

Air Quality Assessment

Unit 4, Silverdale Data Centre, Hayes

Client: Mulhaven Properties LLC

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Table of Contents

1.0	INTRODUCTION	1
1.1	Background	1
1.2	Site Location and Context	1
2.0	LEGISLATION AND POLICY	3
2.1	Legislation	3
2.2	Environmental Assessment Levels	4
2.3	Local Air Quality Management	5
2.4	National Planning Policy	5
2.5	Local Planning Policy	7
	London Plan	7
	Hillingdon Local Plan	8
	Air Quality Action Plan	10
3.0	ASSESSMENT	11
3.1	Introduction	11
3.2	Construction Phase Fugitive Dust Emissions	11
3.3	Operational Phase Road Vehicle Exhaust Emissions	12
3.4	Operational Phase Combustion Emissions	13
3.5	Air Quality Neutral Assessment	14
3.6	Low Emissions Strategy	14
4.0	BEST AVAILABLE TECHNOLOGY ASSESSMENT	16
5.0	SUMMARY	19
6.0	ABBREVIATIONS	20

Appendix

Appendix 1 - Generator Technical Specification

1.0 INTRODUCTION

1.1 Background

- 1.1.1 This Air Quality Assessment has been prepared by Redmore Environmental to discharge Condition 25 attached to full planning permission (ref. 49261/APP/2024/2904), approved by LB Hillingdon on 12th March 2026 for redevelopment of Unit 4, Silverdale Industrial Estate, Hayes. The approved description of the development is as follows:

"Demolition of the existing building and structures on site, and all other associated site clearance works. Construction of a data centre building (Class B8) with plant at roof level with an emergency generator (1no.) and associated flue, (provided within an external compound adjoining the data centre building), sprinkler tank and pumphouse, security guard house, and provision of one kiosk substation and MV Building. The development also comprises the construction of a new access and internal road and circulation areas, footpaths, provision of car and bicycle parking, hard and soft landscaping and other associated works and ancillary site infrastructure."

- 1.1.2 This report is commissioned on behalf of Mulhaven Properties LLC.

1.2 Site Location and Context

- 1.2.1 The site is located at Unit 4, Silverdale Industrial Estate, Hayes, at approximate National Grid Reference (NGR): 510283, 179469. Reference should be made to Figure 1 for a map of the site and surrounding area.
- 1.2.2 Planning approval for the development has been granted by the LB Hillingdon (reference: 42961/APP/2024/2904) subject to a number of conditions. These include the following in relation to air quality:

"25. Prior to the installation of any generator(s), an Air Quality Assessment shall be submitted to and approved in writing by the Local Planning Authority. The report shall detail how the proposed generator(s) will minimise emissions and exposure to air pollution during operation to the maximum possible extent and will comply with the London Borough of Hillingdon Air Quality Local Action Plan.

The report shall show what alternatives have been considered, including a secondary electrical power supply, battery backup or alternatively fuelled generators such as gas fired or hydrogen. The details of the proposed generator(s) shall be submitted for approval. Where it is not possible to deploy alternatives, any diesel generators must comply with the emission requirements agreed with London Borough of Hillingdon during the evaluation of the application. The generator shall be used solely on the brief intermittent and exceptional occasions when required in response to an emergency and for the testing and maintenance necessary to meet that purpose and shall not be used at any other time.

Thereafter the development shall be implemented and operated in accordance with these details.

Reason: The application site is within an Air Quality Management Area and Air Quality Focus Area, in close proximity to sensitive receptors, and to reduce the impact on air quality in accordance with Policy EM8 of the Hillingdon Local Plan: Part 1 (2012), Policy DME1 14 of the Hillingdon Local Plan: Part 2 (2020), the London Borough of Hillingdon Air Quality Action Plan 2019-2024, Policy SI 1 of the London Plan (2021), and paragraphs 8(c), 187e) and 198, 199 of the National Planning Policy Framework (2024)."

- 1.2.3 An Air Quality Assessment has therefore been produced in order to address the requirements of the above condition. This is provided in the following report.
- 1.2.4 Reference should be made to the original Air Quality Assessment¹ for a full description of the assessment methodology and associated results, as well as the Low Emission Strategy². The Technical Specification for the proposed generator to be installed is provided within Appendix 1.

¹ Air Quality Assessment, Unit 4, Silverdale Industrial Estate, Hayes - ref: 8167, Redmore Environmental Ltd, 2025.

² Low Emission Strategy, Unit 4, Silverdale Industrial Estate, Hayes, ref: 8167-2, Redmore Environmental Ltd, 2026.

2.0 **LEGISLATION AND POLICY**

2.1 **Legislation**

2.1.1 The Air Quality Standards Regulations (2010) and subsequent amendments include Air Quality Limit Values (AQLVs) for the following pollutants:

- Nitrogen dioxide (NO₂);
- Sulphur dioxide (SO₂);
- Lead;
- Particulate matter with an aerodynamic diameter of less than 10µm (PM₁₀);
- Particulate matter with an aerodynamic diameter of less than 2.5µm (PM_{2.5});
- Benzene (C₆H₆); and,
- Carbon monoxide.

2.1.2 Air Quality Target Values were also provided for several additional pollutants. It should be noted that the AQLV for PM_{2.5} stated in the Air Quality Standards Regulations (2010) was amended in the Environment (Miscellaneous Amendments) (EU Exit) Regulations (2020).

2.1.3 The Air Quality Strategy (AQS) was produced by the Department for Environment, Food and Rural Affairs (DEFRA) and published on 28th April 2023³. The document contains standards, objectives and measures for improving ambient air quality, including a number of Air Quality Objectives (AQOs). These are maximum ambient pollutant concentrations that are not to be exceeded either without exception or with a permitted number of exceedences over a specified timescale. These are generally in line with the AQLVs, although the requirements for the determination of compliance vary.

2.1.4 The Environmental Improvement Plan 2025⁴ was published in December 2025, providing long term and Interim Targets in order to reduce population exposure to PM_{2.5}. The Concentration Target for 2040 was adopted in the Environmental Targets (Fine Particulate Matter) (England) Regulations (2023).

³ The AQS: Framework for Local Authority Delivery, DEFRA, 2023.

⁴ Environmental Improvement Plan 2025, DEFRA, 2025.

2.1.5 Table 1 presents the AQOs, Interim Target and Concentration Target for pollutants considered within the report.

Table 1 Air Quality Objectives/Interim Target/Concentration Target

Pollutant	Air Quality Objective	
	Concentration ($\mu\text{g}/\text{m}^3$)	Averaging Period
NO ₂	40	Annual mean
	200	1-hour mean, not to be exceeded on more than 18 occasions per annum
PM ₁₀	40	Annual mean
	50	24-hour mean, not to be exceeded on more than 35 occasions per annum
PM _{2.5}	10 ^(a)	Annual mean
	10 ^(b)	Annual mean
SO ₂	125	24-hour mean; not to be exceeded more than 3 times per annum
	350	1-hour mean; not to be exceeded more than 24 times per annum
	266	15-minute mean; not to be exceeded more than 35 times per annum

Note: (a) Interim Target to be achieved by 2030.

(b) Concentration Target to be achieved by 2040.

2.2 Environmental Assessment Levels

2.2.1 An Environmental Assessment Level (EAL) is the concentration of a substance, which, in a particular environment medium, the regulators regard as an appropriate value to enable a comparison between the environmental effects of different substances in that medium and between environmental effects in different media, enabling the summation of those effects.

2.2.2 EALs considered within the report were obtained from EA guidance⁵ and are summarised in Table 2.

⁵ <https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit>.

Table 2 Environmental Assessment Levels

Pollutant	Environmental Assessment Level	
	Concentration (µg/m ³)	Averaging Period
Formaldehyde (CH ₂ O)	5	Annual mean
	100	1-hour mean

2.3 Local Air Quality Management

- 2.3.1 Local Authorities (LAs) are required to periodically review and assess air quality within their area of jurisdiction under the system of Local Air Quality Management (LAQM). This review and assessment of air quality involves comparing present and likely future pollutant concentrations against the AQOs. If it is predicted that levels at locations of relevant exposure are likely to be exceeded, the LA is required to declare an Air Quality Management Area (AQMA). For each AQMA the LA is required to produce an Air Quality Action Plan, the objective of which is to reduce pollutant concentrations in pursuit of the AQOs.

2.4 National Planning Policy

- 2.4.1 The revised National Planning Policy Framework⁶ (NPPF) was published in December 2024 and sets out the Government's planning policies for England and how these are expected to be applied.
- 2.4.2 The purpose of the planning system is to contribute to the achievement of sustainable development. In order to ensure this, the NPPF recognises three overarching objectives, including the following of relevance to air quality:

"Paragraph 8(c) An environmental objective - to protect and enhance our natural built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy."

