FIDDLER'S FERRY ASH PROCESSING PLANT

AIR QUALITY ASSESSMENT

November 2025

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CONTENTS

1.0 INTRODUCTION

1.1 Background

This air quality assessment has been undertaken by Isopleth Ltd on behalf of Titan Cement UK ltd ('the operator'). The assessment considers air quality impacts associated with operation of 6 No. natural gas fuelled combustion units (Dryers) and associated energy plant for the purposes of drying Coal Derived Fuel Ash (CDFA) stored in lagoons, the site being an Ash Processing Plant (APP). The APP drying units are located at the site of the former Fiddler's ferry Power station, Widnes Road, Warrington, which closed on 31st March 2020. The site lies within the administrative area of Warrington Borough Council (WBC).

The potential impact of the 6 No. APP dryers, natural gas fuelled spark ignition generator and diesel generator on local air quality has been assessed. The type, source and significance of potential impact is identified as are any further measures that should be employed to minimise these impacts are described.

The key pollutants associated with operation of the facility considered in this assessment are oxides of nitrogen (NO_x as NO_2), particulate matter (PM_{10}) and Carbon monoxide (CO) as the primary pollutants. Other pollutants, such as sulphur dioxide (SO_2) are generated in negligible levels. Emissions of dust (particulates) from ash silo vents has also been assessed, for completeness.

Predicted ground level concentrations of these pollutants are compared with relevant air quality standards and guidelines for the protection of human health and sensitive habitats.

1.2 Scope

This detailed assessment report relates to the potential impact of air pollutants from the operation of the APP dryers and associated emission sources. Results of the dispersion modelling for exhaust emissions are presented in terms of concentrations, with a description of magnitude and also determination of significance where relevant.

2.0 REGULATORY STANDARDS AND GUIDELINES

2.1 Legislation

2.1.1 Air Quality Standards

The Air Quality Standards Regulations 2010, Statutory Instrument 2010 No. 1001 came into force on 11th June 2010 and include Air Quality Limit Values (AQLVs) for seven pollutants, including those (NO_2, PM and CO) which have been assessed in this study.

2.1.2 Air Quality Strategy

The Air Quality Strategy (AQS) was produced by the Department for Environment, Food and Rural Affairs (DEFRA) and published on 28th April 2023[1]. 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.

The Environmental Improvement Plan 2023[2] was published in January 2023, providing long term and Interim Targets in order to reduce population exposure to $PM_{2.5}$. The concentration target for 2040 was subsequently adopted in the Environmental Targets (Fine Particulate Matter) (England) Regulations (2023). The air quality Standards and Objectives and Interim Target considered within this air quality assessment are presented within Table 2-1.

Table 2-1
Air Quality Standards

Pollutant	Standard	Measured as	Equivalent percentile
NO_2	40 µg/m^3	Annual mean	-
	200 µg/m^3	1 hour mean	99.79th percentile of 1-hour-means (equivalent to 18 1-hour exceedences)
PM_{10} (gravimetric)	40 µg/m^3	Annual mean	-
	50 µg/m^3	24 hour mean	90.41st percentile of 24-hour-means (equivalent to 35 24-hour exceedences)
$PM_{2.5}$ (gravimetric)	20 µg/m^3	Annual mean	-
	[(a)]12 µg/m^3	Annual mean	-
CO	10000 µg/m^3	8 hour	Maximum 8 hour running mean in any daily period

Note: (a) Interim Target to be achieved by the end of January 2028.

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.

[1] AQS: Framework for Local Authority Delivery, DEFRA, 2023.
[2] Environmental Improvement Plan 2023, DEFRA, 2023.

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 2-2 below, as taken from DEFRA Guidance LAQM TG(22). This table should be considered in the context of the conclusions of various review documents such as The AQC report[3] *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'*.

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.

A summary of relevant exposure for the objectives presented in Table 2-1 are shown below in Table 2-2.

Table 2-2
Relevant Public Exposure

Objective Averaging Period	Relevant Locations	Objectives should apply at:	Objectives should not apply at:
Annual mean	Where individuals are exposed for a cumulative period of 6 months in a year;	Building facades of residential properties, schools, hospitals etc	Facades of offices Hotels Gardens of residences Kerbside sites
24-hour mean	Where individuals may be exposed for eight hours or more in a day	As above together with hotels and gardens of residential properties	Kerbside sites where public exposure is expected to be short term
1-hour mean	Where individuals might reasonably expected to spend one hour or longer	As above together with kerbside sites of regular access, car parks, bus stations etc	Kerbside sites where public would not be expected to have regular access

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

2.1.3 Local Authority Air Quality Review and Assessment

Local Authorities (LAs), including WBC, have formal powers to control air quality through a combination of Local Air Quality Management (LAQM) and by use of their wider planning policies.

Under Section 82 of the Environment Act 1995 (Part IV), LAs are required to periodically review and assess air quality within their area of jurisdiction under the system of LAQM. This review and assessment of air quality involves assessing present and likely future air quality against the Objectives. If it is predicted that levels at the façade of buildings, in the instance of annual mean concentrations, where members of the public are regularly present (normally residential properties) 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 (AQAP), the objective of which is to reduce pollutant concentrations in pursuit of the Objectives.

The results of the Warrington Borough Council Review and Assessment of air quality are summarised in Section 3.4.

2.2 National Planning Policy

The revised National Planning Policy Framework (NPPF) was published in December 2024 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:

> ***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.'*

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

> ***187*** *'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:

> ***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.'*

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

2.3 Local Planning Policy

The *Warrington Local Plan 2021/22 – 2038/39* was formally adopted at a meeting of full council on Monday 4 December 2023 and is now the statutory Development Plan for the Borough to 2038/39. The *Local Plan 2021/22 – 2038/39* has replaced the *Local Plan Core Strategy 2014* in its entirety and will be used in the determination of planning applications.

Of direct relevance to air pollution is Local Plan Policy ENV8 'Environmental and Amenity Protection':

> ***'General Principles***
>
> *1.The Council requires that all development is located and designed so as not to result in a harmful or cumulative impact on the natural and built environment, and/or general levels of amenity.*
>
> *2.Development proposals, as appropriate to their nature and scale, should demonstrate that environmental risks have been evaluated and appropriate measures have been taken to minimise the risks of adverse impacts to air, land and water quality, whilst assessing vibration, light and noise pollution both during their construction and in their operation.*
>
> ***Air Quality***
>
> *3.The Council will seek to ensure that proposals for new development will not have an unacceptable negative impact on air quality and will not further exacerbate air quality in the Council's designated Air Quality Management Areas (AQMAs); or will contribute to air pollution in areas which may result in further areas being designated.*
>
> *4. The main allocations (Policies MD1 to MD4) and the smaller settlement allocations, which line the M62 corridor (Policies OS1, OS2 and OS6) must make a proportionate contribution towards restoration measures at Holcroft Moss and devise a scheme-*

specific range of measures to reduce reliance on cars, reduce trip generation and promote ultra-low emission vehicles. In addition, all other new development that exceeds the thresholds for requiring a Transport Assessment, as specified in the Council's Transport SPD, will be required to consider air quality impacts on the Manchester Mosses Special Area of Conservation (SAC). Any proposals that would result in increased traffic flows on the M62 past the Manchester Mosses SAC of more than 100 vehicles per day or 20 Heavy Goods Vehicles (HGVs) per day must make a proportionate contribution towards restoration measures at Holcroft Moss and devise a scheme-specific range of measures to reduce reliance on cars, reduce trip generation and promote ultra-low emission vehicles.

5.Development proposals for sensitive end uses (including but not limited to residential, schools, nurseries, hospitals) are not desirable where they are located in areas of poor air quality including AQMAs, unless a suitable assessment, review and identification of mitigation to lessen the effects on future site users is provided. An air quality assessment will be required where a development may place new sensitive receptors in areas of poor air quality; and/or that may lead to a deterioration in local air quality resulting in unacceptable effects on human health and/or the environment.'

The implications of the above Policy have been taken into consideration is this assessment.

2.4 Environmental Permitting

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 Regulations. The MCPD regulates emissions of pollutants such as NO_x 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).

2.5 Standards for Ecological Receptors

Sensitive ecological sites may be impacted by both gaseous pollutants and also deposition of nutrients (such as nitrogen).

2.5.1 Critical Levels

Critical levels for the protection of vegetation and ecosystems are specified within relevant European air quality directives and corresponding UK air quality regulations.

Table 2-3
UK Air Quality Limits: Ecology

Pollutant	Concentrations	Measured As
Oxides of Nitrogen (NO_x)	30 µg/m^3	Annual mean (vegetation)
	75 µg/m^3	24-hour average (vegetation)

2.5.2 Critical Loads

Critical loads are set for the deposition of various substances to sensitive ecosystems. Predicted contributions to nitrogen deposition have been calculated and compared with the relevant critical load range for the habitat types associated with each designated site as derived from the UK Air Pollution Information System (APIS) website[4]. The contribution to critical loads for Nitrogen deposition are recorded as KgN/ha/yr.

Deposition rates were calculated using dispersion modelling results processed by following empirical methods recommended by the Environment Agency in AQTAG and summarised below.

Firstly, calculate dry deposition flux using the following equation:

> *Dry deposition flux (µg/m^2/s) = ground level concentration (µg/m^3) x deposition velocity (m/s)*

The applied deposition velocity for nitrogen dioxide is 0.0015 for grassland and 0.003 for woodland. The units are then converted from µg/m^2/s to units of kg/ha/year by multiplying the dry deposition flux by a standard conversion factor for nitrogen dioxide of 96.

Wet deposition occurs via the incorporation of the pollutant into water droplets which are then removed in rain or snow and is not considered significant over short distances compared with dry deposition and therefore for the purposes of this assessment, wet deposition has not been considered.

[4] www.apis.ac.uk

3.0 SITE DESCRIPTION AND AIR QUALITY BASELINE

3.1 Location

The APP is located to the south east of the former Fiddler's Ferry power station site. The site grid reference is OS GR 354705,386040. A layout and location plan of the site is shown in Drawing AQ1.

3.2 Proposed Development

As noted above, the APP is located to the south east of the former Fiddler's Ferry site. There is already a consented ash drying and processing plant at this location, this assessment is for proposals to amend the technology used for the drying and processing of the ash at the same location. The proposed APP development will introduce 6 No. natural gas fuelled ash dryers, natural gas fuelled spark ignition generator and diesel generator. This air quality assessment assumes that each dryer and the natural gas engines operate for a maximum of 8000 hours of the year and the diesel generator will run for a maximum of 50 hours.

3.3 Sensitive Receptors

The dispersion modelling assessment presents impacts at human and ecological receptor locations.

3.3.1 Sensitive Receptors for Human Health

The term 'sensitive receptors' includes any persons, locations or systems that may be susceptible to changes as a consequence of the operation of the APP dryers and ash silos. Annual objectives only apply at residences.

The former Fiddler's Ferry power station was a 2GW coal fired power station that was operational by the early 1970s. Understandably, for this reason there are few residences close to the APP site. A selection of the closest residential receptors to the site which have been used for modelling purposes are shown in Table 3.1 and Drawing AQ1.

Table 3-1
Modelled Residential Receptors (Existing)

Reference	Description	OS GR Xm	OS GR Ym	Elevation (mAoD)
HR1	Bennett's Lane	353433.0	386678.0	21.3
HR2	Ronaldshay Road	353514.0	386907.0	20.7
HR3	Widnes Road	354148.0	386868.0	18.4
HR4	Rose Tree Farm	354625.0	386827.0	16.0
HR5	Clock Lane Farm	353889.0	386954.0	19.1
HR6	Widnes Road	354187.0	386899.0	19.0
HR7	Marsh End Farm	355199.5	386580.9	11.6
HR8	Cross Lane Farm Cottage	355054.0	387140.0	14.0

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 site.

The distance of the above residences / farms to the centroid of the dryer stacks is shown below in each case:

- Bennett's Lane: 1427m;
- Ronaldshay Road: 1477m;
- Widnes Road: 1002m;
- Rose Tree Farm: 793m;
- Clock Lane Farm: 1229m;
- Widnes Road: 1007m;
- Marsh End Farm: 732m; and
- Cross Lane Farm Cottage: 1155m.

In addition to the receptor locations above, Warrington Local Plan Policy MD3 – Fiddlers Ferry relates to Land at the former Fiddlers Ferry Power Station. The Local Plan confirms that the site will be allocated to deliver a mixed-use development comprising approximately 101ha of employment land and a minimum of 860 new homes in the Plan period. A total of 102 discrete receptors have been used to represent the area of the proposed MD3 residential allocation.

3.3.2 Sensitive Habitats and Ecosystems

Searches have been completed for the following habitat sites:

- Special Areas of Conservation (SACs) and candidate SACs (cSACs) designated under the EC Habitats Directive[5];
- Special Protection Areas (SPAs) and potential SPAs designated under the EC Birds Directive[6];
- Ramsar Sites designated under the Convention on Wetlands of International Importance[7].
- Sites of Special Scientific Interest (SSSI); and
- Ancient Woodland.

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

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

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

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

animals. The APP dryers are not a significant source of SO_2 or HCL / HF due to their natural gas fuel.

A 10km screening distance to all ecological sites is relevant for this scheme. As can be seen in Appendix D, the sites of ecological interest within the search area are as follows:

Table 3-2
Ecological Receptors

Reference	Description	Designation
ECO1	Mersey Estuary Ramsar	SSSI
ECO2	Mersey Estuary	SPA
ECO3	Red Brow Cutting	SSSI
ECO4	Flood Brook Clough	SSSI
ECO5	Frodsham Railway and Road Cuttings	SSSI
ECO6	Hatton's Hey Wood, Whittle's Corner and Bank Rough	SSSI
ECO7	Woolston Eyes	SSSI
ECO8	Beechmill Wood and Pasture	SSSI
ECO9	Warburton's Wood and Well Wood	SSSI

The receptors have been modelled at the following locations, as shown on Drawing ECO1. The grid coordinates have been taken from the Simple Calculation of Atmospheric Impact Limits (SCAIL) screening tool.

Table 3-3
Ecological Receptor Locations

Reference	Description	OS GR Xm	OS GR Ym	Elevation (mAoD)
ECO1	Mersey Estuary Ramsar	350982.0	383751.0	5.2
ECO2	Mersey Estuary	350767.0	383769.0	0.0
ECO3	Red Brow Cutting	356685.0	381684.0	23.7
ECO4	Flood Brook Clough	353488.0	380333.0	49.7
ECO5	Frodsham Railway and Road Cuttings	352164.0	378126.0	30.0
ECO6	Hatton's Hey Wood, Whittle's Corner and Bank Rough	356404.0	377401.0	49.3
ECO7	Woolston Eyes	363380.0	388469.0	7.1
ECO8	Beechmill Wood and Pasture	354070.0	376978.0	25.9
ECO9	Warburton's Wood and Well Wood	355226.0	376637.0	8.0

The following SSSI are geological designations and therefore not sensitive to air quality impacts:

- Red Brow Cutting SSSI; and
- Frodsham Railway and Road Cuttings SSSI

These SSSI have therefore not been considered further in this report.

The ecological assessment also considers the potential for impacts at 'Functionally linked land' (FLL), areas of land or sea occurring outside a designated site which is considered to be critical to, or necessary for, the ecological or behavioural functions in a relevant season of a qualifying feature for which a Special Areas of Conservation (SAC)/ Special Protection Area (SPA)/ Ramsar site has been designated. There is no requirement for air quality assessments to consider FLL. As such, although this air quality assessment does not discuss impacts at FLL, dispersion modelling results have been discussed in the ecological assessment (prepared under separate cover).

Similarly, the Manchester Mosses SAC are over 10km from the proposed facility, however impacts are discussed in the ecological assessment:

- Manchester Mosses SAC: OSGR 369100.0, 397300.0; and
- Functionally Linked Land: OSGR 354859.0, 385682.0.

