GAS-FIRED STANDBY ELECTRICITY GENERATION FACILITY

CARRINGTON, TRAFFORD

AIR QUALITY ASSESSMENT

August 2021

Report Ref: 01.0197.009 v2

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Registered in England and Wales No. 9150373

CONTENTS

1.0 INTRODUCTION

1.1 Background

This air quality assessment has been undertaken by Isopleth Ltd further to instruction by Forsa Energy Gas Holdings Ltd (hereafter referred to as 'Forsa').

The assessment considers air quality impacts associated with a proposed natural gas fuelled electricity generation plant proposed for land accessed off Manchester Road Carrington, Trafford (Drawings AQ1a and AQ1b). The site lies within the administrative area of Trafford Council (TC).

The impacts of the proposed electricity generation facility on local air quality have been assessed. The type, source and significance of potential impacts are identified and the measures employed to minimise these impacts are described.

The key pollutant associated with operation of the spark ignition engines considered in this assessment are oxides of nitrogen (NO_x as NO_2), identified in the Medium Combustion Plant Directive (MCPD) as the primary pollutants arising from the combustion of natural gas, for which there is a quantitative limit. Other pollutants, such as sulphur dioxide (SO_2), sometimes associated with the operation of spark ignition engines (when run on biogas) are generated in negligible levels when using this fuel type and there is no MCPD limit for carbon monoxide (CO). Predicted ground level concentrations of NOx and NO_2 are compared with relevant air quality standards and guidelines for the protection of human health and sensitive habitats.

1.2 Relevant Planning Considerations

There are two other natural gas fuelled electricity generation plants of relevance to the proposed Forsa site:

- A 10 engine 20MWe facility operated by UK Power Reserve; and
- A 20 engine 40MWe facility proposed by STOR 124 Ltd.

1.2.1 UK Power Reserve

This natural gas fuelled electricity generation plant was Approved with Conditions in October 2016 for a site adjacent to the southern boundary of the proposed Forsa site. This application, reference 89358/FUL/16 was brought forward by UK Power Reserve on land owned by Peel.

> *'Erection of 10 containerised units for the storage of electricity together with the ancillary infrastructure. Land To The West Of A6144 Manchester Road Carrington'*

The application was supported by a detailed air quality assessment prepared by Isopleth Ltd:

> *'Isopleth ltd. (2015) Short-Term Operating Reserve (STOR) Power Plant. Manchester Road, Carrington. Air Quality Assessment. Report Ref: 01.0024.006/15038 v2. October 2015'*

The UKPR facility has been in operation since 2017.

1.2.2 STOR 124 Ltd.

This natural gas fuelled electricity generation plant was Approved with Conditions in October 2016 for a site adjacent to the northern boundary of the proposed Forsa site. This application, reference 89321/FUL/16 was brought forward by STOR 124 Ltd on land owned by Peel.

> *'Erection of a Small Scale Gas Fired Energy Reserve Facility and Ancillary Infrastructure. Land At Manchester Road Carrington'*

The application was supported by a detailed air quality assessment prepared by RPS:

> *'RPS (2016). Air Quality Assessment. Carrington Generating Facility, Trafford. For STOR 124 Ltd. 01 September 2016. Project number JAP9089'*

Although this natural gas fuelled electricity generation plant has yet to be development, Trafford Council confirmed in 2019 that the development was lawful (i.e. had commenced). As such, this development permission remains extant but there is no operational plant on the site at the present time.

It is understood that should the FORSA site be approved, the STOR 124 Ltd. planning consent approved under reference 89321/FUL/16 would be revoked.

1.3 Scope

This detailed assessment report relates to the impact of air pollutants from the operation of the proposed electricity generation facility. Results of the dispersion modelling for engine exhaust emissions are presented in terms of concentrations, with a description of magnitude and also determination of significance where relevant.

2.0 SITE DESCRIPTION

2.1 Location

The site is located on land at land accessed off Manchester Road Carrington, Trafford. The approximate National Grid Reference for the site is 372370, 392535 and a location plan for the site is presented as Drawings AQ1a and AQ1b which also shows the site setting in relation to nearby uses. The site is surrounded by commercial / industrial uses including the SAICA Paper Mill to the south, CCGT Power station to the north and industrial estates to the east and west.

2.2 Development Description

The site will operate on a largely unmanned basis and will be remotely operated by Forsa. The standby, natural gas fuelled spark ignition engines provide balance to the National Grid during unexpected periods of high demand for electricity or where there are constraints on electricity available in England and Wales.

The proposed facility will comprise 9 No. 4.498 MW_e Jenbacher JMS 624 GS-N.L spark ignition engines, fuelled by natural gas, for electricity generation that together will generate a total of 40.482 MWe. Emissions to air will be via 9 No. engine exhausts of 14.0m in height, each serving a single engine.

The NOx emission concentration of the engines is **250 mg/Nm^3 at 5% O_2**, 0 degC, 1atm, dry. This may be converted to differing oxygen concentrations using the equation in MCERTS monitoring Guidance M2 Box 3.5. In this case, the concentration may also be expressed as **93.75 mg/Nm^3 at 15% O_2**, 0 degC, 1atm, dry.

This air quality assessment assumes that each of the engines within the power plant will operate for a maximum of 3000 hours per year.

3.0 REGULATORY STANDARDS AND GUIDELINES

3.1 International Legislation and Policy

European Directive 2008/50/EC of the European Parliament and of the Council of 21st May 2008, sets legally-binding Europe-wide limit values for the protection of public health and sensitive habitats. The Directive streamlines the European Union's air quality legislation by replacing four of the five existing Air Quality Directives within a single, integrated instrument.

The pollutants included are sulphur dioxide (SO_2), nitrogen dioxide (NO_2), particulate matter of less than 10 micrometres (µm) in aerodynamic diameter (PM_{10}), particulate matter of less than 2.5 µm in aerodynamic diameter lead ($PM_{2.5}$), lead (Pb), carbon monoxide (CO), benzene (C_6H_6), ozone (O_3), polycyclic aromatic hydrocarbons (PAHs), cadmium (Cd), arsenic (As), nickel (Ni) and mercury (Hg).

Directive 2008/50/EC makes it clear that the ambient air quality standards shall not be enforced where there is no regular public access and fixed habitation:

> *'2. Compliance with the limit values directed at the protection of human health shall not be assessed at the following locations:*
>
> *(a) any locations situated within areas where members of the public do not have access and there is no fixed habitation;*
>
> *(b) in accordance with Article 2(1), on factory premises or at industrial installations to which all relevant provisions concerning health and safety at work apply;*
>
> *(c) on the carriageway of roads; and on the central reservations of roads except where there is normally pedestrian access to the central reservation.'*

The Environmental Permitting (England and Wales) (Amendment) (EU Exit) Regulations 2019 (SI 2019/39) were made on 8 January 2019 and come into force on exit day. The Regulations ensure that the Environmental Permitting (EP) regime in England and Wales can continue to function after Brexit.

3.2 Air Quality Strategy for England, Scotland, Wales & Northern Ireland

The Government's policy on air quality within the UK is set out in the Air Quality Strategy (AQS) for England, Scotland, Wales and Northern Ireland (AQS) published in July 2007, pursuant to the requirements of Part IV of the Environment Act 1995. The AQS sets out a framework for reducing hazards to health from air pollution and ensuring that international commitments are met in the UK. The AQS is designed to be an evolving process that is monitored and regularly reviewed.

The AQS sets standards and objectives for ten main air pollutants to protect health, vegetation and ecosystems.

The air quality standards are long-term benchmarks for ambient pollutant concentrations which represent negligible or zero risk to health, based on medical and scientific evidence

reviewed by the Expert Panel on Air Quality Standards (EPAQS) and the World Health Organisation (WHO). These are general concentration limits, above which sensitive members of the public (e.g. children, the elderly and the unwell) might experience adverse health effects.

The air quality objectives are medium-term policy based targets set by the Government which take into account economic efficiency, practicability, technical feasibility and timescale. Some objectives are equal to the EPAQS recommended standards or WHO guideline limits, whereas others involve a margin of tolerance, i.e. a limited number of permitted exceedences of the standard over a given period.

For some pollutants there is both a long-term (annual mean) standard and a short-term standard. In the case of NO_2, the short-term standard is for a 1-hour averaging period, whereas for CO it is the 8-hour averaging period. These periods reflect the varying impacts on health of differing exposures to pollutants.

Table 3-1
Air Quality Strategy Objectives

Pollutant	Concentrations	Measured As
Nitrogen Dioxide (NO_2)	200 µg/m^3 not to be exceeded more than 18 times per year	1 hour mean
	40 µg/m^3	Annual mean

The health studies which provide the basis for the air quality standards are based on data for individuals within a population, and therefore the exposure should relate to that of an individual.

For the purposes of LAQM, regulations state that exceedances of the objectives should be assessed in relation to 'the quality of the air at locations which are situated outside of buildings or other natural or man-made structures, above or below ground, and where members of the public are regularly present'.

