Non-Technical Summary – ZP3527SS

Union Park Data Centre

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1.0 INTRODUCTION

This Non-Technical Summary (NTS) has been prepared by HDR Consulting Limited (HDR) on behalf of the operator Ark Data Centres Limited (Ark) in support of the application for a new bespoke Environmental Permit (ref ZP3527SS) for the following installation:

Union Park Data Centre
Bulls Bridge Industrial Estate,
North Hyde Gardens,
Hayes,
UB3 4DG
Grid reference: TQ 10514 79252

Ark, as the legal operator, is required to apply to the Environment Agency (EA) for a permit because the total net thermal input capacity of the site's combustion plant exceeds the 50MW thermal threshold stipulated in the legislation[1].

The Union Park Data Centre is currently being constructed with completion and handover expected in early 2025. The data centre will house various IT equipment that will require a constant stable electrical supply to operate effectively. The Data Centre will use Emergency Standby Generators or 'ESGs' to provide emergency power.

Ark currently holds environmental permits for three other data centres (ref: VP3235DJ, JP3300SN, and PP3003PW) and is fully committed to operating in accordance with the relevant permit conditions and demonstrating best practice within the data centre sector.

This document provides a non-technical introduction to the site and the application for a permit. For a detailed description of the Data Centre (DC) design, surrounding area and risk assessments please refer to the BAT Assessment, Environmental Risk Assessment (ERA) and Site Condition Report submitted with the application.

[1] The Environmental Permitting (England and Wales) Regulations 2016

2.0 SITE SUMMARY

The Union Park Data Centre and associated Energy Centre 3 (EC3) as shown in Figure 2.1 and Figure 2.2 below, is one of three Data Centres to be constructed on the 'Union Park campus'. The other two Data Centres and respective Energy Centres 1&2 (EC1 and EC2) are under the control of a separate operator and thus are covered by a separate environmental permit (ref DP3442QV). This NTS relates solely to the Union Park Data Centre operated by Ark (ref ZP3527SS), however, this application and the noise and air quality modelling associated with it have been prepared in full cognisance of the operating regime of the two adjacent data centres.

The Data Centre will use Emergency Standby Generators or 'ESGs' to provide emergency power in the event of grid electrical failure. The ESGs will be located in the associated 'EC3' Energy Centre which provides emergency power to the UP3 data halls. At final fit-out, EC3 will house x12 no. ESGs. The model selected are Rolls Royce MTU DS4000. which have an electrical output rating of 3.2 MWe. This equates to a net thermal input rating of 8.01MW per ESG and an aggregated total of approximately 96.11 MWth.

All ESGs comply with the Tier II US EPA standard and have been fitted with Selective Catalytic Reduction (SCR) to provide NO_x abatement to 95mg/Nm^3 at 5% O_2.

At the time of writing, construction of EC3 is ongoing with commissioning of the ESGs due in Q1 of 2025. Formal handover from the contractor to Ark will follow some time in Q2 / Q3 of 2025.

The permit boundary outlined in green in Figure 2.1 includes the ESGs and the Directly Associated Activities (DAA) which includes the fuel and urea tanks, associated pipework and the surface water connections.

The ESGs are capable of operating on diesel or biodiesel such as Hydrogenated Vegetable Oil (HVO).

