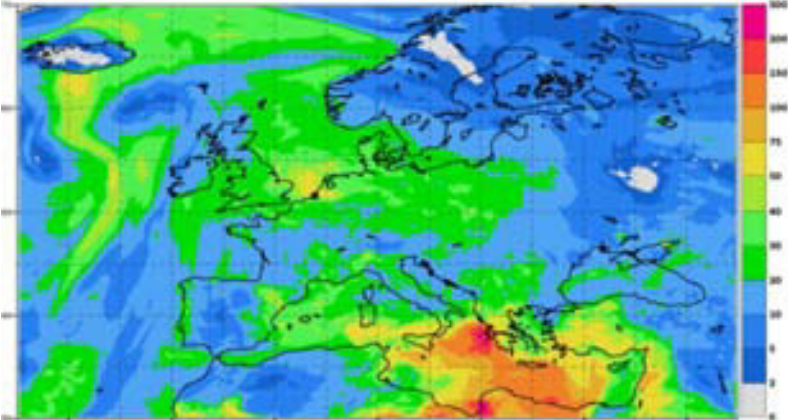
²⁴ <https://ready.arl.noaa.gov/hypub-bin/trajtype.pl?runtype=archive>.

Date	PM ₁₀ concentration (µg/m ³)			Supporting evidence
	Gharb	Msida	Zejtun	
02/03/2018	<u>58.3</u>	<u>80.6</u>	<u>74.2</u>	<p>NOAA HYSPLIT MODEL Backward trajectories ending at 1200 UTC 05 Mar 18 GDAS Meteorological Data</p> <p>Source ★ at 35.87 N 14.42 E</p> <p>Meters AGL</p> <p>Job ID: 116620 Job Start: Thu Apr 12 10:02:45 UTC 2018 Source 1 lat: 35.873000 lon: 14.423300 hgts: 1500, 500, 1 m AMSL</p> <p>Trajectory Direction: Backward Duration: 72 hrs Vertical Motion Calculation Method: Model Vertical Velocity Meteorology: 0000Z 1 Mar 2018 - GDAS1</p>

Date	PM ₁₀ concentration (µg/m ³)			Supporting evidence
	Għarb	Msida	Żejtun	
03/03/2018	<u>104.1</u>	<u>199.2</u>	<u>140.7</u>	
04/03/2018	45.9	<u>91.1</u>	<u>66.9</u>	

Date	PM ₁₀ concentration (µg/m ³)			Supporting evidence
	Għarb	Msida	Żejtun	
12/04/2018	<u>53.9</u>	No data	<u>57.2</u>	<p>Thursday 12 April 2018 00UTC CAMS Forecast t+000 VT: Thursday 12 April 2018 00UTC Model: ENSEMBLE Height level: Surface Parameter: PM10 Aerosol [µg/m3]</p> 
13/04/2018	41.4	No data	<u>50.8</u>	<p>Friday 13 April 2018 00UTC CAMS Forecast t+000 VT: Friday 13 April 2018 00UTC Model: ENSEMBLE Height level: Surface Parameter: PM10 Aerosol [µg/m3]</p> 

Date	PM ₁₀ concentration (µg/m ³)			Supporting evidence
	Għarb	Msida	Żejtun	
14/04/2018	45.6	No data	<u>55.1</u>	<p>Saturday 14 April 2018 00UTC CAMS Forecast 1+000 VT: Saturday 14 April 2018 00UTC Model: ENSEMBLE Height level: Surface Parameter: PM10 Aerosol [µg/m3]</p> 
15/04/2018	<u>152.2</u>	No data	<u>260.6</u>	<p>Sunday 15 April 2018 00UTC CAMS Forecast 1+000 VT: Sunday 15 April 2018 00UTC Model: ENSEMBLE Height level: Surface Parameter: PM10 Aerosol [µg/m3]</p> 

Date	PM ₁₀ concentration (µg/m ³)			Supporting evidence
	Għarb	Msida	Żejtun	
16/04/2018	41.2	No data	<u>85.8</u>	<p>Monday 16 April 2018 00UTC CAMS Forecast 1+000 VT; Monday 16 April 2018 00UTC Model: ENSEMBLE Height level: Surface Parameter: PM10 Aerosol [µg/m3]</p> 
19/04/2018	<u>56.1</u>	No data	<u>78.4</u>	<p>Thursday 19 April 2018 00UTC CAMS Forecast 1+000 VT; Thursday 19 April 2018 00UTC Model: ENSEMBLE Height level: Surface Parameter: PM10 Aerosol [µg/m3]</p> 



Part C: PM₁₀ lab reports

Laboratorio: Via Europa, 5 – 27041 CASANOVA LONATI (Pavia) – Sede legale: Via Rota Candiani, 13 – 27043 BRONI (Pavia)
 Tel. 0385.287128 (15 linee) – Fax 0385.57311 – E-mail: info@labanalysis.it – Sito internet: <http://www.labanalysis.it>

Report n° EV-18-004493-036595



To:
 ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
 KAPPARA BUSINESS CENTRE
 11 TRIQ BIRKIRKARA
 SGN4197 SAN GWANN - MALTA

Identification: Filter 21501 Project TEM004
 Matrix: Filter
 Sampling Company: Requesting Company
 Receiving sample: 2018-03-26
 Initial analysis date: 2018-03-28
 Final analysis date: 2018-04-05
 Report date: 2018-04-09

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i> particulate matter <10 µm (PM10)	µg	1360	m³	55,156	µg/m³	24,7	± 5,4

* = the tests so marked are not accredited by Accredia
 Sampling under the responsibility of the requesting company
 U.M. = Unit of Measurement
 Sampling volume = Sampling volume provided by Requesting Company
 Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company
 IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ
 The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.
 The expanded uncertainty is associated only if result is greater than LOQ
 "<x" = < MDL corrected for scaling factor (weighing and dilution)
 MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
 Ordine dei Chimici della Provincia di Pavia n° 423 A
 Dott. Stefano Maggi

51X0IT-111X64-111X0IX61-11X-111111-111111



To:
ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
KAPPARA BUSINESS CENTRE
11 TRIQ BIRKIRKARA
SGN4197 SAN GWANN - MALTA

Identification: Filter 21502 Project TEM004
Matrix: Filter
Sampling Company: Requesting Company
Receiving sample: 2018-03-26

Initial analysis date: 2018-03-28
Final analysis date: 2018-04-05
Report date: 2018-04-09