Examples of where the objectives should, and should not apply, are summarised in Table 3-2 below, as taken from DEFRA Guidance LAQM TG(16). This table should be considered in the context of the conclusions of various review documents such as The AQC report[1] *Relationship between the UK Air Quality Objectives and Occupational Air Quality Standards* (November 2016). In particular it is important that, when setting the objective, DEFRA took account of EPAQs's recommendations. It was also influenced by the limit value set in European Commission's First Air Quality Daughter Directive which made it clear that it only applied to *'outdoor air in the troposphere, excluding work places'*. The Ambient air quality Directive is consistent with this, stating that *'Compliance with the limit values directed at the protection of human health shall not be assessed… on factory premises or at industrial installations to which all relevant provisions concerning health and safety at work apply'*.

[1] http://www.aqconsultants.co.uk/AQC/media/Reports/Relationship-between-the-UK-Air-Quality-Objectives-and-Occupational-Air-Quality-Standards.pdf

As such, commercial / industrial occupiers of industrial units would therefore be outside the requirements of the air quality objectives. Occupiers of industrial units where members of the public would 'regularly be present' are however within the requirements.

Table 3-2
Air Quality Strategy Objectives

Averaging Period	Objectives should apply at:	Objectives should generally not apply at:
Annual mean	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes etc.	Building façades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
24-hour mean and 8-hour mean	All locations where the annual mean objective would apply, together with hotels. Gardens of residential properties	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
1-hour mean	All locations where the annual mean, 24 and 8-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets). Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations where members of the public might reasonably expected to spend one hour or longer.	Kerbside sites where the public would not be expected to have regular access.

3.3 Local Air Quality Management (LAQM)

Part IV of the Environment Act 1995 also requires local authorities to periodically Review and Assess the quality of air within their administrative area. The Reviews have to consider the present and future air quality and whether any air quality objectives prescribed in Regulations are being achieved or are likely to be achieved in the future.

Where any of the prescribed air quality objectives are not likely to be achieved the authority concerned must designate that part an Air Quality Management Area (AQMA).

For each AQMA, the local authority has a duty to draw up an Air Quality Action Plan (AQAP) setting out the measures the authority intends to introduce to deliver improvements in local

air quality in pursuit of the air quality objectives. Local authorities are not statutorily obliged to meet the objectives, but they must show that they are working towards them.

The Department of Environment, Food and Rural Affairs (DEFRA) has published technical guidance for use by local authorities in their Review and Assessment work. This guidance is commonly referred to as LAQM.TG(16). Full details are available on the DEFRA website.

3.4 Medium Combustion Plant Directive (MCPD)

Directive (EU) 2015/2193 of the European Parliament and the Council of 25th November 2015 on the limitation of emissions of certain pollutants into the air from medium combustion facilities (Medium Combustion Plant (MCP) Directive) regulates pollutant emissions from the combustion of fuels in facilities with a rated thermal input equal to or greater than 1 megawatt (MW_{th}) and less than 50 MW_{th}.

The MCPD entered into force on 18th December 2015 and has been transposed into the Environmental Permitting Regulations, most recently through The Environmental Permitting (England and Wales) (Amendment) Regulations 2018 No. 110. The MCPD regulates emissions of NO_x, SO_2, and particulate matter (PM_{10}) into the air with the aim of reducing those emissions and the risks to human health and the environment they may cause. It also lays down rules to monitor emissions of carbon monoxide (CO).

Environment Agency has issued guidance relating to MCPD regulation and assessment, including:

> *'Emissions from specified generators (Version 1). Guidance on dispersion modelling for oxides of nitrogen assessment from specified generators.'*

This EA guidance states that it is intended for use with:

- Tranche A generators that have NO_X emissions greater than 500 mg/Nm^3 (at 273.15 K, 101.3 kPa, 0% moisture and 15% oxygen), with aggregated rated thermal inputs of greater than 5 MW_{th} and operating more than 50 hours per year;
- Tranche B generators with NO_X emissions less than 190 mg/Nm^3, with aggregated thermal inputs greater than 1 MW_{th} and operating more than 50 hours per year where there is a higher risk of NOX impacts. For example, where the facility is located in or near an Air Quality Management Area (AQMA) declared for NO_2, or operates for more than 500 hours per year.

These include former Tranche A generators with transitional arrangements of:

- NO_X emissions less than 500 mg/Nm^3 with aggregated rated thermal inputs greater than 5 MW_{th}; and aggregated rated thermal inputs less than 5 MW_{th}.

This detailed air quality assessment is compliant with the requirements of the EA guidance.

3.5 National Planning Policy

The revised National Planning Policy Framework (NPPF) was published in February 2019 and sets out the Government's planning policies for England and how these are expected to be applied.

The purpose of the planning system is to contribute to the achievement of sustainable development. In order to ensure this, this NPPF recognises three overarching objectives, including the following of relevance to air quality:

> *"c) An environment objective - to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigation and adapting to climate change, including moving to a low carbon economy."*

Chapter 15 of the NPPF details objectives in relation to conserving and enhancing the natural environment. It states that:

> *"Planning policies and decisions should contribute to and enhance the natural and local environment by:*
>
> *[…]*
>
> *e) preventing new and existing development 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 […]"*

The NPPF specifically recognises air quality as part of delivering sustainable development and states that:

> *"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."*

The implications of the NPPF have been considered throughout this assessment.

3.6 Trafford Council Planning Policy

Trafford Council has stated that planning applications are currently decided upon primarily by using the policies including the:

- Core Strategy (Adopted January 2012);
- Revised Unitary Development Plan (UDP) (Adopted June 2006);

The Council website states that:

> *'The Core Strategy and Revised UDP are being replaced by the Trafford Local Plan with the emerging Greater Manchester Spatial Framework (GMSF) providing the overarching framework. However, until such time as the Core Strategy and Revised UDP policies are fully replaced, after the adoption of the Local Plan, the relevant policies will still be used to determine planning applications.'*

Trafford Council recently published a public consultation on the Regulation 18 Draft Local Plan which was carried out between 4 February 2021 and 18 March 2021.

3.6.1 Core Strategy (Adopted January 2012)

The Policy statements of most relevance to this development are those below.

> *'L5.13 Development that has potential to cause adverse pollution (of air, light, water, ground), noise or vibration will not be permitted unless it can be demonstrated that adequate mitigation measures can be put in place.'*
>
> *'L5.14 Where development is proposed close to existing sources of pollution, noise or vibration, developers will be required to demonstrate that it is sited and designed in such a way as to confine the impact of nuisance from these sources to acceptable levels appropriate to the proposed use concerned.'*
>
> *'L5.15 Within the Borough's Air Quality Management Zones developers will be required to adopt measures identified in the Greater Manchester Air Quality Action Plan, to ensure that their development would not have an adverse impact on the air quality'*

3.6.2 New Local Plan

The draft Policy of most relevance to this development is EP3 – Air quality:

> *EP3.1 A range of measure will be used to achieve improvements to air quality in Trafford including, but not limited to, the following:*
>
> *…*
>
> *d) Include measures to minimise air pollution at the design stage and incorporate best practice in the design, construction and operation of the development;*
>
> *…*

4.0 ASSESSMENT METHODOLOGY

The scope of the impact assessment for stack emissions from the proposed plant has been determined in the following way:

- review of air quality data for the area surrounding the Site, including data from the Defra Air Quality Information Resource (UK-AIR) and the Air Pollution Information System (APIS);
- desk study to confirm the location of nearby areas that may be sensitive to changes in local air quality; and
- review of emission parameters for the power plant and dispersion modelling using the Breeze AERMOD 9 dispersion model (version 19191) to predict ground-level concentrations of pollutants at sensitive human and habitat receptor locations.

4.1 Model Scenarios

A total of 5 No. model scenarios have been assessed:

- **Scenario 0**: This scenario represents the 2021 'baseline' situation, with the background NO_2 added to the modelled impacts from the existing UKPR site only.
- **Scenario 1**: This scenario represents the 'extant' situation, with the background NO_2 added to the modelled impacts from the existing UKPR site and the STOR 124 site for which permission was granted and the development deemed lawful but has yet to be built.
- **Scenario 2**: This scenario represents the 'proposed' situation, with the background NO_2 added to the modelled impacts from the existing UKPR site and the proposed FORSA site. This scenario assumes that the STOR 124 permission has been revoked (i.e. the FORSA site will be built instead of the STOR 124 site).
- **Scenario 3**: This topographical sensitivity scenario represents the 'proposed' situation, with the background NO_2 added to the modelled impacts from the existing UKPR site and the proposed FORSA site. However, this scenario has been run in order to quantify the effects of topography on the model and assumes that all sources, buildings and receptors are at the same height.
- **Scenario 4**: This scenario presents the process contribution results from the FORSA site only (i.e. assumes no other sources).

4.2 Model Inputs

Manufacturer emission limits have been assumed for the purposes of the modelling assessment. The input parameters used in the assessment are identified in Appendix A. For the UKPR and STOR 124 sites the emission data has been taken from the detailed modelling reports for each site, which are available in the public domain.