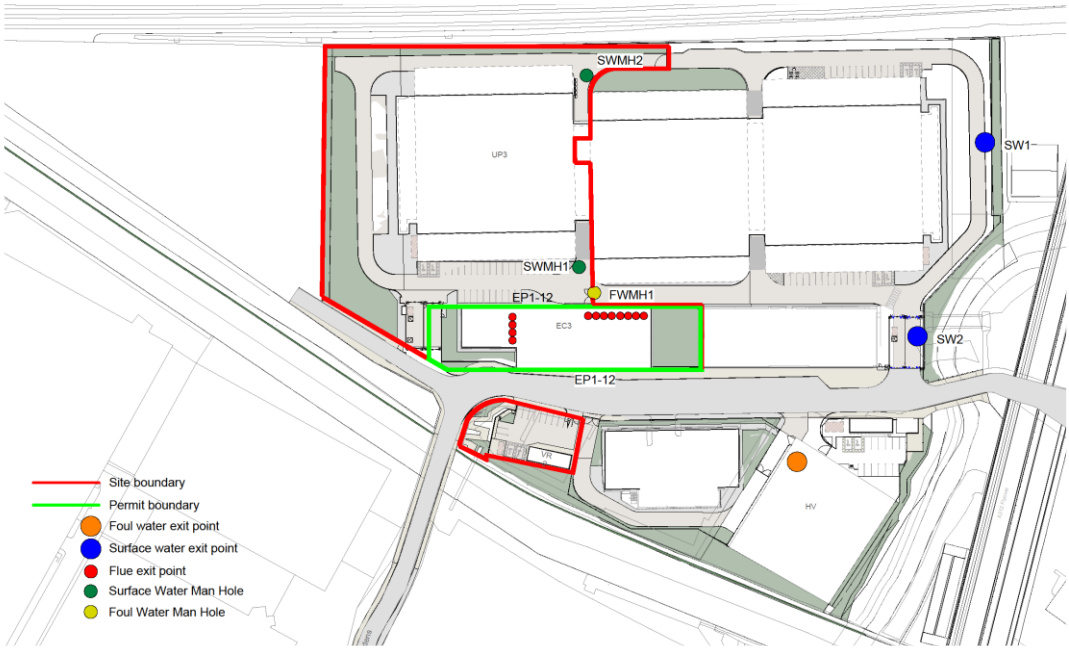

Figure 2.1 - Site Plan showing permit boundary and emissions points

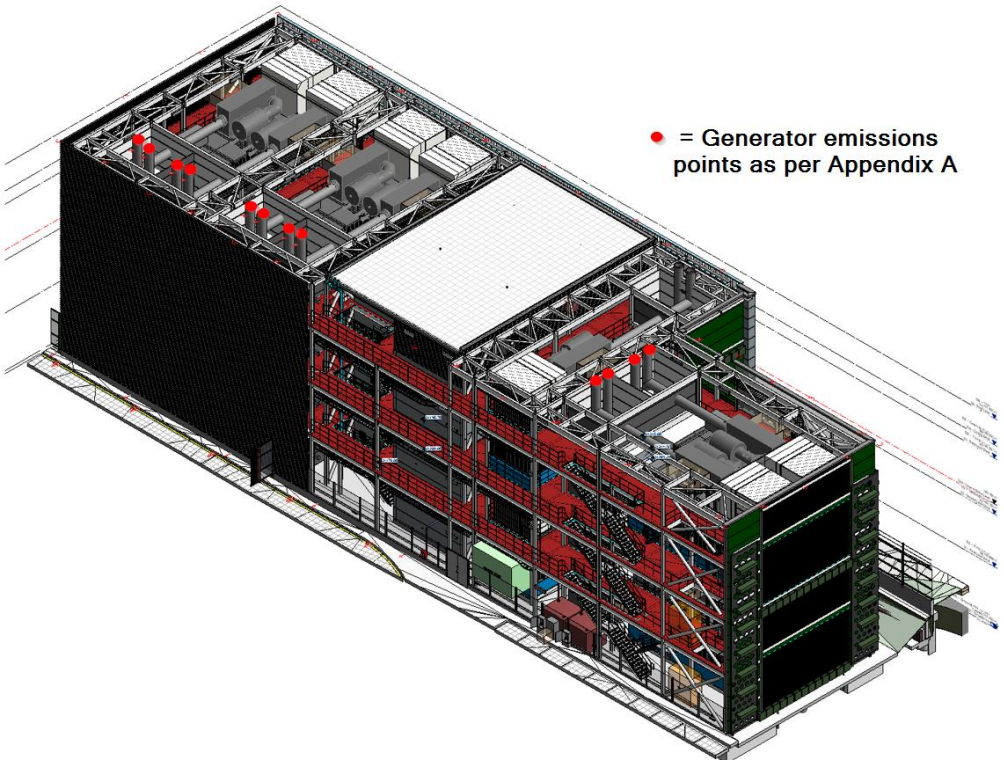

Figure 2.2 - Indicative EC3 Building layout with x12 ESGs.

Data Centres have recently been classed as Critical National Infrastructure (CNI), as they underpin a large portion of the UK's economy. Data Centres enable a wide range of digital activities including hosting various internet-based activities via servers in large "data halls" or warehouses.

