# WEDNESBURY WASTE MANAGEMENT RESOURCE CENTRE

# ENVIRONMENTAL PERMIT VARIATION APPLICATION

# PERMIT REFERENCE EPR/XP3631SE/V006

# NON-TECHNICAL SUMMARY AND SUPPORTING STATEMENT

# DECEMBER 2024

Registered Office: Coronation Road,
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**Biffa Waste Services Limited**
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**Leicester,**
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# 1.0 EXECUTIVE SUMMARY

Biffa Waste Services Limited (Biffa) is the Operator at the Wednesbury Waste Management Resource Centre (the Site). Biffa is also the permit holder at the Site for the existing permits. Biffa purchased the Site from the original operator and permit holder during the early 1990's. Following purchase of the Site the original Permit was subsequently transferred to Biffa. Biffa subsequently applied for a second (PPC) permit, which only partly superseded the original permit. Biffa has since submitted a response to comply with the requirements of a Regulation 61(1) Notice, issued by the Environment Agency (the Agency) as part of their review under BAT of the chemical waste sector permits. That review is currently underway and it is expected that the existing permits will have been consolidated into a single Environmental Permit following the review.

This variation application is being submitted to vary one of the permits although based upon discussions with the Agency, this variation may be picked up by the officer determining the Regulation 61 review and dealt with at the same time.

The original permit issued for the Site, comprised a Waste Disposal Licence (WDL) issued on 28th July 1987 as SL528 by Sandwell Metropolitan Borough Council (then the relevant Waste Disposal Authority) under the provisions of the Control of Pollution Act 1974 and later transferred to Biffa. The WDL permitted the treatment and transfer of hazardous and non-hazardous wastes. The WDL later fell to be treated as a Waste Management Licence (WML) under the provisions of the Environmental Protection Act 1990 and was renumbered to EAWML41706. The WML was modified eight times between 1st December 1991 and 9th April 1998. It was then part superseded by the issue of a PPC permit. The WML later fell to be treated as an Environmental Permit under the provisions of the Environmental Permitting Regulation 2007 and was renumbered to TP3696FN. This permit currently covers all residual waste activities at the Site.

The second permit issued to Biffa comprised a Pollution Prevention and Control (PPC) Permit issued on 30th June 2006 under the provisions of the Pollution Prevention and Control Regulations 2000 (PPC Regs). The PPC permit was issued (as XP3631SE) under the transitional provisions of the PPC Regs and part superseded the original waste management licence, with newly prescribed installation activities relating to treatment for disposal of hazardous and non-hazardous wastes being covered on the PPC permit. Other activities remained under the former WML, including storage and treatment of wastes for recovery (hazardous and non-hazardous) and transfer of non-hazardous wastes (for disposal or recovery). The PPC permit subsequently became an Environmental Permit under the Environmental Permitting Regulations 2007 and covers waste installation activities at the Site.

The installation permit was subsequently varied (variation V002) on 19th August 2011 to reduce the annual waste throughput, reduce the discharge rate to sewer and to add additional EWCs to table S3.9 that had been omitted during issue of the permit. The permit was further varied (variation V003) on 12/10/2011 to increase the annual throughput of wastes accepted and treated under table S3.6. The permit was later updated (via variation V004) on 10th December 2013) to align with changes made to the Environmental Permitting Regulations (EPR) under IED, with the references under Table S1.1 being amended from treatment for disposal of hazardous and non-hazardous waste under S5.3 (as defined under the PPC Regs

and the later Environmental Permitting Regulations 2007), to the updated description in EPR 2013 of disposal or recovery of hazardous waste under S5.3, with storage of hazardous waste moved to the new description of S5.6.