4.3 Local Meteorological Data

The dispersion modelling has been carried out using five years (2015-2019) of hourly sequential meteorological data in order to take account of inter-annual variability and reduce the effect of any atypical conditions. Data from the Manchester meteorological station has been used for the assessment. This site is the most representative data currently available for the area which provides the level of completeness required for dispersion modelling (i.e. minimal missing data).

The meteorological data has been prepared based on a surface roughness of 0.2m with the Albedo / Bowen is characterised as grassland (40%), deciduous forest (10%), water (10%) and urban (40%).

A windrose for all years of meteorological data are presented in Appendix B.

4.4 Topography

The presence of elevated terrain can significantly affect the dispersion of pollutants and the resulting ground level concentration in a number of ways. Elevated terrain reduces the distance between the plume centre line and the ground level, thereby increasing ground level concentrations. Elevated terrain can also increase turbulence and, hence, plume mixing with the effect of increasing concentrations near to a source and reducing concentrations further away.

The FORSA power plant containers are sites on concrete plinths and lie at a basal elevation of around 25.7m AoD. Topography has been incorporated within the dispersion model. The UKPR and STOR 124 sites have been modelled at 25m AoD and 27.3m AoD respectively.

AERMOD utilises digital elevation data to determine the impact of topography on dispersion from a source. Topographical data for the site has been obtained in OS digital (.ntf) format. Data was processed by the AERMAP function within AERMOD to calculate terrain heights, and interpolate data to calculate terrain heights for sources, buildings etc.

4.5 Building Downwash / Entrainment

The presence of buildings close to emission sources can significantly affect the dispersion of pollutants by leading to downwash. This occurs when a building distorts the wind flow, creating zones of increased turbulence. Increased turbulence causes the plume to come to ground earlier than otherwise would be the case and result in higher ground level concentrations closer to the stack.

Downwash effects are only significant where building heights are greater than 40% of the emission release height. The downwash structures also need to be sufficiently close for their influence to be significant.

The FORSA engine containers are a maximum of 4.9m in height and have been included in the dispersion model to account for potential downwash effects and allow for stack height determination. The containers for the UKPR and STOR 124 sites have also been assumed to

be 4.9m in height. All other buildings / structures within 5 stack heights are lower than 40% of the stacks and are therefore not relevant to the model.

4.6 Nitrogen Oxides to NO_2 Conversion

Oxides of nitrogen (NOx) emitted to atmosphere as a result of combustion will consist largely of nitric oxide (NO), a relatively innocuous substance. Once released into the atmosphere, NO is oxidised to NO_2. The proportion of NO converted to NO_2 depends on a number of factors including wind speed, distance from the source, solar irradiation and the availability of oxidants, such as ozone (O_3).

A conversion ratio of 70% NOx:NO_2 has been assumed for comparison of predicted concentrations with the long-term objectives for NO_2. A conversion ratio of 35% has been utilised for the assessment of short-term impacts, as recommended by Environment Agency guidance[2].

4.7 Sensitive Human Health Receptors

The term 'sensitive receptors' includes any persons, locations or systems that may be susceptible to changes as a consequence of the proposed power plant.

A selection of the closest receptors to the development which have been used for modelling purposes are shown in Table 4.1 and are also shown on Drawing AQ1a. Further receptors have been selected which are consistent with those used in the RPS report for the STOR 124 site and the Isopleth Ltd report for the UKPR site. The receptor locations represent a mix of:

- Residences;
- Commercial / industrial receptors;
- Roadside receptors (where members of the public could spend an hour or more).

As described in section 3.2 of this report, annual objectives only apply at residences.

For impacts at this site, a receptor grid at 30m (i.e. approx. 2 stack heights for the FORSA site) resolution across the model domain has been used. These results have been presented as impact isopleths and this allows the concentration at all locations. These predicted ground level concentrations may then be compared with relevant long term and short term air quality standards and guidelines for the protection of health. This approach enables the concentration of a pollutant to be determined at all locations, including those sites which have yet to be built.

[2] AQMAU, Conversion Rates for NOx and NO_2.

Table 4-1
Modelled Receptors: Human

Reference	Description	OS GR Xm	OS GR Ym
D1	Addison Road	373553.0	392900.0
D2	Stamford Road	373565.0	393010.0
D3	Lorna Way	372626.0	393921.0
D4	Calamanco Way	372376.0	393876.0
D5	Fairhills Road	372151.0	393797.0
D6	Jack Lane Farm	373140.0	393924.0
D7	Orchard Avenue 1	372176.0	391750.0
D8	Roseway Avenue 1	371512.0	392091.0
D9	Aspen Close 1	371777.0	391785.0
D10	Station Road	371269.0	393128.0
D11	Wallacre Technology Secondary School	373832.0	394495.0
D12	Atherton Lane	371278.0	392408.0
D13	Liverpool Road	371296.0	392630.0
D14	Kings Road	371462.0	392897.0
D15	Preston Avenue	371638.0	393344.0
D16	Woods Road	371825.0	393591.0
D17	Uplands Road	374077.0	393816.0
D18	Mona Way	372578.0	393819.0
D19	Manchester Road 1	373274.0	393037.0
D20	Vicarage of St George's Church	372825.0	392656.0
D21	Manchester Road 2	372180.8	391745.9
D22	Orchard Avenue 2	372040.3	391739.0
D23	Aspen Close 2	371781.1	391784.1
D24	Roseway Avenue 2	371514.7	392086.7
D25	River Bend Technology Centre	372025.0	392692.5

It is recognised that this list is not exhaustive, however these receptors have been selected in order to provide an indication of impacts in all directions from the proposed plant.

Trafford Council undertakes air quality monitoring within the local authority area (as discussed further in section 5.0). There is a single Council monitoring point of relevance to the FORSA site and this has been modelled as a discrete receptor.

Table 4-2
Modelled Receptors: Council

Reference	Description	OS GR Xm	OS GR Ym
DT1	Warburton Lane, Partington	371419	390760

4.8 Sensitive Habitats and Ecosystems

Where sensitive ecological receptors are present, maximum predicted ground level concentrations of NOx are compared with relevant critical levels, thresholds of airborne pollutant concentrations above which damage may be sustained to sensitive plants and animals. The development is not a significant source of SO_2 or HCL / HF.

Nitrogen dioxide emitted from the stacks has the potential to impact on sensitive habitat sites through airborne emissions (critical levels) and deposition (critical loads). For a gas fuelled standby generation facility the concerns therefore relate to NOx critical levels and nutrient nitrogen (N) critical loads. Acid critical loads are unlikely be an issue for sites where there is no ammonia or sulphur release (as is the case for the proposed development) and the critical level and N critical load impacts are within acceptable limits.

Environment Agency guidance states that *"the critical levels should be applied at all locations as a matter of policy, as they represent a standard against which to judge ecological harm*".

The maximum predicted deposition rates are compared with site specific critical loads obtained from the APIS database.

The presence of the following habitat sites have been assessed:

- Special Areas of Conservation (SACs) and candidate SACs (cSACs) designated under the EC Habitats Directive[3];
- Special Protection Areas (SPAs) and potential SPAs designated under the EC Birds Directive[4];
- Ramsar Sites designated under the Convention on Wetlands of International Importance[5].
- Sites of Special Scientific Interest (SSSI);
- National Nature Reserves (NNR);
- Local Nature Reserves (LNR); and
- ancient woodland.

MAGIC searches for areas 5km (European sites) and 2km from the site (SSSI, AW) are included in Appendix E. These distances are consistent with Environment Agency Guidance for standby generation. The designated ecological sites of European interest or SSSI within the search areas are:

- Holcroft Moss SSSI/SAC
- Rixton Clay Pits SAC, SSSI & Local Nature Reserve (LNR)

[3] Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora.

[4] Council Directive 79/409/EEC on the conservation of wild birds.

[5] Ramsar (1971), The Convention of Wetlands of International Importance especially as Waterfowl Habitat.

- Manchester Mosses SAC (Bedford Moss SSSI); and
- Brookheys Covert SSSI.

The modelled ecological receptor points are as follows and also shown in Drawing AQ1b

Table 4-3
Modelled Receptors: Ecological

Reference	Description	OS GR Xm	OS GR Ym
ER1	Holcroft Moss SSSI & SAC	368760	393241
ER2	Rixton Clay Pits 1 SAC & SSSI	368762	390528
ER3	Rixton Clay Pits 2 SAC, SSSI & Local Nature Reserve	368715	390247
ER4	Manchester Mosses SAC (Bedford Moss SSSI)	369860	397183
ER5	Brookheys Covert SSSI	374250	390450

There isopleths included in the appendices to this report allow the impact to be seen in relation to any ecological sites of local interest which have not been specifically mentioned in this report.

A summary of critical levels for the protection of sensitive ecosystems and vegetation is presented in Appendix C.

4.9 Significance of Impact

The significance of impact from the generation plant at Carrington has been considered against criteria for both planning and also permitting criteria issued by the Environment Agency.

