# Environmental Permit Variation Application

## Best Available Techniques and Operating Techniques

### Telehouse International Corporation of Europe Limited

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# Appendices

# 1.0 Introduction

SLR Consulting Limited (SLR) has been instructed by Telehouse International Corporation of Europe Limited (TIE) to prepare an environmental permit (EP) variation application for the TIE owned Docklands Data Centre Campus (the Campus) (EP reference EPR/EP3507SL V0002).

The Campus currently includes Telehouse North (TN) located on Coriander Avenue, London E14 2AA, and Telehouse South (TS) located on Blackwall Way, Poplar, London, E14 2EH. TIE intends to develop Telehouse West 2 (TW2), a new data centre which will extend the existing TN campus.

Electricity for operation of the Campus is provided from connections to the local electricity transmission network; however, given the nature of data centres and their requirement to have an available energy supply at all times, the Campus also incorporates a number of emergency standby generators (SBGs).

TW2 will incorporate 13 new SBGs (which will be installed in phases). The EP will therefore be varied to incorporate a total of 44 SBGs at the Campus, as summarised below:

- TN:
  - Existing (comprising East, West, North and North2 data centre units): 27 SBGs with a total thermal rated input of 145 MWth; and
  - Proposed (TW2): 13 SBGs with a total thermal rated input of 97.6 MWth.
- TS (existing): 4 SBGs with a total thermal rated input of 35 MWth.

The total thermal rated input of the Campus, with the inclusion of TW2 will increase from 180 MWth to 277.6 MWth.

The SBGs will provide power to the data centre in the event of an emergency situation such as a brown-out or black-out of the local electricity transmission network where there are fluctuations or loss of the electrical power provided by the network. During such an event, there is the potential for a delay between fault detection and initial operation of the SBGs; on-site battery arrays will provide a temporary uninterruptible power supply in order to cover such delays and the potential for a loss/reduction in the power supply to on-site equipment.

The SBGs, in accordance with the manufacturer requirements, will be subject to planned maintenance and testing. There are currently no agreements in place for the elective generation of electricity for commercial export to the electricity grid.

The proposed TW2 SBGs will be fuelled with hydrogenated vegetable oil (HVO) or diesel. For the purpose of this EP variation application, the air emissions risk assessment has been based on the use of diesel fuel. These SBGs will have selective catalytic reduction (SCR) abatement to reduce emissions of oxides of nitrogen ($NO_x$) to air. The SGB's at the remaining SBG's at TN and the SBGs at TS have been trailing the use of HVO as a fuel and therefore this EP variation application also seeks to include HVO as a permitted fuel for the whole Docklands campus.

This Best Available Techniques and Operating Techniques document (BATOT) is submitted on behalf of the Client, to support the EP variation application for the TW2 data centre. This report is an integrated document which describes the operating techniques that will be implemented at TW2 with respect to operation of the SBGs to ensure compliance with guidelines and demonstrates that BAT will be employed.

For the purpose of this BATOT, key technical standards in the following documents have been referenced:

- Develop a management system: environmental permits guidance, 03 April 2023;

- Risk assessments for your environmental permit guidance, 03 January 2025;
- Emergency backup diesel engines on installations: best available techniques (BAT), 21 August 2023;
- Best Available Techniques: environmental permits, February 2016;
- Data Centre FAQ, Draft Version 21.0 to TechUK for Discussion 15/11/22; and
- Specified generator: comply with permit conditions, 28 December 2022.

# 2.0 Summary of Changes

TN will be expanded to include the proposed TW2 data centre. TW2 will introduce 13 new SBGs (Cummins C3750 D5e), each being 7.506 MWth (97.6 MWth in total). These TW2 SBGs will be installed in phases; Phase 1 will involve the installation of 6 SBGs.

No changes are proposed at TS. The rated thermal input will therefore remain at 35 MWth for TS.

Based on the existing and additional SBGs as summarised above, the aggregated total installed combustion capacity at TN will be 242.6 MWth.

A summary of all the SBGs which will be in place at TN is provided in Table 2-1.

**Table 2-1 TN SBGs**

| Building | Type/Model of Diesel Engine | SBG Thermal Rated Input (MWth) | Number Currently Installed |
|---|---|---|---|
| North | MTU 16V4000 | 4.32 | 4 |
| | MTU 16V4000 | 4.28 | 2 |
| North 2 | MTU 20V4000 G63L | 5.96 | 4 |
| | MTU 20V4000G34F(EO) | 6.805 | 2 (installed 2021) |
| | MTU 20V4000 G34F | 6.805 | 2 (installed 2024) |
| East | MTU 16V396 | 4.56 | 2 |
| | MTU 16V4000 | 4.28 | 3 |
| West | MTU 20V4000 G23E | 6.16 | 4 |
| | MTU 20V4000G23 | 5.37 | 3 (installed 2018) |
| TW2 | Cummins C3750 D5e | 7.506 | 13 (estimated installation & commissioning of 6 SBGs Phase 1 in 2027) |

## Total Rated Thermal Input

Based on the changes, the total rated thermal input (under standby power operating conditions) of the Campus will be approximately 277.6 MWth:

- TN data centre: 242.6 MWth; and
- TS data centre: 35 MWth.

# 3.0 Pre-Application Advice

Enhanced pre-application advice was sought from the EA; this was via a call (Microsoft Teams) on 17th December 2025. During the meeting the EA confirmed the following:

- That a substantial variation to the bespoke EP is required.
- Directly associated activities are limited to the storage of raw materials and surface water drainage.
- The application fee and the supporting documents required for the EP variation application.
- Confirmation of the standards and guidance relevant to the EP variation application for the data centre.

A copy of the EA enhanced pre-application advice letter (reference EPR/EP3507SL/P001, dated 18th December 2025) is presented in Appendix A.

# 4.0 Regulated Activities

The regulated activities at the Campus will consist of:

- TN - 40 SGBs with a total of 242.6 MWth; and
- TS - 4 SBGs with a total of 35 MWth.

The thermal rated input in total will be 277.6 MWth (44 SBGs).

## 4.1 Schedule 1 Activities

Combustion activities that require an EP are defined in Part 2, Schedule 1 of the EPR:

- Section 1.1 Part A(1)(a) burning any fuel in an appliance with a rated thermal input of 50 or more megawatts.

The EPR clarify that:

*"…where two or more appliances with an aggregated rated thermal input of 50 or more megawatts are operated on the same site by the same operator, those appliances must be treated as a single appliance with a rated thermal input of 50 or more megawatts."*

The SBG provision includes for a level of redundancy to the SBG system such that, even in a worst-case blackout scenario, only the required number of SBGs would start up to deliver the required electrical IT load for the data centre; the number of operational SBGs at the time of a blackout would be dependent on the extent of the blackout. However, it is noted that, without specific physical controls preventing operation of an SBG, the thermal input of all SBGs is required for determining the capacity of the site.

This EP variation application relates to the proposed addition of 13 SBGs at TW2 to the extant permitted Section 1.1 Part A(1)(a) combustion activity.

## 4.2 Stationary Technical Unit (STU)

The definition of a STU is not included in the EP Regulations. However, the EA *'RGN 2 Understanding the meaning of regulated facility'* (May 2019) states:

*"The essence of a "technical unit" is that it can carry out the Activity, or Activities, on its own. This means that the technical unit must include enough plant and machinery to allow the Activity to take place in a controlled manner for a sufficient period of time for the operation to reach it designed or intended output."*

Each SBG could be considered as an STU (for the purposes of combusting fuel) however, in accordance with A2.5 of RGN 2:

*"If there are two or more STUs on the same site they will be treated as a single STU if they are technically connected and one of the following criteria is met:*

a) they carry out successive steps in an integrated industrial activity;

b) one of the listed activities is a Directly Associated Activity (DAA) of the other; or

c) both units are served by the same DAA.

In the event of a worst-case blackout scenario of the local transmission system, potentially all the SBGs at the Campus will be operated to deliver the required IT load. In the event of operational redundancy in case of engine failures or SBGs under maintenance, the remaining SBGs will be operated to the required load, but this can only be identified at that time. Therefore, the operation (under emergency) of individual SBGs is linked to the 'availability' of other SBGs, and all SBGs in the data centre are thus considered to be technically connected.

At TW2, fuel storage for the SBGs and the SCR abatement systems are considered to be DDAs. In addition, surface water drainage from the service yard area where the SBGs and fuel storage are located, is also considered as a DAA.

Discussion of the DAAs at the site are provided in section 3.3.

## 4.3 Directly Associated Activities

Schedule 1, Part 1 Regulation 2(1) of the EP Regulations provides that a DAA is an operation that, in relation to any other activity:

- has a technical connection with the activity;
- is carried out on the same site as the activity; and
- could have an effect on pollution.

As stated in A2.19 of RGN 2, a DAA must "serve" a STU. Therefore, a DAA will normally be something that would not be in place if the STU was not present on-site. A2.22 continues that there are four types of technical connection with a STU including *"…input activities concerned with the storage and treatment of inputs into the stationary technical unit."*

A2.11 of RGN-2 states:

*"Storage facilities may be technically connected. […] Stores at the same location are normally technically connected, and as their operation can give rise to pollution, either locally or at the Activity, they are likely to be DAAs."*

In addition to the above, it must also be clear how a DAA may affect emissions from the data centre. Incorrect storage of a raw material/fuel, or the discharge of contaminated surface water could cause off-site releases of these substances.

Therefore, at TW2 the SCR abatement systems, the storage of fuel and AdBlue (for the SCR abatement systems) and surface water drainage from the permitted Installation area are considered to be DAAs of the 'combustion' STU for the data centre.

# 5.0 Data Centre Location

The Campus currently consists of TN and TS. TW2 will be developed adjacent to the north west of the existing TN campus, which is located on Coriander Avenue, London, E14 2AA. The approximate centre of TN is at national grid reference (NGR) TQ 38770 81090.

TN (including TW2) is predominantly surrounded by commercial and residential properties. There are high rise residential apartment complexes approximately 40m to the north and 55m to the east. There are further residential complexes within 100m and 180m to the south, 230m to the west and 360m to the east. The closest commercial properties to the site are a Travelodge hotel, located directly adjacent to the east of the TN campus, and a data centre (Global Switch) 20m to the west.

The site falls within the Tower Hamlets Air Quality Management Area.

The setting for the site for TN, including TW2, is summarised in Table 5-1.

**Table 5-1: Telehouse North Surrounding Land Uses**

| Boundary | Closest Distance (m) | Description |
|---|---|---|
| North | Adjacent | Local road network including East India Dock Road (A13). |
| East | Adjacent | Oregano Drive, beyond which is Travelodge London Docklands Central, Leamouth Road (A1020), residential apartments (Russet House, approx. 55m, Handlebury House, approx. 85m), Tower Hamlets Transport Complex (Government office), a service depot, the River Lea, beyond which lies Limmo Peninsula Ecological Park and a railway line. |
| South | Adjacent | Local road network including Saffron Avenue and East India Dock Road (A1261), residential high-rise apartments, a railway line, beyond which is Virginia Quay Park, residential properties and the River Thames. |
| West | Adjacent | Commercial properties, including Global Switch data centre, local road network including Rosemary Drive, Coriander Avenue, Nutmeg Lane, Clove Crescent, a large pond, beyond which are several commercial and educational premises (circa 140m from the site boundary) including London Campus (UWS), East India Building (London University), York St John University, Pure Gym and Woolmore Primary School.<br>The A102 is circa 320m from the site. |

# 6.0 TW2 Overview

TW2 will involve the installation of 13 new SBGs with a total generating capacity of 97.6 MWth. The SBGs will be fired on either diesel or HVO. The SBGs will be installed in phases, with 6 SBGs being installed in Phase 1.

The SBGs will all be housed at ground level inside the TW2 ten storey data centre building, within dedicated generator rooms (two SBGs per room, plus one SBG in its own room).

Each SBG will have a single flue for the discharge of combustion emissions; these flues will extend beyond the generator rooms and run vertically up the external wall of the data centre building, terminating above roof height.

There will be a linking bridge between TW2 and the existing TN North building.

With the inclusion of TW2, TN in total will consist of the following:

- The existing North, North 2, West and East buildings.
- TW2 data centre, comprising one data centre building.

The generating capacity of the installed SBGs at TN is summarised in Table 6-1.

The locations of the TW2 SBGs are indicated on Drawing 002A TW2 Site Layout and Emission Points. The locations of all the emission points at TN are presented on Drawing 002B.

**Table 6-1: TN Generating Capacity of the SBGs**

| Building | Type/Model of Diesel Engine | SBG Thermal Rated Input (MWth) | Number Currently Installed | Number to be Installed |
|---|---|---|---|---|
| North | MTU 16V4000 | 4.32 | 4 | - |
| | MTU 16V4000 | 4.28 | 2 | - |
| North 2 | MTU 20V4000 G63L | 5.96 | 4 | - |
| | MTU 20V4000G34F(EO) | 6.805 | 2 | - |
| | MTU 20V4000 G34F | 6.805 | 2 (installed 2024) | - |
| East | MTU 16V396 | 4.56 | 2 | - |
| | MTU 16V4000 | 4.28 | 3 | - |
| West | MTU 20V4000 G23E | 6.16 | 4 | - |
| | MTU 20V4000G23 | 5.37 | 3 | - |
| West2 (TW2) | Cummins C3750 D5e | 7.506 | 0 | 13 (of which 6 will be installed in Phase 1) |

## 6.1 Staffing

TW2 will operate 24 hours 365 days a year. TW2 will share staff with the existing TN campus (estimated 225 staff (full time and temporary staff)); an estimated additional 2 staff will be required to support operation of TW2.

## 6.2 TW2 SBG Selection and Resilience Configuration

The TW2 data centre will have a total of 13 data halls. There will be 2 data halls on building floors 1, 2, 3, 4, 5 and 6 (each floor having one space split into two data halls); floor 7 will have one data hall. The SBGs will be a centralised resource for the TW2 building. The data centre has been designed to ensure the maximum number of SBGs are installed to service potential clients and to ensure resilience.

The proposed SBGs have been selected based on the designed customer demand electrical load for TW2. This approach ensures that:

- The SBGs are operated at their optimal design capacity, as operating diesel SBG sets at low loads (i.e. underloading) for extended periods of time can potentially impact uptime and engine life; and
- That only the necessary minimum number of SBGs will be operated to deliver the required electrical load at TW2, this allows for the required number of SBGs to be run dependant on the failure/emergency scenario. In the event of a reduction in electrical power delivered from the National Grid, all SBGs will be started and would then ramp down and shed load so that only the minimum number of SBGs necessary to service the required electrical load would operate.

This approach will result in the reduced consumption of liquid fuel and hence generation of less emissions to air from the SBGs.

As part of the annual maintenance programme, testing of the SBGs throughout the year for short periods of time is required. To minimise the mass emission rate to air of combustion emissions and potential adverse impacts on air quality, one SBG at a time will be tested (with the exception of the twice per year Black Building Test whereby all SBGs will be started at the same time and run for a maximum of 4 hours). Additionally, each of the proposed 13 SBGs will have SCR abatement to reduce $NO_X$ emissions generated as a result of the combustion of fuel.

The proposed SBGs will be Cummins C3750 model. The manufacturer specification states this engine model is EPA Tier 2 compliant. As stated in the Data centre FAQ and the Emergency backup diesel engines on installations: best available techniques (BAT), Tier II USEPA is the minimum appropriate for new SBGs.

*Emergency backup diesel engines on installations: best available techniques (BAT)* also requires $NO_X$ emissions for new SBGs to not exceed 2,000mg/m$^3$ at a typical emergency load (usually greater than 67% of standby power rating). The 13 proposed SGBs will slightly exceed this, with $NO_x$ emissions of 2,280mg/Nm$^3$ @ 5% $O_2$ at 75% load (refer to the SBG specification data sheet in Appendix B). The installation of SCR abatement will reduce the $NO_x$ emissions from each SBG to <2,000mg/m$^3$. The SGBs are therefore considered to be compliant with BAT.

The resilience configuration of the SBGs providing for the electrical load demand of a site (i.e. the data centre building and installed IT equipment) is referred to using ‘n’, where ‘n’ is the specified MWe rate delivered by a SBG unit. The EA Data Centre FAQ states that 2n is the exemplar (i.e. twice as many SBGs as required are installed). The resilience arrangement of the SBGs at the TW2 data centre will be n+1.

The n+1 configuration (i.e. an additional SBG added to support a single SBG failure or required maintenance) allows for a level of redundancy to the SBG system such that, even in a worse case blackout scenario, only the required number of SBGs needed to meet the electrical load demand would be run; the operational capacity of the SBGs at the time of a blackout would be dependent on the extent of blackout. Furthermore, in the event of failure of an SBG, the correct number of remaining SBGs will in an emergency event provide the required load. The n+1 configuration offers resilience and minimises the risk of disruption in service to the data centre's clients.

The proposed TW2 SBGs will in an emergency outage situation be automated via the data centre's facility management system (FMS). In the event of a reduction in electrical power delivered from the National Grid, the FMS will automatically start-up the required number of SBGs necessary to service the data halls; this configuration allows for the required number of SBGs to be run dependant on the failure scenario. This results in the reduced consumption of fuel and hence generation of less emissions to air from the SBGs.

## 6.3 SCR Abatement

Each of the proposed 13 Cummins SBGs will be supplied with SCR abatement to reduce $NO_X$ emissions generated as a result of the combustion of fuel; the SCR abatement will be designed to reduce $NO_X$ emissions to meet the Medium Combustion Plant Directive (MCPD) emission limit of 190 mg/$Nm^3$ (@ 5% oxygen). The SCR abatement system will require circa 20 minutes from commencement of operation to effectively 'warm-up' and abate SBG combustion emissions to this $NO_x$ concentration.

The SCR abatement system will be located within each generator room, with the system being located on a mezzanine above the SBG/s and will serve the SBGs in that room; there will be a dedicated control panel for each generator room SCR abatement system.

The SCR system will involve the use of AdBlue (35% urea in water solution) which will be fed directly to the SCR dosing system located in the generator rooms. The AdBlue will be fed from two bunded above ground bulk AdBlue storage tanks (each with a 10,000 litre capacity) located inside the data centre building on the ground floor (remote from the generator rooms), via an internally located piped delivery system.

### 6.3.1 Ammonia Slip

The Ammonia Slip Catalysts (ASC) on each SCR abatement system will be located downstream of the SCR catalyst. The catalyst prevents any ammonia gas from exiting the tailpipe should there be any excess ammonia gas present that is not used in the catalytic reaction across the SCR catalysts to reduce $NO_X$. The supplier has confirmed that there will be extremely low ammonia slip (<10mg/$m^3$).

## 6.4 Reliability Data

The magnitude of risk posed by operation of the SBGs (other than for SBG testing) is strongly linked to the reliability of the provision of electricity from the local transmission network (in addition to the uninterruptable power supply (UPS) arrangements).

The TW2 data centre is designed to provide the maximum reliability of the electrical power supply to the on-site systems that are critical for operation of the site as a data centre. The data centre will be designed to Uptime Institute Tier III standard, ensuring the required level of resilience to ensure maximum uptime for critical IT infrastructure.

The electricity supply arrangements for the site include:

- two 132kV feeds to the site from the National Grid, either of which can serve the 'customer load'.

These supplies are fed via two 132kV intake substations; in the event of failure of one feed the remaining feed can provide the required electrical power for the data centre. There have been no black outages at TN in the last 5 years.

The UPSs are arrays of batteries that can provide power, almost instantaneously, in the event of a loss of electrical input to the data centre. TW2 will have battery arrays which will provide sufficient protection to the supply of electrical power for the critical 'customer load' whilst the SBG(s) are started. These arrays provide almost instantaneous power in the event of a loss of electrical input to the data centre, providing sufficient protection to the supply of electrical power to the 'customer load' whilst the SBGs are started.

Electrical supplies at TW2 will operate on an automatic basis such that in the event of fluctuations in (or loss of) the electrical supply to the site, where such events could negatively impact operation of the site's data centre function, these are detected and the relevant response (e.g. UPS start-up followed by the start-up of SBGs, if required) is automatically deployed by the data centre FMS.

This infrastructure design provides the required reliability for each customer suite, and the required resilience for the data centre customers. The electricity supply arrangement for the data centre is illustrated in the drawing presented in Appendix C.

### 6.4.1 Technical Standards

TW2 will be designed and operated in accordance with the relevant sections of the following key guidance:

- Develop a management system: environmental permits guidance, 03 April 2023;
- Emergency backup diesel engines on installations: best available techniques (BAT), 23 August 2023;
- Best Available Techniques: environmental permits, February 2016; and
- Specified generator: comply with permit conditions, 28 December 2022.