It should be noted that whilst the Permit had also previously included treatment for disposal of non-hazardous wastes using the original PPC Regs description under S5.3A(1)(c), the varied permit omitted to include the corresponding new description for treatment for disposal of non-hazardous waste using the equivalent new description now under S5.4A(1)(a). This apparent omission had gone unnoticed until preparation of the Regulation 61 response, albeit the treatment of non-hazardous waste for disposal has continued at the site above the installation threshold as originally permitted prior to 2013. Notwithstanding this omission, the relevant EWC codes for the non-hazardous wastes have continued to be included on the Permit, which in error no longer includes any activities relating to non-hazardous wastes under table S1.1. This was raised for attention during the Regulation 61 review process.

This application is for a further variation of the waste installation permit, XP3631SE.

The Site is currently authorised (waste installation permit) to accept and process up to 196,200 tonnes per annum of hazardous and non-hazardous liquid and solid wastes. However, the processing of other than solid wastes would be limited by the restriction on the trade effluent discharge consent and corresponding permit condition which limits throughput to 145,600 tonnes per annum.

In connection with the above, the Permit authorises the following listed activities in accordance with Schedule 1 of the EP Regs, although as noted corresponding S5.4 activities are absent:

- Section 5.3 Part A(1)(a)(ii), namely:

  "Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving physico-chemical treatment." The following ten individual activities are included on the Permit under this heading:

  - Acid/lime neutralisation (80,000 tonnes per annum)
  - Large redox (5,000 tonnes per annum)
  - Small redox (10,000 tonnes per annum)
  - Batch redox (3,700 tonnes per annum)
  - VOC stripping (20,000 tonnes per annum
  - Ammonia stripping (20,000 tonnes per annum)
  - Solidification/encapsulation (5,000 tonnes per annum)
  - Carbon desorption (5,000 tonnes per annum)
  - Advanced redox (2,500 tonnes per annum)
  - Oil and water gravity separation (15,000 tonnes per annum)
  - Effluent treatment plant including pH adjustment (145,600 tonnes per annum)
- Section 5.3 Part A(1)(a)(iii), namely:

"Recovery of hazardous waste soils with a capacity exceeding 10 tonnes per day involving blending or mixing." The following individual activities are included on the Permit under this heading:

- Blending and mixing of hazardous waste (15,000 tonnes per annum)

- Section 5.3 Part A(1)(a)(iv), namely:

"Recovery of hazardous waste soils with a capacity exceeding 10 tonnes per day involving repackaging." The following individual activities are included on the Permit under this heading:

- Repackaging of hazardous wastes (15,000 tonnes per annum)

Section 5.6 Part A(1)(a), namely:

"Temporary storage of hazardous waste with a capacity exceeding 50 tonnes per day." This currently restricts the storage to 18,700 tonnes per annum, but this has also been raised as an error as part of the Regulation 61 review, as this relates to the original throughput of wastes that were subject to oil and water gravity separation only and the annual throughput to cover all hazardous waste activities would be nearer 180,000 tonnes per annum.

The Permit also authorises the following Directly Associated activities:

- Storage of acid;
- Storage of lime;
- Storage of sodium hydroxide;
- Storage of hydrogen peroxide;
- Storage of sodium hypochlorite;
- Storage of filter cake;
- Washing and size reduction of drums and containers;
- Boiler with capacity of less than 1.2MW thermal input for providing heat to the ammonia stripping process.

Biffa wishes to make a variation to the Permit. This comprises the addition of a further activity under S5.3 Part A(1)(a)(ii) to allow physico-chemical treatment of nitrous oxide received in pressure containers. Containers would be punctured in a sealed unit and the nitrous oxide evacuated via a vacuum pump and passed to a destruction unit where a heated catalytic bed decomposes the nitrous oxide to nitrogen and oxygen which can be returned to atmosphere via a new emission point. The process reduces a potential greenhouse gas to atmospheric oxygen and nitrogen and therefore provides an environmental benefit. The empty containers are exported as metallic packaging for recovery.