4.9.1 Planning

The EPUK Guidance describes that:

> *'Impacts on air quality, whether adverse or beneficial, will have an effect on human health that can be judged as 'significant' or 'not significant'. This is the primary requirement of the EIA regulations, but is also relevant to other air quality assessments.*
>
> *It is important to distinguish between the meaning of 'impact' and 'effect' in this context. An impact is the change in the concentration of an air pollutant, as experienced by a receptor.*
>
> *This may have an effect on the health of a human receptor, depending on the severity of the impact and other factors that may need to be taken into account. Judging the severity of an impact is generally easier than judging the significance of an effect.'*

In determining impact significance from the pollutants discharged to air, specific reference has been made to Table 6.3 of "Development Control: Planning for Air Quality", which presents descriptors for impact magnitude and impact significance. These descriptors are reproduced below and relate to annual average impacts.

Figure 4-1: EPUK Impact descriptors for individual receptors

Long term average Concentration at receptor in assessment year	% Change in concentration relative to Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

The following standard terminology has been applied:

- Substantial beneficial;
- Moderate beneficial;
- Minor beneficial;
- Neutral/negligible;
- Minor adverse;
- Moderate adverse; and
- Substantial adverse.

In relation to short-term impacts, the EPUK guidance states:

> *'6.38 Where such peak short term concentrations from an elevated source are in the range 10-20% of the relevant AQAL, then their magnitude can be described as small, those in the range 20-50% medium and those above 50% as large. These are the maximum concentrations experienced in any year and the severity of this impact can be described as slight, moderate and substantial respectively, without the need to reference background or baseline concentrations. That is not to say that background concentrations are unimportant, but they will, on an annual average basis, be a much smaller quantity than the peak concentration caused by a substantial plume and it is the contribution that is used as a measure of the impact, not the overall concentration at a receptor. This approach is intended to be a streamlined and pragmatic assessment procedure that avoids undue complexity.'*

Therefore, the following descriptors for impact magnitude resulting from short term impacts are applied in this assessment:

- <10%: Negligible;
- 10-20%: Small;
- 20-50%: Medium; and
- >50 Large.

The EPUK guidance also states that:

'judgement of the significance should be made by a competent professional who is suitably qualified. The reasons for reaching the conclusions should be transparent and set out logically.'

An impact which results in an exceedance of an air quality objective will normally be regarded as 'significant'.

4.9.2 Permitting

The EA impact, effect and significance criteria are as detailed below.

Stage 1

The EA Guidance describes that, to screen out a PC for any substance so that no further assessment is needed for that pollutant, the PC must meet both of the following criteria:

- the short-term PC is less than 10% of the short-term environmental standard;
- the long-term PC is less than 1% of the long-term environmental standard

If both of these criteria are met no further assessment of the substance is required. There will be a need to carry out a second stage of screening to determine the impact of the PEC if the criteria are not met.

Stage 2

The EA Guidance describes that, in the second stage of screening if both of the following requirements are met there is no requirement for any further assessment of that substance. Detailed modelling will be required for emissions that don't meet both of the following requirements:

- the short-term PC is less than 20% of the short-term environmental standards minus twice the long-term background concentration; and
- the long-term PEC is less than 70% of the long-term environmental standards

The guidance then states that no further action is needed if the assessment has shown that both of the following apply:

- emissions comply with BAT associated emission levels (AELs) or the equivalent requirements where there is no BAT AEL; and
- the resulting PECs are not predicted to exceed environmental standards

A cost benefit analysis is required if any of the following apply:

- PCs could cause a PEC to exceed an environmental standard (unless the PC is very small compared to other contributors);
- the PEC is already exceeding an environmental standard;
- the activity or part of it isn't covered by a 'BAT reference document' (BREF);
- the emissions from the facility don't comply with BAT AELs; or

- a BAT assessment has been requested.

If the emissions from the facility that affect ecological sites meet both of the following criteria, they are insignificant:

- the short-term PC is less than 10% of the short-term environmental standard for protected conservation areas; and
- the long-term PC is less than 1% of the long-term environmental standard for protected conservation areas

If these requirements are not met there is a need to calculate the PEC and check the PEC against the standard for protected conservation areas.

- If your long-term PC is greater than 1% and the PEC is less than 70% of the long-term environmental standard, the emissions are insignificant and there is no requirement to assess them any further; however
- If the PEC is greater than 70% of the long-term environmental standard, detailed modelling is required.

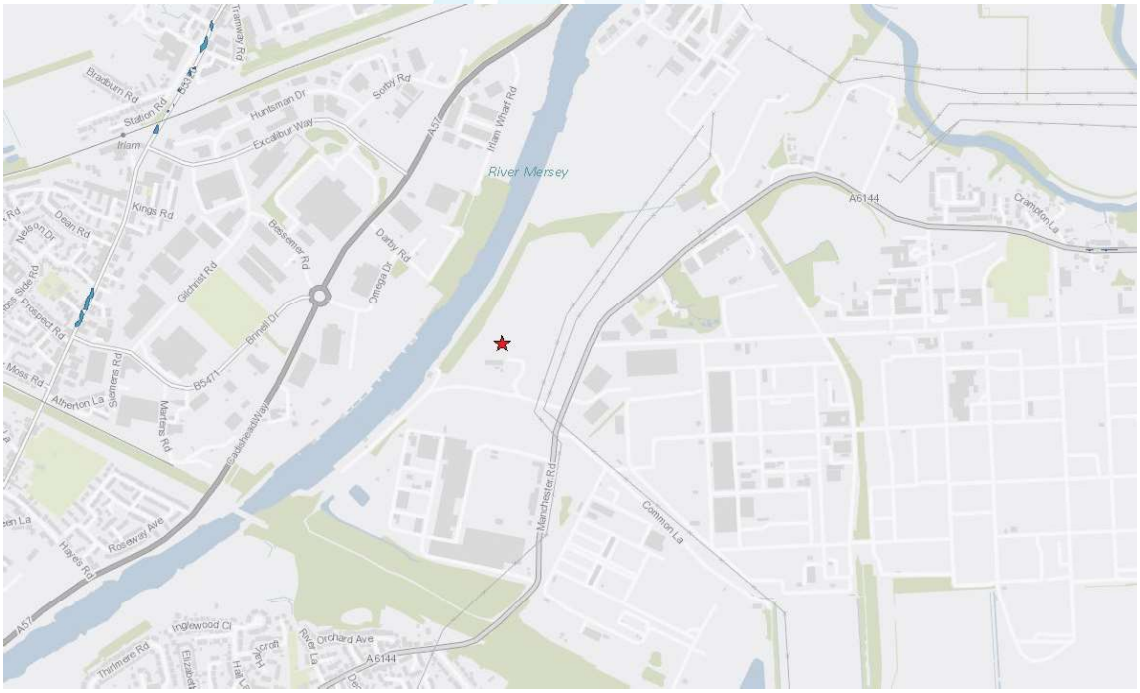
5.0 BASELINE CONDITIONS

5.1 Council Review and Assessment of Air Quality

Clean Air Greater Manchester is the home of air quality information for Greater Manchester. It is a collaboration between the 10 Greater Manchester local authorities, the Greater Manchester Combined Authority (GMCA) and Transport for Greater Manchester (TfGM). In June 2021 the Greater Manchester Combined Authority issued the latest Local Air Quality Management report In fulfilment of Part IV of the Environment Act 1995.

Since 2016, a single Air Quality Management Area (AQMA) has covered Greater Manchester. The 2020 Air Quality Annual Status Report (ASR) confirms that the Trafford council has areas within the Greater Manchester AQMA, including roads close to the proposed development site, as shown below.

Figure 5-1: AQMA location



The AQMA has been declared due to high levels of annual average NO_2. The site is not located within an AQMA neither is adjacent to any locations within the AQMA. However does have the potential to affect levels of pollution within an AQMA, albeit that this is limited given the distances to the air quality hotspots.

5.2 Local Monitoring Data

Trafford Council has no operational automatic monitoring stations on relevance to the proposed development.

The Council also undertook non-automatic (passive) monitoring of NO_2 with diffusion tubes at 15 No. sites during 2019. The closest of these are:

- Trafford 25B (Urban background): 2019 measured concentration 13.0 µg/m^3; and
- Trafford 27 (Urban traffic): 2019 measured concentration 21.7 µg/m3

Trafford 27 is the tube at Warburton Lane, Partington used as a discrete receptor in the dispersion modelling assessments.

The development site is also close to the administrative area of Salford Council. There are 2 tubes of some relevance to the proposed development site:

- Salford 1 (Urban background): 2019 measured concentration 19.9 µg/m^3; and
- Salford 2 (Urban background): 2019 measured concentration 20.2 µg/m^3

In all cases the 2020 measured concentration was much reduced as a result of the CV-19 pandemic when compared with 2019 data.

5.3 DEFRA Background Maps

Additional information on background concentrations in the vicinity of the development site has been obtained from the DEFRA background pollutant maps. The background NO_2 highest concentration from the 8 closest grid squares which represent the site and receptors for the current year of 2021 are given as:

- Oxides of Nitrogen (NOx): 23.13 µg/m^3.
- Nitrogen dioxide (NO2): 16.47 µg/m^3.