In addition, the site is operated in accordance with *Data Centre FAQ, Draft Version 21.0 to TechUK for Discussion 15/11/22* with respect to standby operation. It is noted that this guidance is draft, however, for the purposes of this application, this guidance is considered to represent the current EA position of BAT for data centre back-up generation systems.

Operation of the SBGs (other than for maintenance and testing) will commence in the event that electricity is not available from the local transmission network (e.g. brown- or black-out) or on internal failure of electrical supply (e.g. transformer failure, UPS problem).

The SBGs on-site will also be operated for maintenance and testing purposes, each for no more than 50 hours per annum, and will not be subject to the emission limit value (ELV) for $NO_X$ (190mg/kg).

#### 6.4.1.1 Emergency Operation

Emergency operations are taken to include unplanned hours required to come off grid to make emergency repair of electrical infrastructure associated within the data centre itself.

Given the short start-up and shutdown times for diesel engines, the SBGs are regarded, for the purposes of determining operating hours, as commencing operation at the first fuel ignition. This is taken to include the shorter periods of plant 'overlap' when engines provided as redundancy are started as a precautionary measure before final customer load is reached with the optimum/minimum number of SBGs.

In the event of emergency operation of the SBGs, the Operator will notify the EA in accordance with the requirements as stated in the EP.

# 7.0 Operating Regime

## 7.1 SBG Scheduled Operating Regime

### Telehouse North

Since issue of the previous EP Variation, thirteen additional SBGs are to be installed in the newly developed TW2 data centre building.

During planned maintenance and testing the SBGs will each be typically operated for less than 50 hours per year.

The planned maintenance and testing regime for the SBGs is scheduled to ensure that the impact on air quality as a result of the fuel combustion emissions is minimised.

The planned operating regime for the TN SBGs (i.e. testing and maintenance) is presented in Table 7-1.

**Table 7-1: TN Planned SBG Testing Regime**

| Operational Requirement | North Building | East Building | North 2 Building | West Building | TW2 Building |
|---|---|---|---|---|---|
| 3-monthly off-load testing during maintenance<br>(1 hour per test / 3 months) | 4 | 4 | 4 | 4 | 4 |
| UPS wrap around maintenance<br>(4 hours per test / 3 months, except:<br>- West building (10 hours per test))<br>- TW2 (3 hour test per SBG every 2 months) | 15 | 15 | 39 | 18 | 18 |
| Part load testing - six times per year<br>(2 or 4 hours per test per SBG) | 18 | 18 | 2 | 18 | - |
| Part load testing (TW2 only)<br>2 hours per test 10 times per year | - | - | - | - | 20 |
| Black Building Tests<br>(4 hours per test twice per year) where SBGs are started, synchronised and take the associated building load | 8 | 8 | 8 | 8 | 8 |
| **Total Annual Operational Hours Per SBG** | **45** | **45** | **53** | **48** | **50** |

The scheduled maintenance and testing regime for each SBG at TW2 aligns with the 50-hour testing regime for SBGs which are used purely for a stand-by emergency role, as stated in the EA Data centre FAQ.

In relation to the above, whilst Telehouse will endeavour for the TW2 SBGs not to be tested concurrently with the TN and TS SBGs, it is possible that simultaneous testing of the SBGs



at the Campus will happen on occasion. Telehouse will, whenever possible seek to avoid such concurrent testing in order to minimise adverse impacts on air quality.

## 7.2 TW2 SBG Commissioning

The 13 proposed SBGs will following on-site installation, be subject to a period of commissioning. Installation of the SBGs will be in phases; the commissioning of the Phase 1 generators (6 SBGs) is estimated to be in Q4 2027. Details of the commissioning, including operational hours, times and dates have yet to be decided. Telehouse will forward these details to the EA once available.

# 8.0 Emissions

## 8.1 Emissions to Air

The Air Emissions Risk Assessment (AERA) (SLR Ref: 410.066261.00001 AERA) has considered the proposed SBGs at TW2, in addition to the existing SBGs at the Campus (at TN and TS).

Potential air quality impacts as a result of routine testing and maintenance operations and non-routine emergency outage operation for Telehouse South cumulative with Telehouse North (including TW2) have been considered.

The AERA predicts for the following:

- **Planned maintenance and testing**: significant adverse impacts are not predicted on identified local human receptors and designated ecological receptors as a result of TW2 planned testing.
- **TW2 Emergency outage scenario (hypothetical 26 hour outage)**: significant adverse impacts are not predicted on identified local human receptors and designated ecological receptors.
- **Whole Campus Emergency Outage Scenario (hypothetical 26 hour outage):** overall it is considered that there will be no significant adverse impacts on identified local human receptors and designated ecological receptors with the inclusion of TW2. Exceptions to this are as follows:
    - There are no new receptor locations at risk of exceedances of the $NO_2$ 1-hour mean (US AEGL-1) with TW2. At the receptor locations where a potential for exceedance exists (without TW2), the inclusion of TW2 only results in a small change in process contribution (PC) (+1.3%);
    - With the inclusion of TW2 there are two new receptor locations at which an exceedance of the $NO_2$ 10-min mean (US AEGL-1) could occur, the PEC at these locations are significantly below AEGL-2. The assessment is precautionary based on the assumption of TW2 emissions without any abatement from SCR abatement in 10 minutes, in reality the SCR system will begin to reduce emissions within approximately 3 minutes. As such, this is a highly unlikely scenario; and
    - Presented in Table C-15: there are no new receptor locations at risk of exceedances of the NO 1-hour mean (EAL) with TW2. At the receptor locations where a potential for exceedance exists (without TW2), the inclusion of TW2 only results in a small change in PC (+1.3%).

Overall, however the risk of a prolonged emergency outage is considered to be low.

Refer to the Environmental Risk Assessment for further information (document reference 416.066261.00001 ERA).

## 8.2 Emissions to Sewer and Surface Water

The drainage systems at the TW2 data centre will include separate foul and surface water systems.

**Foul Water Discharge**

There will be no discharges to foul sewer from the permitted activities.

All SBGs, SCR abatement and fuel storage will be located within the data centre building; there will be no drainage to the foul water drainage system in these areas. Runoff from the externally located fuel off loading area will drain to the surface water drainage system, as detailed in the next section.

**Surface Water Discharge**

There will be a dedicated surface water drainage system for surface water runoff from the TW2 site. Surface water runoff from the external areas of the site where the tanker (fuel and AdBlue) loading area and bulk tank fill points will be located, will drain to the on-site surface water drainage system. This drainage will be directed via a newly installed full retention Class 1 forecourt petrol interceptor with an oil alarm, prior to discharge into the off site municipal surface water drainage system in Nutmeg Road.

The proposed surface water drainage arrangements at TW2 are illustrated on the drainage plan TW2001-CDL-TW2-XX-DR-C-900200, Rev C02, 11/10/24, as presented in Appendix D), and are summarised below.

The point at which surface water leaves the site is labelled as TW2 SW1 on Drawing 002 Site Emissions Plan.

Improvement Condition TN IC3

Associated with EP Improvement Condition TN IC3, TIE took the opportunity to review the surface water drainage arrangements at TN, specifically associated with diverting surface water runoff around the North data centre building via the proposed interceptor on TW2. Due to the extent and congestion of below ground services along the potential drainage route from the TN North building to TW2, the re-routing of this drainage was not possible.

***SBGs and SCR Abatement Systems***

The proposed TW2 SBGs will each have fuel day tanks (13 tanks in total, each with a 3,750 lire capacity) (designed to provide 4 hours' worth of fuel supply for the SBG the tank serves), and an associated SCR abatement dosing system, which will be located inside the ground floor generator rooms internal to the TW2 data centre building.

Pollution prevention measures for the day tanks and SCR dosing systems will include the following:

- A shallow steel bund will be provided around the SBGs and the fuel and AdBlue delivery pipework located in the generator rooms, to allow for the containment of any leaks or spills.
- There will be automatic shut off valves on the day tanks to prevent the continuous supply of fuel from the bulk tanks in the event of a leak.

There will be no drains in the generator rooms.

***Bulk Fuel Tanks***

There will be 4 x bulk fuel storage tanks (agl) (each tank having a capacity of 54,000 litres). These tanks will be located on the ground floor of the TW2 data centre building, the tanks will be located in one of two dedicated rooms (2 tanks per room). The tanks will be sized to provide 24 hours of fuel to the SBGs during a blackout event.

A fuel discharge mains ring (located internal to the data centre building) will deliver fuel from the bulk tanks to the SBGs; the fuel pumps serving this system will be located in an Oil Pump Room (ground floor level). The fuel delivery pipework will have leak detection.

The bulk fuel tanks will be double skinned; these will be located in the Oil Pump Room. The bulk tanks and oil pumps in this room will be located in a concrete bund which will provide 110% containment.

To enable filling by road tanker, the fill points for the bulk fuel tanks will be located externally on the wall of the room in which the tanks are located. These fill points will be located in a lockable cabinet; the cabinet will be provided with a drip tray.

There will be no drains in the Oil Pump Room.

***AdBlue Bulk Storage Tanks***

The SCR abatement system will comprise 2 x 10,000 litre above ground level (agl) stainless steel AdBlue tanks; one tank being a duty stand-by. These will be located internal to the data centre building at ground level.

The tanks will be located in a bunded room designed to contain 110% of the tank contents.

The fill points for the bulk AdBlue tanks will be located externally on the wall of the room in which the tanks are located. These fill points will be located in lockable cabinets; the cabinet will be provided with a drip tray.

An AdBlue discharge mains ring (located internal to the data centre building) will deliver AdBlue from these tanks to the AdBlue dosage system in each generator room. The delivery pipework will be of stainless steel construction and provided with leak detection.

There will be no drains in the bulk AdBlue tank area.

***Fuel Dump Tanks***

There will be 2 x oil dump tanks (Tank 1 and Tank 2, each with a 7,500 litre capacity). The dump tanks will be designed for 2 SBG day tanks to discharge into a single dump tank in an emergency event.

These dump tanks will be located inside the data centre building in a dedicated room. The tanks will be in sunken (below ground level) concrete lined chambers (3.5m depth). Each tank will have an access ladder to the tank access point. Leak detection will be provided in the chambers.

Emergency fuel dump pipework will be located in a concrete lined floor trench which will have a grid covering to allow for ease of inspection of the pipeline. The pipework will be provided with leak detection. Any fuel that requires dumping from the SBGs and/or day tanks will be gravity feed back to the bulk fuel dump tanks.

***Tanker Loading Area***

Two dedicated loading areas will be provided for the bulk delivery of SBG fuel and AdBlue. The loading areas will be designed to allow bulk tankers to park and connect to the fill points located on the ground floor of the data centre building. Each loading area will be concrete surfaced with Aco floor drainage channels around the perimeter and will be cambered so that any runoff will drain towards these drainage channel. These drainage channels will direct the runoff via the surface water drainage system to a newly installed full retention Class 1 forecourt petrol interceptor.

## 8.3 Emissions to Land

There will be no point source emissions to land from the TW2 data centre site.

## 8.4 Fugitive Emissions

Significant fugitive emissions, odours and noise are not anticipated in respect of the TW2 data centre.

A summary of the storage arrangements for fuel and AdBlue is provided in Section 9 of this document.

TIE maintains a spill procedure, and relevant operating personnel have been/will be provided with spill response training. Additionally, the requirement for completing regular inspections of the data centre sites is included in the environmental management system (EMS) and maintenance procedures; these will be expanded to include TW2.

## 8.5 Noise and Vibration

A Noise Assessment has been undertaken in accordance with British Standard 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound,* Method Implementation Document for BS 4142, and EA noise guidance (*Noise and vibration management: environmental permits (NVM) guidance* in January 2022).

The noise assessment, which assessed the noise impact of the SBGs at TN, including TW2, and at TS during normal and emergency operations, concluded that:

- With regard to routine testing, the SBGs will typically be operated individually during daytime hours and avoid concurrent testing across multiple buildings where practicable. Therefore, noise impact of a single SBG is considered **negligible**.
- The results of the assessment demonstrate that the cumulative rating levels from all SBGs at TN and TS during emergency operations, remain below the representative background sound levels at identified noise sensitive receptors, and are therefore not considered to have significant adverse impact.

Overall, operation of the SBGs at the Campus is not expected to give rise to adverse noise impacts and is therefore considered acceptable in the context of this EP variation.



# 9.0 Resource Use and Efficiency

## 9.1 Types and Amounts of Raw Materials

Diesel/HVO and oil use at TW2 is summarised below:

- Diesel/HVO fuel oil:
    - Cummins C3750 D5e SBG (7.506 MWth): each SBG will as a maximum require up to 748 litres per hour (at maximum fuel supply during normal mode).
- Lubricating oil: used in the engines and other mechanical equipment. Occasional top up or replacement will be required during scheduled or forced maintenance periods only.
- The lubricating oil for the SBGs will be stored within the engine and will be manually topped up during servicing by the TIE appointed service contractor.

AdBlue will be stored and used on site for the SCR abatement systems. The anticipated use is summarised below:

- AdBlue: 60 litres per hour for each SBG. Based on 13 SBGs and the planned maintenance programme of 50 hours per SBG as detailed in this document, the estimated annual usage will be circa 390,000 litres.

The SBG engines are designed for the combustion of diesel fuel, however TIE will seek to use HVO as a sustainable alternative fuel to diesel; the SBGs are designed for the use of diesel or HVO as a fuel.

AdBlue is 32% urea in water. The abatement systems are design for the use of this chemical to reduce $NO_x$ emissions to air as a result of the combustion of diesel/HVO fuel in the SBGs. There is no alternative chemical for use in the proposed abatement.

### Cogeneration (Combined Heat and Power)

The provision/implementation of combined heat and power (CHP) is not applicable as the SBGs will each operate for substantially less than 500 hours per annum for the provision of emergency power generation; each engine inherently only operates for a small fraction of the year for planned maintenance and testing.

## 9.2 Fuel Storage

TW2 will involve the following in terms of fuel storage:

- Installation of 13 new SBGs on the ground level of the new TW2 data hall. Each SBG will be served by a day tank (3,750 litre capacity per SBG) located inside the ground floor generator rooms internal to the proposed TW2 data centre building. A shallow steel bund will be provided around each SBG and the fuel and AdBlue delivery pipework located in the generator rooms, to allow for the containment of any leaks or spills. There will be an automatic shut off valve on the day tanks to prevent the continuous supply of fuel from the bulk tanks in the event of a leak.

- There will be 4 x bulk fuel storage tanks (agl) (each 54,000 litres in capacity). These tanks will be located on the ground floor of the TW2 data centre building. The tanks will be located in one of two dedicated rooms (2 tanks per room). The tanks will be sized to provide 24 hours supply to the SBGs during a black out event. The bulk fuel tanks will be double skinned; the bulk fuel tank rooms will be designed to provide 110% containment.

- The fill points for the bulk fuel tanks will be located externally on the wall of the room in which the tanks will be located. These fill points will be located in a lockable cabinet; the cabinet will be provided with a drip tray.
- A fuel discharge mains ring (located internal to the data centre building) will deliver fuel from the bulk tanks to the SBGs, with the fuel pumped from the bulk tanks to the SBGs by fuel pumps located in an Oil Pump Room. The Oil Pump Room will be provided with 110% containment. The fuel delivery pipework will have leak detection.

Based on the 4 x bulk fuel tanks and 13 x belly day tank capacities, a total maximum of **264,750 litres** of diesel can be stored at the TW2 data centre.

In addition, there will also be 2 x oil dump tanks (each with a 7,500 litre capacity). The dump tanks will be designed for 2 SBG day tanks to discharge into a single dump tank in an emergency event. These dump tanks will be located inside the data centre building each in a dedicated room. The tanks will be sunk in below ground (3.5m depth) concrete lined chambers.

Emergency fuel dump pipework will be located in a concrete lined floor trench which will have a grid covering to allow for ease of inspection of the pipeline. Any fuel that requires dumping from the SBGs and/or day tanks will be gravity feed back to the bulk fuel dump tanks. The pipework will be provided with leak detection.

Further details of the diesel storage arrangements are provided *Section 13.0. Best Available Techniques*.

## 9.3 AdBlue Storage

AdBlue at TW2 will be stored in 10,000 litre above ground level (agl) stainless steel AdBlue (urea) tanks; one tank being a duty stand-by. These will be located internal to the data centre building at ground level.

Each bulk storage tank will be single skinned and of stainless steel construction. The tanks will be located in individual concrete bunds designed to contain 110% of the tank contents.

Each bulk tank will be fitted with level sensors, a tank level gauge and high/low level alarms. There will be a senor in each AdBlue bund which will alarm on the detection of excessive liquid in the bund.

The bulk tanks will be filled from the ground level fill points. These fill points will be located externally on the wall of the room in which the AdBlue bulk tanks are located. These fill points will be located in lockable cabinets; the cabinet will be provided with a drip tray.

An AdBlue discharge mains ring (located internal to the data centre building) will deliver AdBlue from these tanks to the AdBlue dosing systems in each generator room. The pipework will be of stainless steel construction and provided with leak detection.

The AdBlue tanks and associated delivery pipework will be subject to regular preventative maintenance to minimise the risk of leaks.

## 9.4 Energy Efficiency

### 9.4.1 Climate Change Agreement

Telehouse is a participant to a Climate Change Agreement, (CAA) (agreement reference DATC/T00031). Energy management techniques have been implemented to monitor, record and track energy consumption at the installation.

An ISO 50001 certified energy management system is also in place, via which energy efficiency and reduction is managed.

### 9.4.2 Energy Efficiency Directive (EED)

The 2023 revised EED exempts “those peak load and back-up electricity generating installations which are planned to operate under 1,500 operating hours per year as a rolling average over a period of five years”.

Based on the planned maintenance and testing schedule, in total the SBGs at the TN (including TW2) and TS data centres will be operated for less than the 1,500 hour threshold. For the purpose of this EP variation application, the TN and TS data centres are therefore exempt from the EED requirements and an assessment of energy efficiency in accordance with the Reference Document on Best Available Techniques for Energy Efficiency, February 2009 is not required.

### 9.4.3 Energy Management

The management of energy is an integral part of the environmental and energy management system (MS), and Telehouse, in line with ISO 50001, has developed an energy policy. Training aimed at minimising energy use and developing good housekeeping techniques is a part of the staff training programme. Energy use and its minimisation are managed via the ISO 50001 certified energy MS. Improvement plans are managed through the ISO 50001 MS and identify the areas where energy is utilised, potential energy efficiency measures and ensure that the financial viability of any proposed measures is appraised.

### 9.4.4 Measures for the Improvement of Energy Efficiency

The SBGs are subject to periodic maintenance and inspections that include ensuring the engines are optimised to minimise the heat rate (energy consumption) whilst maintaining the relevant emissions standards.

Energy recovery is not reasonably practicable for engines with such small anticipated operational hours, however, as part of the ISO 50001 MS, assessment of the site’s energy usage will be undertaken with a view to identifying measures to reduce energy consumption.

### 9.4.5 Energy Usage

The overall efficiency of the TN data centre SBGs (existing 27 SBGs at TN plus the 13 SBGs at TW2) (under the provision of ‘standby’ power), will be approximately 38.1%, with SBG efficiencies of:

- North Building, 35.6%;
- East Building, 35.6%;
- North 2 Building, 39.6%;
- West Building, 39.6%; and
- TW2, 40%.

## 9.5 Water Minimisation

There will be no consumption of water associated with the SBG combustion activities, SCR abatement systems, and diesel use/storage at the TW2 data centre.

## 9.6 Waste Minimisation

Management of waste oil generated as result of servicing will be managed as part of the wider TN campus.

Whilst TW2 will inherently not produce significant amounts of waste, a waste minimisation audit will be performed periodically throughout the operational lifetime of the data centre in

accordance with EP requirements. The aim of this audit will be to minimise the use of all raw materials and thus prevent waste at source.

Waste oils (EWC 13 02) from the SBGs at TW2 will unlikely exceed 5m3/4.5 tonnes per annum. Oily wastes are/will be stored in suitable containers, such as 205 litre drums, located on bunded stillages whilst awaiting collection for off-site disposal by a licensed waste contractor.

# 10.0 F Gases

Fluorinated gases (F-gases) are used at the Campus in the refrigeration systems for chiller units, air conditioning units and in fire suppression systems. F-gases will also be in use at TW2.

The chiller and air conditioning units at TW2 will be subject to regular maintenance and leak testing; these requirements will be included in the sites preventative maintenance system. Maintenance and testing will be undertaken by a Telehouse approved external specialist contractor; copies of the certificates of the engineers qualified to install, maintain and service refrigeration equipment will be maintained on file by Telehouse.