There are no other emissions to water, sewer or land, with the only emissions to air being nitrogen and oxygen which are harmless and the process does not therefore increase risk from the facility. The equipment does not generate any significant increase in noise levels or result in vibration. A single EWC code is required for the activity, 16 05 04, which is already permitted for storage at the facility. An annual throughput of up to 410 tonnes (this is inclusive of packaging) will treat 102.2 tonnes of nitrous oxide, yielding approx. 65 tonnes of nitrogen and 37.2 tonnes of oxygen released to atmosphere with no negative environmental

impact, and the remaining 307.8 tonnes being metal packaging which is recycled. Up to 25 tonnes, comprising material predominantly confiscated by government agencies, would be received at any time and securely stored pending processing. Material would be processed prior to subsequent deliveries to maintain secure storage capacity.

We have had discussions with the Agency's Permitting Officer, Mark Jones, concerning the variation type and level of fee as Mark is currently dealing with the Regulation 61 review. Mark Jones has advised on fees and type of variation for the application. The variation is to add an operation that would be covered by an activity under S5.3 Part A(1)(a)(ii). Whilst the Agency's charging guidance (section 3.8 states "If you want to add an activity to your permit, you must pay the charge for a new permit application for that type of activity" the permit already has 11 separate S5.3 Part A(1)(a)(ii) activities listed (see section above). Whilst we are therefore adding a further activity, the permit already contains this type of activity.

Setting aside the fee, the process itself is of very low risk, low annual throughput and results in the destruction of a potential greenhouse gas, which is instead discharged to atmosphere as oxygen and nitrogen. Therefore, emission have no impact and there is a significant environmental benefit from the process. Whilst the application would require technical assessment by the Agency, it is not believed that this will require significant technical assessment and in terms of the guidance at section 3.6.2, the change does not add a process that would make the activity a part A(1) activity in its own right (it is below the treatment threshold of 10 tonnes per day and is only being added as an installation rather than a waste operation because of aggregation as the permit already contains a number of part A(1) activities above the threshold), the receipt of material will not increase storage capacity by more than the relevant threshold (the permit already permits storage of the relevant EWC under table S3.9), and cannot have significant negative effects (it removes a potential greenhouse gas and the only emissions are oxygen and nitrogen). The application itself would therefore be submitted as a normal variation and whilst the charging scheme guidance under section 3.8 still requires the fee for a new application, Mark Jones has advised that we request the fee is abated for this application and that payment is made as part of the submission in line with the normal variation charge.

Mark Jones has also indicated that he would be able to pick up the application and deal with at the same time as the Regulation 61 review of the permit.

This Variation Application has been prepared in accordance with Regulation 20 of the Environmental Permitting (England and Wales) Regulations 2016 (EP Regulations).

# WEDNESBURY WASTE MANAGEMENT RESOURCE CENTRE

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# PART I

# APPLICATION FORMS PART A, C2, C3 and F1

# WEDESBURY WASTE MANAGEMENT RESOURCE CENTRE

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## PART II

## SUPPORTING STATEMENT

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## A.1 INTRODUCTION

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There are no other emissions to water, sewer or land, with the only emissions to air being nitrogen and oxygen which are harmless and the process does not therefore increase risk from the facility. The equipment does not generate any significant increase in noise levels or result in vibration. A single EWC code is required for the activity, 16 05 04, which is already permitted for storage at the facility. An annual throughput of 410 tonnes (this is inclusive of packaging) will treat 102.2 tonnes of nitrous oxide, yielding approx. 65 tonnes of nitrogen and 37.2 tonnes of oxygen released to atmosphere with no negative environmental impact, and the

remaining 307.8 tonnes being metal packaging which is recycled. Up to 25 tonnes, comprising material predominantly confiscated by government agencies, would be received at any time and securely stored pending processing. Material would be processed prior to subsequent deliveries to maintain secure storage capacity.

The variation is being submitted as a normal variation, and following discussions with the Agency, fee abatement has been requested and as advise only the normal variation fee is being paid (as opposed to the new permit charge for the activity concerned)

This Variation Application has been prepared in accordance with Regulation 20 of the Environmental Permitting (England and Wales) Regulations 2016 (EP Regulations).