Data Centres rely on an uninterruptible supply of electricity to power various IT equipment. An interruption or break in this supply even momentarily would have catastrophic consequences on equipment and on the operator's reputation. As such, Data Centres, employ ESGs to provide power should the grid supply be unavailable.

Grid supplies are very reliable, however, in the unlikely event of an outage, the generators are designed to operate until the grid supply is restored. Outages are rare events and thus operation is normally limited to testing and maintenance, which is likely to be less than 50 hours per ESG or 0.006% of a year.

2.1 Site Context

The surrounding land use can be seen in Figure 2.3 below. Further details can be found in the Environmental Risk Assessment (ERA) and Site Condition Report (SCR) submitted with the application for a permit.

The site is located in Hayes, in an urban location, which is relatively industrial in the immediate vicinity with residential properties to the north and south.

The Parkway dual carriageway is located directly to the East which joins the M4 Motorway further South. To the North, the site backs onto a railway line. The Grand Union Canal borders the campus to the South, while the River Crane borders the East boundary of the site. There are several small businesses, restaurants, offices, leisure facilities, religious buildings, parks and schools in the wider vicinity of the installation.

The closest ecological receptors are Local Wildlife sites (LWS) approximately 2,000m from the site, with the closest Special Area of Conservation (SAC), Special Protection Area (SPA) and Ramsar sites approximately 10,000m from the site boundary.

The installation is located within an Air Quality Management Area (AQMA) for NO_2 and near an Air Quality Focus Area (AQFA). As a result, during the planning process, the

London Borough of Hillingdon (LBH) required that NOx abatement be fitted to the generators in the form of Selective Catalytic Reduction (SCR). Further details on the SCR system are presented in sections 3.5.1 and 3.6.3.

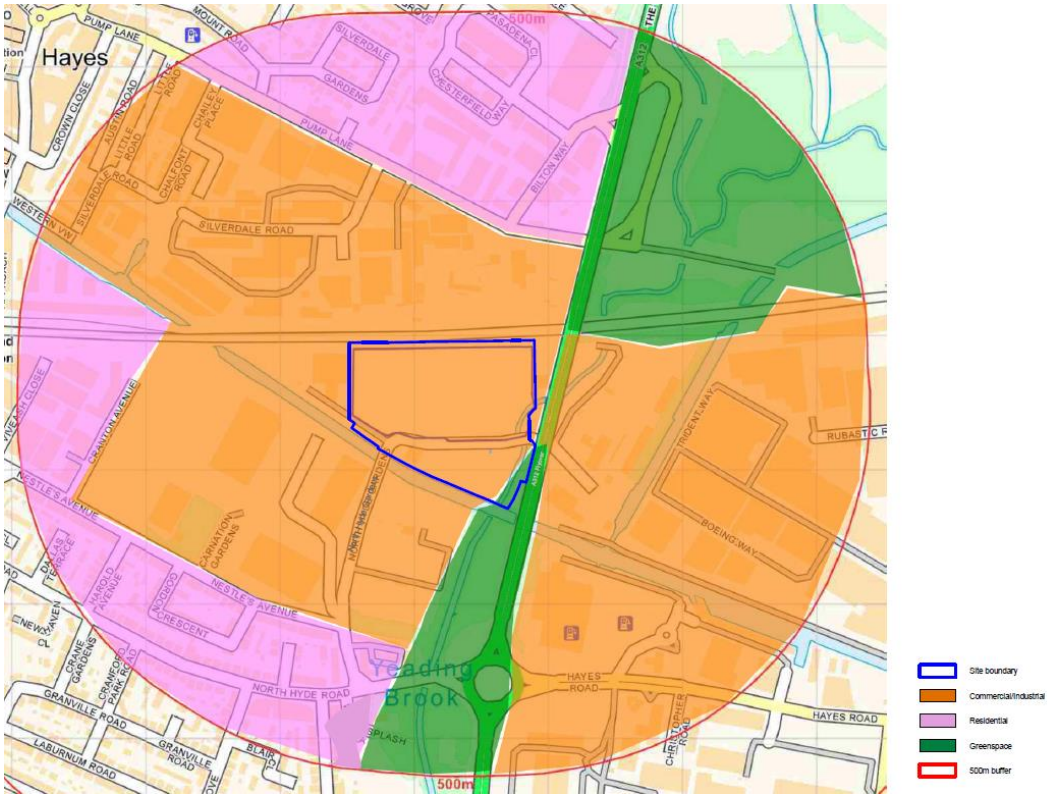

Figure 2.3 – Site surrounding land use.