Telehouse will maintain an F-gas register for each TW2 asset containing refrigerant; the register will detail the location of the asset, asset model and serial number, refrigerant type and charge, the global warming potential (GWP), carbon dioxide equivalent ($CO_2e$ kg), maintenance/leak test frequency and refrigerant phase down details.

Leak detection and maintenance records will be maintained which will include details of the quantity of refrigerant used to recharge the units, date of recharge and leak re-test for those assets where leaks are identified. Telehouse has an appointed a responsible third party engineer for undertaking maintenance activities.



# 11.0 Management Systems

The data storage services at the TW2 data centre will be managed in accordance with the following standards, which are currently in place for the wider data centre campus:

- ISO/IEC 27001:2013 that specifies the requirements for establishing, implementing, maintaining and continually improving an information security management system.
- ISO 14001:2015 that specifies the requirements for an environmental management system to enable an organisation to develop and implement a policy and objectives which take into account legal requirements and other requirements to which the organization subscribes, and information about significant environmental aspects.
- ISO 50001:2018 that specifies requirements for establishing, implementing and maintaining an energy management system, whose purpose is to enable an organization to follow a systematic approach in achieving continual improvement of energy performance, including energy efficiency, energy use and consumption.

## 11.1 Environmental Management System (EMS)

TW2 will be incorporated into the existing ISO14001 certified EMS. The EMS includes the policies, management principles, organisational structure, responsibilities, standards/ procedures, process controls and resources which are in place to manage environmental protection across all aspects of the business.

The EMS places particular importance on:

- Reducing risks to the environment to a level that is as low as reasonably practicable using best available techniques;
- Integrating EMS responsibilities within line management;
- A commitment to personnel environmental awareness and competence;
- The ongoing monitoring and review of environmental performance; and
- A commitment to working to achieve continuous improvement in environmental performance.

### 11.1.1 Climate Change Risk Assessment and Adaptation Plan

A Climate Change Risk Assessment (CCRA) and Climate Change Adaptation Plan (CCAP) will be developed in accordance with EA guidance[1]. This has/will be included within the EMS.

The CCRA and CCAP will be updated to include TW2.

1 Climate change: risk assessment and adaptation planning in your management system - GOV.UK (www.gov.uk)

# 12.0 Monitoring

## 12.1 Emission Limits

The proposed 13 SBGs at TW2 will each be operated for less than 500 hours per annum and will therefore not be subject to emissions limit values (ELV) for the substances listed in Annex V of Directive 2010/75/EU on industrial emissions (Industrial Emissions Directive, IED).

As the SBGs will not be used for the elective generation of electricity they will not be considered 'specified SBGs' in accordance with EPR 2018 and hence will not be subject to the ELV for $NO_x$ (190mg/kg (within 10 minutes of the specified SBG commencing operation)).

The TW2 SBGs will be subject to the emissions monitoring requirements as stated in the EP (EPR/SP3237JU) for $NO_x$ and CO. The initial monitoring will be completed within 4 months of receipt of the varied EP or following installation of the SBGs, whichever is sooner.

Other monitoring will be undertaken by TIE in accordance with the EP requirements; specifically, TIE will record:

- the operating hours of each SBG for planned maintenance and testing;
- the operating hours of each SBG for emergency operation; and
- the amount of fuel used on an annual basis.

For the purposes of determining operating hours, the SBGs are regarded as having minimal start-up or shut-down times. Operational hours will be counted from the first fuel ignition. This will include the shorter periods of plant 'overlap' when redundant plant is started as a precautionary measure before final load is reached with the optimum/minimum number of SBGs.

## 12.2 Point Source Emissions to Atmosphere

Point source emissions to air are from the SBGs as a result of diesel/HVO combustion. Air emissions modelling has been completed for the existing SBGs at TN, TS and the proposed SBGs at TW2. Based on the findings of the air emissions risk assessment (410.066261.00001 AERA) the products of combustion which are released to air as a result of planned maintenance and testing of the SBGs are not predicted to result in a significant adverse impact on the environment.

For operation of all TN, TS and TW2 SBGs under an emergency (brown- or black-out) scenario (26 hours modelled), overall it is predicated that there will be no significant adverse impacts on identified local human receptors and designated ecological receptors, with a few exceptions as detailed in Section 8.1 of this BATOT. Whilst there are predicted impacts on air quality in the event of a prolonged emergency outage, the risk of such an outage is considered to be low.

## 12.3 Point Source Emissions to Sewer

There will be no point source discharges to sewer from the permitted activities at TW2.

## 12.4 Point Source Emissions to Water

There will be no direct discharges to water from TW2. Surface water drainage from the site will drain to the on-site surface water drainage system prior to discharge into the off site municipal surface water drainage system in Nutmeg Road. The proposed fuel and AdBlue tanker off loading areas will be hard surfaced and designed to drain to the surface water

drainage system via a newly installed full retention Class 1 forecourt petrol interceptor, before joining the wider site surface water drainage system.

The point at which surface water leaves the site is labelled as TW2 SW1 on Drawing 002 Site Emissions Plan.

# 13.0 Best Available Techniques

The assessment for the implementation for Best Available Techniques (BAT) at the TW2 data centre is based on the following:

- the latest version of the '*Data Centre FAQ, Draft Version 21.0 to TechUK for Discussion 15/11/22'* – Release To Industry', provided by the EA; and
- with respect to technology selection, Department of Energy & Climate Change, Developing Best Available Techniques for Combustion Plants Operating in the Balancing Market, Final Report, June 2016.

## 13.1 Data Centre BAT - Operating Regime

### 13.1.1 Planned Maintenance and Testing

During operation for planned testing/maintenance at the TW2 data centre, the SBGs will each operate typically for 50 hours per year; this is in line with the 50 hour per annum data centre BAT requirement.

In the event that electricity is not available from the local transmission network (e.g. brown- or black-out) the SBGs will be operated to deliver the required data centre customer load.

Whilst emergency operation (if required) would increase the total operational hours of each SBG, it is extremely unlikely that operation of any single SBG would exceed 500 hours per annum (this being the definition of an 'emergency' unit).

The SBG provision includes for a level of redundancy to the SBG system such that, even in a worse case blackout scenario, whilst all SBGs would start up they would not operate at full capacity; the operational capacity of the SBGs at the time of a blackout would be dependent on extent of the facility's IT load at the time. Should an SBG fail the engine will be covered by the remaining engines, which will operate to share the required IT load at that time.

Emergency operations are taken to include unplanned hours required to come off grid to make emergency repair of electrical infrastructure within the data centre.

The Operator will notify the EA:

- In advance of planned outage/maintenance of the local transmission system that is expected to exceed 18 continuous hours; and
- Upon an incident of unplanned continuous outage that exceeds 18 hours.

### 13.1.2 Elective Electricity Generation

The SBGs at the data centre will not be operated for elective electricity generation.

### 13.1.3 Operating Regime Time Limit

The air emissions modelling (410.066261.00001 AERA) has predicted that operation of the SBGs for the planned maintenance and testing regime, as detailed in Table 6-2, will not result in adverse impacts on air quality. The operator will therefore not operate the SBGs for more than these hours per year for the purpose of planned maintenance and testing.

## 13.2 Data Centre BAT: Engine Selection

Diesel-fired SBGs have been chosen for the provision of emergency back-up energy in the event of a black- or brown out at the facility. A BAT assessment has been undertaken which compares diesel SBGs to other available technologies to support the chosen technology.

The following key requirements for the SBGs to provide emergency back-up electricity have been considered for the selected technologies:

- Start-up time;
- Reliability;
- Independence of off-system services; and
- Causing the least environmental impact.

A comparison of these technology types is presented in Table 13-1. Start up, efficiency and emissions data as stated has been obtained from a report prepared by DECC (Department of Energy & Climate Change, Developing Best Available Techniques for Combustion Plants Operating in the Balancing Market, Final Report, June 2016) unless otherwise stated. Figures are reported at oxygen reference values of 15%.

**Table 13-1: Comparison of Technologies**

| | Combined Cycle Gas Turbines (CCGT) | Open Cycle Gas Turbines (OCGT) | Aero Derivative Gas Turbines[2] | Gas Engines | Diesel Engines |
|---|---|---|---|---|---|
| **Process Description** | CCGT technology uses a primary gas turbine coupled to a secondary steam turbine.<br>Air is compressed through a rotating compressor, then mixed with fuel and combusted before being expanded through a gas turbine, converting the thermal energy into rotation of the turbine blades. Some of the mechanical energy powers the compressor, with the majority turning a SBG which converts the mechanical energy to electricity.<br>The hot turbine exhaust gases then pass through a boiler to generate steam. The steam is fed to a steam turbine which powers a second SBG, producing further electricity. | OCGT consist of a compressor, combustion chamber and gas turbine. They differ from CCGTs in that they operate without the secondary component to recover heat.<br>Air is fed into the compressor, pressurised and then passed to the combustion chamber where fuel is added and combusted. The hot exhaust gas turns the turbine blades and energy is converted to electricity.<br>OCGTs can provide STOR and peaking services but not fast reserve services as during start-up thermal stresses need to be managed through a slow heating up process. | Aero Derivative Gas Turbines are similar to open cycle gas turbines but have been derived from turbines used for aeronautical applications.<br>As a result of the different requirements for use of gas turbines in aircraft, they are more flexible than OCGT plant, and are able to operate under wider ranges of load and start up and shut down quicker than other turbines. | A gas engine consists of a bank of fixed cylinders inside which pistons move, injecting air and fuel, compressing the mixture, igniting the mixture and then expanding the hot gas produced converting the thermal energy into rotation of a crank shaft.<br>The engine load is adjusted by controlling the amount of gas and air injected into the cylinder, which is controlled by an automated system.<br>An SBG connected to the crank shaft of the engine converts the mechanical energy into electricity. | Diesel engines work in a similar fashion to gas engines with the key difference being that diesel fuel is injected into the cylinder after compression of the air has taken place, and automatically ignites as a result of the high temperature of the compressed air.<br>Engines are generally rated for a continuous power output but can exceed this by stated amounts for shorter periods of time in modes named Standby (1hr maximum) and Prime (12hr maximum). These higher power outputs come at the cost of higher emissions and greater equipment stress. |
| **Start-Up Time[3]** | 1 – >3.5 hours | 15 -30 minutes | As low as 1 minute | 1-10 minutes | <10 minutes |



| | Combined Cycle Gas Turbines (CCGT) | Open Cycle Gas Turbines (OCGT) | Aero Derivative Gas Turbines[2] | Gas Engines | Diesel Engines |
|---|---|---|---|---|---|
| **Thermal Efficiency (LHV%)** | 58.8-60.7 | 38.3-39.9 | 35-39 | 35.0-45.0 | 35.0-37.0 |
| **Notes** | The secondary steam turbine increases the start-up time of the facility, as it requires slow warming.<br>The complexity and footprint of a combined cycle, combined with the efficiency of steam cycles only being high at relatively large capacities means that CCGT systems are only suitable for large facilities (c.100MW+) | The significant amount of heat lost in the exhaust gas makes open cycle gas turbines significantly less efficient than combined cycle systems. | As with the open-cycle gas turbine, heat loss in exhaust gases means these systems are not as efficient as other options. Certain enhancements can be added, e.g. steam injection, but these are relatively novel and difficult to apply in a non-continuous scenario. | Gas engines are proven, reliable technology and are known to perform well and emit relatively low amounts of $NO_x$, $SO_x$ and particulates when compared to diesel fired engines. | Diesel engines, unabated, emit relatively high amounts of $SO_2$ and particulate matter as well as $NO_x$. The use of low sulphur fuel, catalysts and particle filters can reduce this but diesel engine emissions are considerably higher than other options. |

[2] GE Power Systems, Aero Derivative Gas Turbines – Design and Operating Features

[3] Note that this is based on typical industrial facilities.

## Technology Selection

### Gas Turbines

As per Table 13-1, CCGTs are not considered BAT for the provision of emergency/standby power. This is due to their lengthy start up times and their size limitations; the efficiency of steam cycles being relatively low at small capacity and the overall system complexity being more appropriate to larger size installations.

OCGTs have relatively high capital investment, operating and maintenance costs and lower thermal efficiencies than can be achieved by CCGTs and gas engines.

Aero derivative gas turbines can achieve suitably short start-up times of as low as one minute, however they suffer from relatively low efficiencies compared to engines and the enhancements which have recently become available to improve these are relatively novel and unproven. This is especially applicable for non-continuous operation, where steam or water injection may become a problem as a result of potential condensation within turbine sections.

### Reciprocating Engines

Reciprocating engines perform well in terms of their thermal efficiencies. At the upper end of their efficiency range, gas engines have higher thermal efficiencies than diesel engines and OCGTs.

Reciprocating engines also have shorter start up times and are thus more suitable for the provision of emergency/standby power. Under standby conditions, higher emissions are produced, including $NO_x$, $SO_2$ and Particulate Matter as soot.

Gas engines benefit from lower $NO_x$ emissions than diesel engines and can utilise gas delivered by the national gas grid, avoiding the additional transport and fuel storage issues associated with diesel systems.

Reciprocating engines fired on diesel fuel oil have a high response (i.e. low start-up duration) and good independent performance reliability due to the on-site storage of diesel fuel in sufficient quantities, which will be managed and controlled by the facility, with the option for fuel oil to be sourced from more than one supplier for delivery to the site. Diesel-fired engines do have a large number of moving parts which can be subject to failure and require regular ongoing maintenance to ensure reliability, however these moving parts can be readily obtained and replaced and are typically included as part of the service agreement with the generator vendor. Due to the number of moving parts, diesel generators when operated can be noisy and generate vibration.

When compared to gas-fired generators diesel engines produce polluting emissions to air, most notably $NO_x$ and particulate matter, which can impact local air quality if operated for prolonged periods of time.

### Final Choice of Engine

From the above options, and considering all the aspects required of the plant to provide emergency/standby power for the data centre, diesel engines have been determined as BAT on the basis that:

- These engines provide a fast response speed to the required load; as stated previously, fast start-up of standby generators for data centre is fundamental as an almost instantaneous supply of electricity is required in the event of power loss to the site.



- Diesel engines have low maintenance costs and replacement parts are readily available.
- The need for a reliable supply of fuel is essential to ensure reliance, the on-site storage of sufficient quantities of fuel provides the required level of independent performance reliability.

In addition, the engines will allow for the use of diesel or HVO as an alternative fuel without having any detrimental impact on the engine.

The storage of gas on-site as a fuel source will not be possible due to restraints on available space, additionally there are significant health and safety risks associated with such storage. As such, there will be reliance on an off-site supply of gas, which would have to be provided to the site via a pipeline which would be operated and maintained by others. Should this supply of gas be interrupted there will be no emergency back-up generation for the data centre, and as such would not meet the resilience requirements of the facility.

## 13.3 Data Centre BAT: Emissions

The '*Data Centre FAQ Headline Approach*' specifies the BAT emissions specification for new diesel-fired reciprocating engines as 2g TA-Luft or US EPA Tier II (or equivalent standard).

The proposed TW2 SBGs will be the Cummins C3750 model. The manufacturer specification states this engine model is EPA Tier 2 compliant. As stated in the Data centre FAQ, Tier II US EPA is the minimum appropriate for new SBGs.

The Data Centre FAQ also requires $NO_X$ emissions for new SBGs to not exceed 2,000mg/m$^3$. The 13 proposed SGBs will slightly exceed this, with $NO_x$ emissions of 2,280mg/Nm$^3$ @ 5% $O_2$ at 75% load (2,990mg/Nm$^3$ at 100% load) (refer to the SBG specification data sheet in Appendix A). The installation of SCR abatement will reduce the $NO_x$ emissions from each SBG to <2,000mg/m$^3$. The SGBs are therefore considered to be compliant with BAT, the BAT requirement being:

"*Approximately 750mg per m$^3$ $NO_x$ (as $NO_2$) at 15% $O_2$ standard temperature and pressure, dry, 273K and 101.3kPa (equivalent to 2,000mg per m$^3$ at 5% $O_2$ – commonly termed '2g') at a typical emergency load (usually greater than 67% of standby power rating)*"[4].

The operator will report the following to the EA (annually):

- the operating hours of each SBG for planned maintenance and testing;
- the total operating hours of all SBGs for emergency use and the number of emergency occurrences; and
- the annual amount of fuel used.

Given the short start-up and shutdown times for diesel engines, the SBGs are regarded, for the purposes of determining operating hours, as commencing operation at the first fuel ignition. This is taken to include the shorter periods of plant 'overlap' when engines provided as redundancy are started as a precautionary measure before final load is reached with the optimum/minimum number of SBGs.

[4] Emergency backup diesel engines on installations: best available techniques (BAT) - GOV.UK

## 13.4 Data Centre BAT: Stacks

*Data Centre FAQ Headline Approach* states that data centres usually have very low profile sites and as such can have short, below roof level emission stacks which can impact on the efficiency of dispersion of emissions. BAT is that release stacks are vertical to aid the dispersion of emissions from the SBGs.

By elevating stack heights it is possible to increase the dispersion of exhaust gases as a result of mixing with the surrounding air once the plume of exhaust gases leaves the stack. Whilst this will not reduce the concentration of pollutants leaving the stack, it will result in a lower concentration at ground level – i.e. a lesser impact on the receptor. Increasing the stack height also avoids the effects of building wake and entrainment of the emissions in the locality of the emission source. The use of taller stacks does have an impact on the operation of the engine(s) as it will marginally increase the back pressure on the engine.

By bringing together the exhaust streams for multiple engines, it is possible to improve the mixing of flue gases with the surrounding air. This aggregation does not decrease the absolute quantities of $NO_x$ emitted but does lead to a lower concentration at ground level – i.e. a lesser impact on the receptor.

The reduction in ground level concentration is achieved through improved mixing with the surrounding air once the plume of exhaust gases leaves the stack. A higher mass flowrate of gases will result in a greater momentum that increases the final height of the plume after it has left the aggregated stack. This increased mixing leads to a lower concentration of pollutants at receptors.

Each SBG will have a dedicated vertical stack to aid the dispersion of the engine flue gases (for further details, please see the Air Emissions Risk Assessment (410.066261.00001 AERA)):

- The stack release heights for the proposed TW2 SBGs will be 65m above ground level (agl), terminating above the roof parapet.

The AERA has taken into account the profiles and heights of all the stacks and building downwash impacts at the data centre and has concluded that:

- For planned maintenance and testing significant impacts are not predicted on air quality;
- For operation of the SBGs under an emergency (brown- or black-out) scenario modelled at 26 hours, there are some adverse impacts However, as stated previously, it is recognised that such a prolonged emergency scenario is highly unlikely.

Further air emissions controls are not considered necessary as, given the very low probability of emergency operation at the site, the overall environmental risk is not considered to be significant[5].

## 13.5 Data Centre BAT: Electrical System Reliability

Section 5.4 provides a description of the on-site electricity supply system for the data centre which has been implemented to service the ‘customer load’ that, in addition to the SBGs, incorporates physical connections to the local transmission network (to allow for the failure of any single connection).

[5] Refer to Air Emissions Risk Assessment (SLR Ref: 410.066261.00001 AERA) and Environmental Risk Assessment (SLR Ref: 410.066261.00001 ERA)

The electrical system for the data centre will provide significant protection against the failure of (or fluctuation in) the electrical supply to the site before it would become necessary to start the SBGs.

The operator will ensure information security at the data centre is managed in accordance with ISO 27001:2013 standard.

Operation of the SBGs will in the main be limited to maintenance and testing. The operator will implement a programme of planned maintenance and testing of the SBGs, in accordance with manufacturer requirements, to limit unplanned maintenance/testing of the generators and thus avoiding the unnecessary use of diesel and the generation of emissions to air.

## 13.6 Data Centre BAT: Air Quality Action Plan

The operator has developed an Air Quality Action Plan (AQAP) for TN and TS; this has been incorporated into the site's EMS. This has been updated to include TW2 and is included with the EP variation application.

The AQAP details the management actions to be taken in the event of an emergency outage of the national electricity transmission system that could result in the prolonged usage of the SBGs which could potentially result in adverse impacts on local air quality.

The updated AQAP will be shared with the Local Authority once approved by the Environment Agency.

The operator will maintain open lines of communication with the Local Authority, particularly to manage any risks that may be identified in the future as becoming significant threats to the local air quality, for example identification of new emissions sources (cumulative impacts) or potential for future site expansion.

## 13.7 Data Centre BAT: Fuel Storage

The proposed fuel storage arrangements at TW2 and their compliance with BAT are summarised below.