## B.1 SITE LOCATION

The Wednesbury Waste Management Resource Centre is located on Potters Lane, Wednesbury in the West Midlands and is centred on National Grid Reference SO 9855 945. The site covers an area of approximately 13,000 $m^2$.

The Site is situated on made ground, which overlies glacial deposits of sandy gravelly clays which in turn overlay Coal Measures, the Coal Measures being classed as a minor aquifer and designated as a Nitrate Vulnerable Zone.

The activities carried out at the site are nominally divided into waste transfer station operations and waste treatment plant operations. The site is equipped with a laboratory to carry out pre-acceptance testing on samples of waste prior to delivery to the site and confirmatory testing on delivered wastes.

The waste transfer station operation consists of 14 designated bays situated in the north-eastern corner of the site and a number of storage skips located along the western boundary. The activities carried out at the transfer station primarily involve the storage of hazardous and non-hazardous wastes in sealed containers with treatment activities also being carried out comprising mixing, blending and bulking of waste, repackaging of laboratory smalls and washing and size reduction by crushing of empty metal and plastic containers.

The waste treatment plan involves a number of tanks of varying sizes and duties, situated in a central location within the site. The activities carried out involve the storage of both hazardous and non-hazardous liquid wastes and raw materials in tanks and the subsequent physico-chemical treatment of the waste prior to disposal. The treatment plant has been designed on a modular concept where a wide range of waste treatment techniques are employed, including acid/lime neutralisation, redox (large, small and advanced), batch redox/neutralisation, VOC stripping, ammonia stripping, consolidation/encapsulation, carbon adsorption, oil/water separation. Treatment results in a filter cake and a trade effluent which is treated in an effluent treatment plant prior to discharge. The trade effluent is discharged to foul sewer (the Wednesbury/Black County Trunk Sewer). The sewer discharges the effluent to Ray Hall and Minworth Wastewater Treatment Works, which subsequently discharges to the River Tame.

The nearest surface water feature is the River Tame which lies approximately 400 metres to the south of the site. However, the entire site is surface with concrete within is drained to a number of sumps/discharge pits around the site. All water collected is classed as potentially contaminated and is processed in the main treatment plant prior to discharge to foul sewer.

The immediate land use surrounding the site comprises of predominantly commercial/industrial units with a disused railway line to the Eastern boundary and the West Midlands Metro's Birmingham to Wolverhampton tram route running nearby to the Southern boundary. The nearest residential properties are approximately 230 metres to the north of the site. There are no Natura 2000 sites or Sites of Special Scientific Interest (SSSI) that are within the relevant screening criteria of the Site.

## C2.1 ABOUT THE PERMIT

### C2.1.a Pre-application discussions

We have had discussions with the Agency's Permitting Officer, Mark Jones, concerning the variation type and level of fee as Mark is currently dealing with the Regulation 61 review. Mark Jones has advised on fees and type of variation for the application. The variation is to add an operation that would be covered by an activity under S5.3 Part A(1)(a)(ii). Whilst the Agency's charging guidance (section 3.8 states "If you want to add an activity to your permit, you must pay the charge for a new permit application for that type of activity" the permit already has 11 separate S5.3 Part A(1)(a)(ii) activities listed (see section above). Whilst we are therefore adding a further activity, the permit already contains this type of activity.

Setting aside the fee, the process itself is of very low risk, with low annual throughput and results in the destruction of a potential greenhouse gas, which is instead discharged to atmosphere as oxygen and nitrogen. Therefore, emission have no impact and there is a significant environmental benefit from the process. Whilst the application would require technical assessment by the Agency, it is not believed that this will require significant technical assessment and in terms of the guidance at section 3.6.2, the change does not add a process that would make the activity a part A(1) activity in its own right (it is below the treatment threshold of 10 tonnes per day and is only being added as an installation rather than a waste operation because of aggregation as the permit already contains a number of part A(1) activities above the threshold). Further, the receipt of material will not increase storage capacity by more than the relevant threshold (the permit already permits storage of the relevant EWC under table S3.9) and cannot have significant negative effects (it removes a potential greenhouse gas and the only emissions are oxygen and nitrogen). The application itself would therefore be submitted as a normal variation and whilst the charging scheme guidance under section 3.8 still requires the fee for a new application, Mark Jones has advised that we request the fee is abated for this application and that payment is made as part of the submission in line with the normal variation charge.