2.2 Site History

The historical land use has been detailed in the Site Condition Report submitted with the application for a permit. One of the Site Condition Report appendices is a Phase 1 Environmental risk assessment which notes the following:

> *"The earliest available map from 1865 shows the site as mostly vacant with a river running north to south along the eastern part of the site. This map also shows a railway and creosoting works in the northeast corner. By 1932, the creosoting works had extended into the site and a building was shown in the centre. Excavations and ground workings were noted onsite by 1963 to 1964. The creosoting works were no longer shown by 1973 and a power station with chimney was shown in the western part of the site by 1983. By 2002, the power station was no longer shown and the British Airways building was shown. The building on the Vodafone plot was constructed by 2010."*

The same Phase 1 report also notes the following:

> *"The surrounding area has supported various industrial (potentially contaminative) land uses, including factories (50m all directions), brick fields (200m northwest), mills (200m northwest), railway (10m north), electricity substation (100m south), creosoting works (1m east and northeast), and rubber works (200m east)."*

3.0 ENVIRONMENTAL PERMIT APPLICATION

3.1 Permit Type and Regulated Activities

The activities onsite require a bespoke installation permit under Schedule 1, 1.1 Part A (1) of the Environmental Permitting Regulations: "*burning of any fuel in an appliance with a rated thermal input of 50 megawatts or more*."

The Data Centre will use Emergency Standby Generators or 'ESGs' to provide emergency power in the event of a grid electrical failure. The ESGs will be located in the associated 'EC3' Energy Centre which provides emergency power to the UP3 data halls. At final fit-out, EC3 will house x12 no. ESGs. The model selected are Rolls Royce MTU DS4000. which have an electrical output rating of 3.2 MWe each. This equates to a net thermal input rating of 8.01MW per ESG and an aggregated total of approximately 96.11 MWth.

All of the ESGs due to be commissioned are over 1MWth and are therefore classed as new 'Medium Combustion Plant' (MCP) and Specified Generators. These ESGs are 'limited hour MCPs' as they are purely standby plant that will operate less than 500 hours per year and there is no capacity agreement in place. The operation of the ESGs is likely to be limited to monthly/annual maintenance and testing.

The Directly Associated Activities (DAA) include the fuel and urea tanks, associated pipework and the surface water drainage network.

3.2 EA pre-application meeting

An enhanced pre-application meeting was held on 28th June 2024. This included attendance from the EA, HDR, Ark and the operator for the adjacent Datacentre (ref DP3442QV). Pre-application advice letter was issued by Miriam Townshend of the EA on 20th August 2024.

3.3 Application contents

This application has been prepared in accordance with the EA's informal Data Centre FAQ guidance document: '*Data Centre FAQ Headline Approach v21'* (November 2022).

The following documents have been submitted to the EA as part of the application for a permit. We have provided a high level non-technical summary of each of these in the following sections. Please refer to the latest version of these documents for further information.

- Application forms – Part A, B2, B3, F1 & Directors Details
- Best Available Techniques Assessment (BAT)
- Non-technical Summary (this document)
- Site Condition Report
- Environmental Risk Assessment (ERA)
    - Air Quality Assessment (AQA)
    - Noise Impact Assessment (NIA)
- Thermal Schedule
- Supporting information including site plans, drawings, generator datasheets etc.

3.4 Site Condition Report

A Site Condition Report (or 'Site Baseline Report') has been submitted along with the application for a permit. Extensive baseline soil and groundwater sampling and site investigations were completed as part of planning requirements for the development of the site. These identified the presence of some degree of contamination from historical land use. A risk assessment and remediation strategy were undertaken, and subsequent sampling has since shown this to be effective with all planning conditions discharged.

This Site Condition Report is intended to provide the EA with a description of the baseline conditions at permit issue and it has been prepared in accordance with the EA's H5 Guidance Note[2] provides details on the following:

- Site background
- Condition of the land at permit issue
- Geology
- Hydrogeology & Hydrology
- Previous land use
- Pollution history
- Evidence of historical contamination
- Permitted activities.