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i>							
particulate matter <10 µm (PM10)	µg	4510	m ³	55,159	µg/m ³	82	± 20

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
Dott. Stefano Maggi

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Report n° EV-18-004493-036597



To:
ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
KAPPARA BUSINESS CENTRE
11 TRIQ BIRKIRKARA
SGN4197 SAN GWANN - MALTA

Identification: Filter 21503 Project TEM004
Matrix: Filter
Sampling Company: Requesting Company
Receiving sample: 2018-03-26

Initial analysis date: 2018-03-28
Final analysis date: 2018-04-05
Report date: 2018-04-09

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i>							
particulate matter <10 µm (PM10)	µg	3230	m³	55,158	µg/m³	58,6	± 5,4

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
Dott. Stefano Maggi

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To:
ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
KAPPARA BUSINESS CENTRE
11 TRIQ BIRKIRKARA
SGN4197 SAN GWANN - MALTA

Identification: Filter 21504 Project TEM004
Matrix: Filter
Sampling Company: Requesting Company
Receiving sample: 2018-03-26

Initial analysis date: 2018-03-28
Final analysis date: 2018-04-05
Report date: 2018-04-09

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i>							
particulate matter <10 µm (PM10)	µg	7830	m ³	55,156	µg/m ³	142	± 36

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
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Report n° EV-18-004493-036599



To:
ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
KAPPARA BUSINESS CENTRE
11 TRIQ BIRKIRKARA
SGN4197 SAN GWANN - MALTA

Identification: Filter 21505 Project TEM004
Matrix: Filter
Sampling Company: Requesting Company
Receiving sample: 2018-03-26

Initial analysis date: 2018-03-28
Final analysis date: 2018-04-05
Report date: 2018-04-09

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i> particulate matter <10 µm (PM10)	µg	4400	m ³	55,153	µg/m ³	80	± 20

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
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Report n° EV-18-004493-036600



To:
ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
KAPPARA BUSINESS CENTRE
11 TRIQ BIRKIRKARA
SGN4197 SAN GWANN - MALTA

Identification: Filter 21506 Project TEM004
Matrix: Filter
Sampling Company: Requesting Company
Receiving sample: 2018-03-26

Initial analysis date: 2018-03-28
Final analysis date: 2018-04-05
Report date: 2018-04-09

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i> particulate matter <10 µm (PM10)	µg	2580	m ³	55,156	µg/m ³	46,8	± 5,4

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
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Report n° EV-18-004493-036601



To:
 ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
 KAPPARA BUSINESS CENTRE
 11 TRIQ BIRKIRKARA
 SGN4197 SAN GWANN - MALTA

Identification: Filter 21507 Project TEM004
 Matrix: Filter
 Sampling Company: Requesting Company
 Receiving sample: 2018-03-26

 Initial analysis date: 2018-03-28
 Final analysis date: 2018-04-05
 Report date: 2018-04-09

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i>							
particulate matter <10 µm (PM10)	µg	1500	m ³	55,154	µg/m ³	27,2	± 5,4

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
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Dott. Stefano Maggi

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Report n° EV-18-004493-036602



To:
ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
KAPPARA BUSINESS CENTRE
11 TRIQ BIRKIRKARA
SGN4197 SAN GWANN - MALTA

Identification: Filter 21508 Project TEM004
Matrix: Filter
Sampling Company: Requesting Company
Receiving sample: 2018-03-26

Initial analysis date: 2018-03-28
Final analysis date: 2018-04-05
Report date: 2018-04-09

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i> particulate matter <10 µm (PM10)	µg	3710	m ³	55,155	µg/m ³	67	± 17

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
Dott. Stefano Maggi

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Report n° EV-18-004493-036603



To:
ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
KAPPARA BUSINESS CENTRE
11 TRIQ BIRKIRKARA
SGN4197 SAN GWANN - MALTA

Identification: Filter 21509 Project TEM004
Matrix: Filter
Sampling Company: Requesting Company
Receiving sample: 2018-03-26

Initial analysis date: 2018-03-28
Final analysis date: 2018-04-05
Report date: 2018-04-09

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i>							
particulate matter <10 µm (PM10)	µg	1380	m ³	55,156	µg/m ³	25	± 5,4

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
Dott. Stefano Maggi

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Report n° EV-18-004493-036604



To:
ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
KAPPARA BUSINESS CENTRE
11 TRIQ BIRKIRKARA
SGN4197 SAN GWANN - MALTA

Identification: Filter 21510 Project TEM004
Matrix: Filter
Sampling Company: Requesting Company
Receiving sample: 2018-03-26

Initial analysis date: 2018-03-28
Final analysis date: 2018-04-05
Report date: 2018-04-09

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i> particulate matter <10 µm (PM10)	µg	1160	m ³	55,157	µg/m ³	21	± 5,4

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
Dott. Stefano Maggi

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Report n° EV-18-004493-036605



To:
ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
KAPPARA BUSINESS CENTRE
11 TRIQ BIRKIRKARA
SGN4197 SAN GWANN - MALTA

Identification: Filter 21511 Project TEM004
Matrix: Filter
Sampling Company: Requesting Company
Receiving sample: 2018-03-26

Initial analysis date: 2018-03-28
Final analysis date: 2018-04-05
Report date: 2018-04-09

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i>							
particulate matter <10 µm (PM10)	µg	3480	m ³	55,157	µg/m ³	63	± 16

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
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Dott. Stefano Maggi

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Report n° EV-18-004493-036606



To:
ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
KAPPARA BUSINESS CENTRE
11 TRIQ BIRKIRKARA
SGN4197 SAN GWANN - MALTA

Identification: Filter 21512 Project TEM004
Matrix: Filter
Sampling Company: Requesting Company
Receiving sample: 2018-03-26

Initial analysis date: 2018-03-28
Final analysis date: 2018-04-05
Report date: 2018-04-09

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i>							
particulate matter <10 µm (PM10)	µg	2070	m³	55,156	µg/m³	37,5	± 5,4

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
Dott. Stefano Maggi

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To:
ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
KAPPARA BUSINESS CENTRE
11 TRIQ BIRKIRKARA
SGN4197 SAN GWANN - MALTA

Identification: Filter 21513 Project TEM004
Matrix: Filter
Sampling Company: Requesting Company
Receiving sample: 2018-03-26

Initial analysis date: 2018-03-28
Final analysis date: 2018-04-05
Report date: 2018-04-09

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i>							
particulate matter <10 µm (PM10)	µg	1840	m ³	55,156	µg/m ³	33,4	± 5,4