Estimated DEFRA background concentrations are therefore 'well below' the relevant objectives.

5.4 Background Data Selection

For purposes of this assessment, the highest background NO_2 highest concentration from the 8 closest grid squares which represent the site and receptors for the current year of 2021 have been used as shown in section 5.3 above.

6.0 PREDICTED IMPACTS

The assessment results are presented in the tables below for the detailed modelling scenarios described in section 4.1.

6.1 Scenario 0

This scenario represents the 2021 'baseline' situation, with the background NO_2 added to the modelled impacts from the existing UKPR site only.

6.1.1 All Locations

The predicted process contribution (PC) at the maximum point of impact (outside the FORSA site red line boundary) is presented in Table 6.1 for short term limits. The annual objective does not apply at the point of maximum ground level concentration except where a residence is present.

Table 6-1
Maximum Predicted Ground Level Concentrations (µg/m³)

Pollutant	Averaging Period	EAL (µg/m³)	PC (µg/m³)	PC (%age of EAL)
NO_2	1-hour	200	49.9	24.9%

[*18th Highest value of operational period, equating to 99.79th percentile of entire year.]

The short-term impacts are compared with the baseline concentrations (i.e. PC + Baseline, or Predicted Environmental Concentration, 'PEC') for the power generation plant in Table 6.2.

Table 6-2
Comparison of Predictions with Baseline Concentrations (µg/m³)

Pollutant	EAL	Baseline	PEC	PEC (as a %age of EAL)
NO_2	200	32.9	82.8	41.4%

The results show that for the existing UKPR plant the process contribution for short term NO_2 is below the relevant objective at this point of maximum impact. The impact is in the range which would be regarded as 'medium' when using the IAQM criteria.

As can be seen in the isopleth plots (Appendix D) the point of maximum impact is to the east of the site between the UKPR boundary and the Manchester Road. This location is not defined as a location '*where members of the public have regular access*', i.e. it is not likely that they would be at this location for 18 hours or more per year.

6.1.2 Discrete Receptors: Human

The predicted process contribution (PC) and predicted environmental concentration (PEC) at the assessed receptor locations is presented in Table 6.3.

Table 6-3
Receptor Impact Concentrations (µg/m³)

Receptor	PC Annual NO_2	PEC Annual NO_2	PC 1-hr NO_2	PEC 1-hr NO_2
D1	0.09	16.6	7.5	40.4
D2	0.08	16.6	7.3	40.3
D3	0.14	16.6	7.2	40.1
D4	0.14	16.6	7.5	40.5
D5	0.11	16.6	7.7	40.6
D6	0.10	16.6	6.3	39.3
D7	0.05	16.5	9.6	42.5
D8	0.07	16.5	8.9	41.9
D9	0.07	16.5	9.4	42.3
D10	0.04	16.5	6.8	39.8
D11	0.05	16.5	4.9	37.9
D12	0.06	16.5	8.5	41.4
D13	0.05	16.5	8.6	41.5
D14	0.04	16.5	8.0	40.9
D15	0.06	16.5	8.8	41.7
D16	0.06	16.5	7.8	40.7
D17	0.05	16.5	5.3	38.2
D18	0.15	16.6	7.5	40.5
D19	0.11	16.6	8.7	41.7
D20	0.31	16.8	20.0	52.9
D21	0.05	16.5	9.4	42.4
D22	0.06	16.5	9.4	42.4
D23	0.07	16.5	9.4	42.3
D24	0.07	16.5	9.0	42.0
D25	0.13	16.6	15.4	48.4

Maximum predicted impacts can be seen in Appendix D. The highest long term NO_2 impact at an assessed receptor is predicted to fall at receptor D20 (Vicarage of St George's Church) which represents 0.8% of the annual objective with the PEC being 42% of the annual objective. According to the IAQM significance criteria this impact is 'negligible'. The highest hourly NO_2 impact at an assessed receptor is also predicted to fall at the same property which is 10.0% of the short term objective with the PEC being 26.5% of the annual objective.

Maximum predicted impacts at receptor locations are (at worst) within 70% of the objective limits for protection of human health and annual impacts are dominated by the existing background, as can be seen in Table 6.3 and Appendix D.

6.1.3 Discrete Receptors: Ecological

The NOx critical level impacts at all locations (annual and 24-hour) can be seen in Table 6-4, below.

Table 6-4
Ecological Receptors: Critical Levels (µg/m^3)

Receptor	PC Annual NO_X	Annual NO_X % of limit	PC 24-hr NOx	24-hr NOx % of limit
Holcroft Moss SSSI/SAC	0.019	0.1%	0.6	0.8%
Rixton Clay Pits 1	0.021	0.1%	0.5	0.7%
Rixton Clay Pits 2	0.020	0.1%	0.5	0.7%
Manchester Mosses SAC	0.025	0.1%	0.7	0.9%
Brookheys Covert SSSI	0.027	0.1%	1.0	1.3%

It can be seen that at no location is the maximum GLC greater than the 24 hour or annual average critical levels of vegetation which would be applied at sites of local ecological interest. Annual and 24 hour impacts at the ecological sites are less than 1% and 10% of their respective critical levels and are therefore insignificant according to Environment Agency guidance.

In relation to critical loads, the Nutrient N impacts at all locations can be seen in Table 6-5, below.

Table 6-5
Ecological Receptors: Critical Loads

Receptor	PC	lower critical load Kg N/ha/yr	PC (% of lower critical load)
Holcroft Moss SSSI/SAC	0.003	5.00	0.05%
Rixton Clay Pits 1	0.003	10.00	0.03%
Rixton Clay Pits 2	0.003	10.00	0.03%
Manchester Mosses SAC	0.004	5.00	0.07%
Brookheys Covert SSSI	0.008	15.00	0.05%

Nutrient N impacts are less than 1% of the critical loads and are therefore insignificant at all of the assessed locations according to Environment Agency guidance.

6.2 Scenario 1

This scenario represents the 'extant' situation, with the background NO2 added to the modelled impacts from the existing UKPR site and the STOR 124 site for which permission was granted and the development deemed lawful but has yet to be built.

6.2.1 All Locations

The predicted process contribution (PC) at the maximum point of impact (outside the FORSA site red line boundary) is presented in Table 6.6 for short term limits. The annual objective does not apply at the point of maximum ground level concentration except where a residence is present.

Table 6-6
Maximum Predicted Ground Level Concentrations (µg/m^3)

Pollutant	Averaging Period	EAL (µg/m^3)	PC (µg/m^3)	PC (%age of EAL)
NO_2	1-hour	200	645.7	322.9%

[*18th Highest value of operational period, equating to 99.79th percentile of entire year.]

The short-term impacts are compared with the baseline concentrations (i.e. PC + Baseline, or Predicted Environmental Concentration, 'PEC') for the power generation plant in Table 6.7.

Table 6-7
Comparison of Predictions with Baseline Concentrations (µg/m^3)

Pollutant	EAL	Baseline	PEC	PEC (as a %age of EAL)
NO_2	200	32.9	678.6	339.3%

The results show that for the extant STOR 124 plant the process contribution for short term NO_2 is well above the relevant objective at this point of maximum impact. These results are consistent with those reported by RPS in support of the application (Appendix B, Graph B-2 of that report).

As can be seen in the isopleth plots (Appendix D) the point of maximum impact is to the north and east of the site, including levels above the short term NO_2 limit on the Manchester Road. This is potentially a location '*where members of the public have regular access*'. Notwithstanding the above, planning permission was granted for this site in October 2016.

6.2.2 Discrete Receptors: Human

The predicted process contribution (PC) and predicted environmental concentration (PEC) at the assessed receptor locations is presented in Table 6.8.

Table 6-8
Receptor Impact Concentrations (µg/m³)

Receptor	PC Annual NO_2	PEC Annual NO_2	PC 1-hr NO_2	PEC 1-hr NO_2
D1	0.62	17.1	58.2	91.1
D2	0.58	17.1	55.9	88.8
D3	1.17	17.6	59.4	92.4
D4	1.12	17.6	61.7	94.7
D5	0.81	17.3	63.1	96.0
D6	0.75	17.2	52.2	85.1
D7	0.32	16.8	62.8	95.7
D8	0.49	17.0	63.4	96.3
D9	0.43	16.9	61.1	94.1
D10	0.27	16.7	50.5	83.5
D11	0.37	16.8	40.2	73.2
D12	0.42	16.9	58.0	90.9
D13	0.42	16.9	63.3	96.3
D14	0.36	16.8	61.4	94.4
D15	0.43	16.9	65.3	98.3
D16	0.50	17.0	63.7	96.7
D17	0.32	16.8	40.1	73.1
D18	1.28	17.8	62.8	95.7
D19	0.83	17.3	69.3	102.2
D20	2.78	19.3	151.5	184.5
D21	0.32	16.8	63.2	96.2
D22	0.34	16.8	60.2	93.2
D23	0.42	16.9	61.4	94.3
D24	0.50	17.0	63.1	96.1
D25	1.12	17.6	123.0	156.0

Maximum predicted impacts can be seen in Appendix D. The highest long term NO_2 impact at an assessed receptor is predicted to fall at receptor D20 (Vicarage of St George's Church) which represents 7% of the annual objective with the PEC being 48.1% of the annual objective. According to the IAQM significance criteria this impact is 'slight adverse'. The highest hourly NO_2 impact at an assessed receptor is also predicted to fall at the same property which is 75.8% of the short term objective with the PEC being 92.2% of the annual objective.