3.4 Baseline Pollutant Levels

3.4.1 Council Review and Assessment of Air Quality

The 2024 Air Quality Annual Status Report (ASR) dated June 2024 is the most recent LAQM report published on the Warrington Council website. This report states that there are two Air Quality Management Areas (AQMAs) within the Borough, which were declared because levels of NO_2 exceeded the national objective:

- Motorway AQMA around the M56, M6 and M62; and
- Warrington AQMA, around the town centre and main arterial roads.

The APP site is outside of both these AQMA.

The 2024 ASR confirms that Warrington Borough Council undertook automatic (continuous) monitoring at 5 sites during 2023 and non-automatic (i.e. passive) monitoring of NO_2 at 38 sites. No monitoring locations are relevant to the APP site as monitoring has been focussed on the main road network and urban centres.

3.4.2 DEFRA Background Maps

Additional information on background concentrations in the vicinity of the site has been obtained from the DEFRA background pollutant maps. Background concentrations from grid square which represents the site are provided in Table 3-4.

Table 3-4
Estimated DEFRA 2024 background concentrations

Pollutant	Concentration ($\mu g/m^3$)	Limit ($\mu g/m^3$)
Oxides of Nitrogen (NO_x)	12.3	30
Nitrogen dioxide (NO_2)	9.5	40
Particulate Matter, <10 microns (PM_{10})	12.6	40
Particulate Matter, <2.5 microns ($PM_{2.5}$)	6.5	20
Carbon monoxide (CO)	374	10000

The data presented in Table 3-4 shows that estimated DEFRA background concentrations are extremely low and 'well below' the relevant objectives, as would be expected in this location.

3.4.3 Ecological Baseline Data

The baseline pollution data for the ecological receptor sites is as shown in Table 3-5 below. This data is taken from the UK Air Pollution Information System (APIS) database.

Table 3-5
Baseline Data

Reference	NO_x ($\mu g/m^3$)	NO_x Critical Level ($\mu g/m^3$)*	Nutrient N (kgN/ha/yr)	Nutrient N: Lower Critical Load (kgN/ha/yr)
ECO1	17.7	30.0	19.0	5.0
ECO2	17.7	30.0	19.0	5.0
ECO4	16.3	30.0	36.0	15.0
ECO6	9.5	30.0	36.8	15.0
ECO7	15.0	30.0	19.2	10.0
ECO8	9.2	30.0	20.8	10.0
ECO9	9.2	30.0	37.3	10.0

4.0 ASSESSMENT METHODOLOGY

4.1 Stack Emissions

The scope of the impact assessment for stack emissions from the proposed facility 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 dryers and dispersion modelling using the Breeze AERMOD 13.1 dispersion model (version 24142) to predict ground-level concentrations of pollutants at sensitive human and habitat receptor locations.

Manufacturer emission limits have been assumed for the purposes of the modelling assessment and the APP dryers and natural gas fuelled engines are assumed to be operating at full load for 8000 hours in the year. The diesel generator will operate no more than 50 hours per year (to assist with startup). The input parameters used in the assessment are identified in Appendix B.

4.2 Model Scenarios

Two model scenarios have been assessed, both representing the 6 No. APP dryer units, gas fuelled engines, generator unit and ash silo vents (for dust). The differences between scenarios relate to the emission point for the gas fuelled engines:

- Scenario 1: natural gas fuelled engines vented through APP dryer stacks;
- Scenario 2: natural gas fuelled engines vented through separate dedicated stacks adjacent to the APP dryer stacks.

Overall mass emissions are the same for both scenarios, the only difference being the location of the point sources for the natural gas fuelled engines.

4.3 Nitric Oxide to NO_2 Conversion

Oxides of nitrogen (NOx) emitted to atmosphere as a result of combustion will consist largely of nitric oxide (NO). 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[8].

Unlike human receptors, impacts at ecological sites are taken to be 100% of the NOx result.

4.4 Significance of Impact

4.4.1 EPUK Guidance

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.

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;

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

- 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'.

4.4.2 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); or
- the emissions from the facility don't comply with BAT AELs.

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 MODELLING INPUTS

5.1 Source Locations

5.1.1 Scenario 1

The location of the modelled sources and physical parameters are as follows for Scenario 1:

Table 5-1
Point Sources

ID	OS GR Xm	OS GR Ym	Basal Elevation (mAoD)	Height (m)	Temp (°C)	Velocity (m/s)	Diameter (m)
S1	354697.1	386039.6	13.5	17.6	58.0	15.36	0.8
S2	354702.1	386039.0	13.5	17.6	126.9	19.10	0.8
S3	354707.0	386038.3	13.5	17.6	58.0	15.36	0.8
S4	354712.0	386037.6	13.5	17.6	58.0	15.36	0.8
S5	354717.0	386037.0	13.5	17.6	126.9	19.10	0.8
S6	354721.9	386036.3	13.5	17.6	58.0	15.36	0.8
DG1	354741.3	386059.2	13.5	7.5	400.0	55.70	0.2
DG2	354741.9	386063.5	13.5	7.5	400.0	55.70	0.2
SV1	354684.5	386072.0	13.5	30.0	15.0	2.10	1.0
SV2	354683.0	386060.5	13.5	30.0	15.0	2.10	1.0
SV3	354681.5	386049.4	13.5	30.0	15.0	2.10	1.0
SV4	354720.6	386096.3	13.5	30.0	15.0	2.10	1.0
SV5	354709.3	386097.6	13.5	30.0	15.0	2.10	1.0

Key: S = Stack (drier), DG = Diesel Generator, SV = Silo Vent

5.1.2 Scenario 2

The location of the modelled sources and physical parameters are as follows for Scenario 2:

Table 5-2
Point Sources

ID	OS GR Xm	OS GR Ym	Basal Elevation (mAoD)	Height (m)	Temp (°C)	Velocity (m/s)	Diameter (m)
S1	354697.1	386039.7	13.5	17.6	58.0	15.36	0.8
S2	354702.1	386040.7	13.5	17.6	58.0	15.36	0.8
S3	354707.0	386041.7	13.5	17.6	58.0	15.36	0.8
S4	354712.0	386042.7	13.5	17.6	58.0	15.36	0.8
S5	354717.0	386043.7	13.5	17.6	58.0	15.36	0.8
S6	354721.9	386044.7	13.5	17.6	58.0	15.36	0.8
DG1	354741.3	386045.7	13.5	7.5	400.0	55.69	0.2

ID	OS GR Xm	OS GR Ym	Basal Elevation (mAoD)	Height (m)	Temp (°C)	Velocity (m/s)	Diameter (m)
DG2	354741.9	386046.7	13.5	7.5	400.0	55.69	0.2
GG1	354702.3	386047.7	13.5	17.6	120.0	15.61	0.4
GG2	354717.3	386048.7	13.5	17.6	120.0	15.61	0.4
SV1	354684.5	386049.7	13.5	30.0	15.0	2.10	1.0
SV2	354683.0	386050.7	13.5	30.0	15.0	2.10	1.0
SV3	354681.5	386051.7	13.5	30.0	15.0	2.10	1.0
SV4	354720.6	386052.7	13.5	30.0	15.0	2.10	1.0
SV5	354709.3	386053.7	13.5	30.0	15.0	2.10	1.0

5.2 Emission Rates

The detailed dispersion modelling is based on the emission concentrations and mass emissions for each pollutant as shown in Appendix B.

It must be noted that the MCPD ANNEX II *PART 2 Emission limit values for new medium combustion plants* states that:

> *'All emission limit values set out in this Annex are defined at a temperature of 273.15K, a pressure of 101,3 kPa and after correction for the water vapour content of the waste gases and at a standardised O_2 content of 6% for medium combustion plants using solid fuels, 3% for medium combustion plants, other than engines and gas turbines, using liquid and gaseous fuels and 15% for engines and gas turbines. '*

As such, where emission concentrations are stated, it is important to ensure that these are stated at a given O_2 concentration. For example, where the NOx emission concentration of an emission source 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 which is similar to the MCPD limit for natural gas[9].

5.3 Receptor Locations

In addition to the discrete receptors described in Section 3 of this report, a receptor grid has been used in order to allow the preparation of isopleths of pollutant concentration and assessment of impacts at any location for which discrete results are not reported. A grid of 30m density covering an area of 1.35km x 1.35km has been used (2116 receptor points).

[9] PART 2 Emission limit values for new medium combustion plants. Table 2. Emission limit values (mg/Nm^3) for new engines and gas turbines. 95 mg/Nm^3 at 15% O_2, 0 degC, 1atm.

5.4 Local Meteorological Data

The dispersion modelling has been carried out using five years (2018-2022) 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 Liverpool (Speke) Airport 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). A windrose for all years of meteorological data are presented in Appendix C.

5.5 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 APP lies at a basal elevation of around 13.5m AoD. Topography has been incorporated within the dispersion model.

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.

5.6 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 buildings / structures modelled are:

- Main Building: basal height 13.5m AoD, roof height 16.6m (above ground), length 77.3m, width 32.6m;
- Buildings 2-4: basal height 13.5m AoD, roof height 12.0m (above ground);
- Ash Storage Silos (A1 – A5): basal height 13.5m AoD, roof height 28.0m (above ground), diameter 10m;

5.7 Efflux Velocity

The modelled efflux velocities are shown in Tables 5-1 and 5-2 and have been based on assumptions as follows:

- The exhaust for the proposed APP dryer units (Scenario 2) have been calculated at 15.36m/s based on the actual volume release of exhaust from the unit (27791m^3/hr) which is released through the 0.8m diameter stack;
- When combined with the engine exhaust (Scenario 1) the volume of air increases through the same stack. This has the effect of increasing the efflux velocity to 19.1m/s in addition to the temperature increasing;
- The velocity of the air from the natural gas engines and diesel generator have been calculated from the data provided by the supplier of this plant.
- The velocity of releases from the ash silo vents is assumed to be 2.1m/s.

6.0 PREDICTED IMPACTS: HEALTH

The results at the receptor locations (where both short and long term objectives apply) are shown in the tables below. These results are also shown in the isopleth drawings included with this report (Appendix E).

6.1 Scenario 1

The results for Scenario 1 are below. In this scenario the exhaust from the natural gas fuelled engines are vented through APP dryer stacks.

6.1.1 Oxides of Nitrogen

The predicted impacts of nitrogen dioxide at the 8 modelled residential receptors are as shown below.

Table 6-1
NO_2: Impact Concentrations (µg/m^3)

Receptor Ref	PC Annual NO_2	PEC Annual NO_2	PC 1-hr NO_2	PEC 1-hr NO_2
HR1	0.2	9.7	4.6	23.5
HR2	0.2	9.7	4.2	23.1
HR3	0.5	10.0	7.9	26.8
HR4	0.8	10.2	9.9	28.8
HR5	0.3	9.8	5.5	24.4
HR6	0.5	10.0	7.2	26.1
HR7	0.8	10.2	13.5	32.4
HR8	0.3	9.7	4.7	23.6

In terms of impact at the assessed receptor points:

- The magnitude of change in 1-hour NO_2 impact at these discrete receptor locations is 'negligible', at less than 10% of the 1-hour NO_2 AQO; and
- The EPUK impact descriptor for annual average NO_2 impact at these discrete receptor locations is 'negligible', with the highest impact at 2.0% of the annual AQO and the maximum PEC predicted to be <26% of the AQO.

The highest impacts at the 102 receptors modelled in the MD3 Local Plan allocation area are:

- 1-hour NO_2 maximum impact: 35.5µg/m^3 which represents 17.7% of the relevant limit. The maximum PEC is 54.4 µg/m^3, which is 27.2% of the limit. The magnitude of change in 1-hour NO_2 impact at the allocation site is therefore 'small'; and
- annual average NO_2 maximum impact: 3.0µg/m^3 which represents 7.6% of the relevant limit. The maximum PEC is 12.5 µg/m^3, which is 31.2% of the limit. The EPUK impact descriptor for this change is therefore 'negligible'.

In summary, the proposed Fiddlers Ferry APP is not predicted to result in significant NO_2 impacts at existing residential receptors or residential receptors sited in the area allocated within the Development Plan (as shown on drawing AQ1).

6.1.2 Particulate Matter

The predicted impacts of particulate matter (<10 microns) have been presented below.

Table 6-2
PM_{10}: Impact Concentrations (µg/m³)

Receptor Ref	PC Annual PM_{10}	PEC Annual PM_{10}	PC 24hr PM_{10}	PEC 24hr PM_{10}
HR1	0.1	12.7	0.4	25.5
HR2	0.1	12.7	0.4	25.5
HR3	0.3	12.9	0.9	26.0
HR4	0.4	13.0	1.1	26.3
HR5	0.2	12.8	0.6	25.7
HR6	0.3	12.9	0.8	26.0
HR7	0.4	12.9	1.1	26.3
HR8	0.1	12.7	0.4	25.6

In terms of impact at the assessed receptor points:

- The magnitude of change in 24-hour PM_{10} impact at these discrete receptor locations is 'negligible', at less than 10% of the 24-hour PM_{10} AQO (maximum 2.2%); and
- The EPUK impact descriptor for annual average PM_{10} impact at these discrete receptor locations is 'negligible', with the highest impact at less than 1% of the annual AQO and the maximum PEC predicted to be 32.4% of the AQO.

The highest impacts at the 102 receptors modelled in the MD3 Local Plan allocation area are:

- 24-hour PM_{10} maximum impact: 4.1µg/m³ which represents 7.7% of the relevant limit. The maximum PEC is 29.3 µg/m³, which is 59% of the limit. The magnitude of change in 24-hour PM_{10} impact at the allocation site is therefore 'negligible' with the PC at less than 10% of the AQO; and
- annual average PM_{10} maximum impact: 1.4µg/m³ which represents 3.6% of the relevant limit. The maximum PEC is 14.0 µg/m³, which is 35% of the limit. The EPUK impact descriptor for this change is therefore 'negligible'.

In summary, the proposed Fiddlers Ferry APP is not predicted to result in significant PM_{10} impacts at existing residential receptors or residential receptors sited in the area allocated within the Development Plan (as shown on drawing AQ1).

The predicted impacts of particulate matter (<2.5 microns) have been presented below. As noted above, these results assume that 100% of the PM_{10} falls in the $PM_{2.5}$ microns category.

Table 6-3
$PM_{2.5}$: Impact Concentrations (µg/m^3)

Receptor Ref	PC Annual $PM_{2.5}$	PEC Annual $PM_{2.5}$
HR1	0.10	6.62
HR2	0.11	6.62
HR3	0.27	6.78
HR4	0.39	6.90
HR5	0.18	6.69
HR6	0.27	6.78
HR7	0.36	6.87
HR8	0.14	6.65

In terms of impact at the assessed receptor points, the EPUK impact descriptor for annual average $PM_{2.5}$ impact at these discrete receptor locations is 'negligible', with the highest impact at 1.9% of the annual AQO (20µg/m^3) and the maximum PEC predicted to be 34.5% of the AQO.

The highest annual average $PM_{2.5}$ impact at the 102 receptors modelled in the MD3 Local Plan allocation area is 1.4µg/m^3 which represents 7.1% of the relevant limit. The maximum PEC is 7.9 µg/m^3, which is 39.7% of the limit. The EPUK impact descriptor for this change is therefore 'slight adverse' and 'not significant'. The maximum predicted PEC of 7.9 µg/m^3 is also below the $PM_{2.5}$ target of 12µg/m^3.

In summary, the proposed Fiddlers Ferry APP is not predicted to result in significant $PM_{2.5}$ impacts at existing residential receptors or residential receptors sited in the area allocated within the Development Plan (as shown on drawing AQ1), even when assuming that 100% of the PM_{10} falls in the $PM_{2.5}$ microns category.

6.1.3 Carbon monoxide

The predicted impacts of carbon monoxide have been presented below.

Table 6-4
CO: Impact Concentrations (µg/m^3)

Receptor Ref	PC 8-hour CO	PEC 8-hour CO
HR1	8.8	382.8
HR2	9.9	383.9
HR3	19.8	393.8
HR4	25.8	399.8
HR5	12.3	386.3
HR6	16.9	390.9
HR7	27.2	401.2
HR8	11.8	385.8

In terms of impact at the assessed receptor points, the magnitude of change in 8-hour CO impact at these discrete receptor locations is 'negligible', at less than 10% of the 8-hour CO AQO (maximum 0.27%).