Mark Jones has also indicated that he would be able to pick up the application and deal with at the same time as the Regulation 61 review of the permit.

## C2.2 ABOUT THE PROPOSED CHANGES

### C2.2.b Summary of Environmental Permit Variation

Biffa is applying to vary the Wednesbury Waste Management Resource Centre Permit, specifically XP3631SE.

The purpose of the variation is to allow extraction of nitrous oxide from metal cannisters and its destruction, with releases being oxygen and nitrogen back to atmosphere. Cannisters are material predominantly confiscated by government agencies, requiring secure storage and destruction. Metallic packaging is sent for recovery following removal of nitrous oxide. The permit already permits storage of the relevant EWC under the heading relating to consolidation of wastes at table S3.9.

It is requested that Schedule 1, Table S1.1 of the Permit is varied to add an additional activity under S5.3 Part A(1)(a)(ii) –disposal or recovery of hazardous waste by physico-chemical treatment (there are currently 11 activities under S5.3 Part A(1)(a)(ii) listed on the Permit). This is to cover the extraction of nitrous oxide from cannisters and destruction.

Schedule 2 to be updated in connection with the above. EWC code 16 05 04* will be required for the nitrous oxide process. This code is already included on the permit in relation to other activities under S5.3, and in relation to the storage of hazardous wastes under S5.6. It is however assumed that the additional S5.3 activity will reference a separate table which would duplicate this EWC for that process. An annual throughput of 410 tonnes is required for this activity. This includes weight of metal packaging as well as nitrous oxide and depending on form of packaging (small canisters (whippets) having a lower capacity for nitrous oxide than the larger cannisters), overall gross weight received may be less. Nitrous oxide processing equipment will be installed with a total capacity to process up to 102.2 tonnes of nitrous oxide. As stated, storage of the EWC on the Permit is already covered under S5.6, although the site layout plan has been updated to show the processing area for the new activity which will contain up to 25 tonnes at any time in cages prior to processing.

An emission point also requires adding to the Permit for emissions from the process to air, although these will only comprise oxygen and nitrogen.

The application for the above variation is being submitted as a normal variation for the reasons outlined in section C2.1a.

## C2.3 ABILITY AS AN OPERATOR

This variation application does not include a request to add waste installations or waste operations to a permit that does not already include them – it is simply to add an additional activity under S5.3 Part A(1)(a)(ii), that already contains 11 separate such activities. Neither has Biffa requested to consolidate permits as part of the application. Therefore, it has not been deemed necessary to provide any of the information in relation to section 3 of the Part C2 permit application form. A copy of the current ISO14001 registration certificate is however appended to the application (Appendix 2) for information. There are no changes required to the existing management system.

## C2.5 SUPPORTING INFORMATION

The site layout has been updated in connection with the variation application, to include the area to be used for the nitrous oxide destruction process and the corresponding air emissions point. Please refer to drawing reference WV090700.

## C2.6 PROCESS DESCRIPTION AND ENVIRONMENTAL RISK ASSESSMENT

The Installation was subject to a detailed risk assessment at the time of preparation of the original application for a Permit for the site. This document has been updated periodically and submitted to the Agency in relation to subsequent variation applications where required.

The proposed changes under this variation application are to add an additional activity under S5.3 Part A(1)(a)(ii) to allow the nitrous oxide destruction process along with an emission point to air for oxygen and nitrogen. The potential impact of the proposed changes at the site is considered below:

**Storage:**
Nitrous oxide cannisters are typically confiscated materials and will be predominantly received from government agencies for secure storage and destruction, under EWC 16 05

04*. The Permit already allows storage of the relevant EWC codes and so no additional waste types and associated risk will be introduced by the variation. No changes to existing waste pre-characterisation and assessment procedures will be required. Nor will waste reception procedures require any changes.