⁶ NPPF, Ministry of Housing, Communities and Local Government, 2024.

"Paragraph 187(e) preventing new and existing developments from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans."

"Paragraph 198 - Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- a) Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development - and avoid noise giving rise to significant adverse impacts on health and the quality of life;
- b) Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and
- c) Limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation."

"Paragraph 199 - Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas.

Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."

2.4.3 The implications of the NPPF were considered throughout the report.

2.5 Local Planning Policy

London Plan

2.5.1 The London Plan (2021)⁷ is the Spatial Development Strategy for Greater London. It sets out a framework for how London will develop over the next 20-25 years and the Mayor's vision for Good Growth. Review of this document indicated the following:

"Policy SI 1 - Improving Air Quality

A. Development plans, through relevant strategic, site specific and area-based policies should seek opportunities to identify and deliver further improvements to air quality and should not reduce air quality benefits that result from the Mayor's or boroughs' activities to improve air quality.

B. To tackle poor air quality, protect health and meet legal obligations the following criteria should be addressed.

1. Development proposals should not:

- a) lead to further deterioration of existing poor air quality
- b) create any new areas that exceed air quality limits, or delay the date at which compliance will be achieved in areas that are currently in exceedance of legal limits
- c) create unacceptable risk of high levels of exposure to poor air quality.

2. In order to meet the requirements of Part 1, as a minimum:

- a) development proposals must be at least Air Quality Neutral
- b) development proposals should use design solutions to prevent or minimise increased exposure to existing air pollution and make provision to address local problems of air quality in preference to post-design or retro-fitted mitigation measures.
- c) major development proposals must be submitted with an Air Quality Assessment. Air quality assessments should show how the development will meet the requirements of B1
- d) development proposals in Air Quality Focus Areas or that are likely to be used by large numbers of people particularly vulnerable to poor air quality, such as

⁷ The London Plan March 2021, GLA, 2021.

children or older people, should demonstrate that design measures have been used to minimise exposure.

C. Masterplans and development briefs for large-scale development proposals subject to an Environmental Impact Assessment should consider how local air quality can be improved across the area of the proposal as part of an air quality positive approach. To achieve this a statement should be submitted demonstrating:

- a) How proposals have considered ways to maximise benefits to local air quality, and
- b) What measures or design features will be put in place to reduce exposure to pollution, and how they will achieve this.

D. In order to reduce the impact on air quality during the construction and demolition phase development proposals must demonstrate how they plan to comply with the Non-Road Mobile Machinery Low Emission Zone and reduce emissions from the demolition and construction of buildings following best practice guidance.

E. Development proposals should ensure that where emissions need to be reduced to meet the requirements of Air Quality Neutral or to make the impact of development on local air quality acceptable, this is done on-site. Where it can be demonstrated that emissions cannot be further reduced by on-site measures, off-site measures to improve local air quality may be acceptable, provided that equivalent air quality benefits can be demonstrated within the area affected by the development."

2.5.2 The requirements of these policies were considered throughout the report.

Hillingdon Local Plan

2.5.3 The LB Hillingdon Local Plan Part 1⁸ was adopted in November 2012. It sets out the overall level and broad locations of growth up to 2026. Review of the document indicated the following of relevance:

⁸ Local Plan Part 1, LB Hillingdon, 2012.

"Policy EM8: Land, Water, Air and Noise

[...]

Air Quality

All development should not cause deterioration in the local air quality levels and should ensure the protection of both existing and new sensitive receptors.

All major development within the Air Quality Management Area (AQMA) should demonstrate air quality neutrality (no worsening of impacts) where appropriate; actively contribute to the promotion of sustainable transport measures such as vehicle charging points and the increased provision for vehicles with cleaner transport fuels; deliver increased planting through soft landscaping and living walls and roofs; and provide a management plan for ensuring air quality impacts can be kept to a minimum.

The Council seeks to reduce the levels of pollutants referred to in the Government's National Air Quality Strategy and will have regard to the Mayor's Air Quality Strategy. London Boroughs should also take account of the findings of the Air Quality Review and Assessments and Actions plans, in particular where Air Quality Management Areas have been designated.

The Council has a network of Air Quality Monitoring stations but recognises that this can be widened to improve understanding of air quality impacts. The Council may therefore require new major development in an AQMA to fund additional air quality monitoring stations to assist in managing air quality improvements.

[...]"

2.5.4 The Local Plan Part 2 Development Management Policies and Site Allocations and Designations⁹ was adopted by LB Hillingdon on 16th January 2020. Review of the document indicated the following of relevance:

⁹ Local Plan Part 2 Development Management Policies and Site Allocations and Designations, LB Hillingdon, 2020.

"Policy DMEI 14: Air Quality

A) Development proposals should demonstrate appropriate reductions in emissions to sustain compliance with and contribute towards meeting EU limit values and national air quality objectives for pollutants.

B) Development proposals should, as a minimum:

i. be at least 'air quality neutral';

ii. include sufficient mitigation to ensure there is no unacceptable risk from air pollution to sensitive receptors, both existing and new; and

iii) actively contribute towards the improvement of air quality, especially within the Air Quality Management Area."

2.5.5 The above policies were considered throughout the report.

Air Quality Action Plan

2.5.6 The LB Hillingdon Air Quality Action Plan 2019-2024¹⁰ was adopted in May 2019. The document outlines the actions that will be taken to improve air quality in the borough between 2019 and 2024. The document was taken into consideration throughout the report.

¹⁰ LB Hillingdon Air Quality Action Plan 2019-2024. LB Hillingdon, 2019.

3.0 **ASSESSMENT**

3.1 **Introduction**

- 3.1.1 The proposed development has the potential to cause air quality impacts during the construction and operational phases. These were assessed as part of the original Air Quality Assessment¹¹.
- 3.1.2 In order to address the requirements of Condition 25 a review of the findings of the Assessment has been undertaken. This is provided in the following Sections, alongside how the scheme will minimise emissions and exposure to air pollution to the maximum possible extent.

3.2 **Construction Phase Fugitive Dust Emissions**

- 3.2.1 An assessment of potential impacts associated with fugitive dust emissions during the construction phase was undertaken in accordance with the Institute of Air Quality Management (IAQM) document 'Guidance on the Assessment of Dust from Demolition and Construction V2.2'¹² and the Mayor of London's 'The Control of Dust and Emissions during Construction and Demolition Supplementary Planning Guidance'¹³. The assessment considered potential impacts as a result of demolition, earthworks, construction and trackout activities.
- 3.2.2 The findings of the assessment indicated that the potential risk of dust soiling was **medium** from trackout and **low** from demolition, earthworks and construction. The potential risk of human health impacts was determined to be **low** from trackout and **negligible** from demolition, earthworks and construction.
- 3.2.3 Based on the findings of the assessment, a number of mitigation measures were outlined for inclusion within the Outline Construction Management Plan prepared for the

¹¹ Air Quality Assessment, Unit 4, Silverdale Industrial Estate, Hayes - ref: 8167, Redmore Environmental Ltd, 2025.

¹² Guidance on the Assessment of Dust from Demolition and Construction V2.2, IAQM, 2024

¹³ The Control of Dust and Emissions during Construction and Demolition Supplementary Planning Guidance, The Mayor of London, 2014.

Application. These are summarised in Table 21 of the Air Quality Assessment¹⁴. Assuming the outlined mitigation measures are implemented, the residual impact from all dust generating activities was predicted to be **not significant** in accordance with the IAQM guidance.

3.2.4 Emissions associated with the construction of the proposed generator and associated infrastructure have therefore been minimised as far as practicable.

3.2.5 Based on the findings of the assessment, the construction of the development complies with the requirements of the aforementioned policies and guidance documents.

3.3 Operational Phase Road Vehicle Exhaust Emissions

3.3.1 An assessment of potential impacts associated with road vehicle exhaust emissions during the operation of the proposal was undertaken in accordance with the IAQM document 'Land-Use Planning & Development Control: Planning for Air Quality'¹⁵. This included consideration of the anticipated trip generation associated with the development.

3.3.2 The results of the assessment indicated that due to the low number of vehicle movements generated by the scheme, potential air quality impacts were predicted to be **not significant**. As such, mitigation measures to further control emissions were not required. Notwithstanding this, a Low Emission Strategy¹⁶ was produced in order to outline the specific mitigation to be incorporated into the development. This is summarised in Section 3.6.

3.3.3 Through the implementation of measures outlined within the Low Emission Strategy, emissions associated with road vehicle exhaust emissions during the operation of the site have been minimised as far as practicable.

3.3.4 Based on the findings of the assessment, the development complies with the requirements of the aforementioned policies and guidance documents.

¹⁴ Air Quality Assessment, Unit 4, Silverdale Industrial Estate, Hayes - ref: 8167, Redmore Environmental Ltd, 2025.