3.5 Environmental Risk Assessment

An ERA has been provided in support of this application using the EA's "Risk assessment for your environmental permit" guidance[3].

The purpose of the ERA is to identify the potentially significant risks to human health and the environment from permitted activities, as well as the controls in place to help mitigate these risks to an acceptable level.

The potential risks identified as part of the ERA are outlined below:

- Controlled releases to air
- Accidents
- Odour
- Noise and Vibration
- Fugitive emissions (from uncontrolled sources)
- Visible emissions
- Global warming potential.

Detailed standalone risk assessments have been completed to assess the risk of air quality and noise impacts from the operation of the ESGs. These are summarised below.

3.5.1 Air Quality Assessment

Emissions to air will occur from the operation of the generators. Due to the Data Centre's high levels of resiliency, it is expected that operation will be limited to maintenance and testing only, with no capacity agreement / 'elective operation'.

An Air Quality Assessment (AQA) was completed in support of the permit application to model the predicted impacts of operating the generators, with their associated SCR, on short-term and long-term air quality. A summary of the findings is as follows:

Scenario 1: Testing scenario

- Monthly – All generators will be tested simultaneously for 15 minutes per month off-load, totalling 2 hours per year.
- Quarterly – All generators will be tested simultaneously for 1 hour per quarter on-load, totalling 3 hours per year.
- Annually – Each generator will be tested independently for 2 hours at maximum load capacity, totalling 2 hours per year.

[2] Environmental permitting: H5 Site condition report - GOV.UK (www.gov.uk)
[3] Risk assessments for your environmental permit - GOV.UK (www.gov.uk)

Scenario 2 – Emergency running scenario

All 12 of the generators would be used during emergency running. It has been assumed that the generators would be used for 72 hours of continuous, concurrent running at 100% load out of a year for power failure purposes. This is a conservative estimate as during an outage it is likely that the generators would run at less than 80% load at any one time.

The conclusion of the assessment is as follows:

> *A dispersion modelling assessment of the 12 No. standby generators was undertaken. Concentrations of NO2, PM, CO, C6H6, NO and SO2 were predicted at selected human receptors using a detailed dispersion model and compared with relevant long and short-term AQSs, EALs and AEGLs. Concentrations of NOx, NH3 and SO2 were predicted at selected ecological receptors.*
>
> *Long-term and short-term impacts from the generators were predicted to be insignificant during testing and maintenance and a prolonged grid failure at all relevant modelled receptor locations when assessed against all relevant long-term and short-term exceedance thresholds.*

Conclusions

The EC3 maintenance and testing regime is sufficiently different to that of the neighbouring Data Centre meaning it is highly unlikely that the ESGs will be tested simultaneously. This means Air Quality impacts from maintenance and testing are unlikely to be significant. Even if the testing regimes coincided with one another, the combined impact would still be well below the critical limits and critical loads identified in the two reports.

The only event that is likely to cause coincident running of all the generators in the two facilities is a significant grid outage affecting both facilities (in itself extremely unlikely). Even in this extremely unlikely event the air quality impact of all generators running simultaneously would be below critical limits and critical loads. This is because of the significant effect of the SCR systems on the generators which reduces NOx emissions to 95mg/Nm^3.

The individual AQAs for both permits do not predict significant impacts and this is the same conclusion that was drawn from the AQA that was produced for the Planning Permission. This assessed the impacts of 42 ESGs across the campus operating in an outage and represents a worst case scenario as it assessed the impacts of 42 ESGs. In reality there will only be 40 ESGs across the 2 permit applications.

Given the above, the site's ESGs are unlikely to have a significant impact on surrounding receptors and therefore represent the BAT.

3.5.2 Noise Assessment

A noise impact assessment (NIA) was completed in support of the application for an environmental permit. This report identifies sensitive receptors and potential sources of noise from the installation. The primary noise sources are the site's generators. The impact assessment concluded the following:

> *The noise levels are predicted to achieve the noise limits at the nearest noise sensitive properties and therefore noise impacts are not considered to be significant.*

Further information can be seen in the 'Noise Impact Assessment v1' submitted as part of this application.