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
Dott. Stefano Maggi



To:
ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
KAPPARA BUSINESS CENTRE
11 TRIQ BIRKIRKARA
SGN4197 SAN GWANN - MALTA

Identification: Filter 21515 Project TEM004
Matrix: Filter
Sampling Company: Requesting Company
Receiving sample: 04/04/2018

Initial analysis date: 18/04/2018
Final analysis date: 18/04/2018
Report date: 18/04/2018

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i> particulate matter <10 µm (PM10)	µg	2920	m³	55,157	µg/m³	52,9	± 5,4

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
Dott. Stefano Maggi

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 Tel. 0385.287128 (15 linee) – Fax 0385.57311 – E-mail: info@labanalysis.it – Sito internet: <http://www.labanalysis.it>

Report n° EV-18-005018-040965



To:
 ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
 KAPPARA BUSINESS CENTRE
 11 TRIQ BIRKIRKARA
 SGN4197 SAN GWANN - MALTA

Identification: Filter 21522 Project TEM004
 Matrix: Filter
 Sampling Company: Requesting Company
 Receiving sample: 04/04/2018

Initial analysis date: 18/04/2018
 Final analysis date: 18/04/2018
 Report date: 18/04/2018

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i>							
particulate matter <10 µm (PM10)	µg	2000	m³	55,158	µg/m³	36,3	± 5,4

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
Dott. Stefano Maggi

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To:

ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
 KAPPARA BUSINESS CENTRE
 11 TRIQ BIRKIRKARA
 SGN4197 SAN GWANN - MALTA

Identification: Filter 21524 Project TEM004
 Matrix: Filter
 Sampling Company: Requesting Company
 Receiving sample: 04/04/2018

 Initial analysis date: 18/04/2018
 Final analysis date: 18/04/2018
 Report date: 18/04/2018

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i>							
particulate matter <10 µm (PM10)	µg	1390	m³	55,156	µg/m³	25,2	± 5,4

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
Dott. Stefano Maggi

Laboratorio: Via Europa, 5 – 27041 CASANOVA LONATI (Pavia) – Sede legale: Via Rota Candiani, 13 – 27043 BRONI (Pavia)
Tel. 0385.287128 (15 linee) – Fax 0385.57311 – E-mail: info@labanalysis.it – Sito internet: <http://www.labanalysis.it>

Report n° EV-18-005018-040969



To:
ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
KAPPARA BUSINESS CENTRE
11 TRIQ BIRKIRKARA
SGN4197 SAN GWANN - MALTA

Identification: Filter 21526 Project TEM004
Matrix: Filter
Sampling Company: Requesting Company
Receiving sample: 04/04/2018

Initial analysis date: 18/04/2018
Final analysis date: 18/04/2018
Report date: 18/04/2018

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i>							
particulate matter <10 µm (PM10)	µg	903	m³	55,156	µg/m³	16,4	± 5,4

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
Dott. Stefano Maggi

Laboratorio: Via Europa, 5 – 27041 CASANOVA LONATI (Pavia) – Sede legale: Via Rota Candiani, 13 – 27043 BRONI (Pavia)
 Tel. 0385.287128 (15 linee) – Fax 0385.57311 – E-mail: info@labanalysis.it – Sito internet: <http://www.labanalysis.it>

Report n° EV-18-005018-040970



To:
 ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
 KAPPARA BUSINESS CENTRE
 11 TRIQ BIRKIRKARA
 SGN4197 SAN GWANN - MALTA

Identification: Filter 21527 Project TEM004
 Matrix: Filter
 Sampling Company: Requesting Company
 Receiving sample: 04/04/2018

Initial analysis date: 18/04/2018
 Final analysis date: 18/04/2018
 Report date: 18/04/2018

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i>							
particulate matter <10 µm (PM10)	µg	1430	m ³	55,152	µg/m ³	25,9	± 5,4

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
 Ordine dei Chimici della Provincia di Pavia n° 423 A
 Dott. Stefano Maggi



To:
ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
KAPPARA BUSINESS CENTRE
11 TRIQ BIRKIRKARA
SGN4197 SAN GWANN - MALTA

Identification: Filter 21528 Project TEM004
Matrix: Filter
Sampling Company: Requesting Company
Receiving sample: 04/04/2018

Initial analysis date: 18/04/2018
Final analysis date: 18/04/2018
Report date: 18/04/2018

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i>							
particulate matter <10 µm (PM10)	µg	1090	m³	55,156	µg/m³	19,8	± 5,4

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
Dott. Stefano Maggi

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Tel. 0385.287128 (15 linee) – Fax 0385.57311 – E-mail: info@labanalysis.it – Sito internet: <http://www.labanalysis.it>

Report n° EV-18-005018-040972



To:
ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
KAPPARA BUSINESS CENTRE
11 TRIQ BIRKIRKARA
SGN4197 SAN GWANN - MALTA

Identification: Filter 21529 Project TEM004
Matrix: Filter
Sampling Company: Requesting Company
Receiving sample: 04/04/2018
Initial analysis date: 18/04/2018
Final analysis date: 18/04/2018
Report date: 18/04/2018

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i>							
particulate matter <10 µm (PM10)	µg	2930	m ³	55,154	µg/m ³	53,1	± 5,4

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
Dott. Stefano Maggi

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Report n° EV-18-005018-040973



To:
ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
KAPPARA BUSINESS CENTRE
11 TRIQ BIRKIRKARA
SGN4197 SAN GWANN - MALTA

Identification: Filter 21530 Project TEM004
Matrix: Filter
Sampling Company: Requesting Company
Receiving sample: 04/04/2018

Initial analysis date: 18/04/2018
Final analysis date: 18/04/2018
Report date: 18/04/2018

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i> particulate matter <10 µm (PM10)	µg	1260	m ³	55,155	µg/m ³	22,8	± 5,4

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
Dott. Stefano Maggi

5 IX Q I T I N X E Q I L I X digitalmente ⇄ A I X D I X E L I X I L P O U I T E T I T

Laboratorio: Via Europa, 5 – 27041 CASANOVA LONATI (Pavia) – Sede legale: Via Rota Candiani, 13 – 27043 BRONI (Pavia)
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Report n° EV-18-005018-040975



To:
ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
KAPPARA BUSINESS CENTRE
11 TRIQ BIRKIRKARA
SGN4197 SAN GWANN - MALTA