### 13.7.1 SBG Day Tanks

There will be a total of 13 new SBGs on the ground level of the TW2 data centre. Each SBG will be served by a day tank (3,750 litre capacity single skin tank per SBG) located inside the ground floor generator rooms internal to the proposed TW2 data centre building.

The proposed SBG fuel day tanks will have the following protection measures:

- A shallow steel bund designed to contain any leaks or spills from the day tank.
- An automatic shut off valve on the day tanks to prevent the continuous supply of fuel from the bulk tanks in the event of a leak.
- The day tanks will have:
    - automatic tank contents level gauge.
    - high and low level alarms connected to the FMS.
    - a pressure delivery over-fill prevention valve.
- The SBGs will have mechanical relief valves to prevent over pressurisation of fuel supplied from the day tanks.
- To minimise the risk or corrosion all pipework will be painted or constructed of corrosion resistant material.

### 13.7.2 Bulk Fuel Tanks

There will be 4 x bulk fuel storage tanks (agl) (each 54,000 litres in capacity) located on the ground floor of the TW2 data centre building. The tanks will be located in one of two dedicated rooms (2 tanks per room). The tanks will be sized to provide 24 hours to the generator during a black out event.

The proposed bulk fuel tanks will have the following protection measures:

- The bulk fuel tanks will be double skinned. They will be located in the Oil Pump Room. The bulk tanks and oil pumps in this room will be located in a concrete bund which will provide 110% containment.
- There will be a sensor in the bund to detect any leaks; this will be connected to the FMS.
- The bulk fuel tanks will have:
    - a leak detection alarm (external tank skin alarm) connected to the FMS.
    - high high/high and low low/low level alarms connected to the FMS.
    - a tank level gauge located at the tank fill point (the FMS will also indicate the tank level).
    - a pressure delivery over-fill prevention valve.
- Mechanical relief valves to prevent over pressurisation of fuel supplied from fuel tanker deliveries.
- To minimise the risk or corrosion all pipework will be painted or constructed of corrosion resistant material.

### 13.7.3 Fuel Tank Fill Points:

The fill points for the bulk fuel tanks will be located externally on the wall of the room in which the tanks are located; these will allow for the delivery of fuel to the bulk tanks by road tanker. These fill points will be:

- Located in a lockable cabinet.
- The cabinet will be provided with a drip tray.

### 13.7.4 Fuel Discharge Ring

A fuel discharge mains ring (located internal to the TW2 data centre building) will deliver fuel from the bulk tanks to the SBG day tanks. The fuel will be pumped from the bulk tanks to the day tanks by fuel pumps to be located in an Oil Pump Room:

- The Oil Pump Room will be provided with 110% containment.
- There will be a sensor in each bunded pump room to detect any leaks; this will be connected to the FMS.
- The fuel delivery pipework will have leak detection connected to the FMS.

### 13.7.5 Fuel Dump Tanks & Pipework

There will be 2 x fuel dump tanks (each with a 7,500 litre capacity), designed for 2 SBG day tanks to discharge into a single dump tank in an emergency event. These dump tanks will be located inside the TW2 data centre building, each in a dedicated room.



- The tanks will be of steel construction (single skin) and located in below ground (3.5m depth) concrete lined chambers.
- The dump tanks will have:
    - leak detection connected to the FMS.
    - automatic tank contents level gauge connected to the FMS.
    - high level alarm connected to the FMS.
- The emergency fuel dump pipework will be located in a concrete lined floor trench which will have a grid covering which will allow for ease of inspection of the pipeline. Any fuel that requires dumping from the SBGs and/or day tanks will gravity feed back to the bulk fuel dump tanks. The pipework will be provided with leak detection.

### 13.7.6 Fuel Delivery

Two dedicated loading areas will be provided for the bulk delivery of diesel and AdBlue. The loading areas will be designed to allow bulk tankers to park and connect to the fill points located at ground floor level of the data centre building. Each loading area, which will be concrete surfaced with raised kerbing around the perimeter, will be cambered so that any runoff will drain towards a central drainage channel. This Arco drainage channel will direct the runoff via the surface water drainage system to the full retention Class 1 forecourt petrol interceptor. This interceptor will have high level silt and oil alarms. From this interceptor the runoff will enter the site's surface water drainage system and will be directed via a Vortex separator, designed to remove suspended solids entrained in the runoff, prior to being discharged into the municipal surface water drainage system.

All deliveries of fuel will be fully supervised by a member of the TIE site team and the fuel tanker driver.

TIE has a procedure in place for the filling of bulk tanks by road tanker (Fuel Delivery and Storage procedure); this procedure will be updated to include the requirements for TW2.

A summary of how the bulk tanks will be filled is provided below (this is based on the extant Fuel Delivery and Storage procedure):

- Following a refill request a designated safe system of work will be invoked.
- A trained staff member will take a tank level reading and cross-reference this with the FMS. Where accuracy is in doubt a dipstick reading will be taken.
- Sump pumps will be switched off by manual controls located as a precaution.
- Where necessary the local area will be appropriately cordoned off using barriers and cones. The tanker will be supervised at all times.
- Any 'at risk' drains will be covered to prevent any illegal discharges and spill protection will be positioned for ease of access if required. Any concerns over the quality of the spill kits or drain covers will be reported to the Contract Manager. Delivery of fuel will not be carried out until any remedial actions are conducted.
- Fuel delivery tankers will be required to park in a dedicated tanker refuelling area.
- The tanks will not be filled more than 95% of their capacity. The supplier must be given an accurate reading. Any concerns over the accuracy of the readings must be reported to the Contract Manager.

### 13.7.7 Tertiary Containment

Tertiary containment will be provided by the external site hard standing where the fuel road tanker off-loading area are/will be located. This tertiary containment (along with the capacity



of the proposed oil interceptor and surface water drainage serving this area) will provide containment.

Any unplanned release of fuel would be prevented from percolating into the ground by the hard standing; should such a release enter the local on-site surface water drainage system it would be captured by the alarmed interceptor. The interceptor alarm will activate on detection of fuel; this alarm will be connected to the FMS and will notify key data centre staff. In such an event, spillage procedures would be implemented.

Further details of the surface water drainage system and interceptors are provided in section 8.2 Emissions to Sewer and Surface Water.

### 13.7.8 Preventative and Predictive Maintenance (PPM)

TIE has a planned preventative maintenance (PPM) system in place. PPM is managed and completed by the facilities management personnel and appointed approved third-party specialists, as required. The PPM system is used to inform facility management personnel of plant status and any system issues.

The PPM system includes the requirement for regular inspection, maintenance and testing of containment on the fuel storage tanks, along with regular checks of the condition of tertiary containment at the site. The PPM requirements for TW2 will be incorporated into the TIE PPM system.

Visual inspections will be carried out in accordance with the PPM to confirm the integrity of storage tanks/bunds, spill prevention and protection equipment, and to identify any unsafe conditions. Where there are any changes the Fuel Storage Inspection Log will be updated.

The facility will be manned 24 hours a day by data centre personnel with a minimum of 1 employee on site at all times.

It is considered that fuel delivery and storage arrangements are BAT.

# 14.0 Conclusion

Based on the above discussions, it is considered that the SBGs and associated fuel and AdBlue storage arrangements at the TW2 data centre will be operated and maintained in accordance with all relevant BAT.



# Appendix A EA Enhanced Pre-application Advice

## Environmental Permit Variation Application

### Best Available Techniques and Operating Techniques

**Telehouse International Corporation of Europe Limited**

SLR Project No.: 410.066261.00001

Maria Francis and Sharon Abram

SLR Consulting Limited Date: 18/12/2025

By email

Dear Maria Francis and Sharon Abram,

**Pre application advice – Enhanced service**

Pre-application reference EPR/EP3507SL/P001

Site: Docklands Campus, Coriander Ave, London, E14 2AA.

Thank you for your pre application enquiry on 11/08/2025.

I am pleased to provide you with your pre-application advice. This advice is based on the information provided on your pre application advice form and conversations recorded on the following dates:

- Teams meeting on 17/12/2025.

**The advice is provided in response to each of your queries (in bold and italics) and is as follows:**

***Confirm the scope of the application and supporting documents required***

For a Substantial Variation of an existing data centre Installation permit the following information is required:

- Parts A, C2, C2.5, C3 and F1 forms for the Substantial Variation.
- Combustion plant list spreadsheet as we will need this information for each MCP, please find link to the spreadsheet here: Application for an environmental permit: part C2.5 vary to add MCP or SG or change an existing MCP or SG permit - GOV.UK (www.gov.uk) – Please include all MCPs on site.
- Application fee (see below).
- Non-technical summary.
- Site specific environmental risk assessment (in the format source-pathway-receptor).

- Air Quality Modelling and Assessment, including model input files and generator specification sheets, taking account of the emissions from the Installation as a whole.
- Noise Modelling and Impact Assessment, including model input files, taking account of the noise from the Installation as a whole.
- Noise Management Plan (where one is required based on the outcome of the noise impact assessment).
- Site plan with site boundary/ permitted area marked in green which includes all emission points (air, water and land).
- Drainage plan.
- Site Condition Report if expanding permitted boundary.
- BAT assessment – new combustion plant has to meet BAT.
- Updated operating techniques.
- Summary of updated Environmental Management System – confirm your EMS meets our criteria in our guidance.

Please find attached additional information that covers the above items in detail.

Other documents to be updated and included in the application, if possible, include:

- Air Quality Management Plan (AQMP).
- Monitoring plan - flue gas monitoring requirements.

If these documents were not included in the application, they would be added as Improvement Conditions in the permit.

***Confirm the application fee***

The cost to vary your existing Installation's permit would be based on a Substantial Variation charge which in this case is £17,193.

The charges are based on table reference 1.10.1 in the charging scheme, relating to combustion activities.

The charging scheme with the tables of charges is here:

Environmental permits and abstraction licences: tables of charges - GOV.UK (www.gov.uk)

The guidance on how and when we charge is here:

Environmental permits: when and how you are charged - GOV.UK (www.gov.uk)

- Substantial Variation – Section 3.3 of the guidance.

Additional charges – table 1.19 of the scheme:

- Reference 1.19.2 – Habitats assessment fee = £779
- Reference 1.19.7 – Assessment of noise management plan fee is required (where one is required based on the outcome of the noise impact assessment) = £1,246

***Confirm Environment Agency timelines for determination of the environmental permit variation application***

Current Status of Combustion Queue - The combustion queue is currently operating efficiently. The queue, however, is dynamic and the below timescales are subject to change.

Validation Timescales - Applications are validated within six weeks of receipt, provided they are complete, and subsequently marked as Duly Made.

Assignment of Determining Officer - A Determining Officer is assigned immediately following validation, with no delay.

Determination Timescales - Subject to smooth progression, permits are expected to be determined within twelve months.

Outstanding Delays - The only current delays relate to the Air Quality Modelling and Assessment Unit (AQMAU) queue and the Habitats queue:

- AQMAU: Applications face a waiting period of approximately three months before review by an Air Quality Specialist.
- Habitats: Applications face a waiting period of approximately one month before review by a Habitats Specialist.

***Confirm the guidance and standards that apply for the application***

- BAT for emergency backup diesel engines on Installations: Emergency backup diesel engines on installations: best available techniques (BAT) - GOV.UK (www.gov.uk)
- BAT for data centres is the FAQ. The current version is version 21, dated 15/11/2022 (attached).
- Best available techniques guidance: Best available techniques: environmental permits - GOV.UK (www.gov.uk)
- Medium combustion plant and specified generators guidance: Medium combustion plant and specified generators: environmental permits - GOV.UK (www.gov.uk)
- Management system guidance: Develop a management system: environmental permits - GOV.UK (www.gov.uk)
- Risk assessment guidance: Risk assessments for your environmental permit - GOV.UK (www.gov.uk) and within this guidance are links to guidance for noise and air quality impact assessments.
- Conservation Screening Report, dated 11/11/2025 (attached).
- Supplementary basic pre-application guidance for combustion activities (attached).

***Confirm any other Environment Agency requirements for the environmental permitting of data centres that may be relevant***

As discussed in the meeting, the following may be relevant:

Air Quality Risk Assessment

Air quality modelling and assessment will be required for the Installations permit. Your air quality assessment should follow our air emissions risk assessment for your environmental permit guidance found here: Air emissions risk assessment for your environmental permit - GOV.UK (www.gov.uk). Guidance on what to include in an air dispersion modelling report is available here: Environmental permitting: air dispersion modelling reports - GOV.UK (www.gov.uk)

You will be required to carry out modelling of the emissions to air in different operating (maintenance and testing) and emergency scenarios. Impacts of the emissions to air should be assessed at both human and ecological receptors.

The modelling of the generator maintenance and testing regime must accurately reflect the practices undertaken on site.

Maintenance and testing activities should not exceed 50 hours per annum per engine and must be minimised and appropriately staggered.

The regime must be clearly defined in terms of:

- The number of plant units operating simultaneously.
- The duration of each operation.
- The load at which the plant is operated.

The standard emergency modelling scenario for data centres is 72 hours.

The air quality modelling and assessment must explicitly consider cumulative impacts arising from neighbouring data centre sites.

The maintenance and testing schedule for the new data centre must also account for the operations of other data centres on the campus.

To minimise cumulative impacts, engine testing should be staggered across different times and days, ensuring that simultaneous testing is avoided wherever possible.

These measures must be clearly documented within the application, as they will form part of the defined operating techniques under the permit.

The general emissions to air from gas oil (or equivalent fuel) backup generators are:

- Oxides of Nitrogen (NO and NOx)
- Carbon monoxide
- Sulphur dioxide
- Particulate Matter
- Ammonia (from ammonia slip).

The air quality modelling and assessment should be based on a worst-case scenario, for example, if you intend to use HVO as a fuel, the modelling should be carried out using gas

oil. If using SCR, the modelling and assessment should include the time it takes for the SCR to kick in.

An assessment of peak NOx and an acute exposure risk assessment comparing the 100%ile predicted environmental concentrations of $NO_2$ against appropriate acute exposure criteria, such as the US EPA acute exposure guidelines levels (AEGLs) or other relevant acute exposure criteria also needs to be included in the air quality modelling and assessment.

BAT

New combustion plant (post 20/12/18) has to meet BAT.

Existing combustion plant (pre-20/12/18) does not have to meet BAT, however, we may add Improvement Conditions to the permit if NOx is too high and needs to be reduced.

If following the air quality modelling and assessment it appears you are exceeding Emission Limit Values (ELVs) and/or breaching Acute Exposure Guideline Level (AEGL) 1 you may need to go beyond BAT.

Engines

The backup engines used should be emissions optimised to meet best available techniques (BAT) for the Installation.

The default generator specification as a minimum for new plant to minimise the impacts of emissions to air (NOx) is 2g-TA Luft or US EPA Tier 2 or an equivalent standard for a NOx emission concentration of 2000 $mg/m^3$ at 5% reference oxygen and normal conditions. Please see guidance here: Emergency backup diesel engines on installations: best available techniques (BAT) - GOV.UK (www.gov.uk).

Stacks

Your stack design should ensure good flue gas dispersion. Stacks should be vertical, and emissions should not be obstructed by caps or cowls.

If existing engines that are already permitted on the site have horizontal stacks rather than vertical stacks, we may add an Improvement Condition to change these stacks in the future or if dispersion is a problem.

Commissioning of Combustion Plant

The impacts of the emissions to air during commissioning of combustion plant does not need to be included in the air quality modelling and assessment. If commissioning is not included in the assessment, it would be added as a Pre-Operational Condition in the permit.

**What this enhanced pre application advice covers**

As part of this service, we have provided you with the following information:

**Documents attached**:

Installations pre-app basic advice

Combustion (Part A) pre-app basic advice

Combustion (Part A) supplementary Data Centre FAQ

Noise Impact Assessment (NIA) pre-app basic advice

Noise Management Plan (NMP) Template

Pre-application Enhanced Conservation Screening Report – 11/11/2025

**Habitats screening:** Conservation Screening Report – 11/11/2025

**Application charge required:** See above.

**Forms required to be submitted:** See above.

**Additional documents required:** See above.

A complete application must contain the following information below:

1. **Declaration:** Please ensure the declaration section is completed by each relevant person. For a limited company, this must be a director/company secretary as listed on Companies House
2. **Site Plan:** Site plan must be clearly marked with full site boundary.
3. **Payment:** Please note your application will not be processed until we receive the full payment.

**Additional information**

We have included our basic pre-application advice documents which cover relevant information for your application. You should read these carefully and use the information to help prepare your application.

**After you apply**

The information that you need to submit with your application is explained in the application form and its guidance. The Environment Agency will check that you have submitted this information and the correct application charges. This is to ensure we have enough information to start to determine your permit application.

We will contact you if information is missing and can feasibly be provided within 10 working days. If we consider information cannot be provided within this time frame, we will return your application with a list of what is missing.

We'll retain 20% of the correct application charge to cover our costs in reviewing your application and requesting information. This maximum amount we'll retain is capped at £1,613. This is explained in the environmental permitting charges guidance.

We will not charge this if we return an application after having done very little work – for example, because it contained obvious errors or omissions.

Once we have duly made an application we will start to determine it.

Once an application is validated and duly made, it is ready to be allocated for determination. Determination is when we do our technical checks. We may need to ask you for further information or additional documents during determination, and it is important you send anything requested as quickly as possible.

The time it takes us to allocate an application depends on a number of factors, including the complexity of the specific application and the availability of a member of our team with the right skills to assess it.

The amount of time taken to determine your application will vary. It will be impacted by factors such as:

- The quality of the application
- The complexity of the application
- Whether an application is of high public interest
- Whether the application includes novel technologies or techniques
- Whether the determination requires input from others, both internal and external to the Environment Agency
- Whether modelling and/or monitoring and assessment is required, for example Air Quality modelling and assessment or water discharge or groundwater activity specific substances assessment.

The Permitting Officer determining your application will be able to keep you updated with the progress of your application.

**What happens next?**

If you submit an environmental permit application, then please quote this pre-application reference number: EPR/EP3507SL/P001.

If the advice above details using the online digital application form, your application can be submitted using this method. If not, please send your completed application documents via email to: psc@environment-agency.gov.uk

Please email applications where possible. If email is not possible you can submit by post to:

Environment Agency, Permitting Support Centre, Quadrant 2, 99 Parkway Avenue, Sheffield, S9 4WF

**Scope of this advice**

We have only provided the specific advice you requested based on the information provided. We cannot provide advice on all aspects of your application, so it is important you read all available online guidance and the application forms to ensure anything not covered within this advice is considered as part of your application.

It is important to remember:

- this is advice, we are not agreeing anything at this stage
- we have provided this advice based on the limited information we have about your proposals at this time
- we have only provided the advice you specifically requested
- we may need to request additional information when we have a full application

**Disclaimer**

The advice given is based on the information you have provided and does not constitute a formal response or decision of the Environment Agency with regard to future permit applications. Any views or opinions expressed are without prejudice to the Environment Agency's formal consideration of any application. Please note that any application is subject to duly making and then full technical checks during determination, and additional information may be required based on your detailed submission and site-specific requirements and the advice given is to address the specific pre-application request.

This advice covers Installations only.

Other permissions from the Environment Agency and/or other bodies may be required for associated or other activities.

**Enhanced pre application cost estimate**

At this stage the pre-application advice is expected to cost up to £1000 plus VAT. An invoice will be sent separately. This will include a link to pay online. You can also pay your application charges online, but this is a different link so please ensure you are using the correct one when you apply.

**This pre-application request is now closed**

We consider this pre application request is now closed however if you have any questions regarding this letter please contact PreApplicationService@environment-agency.gov.uk.

If you require additional enhanced pre-application advice please complete our online form.

Yours sincerely

Hayley Jenkins-Jones

Senior Permitting Officer

# Appendix B Generator Manufacturer Specification

## Environmental Permit Variation Application

### Best Available Techniques and Operating Techniques

**Telehouse International Corporation of Europe Limited**

SLR Project No.: 410.066261.00001

# Generator set data sheet

**Model:** C3750 D5e
**Frequency:** 50 Hz
**Fuel type:** Diesel
**kVA rating:** 3750 Standby
3350 Prime
3000 Continuous
**Emissions level:** EPA Tier 2

Thermal power input = 7,506MWth

## Fuel consumption

| | Standby | | | | Prime | | | | Continuous | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | kVA (kW) | | | | kVA (kW) | | | | kVA (kW) | | | |
| Ratings | 3750 (3000) | | | | 3350 (2680) | | | | 3000 (2400) | | | |
| Ratings without fan[1] | 3844 (3075) | | | | 3445 (2756) | | | | 3095 (2476) | | | |
| **Load** | **1/4** | **1/2** | **3/4** | **Full** | **1/4** | **1/2** | **3/4** | **Full** | **1/4** | **1/2** | **3/4** | **Full** |
| US gph | 62 | 106 | 149 | 193 | 57 | 96 | 134 | 173 | 53 | 88 | 122 | 157 |
| L/hr | 235 | 401 | 564 | 731 | 216 | 363 | 507 | 655 | 201 | 333 | 462 | 594 |

[1]Ratings for reference with the optional remote radiator cooling configuration. See note 1 under “Alternator data” section.