The highest annual average CO impact at the 102 receptors modelled in the MD3 Local Plan allocation area is 96.4 µg/m^3 which represents 1% of the relevant limit. The maximum PEC is 470.4 µg/m^3, which is 4.7% of the limit. The EPUK impact descriptor for this change is therefore 'negligible' and 'not significant'.

In summary, the proposed Fiddlers Ferry APP is not predicted to result in significant CO impacts at existing residential receptors or residential receptors sited in the area allocated within the Development Plan (as shown on drawing AQ1).

6.2 Scenario 2

The results for Scenario 2 are below. In this scenario the exhaust from the natural gas fuelled engines are vented through separate dedicated stacks adjacent to the APP dryer stacks.

6.2.1 Oxides of Nitrogen

The predicted impacts of nitrogen dioxide at the 8 modelled residential receptors are as shown below.

Table 6-5
NO_2: Impact Concentrations (µg/m^3)

Receptor Ref	PC Annual NO_2	PEC Annual NO_2	PC 1-hr NO_2	PEC 1-hr NO_2
HR1	0.3	9.7	7.1	26.1
HR2	0.3	9.7	6.6	25.5
HR3	0.7	10.1	11.5	30.4
HR4	1.0	10.4	13.8	32.7
HR5	0.4	9.9	8.5	27.4
HR6	0.7	10.1	10.9	29.8
HR7	0.9	10.3	17.5	36.4
HR8	0.3	9.8	6.8	25.7

In terms of impact at the assessed receptor points:

- The magnitude of change in 1-hour NO_2 impact at these discrete receptor locations is 'negligible', at less than 10% of the 1-hour NO_2 AQO; and
- The EPUK impact descriptor for annual average NO_2 impact at these discrete receptor locations is 'negligible', with the highest impact at 2.4% of the annual AQO and the maximum PEC predicted to be 26% of the AQO.

The highest impacts at the 102 receptors modelled in the MD3 Local Plan allocation area are:

- 1-hour NO_2 maximum impact: 49.5µg/m^3 which represents 24.8% of the relevant limit. The maximum PEC is 68.4 µg/m^3, which is 34.2% of the limit. The magnitude of change in 1-hour NO_2 impact at the allocation site is therefore 'small'; and
- annual average NO_2 maximum impact: 3.6µg/m^3 which represents 9.1% of the relevant limit. The maximum PEC is 13.1 µg/m^3, which is 32.8% of the limit. The EPUK impact descriptor for this change is therefore 'negligible'.

In summary, the proposed Fiddlers Ferry APP is not predicted to result in significant NO_2 impacts at existing residential receptors or residential receptors sited in the area allocated within the Development Plan (as shown on drawing AQ1).

6.2.2 Particulate Matter

The predicted impacts of particulate matter (<10 microns) have been presented below.

Table 6-6
PM_{10}: Impact Concentrations (µg/m^3)

Receptor Ref	PC Annual PM_{10}	PEC Annual PM_{10}	PC 24hr PM_{10}	PEC 24hr PM_{10}
HR1	0.1	12.7	0.4	25.6
HR2	0.1	12.7	0.4	25.6
HR3	0.3	12.9	0.9	26.1
HR4	0.4	13.0	1.2	26.4
HR5	0.2	12.8	0.6	25.8
HR6	0.3	12.9	0.9	26.1
HR7	0.4	13.0	1.1	26.3
HR8	0.2	12.7	0.4	25.6

In terms of impact at the assessed receptor points:

- The magnitude of change in 24-hour PM_{10} impact at these discrete receptor locations is 'negligible', at less than 10% of the 24-hour PM_{10} AQO (maximum 2.4%); and
- The EPUK impact descriptor for annual average PM_{10} impact at these discrete receptor locations is 'negligible', with the highest impact at 1% of the annual AQO and the maximum PEC predicted to be 32.5% of the AQO.

The highest impacts at the 102 receptors modelled in the MD3 Local Plan allocation area are:

- 24-hour PM_{10} maximum impact: 4.4µg/m^3 which represents 8.8% of the relevant limit. The maximum PEC is 29.6 µg/m^3, which is 59.2% of the limit. The magnitude of change in 24-hour PM_{10} impact at the allocation site is therefore 'negligible' with the PC at less than 10% of the AQO; and

- annual average PM_{10} maximum impact: 1.5µg/m^3 which represents 3.9% of the relevant limit. The maximum PEC is 14.1 µg/m^3, which is 35.3% of the limit. The EPUK impact descriptor for this change is therefore 'negligible'.

In summary, the proposed Fiddlers Ferry APP is not predicted to result in significant PM_{10} impacts at existing residential receptors or residential receptors sited in the area allocated within the Development Plan (as shown on drawing AQ1).

The predicted impacts of particulate matter (<2.5 microns) have been presented below. As noted above, these results assume that 100% of the PM_{10} falls in the $PM_{2.5}$ microns category.

Table 6-7
$PM_{2.5}$: Impact Concentrations (µg/m^3)

Receptor Ref	PC Annual $PM_{2.5}$	PEC Annual $PM_{2.5}$
HR1	0.12	6.63
HR2	0.12	6.63
HR3	0.30	6.81
HR4	0.42	6.93
HR5	0.19	6.71
HR6	0.30	6.81
HR7	0.38	6.89
HR8	0.15	6.66

In terms of impact at the assessed receptor points, the EPUK impact descriptor for annual average $PM_{2.5}$ impact at these discrete receptor locations is 'negligible', with the highest impact at 2.1% of the annual AQO (20µg/m^3) and the maximum PEC predicted to be 34.6% of the AQO.

The highest annual average $PM_{2.5}$ impact at the 102 receptors modelled in the MD3 Local Plan allocation area is 1.5µg/m^3 which represents 7.7% of the relevant limit. The maximum PEC is 8.1µg/m^3, which is 40.3% of the limit. The EPUK impact descriptor for this change is therefore 'slight adverse' and 'not significant'. The maximum predicted PEC of 8.1 µg/m^3 is also below the $PM_{2.5}$ target of 12µg/m^3 (at 62.7%).

In summary, the proposed Fiddlers Ferry APP is not predicted to result in significant $PM_{2.5}$ impacts at existing residential receptors or residential receptors sited in the area allocated within the Development Plan (as shown on drawing AQ1), even when assuming that 100% of the PM_{10} falls in the $PM_{2.5}$ microns category.

6.2.3 Carbon monoxide

The predicted impacts of carbon monoxide have been presented below.

Table 6-8
CO: Impact Concentrations (µg/m^3)

Receptor Ref	PC 8-hour CO	PEC 8-hour CO
HR1	24.6	398.6
HR2	20.6	394.6
HR3	42.7	416.7
HR4	40.9	414.9
HR5	31.1	405.1
HR6	31.3	405.3
HR7	43.9	417.9
HR8	16.8	390.8

In terms of impact at the assessed receptor points, the magnitude of change in 8-hour CO impact at these discrete receptor locations is 'negligible', at less than 10% of the 8-hour CO AQO (<0.05%).

The highest annual average CO impact at the 102 receptors modelled in the MD3 Local Plan allocation area is 164.9 µg/m^3 which represents 1.6% of the relevant limit. The maximum PEC is 538.9 µg/m^3, which is 5.4% of the limit. The EPUK impact descriptor for this change is therefore 'negligible' and 'not significant'.

In summary, the proposed Fiddlers Ferry APP is not predicted to result in significant CO impacts at existing residential receptors or residential receptors sited in the area allocated within the Development Plan (as shown on drawing AQ1).

7.0 PREDICTED IMPACTS: ECOLOGY

The results at the designated ecological receptor locations (long term ecological objectives apply) are shown in the tables below. These results are also shown in the isopleth drawings included with this report (Appendix E).

7.1 Scenario 1

The results for Scenario 1 are below. In this scenario the exhaust from the natural gas fuelled engines are vented through APP dryer stacks.

7.1.1 Critical Level

The predicted impacts of oxides of nitrogen are as shown below.

Table 7-1
NO_X: Impact Concentrations (µg/m^3)

Receptor Ref	PC Annual NO_x	PEC Annual NO_x	PC 24-hr NO_x	PEC 24-hr NO_x
ECO1	0.05	12.34	1.22	25.80
ECO2	0.05	12.34	1.04	25.61
ECO4	0.02	12.31	0.71	25.28
ECO6	0.02	12.31	0.43	25.00
ECO7	0.02	12.31	0.44	25.01
ECO8	0.02	12.30	0.55	25.13
ECO9	0.02	12.31	0.57	25.15

The maximum impact at any of the modelled ecological receptor locations is 0.2% of the NOx annual critical level of 30µg/m^3 and 1.6% of the NOx 24-hour critical level of 75µg/m^3. As such, these impacts are insignificant at below 1% and 10% respectively.

7.1.2 Nutrient N Critical Load

The nutrient Nitrogen deposition at each of the ecological sites is as follows:

Table 7-2
Nutrient N Deposition

Receptor Ref	PC Annual NO_x	Deposition Velocity (m/s)	N Deposition (kgN/Ha/yr)	% of Lower N Critical Load
ECO1	0.05	0.0015	0.0077	0.15%
ECO2	0.05	0.0015	0.0073	0.15%
ECO4	0.02	0.003	0.0068	0.05%
ECO6	0.02	0.003	0.0060	0.04%
ECO7	0.02	0.0015	0.0035	0.04%
ECO8	0.02	0.003	0.0050	0.05%
ECO9	0.02	0.003	0.0055	0.06%

The maximum impact at any of the modelled ecological receptor locations is 0.15% of the nutrient N critical load for each receptor (taken from APIS). As such, these impacts are insignificant at below 1% of the relevant critical load.

7.2 Scenario 2

The results for Scenario 2 are below. In this scenario the exhaust from the natural gas fuelled engines are vented through separate dedicated stacks adjacent to the APP dryer stacks.

7.2.1 Critical Level

The predicted impacts of oxides of nitrogen are as shown below.

Table 7-3
NO_X: Impact Concentrations (µg/m^3)

Receptor Ref	PC Annual NO_x	PEC Annual NO_x	PC 24-hr NO_x	PEC 24-hr NO_x
ECO1	0.06	12.35	1.56	26.13
ECO2	0.06	12.35	1.30	25.87
ECO4	0.03	12.31	0.83	25.40
ECO6	0.02	12.31	0.52	25.09
ECO7	0.03	12.31	0.57	25.14
ECO8	0.02	12.31	0.76	25.34
ECO9	0.02	12.31	0.62	25.20

The maximum impact at any of the modelled ecological receptor locations is 0.23% of the NOx annual critical level of 30µg/m^3 and 2.1% of the NOx 24-hour critical level of 75µg/m^3. As such, these impacts are insignificant at below 1% and 10% respectively.

7.2.2 Nutrient N Critical Load

The nutrient Nitrogen deposition at each of the ecological sites is as follows:

Table 7-4
Nutrient N Deposition

Receptor Ref	PC Annual NO_x	Deposition Velocity (m/s)	N Deposition (kgN/Ha/yr)	% of Lower N Critical Load
ECO1	0.06	0.0015	0.0090	0.18%
ECO2	0.06	0.0015	0.0085	0.17%
ECO4	0.03	0.003	0.0077	0.05%
ECO6	0.02	0.003	0.0066	0.04%
ECO7	0.03	0.0015	0.0039	0.04%
ECO8	0.02	0.003	0.0056	0.06%
ECO9	0.02	0.003	0.0061	0.06%

The maximum impact at any of the modelled ecological receptor locations is 0.18% of the nutrient N critical load for each receptor (taken from APIS). As such, these impacts are insignificant at below 1% of the relevant critical load.

8.0 MITIGATION

Maintenance of the APP dryer units and ash silos in accordance with an approved service schedule will ensure that emissions stay within manufacturers stated limits.

Based on the results of the assessment, as shown in Sections 6 and 7, no further mitigation is required and the stack height is suitable.

9.0 CONCLUSIONS

This air quality assessment has been undertaken by Isopleth Ltd on behalf of Titan Cement UK ltd ('the operator'). The assessment considers air quality impacts associated with operation of 6 No. natural gas fuelled combustion units (Dryers) and associated energy plant for the purposes of drying Coal Derived Fuel Ash (CDFA) stored in lagoons, the site being an Ash Processing Plant (APP). The APP drying units are located at the site of the former Fiddler's ferry Power station, Widnes Road, Warrington, which closed on 31st March 2020. The site lies within the administrative area of Warrington Borough Council (WBC).

Detailed air quality modelling using the AERMOD 13 dispersion model has been undertaken to predict the impacts associated with the operation of the ash dryers, natural gas fuelled engines and diesel generators.

All impacts, human and ecological, are predicted to be below limit values at locations where the Air Quality Directive and Regulations, policies and guidance in England states that they must be applied. When applying the assumptions above it can be seen that there is no realistic potential for a breach of the air quality objectives at residences (or ecological sites).

APPENDIX A: DRAWINGS

HR1
HR2
HR3
HR4
HR5
HR6
HR7
HR8

NOTES

LEGEND

- SITE BOUNDARY
- WARRINGTON LOCAL PLAN POLICY MD3 – FIDDLERS FERRY ALLOCATION
- PROPOSED RESIDENTIAL AREA WITHIN THE DEVELOPMENT FRAMEWORK
- HUMAN RECEPTOR LOCATION

N
W E
S

TITAN CEMENT UK

SITE
Ash Processing Plant, Widnes Road, Warrington

PROJECT
Air Quality Assessment

DRAWING TITLE
Site Setting and Human Receptor Locations

DRAWING NUMBER	REVISION
AQ1	0
SCALE	DATE
1:10000 @ A3	17.09.2024

ISOPLETH

EC01
EC02
EC03
EC04
EC05
EC06
EC07
EC08
EC09

NOTES

LEGEND

- SITE BOUNDARY
- WARRINGTON LOCAL PLAN POLICY MD3 – FIDDLERS FERRY ALLOCATION
- PROPOSED RESIDENTIAL AREA WITHIN THE DEVELOPMENT FRAMEWORK
- ECOLOGICAL RECEPTOR LOCATION

N
W E
S

TITAN CEMENT UK

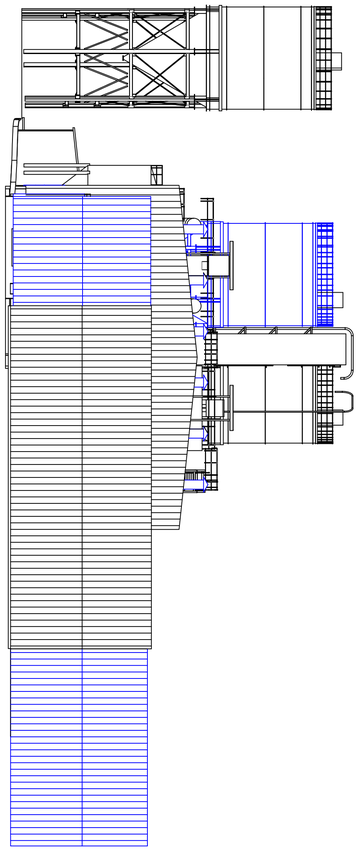
SITE
Ash Processing Plant, Widnes Road, Warrington