Maximum predicted impacts at the assessed receptor locations are between 70% and 100% of the objective limits for protection of human health as can be seen in Table 6.8.

6.2.3 Discrete Receptors: Ecological

The NOx critical level impacts at all locations (annual and 24-hour) can be seen in Table 6-9, below.

Table 6-9
Ecological Receptors: Critical Levels (µg/m³)

Receptor	PC Annual NO_X	Annual NO_X % of limit	PC 24-hr NOx	24-hr NOx % of limit
Holcroft Moss SSSI/SAC	0.175	0.6%	5.4	7.2%
Rixton Clay Pits 1	0.160	0.5%	4.3	5.8%
Rixton Clay Pits 2	0.155	0.5%	4.2	5.5%
Manchester Mosses SAC	0.242	0.8%	5.6	7.4%
Brookheys Covert SSSI	0.194	0.6%	7.1	9.5%

It can be seen that at no location is the maximum GLC greater than the 24 hour or annual average critical levels of vegetation which would be applied at sites of local ecological interest. Annual and 24 hour impacts at the ecological sites are less than 1% and 10% of their respective critical levels and are therefore insignificant according to Environment Agency guidance.

In relation to critical loads, the Nutrient N impacts at all locations can be seen in Table 6-10, below.

Table 6-10
Ecological Receptors: Critical Loads

Receptor	PC	lower critical load Kg N/ha/yr	PC (% of lower critical load)
Holcroft Moss SSSI/SAC	0.025	5.00	0.51%
Rixton Clay Pits 1	0.023	10.00	0.23%
Rixton Clay Pits 2	0.022	10.00	0.22%
Manchester Mosses SAC	0.035	5.00	0.70%
Brookheys Covert SSSI	0.056	15.00	0.37%

Nutrient N impacts are less than 1% of the critical loads and are therefore insignificant at all of the assessed locations according to Environment Agency guidance.

6.3 Scenario 2

This scenario represents the 'proposed' situation, with the background NO_2 added to the modelled impacts from the existing UKPR site and the proposed FORSA site. This scenario assumes that the STOR 124 permission has been revoked (i.e. the FORSA site will be built instead of the STOR 124 site).

6.3.1 All Locations

The predicted process contribution (PC) at the maximum point of impact (outside the FORSA site red line boundary) is presented in Table 6.11 for short term limits. The annual objective does not apply at the point of maximum ground level concentration except where a residence is present.

Table 6-11
Maximum Predicted Ground Level Concentrations (µg/m³)

Pollutant	Averaging Period	EAL (µg/m³)	PC (µg/m³)	PC (%age of EAL)
NO_2	1-hour	200	249.6	124.8%

[*18th Highest value of operational period, equating to 99.79th percentile of entire year.]

The short-term impacts are compared with the baseline concentrations (i.e. PC + Baseline, or Predicted Environmental Concentration, 'PEC') for the power generation plant in Table 6.12.

Table 6-12
Comparison of Predictions with Baseline Concentrations (µg/m³)

Pollutant	EAL	Baseline	PEC	PEC (as a %age of EAL)
NO_2	200	32.9	282.5	141.3%

The results show that for the existing UKPR plant and proposed FORSA plant combined the process contribution for short term NO_2 is below the relevant objective at this point of maximum impact. The impact is in the range which would be regarded as 'large' when using the IAQM criteria.

As can be seen in the isopleth plots (Appendix D) the point of maximum impact is on the northern boundary of the FORSA plant. This location is not defined as a location '*where members of the public have regular access*', i.e. it is not likely that they would be at this location for 18 hours or more per year.

6.3.2 Discrete Receptors: Human

The predicted process contribution (PC) and predicted environmental concentration (PEC) at the assessed receptor locations is presented in Table 6.13.

Table 6-13
Receptor Impact Concentrations (µg/m^3)

Receptor	PC Annual NO_2	PEC Annual NO_2	PC 1-hr NO_2	PEC 1-hr NO_2
D1	0.29	16.8	14.9	47.8
D2	0.27	16.7	14.1	47.0
D3	0.42	16.9	13.6	46.6
D4	0.40	16.9	14.5	47.4
D5	0.31	16.8	14.8	47.7
D6	0.30	16.8	12.2	45.1
D7	0.15	16.6	18.6	51.5
D8	0.21	16.7	17.5	50.5
D9	0.20	16.7	18.5	51.5
D10	0.10	16.6	12.2	45.2
D11	0.16	16.6	9.1	42.0
D12	0.17	16.6	15.7	48.6
D13	0.16	16.6	15.8	48.8
D14	0.13	16.6	14.2	47.1
D15	0.16	16.6	16.1	49.0
D16	0.18	16.7	15.0	47.9
D17	0.15	16.6	9.7	42.6
D18	0.45	16.9	14.7	47.7
D19	0.36	16.8	18.0	50.9
D20	1.02	17.5	40.0	72.9
D21	0.15	16.6	18.9	51.8
D22	0.16	16.6	17.5	50.5
D23	0.20	16.7	18.5	51.5
D24	0.22	16.7	17.4	50.4
D25	0.38	16.9	25.0	58.0

Maximum predicted impacts can be seen in Appendix D. The highest long term NO_2 impact at an assessed receptor is predicted to fall at receptor D20 (Vicarage of St George's Church) which represents 2.6% of the annual objective with the PEC being 43.7% of the annual objective. According to the IAQM significance criteria this impact is 'negligible'. The highest hourly NO_2 impact at an assessed receptor is also predicted to fall at the same property which is 20.0% of the short term objective with the PEC being 36.5% of the annual objective.

Maximum predicted impacts at receptor locations are (at worst) within 70% of the objective limits for protection of human health and annual impacts are dominated by the existing background, as can be seen in Table 6.13 and Appendix D.

6.3.3 Discrete Receptors: Ecological

The NOx critical level impacts at all locations (annual and 24-hour) can be seen in Table 6-14, below.

Table 6-14
Ecological Receptors: Critical Levels (µg/m^3)

Receptor	PC Annual NO_X	Annual NO_X % of limit	PC 24-hr NOx	24-hr NOx % of limit
Holcroft Moss SSSI/SAC	0.057	0.2%	1.8	2.4%
Rixton Clay Pits 1	0.066	0.2%	1.6	2.1%
Rixton Clay Pits 2	0.064	0.2%	1.5	2.0%
Manchester Mosses SAC	0.073	0.2%	2.0	2.6%
Brookheys Covert SSSI	0.082	0.3%	3.1	4.1%

It can be seen that at no location is the maximum GLC greater than the 24 hour or annual average critical levels of vegetation which would be applied at sites of local ecological interest. Annual and 24 hour impacts at the ecological sites are less than 1% and 10% of their respective critical levels and are therefore insignificant according to Environment Agency guidance.

In relation to critical loads, the Nutrient N impacts at all locations can be seen in Table 6-15, below.

Table 6-15
Ecological Receptors: Critical Loads

Receptor	PC	lower critical load Kg N/ha/yr	PC (% of lower critical load)
Holcroft Moss SSSI/SAC	0.008	5.00	0.17%
Rixton Clay Pits 1	0.010	10.00	0.10%
Rixton Clay Pits 2	0.009	10.00	0.09%
Manchester Mosses SAC	0.011	5.00	0.21%
Brookheys Covert SSSI	0.024	15.00	0.16%

Nutrient N impacts are less than 1% of the critical loads and are therefore insignificant at all of the assessed locations according to Environment Agency guidance.

6.4 Scenario 4

This scenario presents the process contribution results from the FORSA site only (i.e. assumes no other sources).

[Note: Scenario 3 results are presented in the section 7.0 of this report, 'Model Sensitivity']

6.4.1 All Locations

The predicted process contribution (PC) at the maximum point of impact (outside the FORSA site red line boundary) is presented in Table 6.16 for short term limits. The annual objective does not apply at the point of maximum ground level concentration except where a residence is present.

Table 6-16
Maximum Predicted Ground Level Concentrations (µg/m^3)

Pollutant	Averaging Period	EAL (µg/m^3)	PC (µg/m^3)	PC (%age of EAL)
NO_2	1-hour	200	196.8	98.4%

[*18th Highest value of operational period, equating to 99.79th percentile of entire year.]

The short-term impacts are compared with the baseline concentrations (i.e. PC + Baseline, or Predicted Environmental Concentration, 'PEC') for the power generation plant in Table 6.17.