Identification: Filter 21532 Project TEM004
Matrix: Filter
Sampling Company: Requesting Company
Receiving sample: 04/04/2018
Initial analysis date: 18/04/2018
Final analysis date: 18/04/2018
Report date: 18/04/2018

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i>							
particulate matter <10 µm (PM10)	µg	2210	m ³	55,155	µg/m ³	40,1	± 5,4

* = the tests so marked are not accredited by Accredia
Sampling under the responsibility of the requesting company
U.M. = Unit of Measurement
Sampling volume = Sampling volume provided by Requesting Company
Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company
IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ
The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.
The expanded uncertainty is associated only if result is greater than LOQ
"<x" = < MDL corrected for scaling factor (weighing and dilution)
MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
Dott. Stefano Maggi



To:
ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
KAPPARA BUSINESS CENTRE
11 TRIQ BIRKIRKARA
SGN4197 SAN GWANN - MALTA

Identification: Filter 21533 Project TEM004
Matrix: Filter
Sampling Company: Requesting Company
Receiving sample: 04/04/2018

Initial analysis date: 18/04/2018
Final analysis date: 18/04/2018
Report date: 18/04/2018

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i>							
particulate matter <10 µm (PM10)	µg	3490	m ³	55,157	µg/m ³	63	± 16

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
Dott. Stefano Maggi

Laboratorio: Via Europa, 5 – 27041 CASANOVA LONATI (Pavia) – Sede legale: Via Rota Candiani, 13 – 27043 BRONI (Pavia)
Tel. 0385.287128 (15 linee) – Fax 0385.57311 – E-mail: info@labanalysis.it – Sito internet: <http://www.labanalysis.it>

Report n° EV-18-005018-040977



To:
ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
KAPPARA BUSINESS CENTRE
11 TRIQ BIRKIRKARA
SGN4197 SAN GWANN - MALTA

Identification: Filter 21534 Project TEM004
Matrix: Filter
Sampling Company: Requesting Company
Receiving sample: 04/04/2018

Initial analysis date: 18/04/2018
Final analysis date: 18/04/2018
Report date: 18/04/2018

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i> particulate matter <10 µm (PM10)	µg	3600	m ³	55,157	µg/m ³	65	± 16

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
Dott. Stefano Maggi



To:
ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
KAPPARA BUSINESS CENTRE
11 TRIQ BIRKIRKARA
SGN4197 SAN GWANN - MALTA

Identification: Filter 21535 Project TEM004
Matrix: Filter
Sampling Company: Requesting Company
Receiving sample: 04/04/2018

Initial analysis date: 18/04/2018
Final analysis date: 18/04/2018
Report date: 18/04/2018

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i>							
particulate matter <10 µm (PM10)	µg	3220	m ³	52,794	µg/m ³	61	± 15

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
Dott. Stefano Maggi

5 I X C I T I N X E Q I L I X I G I T A L M E N T E I T A I X I V E L I I X I L P O L I T E T I T



To:
ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
KAPPARA BUSINESS CENTRE
11 TRIQ BIRKIRKARA
SGN4197 SAN GWANN - MALTA

Identification: Filter 3251 Project TEM004
Matrix: Filter
Sampling Company: Requesting Company
Receiving sample: 2018-04-26

Initial analysis date: 2018-04-27
Final analysis date: 2018-05-02
Report date: 2018-05-02

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i>							
particulate matter <10 µm (PM10)	µg	1250	m ³	55,159	µg/m ³	22,7	± 5,4

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
Dott. Stefano Maggi



To:
ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
KAPPARA BUSINESS CENTRE
11 TRIQ BIRKIRKARA
SGN4197 SAN GWANN - MALTA

Identification: Filter 3252 Project TEM004
Matrix: Filter
Sampling Company: Requesting Company
Receiving sample: 2018-04-26

Initial analysis date: 2018-04-27
Final analysis date: 2018-05-02
Report date: 2018-05-02

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i>							
particulate matter <10 µm (PM10)	µg	2020	m³	55,159	µg/m³	36,6	± 5,4

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
Dott. Stefano Maggi

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 Tel. 0385.287128 (15 linee) – Fax 0385.57311 – E-mail: info@labanalysis.it – Sito internet: <http://www.labanalysis.it>

Report n° EV-18-005910-047680



To:
 ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
 KAPPARA BUSINESS CENTRE
 11 TRIQ BIRKIRKARA
 SGN4197 SAN GWANN - MALTA

Identification:	Filter 3253	Project TEM004
Matrix:	Filter	
Sampling Company:	Requesting Company	
Receiving sample:	2018-04-26	
Initial analysis date:	2018-04-27	
Final analysis date:	2018-05-02	
Report date:	2018-05-02	

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i>							
particulate matter <10 µm (PM10)	µg	1870	m³	55,159	µg/m³	33,9	± 5,4

* = the tests so marked are not accredited by Accredia
 Sampling under the responsibility of the requesting company
 U.M. = Unit of Measurement
 Sampling volume = Sampling volume provided by Requesting Company
 Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company
 IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ
 The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.
 The expanded uncertainty is associated only if result is greater than LOQ
 "<x" = < MDL corrected for scaling factor (weighing and dilution)
 MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
Dott. Stefano Maggi

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Report n° EV-18-005910-047681



To:
ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
KAPPARA BUSINESS CENTRE
11 TRIQ BIRKIRKARA
SGN4197 SAN GWANN - MALTA

Identification: Filter 3254 Project TEM004
Matrix: Filter
Sampling Company: Requesting Company
Receiving sample: 2018-04-26

Initial analysis date: 2018-04-27
Final analysis date: 2018-05-02
Report date: 2018-05-02

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i>							
particulate matter <10 µm (PM10)	µg	1600	m ³	55,159	µg/m ³	29	± 5,4

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
Dott. Stefano Maggi

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Report n° EV-18-005910-047682



To:
 ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
 KAPPARA BUSINESS CENTRE
 11 TRIQ BIRKIRKARA
 SGN4197 SAN GWANN - MALTA

Identification: Filter 3255 Project TEM004
 Matrix: Filter
 Sampling Company: Requesting Company
 Receiving sample: 2018-04-26

 Initial analysis date: 2018-04-27
 Final analysis date: 2018-05-02
 Report date: 2018-05-02

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i>							
particulate matter <10 µm (PM10)	µg	1700	m ³	55,160	µg/m ³	30,8	± 5,4

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
Dott. Stefano Maggi

51X0IT INX04 I LIX0IX04 IIX I LIX0I IET IT

Report n° EV-18-005910-047684



To:
 ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
 KAPPARA BUSINESS CENTRE
 11 TRIQ BIRKIRKARA
 SGN4197 SAN GWANN - MALTA