## Engine

| | Standby rating | Prime rating | Continuous rating |
|---|---|---|---|
| Engine model | QSK95-G10 | | |
| Configuration | Cast iron, Vee, 16 cylinder | | |
| Aspiration | Turbocharged and after-cooled | | |
| Gross engine power output, $kW_m$ (bhp) | 3213 (4307) | 2851 (3822) | 2562 (3434) |
| BMEP at set rated load, kPa (psi) | 2696 (391) | 2392 (347) | 2151 (312) |
| Bore, mm (in.) | 190.0 (7.48) | | |
| Stroke, mm (in.) | 210.1 (8.27) | | |
| Rated speed, rpm | 1500 | | |
| Piston speed, m/s (ft/min) | 10.5 (2067) | | |
| Compression ratio | 15.5:1 | | |
| Lube oil capacity, L (qt) | 647 (684) | | |
| Overspeed limit, rpm | 2070 | | |
| Regenerative power, kW | 430 | | |

## Fuel flow

| | |
|---|---|
| Maximum fuel flow, L/hr (US gph) | 1427 (377) |
| Maximum fuel inlet restriction with clean filter, kPa (in Hg) | 16.9 (5) |
| Maximum fuel return line restriction, kPa (in Hg) | 34 (10) |
| Maximum fuel inlet temperature, °C (°F) | 71.1 (160) |
| Maximum fuel outlet temperature, °C (°F) | 92.2 (198) |

| Air | Standby rating | Prime rating | Continuous rating |
|---|---|---|---|
| Combustion air, $m^3$/min (scfm) | 255 (9000) | 243 (8580) | 234 (8250) |
| Maximum air cleaner restriction with clean filter, mm $H_2O$ (in $H_2O$) | 457 (18) | | |
| Alternator cooling air, $m^3$/min (scfm) | 240 (8476) | | |

| Exhaust | | | |
|---|---|---|---|
| Exhaust flow at set rated load, $m^3$/min (cfm) | 584 (20630) | 539 (19040) | 503 (17770) |
| Exhaust temperature at set rated load, °C (°F) | 422 (791) | 398 (749) | 379 (715) |
| Maximum back pressure, kPa (in $H_2O$) | 7 (28) | | |

| Standard set-mounted radiator cooling | |
|---|---|
| Ambient design, °C (°F) | 43 (109) |
| Fan load, kWm (HP) | 129 (173) |
| Coolant capacity (with radiator), L (US gal) | 1237 (327) |
| Cooling system air flow, $m^3$/min (scfm) | 2094 (73941) |
| Maximum cooling air flow static restriction, kPa (in $H_2O$) | 0.25 (1) |

| Optional set-mounted radiator cooling | |
|---|---|
| Ambient design, °C (°F) | 52 (126) |
| Fan load, kWm (HP) | 78 (105) |
| Coolant capacity (with radiator), L (US gal) | 1120 (296) |
| Cooling system air flow, $m^3$/min (scfm) | 3135 (110700) |
| Maximum cooling air flow static restriction, kPa (in $H_2O$) | 0.12 (0.5) |

| Optional remote radiator cooling | | | |
|---|---|---|---|
| Engine coolant capacity, L (US gal) | 379 (100) | | |
| Max flow rate at max friction head, jacket water circuit, L/min (US gal/min) | 2559 (676) | | |
| Max flow rate at max friction head, after-cooler circuit, L/min (US gal/min) | 538 (142) | | |
| Heat rejected, jacket water circuit, MJ/min (Btu/min) | 80.50 (76340) | 71.90 (68170) | 65 (61640) |
| Heat rejected, after-cooler circuit, MJ/min (Btu/min) | 20.80 (19710) | 18.40 (17430) | 16.50 (15600) |
| Heat rejected, fuel circuit, MJ/min (Btu/min) | 0.25 (239) | 0.22 (210) | 0.20 (187) |
| Total heat radiated to room, MJ/min (Btu/min) | 23.80 (22540) | 21.20 (20100) | 19.10 (18110) |
| Maximum friction head, jacket water circuit, kPa (psi) | 59 (8.5) | | |
| Maximum friction head, after-cooler circuit, kPa (psi) | 59 (8.5) | | |
| Maximum static head above engine crank centerline, jacket water circuit, m (ft) | 18 (60) | | |
| Maximum static head above engine crank centerline, after-cooler circuit, m (ft) | 18 (60) | | |
| Maximum jacket water outlet temp, °C (°F) | 107.4 (220) | 100 (212) | 100 (212) |
| Maximum after-cooler inlet temp, °C (°F) | 71.1 (160) | 68 (155) | 68 (155) |
| Maximum after-cooler inlet temp at 25 °C (77 °F) ambient, °C (°F) | 46.1 (115) | | |

**Note:** For non-standard remote installations contact your local Cummins representative.

## Weights

| | |
|---|---|
| Unit dry weight kg (lb) | 29500 (65100) |
| Unit wet weight kg (lb) | 31200 (68771) |

**Note:** Weights represent a set with standard features and alternator frame P80X. See outline drawing for weights of other configurations.

## Derating factors

| | |
|---|---|
| **Standby** | Full genset power available up to 860 m (2821 ft) at ambient temperatures up to 40 °C (104 °F) and 753 m (2470 ft) at ambient temperatures up to 50 °C (122 °F). Above these conditions, derate at 3.9% per 305 m (1000 ft) and 9.9% per 10 °C (18 °F). |
| **Prime** | Full genset power available up to 1341 m (4400 ft) at ambient temperatures up to 40 °C (104 °F) and 667 m (2188 ft) at ambient temperatures up to 50 °C (122 °F). Above these conditions, derate at 4.6% per 305 m (1000 ft) and 10% per 10 °C (18 °F). |
| **Continuous** | Full genset power available up to 1838 m (6030 ft) at ambient temperatures up to 40 °C (104 °F) and 1101 m (3612 ft) at ambient temperatures up to 50 °C (122 °F). Above these conditions, derate at 7% per 305 m (1000 ft) and 34% per 10 °C (18 °F). |

## Ratings definitions

| **Emergency Standby Power (ESP):** | **Limited-Time Running Power (LTP):** | **Prime Power (PRP):** | **Base Load (Continuous) Power (COP):** |
|---|---|---|---|
| Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel stop power in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514. | Applicable for supplying power to a constant electrical load for limited hours. Limited-Time Running Power (LTP) is in accordance with ISO 8528. | Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514. | Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) is in accordance with ISO 8528, ISO 3046, AS 2789, DIN 6271 and BS 5514. |

## Alternator data[1]

| Voltage | Connection | Temperature rise °C | Duty[2] | Max surge kVA | Winding number | Alternator data sheet | Feature code |
|---|---|---|---|---|---|---|---|
| 380 | Wye, 3-phase | 150/125/105 | S/P/C | 11145 | 12 | ADS-532 | B595-2 |
| 380-440 | Wye, 3-phase | 150/125 | S/P | 11146 | 12 | ADS-532 | B667-2 |
| 380 | Wye, 3-phase | 105 | P | 11145 | 12 | ADS-532 | B630-2 |
| 400 | Wye, 3-phase | 125 | S | 11146 | 12 | ADS-532 | BA63-2 |
| 400 | Wye, 3-phase | 105 | P | 11146 | 12 | ADS-532 | BA62-2 |
| 400-415 | Wye, 3-phase | 125 | P | 10132 | 12 | ADS-531 | B635-2 |
| 400 | Wye, 3-phase | 105 | C | 11146 | 12 | ADS-532 | BA61-2 |
| 415 | Wye, 3-phase | 125 | S | 11146 | 12 | ADS-532 | BA68-2 |
| 415 | Wye, 3-phase | 105 | P | 11146 | 12 | ADS-532 | BA66-2 |
| 415 | Wye, 3-phase | 105 | C | 11146 | 12 | ADS-532 | BA65-2 |
| 440 | Wye, 3-phase | 105 | C | 11025 | 12 | ADS-532 | BA71-2 |
| 440 | Wye, 3-phase | 105 | P | 11025 | 12 | ADS-532 | B658-2 |
| 690 | Wye, 3-phase | 125 | S | 11970 | 65 | ADS-586 | BA77-2 |
| 690 | Wye, 3-phase | 150 | S | 11970 | 65 | ADS-586 | BA78-2 |
| 690 | Wye, 3-phase | 105 | P | 11970 | 65 | ADS-586 | BA74-2 |
| 690 | Wye, 3-phase | 125 | P | 9960 | 65 | ADS-531 | BA76-2 |
| 690 | Wye, 3-phase | 80 | C | 11970 | 65 | ADS-586 | BA72-2 |
| 690 | Wye, 3-phase | 105 | C | 11970 | 65 | ADS-586 | BA73-2 |
| 3300 | Wye, 3-phase | 80 | S | 14880 | 8003 | ADS-592 | B620-2 |
| 3300 | Wye, 3-phase | 105 | S | 10845 | 51 | ADS-587 | BA80-2 |
| 3300 | Wye, 3-phase | 125/105/80 | S/P/C | 10845 | 51 | ADS-587 | B470-2 |
| 3300 | Wye, 3-phase | 150 | S | 9481 | 51 | ADS-545 | BB78-2 |
| 3300 | Wye, 3-phase | 80 | P | 10845 | 51 | ADS-587 | BA79-2 |
| 3300 | Wye, 3-phase | 105 | P | 9481 | 51 | ADS-545 | B372-2 |
| 3300 | Wye, 3-phase | 125 | P | 9481 | 51 | ADS-545 | BB79-2 |
| 3300 | Wye, 3-phase | 105 | C | 10845 | 51 | ADS-587 | B471-2 |
| 6000 | Wye, 3-phase | 80 | S | 14170 | 8010 | ADS-591 | BA83-2 |
| 6000 | Wye, 3-phase | 105 | S | 12728 | 8008 | ADS-589 | BA86-2 |

**Notes:**

[1]Alternator data is configured for a set with ratings including engine cooling fan losses and standard features at 40 °C ambient temperature. For non-standard configurations, including remote radiator applications, check appropriate alternator data sheets or contact your local Cummins representative.

[2]Standby (S), Prime (P) and Continuous ratings (C).

[3]Maximum rated starting kVA that results in a minimum of 90% of rated sustained voltage during starting.

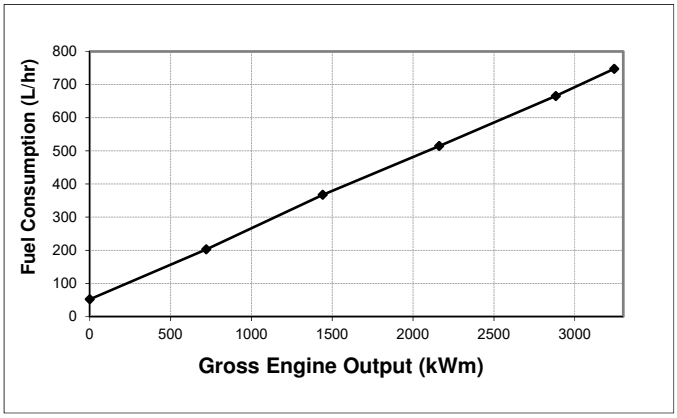
| Engine Performance Data | G-Drive | Date | | |
|---|---|---|---|---|
| Cummins Inc.<br>Columbus, Indiana 47202-3005<br>http://www.cummins.com | QSK95-G10<br>FR7369 | 5-May-16 | | |
| | | Configuration | CPL | Revision |
| | | D0M3001GX03 | 4245 | - |

| | | | |
|---|---|---|---|
| **Compression Ratio** | 15.5:1 | **Displacement** | 95 L (5816 in³) |
| **Fuel System** | Cummins MCRS | **Aspiration** | Turbocharged and Low Temperature Aftercooled |
| **Aftertreatment** | None | **Emission Certification** | EPA Tier2 (NSPS) |

| Engine Speed | Standby Power | | Prime Power | | Continuous Power | |
|---|---|---|---|---|---|---|
| rpm | kWm | bhp | kWm | bhp | kWm | bhp |
| 1500 | 3245 | 4351 | 2883 | 3866 | 2593 | 3477 |

## Engine Fuel Consumption @ 1500 rpm

| Output Power | | | Fuel Consumption | | | |
|---|---|---|---|---|---|---|
| % | kWm | bhp | kg/kWm-hr | lb/bhp-hr | L/hr | US gal/hr |
| **Standby Power** | | | | | | |
| 100 | 3245 | 4351 | 0.196 | 0.322 | 748 | 197.3 |
| **Prime Power** | | | | | | |
| 100 | 2883 | 3866 | 0.196 | 0.323 | 666 | 175.7 |
| 75 | 2162 | 2899 | 0.202 | 0.333 | 515 | 135.9 |
| 50 | 1441 | 1933 | 0.217 | 0.356 | 367 | 97.0 |
| 25 | 721 | 966 | 0.239 | 0.393 | 203 | 53.5 |
| **Continuous Power** | | | | | | |
| 100 | 2593 | 3477 | 0.197 | 0.325 | 602 | 159.0 |




Fuel consumption @ 3000kWe output is 731L/hr - please see the genset data sheet, the consumption here is given at max engine power

Data Subject to Change Without Notice

These guidelines have been formulated to ensure proper application of generator drive engines in A.C. generator set installations. **STANDBY POWER RATING:** Applicable for supplying emergency power for the duration of the utility power outage. No overload capability is available for this rating. Under no condition is an engine allowed to operate in parallel with the public utility at the Standby Power rating. This rating should be applied where reliable utility power is available. A Standby rated engine should be sized for a Max of an 80% average load factor and 200 hours of operation per year. This includes less than 25 hours per year at the Standby Power rating. Standby ratings should never be applied except in true emergency power outages. Negotiated power outages contracted with a utility company are not considered an emergency. **PRIME POWER RATING:** Applicable for supplying electric power in lieu of commercially purchased power. Prime Power applications must be in the form of one of the following two categories: **UNLIMITED TIME RUNNING PRIME POWER:** Prime Power is available for an unlimited number of hours per year in a variable load application. Variable load should not exceed a 70% average of the Prime Power rating during any operating period of 250 hours. The total operating time at 100% Prime Power shall not exceed 500 hours per year. A 10% overload capability is available for a period of 1 hour within a 12-hour period of operation. Total operating time at the 10% overload power shall not exceed 25 hours per year. **LIMITED TIME RUNNING PRIME POWER:** Limited Time Prime Power is available for a limited number of hours in a non-variable load application. It is intended for use in situations where power outages are contracted, such as in utility power curtailment. Engines may be operated in parallel to the public utility up to 750 hours per year at power levels never to exceed the Prime Power rating. The customer should be aware, however, that the life of any engine will be reduced by this constant high load operation. Any operation exceeding 750 hours per year at the Prime Power rating should use the Continuous Power rating. **CONTINUOUS POWER RATING:** Applicable for supplying utility power at a constant 100% load for an unlimited number of hours per year. No overload capability is available for this rating.

Reference AEB 10.47 for determining Electrical Output.

Data shown above represent gross engine performance capabilities obtained and corrected in accordance with ISO-3046 conditions of 100 kPa (29.53 in Hg) barometric pressure [110 m (361 ft) altitude], 25 °C (77 °F) air inlet temperature, and relative humidity of 30% with No. 2 diesel or a fuel corresponding to ASTM D2.

Derates shown are based on 18 in H2O air intake restriction and 1.5 in Hg exhaust back pressure.

The fuel consumption data is based on No. 2 diesel fuel weight at 0.85 kg/L (7.1 lbs/US gal). Power output curves are based on the engine operating with fuel system, water pump and lubricating oil pump; not included are battery charging alternator, fan, optional equipment and driven components.

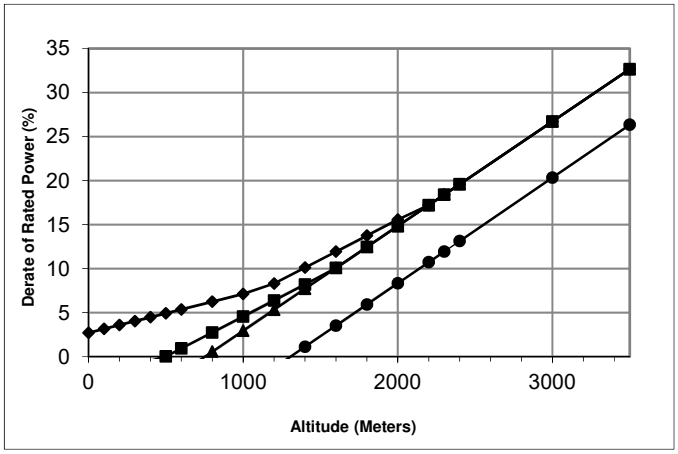
Data Status : Limited Production

Tolerance : +/- 5%

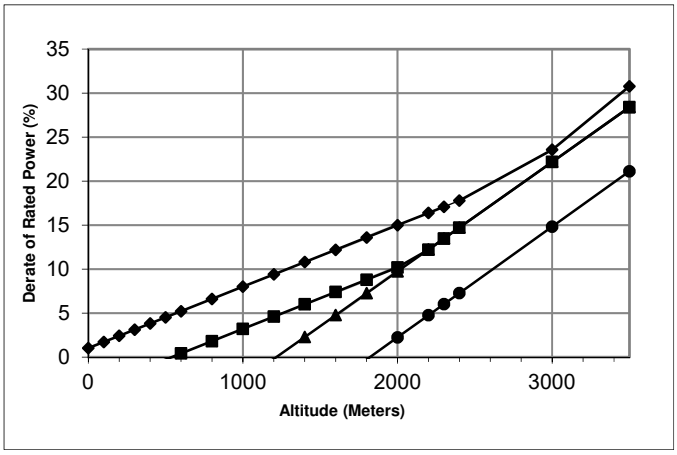
Chief Engineer

## 1,500 rpm Power Derate Curves

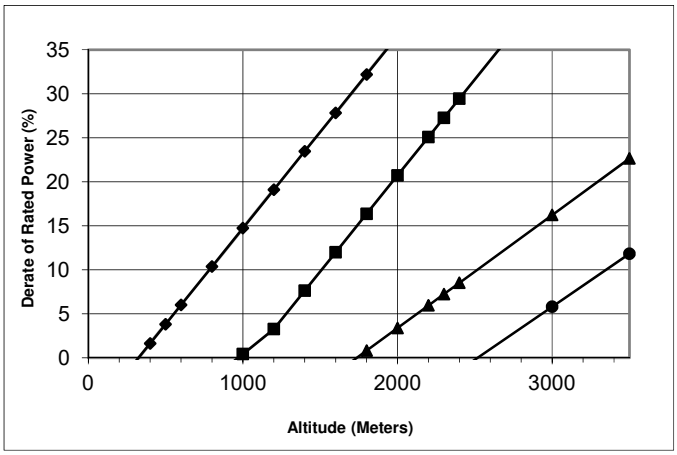
**Standby Power**




**Prime Power**




**Continuous Power**




131 °F (55 °C)
122 °F (50 °C)
104 °F (40 °C)
77 °F (25 °C)

**Operation At Elevated Temperature And Altitude:**

For **Standby Operation** above these conditions, derate by an additional 3.6% per 300m (1000 ft), and 9.9% per 10 °C (18 °F).
For **Prime Operation** above these conditions, derate by an additional 4.3% per 300m (1000 ft), and 9.6% per 10 °C (18 °F).
For **Continuous Operation** above these conditions, derate by an additional 6.5% per 300m (1000 ft), and 31.7% per 10 °C (18 °F).