Table 6-17
Comparison of Predictions with Baseline Concentrations (µg/m^3)

Pollutant	EAL	Baseline	PEC	PEC (as a %age of EAL)
NO_2	200	32.9	229.8	114.9%

The results show that for the proposed FORSA plant the process contribution for short term NO_2 is above the relevant objective at the point of maximum impact. However, as can be seen in the isopleth plots (Appendix D) the point of maximum impact is within the UKPR boundary which is a workplace and therefore covered by HSE legislation. This location is not defined as a location '*where members of the public have regular access'*, i.e. it is not likely that they would be at this location for 18 hours or more per year. It can be seen in Appendix D that the short term NO_2 concentration drops very quickly with distance from the proposed FORSA plant to levels well within the 1-hour NO_2 objective within the parcel of land owned by Peel.

6.4.2 Discrete Receptors: Human

The predicted process contribution (PC) and predicted environmental concentration (PEC) at the assessed receptor locations is presented in Table 6.18.

Table 6-18
Receptor Impact Concentrations (µg/m^3)

Receptor	PC Annual NO_2	PEC Annual NO_2	PC 1-hr NO_2	PEC 1-hr NO_2
D1	0.20	16.7	8.3	41.2
D2	0.19	16.7	7.9	40.9
D3	0.28	16.8	7.5	40.5
D4	0.26	16.7	7.9	40.9
D5	0.20	16.7	8.2	41.1
D6	0.21	16.7	6.6	39.5
D7	0.10	16.6	9.6	42.6
D8	0.14	16.6	9.2	42.2
D9	0.13	16.6	9.6	42.5
D10	0.07	16.5	5.7	38.7
D11	0.11	16.6	4.7	37.7
D12	0.11	16.6	8.2	41.2
D13	0.10	16.6	7.8	40.8
D14	0.09	16.6	6.6	39.5
D15	0.10	16.6	7.8	40.8
D16	0.12	16.6	7.9	40.9
D17	0.10	16.6	5.1	38.0
D18	0.30	16.8	8.1	41.1
D19	0.25	16.7	9.9	42.8
D20	0.71	17.2	22.8	55.7
D21	0.10	16.6	9.6	42.6
D22	0.11	16.6	9.3	42.2
D23	0.13	16.6	9.7	42.6
D24	0.14	16.6	9.3	42.2
D25	0.25	16.7	13.8	46.7

Maximum predicted impacts can be seen in Appendix D. The highest long term NO_2 impact at an assessed receptor is predicted to fall at receptor D20 (Vicarage of St George's Church) which represents 1.8% of the annual objective with the PEC being 43% of the annual objective. According to the IAQM significance criteria this impact is 'negligible'. The highest hourly NO_2 impact at an assessed receptor is also predicted to fall at the same property which is 11.4% of the short term objective with the PEC being 27.9% of the annual objective.

Maximum predicted impacts at receptor locations are (at worst) within 70% of the objective limits for protection of human health and annual impacts are dominated by the existing background, as can be seen in Table 6.18 and Appendix D.

6.4.3 Discrete Receptors: Ecological

The NOx critical level impacts at all locations (annual and 24-hour) can be seen in Table 6-19, below.

Table 6-19
Ecological Receptors: Critical Levels (µg/m^3)

Receptor	PC Annual NO_X	Annual NO_X % of limit	PC 24-hr NOx	24-hr NOx % of limit
Holcroft Moss SSSI/SAC	0.038	0.1%	1.2	1.6%
Rixton Clay Pits 1	0.045	0.2%	1.0	1.4%
Rixton Clay Pits 2	0.044	0.1%	1.1	1.4%
Manchester Mosses SAC	0.048	0.2%	1.3	1.7%
Brookheys Covert SSSI	0.055	0.2%	2.1	2.8%

It can be seen that at no location is the maximum GLC greater than the 24 hour or annual average critical levels of vegetation which would be applied at sites of local ecological interest. Annual and 24 hour impacts at the ecological sites are less than 1% and 10% of their respective critical levels and are therefore insignificant according to Environment Agency guidance.

In relation to critical loads, the Nutrient N impacts at all locations can be seen in Table 6-20, below.

Table 6-20
Ecological Receptors: Critical Loads

Receptor	PC	lower critical load Kg N/ha/yr	PC (% of lower critical load)
Holcroft Moss SSSI/SAC	0.006	5.00	0.11%
Rixton Clay Pits 1	0.007	10.00	0.07%
Rixton Clay Pits 2	0.006	10.00	0.06%
Manchester Mosses SAC	0.007	5.00	0.14%
Brookheys Covert SSSI	0.016	15.00	0.11%

Nutrient N impacts are less than 1% of the critical loads and are therefore insignificant at all of the assessed locations according to Environment Agency guidance.

6.4.4 Comparison with Extant Permission

The process contribution from the proposed FORSA plant is lower than that predicted by RPS for the approved STOR 124 plant, as described in the detailed air quality assessment prepared by RPS:

> *'RPS (2016). Air Quality Assessment. Carrington Generating Facility, Trafford. For STOR 124 Ltd. 01 September 2016. Project number JAP9089'*

This is discussed in more detail in Section 6.5, below.

6.5 Results Comparison: Sc1 and Sc2

This scenario represents the 2021 'baseline' situation, with the background NO_2 added to the modelled impacts from the existing UKPR site only.

6.5.1 Comparison: 1-hour NO_2

The predicted impacts at the point of maximum GLC is presented in Table 6.21 for 1-hour NO_2.

Table 6-21
1-hour NO_2 Impacts

Scenario	PC		PEC	
	Result (µg/m³)	%age of EAL	Result (µg/m³)	%age of EAL
Scenario 1	645.7	322.9%	678.6	339.3%
Scenario 2	249.6	124.8%	282.5	141.3%

[*18th Highest value of operational period, equating to 99.79th percentile of entire year.]

The process contribution in the scenario including the proposed FORSA plant (Sc2) is significantly lower than that predicted by RPS in the scenario including the approved STOR 124 plant (Sc1). A situation whereby the STOR 124 plant is replaced by the proposed FORSA plant is therefore most advantageous in relation to air quality.

6.5.2 Comparison: Annual NO_2

The predicted impacts (process contribution) at modelled receptor locations is presented in Table 6.22 for annual NO_2.

Table 6-22
Annual NO_2 Impacts

Receptor	Scenario 1 Result (µg/m³)	%age of EAL	Scenario 2 Result (µg/m³)	%age of EAL
D1	0.62	1.55%	0.29	0.72%
D2	0.58	1.46%	0.27	0.67%
D3	1.17	2.94%	0.42	1.04%
D4	1.12	2.79%	0.40	0.99%
D5	0.81	2.04%	0.31	0.77%
D6	0.75	1.87%	0.30	0.76%
D7	0.32	0.80%	0.15	0.37%
D8	0.49	1.24%	0.21	0.54%
D9	0.43	1.06%	0.20	0.50%
D10	0.27	0.67%	0.10	0.26%
D11	0.37	0.92%	0.16	0.41%
D12	0.42	1.05%	0.17	0.43%
D13	0.42	1.05%	0.16	0.39%
D14	0.36	0.90%	0.13	0.34%

Receptor	Scenario 1 Result (µg/m³)	%age of EAL	Scenario 2 Result (µg/m³)	%age of EAL
D15	0.43	1.07%	0.16	0.40%
D16	0.50	1.26%	0.18	0.45%
D17	0.32	0.81%	0.15	0.37%
D18	1.28	3.20%	0.45	1.12%
D19	0.83	2.08%	0.36	0.91%
D20	2.78	6.96%	1.02	2.56%
D21	0.32	0.79%	0.15	0.36%
D22	0.34	0.86%	0.16	0.41%
D23	0.42	1.06%	0.20	0.50%
D24	0.50	1.24%	0.22	0.54%
D25	1.12	2.79%	0.38	0.95%

The process contribution in the scenario including the proposed FORSA plant (Sc2) is significantly lower than that predicted by RPS in the scenario including the approved STOR 124 plant (Sc1). A situation whereby the STOR 124 plant is replaced by the proposed FORSA plant is therefore most advantageous in relation to air quality.

6.6 Results: Council DT 27

Trafford 27 is the tube at Warburton Lane, Partington. The annual average results for each scenario are presented below. For calculation of the PEC the 2019 monitored result for that DT location has been used (21.7 µg/m³).

Table 6-23
DT27: Annual NO_2 Impacts

Scenario	PC (µg/m³)	%age of EAL	PEC (µg/m³)	%age of EAL
0	0.021	0.05%	27.12	67.8%
1	0.134	0.33%	27.23	68.1%
2	0.064	0.16%	27.16	67.9%
3	0.069	0.17%	27.17	67.9%
4	0.043	0.11%	27.14	67.9%

Impacts are below 1% and therefore negligible at Trafford DT27 for all model scenarios.