Identification: Filter 3257 Project TEM004
 Matrix: Filter
 Sampling Company: Requesting Company
 Receiving sample: 2018-04-26

 Initial analysis date: 2018-04-27
 Final analysis date: 2018-05-02
 Report date: 2018-05-02

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
Method UNI EN 12341:2014							
particulate matter <10 µm (PM10)	µg	1520	m³	55,160	µg/m³	27,6	± 5,4

* = the tests so marked are not accredited by Accredia
 Sampling under the responsibility of the requesting company
 U.M. = Unit of Measurement
 Sampling volume = Sampling volume provided by Requesting Company
 Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company
 IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ
 The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.
 The expanded uncertainty is associated only if result is greater than LOQ
 "<x" = < MDL corrected for scaling factor (weighing and dilution)
 MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
Dott. Stefano Maggi



To:
ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
KAPPARA BUSINESS CENTRE
11 TRIQ BIRKIRKARA
SGN4197 SAN GWANN - MALTA

Identification: Filter 3258 Project TEM004
Matrix: Filter
Sampling Company: Requesting Company
Receiving sample: 2018-04-26

Initial analysis date: 2018-04-27
Final analysis date: 2018-05-02
Report date: 2018-05-02

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i>							
particulate matter <10 µm (PM10)	µg	1820	m ³	55,159	µg/m ³	33	± 5,4

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
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Laboratorio: Via Europa, 5 – 27041 CASANOVA LONATI (Pavia) – Sede legale: Via Rota Candiani, 13 – 27043 BRONI (Pavia)
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Report n° EV-18-005910-047686



To:
 ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
 KAPPARA BUSINESS CENTRE
 11 TRIQ BIRKIRKARA
 SGN4197 SAN GWANN - MALTA

Identification: Filter 3259 Project TEM004
 Matrix: Filter
 Sampling Company: Requesting Company
 Receiving sample: 2018-04-26
 Initial analysis date: 2018-04-27
 Final analysis date: 2018-05-02
 Report date: 2018-05-02

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i> particulate matter <10 µm (PM10)	µg	1640	m³	55,157	µg/m³	29,7	± 5,4

* = the tests so marked are not accredited by Accredia
 Sampling under the responsibility of the requesting company
 U.M. = Unit of Measurement
 Sampling volume = Sampling volume provided by Requesting Company
 Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company
 IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ
 The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.
 The expanded uncertainty is associated only if result is greater than LOQ
 "<x" = < MDL corrected for scaling factor (weighing and dilution)
 MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
Dott. Stefano Maggi

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Report n° EV-18-005910-047688



To:
ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
KAPPARA BUSINESS CENTRE
11 TRIQ BIRKIRKARA
SGN4197 SAN GWANN - MALTA

Identification: Filter 3261 Project TEM004
Matrix: Filter
Sampling Company: Requesting Company
Receiving sample: 2018-04-26

Initial analysis date: 2018-04-27
Final analysis date: 2018-05-02
Report date: 2018-05-02

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i>							
particulate matter <10 µm (PM10)	µg	2090	m ³	55,158	µg/m ³	37,9	± 5,4

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
Dott. Stefano Maggi

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Report n° EV-18-005910-047689



To:
ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
KAPPARA BUSINESS CENTRE
11 TRIQ BIRKIRKARA
SGN4197 SAN GWANN - MALTA

Identification: Filter 3262 Project TEM004
Matrix: Filter
Sampling Company: Requesting Company
Receiving sample: 2018-04-26

Initial analysis date: 2018-04-27
Final analysis date: 2018-05-02
Report date: 2018-05-02

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i> particulate matter <10 µm (PM10)	µg	1830	m ³	55,159	µg/m ³	33,2	± 5,4

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
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Dott. Stefano Maggi

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Report n° EV-18-005910-047690



To:
 ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
 KAPPARA BUSINESS CENTRE
 11 TRIQ BIRKIRKARA
 SGN4197 SAN GWANN - MALTA

Identification: Filter 3263 Project TEM004
 Matrix: Filter
 Sampling Company: Requesting Company
 Receiving sample: 2018-04-26

 Initial analysis date: 2018-04-27
 Final analysis date: 2018-05-02
 Report date: 2018-05-02

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i>							
particulate matter <10 µm (PM10)	µg	2200	m ³	55,159	µg/m ³	39,9	± 5,4

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
Dott. Stefano Maggi

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Report n° EV-18-005910-047691



To:
 ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
 KAPPARA BUSINESS CENTRE
 11 TRIQ BIRKIRKARA
 SGN4197 SAN GWANN - MALTA

Identification: Filter 3264 Project TEM004
 Matrix: Filter
 Sampling Company: Requesting Company
 Receiving sample: 2018-04-26

 Initial analysis date: 2018-04-27
 Final analysis date: 2018-05-02
 Report date: 2018-05-02

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i>							
particulate matter <10 µm (PM10)	µg	3030	m ³	55,159	µg/m ³	54,9	± 5,4

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
Dott. Stefano Maggi

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Report n° EV-18-005910-047692



To:
ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
KAPPARA BUSINESS CENTRE
11 TRIQ BIRKIRKARA
SGN4197 SAN GWANN - MALTA

Identification: Filter 3265 Project TEM004
Matrix: Filter
Sampling Company: Requesting Company
Receiving sample: 2018-04-26

Initial analysis date: 2018-04-27
Final analysis date: 2018-05-02
Report date: 2018-05-02

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i>							
particulate matter <10 µm (PM10)	µg	3760	m³	55,157	µg/m³	68	± 17

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
Dott. Stefano Maggi

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Laboratorio: Via Europa, 5 – 27041 CASANOVA LONATI (Pavia) – Sede legale: Via Rota Candiani, 13 – 27043 BRONI (Pavia)
 Tel. 0385.287128 (15 linee) – Fax 0385.57311 – E-mail: info@labanalysis.it – Sito internet: <http://www.labanalysis.it>

Report n° EV-18-005910-047693



To:
 ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
 KAPPARA BUSINESS CENTRE
 11 TRIQ BIRKIRKARA
 SGN4197 SAN GWANN - MALTA

Identification: Filter 3266 Project TEM004
 Matrix: Filter
 Sampling Company: Requesting Company
 Receiving sample: 2018-04-26
 Initial analysis date: 2018-04-27
 Final analysis date: 2018-05-02
 Report date: 2018-05-02