## General Engine Data

| | | | |
|---|---|---|---|
| Installation Drawing Number | | 4954034 | |
| Type | | Four Cycle; Vee; 16 Cylinder | |
| Aspiration | | Turbocharged and Low Temperature Aftercooled | |
| Bore x Stroke | in x in (mm x mm) | 7.48 x 8.27 | (190 x 210) |
| Displacement | $in^3$ (L) | 5816 | (95) |
| Compression Ratio | | 15.5:1 | |
| Dry Weight (Approximate) | lbm (kg) | 28184 | (12784) |
| Wet Weight (Approximate) | lbm (kg) | 30396 | (13787) |
| Aftertreatment Weight (Approximate) | lbm (kg) | N/A | (N/A) |
| Moment of Inertia of Rotating Components | | | |
| with FW 7057 Flywheel, SAE 00 | lbm • $ft^2$ (kg • $m^2$) | 1334 | (56) |
| Center of Gravity from Rear Face of Block | in (mm) | 53 | (1359) |
| Center of Gravity Above Crankshaft Centerline | in (mm) | 12 | (300) |

## Engine Mounting

| | | | |
|---|---|---|---|
| Max Bending Moment at Rear Face of Block | lb • ft (N • m) | 9669 | (13110) |

## Exhaust System

| | | | |
|---|---|---|---|
| Max Allowable Static Bending Moment @ Exhaust Outlet Flange | lb • ft (N • m) | N/A | (N/A) |
| Max Back Pressure at Standby Power (Turbo Outlet) | in Hg (kPa) | 2 | (6.8) |
| Pressure Drop Across Aftertreatment | in $H_2O$ (kPa) | N/A | (N/A) |
| Minimum Unaided Operating Temperature | °F (°C) | N/A | (N/A) |
| Max Ambient Operating Temperature (Warning) | °F (°C) | N/A | (N/A) |
| Max DEF Supply Flow | US gph (L/hr) | N/A | (N/A) |
| Max DEF Return Flow | US gph (L/hr) | N/A | (N/A) |
| Max Static Head (From Pump to Injector) | ft (m) | N/A | (N/A) |

## Air Induction System

| | | | |
|---|---|---|---|
| Max Intake Air Restriction | | | |
| With Normal Duty Air Cleaner and Clean Filter Element | in $H_2O$ (kPa) | 18 | (4) |
| With Heavy Duty Air Cleaner and Clean Filter Element | in $H_2O$ (kPa) | N/A | (N/A) |
| With Dirty Filter Element | in $H_2O$ (kPa) | 28 | (7) |

## Cooling System

| | | | |
|---|---|---|---|
| **Jacket Water/ High Temperature Circuit Requirements** | | | |
| Max Coolant Friction Head External to Engine (1500 rpm) | psi (kPa) | 8.5 | (59) |
| Engine Water Flow at Stated Friction Head External to Engine: | | | |
| 5 psi Friction Head (1500 rpm) | US gpm (L/m) | 704 | (2665) |
| Maximum Friction Head (1500 rpm) | US gpm (L/m) | 677 | (2563) |
| Coolant Capacity - Engine | US gal (L) | 85 | (323) |
| Minimum Pressure Cap Rating at Sea Level | psi (kPa) | 11 | (76) |
| Max Static Head of Coolant Above Crankshaft Centerline | ft (m) | 60 | (18) |
| Max Coolant (Top Tank) Temperature for Standby/Prime Power | °F (°C) | 220 / 212 | (104 / 100) |
| Thermostat (Modulating) Range | °F (°C) | 180 - 202 | (82 - 94) |
| Max Intake Manifold Temp Warning/Shutdown | °F (°C) | 190 / 200 | (88 / 93) |
| **Low Temperature Circuit (LTC) Requirements** | | | |
| Max Coolant Friction Head External to Engine (1500 rpm) | psi (kPa) | 8.5 | (59) |
| Engine Water Flow at Stated Friction Head External to Engine: | | | |
| 5 psi Friction Head (1500 rpm) | US gpm (L/m) | 152 | (575) |
| Maximum Friction Head (1500 rpm) | US gpm (L/m) | 143 | (541) |
| Max Coolant Temp into LTC @ 77°F (25°C) Ambient | °F (°C) | 115 | (46) |
| Max Coolant Temperature into LTC @ | | | |
| Limiting Ambient Conditions for Standby/Prime Power | °F (°C) | 160 / 155 | (71 / 68) |
| Thermostat (Modulating) Range | °F (°C) | 115 - 130 | (46 - 54) |
| Coolant Capacity - Aftercooler | US gal (L) | 15 | (57) |
| **Charge Air Cooler Requirements** | | | |
| Max Allowable Pressure Drop Across Charge Air Cooler and OEM CAC piping (1500 rpm) | in Hg (kPa) | N/A | (N/A) |
| Max Charge Air Cooler Outlet to Ambient at 77°F (25°C)(CAC dT) | Δ°F (Δ°C) | N/A | (N/A) |

## Lubrication System

| | | | |
|---|---|---|---|
| Oil Pressure at Minimum Idle Speed | psi (kPa) | 40 | (276) |
| Oil Pressure at Governed Speed | psi (kPa) | 65 - 80 | (448 - 552) |
| Max Oil Temperature | °F (°C) | 250 | (121) |
| Oil Capacity with OP 7028: Low - High | US gal (L) | 147 - 164 | (556 - 621) |
| Total System Capacity (with Spin-On Filters) | US gal (L) | 171 | (647) |

## Fuel System

| | | | |
|---|---|---|---|
| Max Fuel Supply Restriction at Fuel Pump Inlet (clean/dirty filter) | in Hg (kPa) | 5 / N/A | (17 / N/A) |
| Max Allowable Head on Injector Return Line | | | |
| (Consisting of Friction Head and Static Head) | in Hg (kPa) | 10 | (34) |
| Max Fuel Inlet Temperature | °F (°C) | 158 | (70) |
| Max Supply Fuel Flow (Standby/Prime Power) | US gph (L/hr) | 377 / 368 | (1428) / (1392) |
| Max Return Fuel Flow (Standby/Prime Power) | US gph (L/hr) | 149 / 168 | (564) / (636) |
| Max Fuel Supply Restriction at Max Fuel Flow (from Customer Plumbing) | | | |
| Measured at Customer Fuel Inlet Connection | in Hg (kPa) | 4 | (14) |

## Electrical System

| | | | |
|---|---|---|---|
| System Voltage | volts | 24 | N/A |
| Minimum Recommended Battery Capacity | | | |
| Cold Soak @ 0 °F (-18 °C) | CCA | 1400 | N/A |
| Max Starting Circuit Resistance | ohm | 0.002 | N/A |
| Max Current Draw of the System | Amps | 67 | N/A |

## Cold Start Capability

| | | | |
|---|---|---|---|
| Unaided Cold Start | | | |
| Minimum Cranking Speed | rpm | 110 | N/A |
| Minimum Ambient Temp for Unaided Cold Start | °F (°C) | 10 | (-12) |

## Performance Data

| | | STANDBY | PRIME | CONTINUOUS |
|---|---|---|---|---|
| | | 50 Hz | 50 Hz | 50 Hz |
| Governed Engine Speed | rpm | 1500 | 1500 | 1500 |
| Engine Idle Speed | rpm | 750 - 900 | 750 - 900 | 750 - 900 |
| Gross Engine Power Output | bhp (kWm) | 4351 (3245) | 3866 (2883) | 3477 (2593) |
| Brake Mean Effective Pressure | psi (kPa) | 395 (2724) | 351 (2421) | 316 (2179) |
| Friction Power | hp (kWm) | N/A (N/A) | N/A (N/A) | N/A (N/A) |
| Intake Air Flow | $ft^3$/min (L/sec) | 8951 (4225) | 8586 (4053) | 8184 (3863) |
| Exhaust Gas Temp | °F (°C) | 803 (429) | 756 (403) | 729 (388) |
| Exhaust Gas Flow | $ft^3$/min (L/sec) | 20661 (9751) | 19127 (9027) | 17891 (8444) |
| Air:Fuel Ratio | | 27.4:1 | 29.5:1 | 31.1:1 |
| Radiated Heat to Ambient | BTU/min (kWm) | 17092 (301) | 15215 (268) | 13770 (242) |
| Heat to JW Radiator | BTU/min (kWm) | 82287 (1446) | 73365 (1289) | 66120 (1162) |
| Heat to Exhaust | BTU/min (kWm) | 122572 (2154) | 109386 (1922) | 100103 (1759) |
| * Heat to Fuel | BTU/min (kWm) | 493 (8.7) | 493 (8.7) | 493 (8.7) |
| Heat to Aftercooler Radiator | BTU/min (kWm) | 20263 (356) | 17926 (315) | 16242 (286) |
| Charge Air Flow | lb/min (kg/min) | 640 (291) | 614 (279) | 585 (266) |
| Turbo Comp Outlet Pressure | psi (kPa) | 46 (318) | 43 (297) | 40 (276) |
| Turbo Comp Outlet Temp | °F (°C) | 450 (233) | 424 (218) | 401 (205) |

* This is the maximum heat rejection to fuel.

## Noise Emissions

| Frequency (Hz) Sound Power dB(A)[123] | | 31.5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | 16000 | Overall |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1500 rpm 50 Hz | Engine[4] | 66.6 | 85.2 | 104.2 | 106.6 | 113.4 | 116.3 | 117.6 | 116.6 | 123.7 | 100.8 | 126.1 |
| | Exhaust[5] | 55.3 | 85.3 | 90.4 | 109.7 | 106.8 | 107.5 | 109.3 | 108.4 | 104.0 | 89.1 | 115.8 |

1. The test figures quoted are from a single gen-set test and do not constitute a guarantee of performance for any particular engine. The data is subject to instrumentation, measurement, and engine to engine variability.
2. Test reference procedures ISO 3744 and ANSI S12.34-1998 as applicable.
3. All data are "A" weighted and are rounded to the nearest dB.
4. Engine only "Without Radiator and fan", Sound Power (dB).
5. Engine Exhaust at 1 Meter from open stack, Sound Pressure (dB).

# Sound data

**C3750 D5e** **50 Hz**

## Sound pressure level @ 7 meters, dB(A)

See notes 1-6 listed below

| Configuration | Exhaust | Measurement location number (note 1) | | | | | | | | 8 Position average |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | |
| Unhoused - remote cooled | Infinite | 92.4 | 97.4 | 94.6 | 95.5 | 92.6 | 96.5 | 96.9 | 96.3 | 95.6 |
| Unhoused - high ambient cooling system | Infinite | 92.6 | 97.6 | 97.9 | 97.1 | 96.4 | 98.2 | 97.6 | 99.8 | 97.5 |
| Unhoused - enhanced high ambient cooling system | Infinite | 92.6 | 97.6 | 97.9 | 97.1 | 96.4 | 98.2 | 97.6 | 99.8 | 97.5 |

## Sound power level, dB(A)

See notes 2-4, 7 and 8 listed below

| Configuration | Exhaust | Octave band center frequency (Hz) | | | | | | | | | | Overall sound power level |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 31.5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | 16000 | |
| Unhoused - remote cooled | Infinite | 67.6 | 87.0 | 104.4 | 107.9 | 114.1 | 117.1 | 118.2 | 116.1 | 122.6 | 99.6 | 125.7 |
| Unhoused - high ambient cooling system | Infinite | 72.3 | 89.2 | 114.2 | 118.1 | 119.7 | 120.2 | 119.2 | 115.7 | 117.6 | 96.8 | 126.7 |
| Unhoused - enhanced high ambient cooling system | Infinite | 72.3 | 89.2 | 114.2 | 118.1 | 119.7 | 120.2 | 119.2 | 115.7 | 117.6 | 96.8 | 126.7 |

## Exhaust sound power level, dB(A)

See note 2 and 9 listed below

| Open exhaust (no muffler @ rated load) | Octave band center frequency (Hz) | | | | | | | | | | Overall power level |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 31.5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | 16000 | |
| | 66.3 | 96.3 | 101.4 | 120.7 | 117.8 | 118.5 | 120.3 | 119.4 | 115.0 | 100.1 | 126.8 |

Note:

1. Position 1 faces the generator front per ISO 8528-10. The positions proceed around the generator set in a counter-clockwise direction in 45° increments. All positions are at 7 m (23 ft) from the surface of the generator set and 1.2 m (48 in) from floor level.
2. Sound levels are subject to instrumentation, measurement, installation and manufacturing variability.
3. Data based on full rated load. Sound data with remote-cooled generator sets are based on rated loads without cooling fan noise.
4. Sound data for generator set with infinite exhaust do not include exhaust noise.
5. Sound pressure levels are measured per ANSI S1.13 and ANSI S12.18, as applicable.
6. Reference sound pressure is 20 µPa.
7. Sound power levels per ISO 3744 and ISO 8528-10, as applicable.
8. Reference power = 1 pw ($10^{-12}$W).
9. Exhaust sound power levels are per ISO 6798, as applicable.

# PROTOTYPE TEST SUPPORT (PTS)
# 50 HZ TEST SUMMARY

| GENERATOR SET MODELS | REPRESENTATIVE PROTOTYPE | |
|---|---|---|
| C3750 D5e | Model: | C3750 D5 |
| C3500 D5e | Alternator: | MVSI804X2 |
| C3500 D5 | | winding 51 |
| C3750 D5 | Engine: | QSK95-G4 |

The following summarizes prototype testing conducted on the designated representative prototype of the specified models. This testing is conducted to verify the complete generator set electrical and mechanical design integrity. Prototype testing is conducted only on generator sets not sold as new equipment.

**Maximum Surge Power: 3000 KW**

The generator set was evaluated to determine the stated maximum surge power.

**Maximum Motor Starting: 30163 kVA**

The generator set was tested to simulate motor starting by applying the specified kVA load at low lagging power factor (0.4 or lower). With this load applied, the generator set recovered to a minimum of 90% rated voltage.

**Torsional Analysis and Testing:**

The generator set was tested to verify that the design is not subjected to harmful torsional stresses. A spectrum analysis of the transducer output was conducted over the speed range of 1350 to 1950 RPM.

**Cooling System:** 50 ºC Ambient
0.5 in. H2O restriction

The cooling system was tested to determine ambient temperature and static restriction capabilities. The test was performed at full rated load in elevated ambient temperature under stated static restriction conditions.

**Durability:**

The generator set was subjected to endurance testing replicating field duty cycles operating at variable load up to the standby rating based upon MIL-STD-705 to verify structural soundness and durability of the design.

**Electrical and Mechanical Strength:**

The generator set was tested to several single phase and three phase faults to verify that the generator can safely withstand the forces associated with short circuit conditions. The generator set was capable of producing full rated output at the conclusion of the testing.

**Steady State Performance:**

The generator set was tested to verify steady state operating performance. It was within the specified maximum limits.

| | |
|---|---|
| Voltage Regulation: | ±0.5% |
| Random Voltage Variation: | ±0.5% |
| Frequency Regulation: | Isochronous |
| Random Frequency Variation: | ±0.25% |

**Transient Performance:**

The generator set was tested with the listed alternator to verify single step loading capability as required by NFPA 110. Voltage and frequency response on load addition or rejection were evaluated. The following results were recorded at 0.8 Power Factor:

Full Load Acceptance:

| | | |
|---|---|---|
| Voltage Dip: | 36.6 | % |
| Recovery Time: | 7.5 | Second |
| Frequency Dip: | 16.0 | % |
| Recovery Time: | 7.3 | Second |

Full Load Rejection:

| | | |
|---|---|---|
| Voltage Rise: | 19.9 | % |
| Recovery Time: | 2.2 | Second |
| Frequency Rise: | 6.5 | % |
| Recovery Time: | 2.4 | Second |

All Data Based on 0.8 Power Factor:

**Harmonic Analysis:**
(per MIL-STD-705B, Method 601.4)

| | Line to Line | | Line to Neutral | |
|---|---|---|---|---|
| Harmonic | No Load | Full Load | No Load | Full Load |
| 3 | 0 | 0.08074 | 0.1399 | 0.1417 |
| 5 | 0.08097 | 0.8881 | 0.1399 | 0.9916 |
| 7 | 0.5667 | 0.08074 | 0.5597 | 0.1417 |
| 9 | 0 | 0 | 0 | 0 |
| 11 | 0.5668 | 0.3229 | 0.5597 | 0.2833 |
| 13 | 0.2429 | 0.3229 | 0.2798 | 0.2833 |
| 15 | 0 | 0 | 0 | 0.0000 |

## High Ambient Air Temperature Radiator Cooling System

| | Fuel Type | Duty | Rating (kW) | Max cooling @ air flow static restriction, unhoused (inches water/mm water) | | | | | Housed in free air, no air discharge restriction | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 0.0/0.0 | 0.25/6.4 | 0.5/12.7 | 0.75/19.1 | 1.0/25.4 | Weather | Sound level 1 | Sound level 2 |
| | | | | Maximum allowable ambient temperature, degree C | | | | | | | |
| 50 Hz | Diesel | Standby | 3000 | 43 | 43 | 43 | 42 | 40 | N/A | N/A | N/A |
| | | Prime | 2680 | 44 | 44 | 44 | 43 | 42 | N/A | N/A | N/A |
| | | Continuous | 2400 | 45 | 45 | 45 | 44 | 43 | N/A | N/A | N/A |
| | | DCC | 2680 | 47 | 47 | 47 | 46 | 45 | N/A | N/A | N/A |
| | | | | Airflow ($m^3/s$) – Actual @ Fan | | | | | | | |
| | | | | 61.3 | 58.2 | 55 | 53 | 51 | N/A | N/A | N/A |

## High Ambient Air Temperature Radiator Cooling System - Compact

| | Fuel Type | Duty | Rating (kW) | Max cooling @ air flow static restriction, unhoused (inches water/mm water) | | | | | Housed in free air, no air discharge restriction | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 0.0/0.0 | 0.25/6.4 | 0.5/12.7 | 0.75/19.1 | 1.0/25.4 | Weather | Sound level 1 | Sound level 2 |
| | | | | Maximum allowable ambient temperature, degree C | | | | | | | |
| 50 Hz | Diesel | Standby | 3000 | 45 | 45 | 44 | 43 | 41 | N/A | N/A | N/A |
| | | Prime | 2680 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | | Continuous | 2400 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | | DCC | 2680 | 52 | 51 | 50 | 49 | 48 | N/A | N/A | N/A |
| | | | | Airflow ($m^3/s$) – Actual @ Fan | | | | | | | |
| | | | | 45 | 44 | 42.8 | 41.6 | 40.9 | N/A | N/A | N/A |

# Cooling System Data
## C3750 D5e

| Enhanced High Ambient Air Temperature Radiator Cooling System | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Max cooling @ air flow static restriction, unhoused (inches water/mm water) | | | | | Housed in free air, no air discharge restriction | | |
| | | | | 0.0/0.0 | 0.25/6.4 | 0.5/12.7 | 0.75/19.1 | 1.0/25.4 | Weather | Sound level 1 | Sound level 2 |
| | **Fuel Type** | **Duty** | **Rating (kW)** | **Maximum allowable ambient temperature, degree C** | | | | | | | |
| 50 Hz | Diesel | Standby | 3000 | 52 | 52 | 52 | 51 | 49 | N/A | N/A | N/A |
| | | Prime | 2680 | 53 | 53 | 53 | 52 | 51 | N/A | N/A | N/A |
| | | Continuous | 2400 | 54 | 54 | 54 | 53 | 52 | N/A | N/A | N/A |
| | | DCC | 2680 | 56 | 56 | 56 | 55 | 54 | N/A | N/A | N/A |
| | | | | **Airflow ($m^3/s$) – Actual @ Fan** | | | | | | | |
| | | | | 61.3 | 58.2 | 55 | 53 | 51 | N/A | N/A | N/A |

Notes:

1. Data shown are anticipated cooling performance for typical generator set.
2. Cooling data is based on 1000 ft (305 m) site test location.
3. Generator set power output may need to be reduced at high ambient conditions. Consult generator set data sheet for derate schedules.
4. Cooling performance may be reduced due to several factors including but not limited to: Incorrect installation, improper operation, fouling of the cooling system, and other site installation variables.