Wastes will be unloaded by fork-lift truck on the area adjoining the nitrous building (see drawing WV090700) and stored in cages within the nitrous oxide destruction building pending processing. The operation will process one batch of deliveries at a time following receipt of a transport consignment which will be cleared/processed prior to receipt of the next delivery. A a maximum of 25 tonnes will be accommodated at any one time. The storage element will not therefore introduce any additional risk to the facility.

**Processing:**
The process itself will treat a fairly small quantity, with up to 410 tonnes of canisters (containing up to 102.2 tonnes of nitrous oxide) per annum being dealt with, which represents up to 0.28 tonnes of nitrous oxide per day (1.12 tonnes gross with packaging at worst case) so is low risk in comparison to existing treatment activities at Wednesbury.

The destruction unit, the Medclair DU2000 has been designed in Europe to handle exhaled air from patients undergoing medical procedures (childbirth, dentistry etc) which still contains nitrous oxide to which other persons could be inadvertently exposed and which otherwise is released to atmosphere where it would cause a negative impact through being a greenhouse gas. There is therefore a positive environmental benefit from the process. Since the sole emissions from the process are oxygen and nitrogen there is no negative impact and this is low risk. The destruction process is fully automated, with an in-built control system that monitors and controls the process. A user interface also allows remote monitoring. Please see Technical Description document at Appendix 3. The product has been supplied to a number of healthcare facilities within Europe and the Technical Brief is a baseline/generic document as a bespoke system has been developed for application at Wednesbury, hence some of the data quoted will differ.

Nitrous oxide cannisters are confiscated materials and will be received from government agencies for secure storage and destruction. Two types of cannisters are received and two processing units are provided to deal with these.

Larger cannisters, typically up to 1.4kg (gross weight), contain approximately 0.68kg of nitrous oxide. These are dealt with by placing the cannisters into a wagon (rack), of approximate dimensions 1200mm x 800mm x 1000mm, where the valves for up to 26 cannisters at a time may be connected to pipework feeding the destruction unit. The pipework then feeds the destruction unit directly and non-return valves are fitted, therefore it is not necessary to maintain a full wagon and the destruction unit also regulates the flow. Six wagons would initially be connected to the destruction unit, on the basis that the volumes into the Wednesbury site will not initially be operating at full permitted capacity. Once the system monitoring has detected that there is no nitrous oxide within the system the bottles may be removed and replaced with full ones for another cycle.

There are no releases (diffuse emissions) from the wagons and all nitrous oxide is input into the destruction unit, therefore this part of the process represents a low risk.

Empty cannisters are collected for recovery and exported as metallic packaging, EWC 15 01 04, which is consistent with the advice on disposal of outputs contained within Regulatory Position Statement, RPS289, relating to storage and depressurisation of nominally empty nitrous oxide cannisters. They are sent whole and are not crushed to reduce volume.

Smaller cannisters (whippets) weighing approximately 32g and containing up to 8g of nitrous oxide are processed. These need to be emptied to feed the nitrous oxide into the destruction unit. The GEDS (Gas Extraction and Disposal System) is used to empty the smaller canisters, prior to feeding into the same destruction unit that the wagons above are feeding. A single GEDS unit is connected to the destruction unit. Please refer to the Product Sheet at Appendix 4, which again is for a baseline product, so may have differences in some of the data quoted compared to the installation at Wednesbury.

The GEDS feed unit has approximate dimensions 500mm x 500mm x 1500mm and comprises an input hopper that the cannisters are pre-loaded into. The cannisters are orientated correctly as the enter the system one at a time. An airlock opens to allow each tube into the cutting mechanism and then closes. The cutting mechanism then pierces the tube and releases the gas into a volume chamber which allows for a controlled pressure reduction of the gas, which may be 60 to 100 times the cannister volume. The gas is extracted from the volume chamber by a vacuum pump and fed to the destruction unit. Once the pressure in the volume chamber drops to a preset level, the emptied cannister is released via a second airlock into a collection bin.