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i>							
particulate matter <10 µm (PM10)	µg	2550	m³	55,159	µg/m³	46,2	± 5,4

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
Dott. Stefano Maggi

51X0IT INX04 I LIX0IX04 IIX I LIX0I I 0ET IT



To:
ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
KAPPARA BUSINESS CENTRE
11 TRIQ BIRKIRKARA
SGN4197 SAN GWANN - MALTA

Identification: Filter 3267 Project TEM004
Matrix: Filter
Sampling Company: Requesting Company
Receiving sample: 2018-04-26

Initial analysis date: 2018-04-27
Final analysis date: 2018-05-02
Report date: 2018-05-02

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i>							
particulate matter <10 µm (PM10)	µg	5400	m ³	55,156	µg/m ³	98	± 24

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
Dott. Stefano Maggi

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Report n° EV-18-005910-047695



To:
ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
KAPPARA BUSINESS CENTRE
11 TRIQ BIRKIRKARA
SGN4197 SAN GWANN - MALTA

Identification: Filter 3268 Project TEM004
Matrix: Filter
Sampling Company: Requesting Company
Receiving sample: 2018-04-26

Initial analysis date: 2018-04-27
Final analysis date: 2018-05-02
Report date: 2018-05-02

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i> particulate matter <10 µm (PM10)	µg	11000	m ³	55,158	µg/m ³	199	± 50

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
Dott. Stefano Maggi

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Report n° EV-18-005910-047697



To:
 ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
 KAPPARA BUSINESS CENTRE
 11 TRIQ BIRKIRKARA
 SGN4197 SAN GWANN - MALTA

Identification: Filter 3270 Project TEM004
 Matrix: Filter
 Sampling Company: Requesting Company
 Receiving sample: 2018-04-26
 Initial analysis date: 2018-04-27
 Final analysis date: 2018-05-02
 Report date: 2018-05-02

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i>							
particulate matter <10 µm (PM10)	µg	2170	m³	55,155	µg/m³	39,3	± 5,4

* = the tests so marked are not accredited by Accredia
 Sampling under the responsibility of the requesting company
 U.M. = Unit of Measurement
 Sampling volume = Sampling volume provided by Requesting Company
 Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company
 IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ
 The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.
 The expanded uncertainty is associated only if result is greater than LOQ
 "<x" = < MDL corrected for scaling factor (weighing and dilution)
 MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
Dott. Stefano Maggi

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Report n° EV-18-005910-047698



To:
ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
KAPPARA BUSINESS CENTRE
11 TRIQ BIRKIRKARA
SGN4197 SAN GWANN - MALTA

Identification: Filter 3271 Project TEM004
Matrix: Filter
Sampling Company: Requesting Company
Receiving sample: 2018-04-26

Initial analysis date: 2018-04-27
Final analysis date: 2018-05-02
Report date: 2018-05-02

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i> particulate matter <10 µm (PM10)	µg	2180	m ³	55,153	µg/m ³	39,5	± 5,4

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
Dott. Stefano Maggi



To:
ADI ASSOCIATES ENVIRONMENTAL CONSULTANTS LTD
KAPPARA BUSINESS CENTRE
11 TRIQ BIRKIRKARA
SGN4197 SAN GWANN - MALTA

Identification: Filter 3272 Project TEM004
Matrix: Filter
Sampling Company: Requesting Company
Receiving sample: 2018-04-26

Initial analysis date: 2018-04-27
Final analysis date: 2018-05-02
Report date: 2018-05-02

Test	U.M.	Result	U.M.	Sampling volume	U.M.	Calculated result	IM
<i>Method UNI EN 12341:2014</i> particulate matter <10 µm (PM10)	µg	3720	m ³	55,155	µg/m ³	67	± 17

* = the tests so marked are not accredited by Accredia

Sampling under the responsibility of the requesting company

U.M. = Unit of Measurement

Sampling volume = Sampling volume provided by Requesting Company

Calculated result = The result was recalculated in concentration, based on the sampling volume provided by the Requesting Company

IM: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 % if result is greater than LOQ

The expanded uncertainty including sampling is reported only for information, even if the sampling was not performed directly by LabAnalysis.

The expanded uncertainty is associated only if result is greater than LOQ

"<x" = < MDL corrected for scaling factor (weighing and dilution)

MDL = method detection limit: the minimum concentration that can be measured and reported with 99% confidence that the analyte concentration is greater than zero

Il Responsabile Settore Aria LabAnalysis srl
Ordine dei Chimici della Provincia di Pavia n° 423 A
Dott. Stefano Maggi

Appendix 5: Air Dispersion Model

BREEZE ROADS Modelling
Townsend Mellieha
ADM Ltd Project P1808
May 2018

Calibration

Model to be calibrated following using Mepa Guidance - see right box

Calibration Factor for NOx and PM10	1.00
Additional amount to be added to PM10	17.7 µg/m ³

UK average vehicle age	8	years
Maltese average vehicle age	10 and 15	years

Traffic flow data: AADT estimates - FNL for David.xlsx

Road	Classification	% Heavy vehicles	Average speed (km/h)	Network (2017/8)	2020 AADT		2025 AADT	
					Network + Belleveiw	(Network + Belleveiw) + Scheme	Network + Belleveiw	(Network + Belleveiw) + Scheme
Triq Halq ic-Cawl	Access only	4%	25	815	840	1,510	883	1,553
Acces Road	Access only	4%	25	207	213	883	224	894
Triq il-Fortizza (west)	Access only	4%	25	2,319	2,389	3,059	2,511	3,181
Triq il-Fortizza (east)	Access only	4%	25	2,651	2,947	4,287	3,086	4,426
Triq il-Kbira (north)	Local access	12%	35	9,874	10,238	10,888	10,757	11,407
Triq il-Kbira (south)	Local access	12%	35	10,094	10,551	11,241	11,082	11,772
Triq Louis Wettinger	Arterial	8%	60	9,870	10,169	10,169	10,688	10,688
It-Telgħa ta' Selmun	Arterial	8%	50	16,196	16,838	17,528	17,689	18,379
Triq Selmun	Access only	4%	35	690	711	711	747	747

Baseline modelling for calibration assumes:

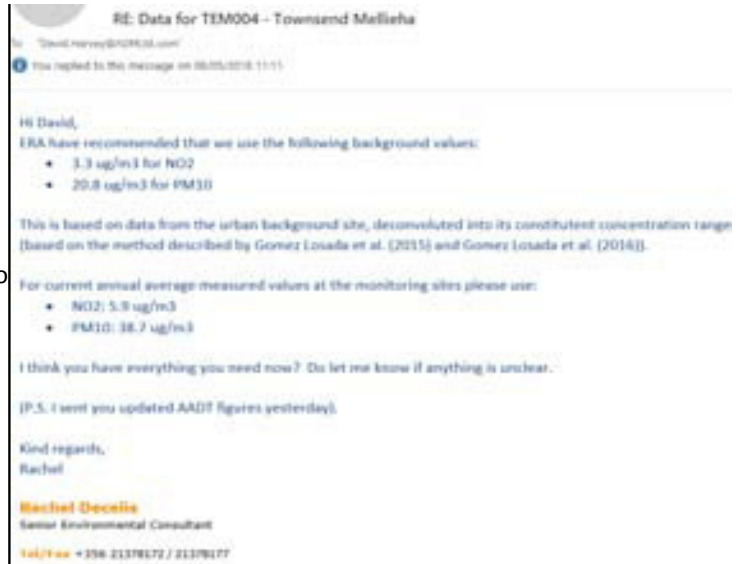
UK	8	Years Old	Model	2018
Maltese	15	Years Old	Emissions	2011

from: EFT2012_v5.1.3.xls

Description	2018			Emission (g/Veh-km)	
	Veh/hr	HGV	KPH	NOx	PM10
Triq Halq ic-Cawl	34	4%	25	0.761	0.041
Acces Road	9	4%	25	0.761	0.041
Triq il-Fortizza (west)	97	4%	25	0.761	0.041
Triq il-Fortizza (east)	110	4%	25	0.761	0.041
Triq il-Kbira (north)	411	12%	35	1.073	0.049
Triq il-Kbira (south)	421	12%	35	1.073	0.049
Triq Louis Wettinger	411	8%	60	0.648	0.041
It-Telgħa ta' Selmun	675	8%	50	0.702	0.042
Triq Selmun	29	4%	35	0.638	0.038
It-Telgħa ta' Selmun	675	8%	50	0.702	0.042



Description	2020		Maltese Vehicle Age		Emission (g/Veh-km)			
	Veh/hour		Emission Year		10		15	
	Baseline	With Dev	HGV	KPH	2018		2013	
Triq Halq ic-Cawl	35	63	4%	25	0.547	0.0295	0.730	0.0375
Acces Road	9	37	4%	25	0.547	0.0295	0.730	0.0375



Triq il-Fortizza (west)	100	127	4%	25	0.547	0.0295	0.730	0.0375
Triq il-Fortizza (east)	123	179	4%	25	0.547	0.0295	0.730	0.0375
Triq il-Kbira (north)	427	454	12%	35	0.588	0.0356	0.927	0.0446
Triq il-Kbira (south)	440	468	12%	35	0.588	0.0356	0.927	0.0446
Triq Louis Wettinger	424	424	8%	60	0.408	0.0309	0.573	0.0371
It-Telgħa ta' Selmun	702	730	8%	50	0.440	0.0312	0.626	0.0377
Triq Selmun	30	30	4%	35	0.469	0.0286	0.613	0.0353
It-Telgħa ta' Selmun	702	730	8%	50	0.440	0.0312	0.626	0.0377

Description	2025		Maltese Vehicle Age		Emission (g/Veh-km)			
	Veh/hour		Emission Year		10		15	
	Baseline	With Dev	HGV	KPH	2023		2018	
					NOx	PM10	NOx	PM10
Triq Halq ic-Cawl	37	65	4%	25	0.339	0.0263	0.547	0.0295
Acces Road	9	37	4%	25	0.339	0.0263	0.547	0.0295
Triq il-Fortizza (west)	105	133	4%	25	0.339	0.0263	0.547	0.0295
Triq il-Fortizza (east)	129	184	4%	25	0.339	0.0263	0.547	0.0295
Triq il-Kbira (north)	448	475	12%	35	0.328	0.0320	0.588	0.0356
Triq il-Kbira (south)	462	491	12%	35	0.328	0.0320	0.588	0.0356
Triq Louis Wettinger	445	445	8%	60	0.247	0.0284	0.408	0.0309
It-Telgħa ta' Selmun	737	766	8%	50	0.263	0.0285	0.440	0.0312
Triq Selmun	31	31	4%	35	0.294	0.0259	0.469	0.0286
It-Telgħa ta' Selmun	737	766	8%	50	0.263	0.0285	0.440	0.0312

Predictions at Receptors

For Model Calibration

Year	2018
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Run No	1	2						
	From Model		After Calibration		Total			
Receptor	NOx	PM10	NOx	PM10	NOx	PM10	NO2	
A	2.33	0.125	2.33	0.12	5.63	38.6	5.46	
B	1.73	0.089	1.73	0.09	5.03	38.6	5.02	
C	7.39	0.346	7.39	0.35	10.69	38.8	8.74	
D	6.77	0.314	6.77	0.31	10.07	38.8	8.36	
E	1.14	0.062	1.14	0.06	4.44	38.6	4.59	
F	9.29	0.559	9.29	0.56	12.59	39.1	9.85	
Monitoring Location	3.50	0.209	3.50	0.21	6.80	38.7	6.27	

	NO2	PM10	NOx	derived from this relationship for background (DEFRA TG4(00)) NO2 =
Background	3.30	20.8	3.30	at such low concentrations all NOx assumed to be oxidised to NO2
Monitoring Location	5.9	38.7		

NOx Calibration Factor	1.00
Addition for PM10	17.7

NOx

Run No	3	4	5	6	7	8	9	10
Assessment Year	2020				2025			
Age of Maltese Vehicle	10		15		10		15	
Receptor	Baseline	With Dev	Baseline	With Dev	Baseline	With Dev	Baseline	With Dev
A	1.44	1.68	2.13	2.46	0.89	1.03	1.51	1.75
B	1.11	1.30	1.61	1.87	0.69	0.80	1.17	1.36
C	4.31	4.69	6.70	7.26	2.55	2.77	4.53	4.90
D	3.89	4.15	6.09	6.50	2.29	2.44	4.08	4.34
E	0.74	0.90	1.06	1.29	0.46	0.56	0.77	0.94
F	6.05	6.29	8.61	8.95	3.80	3.95	6.35	6.60
Monitoring Location	2.28	2.37	3.24	3.38	1.43	1.48	2.39	2.49