¹⁵ Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

¹⁶ Low Emission Strategy, Unit 4, Silverdale Industrial Estate, Hayes, ref: 8167-2, Redmore Environmental Ltd, 2026.

3.4 Operational Phase Combustion Emissions

- 3.4.1 An assessment of potential impacts associated with combustion emissions from the proposed generator was undertaken in accordance with the IAQM document 'Land-Use Planning & Development Control: Planning for Air Quality'¹⁷. This included dispersion modelling of the proposed generator in order to predict concentrations of NO₂, PM₁₀, PM_{2.5}, CH₂O and SO₂ at existing receptor locations in the vicinity of the site during regular testing and maintenance procedures. Reference should be made to the Air Quality Assessment¹⁸ for a full summary of the dispersion modelling inputs. It should be noted that the assessment was undertaken using higher emission concentrations than those outlined within the technical specification for the generator, outlined in Appendix 1. This is due to a change in the proposed unit following completion of the modelling. As such, predicted concentrations outlined within the Air Quality Assessment are considered to be robust as using the new specification would result in lower impacts.
- 3.4.2 The results of the dispersion modelling indicated that predicted concentrations were below the relevant AQOs and EALs at all sensitive receptors as a result of all meteorological years. The results also indicated that impacts associated with the operation of the generator were considered to be **not significant** in accordance with the IAQM guidance. As such, mitigation measures to further control emissions were not required. Notwithstanding this, a Low Emission Strategy was produced in order to outline the specific mitigation to be incorporated into the development. This is summarised in Section 3.6.
- 3.4.3 It should be noted that in order to reduce emissions as far as practicable the generator will be served by a vertical stack that discharges above the ridge of the plant building. This arrangement promotes effective dispersion of pollutant emissions and will help to minimise impacts throughout operation.
- 3.4.4 Based on the findings of the assessment, the operation of the generator complies with the requirements of the aforementioned policies and guidance documents.

¹⁷ Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

¹⁸ Air Quality Assessment, Unit 4, Silverdale Industrial Estate, Hayes - ref: 8167, Redmore Environmental Ltd, 2025.

3.5 Air Quality Neutral Assessment

- 3.5.1 An Air Quality Neutral Assessment was undertaken in accordance with the requirements of the London Plan¹⁹. The methodology produced by the Greater London Authority (GLA)²⁰ was utilised to determine potential emissions from the proposed development.
- 3.5.2 The assessment indicated that as the scheme will provide heating and hot water through use of electric heat pumps, the proposal is considered air quality neutral from a building emissions perspective. Further, the anticipated trip generation associated with the development was lower than the calculated Transport Emission Benchmark. The proposals were therefore considered to be air quality neutral from a transport emissions perspective.
- 3.5.3 The results of the assessment indicate that mitigation measures to further control emissions were not required. Notwithstanding this, a Low Emission Strategy was produced in order to outline the specific mitigation to be incorporated into the development. This is summarised in Section 3.6.
- 3.5.4 Based on the findings of the assessment, the operation of the site complies with the requirements of the aforementioned policies and guidance documents.

3.6 Low Emissions Strategy

- 3.6.1 A Low Emission Strategy²¹ was produced in support of the development in order to specify the ways in which air pollution emissions would be reduced to the maximum possible extent. The strategy considered emissions associated with the construction and operational phases.
- 3.6.2 As summarised within the Strategy, the following mitigation measures will be implemented in order to further reduce any potential emissions and exposure to air pollution during construction and operation:

¹⁹ The London Plan - The Spatial Development Strategy for Greater London, GLA, 2021.

²⁰ London Plan Guidance: Air Quality Neutral, GLA, 2023.

²¹ Low Emission Strategy, Unit 4, Silverdale Industrial Estate, Hayes, ref: 8167-2, Redmore Environmental Ltd, 2026.

- Measures to reduce the potential for fugitive dust emissions associated with construction phase activities;
- Provision of a generator stack that will discharge above the ridge of the building in order to promote effective emission dispersion;
- Provision of a Staff Welcome Pack to provide information on public transport options, cycling and walking routes and car share schemes;
- Provision of a Travel Information Noticeboard to provide up to date information on bus and train times, cycling and walking routes and car share schemes;
- Provision of group walking activities;
- Implementation of a Cycle to Work scheme; Installation of Electric Vehicle Charging points; and,
- Development of a car share database.

3.6.3 A carbon offset payment in lieu has also been paid by the Applicant.

3.6.4 It is noted that the back-up generator requires an Environmental Permit to operate. This will ensure the plant is supplied in accordance with Best Available Technology (BAT). A summary of the BAT assessment undertaken for the development is provided in Section 4.0. This included a review of alternative options for providing emergency power at the site and considered elements such as start-up time, fuel volatility, fuel supply and engine maintenance.

3.6.5 As outlined in the Strategy, the proposal complies with the requirements of the aforementioned policies and guidance documents.

4.0 BEST AVAILABLE TECHNOLOGY ASSESSMENT

4.1.1 An Emergency Stand-by Generator (ESG) has been selected to provide emergency power to the site in the event of grid failure. A BAT assessment considering alternative technologies and why the ESG is considered BAT is presented below.

4.1.2 There are currently no BAT reference documents or BAT Referenced (BREF) notes that have been made available by the European Commission that reference the specific provision of backup power in the Data Centre industry. The selection of technology is based on the guidance in the Environment Agency's (EAs) 'Data Centre FAQ Headline Approach v21'.

4.1.3 One ESG will be installed to provide power to the data centre in the unlikely event of a power outage of mains electricity supplies. To meet the requirements of a Tier III concurrently maintainable data centre, an ESG must:

- Start and take full electrical load in less than 2 minutes to minimise the quantity of batteries deployed in the Uninterruptable Power Supply (UPS) whilst the generator starts, synchronises and accepts the load;
- Have sufficient fuel stored on site to enable generator running at full load for 72-hours of continuous running;
- Must be tested regularly to ensure that it will operate in the unlikely event of a mains power outage;
- Must be able to operate at low loads, during early deployments as the IT demand grows and when external ambient conditions dictate very small cooling demand in the facility; and,
- Must be modular to allow for expansion as the data centre load grows.

4.1.4 As the ESG is an intermittent source of power and the data centre uses ambient conditions for 'free cooling' there is no opportunity for using heat recovery systems on the generator to improve overall operating efficiencies.

4.1.5 In addition, the electric loads in the facility can change very quickly in response to changes in IT processing demands and/ or external ambient conditions. The ESG must therefore be able to respond quickly to changes in load condition.

4.1.6 The available engine technologies to provide this level of duty are diesel engines, gas spark ignition engines, gas turbines and fast start aero engine derivatives. A high-level comparison of the attributes associated with these four technologies, bearing in mind the specific data centre requirements, is presented in Table 3.

Table 3 High Level Comparison of Alternative Engine/ Fuel Technologies

Attributes	Engine/ Fuel Technologies (no heat recovery)			
	Diesel Engine	Gas Engine	Gas Turbine	Aero-Derivative
Start Time to Full Load	<2 minutes	7-10 minutes	10-15 minutes	2-5 minutes
Reaction to Load Changes	Immediate	Slow	Slow	Slow
Fuel Volatility and Storage Safety Risk	Low	High	High	High
Fuel Supply	Diesel/Hydrotreated Vegetable Oil (HVO)	Gas, requires a grid connection	Gas, requires a grid connection	Gas, requires a grid connection
Fuel Storage	Simple tanks and gravity connections	Complex, gas compression, pumps and storage	Complex, gas compression, pumps and storage	Complex, gas compression, pumps and storage
Engine Maintenance	Low frequency, Standard diesel engine technology	High frequency, Standard gas engine technology	High frequency, Specialist engineering support	High frequency, Specialist engineering support
Cost per MW installed	Lowest cost	10-20% more costly than diesel engines	20-30% more costly than diesel engines	30-40% more costly than diesel engines

4.1.7 The high-level comparison between the technologies demonstrates that the benefits of fast start, reaction to load changes, simpler and safer fuel supply, storage and handling systems associated with a diesel combustion engine outweigh the benefits of the other technologies, particularly given the low anticipated run hours each year for the ESG deployed.

4.1.8 The generator has been selected based on the required electrical load for the data centre suite. This ensures that the generator is operated at its optimal design capacity; operating diesel generator sets at low loads (i.e. underloading) for extended periods of

time can potentially impact uptime and engine life. The generator is also dual compatible with biodiesel/ fossil fuel diesel. This allows the use of HVO as the primary fuel source whilst ensuring that it can be blended directly with diesel. This would allow diesel to be used as a 'top-up' in the event of any market shortages of HVO to guarantee uninterrupted supply.