It is anticipated that there may be a small leakage when airlocks are opened, although an overall destruction efficiency of 98% has been quoted for the process. Personnel will be provided with portable personal nitrous oxide detectors to protect from exposure to such diffuse emissions and the overall risk is still low. Destruction of the bulk of the nitrous oxide represents a significant environmental benefit from the process.

As with the larger cannisters, empty cannisters are collected for recovery and exported as metallic packaging, EWC 15 01 04. They are sent whole and are not crushed to reduce volume.

Destruction of nitrous oxide is carried out via the central destruction unit. The nitrous oxide fed from the wagons and GEDS unit is passed through a pre-heated heat exchanger in the unit and then over a catalyst where the nitrous oxide is decomposed to oxygen and nitrogen. This stage has a minimum efficiency of 99%. Whilst the Technical Brief (Appendix 3) gives detail on the destruction unit, the User Manual (Appendix 5) expands much further. As before, the User Manual is generic, and some data will vary compared to the bespoke unit to be provided at Wednesbury. The dimensions of the unit to be supplied to Wednesbury are 1100mm x 1000mm x 2.5mm.

The process is self-contained and so there is no risk of exposure of personnel to nitrous oxide during operation of the destruction unit itself. Outputs comprise nitrogen and oxygen which will be returned to atmosphere via an emission point on the building (please see drawing WV090700). Destruction efficiency has been found during testing (see Validation Report at Appendix 6) to be as high as 99.9%. Emissions to atmosphere do not represent an environmental risk and the operation of the destruction unit provides a significant environmental benefit by destroying potential greenhouse gases that could otherwise have contributed towards atmospheric emissions and global warming.

Capacity of Operation. Whilst the overall gas flow quoted can range between 0 to 30 $m^3$ per hour, this is significantly in excess of volumes to be processed at Wednesbury and is in fact due to the origins of the destruction unit being within the healthcare industry where the air flow can contain a low concentration of nitrous oxide. In the case of Wednesbury, where flows are 100% nitrous oxide, the limiting factor is the nitrous oxide mass per minute destruction rate, and intake into the destruction device is regulated by the control system to ensure optimal destruction of the nitrous oxide. The unit being provided for Wednesbury is a larger unit sourced to provide a greater destruction rate than the examples contained in the

Technical Brief and User Manual. As such the rate of destruction of nitrous oxide for the supplied device is just above 100g per minute. Maximum capacity of the unit is based on a daily throughput of 140,000g of nitrous oxide, and assumes operation for 23 hours, with downtime of approx. 1 hour for exchange of cylinders on the wagons.

Wednesbury will process a number of the small cannisters whippets, in conjunction with the larger cannisters. The larger cannisters each weigh approx. 1.4kg gross weight and contain 680g of nitrous oxide, whereas the smaller cannisters (whippets) weigh 32g gross weight and contain 8g of nitrous oxide, the whippets therefore having a lower capacity for nitrous oxide compared to overall weight per unit.

The initial equipment to be installed will comprise a total of six wagons for the larger cannisters and one GEDS unit to extract nitrous oxide from the small cannisters, with these all feeding into the single destruction unit. The equipment will initially be operated on a two-shift basis over 16 hours, and it is anticipated (with an a roughly half hour down time for loading) will process in total 3471 whippets and 98 of the larger cannisters in the course of a day. This equates to a total gross weight of 90.5 tonnes of waste taken in, from which 34.45 tonnes of nitrous oxide would be treated and emitted as nitrogen and oxygen to atmosphere.