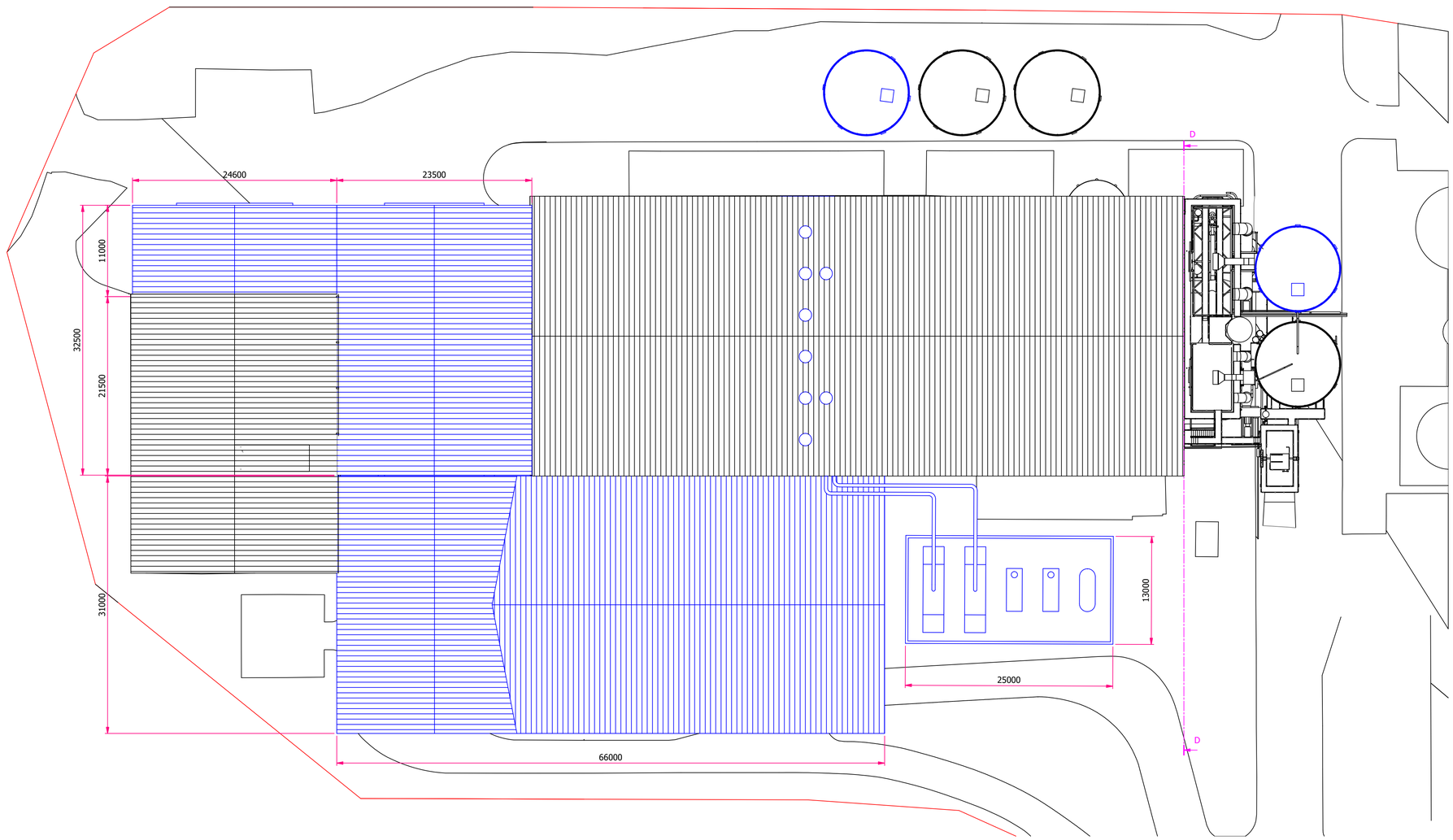
PROJECT
Air Quality Assessment

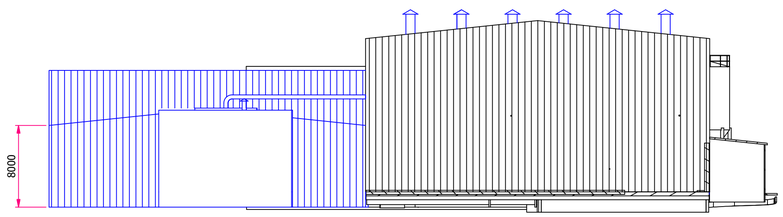
DRAWING TITLE
Site Setting and Ecological Receptor Locations

DRAWING NUMBER	REVISION
ECO1	0
SCALE	DATE
1:50000 @ A3	17.09.2024

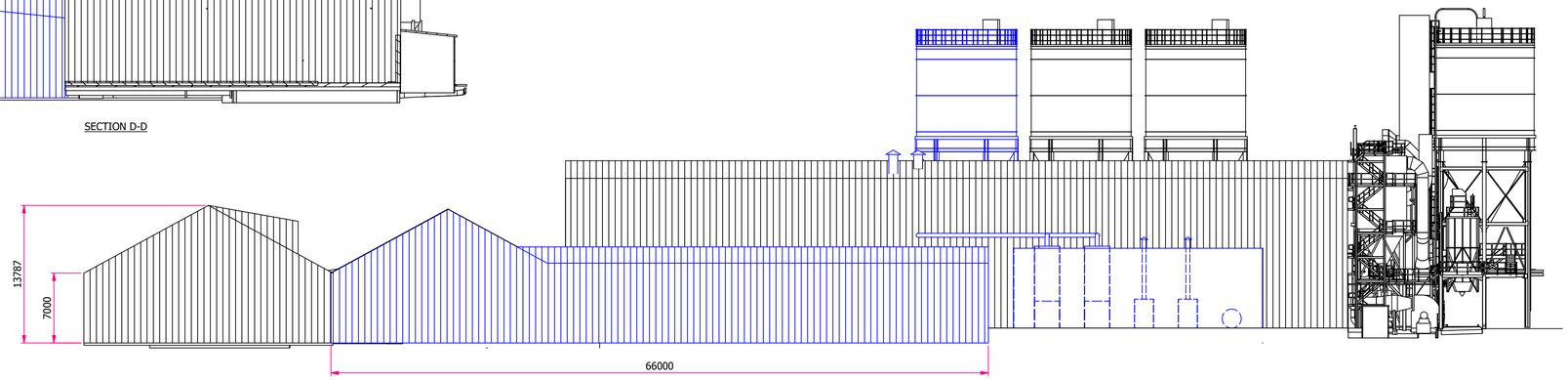
ISOPLETH







SECTION D-D



DO NOT SCALE | FIRST ANGLE | SHEET SIZE **A1**

DRG UNITS: MM

REV	DATE	DESCRIPTION	INTL CHKD
P4	16/04/25	GAS GENERATOR COMPOUND ADDED	DC
P3	16/12/24	ADDITONAL BUILDING AND SILOS SHOWN	DC
P2	28/11/24	EXTENDED STORAGE ROOF ALTERED	DC
P1	06/11/24	FIRST ISSUE	DC

FABRICATIONS TO BE MANUFACTURED TO BS EN 1090-1 EXECUTION CLASS 2

EDS DESIGN SOLUTIONS
Unit 12 Calver Works, Calver,
Hope Valley, Derbyshire, S32 3XH
Tel: 01433 639090 Fax: 01433 630090
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DRAWING STATUS:

PRELIMINARY FOR REFERENCE ONLY

CLIENT / PROJECT TITLE:

FIDDLERS FERRY

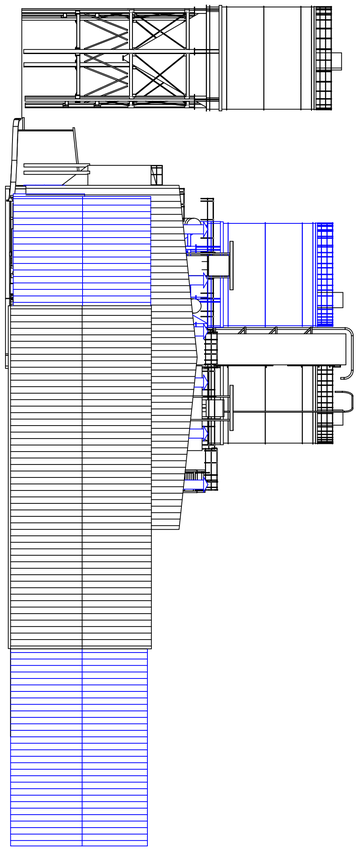
DRAWING TITLE:

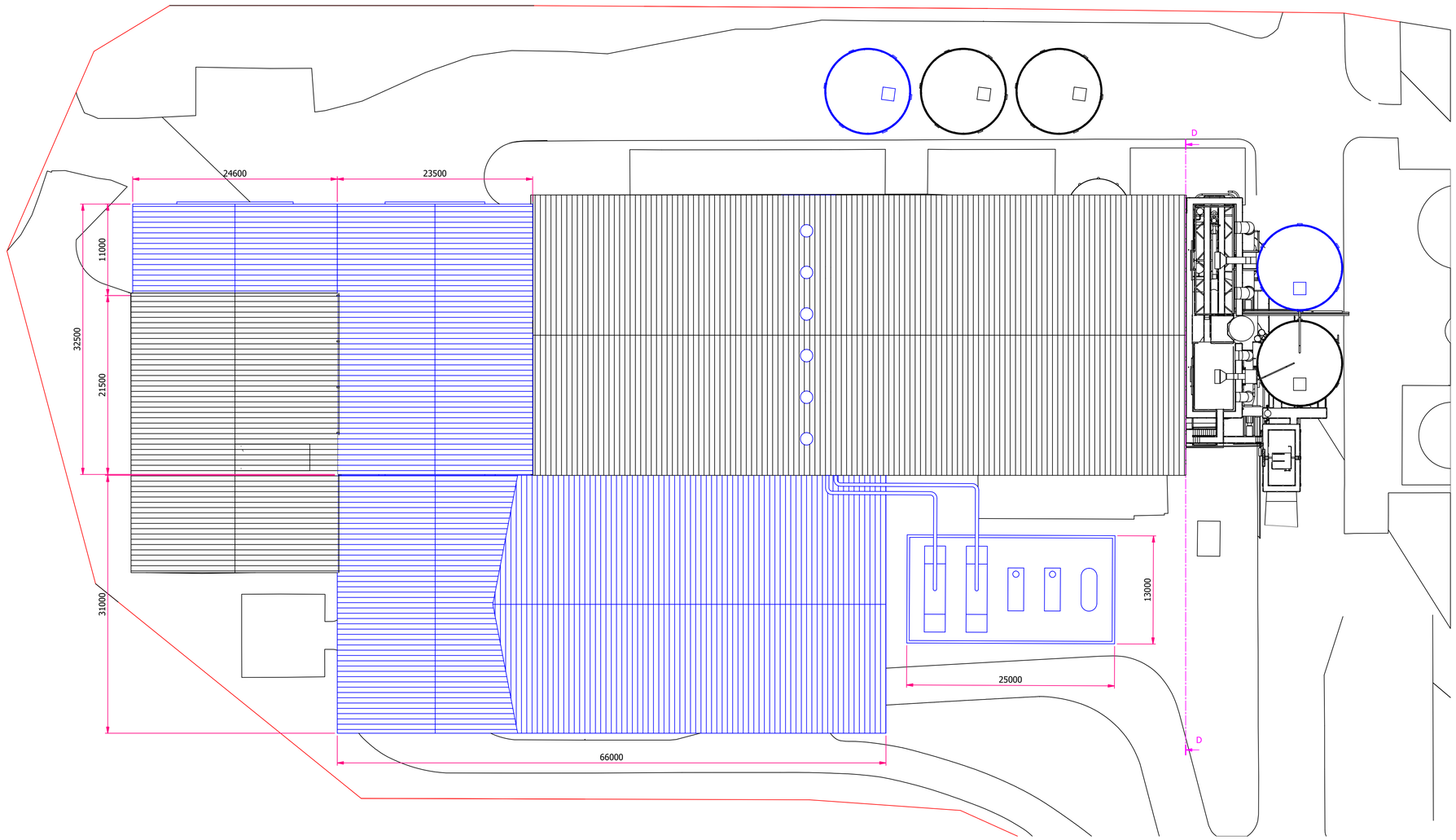
ATRITOR/STI SYSTEM
SITE PLAN/ELEVATION
WITH EXTENDED STORAGE

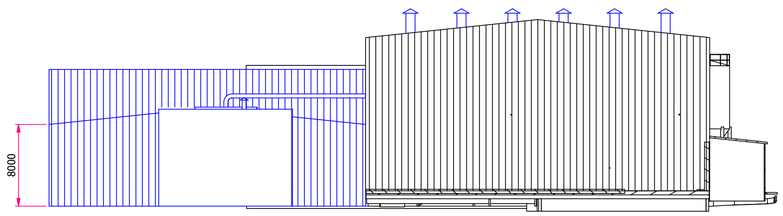
SHEET 1 OF 3

DRAWN:	DC	CHKD:	
DATE:	06/11/24	DATE:	
SCALE:	1:300		

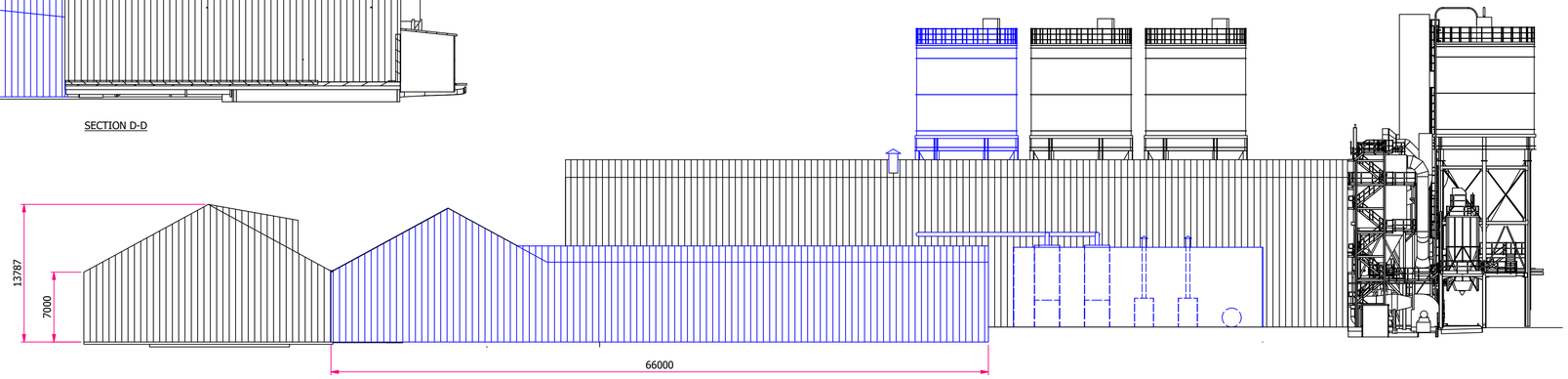
DWG NUM **C24003-056** REV **P4**







SECTION D-D



DO NOT SCALE

DRG UNITS: MM

FIRST ANGLE

SHEET SIZE **A1**

REV	DATE	DESCRIPTION	INTL CHKD
P1	16/04/25	FIRST ISSUE	DC

FABRICATIONS TO BE MANUFACTURED TO BS EN 1090-1 EXECUTION CLASS 2

EDS DESIGN SOLUTIONS

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DRAWING STATUS:

PRELIMINARY FOR REFERENCE ONLY

CLIENT / PROJECT TITLE:

FIDDLERS FERRY

DRAWING TITLE:

ATRITOR/STI SYSTEM
SITE PLAN/ELEVATION
WITH EXTENDED STORAGE

SHEET 1 OF 3

DRAWN:	DC	CHKD:	
DATE:	16/04/25	DATE:	
SCALE:	1:300		

DWG NUM **C24003-056b** REV **P1**

APPENDIX B: INPUT DATA

Table B-1
Modelling Inputs: Physical Parameters (Dryers)

Unit Reference	notes	Scenario 1	Scenario 2
Operational hours	hours per year	8000	8000
Stack height	m	17.60	17.60
stack diameter	m	0.80	0.80
stack X-section area	m2	0.503	0.503
mass flow	kg/hr	27,351	27,351
H_2O	%	14.3%	14.3%
Reference O_2	%	3.0%	3.0%
Exhaust Temp	degrees C	58	58
Exhaust Temp	K	331.15	331.15
Exhaust volume actual	Am^3/s	7.72	7.72
Exhaust volume	Nm^3/s	7.000	7.000
Release Velocity	m/s	15.36	15.36
NO_x concentration	mg/Nm^3	30.0	30.0
PM_{10} concentration	mg/Nm^3	10.0	10.0
$PM_{2.5}$ concentration	mg/Nm^3	10.0	10.0
CO concentration	mg/Nm^3	10.0	10.0

Table B-2
Mass Emission Rates, g/s (Dryers)