- 4.1.9 As part of the annual maintenance programme, testing of the generator throughout the year for short periods of time is required. As only one generator will be installed, the mass emission rate to air of combustion emissions during the testing period is minimised.
- 4.1.10 The above points demonstrate that plant sizing, configuration along with routine maintenance and testing of the generator has been considered and are aligned with the principles of the BAT process delivering optimised efficiency (fuel consumption) and emissions.
- 4.1.11 Although other engine types have been considered as part of this BAT Assessment, an alternative generator for deployment has not been identified. Based on the findings of the Air Quality Assessment, outlined in Section 3.4, the proposed generator will not lead to any exceedence of relevant AQOs or EALs at any sensitive receptor location. As such, the plant complies with the relevant emission requirements.
- 4.1.12 The supplier technical datasheet is provided in Appendix 1.

5.0 SUMMARY

- 5.1.1 This Air Quality Assessment has been prepared by Redmore Environmental to discharge Condition 25 attached to full planning permission (ref. 49261/APP/2024/2904), approved by LB Hillingdon on 12th March 2026 for redevelopment of Unit 4, Silverdale Industrial Estate, Hayes.
- 5.1.2 A review of the original Air Quality Assessment²² and Low Emission Strategy²³ was undertaken with a summary of the findings provided. This indicated that subject to the inclusion of the identified mitigation measures for both the construction and operational phases, emissions and associated exposure to air pollution associated with the development have been minimised to the maximum possible extent. Further, the scheme will comply with the LB Hillingdon Air Quality Action Plan and relevant policy.
- 5.1.3 A BAT Assessment was undertaken in order to identify an alternative engine type to that proposed as part of the Application. This did not indicate an appropriate substitution. However, the findings of the Air Quality Assessment indicated that use of the proposed generator will not lead to air quality impacts at any sensitive receptor in the vicinity of the site. As such, the plant complies with the relevant emission requirements.
- 5.1.4 It is confirmed that the generator shall be used solely on brief intermittent and exceptional occasions when required in response to an emergency and for the testing and maintenance necessary.
- 5.1.5 Based on the above, it is considered that Condition 25 should be discharged.

²² Air Quality Assessment, Unit 4, Silverdale Industrial Estate, Hayes - ref: 8167, Redmore Environmental Ltd, 2025.

²³ Low Emission Strategy, Unit 4, Silverdale Industrial Estate, Hayes, ref: 8167-2, Redmore Environmental Ltd, 2026.

6.0 **ABBREVIATIONS**

AQLV	Air Quality Limit Value
AQMA	Air Quality Management Area
AQO	Air Quality Objective
AQS	Air Quality Strategy
BAT	Best Available Technology
C ₆ H ₆	Benzene
CH ₂ O	Formaldehyde
DEFRA	Department for Environment, Food and Rural Affairs
EA	Environment Agency
EAL	Environmental Assessment Level
ESG	Emergency Stand-by Generator
GLA	Greater London Authority
HVO	Hydro-treated Vegetable Oil
IAQM	Institute of Air Quality Management
LA	Local Authority
LAQM	Local Air Quality Management
NGR	National Grid Reference
NO ₂	Nitrogen dioxide
NPPF	National Planning Policy Framework
PM _{2.5}	Particulate matter with an aerodynamic diameter of less than 2.5µm
PM ₁₀	Particulate matter with an aerodynamic diameter of less than 10µm
SO ₂	Sulphur dioxide
UPS	Uninterruptable Power Supply

Figures



Legend



Site Boundary

Title

Figure 1 - Site Location

Project

Air Quality Assessment
Unit 4, Silverdale Industrial Estate,
Hayes

Project Reference

8167-3

Client

Mulhaven Properties LLC

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Appendix 1 - Generator Technical Specification

Systems Data

Reference Number: EM2752



June 20, 2025
For Help Desk Phone
Numbers [Click Here](#)

AIR INTAKE SYSTEM

THE INSTALLED SYSTEM MUST COMPLY WITH THE SYSTEM LIMITS BELOW FOR ALL EMISSIONS CERTIFIED ENGINES TO ASSURE REGULATORY COMPLIANCE.

MAXIMUM ALLOWABLE INTAKE RESTRICTION WITH CLEAN ELEMENT	3.7	KPA
MAXIMUM ALLOWABLE INTAKE RESTRICTION WITH DIRTY ELEMENT	6.2	KPA

COOLING SYSTEM

ENGINE ONLY COOLANT CAPACITY	156.8	L
MAXIMUM ALLOWABLE JACKET WATER OUTLET TEMPERATURE	99	DEG C
REGULATOR LOCATION FOR JW (HT) CIRCUIT	OUTLET	
MAXIMUM UNINTERRUPTED FILL RATE	19	L/MIN

ENGINE SPEC SYSTEM

CYLINDER ARRANGEMENT	VEE	
NUMBER OF CYLINDERS	12	
CYLINDER BORE DIAMETER	170	MM
PISTON STROKE	215	MM
TOTAL CYLINDER DISPLACEMENT	58.6	L
STANDARD CRANKSHAFT ROTATION FROM FLYWHEEL END	CCW	
STANDARD CYLINDER FIRING ORDER	1-12-9-4-5- 8-11-2-3- 10-7-6	
NUMBER 1 CYLINDER LOCATION	RIGHT FRONT	
STROKES/COMBUSTION CYCLE	4	

EXHAUST SYSTEM

THE INSTALLED SYSTEM MUST COMPLY WITH THE SYSTEM LIMITS BELOW FOR ALL EMISSIONS CERTIFIED ENGINES TO ASSURE REGULATORY COMPLIANCE.

MAXIMUM ALLOWABLE SYSTEM BACK PRESSURE	6.7	KPA
MANIFOLD TYPE	DRY	
MAXIMUM ALLOWABLE STATIC WEIGHT ON EXHAUST CONNECTION	29	KG
MAXIMUM ALLOWABLE STATIC BENDING MOMENT ON EXHAUST CONNECTION	43	NM

FUEL SYSTEM

MAXIMUM FUEL FLOW FROM TRANSFER PUMP TO ENGINE	1260	L/HR
MAXIMUM ALLOWABLE FUEL SUPPLY LINE RESTRICTION	30	KPA
MAXIMUM ALLOWABLE FUEL TEMPERATURE AT TRANSFER PUMP INLET	66	DEG C
MAXIMUM ALLOWABLE FUEL RETURN LINE RESTRICTION	27	KPA
NORMAL FUEL PRESSURE IN A CLEAN SYSTEM	415	KPA
FUEL SYSTEM TYPE	EUI	
MAXIMUM TRANSFER PUMP PRIMING LIFT WITHOUT PRIMING PUMP	3.7	M
MAXIMUM HEAT REJECTION TO FUEL	9.5	KW

MOUNTING SYSTEM

CENTER OF GRAVITY LOCATION - X DIMENSION - FROM REAR FACE OF BLOCK - (REFERENCE TM7077)	949	MM
CENTER OF GRAVITY LOCATION - Y DIMENSION - FROM CENTERLINE OF CRANKSHAFT - (REFERENCE TM7077)	248	MM

CENTER OF GRAVITY LOCATION - Z DIMENSION - FROM CENTERLINE OF CRANKSHAFT - (REFERENCE TM7077)	0	MM
MASS MOMENT OF INERTIA - X AXIS	1000	N.M SEC2
MASS MOMENT OF INERTIA - Y AXIS	7000	N.M SEC2
MASS MOMENT OF INERTIA - Z AXIS	7000	N.M SEC2
STARTING SYSTEM		
MINIMUM CRANKING SPEED REQUIRED FOR START	120	RPM
LOWEST AMBIENT START TEMPERATURE WITHOUT AIDS	0	DEG C

Performance Number: EM2752

Change Level: 00

SALES MODEL:	3512B	COMBUSTION:	DIRECT INJECTION
BRAND:	CAT	ENGINE SPEED (RPM):	1,500
MACHINE SALES MODEL:		HERTZ:	50
ENGINE POWER (BKW):	1,500.0	FAN POWER (KW):	46.0
GEN POWER WITH FAN (EKW):	1,400.0	ASPIRATION:	TA
COMPRESSION RATIO:	15.5	AFTERCOOLER TYPE:	SCAC
RATING LEVEL:	STANDBY	AFTERCOOLER CIRCUIT TYPE:	JW+OC, AC
PUMP QUANTITY:	2	AFTERCOOLER TEMP (C):	60
FUEL TYPE:	DIESEL	JACKET WATER TEMP (C):	99
MANIFOLD TYPE:	DRY	TURBO CONFIGURATION:	PARALLEL
GOVERNOR TYPE:	ADEM3	TURBO QUANTITY:	2
ELECTRONICS TYPE:	ADEM3	TURBOCHARGER MODEL:	GT604105B-53T-1.70
CAMSHAFT TYPE:	STANDARD	COMBUSTION STRATEGY:	LOW EMISSION
IGNITION TYPE:	CI	CRANKCASE BLOWBY RATE (M3/HR):	56.2
INJECTOR TYPE:	EUI	FUEL RATE (RATED RPM) NO LOAD (L/HR):	37.0
FUEL INJECTOR:	3920202	PISTON SPD @ RATED ENG SPD (M/SEC):	10.8
UNIT INJECTOR TIMING (MM):	64.34		
REF EXH STACK DIAMETER (MM):	254		
MAX OPERATING ALTITUDE (M):	800		

INDUSTRY	SUBINDUSTRY	APPLICATION
ELECTRIC POWER	STANDARD	PACKAGED GENSET
OIL AND GAS	LAND PRODUCTION	PACKAGED GENSET

General Performance Data

THIS STANDBY RATING IS FOR A STANDBY ONLY ENGINE ARRANGEMENT. RERATING THE ENGINE TO A PRIME OR CONTINUOUS RATING IS NOT PERMITTED.