# Exhaust emission data sheet

## C3750 D5e

### 50 Hz Diesel generator set

### EPA Tier 2

**Engine Information:**

| | | | |
|---|---|---|---|
| Model: | Cummins Inc. QSK95-G10 | Bore: | 7.48 in. (190 mm) |
| Type: | 4 Cycle, VEE, 16 cylinder diesel | Stroke: | 8.27 in. (210 mm) |
| Aspiration: | Turbocharged and Aftercooled | Displacement: | 5816 cu. in. (95.3 liters) |
| Compression Ratio: | 15.5:1 | | |
| Emission Control Device: | Turbocharged and Aftercooled | | |
| Emission Level: | Stationary Emergency | | |

| Performance Data | 1/4 Standby | 1/2 Standby | 3/4 Standby | Full Standby | Full Prime | Full Continuous |
|---|---|---|---|---|---|---|
| Engine BHP @ 1500 RPM (50 Hz) | 1145 | 2185 | 3225 | 4308 | 3822 | 3433 |
| Fuel Consumption L/Hr (US Gal/Hr) | 231 (61) | 409 (108) | 564 (149) | 738 (195) | 659 (174) | 594 (157) |
| Exhaust Gas Flow m³/min (CFM) | 241 (8514) | 388 (13710) | 484 (17104) | 581 (20526) | 538 (18988) | 503 (17752) |
| Exhaust Gas Temperature °C (°F) | 352 (665) | 380 (716) | 384 (723) | 426 (799) | 401 (753) | 387 (728) |
| **Exhaust Emission Data** | | | | | | |
| HC (Total Unburned Hydrocarbons) | 0.23 (92) | 0.13 (59) | 0.08 (38) | 0.06 (28) | 0.06 (32) | 0.07 (36) |
| NOx (Oxides of Nitrogen as $NO_2$) | 3.4 (1360) | 3.4 (1490) | 4.8 (2280) | 6.1 (2990) | 5.5 (2690) | 5 (2420) |
| CO (Carbon Monoxide) | 0.4 (150) | 0.2 (100) | 0.1 (60) | 0.2 (100) | 0.1 (70) | 0.1 (60) |
| PM (Particulate Matter) | 0.13 (45) | 0.08 (29) | 0.03 (11) | 0.03 (11) | 0.02 (10) | 0.03 (11) |
| $SO_2$ (Sulfur Dioxide) | 0.005 (1.8) | 0.005 (1.8) | 0.004 (1.8) | 0.004 (1.7) | 0.004 (1.8) | 0.004 (1.8) |
| Smoke (FSN) | 0.74 | 0.57 | 0.26 | 0.29 | 0.26 | 0.26 |

All values (except smoke) are cited: g/BHP-hr (mg/Nm³ @ 5% $O_2$)

**Test Conditions**

Steady-state emissions recorded per ISO8178-1 during operation at rated engine speed (+/-2%) and stated constant load (+/-2%) with engine temperatures, pressures and emission rates stabilized.

| | |
|---|---|
| Fuel Specification: | 40-48 Cetane Number, 0.0015 Wt.% Sulfur; Reference ISO8178-5, 40 CFR 86, 1313—98 Type 2-D and ASTM D975 No. 2-D. Fuel Density at 0.85 Kg/L (7.1 lbs/US Gal) |
| Air Inlet Temperature | 25 °C (77 °F) |
| Fuel Inlet Temperature: | 40 °C (104 °F) |
| Barometric Pressure: | 100 kPa (29.53 in Hg) |
| Humidity: | NOx measurement corrected to 10.7 g/kg (75 grains $H_2O$/lb) of dry air |
| Intake Restriction: | Set to 18 in of $H_2O$ as measured from compressor inlet |
| Exhaust Back Pressure: | Set to 1.5 in Hg |
| Note: | mg/m³ values are measured dry, corrected to 5% $O_2$ and normalized to standard temperature and pressure (0°C, 101.325 kPa) |

The NOx, HC, CO and PM emission data tabulated here are representative of test data taken from a single engine under the test conditions shown above. Data for the other components are estimated. These data are subjected to instrumentation and engine-to-engine variability. Field emission test data are not guaranteed to these levels. Actual field test results may vary due to test site conditions, installation, fuel specification, test procedures and instrumentation. Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may results in elevated emission levels.

# 2017 EPA Tier 2 exhaust emission compliance statement

# C3750 D5e

# Stationary Emergency

## 50 Hz diesel generator set

**Compliance information:**

**The engine used in this generator set complies with the Tier 2 emissions limits of U.S EPA new source performance standards for stationary emergency engines under the provisions of 40 CFR 60 Subpart IIII when tested per ISO8178 D2.**

| | |
|---|---|
| Engine manufacturer: | Cummins Inc |
| EPA Certificate number: | HCEXL95.0AAA-028 |
| Effective date: | 11/17/2016 |
| Date issued: | 11/17/2016 |
| EPA engine family (Cummins emissions family): | HCEXL95.0AAA (A0M3) |

**Engine information:**

| | | | |
|---|---|---|---|
| Model: | QSK95-G10 | Bore: | 7.48 in. (190 mm) |
| Engine nameplate HP: | 4351 | Stroke: | 8.27 in. (210 mm) |
| Type: | 4 Cycle, 60°V, 16 Cylinder diesel | Displacement: | 5816 cu. in. (95.3 liters) |
| Aspiration: | Turbocharged and low temperature after-cooled | Compression ratio: | 15.5:1 |
| Emission control device: | Turbocharged and after-cooled | Exhaust stack diameter | 14 in. |

**Diesel fuel emissions limits**

**D2 cycle exhaust emissions**

| | Grams per BHP-hr | | | Grams per $kW_m$-hr | | |
|---|---|---|---|---|---|---|
| | $NO_X$ + NMHC | CO | PM | $NO_X$ + NMHC | CO | PM |
| EPA emissions limit | 4.8 | 2.6 | 0.15 | 6.4 | 3.5 | 0.20 |
| Test results - diesel fuel (300-4000 ppm sulfur) | 4.62 | 0.52 | 0.11 | 6.2 | 0.7 | 0.15 |

The CARB emission values are based on CARB approved calculations for converting EPA (500 ppm) fuel to CARB (15 ppm) fuel.

**Test methods:** EPA/CARB Nonroad emissions recorded per 40CFR89 (ref. ISO8178-1) and weighted at load points prescribed in Subpart E, Appendix A for Constant Speed Engines (ref. ISO8178-4, D2).

**Diesel fuel specifications:** Cetane Number: 40-48. Reference: ASTM D975 No. 2-D.

**Reference conditions:** Air inlet temperature: 25 °C (77 °F), Fuel inlet temperature: 40 °C (104 °F). Barometric pressure: 100 kPa (29.53 in Hg), Humidity: 10.7 g/kg (75 grains $H_2O$/lb) of dry air; required for $NO_X$ correction, Restrictions: Intake restriction set to a maximum allowable limit for clean filter; Exhaust back pressure set to a maximum allowable limit.

Tests conducted using alternate test methods, instrumentation, fuel or reference conditions can yield different results.

Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may result in elevated emission levels.

June 15th, 2021

To Whom It May Concern:

With regards to Cummins Power Systems (CPS) manufactured diesel generator set model **C3750 D5e** rated for 50 Hz operation and equipped with Cummins **QSK95-G10** engine:

When tested under the following conditions:

| **Table 1** | |
|---|---|
| Fuel Specification: | ASTM D975 No. 2-D S15 diesel fuel with 0.0015% sulfur content (by weight), and 42-48 cetane number. |
| Air Inlet Temperature: | 77 °F |
| Fuel Inlet Temperature: | 104 °F (at fuel pump inlet) |
| Barometric Pressure: | 29.53 in. Hg |
| Humidity: | NOx measurement corrected to 75 grains H2O/lb. dry air |

Based on engine emissions validation testing, the table below represents the nominal performance and exhaust emissions data for the generator set listed above:

| | **Standby** | | | | |
|---|---|---|---|---|---|
| PERFORMANCE DATA | **10%** | **25%** | **50%** | **75%** | **100%** |
| BHP @ 1500 RPM (50 Hz) | 592 | 1217 | 2259 | 3302 | 4386 |
| Power Output (KWe) | 300 | 750 | 1500 | 2250 | 3000 |
| Fuel Consumption L/Hr | 141 | 244 | 421 | 575 | 755 |
| Exhaust Gas Flow m3/min | 168 | 251 | 396 | 491 | 590 |
| Exhaust Gas Temperature °C | 288 | 360 | 380 | 385 | 432 |
| | | | | | |
| **NMHC (Nonmethane Hydrocarbons)** | 145 | 87 | 57 | 37 | 28 |
| **NOx (Oxides of Nitrogen)** | 1371 | 1386 | 1543 | 2334 | 2998 |
| **CO (Carbon Monoxide)** | 326 | 136 | 90 | 56 | 105 |
| **PM (Particulate Matter)** | 59 | 42 | 26 | 11 | 11 |
| All emissions values above are cited as mg/Nm3 @ 5% O2 and normalized to 0°C and 101.325 kPa | | | | | |
| **CO2 (Carbon Dioxide)** | 856 | 721 | 670 | 626 | 619 |
| CO2 emissions values are cited as g/KW-hr and are calculated | | | | | |
| **Oxygen (% Dry)** | 14.9 | 13.0 | 12.2 | 11.3 | 9.8 |

Steady-State emissions recorded per ISO8178-1 during operation at rated engine speed (+/-2%) and stated constant load (+/-2%) with engine temperatures, pressures and emission rates stabilized.

The NOx, HC, CO, and PM emission data tabulated here are representative of test data taken from a single engine under the test conditions shown above. Data for the other components are estimated. This data is subject to instrumentation and engine-to-engine variability. Field emissions test data is not guaranteed to these levels. Actual field test results may vary due to test ambient, site conditions, installation, fuel specification, test procedures, instrumentation and ambient correction factors. Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may result in elevated emission levels.

| | **Standby** | | | | |
|---|---|---|---|---|---|
| PERFORMANCE DATA | **10%** | **25%** | **50%** | **75%** | **100%** |
| BHP @ 1500 RPM (50 Hz) | 592 | 1217 | 2259 | 3302 | 4386 |
| Power Output (KWe) | 300 | 750 | 1500 | 2250 | 3000 |
| | | | | | |
| **NMHC (Nonmethane Hydrocarbons)** | 247 | 148 | 97 | 63 | 48 |
| **NOx (Oxides of Nitrogen)** | 1768 | 1788 | 1990 | 3010 | 3867 |
| **CO (Carbon Monoxide)** | 652 | 272 | 180 | 112 | 210 |
| **PM (Particulate Matter)** | 148 | 105 | 65 | 28 | 28 |
| All emissions values are cited as mg/Nm3 @5% O2 and normalized to 0°C and 101.325 kPa | | | | | |
| ***Potential Site variation values provided above account for Engine, Ambient and Measurement variation with no correction factors.*** | | | | | |

This letter does not supersede any of the commercial terms of sale, including, but not limited to, warranty coverage and compliance with law obligations. THE INFORMATION IN THIS LETTER IS PROVIDED “AS IS” AND WITH ALL FAULTS AND DEFECTS. CUMMINS DOES NOT WARRANT THE ACCURACY OF THE INFORMATION PROVIDED AND THIS LETTER SHOULD NOT BE SHARED WITH THIRD PARTIES WITHOUT CUMMINS PRIOR WRITTEN CONSENT. For further questions on this product or application, please contact the local Cummins Sales and Service representative.

Best Regards,

Tochukwu Duru
Application Engineer – Strategic Accounts (Data Center)
Office: +1 (651) 787-6252

# Appendix C Electrical Line Drawing

## Environmental Permit Variation Application

### Best Available Techniques and Operating Techniques

**Telehouse International Corporation of Europe Limited**

SLR Project No.: 410.066261.00001

LEVEL 0

TW2-00-GR1-GEN-01 (Generator) — TW2-00-GR1-GCLB-GEN01 (Generator MV Cable Link Box) — Cn A01 Cn B01
TW2-00-GR1-GEN-02 (Generator) — TW2-00-GR1-GCLB-GEN02 (Generator MV Cable Link Box) — Cn A02 Cn B02
TW2-00-GR2-GEN-03 (Generator) — TW2-00-GR2-GCLB-GEN03 (Generator MV Cable Link Box) — Cn A03 Cn B03
TW2-00-GR2-GEN-04 (Generator) — TW2-00-GR2-GCLB-GEN04 (Generator MV Cable Link Box) — Cn A04 Cn B04
TW2-00-GR3-GEN-05 (Generator) — TW2-00-GR3-GCLB-GEN05 (Generator MV Cable Link Box) — Cn A05 Cn B05
TW2-00-GR3-GEN-06 (Generator) — TW2-00-GR3-GCLB-GEN06 (Generator MV Cable Link Box) — Cn A06 Cn B06
TW2-00-GR4-GEN-07 (Generator) — TW2-00-GR4-GCLB-GEN07 (Generator MV Cable Link Box) — Cn A07 Cn B07
TW2-00-GR4-GEN-08 (Generator) — TW2-00-GR4-GCLB-GEN08 (Generator MV Cable Link Box) — Cn A08 Cn B08
TW2-00-GR5-GEN-09 (Generator) — TW2-00-GR5-GCLB-GEN09 (Generator MV Cable Link Box) — Cn A09 Cn B09
TW2-00-GR5-GEN-10 (Generator) — TW2-00-GR5-GCLB-GEN10 (Generator MV Cable Link Box) — Cn A10 Cn B10
TW2-00-GR6-GEN-11 (Generator) — TW2-00-GR6-GCLB-GEN11 (Generator MV Cable Link Box) — Cn A11 Cn B11
TW2-00-GR6-GEN-12 (Generator) — TW2-00-GR6-GCLB-GEN12 (Generator MV Cable Link Box) — Cn A12 Cn B12

WEST RISER

REFER TO TW2001-CDL-TW2-ZZ-SD-E-613102/3 - ELECTRICAL MV SINGLE LINE DIAGRAM - OVERVIEW - SHEET 2

EAST RISER

REFER TO TW2001-CDL-TW2-ZZ-SD-E-613102/3 - ELECTRICAL MV SINGLE LINE DIAGRAM - OVERVIEW - SHEET 2

**TW2-00-SW2-MVSW-A-02**

11kV SWITCHBOARD
In = 2500A
In = 31.5kA for 3sec
FRONT/REAR ACCESS
TOP CABLE ENTRY/EXIT

TW2-00-MVSW-A-02-C01 … TW2-00-MVSW-A-02-C16

BBE — Q02 1250A CB N/O — Q03 1250A CB N/C — Q04 1250A CB N/O — Q05 1250A CB N/C — Q06 2500A CB N/O — Q07 630A CB — Q08 630A CB — Q09 630A CB — Q10 630A CB — Q11 630A CB — Q12 630A CB — Q13 630A CB — Q14 630A CB — Q15 630A CB — Q16 630A CB — Q17 630A CB — Q18 630A CB — SPACE

Q01 2500A CB N/C — 87L — OC/EF — MEAS — 87B

MECHANICAL / ELECTRICAL INTERLOCK

Cn A01 … Cn A12

**TW2-00-SW1-MVSW-B-02**

11kV SWITCHBOARD
In = 2500A
In = 31.5kA for 3sec
FRONT/REAR ACCESS
TOP CABLE ENTRY/EXIT

TW2-00-MVSW-B-02-C16 … TW2-00-MVSW-B-02-C01

SPACE — Q18 630A CB — Q17 630A CB — Q16 630A CB — Q15 630A CB — Q14 630A CB — Q13 630A CB — Q12 630A CB — Q11 630A CB — Q10 630A CB — Q09 630A CB — Q08 630A CB — Q07 630A CB — Q06 2500A CB N/O — Q05 1250A CB N/O — Q04 1250A CB N/C — Q03 1250A CB N/O — Q02 1250A CB N/C — VT

Cn B12 … Cn B01 — Q19 630A CB — LOAD BANK BREAKER — BBE — Q01 1250A CB N/C — 87L — OC/EF — MEAS — 87B — VT

MECHANICAL / ELECTRICAL INTERLOCK

ELECTRICAL INTERLOCK BETWEEN EACH PAIR OF RING BREAKERS

TW2-00-MVSWW-A-01-C01 — TW2-00-MVSW-A-01-C02 — TW2-00-MVSW-A-01-C03 — TW2-00-MVSW-B-01-C03 — TW2-00-MVSW-B-01-C01

**TW2-00-SW2-MVSW-A-01**

11kV SWITCHBOARD
(BY OTHERS)
In = 4000A
In = 31.5kA for 3sec
FRONT/REAR ACCESS
TOP CABLE ENTRY AND EXIT

2500A CB N/C — 2500A CB N/C — 2500A CB N/C — 4000A CB N/C — 132/11kV TRANSFORMER 66 MVA KNAN YNyn0

TW2-00-SUBS-A-01

TO OTHER BUILDINGS

**TW2-00-SW2-MVSW-A-03**

11kV SWITCHBOARD
In = 2500A
In = 31.5kA for 3sec
FRONT/REAR ACCESS
TOP CABLE ENTRY/
BOTTOM EXIT

2500A CB N/C — 630A CB — 630A CB — 1250A CB — 1250A CB — 1250A CB

**TW2-00-SW1-MVSW-B-03**

11kV SWITCHBOARD
In = 2500A
In = 31.5kA for 3sec
FRONT/REAR ACCESS
TOP CABLE ENTRY/
BOTTOM EXIT

2500A CB N/C — 1250A CB — 1250A CB — 1250A CB — 630A CB — 630A CB

TO OTHER BUILDINGS

**TW2-00-SW1-MVSW-B-01**

11kV SWITCHBOARD
(BY OTHERS)
In = 4000A
In = 31.5kA for 3sec
FRONT/REAR ACCESS
TOP CABLE ENTRY AND EXIT

2500A CB N/C — 2500A CB N/O — 2500A CB N/C — 4000A CB N/C — 132/11kV TRANSFORMER 66 MVA KNAN YNyn0

TW2-00-SUBS-B-01

GENERAL NOTES

A. THIS DRAWING INDICATES RIBA STAGE 4 DESIGN INFORMATION. THE LEVEL OF DETAIL SHOWN IS IN LINE WITH THIS STAGE OF DESIGN DEVELOPMENT AS DEFINED BY THE BSRIA DESIGN FRAMEWORK BG 6/2018. DUE CONSIDERATION SHOULD BE MADE WHEN INTERPRETING THIS DESIGN.

B. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH THE REFERENCE DESIGN DOCUMENTATION, WORK PACKAGE SCOPE OF WORKS, AND ALL OTHER SUPPORTING TECHNICAL INFORMATION FORMING PART OF THE TW2 RIBA STAGE 4 DESIGN PACKAGE.

C. ALL DIMENSIONS IN mm UNLESS OTHERWISE STATED.

D. DO NOT SCALE FROM THIS DRAWING.

PARTICULAR NOTES: (#)
(NOT ALL NOTES BELOW MAY BE USED ON THIS SHEET)

1. FOR ELECTRICAL SYMBOLS AND LEGEND REFER TO DRAWING TW2001-CDL-TW2-ZZ-DR-E-000001 - ELECTRICAL LEGEND AND GENERAL NOTES.
2. ALL CIRCUIT BREAKERS TO BE MOTORISED.
3. BREAKERS MONITORED AND CONTROLLED BY GENERATOR SYSTEMS
4. PMS TO CONTROL ALL NON-GEN BREAKERS
5. MONITORING AND CONTROL AS SUBSTATION PERFOMANCE SPECIFICATION.

PHASE 1
PHASE 2
PHASE 3
BY OTHERS

Checked — Verified

| Rev | Date | By | Description |
|---|---|---|---|
| C01 | 24/10/24 | PM | ISSUED FOR TENDER |

DRAWING STATUS: A4 - AUTHORISED AND ACCEPTED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PROJECT: TELEHOUSE WEST 2
DESIGNER/CONTRACTOR PROJECT NO: 1036281

TITLE: ELECTRICAL MV SINGLE LINE DIAGRAM - OVERVIEW - SHEET 1

| DRAWN BY: | Date | CHECKED BY: | Date | Sheet Size | Scale(s) |
|---|---|---|---|---|---|
| PM | 24/10/2024 | PW | 24/10/2024 | A0 @ | NTS |

DRAWING No: TW2001-CDL-TW2-ZZ-SD-E-613101 — Sheet No: 1/3 — REV: C01

This drawing identifies Employers Requirements and must be read together with all other contract documents and may not specifically indicate everything that is required for the full completion of the works. Include for all elements, including temporary works, necessary for the construction commissioning, handover and operation of the building and associated systems.