PM10

Run No	11	12	13	14	15	16	17	18
Assessment Year	2020				2025			
Age of Maltese Vehicle	10		15		10		15	
Receptor	Baseline	With Dev	Baseline	With Dev	Baseline	With Dev	Baseline	With Dev
A	0.095	0.108	0.118	0.134	0.091	0.102	0.100	0.113
B	0.067	0.077	0.084	0.097	0.063	0.073	0.070	0.081
C	0.261	0.283	0.329	0.357	0.246	0.265	0.274	0.296
D	0.236	0.252	0.298	0.317	0.222	0.236	0.248	0.263
E	0.047	0.056	0.058	0.070	0.045	0.053	0.049	0.058
F	0.427	0.444	0.521	0.542	0.413	0.429	0.449	0.466
Monitoring Location	0.160	0.166	0.195	0.203	0.154	0.160	0.168	0.175

Total NO2 (µg/m3)

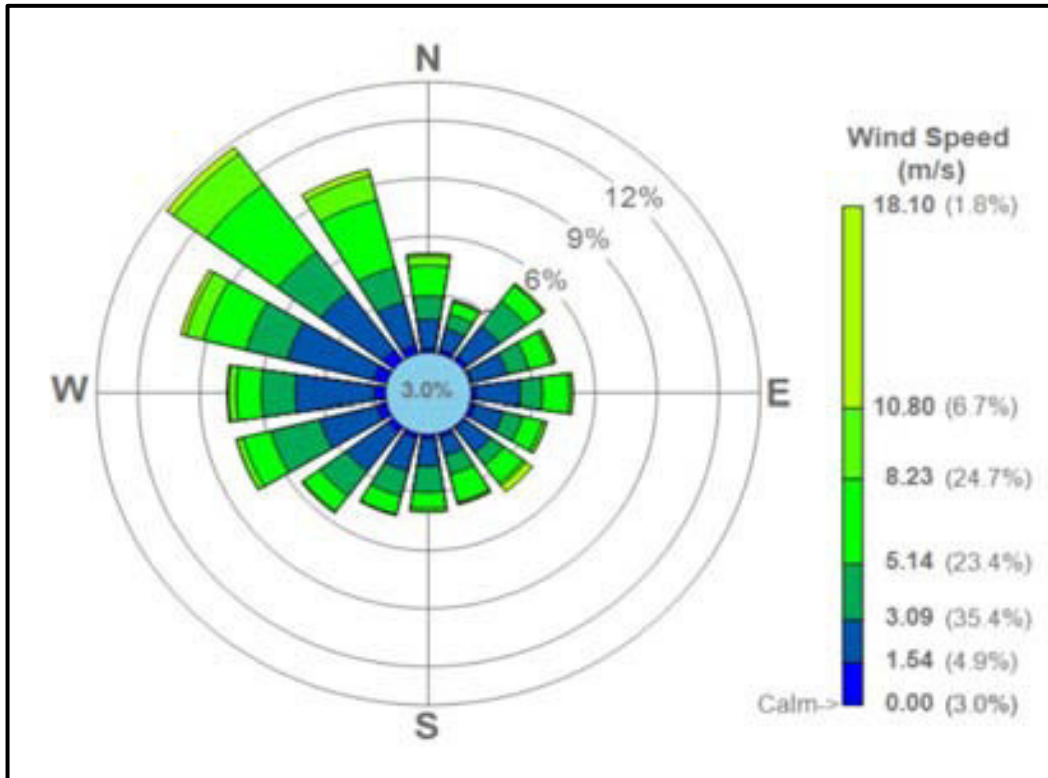
Run No	3	4	5	6	7	8	9	10
Assessment Year	2020				2025			
Age of Maltese Vehicles	10		15		10		15	
Receptor	Baseline	With Dev	Baseline	With Dev	Baseline	With Dev	Baseline	With Dev

A	3.77	3.78	3.78	3.80	3.76	3.77	3.77	3.78
B	3.74	3.75	3.76	3.77	3.74	3.75	3.75	3.75
C	3.90	3.92	3.95	3.98	3.89	3.90	3.91	3.93
D	3.88	3.89	3.93	3.94	3.87	3.88	3.89	3.90
E	3.73	3.73	3.74	3.74	3.72	3.73	3.73	3.74
F	4.03	4.05	4.11	4.12	4.02	4.03	4.05	4.06
Monitoring Location	3.82	3.82	3.85	3.85	3.81	3.82	3.82	3.83

Total PM10 ($\mu\text{g}/\text{m}^3$)

Run No	11	12	13	14	15	16	17	18
Assessment Year	2020				2025			
Age of Maltese Vehicles	10		15		10		15	
Receptor	Baseline	With Dev	Baseline	With Dev	Baseline	With Dev	Baseline	With Dev
A	38.60	38.61	38.62	38.63	38.59	38.60	38.60	38.61
B	38.57	38.58	38.58	38.60	38.56	38.57	38.57	38.58
C	38.76	38.78	38.83	38.86	38.75	38.77	38.77	38.80
D	38.74	38.75	38.80	38.82	38.72	38.74	38.75	38.76
E	38.55	38.56	38.56	38.57	38.54	38.55	38.55	38.56
F	38.93	38.94	39.02	39.04	38.91	38.93	38.95	38.97
Monitoring Location	38.66	38.67	38.70	38.70	38.65	38.66	38.67	38.67

2017 Windrose from Luqa



Road Layout



EFT2017_v8.0.1.xlsb
Only goes back to 2015

NOx			Estimate
2016	2015	2014	2013
0.635	0.666	0.698	0.730
0.635	0.666	0.698	0.730
0.635	0.666	0.698	0.730
0.635	0.666	0.698	0.730
0.735	0.799	0.863	0.927
0.735	0.799	0.863	0.927
0.487	0.516	0.544	0.573
0.528	0.560	0.593	0.626
0.541	0.565	0.589	0.613
0.528	0.560	0.593	0.626

PM10			Estimate
2016	2015	2014	2013
0.0319	0.0338	0.0356	0.0375
0.0319	0.0338	0.0356	0.0375
0.0319	0.0338	0.0356	0.0375
0.0319	0.0338	0.0356	0.0375
0.0387	0.0406	0.0426	0.0446
0.0387	0.0406	0.0426	0.0446
0.0329	0.0343	0.0357	0.0371
0.0333	0.0348	0.0363	0.0377
0.0306	0.0322	0.0337	0.0353
0.0333	0.0348	0.0363	0.0377