Parameter	Scenario 1	Scenario 2
NO_x mass emission LT	0.210	0.210
NO_2 mass emission LT	0.134	0.134
NO_2 mass emission ST	0.074	0.074
PM_{10} & $PM_{2.5}$ mass emission (dryer)	0.070	0.070
PM_{10} & $PM_{2.5}$ mass emission (silo vent)	0.017	0.017
CO mass emission	0.070	0.070

Table B-3
Modelling Inputs: Engines & Generators

Unit Reference	notes	Engines	Diesel Generator
Operational hours	hours per year	8760	50
Stack height	m	17.60	7.5
stack diameter	m	0.45	0.20
stack X-section area	m2	0.16	0.03
mass flow	kg/hr	7947	3271
Actual H_2O	%	11.1%	10.0%

Unit Reference	notes	Engines	Diesel Generator
Actual O_2 (Wet)	%	7.5%	7.5%
Actual O_2 (Dry)	%	8.43%	8.33%
Reference O_2	%	5.0%	3.0%
Exhaust Temp	degrees C	120.0	400.0
Exhaust Temp	K	393.15	673.15
Exhaust volume actual	Am^3/s	2.48	1.75
Exhaust volume	Nm^3/s	1.53	0.71
Release Velocity	m/s	15.61	55.69
NO_x concentration	mg/Nm^3	250.0 (@15% O_2)	43.0 (@3% O_2)
PM_{10} concentration	mg/Nm^3	10.0 (@15% O_2)	3.0 (@3% O_2)
$PM_{2.5}$ concentration	mg/Nm^3	10.0 (@15% O_2)	3.0 (@3% O_2)
CO concentration	mg/Nm^3	1000.0 (@15% O_2)	10.9 (@3% O_2)

The Diesel generator emissions data is taken from TA-LUFT 50Hz g/kWhr:

- NOx: 0.17
- PM: 0.012
- CO: 0.043

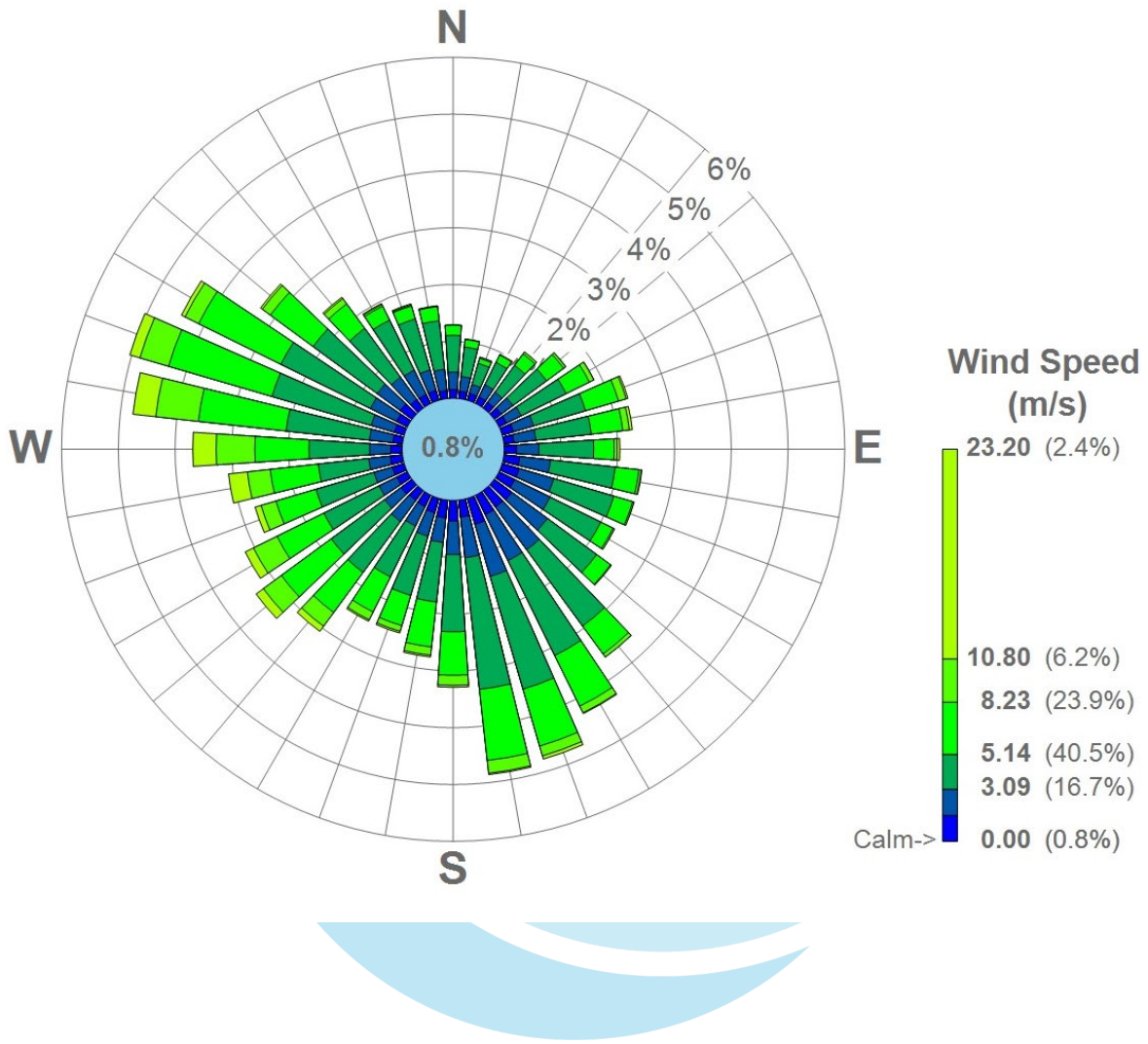
Table B-4
Mass Emission Rates: Engines & Generator (g/s)

Parameter	Engines	Diesel Generator
NO_x mass emission LT	0.301	1.10×10^{-4}
NO_2 mass emission LT	0.192	4.40×10^{-7}
NO_2 mass emission ST	0.105	3.86×10^{-5}
PM_{10} & $PM_{2.5}$ mass emission (dryer)	0.012	0.001
PM_{10} & $PM_{2.5}$ mass emission (silo vent)	0.012	0.001
CO mass emission	1.204	0.005

Due to the levels of water in the emission plumes, in certain weather conditions a plume of steam will be visible as the water condenses whilst cooling. However this does not affect the mass of pollutants emitted.

APPENDIX C: WIND DATA

Figure C-1
Windrose: Speke



APPENDIX D: ECOLOGICAL SITE SEARCH

Figure D-1
European Sites: 10km

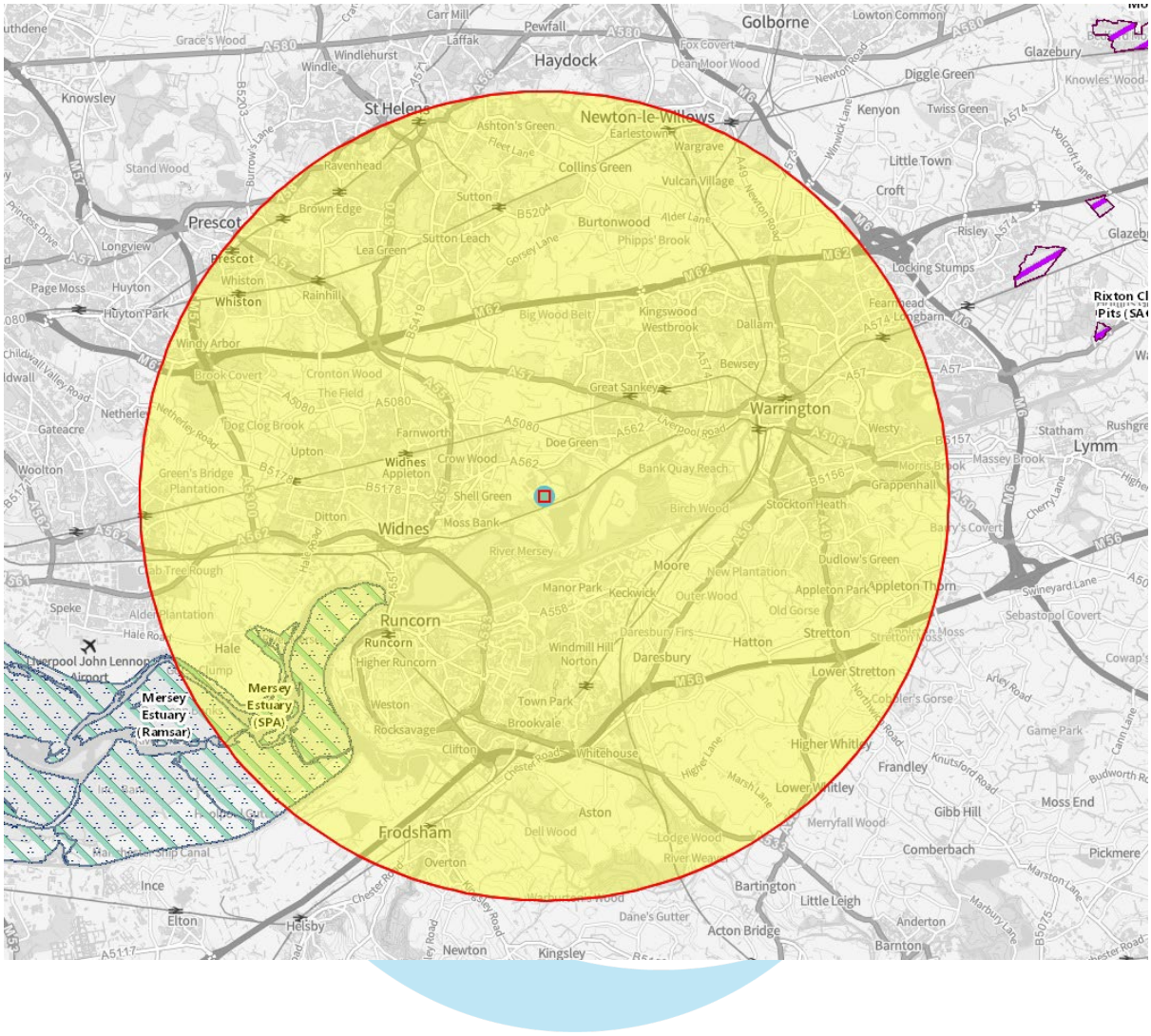


Figure D-2
SSSI: 5km

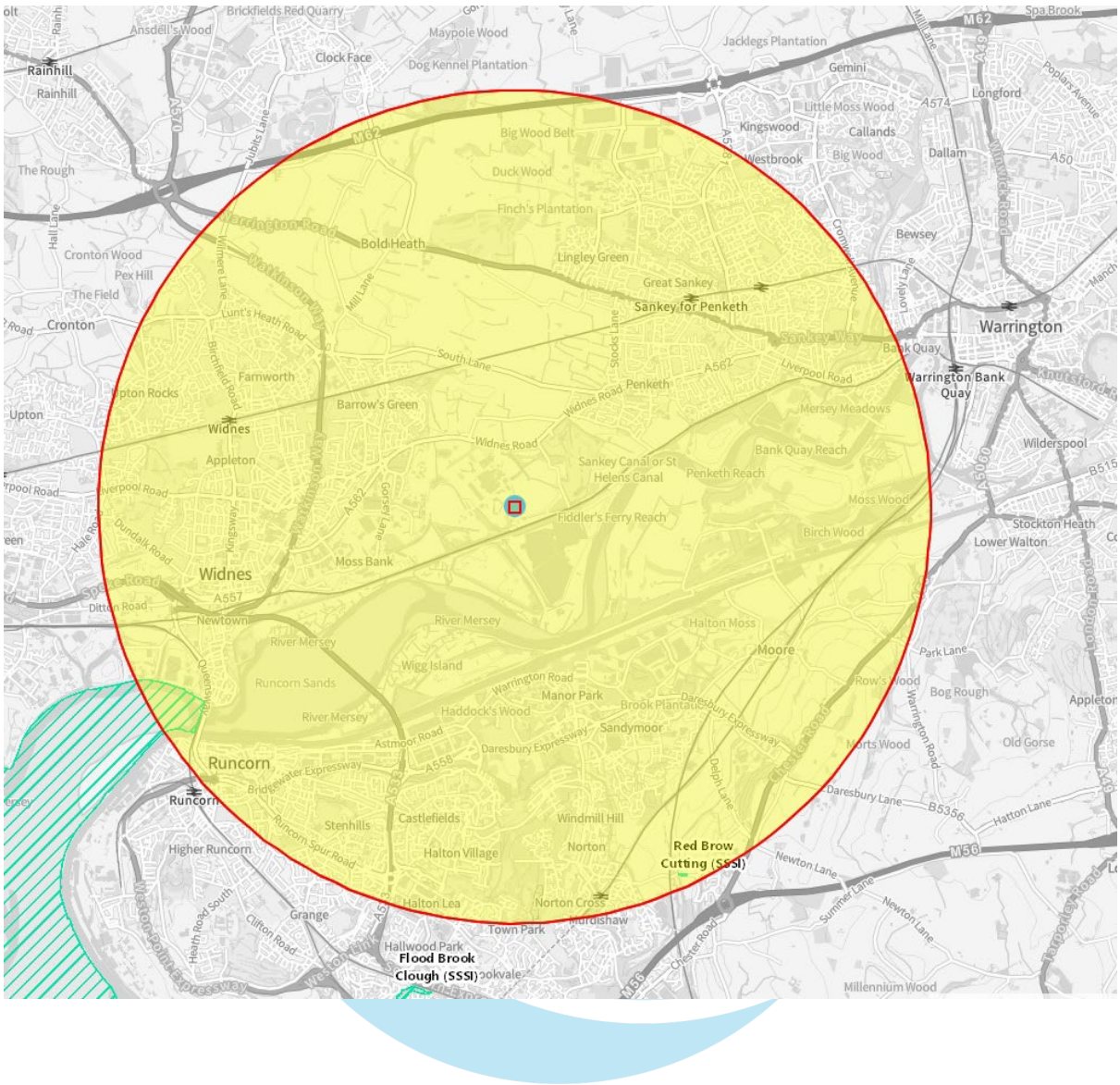
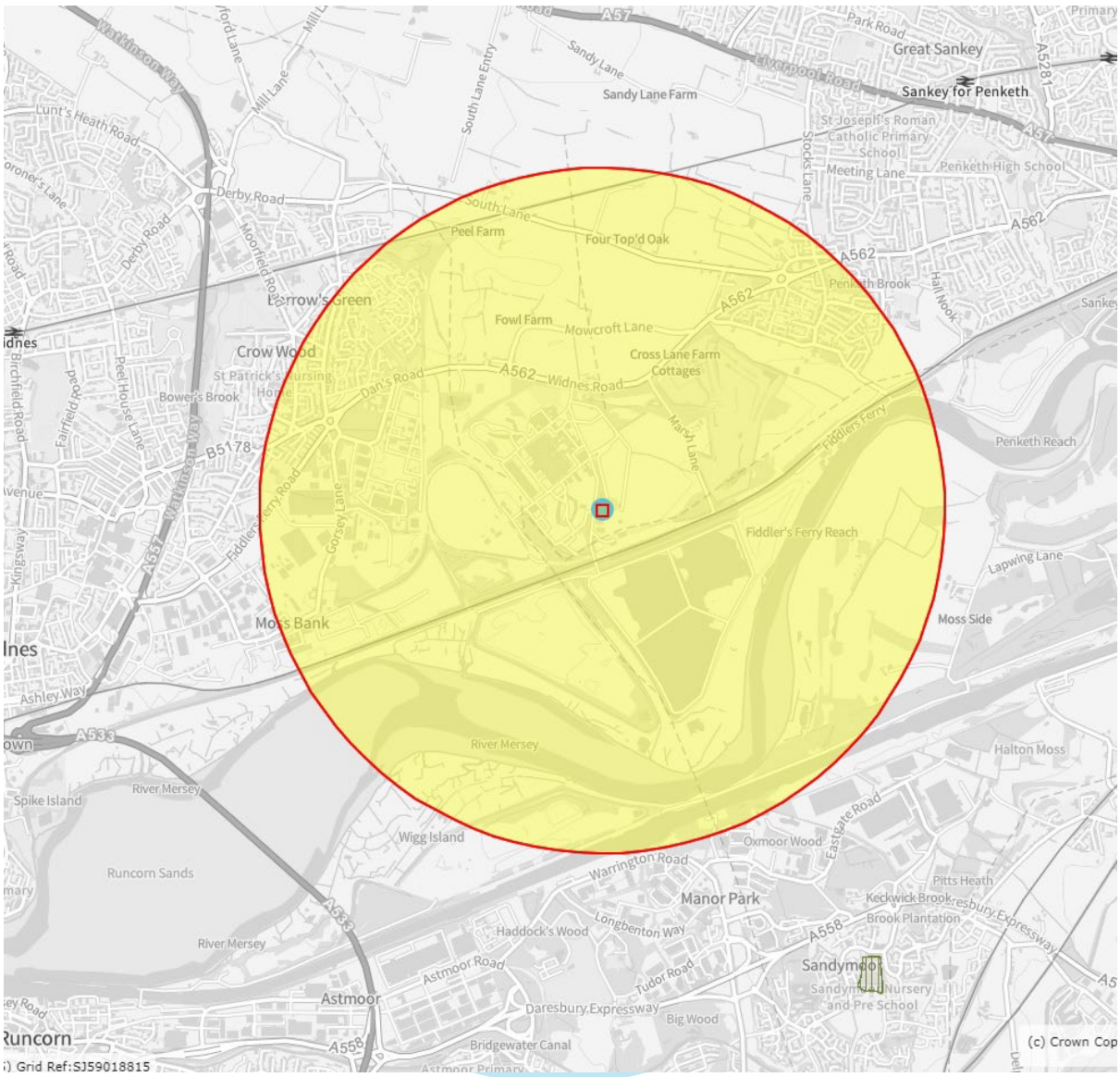