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	BRAKE MEAN EFF PRES (BMEP)	BRAKE SPEC FUEL CONSUMPTN (BSFC)	VOL FUEL CONSUMPTN (VFC)
EKW	%	BKW	KPA	G/BKW-HR	L/HR
1,400.0	100	1,497	2,045	210.4	370.5
1,260.0	90	1,349	1,844	207.9	330.1
1,120.0	80	1,204	1,645	207.0	293.2
1,050.0	75	1,132	1,546	206.9	275.5
980.0	70	1,060	1,448	207.1	258.2
840.0	60	917	1,252	208.1	224.4
700.0	50	774	1,057	210.1	191.2
560.0	40	631	861	213.5	158.4
420.0	30	487	665	219.6	125.8
350.0	25	414	566	224.7	109.5
280.0	20	342	467	232.5	93.5
140.0	10	195	266	272.5	62.5

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	ENGINE OUTLET TEMP	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP
EKW	%	BKW	KPA	DEG C	DEG C	DEG C	KPA	DEG C
1,400.0	100	1,497	266.2	70.6	633.8	453.6	276	215.5
1,260.0	90	1,349	239.8	69.3	602.3	427.7	249	199.2
1,120.0	80	1,204	209.0	67.9	581.4	417.1	218	182.5
1,050.0	75	1,132	193.4	67.2	571.6	412.9	202	173.9
980.0	70	1,060	177.9	66.5	561.9	408.9	186	165.0
840.0	60	917	147.0	65.3	542.4	401.2	154	146.6
700.0	50	774	116.6	64.3	519.9	393.5	123	127.4
560.0	40	631	87.7	63.4	490.7	380.9	94	108.2
420.0	30	487	61.3	62.7	450.9	359.7	67	89.2
350.0	25	414	49.8	62.4	424.0	342.4	55	79.8
280.0	20	342	39.4	62.1	392.6	321.6	44	70.7
140.0	10	195	22.3	61.5	313.9	269.0	27	55.7

General Performance Data (Continued)

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	WET INLET AIR VOL FLOW RATE	ENGINE OUTLET WET EXH GAS VOL	WET INLET AIR MASS FLOW RATE	WET EXH GAS MASS FLOW RATE	ENGINE OUTLET WET EXH VOL	ENGINE OUTLET DRY EXH VOL
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FLOW RATE							FLOW RATE (0 DEG C AND 101 KPA)	FLOW RATE (0 DEG C AND 101 KPA)
EKW	%	BKW	M3/MIN	M3/MIN	KG/HR	KG/HR	M3/MIN	M3/MIN
1,400.0	100	1,497	125.7	321.6	8,910.9	9,225.8	120.9	109.5
1,260.0	90	1,349	117.8	290.2	7,747.8	8,028.4	113.1	102.4
1,120.0	80	1,204	107.8	261.2	6,867.9	7,117.1	103.4	93.6
1,050.0	75	1,132	102.7	247.1	6,456.3	6,690.5	98.4	89.1
980.0	70	1,060	97.5	233.1	6,056.3	6,275.9	93.4	84.6
840.0	60	917	86.9	205.5	5,279.6	5,470.3	83.2	75.4
700.0	50	774	76.2	178.2	4,526.6	4,689.1	73.0	66.1
560.0	40	631	65.9	151.4	3,774.8	3,909.4	63.2	57.3
420.0	30	487	56.5	125.4	3,024.8	3,131.7	54.1	49.0
350.0	25	414	52.4	112.9	2,654.9	2,748.0	50.1	45.4
280.0	20	342	48.6	100.9	2,290.0	2,369.5	46.4	42.0
140.0	10	195	42.6	80.1	1,662.1	1,715.2	40.4	36.6

Heat Rejection Data

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	REJECTION TO JACKET WATER	REJECTION TO ATMOSPHERE	REJECTION TO EXH	EXH RECOVERY TO 177C	FROM OIL COOLER	FROM AFTERCOOLER	WORK ENERGY	LOW HEAT VALUE ENERGY	HIGH HEAT VALUE ENERGY
EKW	%	BKW	KW	KW	KW	KW	KW	KW	KW	KW	KW
1,400.0	100	1,497	589	132	1,413	730	187	360	1,497	3,746	3,991
1,260.0	90	1,349	543	123	1,245	615	167	306	1,349	3,348	3,567
1,120.0	80	1,204	498	116	1,098	538	148	253	1,204	2,974	3,168
1,050.0	75	1,132	476	113	1,028	502	139	226	1,132	2,792	2,974
980.0	70	1,060	453	109	961	468	130	200	1,060	2,613	2,784
840.0	60	917	408	103	834	402	113	150	917	2,264	2,412
700.0	50	774	364	97.0	711	340	97.0	105	774	1,924	2,050
560.0	40	631	318	90.2	593	276	80.6	65.5	631	1,593	1,697
420.0	30	487	270	83.0	479	210	64.0	32.9	487	1,269	1,351
350.0	25	414	245	79.5	423	176	55.5	19.9	414	1,109	1,181
280.0	20	342	219	76.0	367	142	47.0	9.0	342	950	1,012
140.0	10	195	164	68.0	258	78.1	32.0	-6.0	195	637	679

Sound Data

EXHAUST:SOUND PRESSURE(OBCF) DISTANCE:1.5 METER

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	OVERALL SOUND	63 HZ	125 HZ	250 HZ	500 HZ
EKW	%	BKW	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
1,400.0	100	1,497	116.0	110.0	121.0	116.0	109.0
1,260.0	90	1,349	115.0	109.0	120.0	115.0	108.0
1,120.0	80	1,204	114.0	108.0	119.0	114.0	107.0
1,050.0	75	1,132	113.0	108.0	118.0	114.0	106.0
980.0	70	1,060	113.0	107.0	118.0	113.0	106.0
840.0	60	917	112.0	106.0	117.0	112.0	105.0
700.0	50	774	111.0	105.0	116.0	111.0	104.0
560.0	40	631	109.0	104.0	114.0	110.0	102.0
420.0	30	487	108.0	102.0	113.0	108.0	101.0
350.0	25	414	107.0	102.0	112.0	107.0	100.0
280.0	20	342	106.0	101.0	111.0	107.0	99.0
140.0	10	195	104.0	99.0	109.0	104.0	97.0

EXHAUST:SOUND PRESSURE(OBCF) DISTANCE:1.5 METER

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	1000 HZ	2000 HZ	4000 HZ	8000 HZ
EKW	%	BKW	dB(A)	dB(A)	dB(A)	dB(A)
1,400.0	100	1,497	107.0	109.0	109.0	106.0
1,260.0	90	1,349	106.0	108.0	108.0	105.0

PERFORMANCE DATA[EM2752]

June 20, 2025

1,120.0	80	1,204	105.0	107.0	107.0	104.0
1,050.0	75	1,132	105.0	106.0	107.0	104.0
980.0	70	1,060	104.0	106.0	106.0	103.0
840.0	60	917	103.0	105.0	105.0	102.0
700.0	50	774	102.0	104.0	104.0	101.0
560.0	40	631	101.0	102.0	103.0	100.0
420.0	30	487	99.0	101.0	101.0	98.0
350.0	25	414	98.0	100.0	101.0	97.0
280.0	20	342	98.0	99.0	100.0	97.0
140.0	10	195	95.0	97.0	98.0	94.0