3.6 BAT Assessment

A BAT assessment has been submitted with the application. This has been structured using the EAs informal BAT guidance document; *'Data Centre FAQ Headline Approach v21'* (November 2022). The assessment report seeks to provide evidence of BAT or justification where the requirements have not been met.

The following sections provide a non-technical summary of the BAT assessment which concluded that the installation is considered to meet the above BAT requirements.

3.6.1 Technology selected to provide emergency power

ESGs operating on Diesel/HVO have been selected to provide emergency power to the installation in the event of grid failure on account of the following:

- Proven as a reliable technology
- Cold start capability
- Space requirements
- Fuel suitability
- Lifetime of stored fuel.

3.6.2 Generator Operation

The ESGs are solely used as standby plant for emergency power provision in the event of the grid supply being unavailable. There is no capacity agreement in place or plans to operate the generators for generating revenue. As such, operation of the generators is likely to be limited to monthly maintenance and testing. Therefore, the generators are classed as 'limited hour MCPs' and are therefore exempt from meeting the BAT emissions limit values (ELVs) for new MCPs / specified generators.

The intended operation of the ESGs is as follows (see Table 3.1). This reflects the air quality modelling assessment which accompanies the application for a permit.

In the unlikely event of a loss of grid power to the building, all 12 generators (at full deployment) will start and then drop off according to requirement. The arrangement at this installation ensures that 11 generators can provide the full electrical requirement to the site, with 1 as back up in the event a generator fails to start.

Table 3.1 - Summary of generator test regime

Generator Test Frequency	Description	Load Profile	Individual Test Duration	Total hours / gen
Monthly test	All gens in a unit start simultaneously – to prove all gens start on the "start signal" and run for 15 mins. No load.	0%	15 mins	**2**
Quarterly Test	All gens in a unit star simultaneously, to prove all gens start on the "start signal" and take load for 1 hour. Modelling load = 80% of design load *1/(N+1)	80%	1 hour	**3**
Annual test	Each gen started and run at 100% load against a load bank – to clear the system and prove operation at full load for 2 hours.	100%	2 hours	**2**
			Total hours of operation per generator	**7**

3.6.3 Generator emissions performance

The generators that have been selected are emissions optimised and achieve the Tier II US EPA standard. For the size and output, the engines selected are best in class for NO_x emissions.

The installation is located within an Air Quality Management Area (AQMA) for NO_2 and near an Air Quality Focus Area (AQFA). As a result, during the planning process, the London Borough of Hillingdon (LBH) required that abatement be implemented on the generators to achieve a NO_x emissions rate of 95mg/Nm^3 (at 5% O_2). In response to this planning requirement, the operator has made significant investment in NO_x abatement technology in the form of SCR. This technology has been employed for this specific scenario and does not represent BAT for general Data Centre developments.

The SCR system will be fitted to the generator exhaust system to help reduce NO_x emissions before they enter the atmosphere. The SCR system has been designed and sized so that it can outperform even gas generators on NO_x emissions.

The SCR system will rely on a source of Ammonia fed from 12 no 2,500 litre Urea tanks. These are to be integrally bunded to 110% and located within the generator rooms, with 1 tank serving 2 generators. In addition, these tanks will also have overflow alarms and leak detection devices.

3.6.4 Generator flue and exhaust design

Each of the 12 ESGs has its own dedicated flue that rises to 21.1m above ground, terminating at 1m above the building height. Stacks are orientated vertically and are unimpeded by cowls or caps.

3.6.5 Grid electrical supply

Under normal circumstances electricity to the site will be provided direct from the National Grid 275/66kV North Hyde Substation. The electrical infrastructure is such that there are multiple supply routes or 'feeds'. Each feed can support the full site load, meaning that if one feed was to fail, electrical provision to the installation would not be compromised.

A site wide failure is considered extremely rare as it would require a catastrophic regional failure on the grid, or at the supplying power station, and would likely impact not only the site but the surrounding London area. As a result, the grid connection is considered to be highly reliable as demonstrated in the grid reliability letter provided with the application (calculated as 99.999605%).