Figure D-3
Ancient Woodland: 2km



APPENDIX E: RESULTS (SCENARIO 1)

Figure E-1
NO_2: Annual

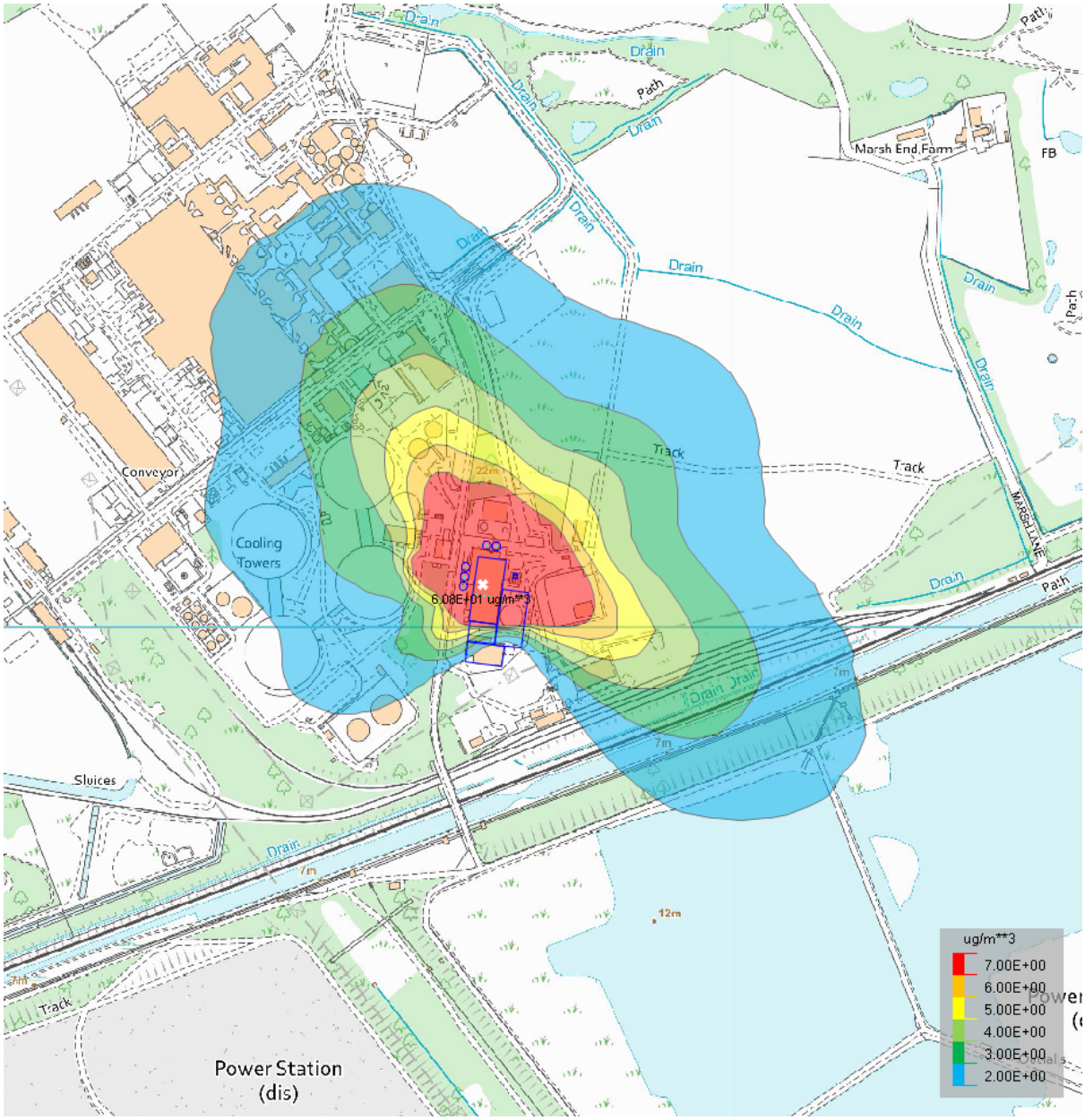


Figure E-2
NO_2: 1-hour

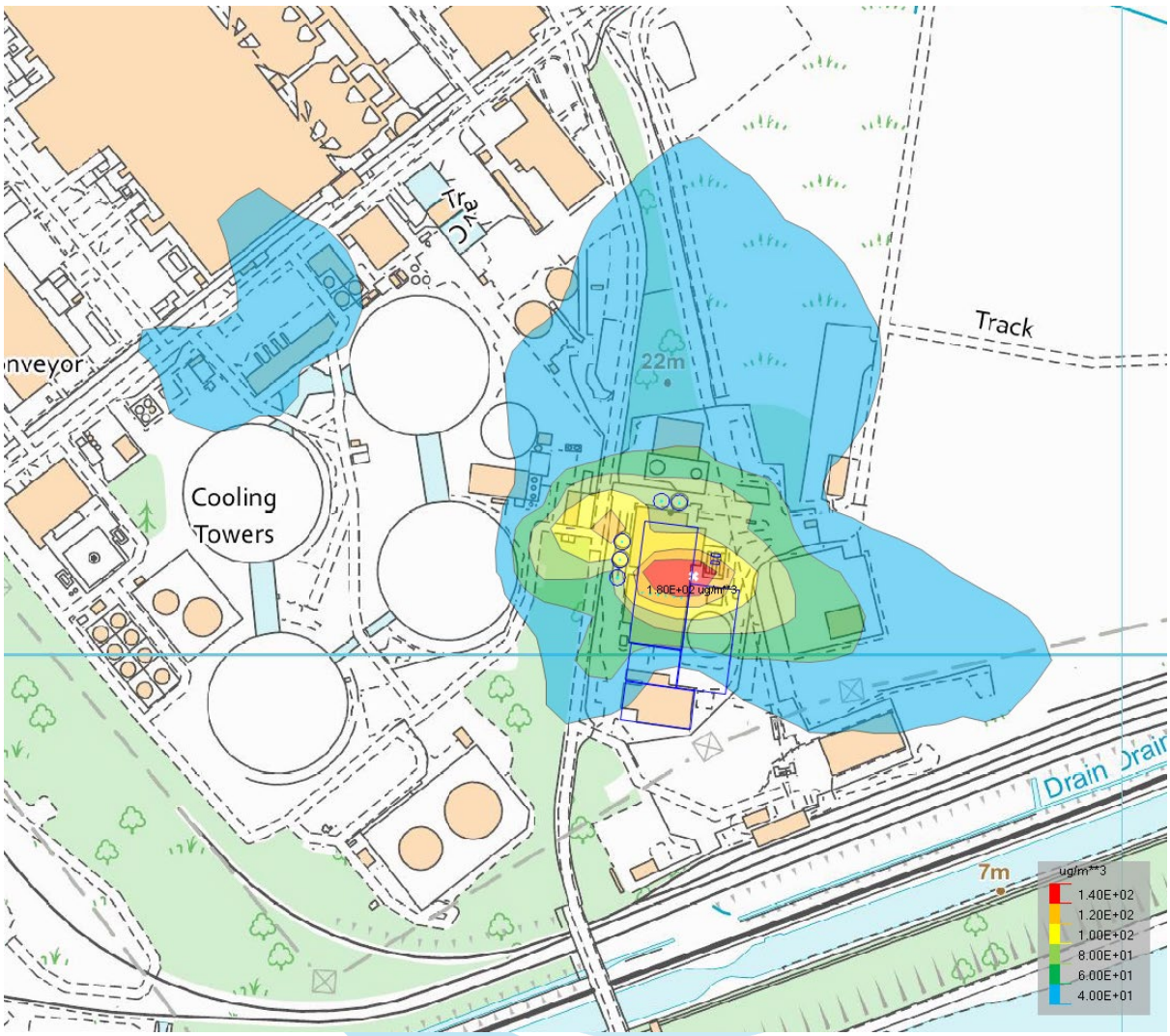


Figure E-3
PM_{10}: Annual

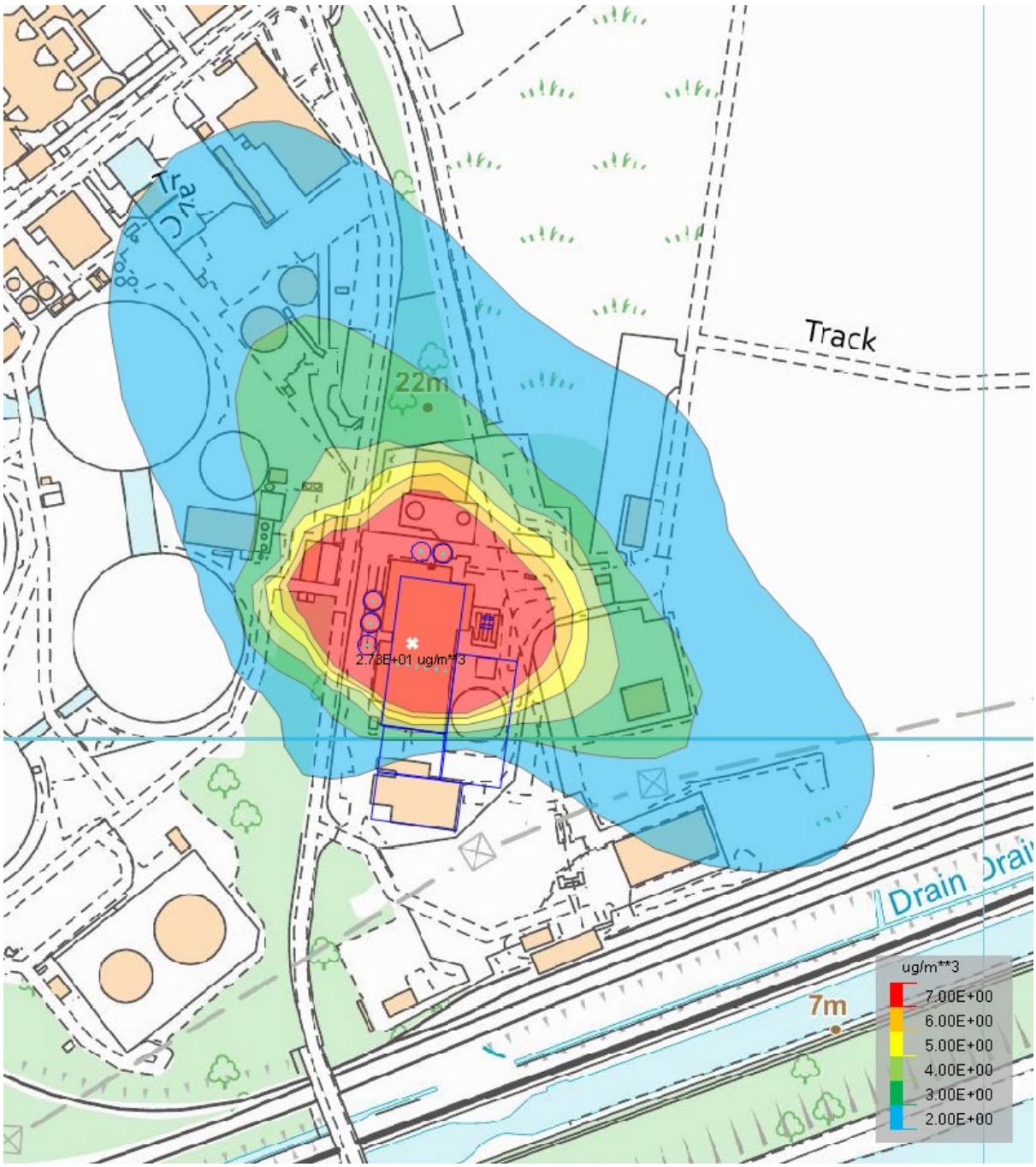