6.7 Summary

In summary, the results of the modelling scenarios show that:

- The impacts from the proposed FORSA plant only are negligible at locations where air quality objectives must be applied;
- The impacts from the proposed FORSA plant are significantly lower in all cases than those for the STOR 124 facility for which planning permission was granted in 2016 and has since been confirmed is 'lawful'.

7.0 MODEL SENSITIVITY

The following model sensitivity scenarios have been considered.

7.1 Hours of Operation

The potentially significant long-term impacts at the residential receptor locations are compared with the baseline concentrations for the proposed development in Table 5.4 assuming that the each engine in the FORSA facility is operational for 6000 hours of the year (rather than the predicted 1500 or modelled 3000 hours for Scenario 4).

Table 7-1
Sensitivity Testing: FORSA Hours of Operation

Receptor	Sc4 Results (3000 hours)	PC % of limit	1500 hours	PC % of limit	6000 hours	PC % of limit
D1	0.20	0.50%	0.10	0.25%	0.40	1.01%
D2	0.19	0.47%	0.09	0.24%	0.38	0.94%
D3	0.28	0.69%	0.14	0.35%	0.55	1.38%
D4	0.26	0.65%	0.13	0.33%	0.52	1.30%
D5	0.20	0.50%	0.10	0.25%	0.40	1.00%
D6	0.21	0.52%	0.10	0.26%	0.41	1.04%
D7	0.10	0.24%	0.05	0.12%	0.19	0.48%
D8	0.14	0.36%	0.07	0.18%	0.28	0.71%
D9	0.13	0.33%	0.07	0.16%	0.26	0.65%
D10	0.07	0.17%	0.03	0.08%	0.13	0.34%
D11	0.11	0.28%	0.06	0.14%	0.23	0.57%
D12	0.11	0.28%	0.06	0.14%	0.22	0.56%
D13	0.10	0.26%	0.05	0.13%	0.21	0.52%
D14	0.09	0.23%	0.05	0.11%	0.18	0.45%
D15	0.10	0.25%	0.05	0.13%	0.20	0.51%
D16	0.12	0.29%	0.06	0.15%	0.23	0.59%
D17	0.10	0.26%	0.05	0.13%	0.21	0.52%
D18	0.30	0.74%	0.15	0.37%	0.59	1.49%
D19	0.25	0.64%	0.13	0.32%	0.51	1.27%
D20	0.71	1.78%	0.36	0.89%	1.42	3.56%
D21	0.10	0.24%	0.05	0.12%	0.19	0.48%
D22	0.11	0.27%	0.05	0.13%	0.21	0.53%
D23	0.13	0.33%	0.07	0.16%	0.26	0.65%
D24	0.14	0.36%	0.07	0.18%	0.29	0.72%
D25	0.25	0.64%	0.13	0.32%	0.51	1.27%

Maximum predicted impacts at residential receptor locations remain are within the objective limits for protection of human health when additional operating hours are assumed. They also remain lower in all cases than those for the STOR 124 facility for which planning

permission was granted in 2016 and has since been confirmed is 'lawful' even when 6000 operating hours are assumed for the FORSA plant.

7.2 Topography

This topographical sensitivity scenario represents the 'proposed' situation, with the background NO_2 added to the modelled impacts from the existing UKPR site and the proposed FORSA site (i.e. the same as Scenario 2). However, this scenario has been run in order to quantify the effects of topography on the model and assumes that all sources, buildings and receptors are at the same height.

The predicted process contribution (PC) and predicted environmental concentration (PEC) at the assessed receptor locations is presented in Table 7-2.

Table 7-2
Receptor Impact Concentrations (µg/m³)

Receptor	PC Annual NO_2	PEC Annual NO_2	PC 1-hr NO_2	PEC 1-hr NO_2
D1	0.31	16.8	16.5	49.4
D2	0.29	16.8	16.1	49.1
D3	0.46	16.9	15.7	48.6
D4	0.44	16.9	16.3	49.3
D5	0.34	16.8	16.8	49.7
D6	0.33	16.8	14.0	46.9
D7	0.16	16.6	20.7	53.6
D8	0.24	16.7	20.1	53.0
D9	0.22	16.7	21.0	53.9
D10	0.11	16.6	12.9	45.8
D11	0.17	16.6	9.9	42.9
D12	0.19	16.7	18.2	51.1
D13	0.17	16.6	17.8	50.7
D14	0.14	16.6	15.3	48.2
D15	0.17	16.6	17.5	50.5
D16	0.19	16.7	16.5	49.4
D17	0.16	16.6	10.5	43.5
D18	0.50	17.0	16.8	49.8
D19	0.39	16.9	19.9	52.8
D20	1.15	17.6	46.3	79.2
D21	0.16	16.6	20.4	53.3
D22	0.18	16.7	20.1	53.0
D23	0.22	16.7	20.9	53.9
D24	0.24	16.7	20.1	53.0
D25	0.45	16.9	31.3	64.2

It can be seen that there is no material difference in predicted impacts (when compared with scenario 2) at assessed discrete receptors when the modelling domain is assumed to be flat.

7.3 Engine Emissions

The engines have been modelled at concentrations / emissions assumed for the detailed dispersion modelling assessments for the UKPR and STOR 124 sites. The emissions from the FORSA plant would (as is the case for the operational UKPR site) be regulated by the Environment Agency through the Environmental Permit for each site to ensure that these emissions are not exceeded. As such it is considered that (realistic) worst case assumptions have been used in this assessment and no further sensitivity modelling is required.

7.4 Inter-Year Comparison

The results presented in this assessment are the result of modelling with a 5-year meteorological data set, the result of which are averaged for the tables presented in section 6. The influence of each individual meteorological data year in the overall average is presented below for Scenario 2.

Table 7-3
Annual NO_2 PC at Receptor Locations ($\mu g/m^3$)

Receptor	2015	2016	2017	2018	2019	Ave
D1	0.3	0.2	0.3	0.3	0.3	0.3
D2	0.3	0.2	0.3	0.3	0.3	0.3
D3	0.6	0.4	0.4	0.3	0.4	0.4
D4	0.6	0.5	0.3	0.3	0.3	0.4
D5	0.4	0.4	0.2	0.3	0.2	0.3
D6	0.4	0.3	0.3	0.2	0.3	0.3
D7	0.1	0.2	0.1	0.2	0.2	0.1
D8	0.2	0.3	0.1	0.3	0.2	0.2
D9	0.1	0.3	0.1	0.3	0.2	0.2
D10	0.1	0.1	0.1	0.1	0.1	0.1
D11	0.2	0.2	0.2	0.1	0.2	0.2
D12	0.2	0.2	0.1	0.2	0.2	0.2
D13	0.2	0.2	0.1	0.2	0.1	0.2
D14	0.2	0.2	0.1	0.1	0.1	0.1
D15	0.2	0.2	0.1	0.2	0.1	0.2
D16	0.2	0.2	0.1	0.2	0.1	0.2
D17	0.2	0.1	0.2	0.1	0.1	0.1
D18	0.6	0.5	0.4	0.4	0.4	0.4
D19	0.4	0.3	0.4	0.3	0.3	0.4
D20	1.1	0.9	1.1	1.0	1.0	1.0
D21	0.1	0.2	0.1	0.2	0.2	0.1
D22	0.1	0.2	0.1	0.2	0.2	0.2

Receptor	2015	2016	2017	2018	2019	Ave
D23	0.1	0.3	0.1	0.3	0.2	0.2
D24	0.2	0.3	0.1	0.3	0.2	0.2
D25	0.5	0.5	0.3	0.3	0.4	0.4

It can be seen that there is no material difference in predicted impacts (when compared with scenario 2) at assessed discrete receptors when the average of 5 years is presented rather than individual met data years.

8.0 CONCLUSIONS

An assessment has been carried out to determine the local air quality impacts associated with the operation of a proposed FORSA power plant on a site on land off Manchester Road, Trafford

Detailed air quality modelling using the AERMOD 9 dispersion model has been undertaken to predict the impacts associated with stack emissions from the gas engines at the Site. As a worst-case, emissions from each of the stacks have been assumed to occur for 3000 hours per year when comparing against long term air quality limits and the entire year when comparing against short term limits. Actual operational hours are likely to be significantly lower.

All impacts, human and ecological, are predicted to be below limit values at locations where the Air Quality Directive states that they must be applied. When applying the theoretical worst case assumptions above (i.e. that each of the engines is operating for 3000 hours per year) it can be seen that there is no realistic potential for a breach of the air quality objectives at any location.

Furthermore, it has been demonstrated that impacts from the proposed FORSA facility are lower than that for the STOR 124 facility to the north which was approved in 2016. It is understood that the planning permission for the STOR 124 facility would be revoked should permission for the FORSA facility be granted. A situation whereby the STOR 124 plant is replaced by the proposed FORSA plant is therefore most advantageous in relation to air quality.

In summary, it can be concluded that the predicted short term and long term PECs at the sensitive human and ecological receptors are within acceptable limits. The site is therefore unlikely to be a significant contributor to or cause an exceedance of an EAL (or upper critical load / level). For these reasons in relation to air quality there is no reason why planning consent should not be granted.

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