EXHAUST:SOUND PRESSURE(OBCF) DISTANCE:7 METER

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	OVERALL SOUND	63 HZ	125 HZ	250 HZ	500 HZ
EKW	%	BKW	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
1,400.0	100	1,497	102.0	99.0	110.0	104.0	95.0
1,260.0	90	1,349	101.0	98.0	109.0	103.0	94.0
1,120.0	80	1,204	100.0	97.0	108.0	102.0	93.0
1,050.0	75	1,132	100.0	97.0	107.0	101.0	92.0
980.0	70	1,060	99.0	96.0	107.0	101.0	92.0
840.0	60	917	98.0	95.0	106.0	100.0	91.0
700.0	50	774	97.0	94.0	105.0	99.0	90.0
560.0	40	631	96.0	93.0	103.0	97.0	88.0
420.0	30	487	94.0	91.0	102.0	96.0	87.0
350.0	25	414	94.0	90.0	101.0	95.0	86.0
280.0	20	342	93.0	89.0	100.0	94.0	85.0
140.0	10	195	91.0	87.0	98.0	92.0	83.0

EXHAUST:SOUND PRESSURE(OBCF) DISTANCE:7 METER

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	1000 HZ	2000 HZ	4000 HZ	8000 HZ
EKW	%	BKW	dB(A)	dB(A)	dB(A)	dB(A)
1,400.0	100	1,497	94.0	95.0	96.0	91.0
1,260.0	90	1,349	93.0	95.0	95.0	90.0
1,120.0	80	1,204	92.0	94.0	94.0	89.0
1,050.0	75	1,132	92.0	93.0	94.0	89.0
980.0	70	1,060	91.0	93.0	93.0	88.0
840.0	60	917	90.0	91.0	92.0	87.0
700.0	50	774	89.0	90.0	91.0	86.0
560.0	40	631	88.0	89.0	90.0	85.0
420.0	30	487	86.0	87.0	88.0	83.0
350.0	25	414	86.0	87.0	87.0	83.0
280.0	20	342	85.0	86.0	86.0	82.0
140.0	10	195	83.0	84.0	84.0	80.0

EXHAUST:SOUND PRESSURE(OBCF) DISTANCE:15 METER

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	OVERALL SOUND	63 HZ	125 HZ	250 HZ	500 HZ
EKW	%	BKW	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
1,400.0	100	1,497	96.0	92.0	103.0	97.0	88.0
1,260.0	90	1,349	95.0	92.0	102.0	96.0	87.0
1,120.0	80	1,204	94.0	91.0	101.0	95.0	86.0
1,050.0	75	1,132	93.0	90.0	101.0	95.0	86.0
980.0	70	1,060	93.0	90.0	100.0	94.0	85.0
840.0	60	917	92.0	88.0	99.0	93.0	84.0
700.0	50	774	91.0	87.0	98.0	92.0	83.0
560.0	40	631	89.0	86.0	97.0	91.0	82.0
420.0	30	487	88.0	84.0	95.0	89.0	80.0
350.0	25	414	87.0	84.0	94.0	88.0	79.0
280.0	20	342	86.0	83.0	94.0	88.0	79.0
140.0	10	195	84.0	81.0	91.0	85.0	76.0

EXHAUST:SOUND PRESSURE(OBCF) DISTANCE:15 METER

PERFORMANCE DATA[EM2752]

June 20, 2025

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	1000 HZ	2000 HZ	4000 HZ	8000 HZ
EKW	%	BKW	dB(A)	dB(A)	dB(A)	dB(A)
1,400.0	100	1,497	88.0	89.0	89.0	85.0
1,260.0	90	1,349	87.0	88.0	89.0	84.0
1,120.0	80	1,204	86.0	87.0	88.0	83.0
1,050.0	75	1,132	85.0	86.0	87.0	82.0
980.0	70	1,060	85.0	86.0	87.0	82.0
840.0	60	917	84.0	85.0	85.0	81.0
700.0	50	774	83.0	84.0	84.0	80.0
560.0	40	631	81.0	82.0	83.0	78.0
420.0	30	487	80.0	81.0	81.0	77.0
350.0	25	414	79.0	80.0	81.0	76.0
280.0	20	342	78.0	79.0	80.0	75.0
140.0	10	195	76.0	77.0	78.0	73.0

MECHANICAL:SOUND PRESSURE(OBCF) DISTANCE:1 METER

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	OVERALL SOUND	63 HZ	125 HZ	250 HZ	500 HZ
EKW	%	BKW	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
1,400.0	100	1,497	102.0	94.0	98.0	97.0	94.0
1,260.0	90	1,349	102.0	94.0	98.0	97.0	94.0
1,120.0	80	1,204	102.0	94.0	98.0	97.0	94.0
1,050.0	75	1,132	102.0	94.0	98.0	97.0	94.0
980.0	70	1,060	102.0	94.0	98.0	97.0	94.0
840.0	60	917	102.0	94.0	98.0	97.0	94.0
700.0	50	774	102.0	94.0	98.0	97.0	94.0
560.0	40	631	102.0	94.0	98.0	97.0	94.0
420.0	30	487	102.0	94.0	98.0	97.0	94.0
350.0	25	414	102.0	94.0	98.0	97.0	94.0
280.0	20	342	102.0	94.0	98.0	97.0	94.0
140.0	10	195	102.0	94.0	98.0	97.0	94.0

MECHANICAL:SOUND PRESSURE(OBCF) DISTANCE:1 METER

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	1000 HZ	2000 HZ	4000 HZ	8000 HZ
EKW	%	BKW	dB(A)	dB(A)	dB(A)	dB(A)
1,400.0	100	1,497	97.0	97.0	95.0	99.0
1,260.0	90	1,349	97.0	97.0	95.0	99.0
1,120.0	80	1,204	97.0	97.0	95.0	99.0
1,050.0	75	1,132	97.0	97.0	95.0	99.0
980.0	70	1,060	97.0	97.0	95.0	99.0
840.0	60	917	97.0	97.0	95.0	99.0
700.0	50	774	97.0	97.0	95.0	99.0
560.0	40	631	97.0	97.0	95.0	99.0
420.0	30	487	97.0	97.0	95.0	99.0
350.0	25	414	97.0	97.0	95.0	99.0
280.0	20	342	97.0	97.0	95.0	99.0
140.0	10	195	97.0	97.0	95.0	99.0

MECHANICAL:SOUND PRESSURE(OBCF) DISTANCE:7 METER

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	OVERALL SOUND	63 HZ	125 HZ	250 HZ	500 HZ
EKW	%	BKW	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
1,400.0	100	1,497	90.0	82.0	86.0	85.0	82.0
1,260.0	90	1,349	90.0	82.0	86.0	85.0	82.0
1,120.0	80	1,204	90.0	82.0	86.0	85.0	82.0
1,050.0	75	1,132	90.0	82.0	86.0	85.0	82.0
980.0	70	1,060	90.0	82.0	86.0	85.0	82.0
840.0	60	917	90.0	82.0	86.0	85.0	82.0
700.0	50	774	90.0	82.0	86.0	85.0	82.0
560.0	40	631	90.0	82.0	86.0	85.0	82.0
420.0	30	487	90.0	82.0	86.0	85.0	82.0
350.0	25	414	90.0	82.0	86.0	85.0	82.0
280.0	20	342	90.0	82.0	86.0	85.0	82.0
140.0	10	195	90.0	82.0	86.0	85.0	82.0

MECHANICAL:SOUND PRESSURE(OBCF) DISTANCE:7 METER

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	1000 HZ	2000 HZ	4000 HZ	8000 HZ
EKW	%	BKW	dB(A)	dB(A)	dB(A)	dB(A)
1,400.0	100	1,497	85.0	85.0	83.0	87.0
1,260.0	90	1,349	85.0	85.0	83.0	87.0
1,120.0	80	1,204	85.0	85.0	83.0	87.0
1,050.0	75	1,132	85.0	85.0	83.0	87.0
980.0	70	1,060	85.0	85.0	83.0	87.0
840.0	60	917	85.0	85.0	83.0	87.0
700.0	50	774	85.0	85.0	83.0	87.0
560.0	40	631	85.0	85.0	83.0	87.0
420.0	30	487	85.0	85.0	83.0	87.0
350.0	25	414	85.0	85.0	83.0	87.0
280.0	20	342	85.0	85.0	83.0	87.0
140.0	10	195	85.0	85.0	83.0	87.0

MECHANICAL:SOUND PRESSURE(OBCF) DISTANCE:15 METER

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	OVERALL SOUND	63 HZ	125 HZ	250 HZ	500 HZ
EKW	%	BKW	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
1,400.0	100	1,497	85.0	76.0	80.0	79.0	76.0
1,260.0	90	1,349	85.0	76.0	80.0	79.0	76.0
1,120.0	80	1,204	85.0	76.0	80.0	79.0	76.0
1,050.0	75	1,132	85.0	76.0	80.0	79.0	76.0
980.0	70	1,060	85.0	76.0	80.0	79.0	76.0
840.0	60	917	85.0	76.0	80.0	79.0	76.0
700.0	50	774	85.0	76.0	80.0	79.0	76.0
560.0	40	631	85.0	76.0	80.0	79.0	76.0
420.0	30	487	85.0	76.0	80.0	79.0	76.0
350.0	25	414	85.0	76.0	80.0	79.0	76.0
280.0	20	342	85.0	76.0	80.0	79.0	76.0
140.0	10	195	85.0	76.0	80.0	79.0	76.0