# Appendix D Drainage Plan

## Environmental Permit Variation Application

### Best Available Techniques and Operating Techniques

**Telehouse International Corporation of Europe Limited**

SLR Project No.: 410.066261.00001

# EAST INDIA DOCK ROAD

## NUTMEG LANE

KEY

- SITE BOUNDARY
- SURFACE WATER DRAIN
- FOUL WATER DRAIN
- SURFACE WATER DRAINAGE DIRECTED TOWARDS RAINWATER HARVESTING TANK
- PROPOSED RAINWATER HARVESTING TANK (8000 LITRE CAPACITY)
- PROPOSED PETROL INTERCEPTOR AND VENT PIPE
- RAINWATER DOWNPIPE — RWP
- SOIL STACK — SS
- FOUL WATER GULLY — FG
- SOIL VENT PIPE — SVP
- FOUL LINEAR DRAIN DROP POINT — LD
- FILTER TRENCH
- PERFORATED PIPE
- FIRE LIFT CHANNEL DRAIN
- ACO MULTIDRAIN
- SURFACE WATER STORAGE TANK
- PERMEABLE REINFORCED GRASS SURFACE
- INLINE ONE WAY VALVE

SW28 CL 5.282 IL 3.960 — 300mmØ @ 1:240 — SW27 CL 5.477 IL 4.023 — 300mmØ @ 1:240 — SW26 CL 5.542 IL 4.118 — 300mmØ @ 1:240 — SW03 CL 5.867 IL 5.264 SEALED — 300mmØ @ 1:240 — SW04 CL 5.894 IL 5.216 SEALED — 300mmØ @ 1:240 — SW25 CL 5.700 IL 4.276 — SW05 CL 5.921 IL 5.172 SEALED

SW01 CL 6.300 IL 5.375 — 300mmØ @ 1:240 — SW02 CL 6.300 IL 5.286

SW31 CL 6.228 IL 4.807 — 300mmØ @ 1:240 — 150mmØ @ 1:100

SW30 CL 6.021 IL 3.877 — 300mmØ @ 1:50 — 150mmØ @ — SW32 CL 6.212 IL 4.723 — SW33 CL 6.246 IL 3.867 — SW29 CL 6.092 IL 4.430

150mm Ø FIRE LIFT CHANNEL OUTLETS AT GROUND FLOOR WITH INLINE ONE-WAY VALVES (STOP SILENT OR EQUIVALENT APPROVED) INSTALLED AT OUTLET TO MANHOLE

FW04 CL 6.300 IL 5.065 — FW05 CL 6.300 IL 5.300 — 150mmØ @ 1:10 — 150mmØ @ 1:60 — 150mmØ @ 1:10 — FW06 CL 6.300 IL 5.300 — 150mmØ @ 1:60 — BELOW SLAB FW PIPES TO BE CAST IN-SITU WITH GROUND FLOOR SLAB AS FULLY ENCASED SUSPENDED DRAINAGE WITHIN TANK VOID

FW07 CL 6.300 IL 5.500 — FW08 CL 6.300 IL 5.400 — 150mmØ @ 1:35 — BDIL 5.300 — FW09 CL 6.300 IL 4.845 — 150mmØ @ 1:25 — FW10 CL 6.300 IL 4.480 — 150mmØ @ 1:60 — FW11 CL 6.300 IL 4.000 — 150mmØ @ 1:60 — FW12 CL 6.300 IL 5.500 — 150mmØ @ 1:35 — BDIL 5.250 — 150mmØ @ 1:40 — FW14 CL 6.300 IL 3.785 — 150mmØ @ 1:60 — FW16 CL 6.300 IL 3.545 — FW17 CL 6.300 IL 3.515 — FW15 CL 6.300 IL 3.595

FW02 CL 6.300 IL 5.300 — SVP — LD — 150mmØ @ 1:40 — FW03 CL 6.300 IL 5.180 — 150mmØ @ 1:40 — FW01 CL 6.300 IL 5.480

SURFACE WATER ATTENUATION TANK [CAST IN-SITU CONCRETE CONSTRUCTION]

EXCEEDANCE LEVEL = 6.300
SOFFIT LEVEL = 5.800
INVERT LEVEL = 3.200
AREA = 191.6m²
DEPTH = 1.5m
VOLUME = 287.4m³

IL 3.456 — IL 3.200 — 1:300 FALLS TO CENTRAL CHANNEL TO BE FORMED BY SCREED IN BASE OF RC TANK — 450mmØ @ 1:400 — IL 3.480

SW36 HYDRO INTERNATIONAL DOWNSTREAM DEFENDER CL 5.788 IL 3.077 — 150Ø @ 1:150 — EXISTING MH EX CL 5.170 NEW CL 5.600 IL 2.920 — SW34 CL 5.793 IL 3.116

OVERFLOW PIPE AT HIGH LEVEL TO DISCHARGE STORMWATER IN 1 IN 30 AND 1 IN 100 (+40% CLIMATE CHANGE) RAINFALL EVENTS — OVERFLOW PIPE OUTGOING IL 3.636 — SW35 [VORTEX FLOW CONTROL] CL 5.615 IL 3.107 DISCHARGE RATES: 1:2 YEAR = 2.2l/s 1:30 YEAR = 5.8l/s 1:100 YEAR = 8.4l/s — SW19 CL 5.920 IL 3.126 — 300mmØ @ 1:240 — 300mmØ @ 1:50 — BDIL 3.997 — SW18 CL 5.700 IL 4.487

300mmØ @ 1:240 — SW16 CL 6.281 IL 4.774 — 300mmØ @ 1:240 — BDIL 4.716 — SW17 CL 6.273 IL 3.485 CATCHPIT — 450mmØ @ 1:400 — 450mmØ @ 1:400 — 450mmØ @ 1:400

RWP

NOTES

1. THIS DRAWING MUST NOT BE USED FOR CONSTRUCTION OR INSTALLATION PURPOSES UNLESS EXPRESSLY STATED.
2. DO NOT SCALE OFF THIS DRAWING. ALWAYS WORK TO NOTED DIMENSIONS.
3. ALL DIMENSIONS MUST BE VERIFIED ON SITE BEFORE COMPLETING SHOP DRAWINGS OR SETTING OUT THE WORKS.
4. THIS DRAWING IS TO BE CONSIDERED IN CONJUNCTION WITH THE CIVIL ENGINEERING SPECIFICATION, EMPLOYERS REQUIREMENTS, AND OTHER RELEVANT CIVILS DRAWINGS.
5. THIS DRAWING SHOULD BE READ IN THE CONTEXT OF THE WIDER TENDER SUBMISSION, INCLUDING ARCHITECTURAL, STRUCTURAL, GEOTECHNICAL, AND OTHER DISCIPLINES DESIGN INFORMATION.
6. FOUL WATER DROP POINTS INVERT LEVELS @ 5.500mAOD U.N.O.
7. REFER TO PUBLIC HEALTH DRAWINGS FOR RAINWATER PIPE DIAMETERS. ALL RAINWATER PIPE LOCATIONS TO BE CONFIRMED WITH PUBLIC HEALTH ENGINEERS AT NEXT DESIGN STAGE.
8. THIS DOCUMENT IDENTIFIES EMPLOYERS REQUIREMENTS AND MUST BE READ TOGETHER WITH ALL OTHER CONTRACT DOCUMENTS AND MAY NOT SPECIFICALLY INDICATE EVERYTHING THAT IS REQUIRED FOR THE FULL COMPLETION OF THE WORKS, INCLUDE FOR ALL ELEMENTS. INCLUDING TEMPORARY WORKS, NECESSARY FOR THE CONSTRUCTION COMMISSIONING, HANDOVER AND OPERATION OF THE BUILDING AND ASSOCIATED SYSTEMS.
9. EXISTING LEVELS INCLUDED ON DRAWING ARE TAKEN FROM MICHAEL GALLIE SURVEY DRAWING NO: 9323/01, REVISION D, DATED FEBURARY 2023. THESE LEVELS DO NOT ACCOUNT FOR THE DEMOLITION OF THE EXISTING STRUCTURE OR ANY REMEDIATION THAT MAY HAVE OCCURRED SINCE THE SURVEY WAS UNDERTAKEN.
10. PROPOSED MASTERPLAN BASED ON TTSP DRAWING TW2001-TSP-TW2-00-DR-A-120102-P01, RECEIVED BY CUNDALL 09/10/24. MASTERPLAN ADDED TO DRAWING BEST FIT BASED ON TOPOGRAPHIC SURVEY 9323/01, REVISION D. CUNDALL CANNOT PROVIDE GUARANTEE ON THE ACCURACY OF THE LOCATION OF THE MASTERPLAN.
11. ALL EXCAVATIONS SHALL BE KEPT FREE OF STANDING WATER. THE CONTRACTOR SHALL ENSURE THE STABILITY OF ALL EXCAVATIONS IS MAINTAINED AT ALL TIMES.
12. COVER LEVELS SHOWN ON THIS DRAWING ARE APPROXIMATE ONLY. EXACT COVER LEVELS OF NEW COVERS AND FRAMES TO BE DETERMINED ON SITE TO MATCH LEVEL PROFILE OF FINISHED SURFACE. REFER TO LANDSCAPE ARCHITECTS DRAWINGS FOR FINISHED COVER LEVELS IN LANDSCAPE AREAS AND TO CUNDALL SCHEDULES FOR FINISHED LEVELS IN ROADS AND FOOTWAYS.
13. FOR STANDARD MANHOLES, THE DEPTH SHOWN IS COVER TO OUTGOING INVERT LEVEL. INCOMING PIPEWORK TO BE SOFFIT TO SOFFIT UNLESS OTHERWISE STATED. COVER OPENING AND CHAMBER SIZES INDICATED ARE MINIMUM PERMITTED. COVERS TO HAVE CORRECT LOAD CLASS FOR THEIR APPLICATION PER BS EN 124:1994.

CDM CONSIDERATION

1. CONTRACTOR TO ENSURE THAT THE STABILITY AND INTEGRITY OF THE EXISTING RETAINING WALL IS MAINTAINED AT ALL TIMES WHEN UNDERTAKING EXCAVATION IN ITS PROXIMITY AND GENERALLY DURING CONSTRUCTION.
2. THAMES FLOOD DEFENCE BREACH EVENT - IN THE CASE OF A THAMES FLOOD DEFENCE BREACH EVENT EA MODELLING SHOWS THE SITE DOES NOT FLOOD. EAST INDIA DOCK ROAD (A13) THOUGH WILL FLOOD.

NOTE

SURFACE WATER TANK HAS BEEN UPDATED SINCE THE STAGE 4 ISSUE. REVISED LOCATION AND LAYOUT REQUIRES CONFIRMATION FOR STRUCTURAL ACCEPTABILITY (INCLUDING BUT NOT LIMITED TO GROUND BEAM DESIGN, LAYOUT & COORDINATION, PILE LOADING ETC.)

| Rev | Date | By | Description |
|---|---|---|---|
| C02 | 08/05/25 | IS | ISSUED FOR INFORMATION |
| C01 | 24/10/24 | LC | ISSUED FOR TENDER |

DRAWING STATUS: A4 - AUTHORISED AND APPROVED

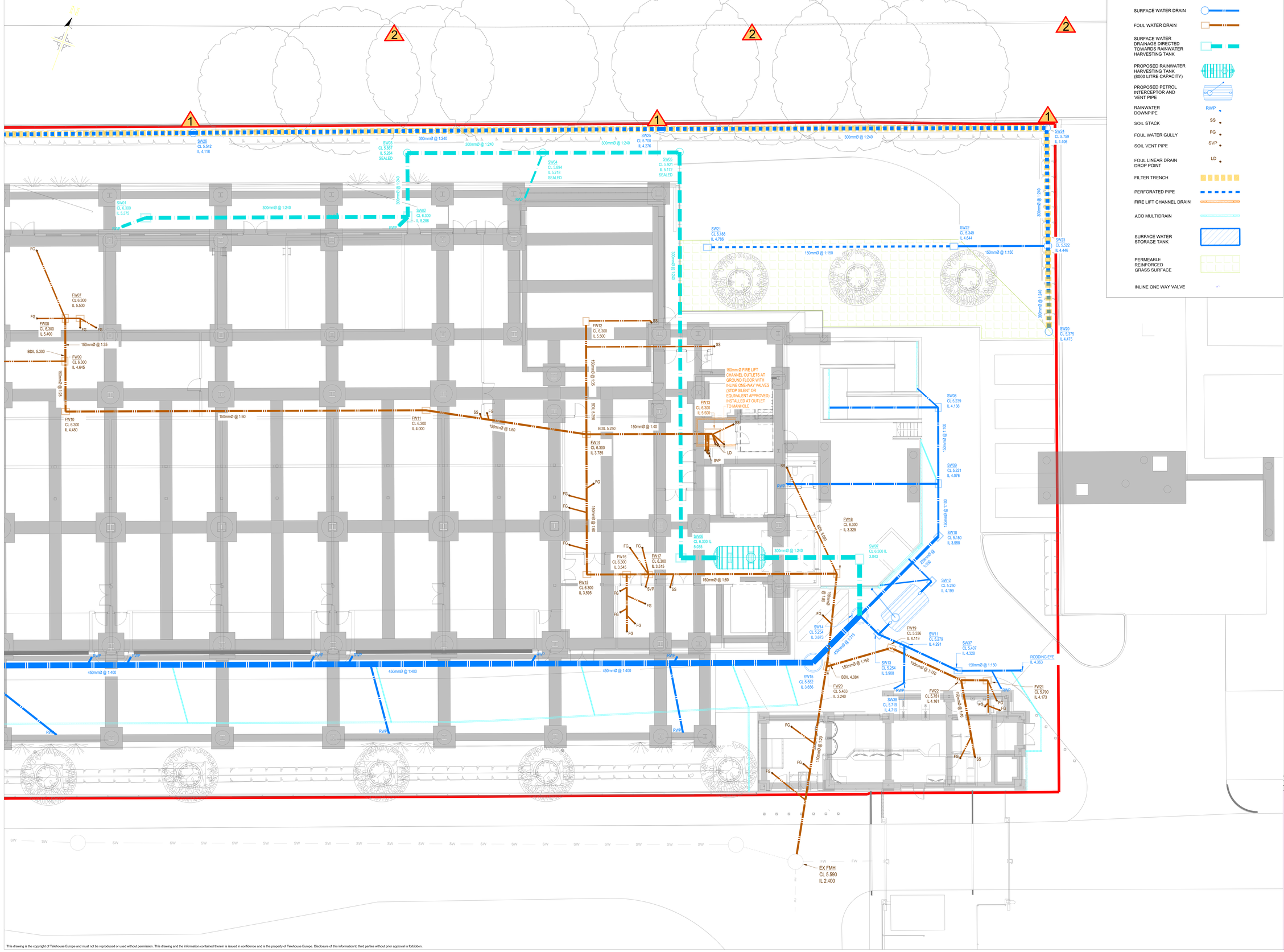
PROJECT: TELEHOUSE WEST 2
DESIGNER/CONTRACTOR PROJECT NO: 1036281

TITLE: BELOW GROUND DRAINAGE PROPOSED LAYOUT SHEET 1

| DRAWN BY: | Date | CHECKED BY: | Date | Sheet Size | Scale(s) |
|---|---|---|---|---|---|
| LC | 11/10/2024 | AC | 11/10/2024 | A0 @ | 1:100 |

DRAWING No: TW2001-CDL-TW2-XX-DR-C-900200 — Sheet No: 1/2 — REV: C02

# EAST INDIA DOCK ROAD




KEY

- SITE BOUNDARY
- SURFACE WATER DRAIN
- FOUL WATER DRAIN
- SURFACE WATER DRAINAGE DIRECTED TOWARDS RAINWATER HARVESTING TANK
- PROPOSED RAINWATER HARVESTING TANK (8000 LITRE CAPACITY)
- PROPOSED PETROL INTERCEPTOR AND VENT PIPE
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- ACO MULTIDRAIN
- SURFACE WATER STORAGE TANK
- PERMEABLE REINFORCED GRASS SURFACE
- INLINE ONE WAY VALVE

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CDM CONSIDERATION

1. CONTRACTOR TO ENSURE THAT THE STABILITY AND INTEGRITY OF THE EXISTING RETAINING WALL IS MAINTAINED AT ALL TIMES WHEN UNDERTAKING EXCAVATION IN ITS PROXIMITY AND GENERALLY DURING CONSTRUCTION.
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3. <1.5m³ FLOODING OCCURS FROM MANHOLE SW01 IN THE 1:100 YEAR + 40 % CC EVENT. FLOODING CAUSED BY PRESSURE ISSUES IN PIPE DOWNSTREAM OF SW05 RATHER THAN SYSTEM CAPACITY PROBLEM. MODELLING SHOWS SUFFICIENT CAPACITY IN FILTER DRAIN TO NORTH TO COLLECT, CONTROL AND MANAGE FLOODED VOLUMES ENSURING IT DOES NOT FLOW ONTO THE A13.

NOTE

SURFACE WASTER TANK HAS BEEN UPDATED SINCE THE STAGE 4 ISSUE. ACCEPTABILITY OF REVISED LOCATION AND LAYOUT REQUIRES CONFIRMED STRUCTURALLY.

| Rev | Date | By | Description |
|---|---|---|---|
| C02 | 08/05/25 | IS | ISSUED FOR INFORMATION |
| C01 | 24/10/24 | LC | ISSUED FOR TENDER |

DRAWING STATUS: A4 - AUTHORISED AND APPROVED

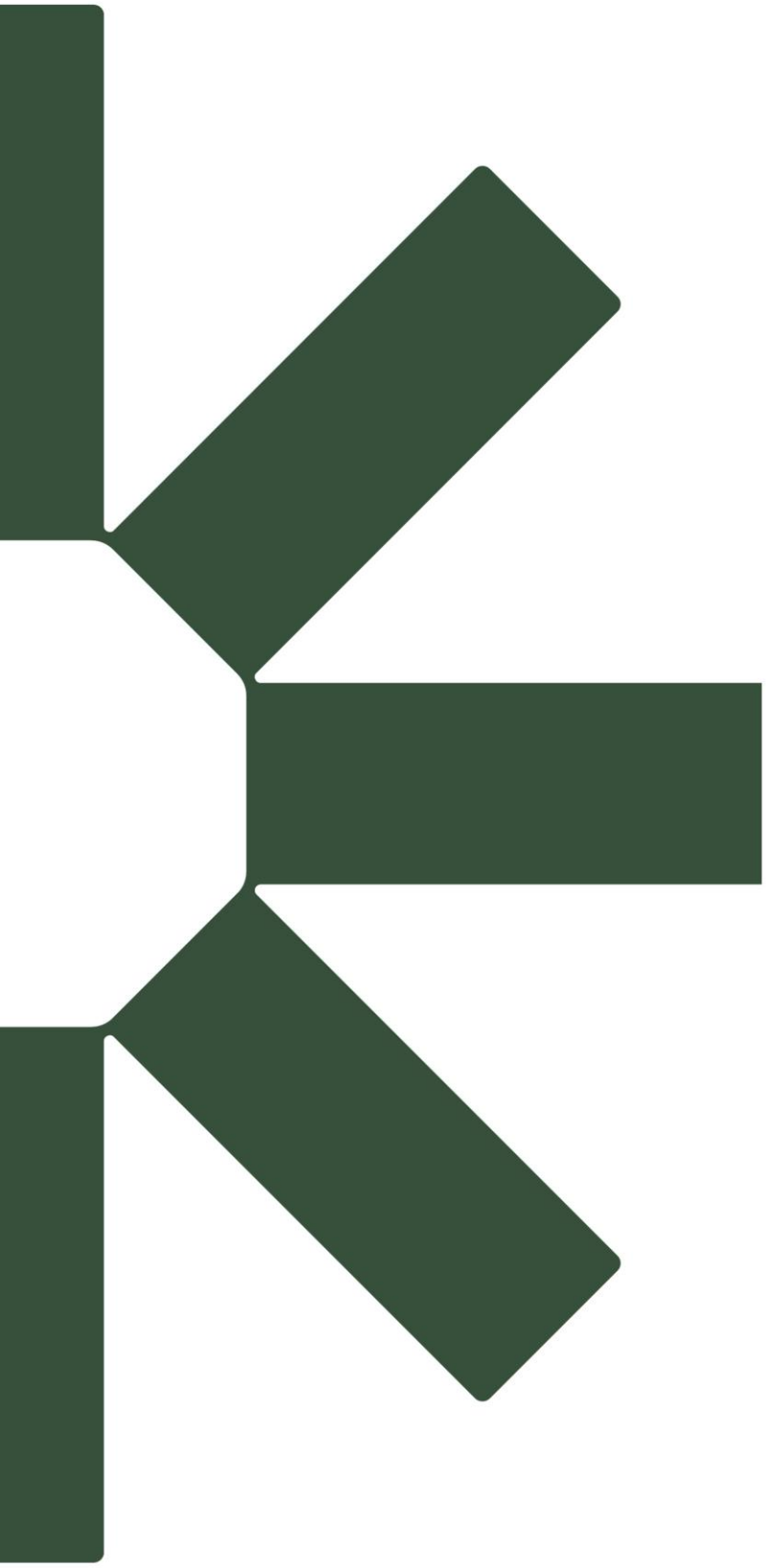
PROJECT: TELEHOUSE WEST 2

DESIGNER/CONTRACTOR PROJECT NO: 1036281

TITLE: BELOW GROUND DRAINAGE PROPOSED LAYOUT SHEET 2

| DRAWN BY: | Date | CHECKED BY: | Date | Sheet Size | Scale(s) |
|---|---|---|---|---|---|
| LC | 11/10/2024 | AC | 11/10/2024 | A0 @ | 1:100 |

DRAWING No: TW2001-CDL-TW2-XX-DR-C-900201 — Sheet No: 2/2 — REV: C02



Making Sustainability Happen