Figure E-4
PM_{10}: 24-hour

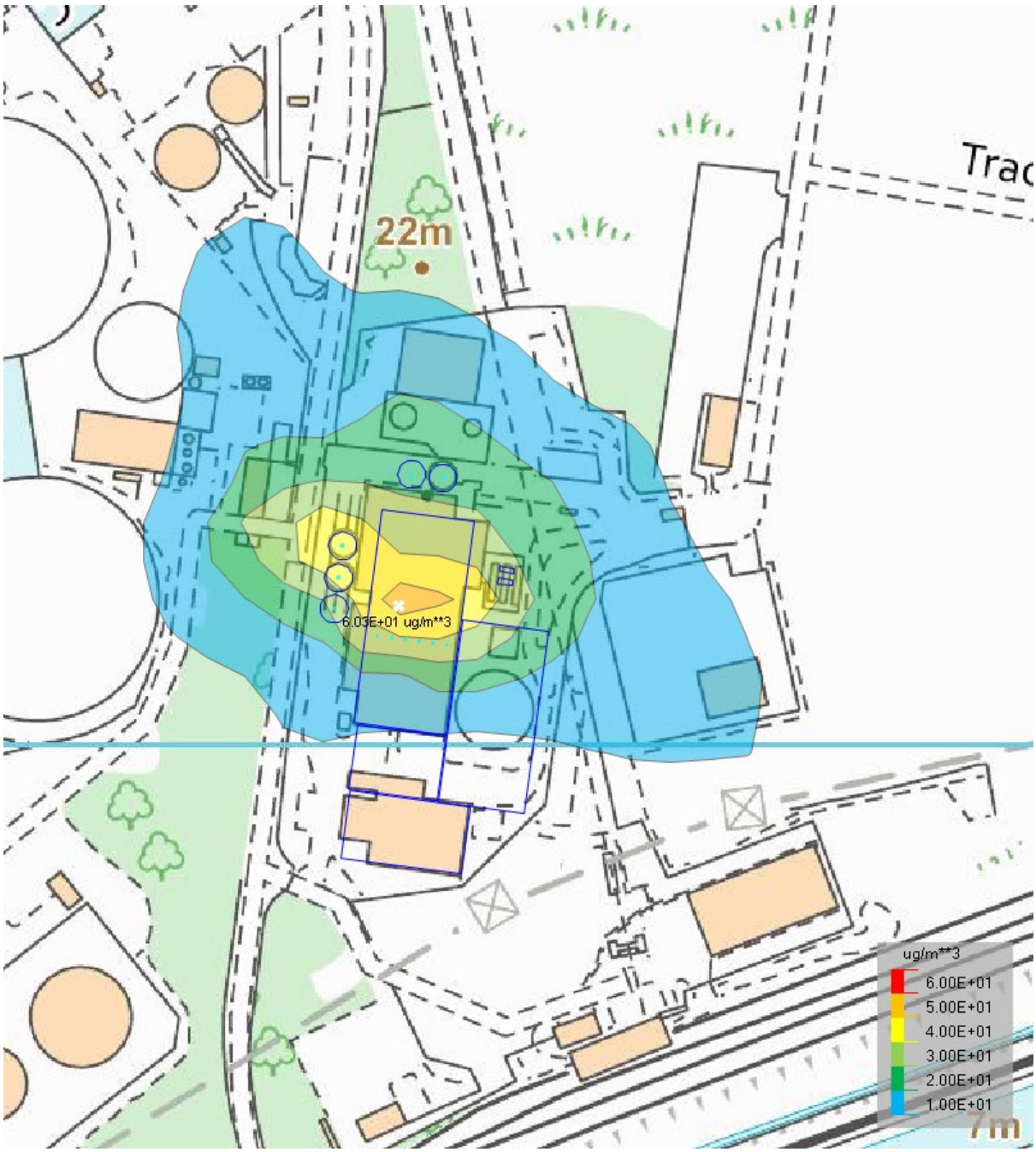


Figure E-5
CO: 8-hour

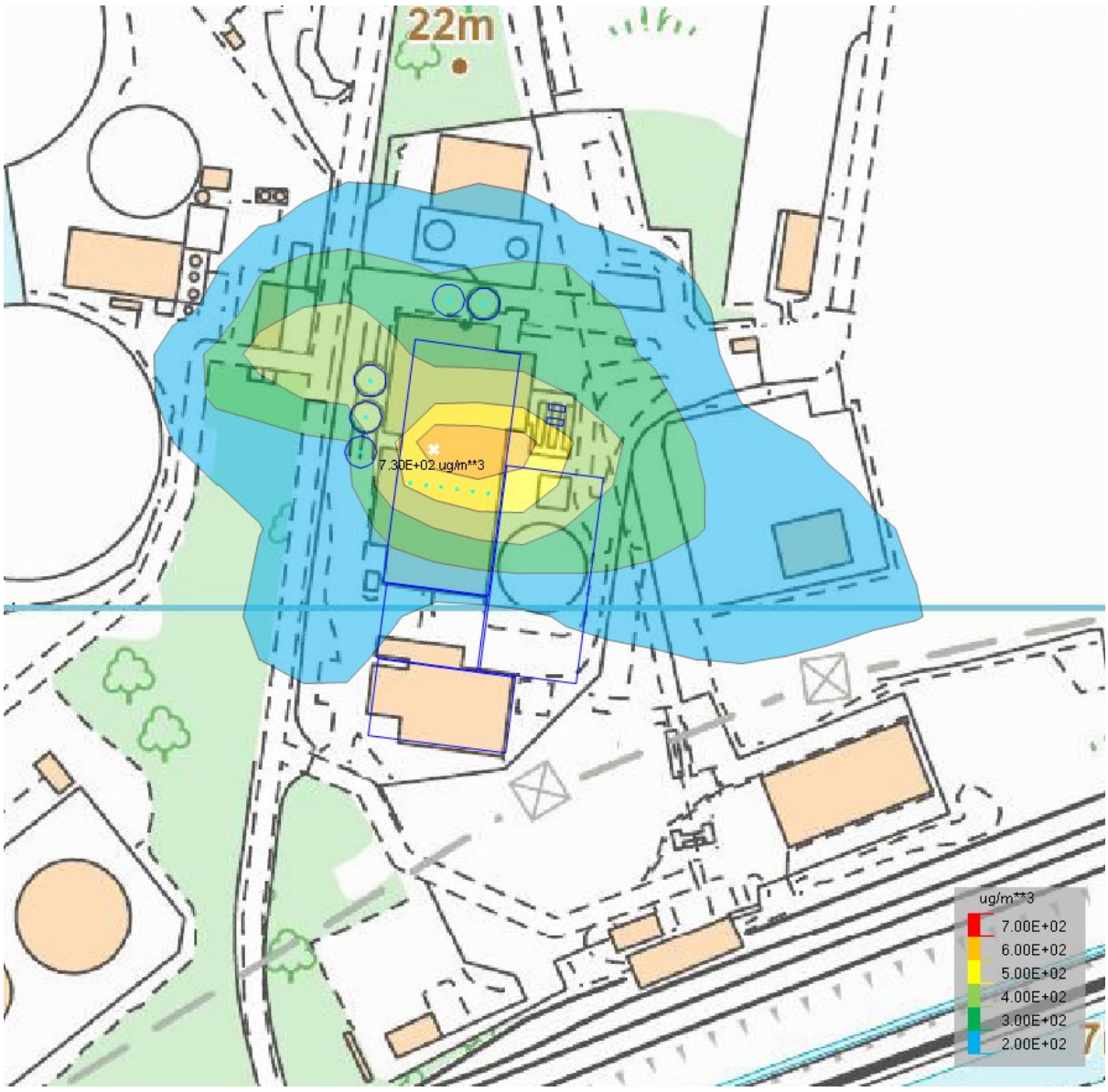
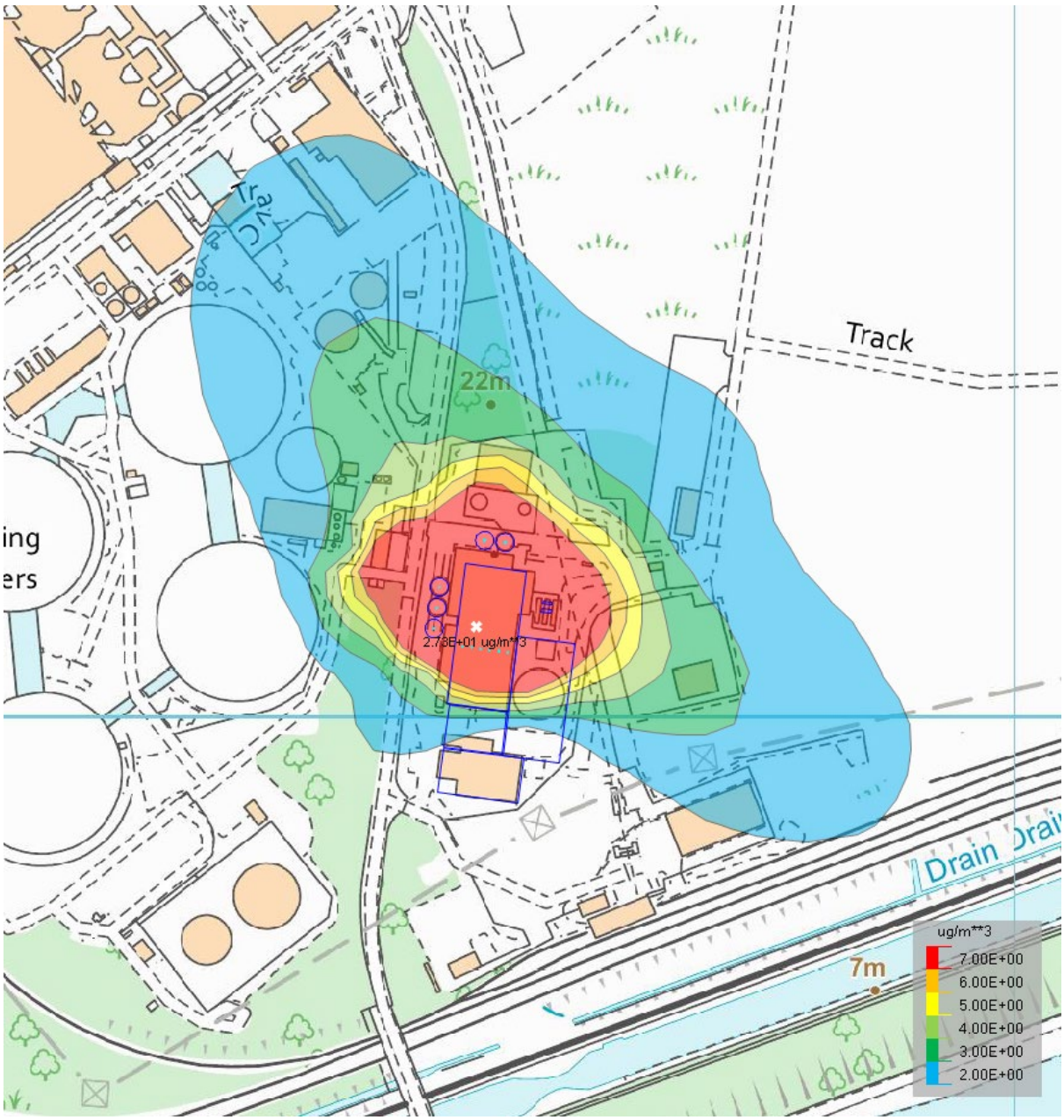


Figure E-6
PM2.5: Annual



APPENDIX F: RESULTS (SCENARIO 2)