3.6.6 Emissions monitoring plan

An Emissions monitoring plan is to be developed once the site is operational in conjunction with the EA guidance. To facilitate flue gas testing, Monitoring ports are to be pre-installed on the generator flues to facilitate NOx and CO monitoring in accordance with web guide 'Monitoring stack emissions: low risk MCPs and specified generators' Published 16 February 2021 (formerly known as TGN M5)[4].

3.6.7 Fuel storage

The ESGs will combust a liquid fuel in order to generate electricity in an emergency. The current plans are for the ESGs to operate on diesel or biodiesel such as HVO. Each of the 12 ESGs will have its own 52,000 litre (usable) bunded belly tank which sits below the generator itself.

The tanks have been sized to provide 72 hours of continuous operation at 100% rated load and offer a total storage capacity for the site of 624,000 litres. The tanks are bunded to 110% and will be fitted with an Overfill Protection Value (OPV) to the tank fill line and a leak detect float switch within the tank bund. More details can be found in the BAT Assessment.

3.6.8 Drainage

The site's drainage system is split into separate foul and surface water networks as shown in the sites drainage plan supplied with the application. This network serves the entire campus irrespective of the operator / permit boundaries as it was originally designed for a single operator of all 3 data centres.

The refuelling area for the energy centre is bounded by channel drains that drain to an interceptor meaning in the event of a spill all of fuel/oils are intercepted for collection by a forecourt separator prior to connecting to the downstream surface water network.

The point source emissions points to surface water from the entire Campus are shown as 'SW1' and 'SW2' in the site plan & emissions points drawing provided with the application.

[4] https://www.gov.uk/government/publications/monitoring-stack-emissions-low-risk-mcps-and-specified-generators/monitoring-stack-emissions-low-risk-mcps-and-specified-generators

Both of these emissions points are existing emissions points that reside within the boundary the adjacent datacentre which holds a separate environmental permit (ref: DP3442QV).

For this reason, these emissions points will not be included in as there cannot be dual regulation of emissions points that are already covered under a separate permit. Therefore, as agreed during the enhanced pre-app meeting with the EA, several manholes have been identified that are close to the site boundary that could be considered to be the point at which the surface water drainage is discharged from ZP3527SS into the drainage system covered under DP3442QV.

There will be an arrangement between both operators regarding action to be taken should pollution be identified at any of the listed emissions points to determine the source of the pollution and which operator is at fault and thus responsible.

3.6.9 Waste

Small quantities of wastes may be generated from routine generator maintenance activities or in the event of a spillage/leakage. This is likely to be low given the standby nature of the generators and procedures utilised by Ark on other permitted sites will be in place to reduce the risk of spills and leaks spillage/leaks.

Procedures for licenced and responsible collection of waste oils and other hazardous wastes are to be developed once operational. These will be based on existing procedures in place at other Ark permitted sites and will be in line with Arks companywide Environmental Management system which is certified to ISO 14001. In accordance with this, waste generated is to be managed in line with the waste hierarchy, using licenced waste management providers and relevant Duty of Care information retained.

3.6.10 Operating procedures

Once the site is operational, suitable Ark procedures utilised on other permitted sites will be reviewed, amended and implemented to this installation. Relevant and responsible staff are to receive appropriate training and awareness on these procedures, and this will be documented through the operator's management systems (e.g. ISO 14001 & ISO 50001). This will help ensure compliance with the Environmental Permit as well as other requirements of legislation for the protection of the environment and human health. Likely procedures are as follows:

- Spill response procedure
- Refuelling procedure
- Grid failure procedure (Air Quality Management Plan or 'AQMP').

3.6.11 Management systems

Once the site is operational, there are plans to implement an effective Environmental Management System (EMS) and Energy Management System (EnMS). These will be based on the systems already in place at other Ark permitted sites and will be in accordance with ISO 140001 and ISO 50001 or a suitable equivalent standard(s).

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4.0 CONCLUSION

We consider this to be comprehensive submission that meets the requirements of all relevant EA guidance documentation.

The overall conclusion is that there is unlikely to be a significant impact on human health or the environment from the operation of the listed activities under this permit.

Ark currently holds several other Environmental Permits for other operational Data Centres with permit reference numbers as follows: JP3300SN, PP3003PW and VP3235DJ. Ark is fully committed to operating in accordance with the relevant permit conditions and demonstrating best practice within the Data Centre sector.