MECHANICAL:SOUND PRESSURE(OBCF) DISTANCE:15 METER

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	1000 HZ	2000 HZ	4000 HZ	8000 HZ
EKW	%	BKW	dB(A)	dB(A)	dB(A)	dB(A)
1,400.0	100	1,497	79.0	80.0	78.0	81.0
1,260.0	90	1,349	79.0	80.0	78.0	81.0
1,120.0	80	1,204	79.0	80.0	78.0	81.0
1,050.0	75	1,132	79.0	80.0	78.0	81.0
980.0	70	1,060	79.0	80.0	78.0	81.0
840.0	60	917	79.0	80.0	78.0	81.0
700.0	50	774	79.0	80.0	78.0	81.0
560.0	40	631	79.0	80.0	78.0	81.0
420.0	30	487	79.0	80.0	78.0	81.0
350.0	25	414	79.0	80.0	78.0	81.0
280.0	20	342	79.0	80.0	78.0	81.0
140.0	10	195	79.0	80.0	78.0	81.0

Emissions Data

DIESEL

RATED SPEED NOMINAL DATA: 1500 RPM

GENSET POWER WITH FAN	EKW	1,400.0	1,050.0	700.0	350.0	140.0
PERCENT LOAD	%	100	75	50	25	10

PERFORMANCE DATA[EM2752]

June 20, 2025

ENGINE POWER	BKW	1,497	1,132	774	414	195
TOTAL NOX (AS NO2)	G/HR	8,425	6,194	4,258	2,425	1,475
TOTAL CO	G/HR	1,691	1,326	1,118	527	469
TOTAL HC	G/HR	335	226	185	154	150
TOTAL CO2	KG/HR	999	742	514	294	168
PART MATTER	G/HR	142.9	97.2	119.6	104.4	85.1
TOTAL NOX (AS NO2) (CORR 5% O2)	MG/NM3	1,949.9	1,925.9	1,915.8	1,910.7	2,031.5
TOTAL CO (CORR 5% O2)	MG/NM3	391.3	412.3	502.9	415.2	645.5
TOTAL HC (CORR 5% O2)	MG/NM3	77.6	70.2	83.1	121.7	206.4
PART MATTER (CORR 5% O2)	MG/NM3	33.1	30.2	53.8	82.3	117.1
TOTAL NOX (AS NO2) (CORR 5% O2)	PPM	950	940	931	921	994
TOTAL CO (CORR 5% O2)	PPM	313	344	391	335	526
TOTAL HC (CORR 5% O2)	PPM	125	112	136	196	335
TOTAL NOX (AS NO2)	G/HP-HR	4.20	4.08	4.10	4.36	5.65
TOTAL CO	G/HP-HR	0.84	0.87	1.08	0.95	1.79
TOTAL HC	G/HP-HR	0.17	0.15	0.18	0.28	0.57
PART MATTER	G/HP-HR	0.07	0.06	0.12	0.19	0.33
TOTAL NOX (AS NO2)	LB/HR	18.57	13.66	9.39	5.35	3.25
TOTAL CO	LB/HR	3.73	2.92	2.46	1.16	1.03
TOTAL HC	LB/HR	0.74	0.50	0.41	0.34	0.33
TOTAL CO2	LB/HR	2,203	1,636	1,134	649	369
PART MATTER	LB/HR	0.32	0.21	0.26	0.23	0.19
OXYGEN IN EXH	%	10.5	11.4	12.1	13.6	15.9
DRY SMOKE OPACITY	%	2.5	2.4	3.6	4.7	4.3
BOSCH SMOKE NUMBER		0.90	0.86	1.33	1.56	1.51

RATED SPEED POTENTIAL SITE VARIATION: 1500 RPM

GENSET POWER WITH FAN	EKW	1,400.0	1,050.0	700.0	350.0	140.0
PERCENT LOAD	%	100	75	50	25	10
ENGINE POWER	BKW	1,497	1,132	774	414	195
TOTAL NOX (AS NO2)	G/HR	10,110	7,433	5,109	2,910	1,770
TOTAL CO	G/HR	3,044	2,387	2,012	949	844
TOTAL HC	G/HR	446	301	246	205	199
PART MATTER	G/HR	200.1	136.1	167.4	146.2	119.2
TOTAL NOX (AS NO2) (CORR 5% O2)	MG/NM3	2,339.9	2,311.1	2,299.0	2,292.8	2,437.7
TOTAL CO (CORR 5% O2)	MG/NM3	704.3	742.1	905.2	747.3	1,161.9
TOTAL HC (CORR 5% O2)	MG/NM3	103.2	93.4	110.5	161.9	274.6
PART MATTER (CORR 5% O2)	MG/NM3	46.3	42.3	75.3	115.2	164.0
TOTAL NOX (AS NO2) (CORR 5% O2)	PPM	1,140	1,128	1,117	1,105	1,193
TOTAL CO (CORR 5% O2)	PPM	563	619	704	603	946
TOTAL HC (CORR 5% O2)	PPM	166	149	181	261	445
TOTAL NOX (AS NO2)	G/HP-HR	5.04	4.90	4.92	5.24	6.78
TOTAL CO	G/HP-HR	1.52	1.57	1.94	1.71	3.23
TOTAL HC	G/HP-HR	0.22	0.20	0.24	0.37	0.76
PART MATTER	G/HP-HR	0.10	0.09	0.16	0.26	0.46
TOTAL NOX (AS NO2)	LB/HR	22.29	16.39	11.26	6.42	3.90
TOTAL CO	LB/HR	6.71	5.26	4.44	2.09	1.86
TOTAL HC	LB/HR	0.98	0.66	0.54	0.45	0.44
PART MATTER	LB/HR	0.44	0.30	0.37	0.32	0.26

Regulatory Information

NON-CERTIFIED	1970 - 2100
THIS ENGINE RATING IS NOT EMISSIONS CERTIFIED BY ANY DOMESTIC OR FOREIGN AGENCY.	

Altitude Derate Data

STANDARD

ALTITUDE CORRECTED POWER CAPABILITY (BKW)

AMBIENT OPERATING TEMP (C)	0	5	10	15	20	25	30	35	40	45	50	55	60	NORMAL
ALTITUDE (M)														
0	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,479	1,500
250	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,480	1,457	1,435	1,500
500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,482	1,459	1,436	1,414	1,393	1,500
750	1,500	1,500	1,500	1,500	1,500	1,500	1,485	1,461	1,438	1,415	1,393	1,372	1,352	1,500
1,000	1,466	1,466	1,466	1,466	1,466	1,465	1,441	1,418	1,395	1,373	1,352	1,331	1,311	1,466
1,250	1,424	1,424	1,424	1,424	1,424	1,421	1,398	1,375	1,353	1,332	1,311	1,291	1,272	1,424
1,500	1,384	1,384	1,384	1,384	1,384	1,379	1,356	1,334	1,312	1,292	1,272	1,253	1,234	1,384
1,750	1,344	1,344	1,344	1,344	1,344	1,337	1,315	1,293	1,273	1,253	1,233	1,215	1,196	1,344
2,000	1,306	1,306	1,306	1,306	1,306	1,296	1,275	1,254	1,234	1,214	1,196	1,177	1,140	1,306
2,250	1,270	1,270	1,270	1,270	1,270	1,256	1,235	1,215	1,196	1,177	1,159	1,141	1,050	1,270
2,500	1,234	1,234	1,234	1,234	1,234	1,217	1,197	1,178	1,159	1,141	1,123	1,065	945	1,234
2,750	1,199	1,199	1,199	1,199	1,199	1,180	1,160	1,141	1,123	1,106	1,088	960	870	1,199
3,000	1,166	1,166	1,166	1,166	1,162	1,143	1,124	1,106	1,088	1,071	1,054	885	795	1,166
3,250	1,133	1,133	1,133	1,133	1,126	1,107	1,089	1,071	1,035	960	900	810	720	1,133
3,500	1,102	1,102	1,102	1,102	1,090	1,072	1,054	1,005	930	870	810	735	660	1,102
3,750	1,072	1,072	1,072	1,072	1,056	1,038	975	915	855	795	750	660	600	1,072
4,000	1,042	1,042	1,042	1,040	1,022	960	900	840	780	720	675	615	555	1,042
4,250	1,014	1,014	1,014	1,005	930	870	810	765	705	660	615	570	525	1,014
4,500	986	986	986	915	855	795	750	690	645	600	570	525	480	986