Figure E-1
NO_2: Annual

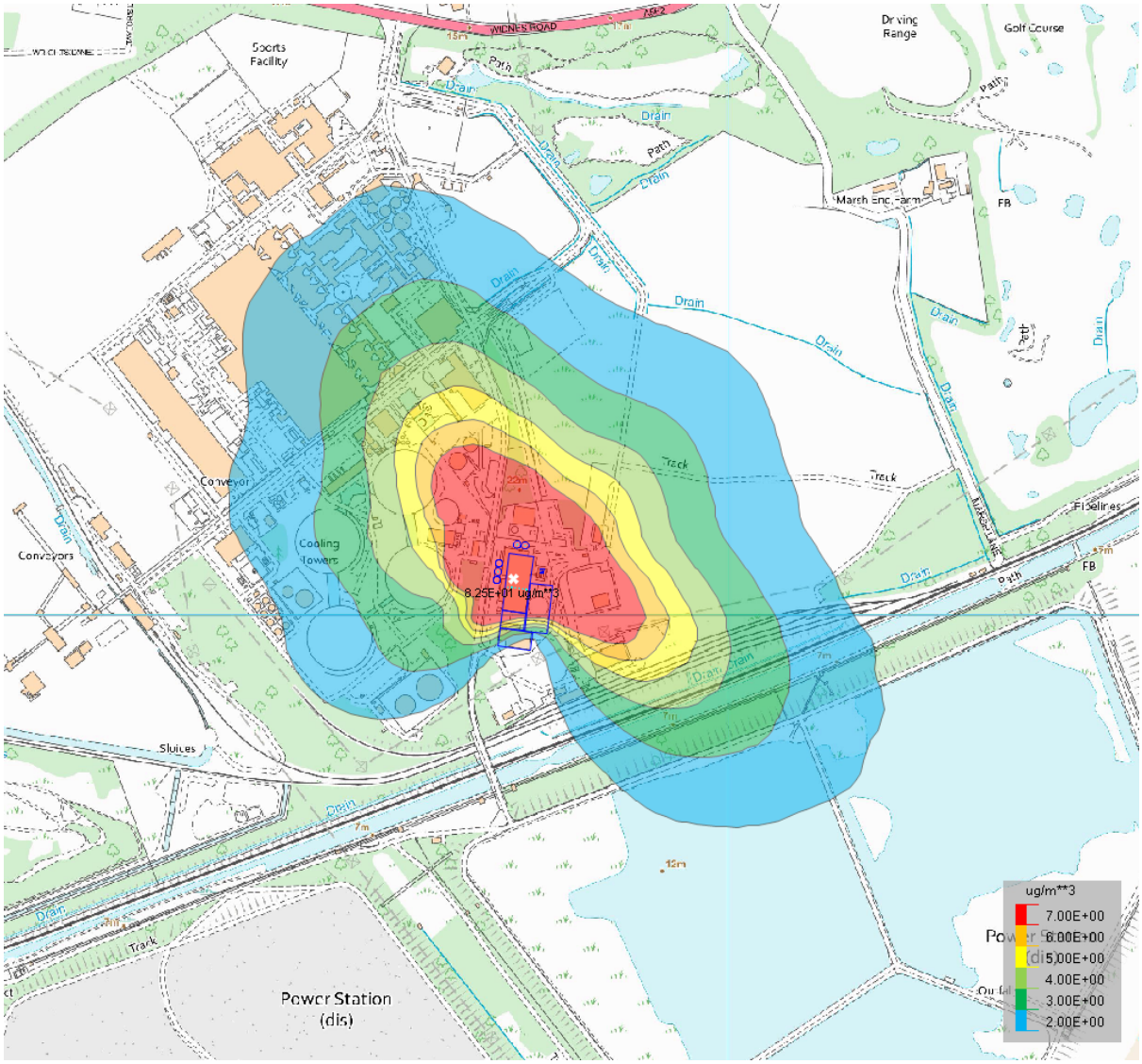


Figure E-2
NO_2: 1-hour

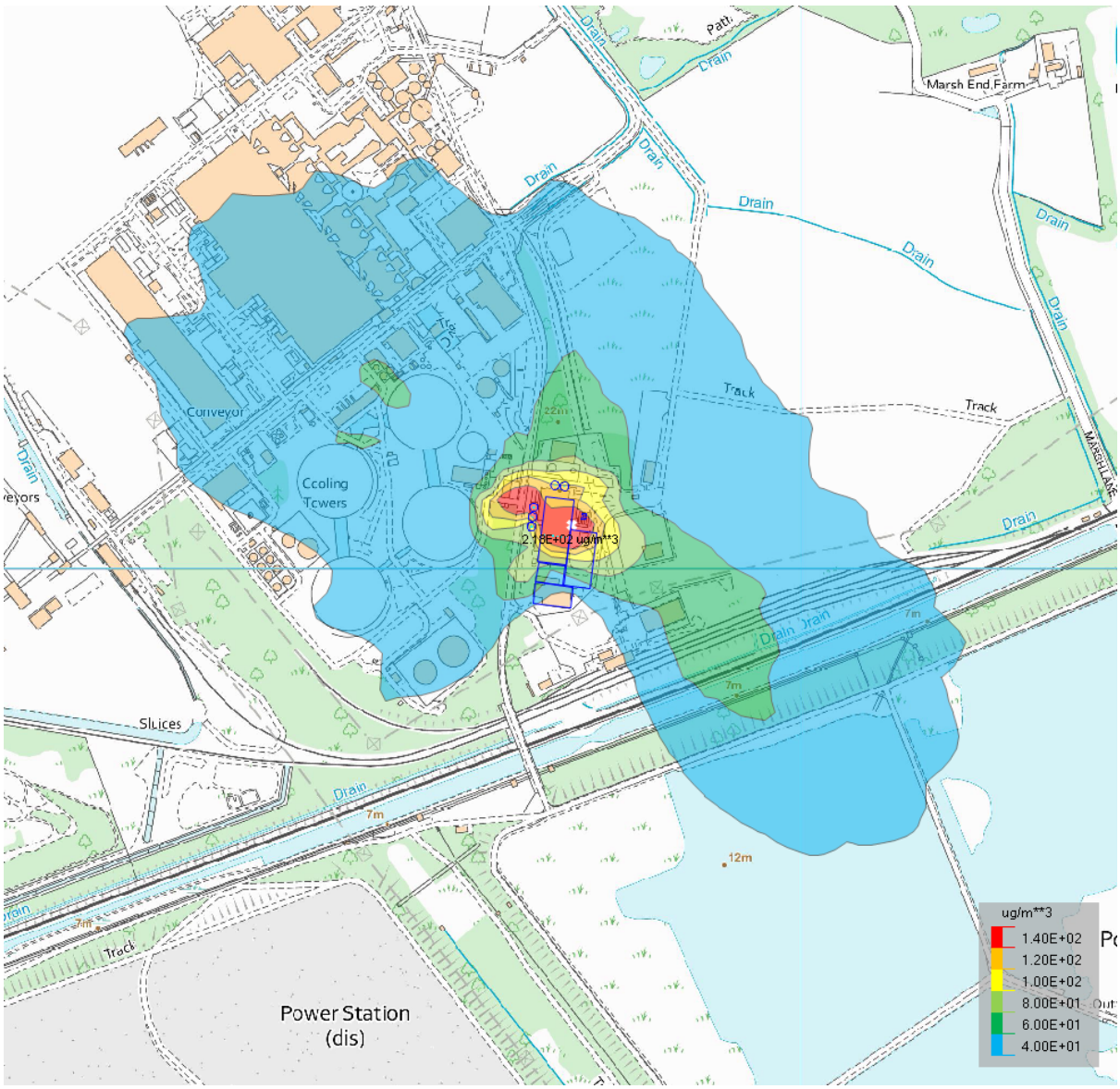


Figure E-3
PM_{10}: Annual

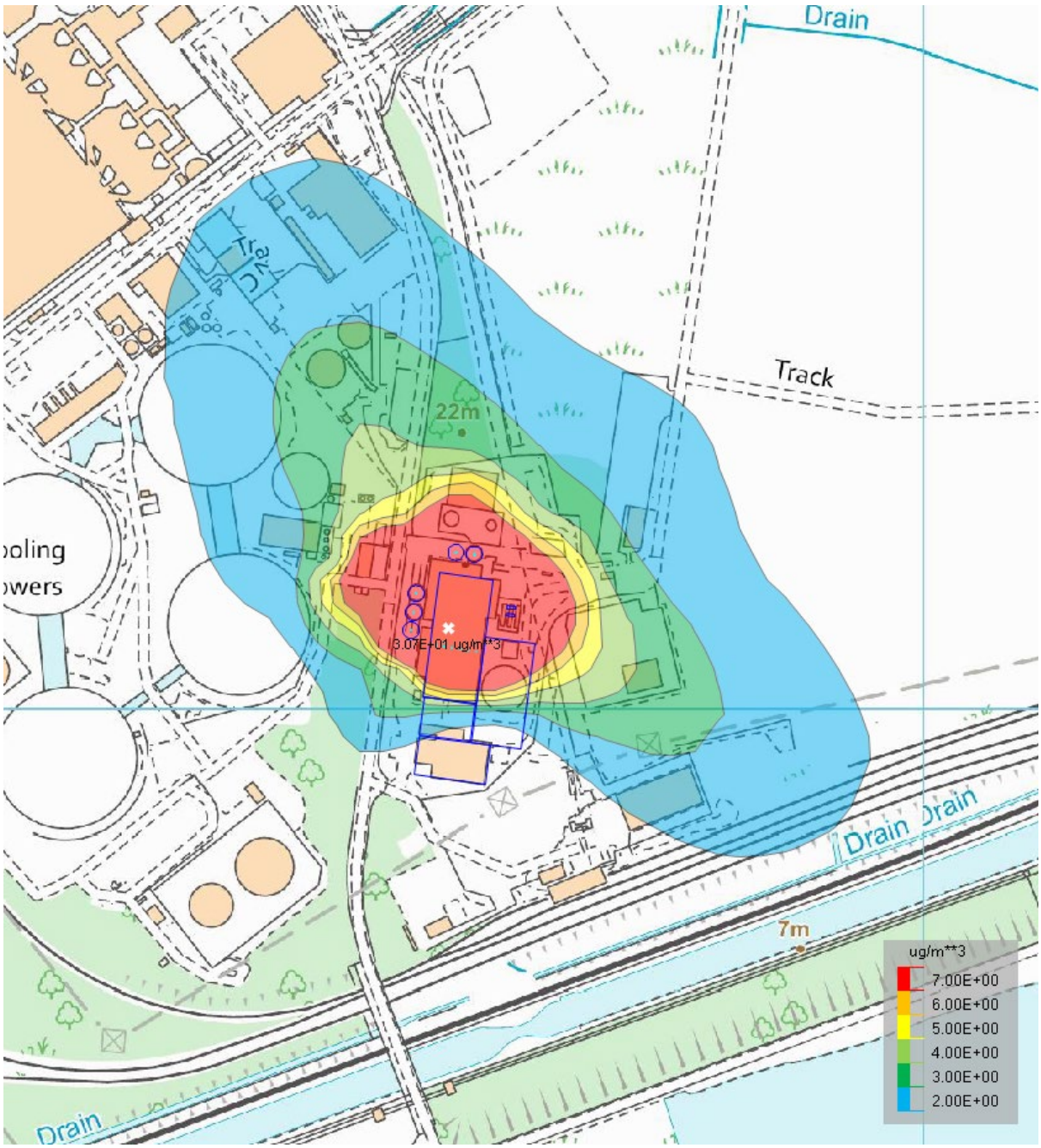


Figure E-4
PM_{10}: 24-hour

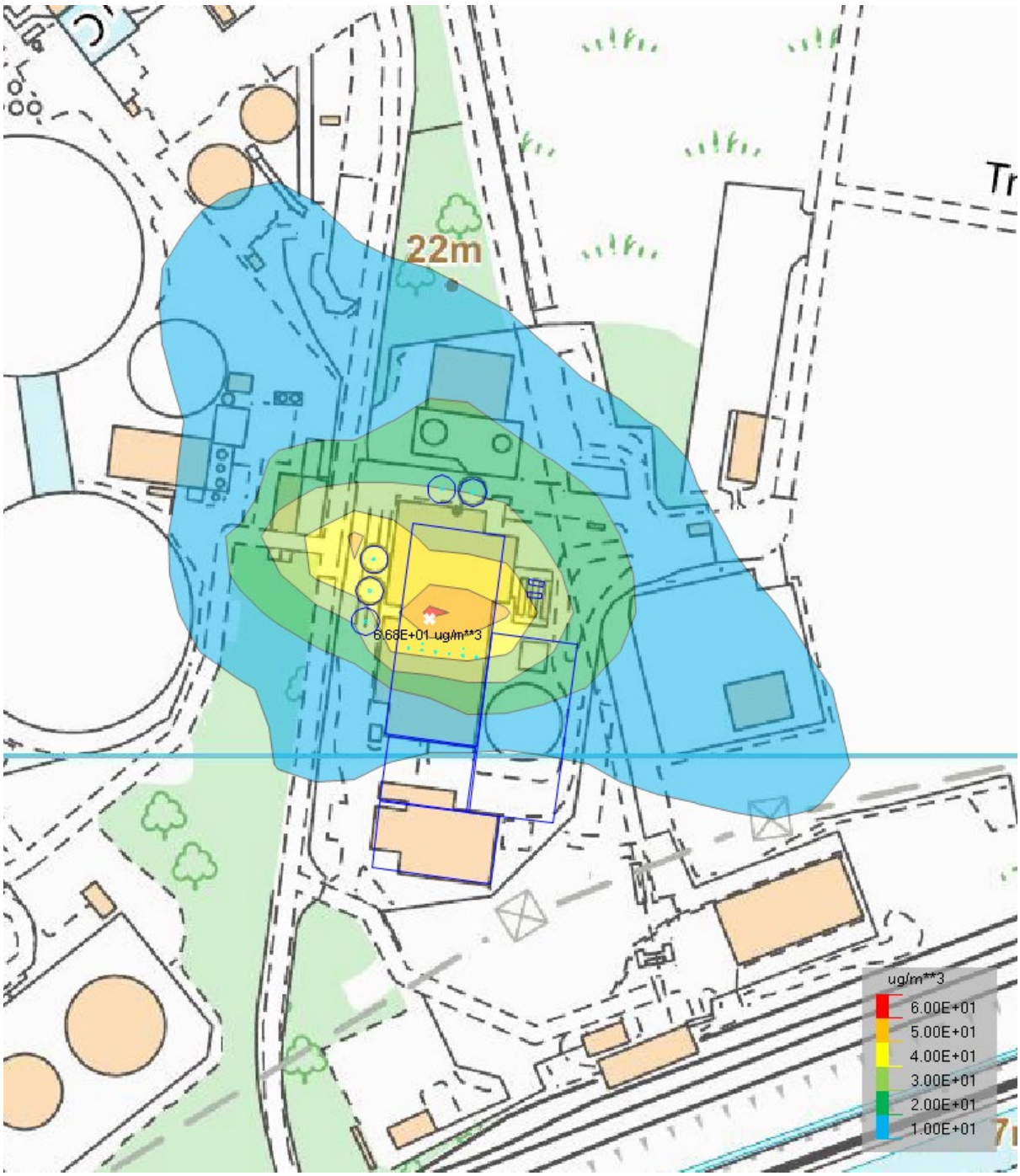


Figure E-5
CO: 8-hour

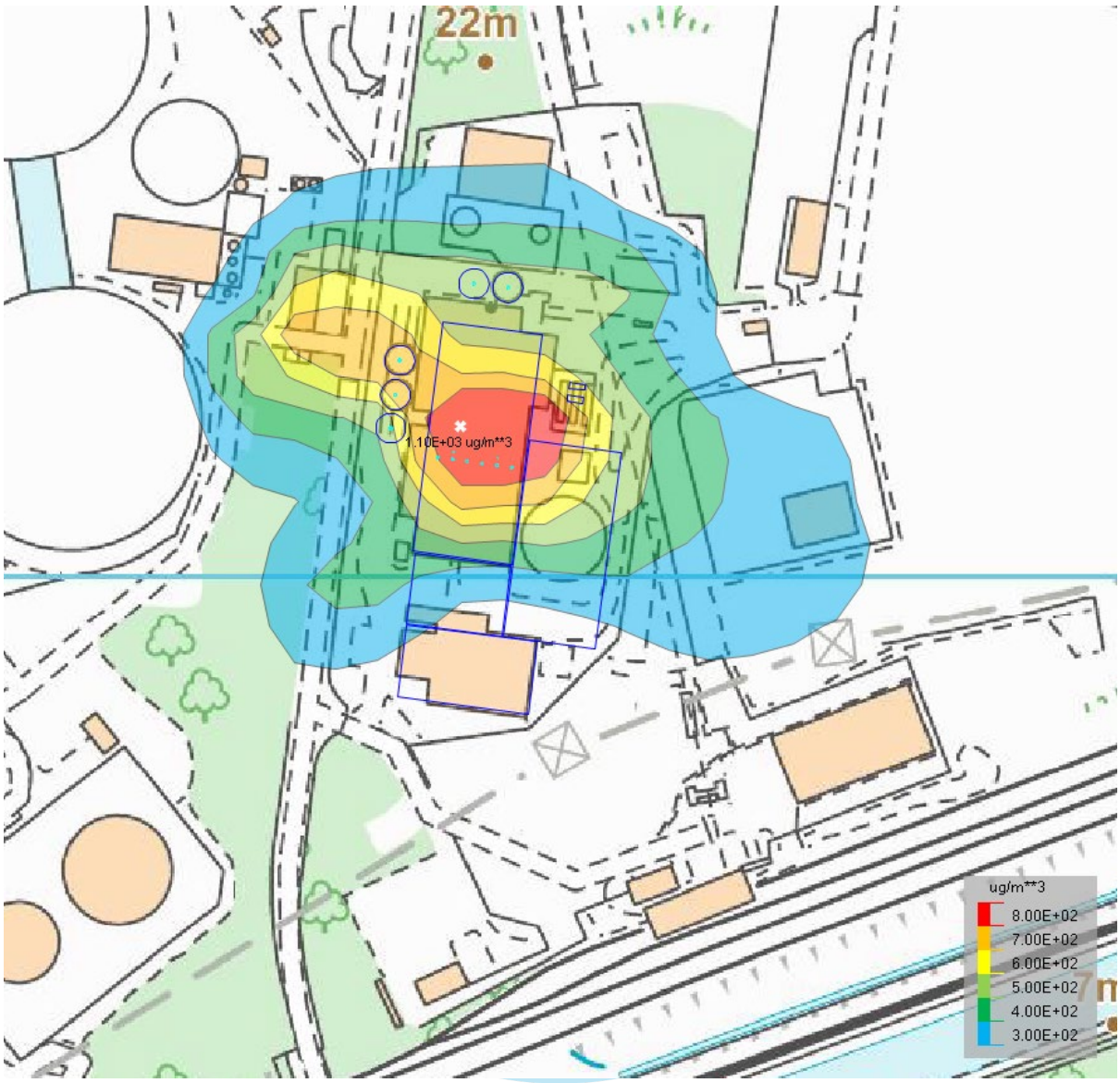
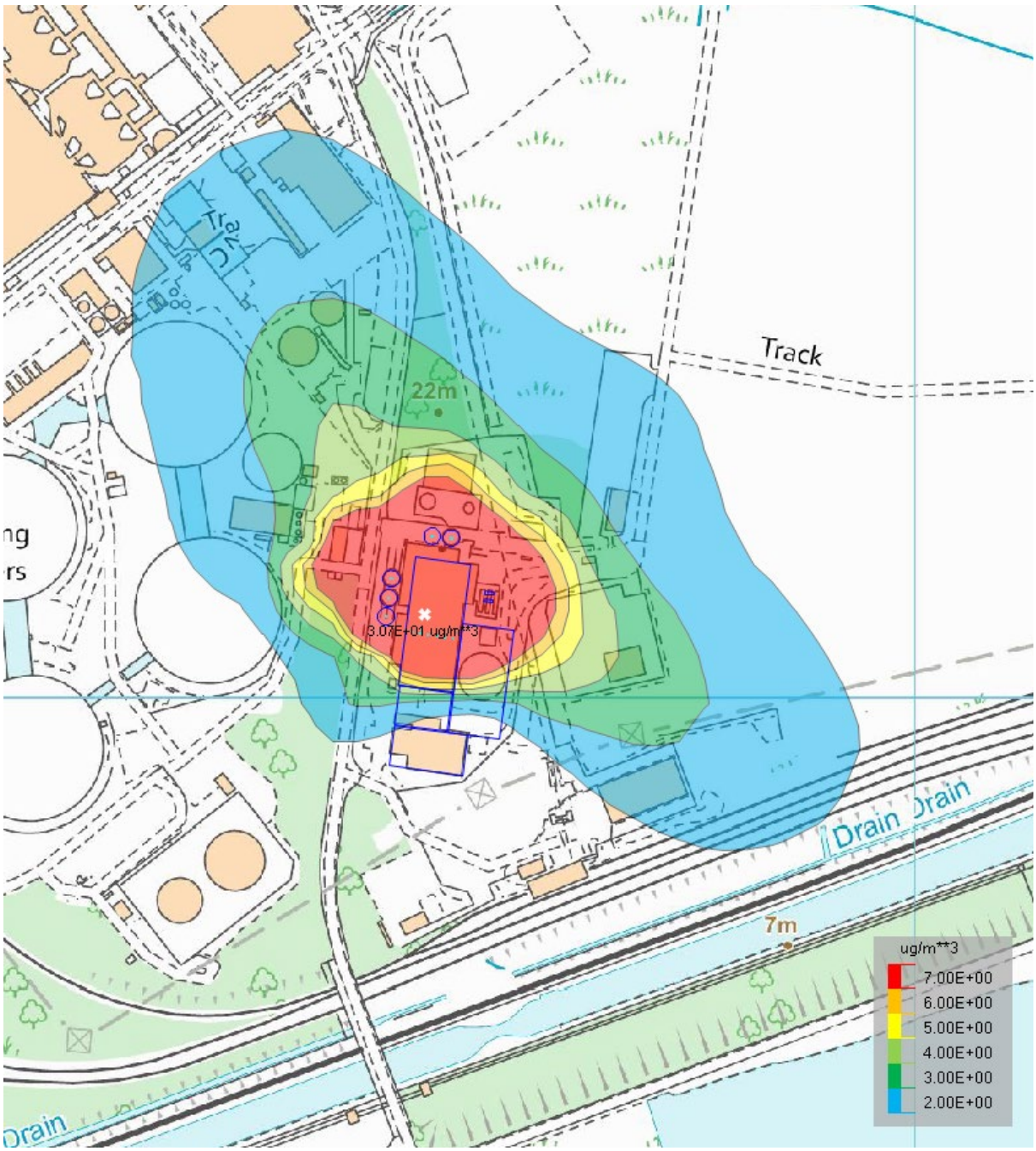


Figure E-6
PM2.5: Annual



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