Cross Reference

Test Spec	Setting	Engine Arrangement	Engineering Model	Engineering Model Version	Start Effective Serial Number	End Effective Serial Number
4581909	GG1398	4869926	GS655	XJ	DB900001	
5643574	GG1556	5331486	PG278	DK	TNP00001	
5643733	GG1938	5331486	PG278	DK	TZX00001	
5643574	GG1593	5331488	PG278	DK	TNP00001	
5643733	GG1953	5331488	PG278	DK	TZX00001	
4581769	GG4115	5390555	PG241	-	LY900001	

Supplementary Data

Type	Classification	Performance Number
SOUND	SOUND PRESSURE	DM8779

This performance data is supplementary data for:
EM2751

General Notes

General Notes EM2752 - 00
SOUND PRESSURE DATA FOR THIS RATING CAN BE FOUND IN PERFORMANCE NUMBER - DM8779

Performance Parameter Reference

Parameters Reference:DM9600-15
PERFORMANCE DEFINITIONS

PERFORMANCE DEFINITIONS DM9600
APPLICATION:
Engine performance tolerance values below are representative of a typical production engine tested in a calibrated dynamometer test cell at SAE J1995 standard reference conditions. Caterpillar maintains ISO9001:2000 certified quality management systems for engine test Facilities to assure accurate calibration of test equipment. Engine test data is corrected in accordance with SAE J1995. Additional reference material SAE J1228, J1349, ISO 8665, 3046-1:2002E, 3046-3:1989, 1585, 2534, 2288, and 9249 may apply in

PERFORMANCE DATA[EM2752]

June 20, 2025

part or are similar to SAE J1995. Special engine rating request (SERR) test data shall be noted.

PERFORMANCE PARAMETER TOLERANCE FACTORS:

Power +/- 3%

Torque +/- 3%

Exhaust stack temperature +/- 8%

Inlet airflow +/- 5%

Intake manifold pressure-gage +/- 10%

Exhaust flow +/- 6%

Specific fuel consumption +/- 3%

Specific fuel consumption (C7-C18) +/- 4%

Fuel rate +/- 5%

Specific DEF consumption +/- 3%

DEF rate +/- 5%

Heat rejection +/- 5%

Heat rejection exhaust only +/- 10%

Heat rejection CEM only +/- 10%

Heat Rejection values based on using treated water.

Torque is included for truck and industrial applications, do not use for Gen Set or steady state applications.

On C7 - C18 engines, at speeds of 1100 RPM and under these values are provided for reference only, and may not meet the tolerance listed.

On 3500 and C175 engines, at speeds below Peak Torque these values are provided for reference only, and may not meet the tolerance listed.

These values do not apply to C280/3600. For these models, see the tolerances listed below.

C280/3600 HEAT REJECTION TOLERANCE FACTORS:

Heat rejection +/- 10%

Heat rejection to Atmosphere +/- 50%

Heat rejection to Lube Oil +/- 20%

Heat rejection to Aftercooler +/- 5%

TEST CELL TRANSDUCER TOLERANCE FACTORS:

Torque +/- 0.5%

Speed +/- 0.2%

Fuel flow +/- 1.0%

Temperature +/- 2.0 C degrees

Intake manifold pressure +/- 0.1 kPa

OBSERVED ENGINE PERFORMANCE IS CORRECTED TO SAE J1995 REFERENCE

AIR AND FUEL CONDITIONS.

REFERENCE ATMOSPHERIC INLET AIR

FOR 3500 ENGINES AND SMALLER

SAE J1228 AUG2002 for marine engines, and J1995 JAN2014 for other engines, reference atmospheric pressure is 100 KPA (29.61 in hg), and standard temperature is 25deg C (77 deg F) at 30% relative humidity at the stated aftercooler water temp, or inlet manifold temp.

FOR 3600 ENGINES

Engine rating obtained and presented in accordance with ISO 3046/1 and SAE J1995 JANJAN2014 reference atmospheric pressure is 100 KPA (29.61 in hg), and standard temperature is 25deg C (77 deg F) at 30% relative humidity and 150M altitude at the stated aftercooler water temperature.

MEASUREMENT LOCATION FOR INLET AIR TEMPERATURE

Location for air temperature measurement air cleaner inlet at stabilized operating conditions.

REFERENCE EXHAUST STACK DIAMETER

The Reference Exhaust Stack Diameter published with this dataset is only used for the calculation of Smoke Opacity values displayed in this dataset. This value does not necessarily represent the actual stack diameter of the engine due to the variety of exhaust stack adapter options available. Consult the price list, engine order or general dimension drawings for the actual stack diameter size ordered or options available.

REFERENCE FUEL

DIESEL

Reference fuel is #2 distillate diesel with a 35API gravity;

A lower heating value is 42,780 KJ/KG (18,390 BTU/LB) when used at 15 deg C (59 deg F), where the density is 850 G/Liter (7.0936 Lbs/Gal).

GAS

Reference natural gas fuel has a lower heating value of 33.74 KJ/L (905 BTU/CU Ft). Low BTU ratings are based on 18.64 KJ/L (500 BTU/CU FT) lower heating value gas. Propane ratings are based on 87.56 KJ/L (2350 BTU/CU Ft) lower heating value gas.

ENGINE POWER (NET) IS THE CORRECTED FLYWHEEL POWER (GROSS) LESS

EXTERNAL AUXILIARY LOAD

Engine corrected gross output includes the power required to drive standard equipment; lube oil, scavenge lube oil, fuel transfer, common rail fuel, separate circuit aftercooler and jacket water pumps. Engine net power available for the external (flywheel) load is calculated by subtracting the sum of auxiliary load from the corrected gross flywheel out put power. Typical auxiliary loads are radiator cooling fans, hydraulic pumps, air compressors and battery charging alternators. For Tier 4 ratings additional

PERFORMANCE DATA[EM2752]

June 20, 2025

Parasitic losses would also include Intake, and Exhaust Restrictions.

ALTITUDE CAPABILITY

Altitude capability is the maximum altitude above sea level at standard temperature and standard pressure at which the engine could develop full rated output power on the current performance data set.

Standard temperature values versus altitude could be seen on TM2001.

When viewing the altitude capability chart the ambient temperature is the inlet air temp at the compressor inlet.

Engines with ADEM MEUI and HEUI fuel systems operating at conditions above the defined altitude capability derate for atmospheric pressure and temperature conditions outside the values defined, see TM2001.

Mechanical governor controlled unit injector engines require a setting change for operation at conditions above the altitude defined on the engine performance sheet. See your Caterpillar technical representative for non standard ratings.

REGULATIONS AND PRODUCT COMPLIANCE

TMI Emissions information is presented at 'nominal' and 'Potential Site Variation' values for standard ratings. No tolerances are applied to the emissions data. These values are subject to change at any time. The controlling federal and local emission requirements need to be verified by your Caterpillar technical representative.

Customer's may have special emission site requirements that need to be verified by the Caterpillar Product Group engineer.

EMISSION CYCLE LIMITS:

Cycle emissions Max Limits apply to cycle-weighted averages only. Emissions at individual load points may exceed the cycle-weighted limit.

WET & DRY EXHAUST/EMISSIONS DESCRIPTION:

Wet - Total exhaust flow or concentration of total exhaust flow

Dry - Total exhaust flow minus water vapor or concentration of exhaust flow with water vapor excluded

EMISSIONS DEFINITIONS:

Emissions : DM1176

EMISSION CYCLE DEFINITIONS

1. For constant-speed marine engines for ship main propulsion, including,diesel-electric drive, test cycle E2 shall be applied, for controllable-pitch propeller sets
test cycle E2 shall be applied.

2. For propeller-law-operated main and propeller-law-operated auxiliary engines the test cycle E3 shall be applied.

3. For constant-speed auxiliary engines test cycle D2 shall be applied.

4. For variable-speed, variable-load auxiliary engines, not included above, test cycle C1 shall be applied.

HEAT REJECTION DEFINITIONS:

Diesel Circuit Type and HHV Balance : DM9500

HIGH DISPLACEMENT (HD) DEFINITIONS:

3500: EM1500

RATING DEFINITIONS:

Agriculture : TM6008

Fire Pump : TM6009

Generator Set : TM6035

Generator (Gas) : TM6041

Industrial Diesel : TM6010

Industrial (Gas) : TM6040

Irrigation : TM5749

Locomotive : TM6037

Marine Auxiliary : TM6036

Marine Prop (Except 3600) : TM5747

Marine Prop (3600 only) : TM5748

MSHA : TM6042

Oil Field (Petroleum) : TM6011

Off-Highway Truck : TM6039

On-Highway Truck : TM6038

SOUND DEFINITIONS:

Sound Power : DM8702

Sound Pressure : TM7080

Date Released : 03/12/24