Processing will be increased as required by operation of three shifts with an hour down time assumed for loading. During this time, it is anticipated that 5138 whippets and 145 of the larger cannisters could be processed during a day. This would equate to a total gross weight of 134.1 tonnes of waste taken in, from which 50.99 tonnes of nitrous oxide would be treated and emitted as nitrogen and oxygen to atmosphere. This would be the maximum capacity of the equipment installed initially.

Further increases in capacity will be obtained as demand increases by the doubling up of the equipment, with 12 wagons, 2 GEDS units and 2 destructors, giving a daily throughput of nitrous oxide per day. On a three-shift basis, the equipment could process in total 10,276 whippets and 290 of the larger cannisters per day. This would equate to a total gross weight of 268.2 tonnes of waste taken in, from which 101.98 tonnes of nitrous oxide would be treated and emitted as nitrogen and oxygen to atmosphere. Whilst this is maximum capacity of the two destruction units together, the gross weight of waste processed is dependent upon the mix of larger cannisters and small whippets. Varying the input stream to all whippets would result in a gross weight of 408.8 tonnes per annum, with 102.2 tonnes of nitrous oxide treated, whilst accepting all as the larger cannisters would reduce the gross weight to 210 tonnes per annum whilst still treating 102.2 tonnes per annum. This might require some changes to the number of wagons or GEDS units feeding into the process but utilises the same two destruction units. To give operational flexibility therefore, the application is to permit the higher input gross weight of 410 (*rounded up*) tonnes per annum to cater for greater proportions of whippets, but for the maximum treatment capacity of the destruction units which is 102.2 tonnes of nitrous oxide per annum regardless.

**Emissions:**

The outputs from the destruction units will be connected to an emission point outside of the building. Please refer to drawing WV090700 for the proposed location of emission point A1 to atmosphere.

The sole emissions to atmosphere are nitrogen and oxygen. At maximum destruction capacity the equipment would emit up to 65 tonnes of nitrogen and 37.2 tonnes of oxygen. There is a significant environmental benefit from the destruction of nitrous oxide which is a greenhouse gas which would otherwise contribute to atmospheric emissions and global warming. The

emission of a mixture of oxygen nitrogen to atmosphere represents no risk to the environment.

There are no other emissions, to water, sewer or land from the process and therefore the process does not increase the level of risk from the existing permitted facility. A balance of up to 307.8 tonnes (dependent upon mix of cannister types being treated) of metallic packaging will be exported for recovery.

Noise emissions are also minimal. Please refer to the Validation Report at Appendix 6. The contribution to noise levels in proximity to the destruction device in a quiet room was minimal.

Process Controls. The destruction process does not require supervision and operation is automatic. Please refer to the User Manual at Appendix 5. An in-built control system monitors key parameters, including continuous monitoring of nitrous oxide concentrations before and after the catalyst, gas flow, temperatures and energy consumption. The process can also be supervised remotely. In the event that the destruction unit fails an electromagnetic valve closes to stop potential emissions of untreated nitrous oxide to atmosphere. This provides a satisfactory control against the potential risk of emissions.

**Summary:**
The storage of nitrous oxide is currently permitted at the site and no additional risk is posed therefore.

The treatment of nitrous oxide is below the installation threshold and comprises only up to 0.28 tonnes per day. The process represents a low risk therefore and provides a significant benefit to the environment by removing and treating nitrous oxide which is a greenhouse gas and would otherwise be emitted to atmosphere contributing to global emissions and global warming.

The release of nitrogen and oxygen to atmosphere does not represent a risk to the environment. Process controls intervene in the event of a malfunction, preventing release of untreated nitrous oxide to atmosphere.

Only minor fugitive emissions/leakages could occur during loading of the smaller whippets into the piercing chamber of the GEDS unit. Personnel nitrous oxide monitors will be provided to staff in the destruction unit area.

It has been concluded that the operation of the nitrous oxide destruction system will not impact adversely on the level of risk from the facility and will provide a positive environmental benefit.

## C3.1 ACTIVITIES BEING VARIED

### C3.1.a Types of activities

The Schedule 1 listed activities and Directly Associated activities authorised by the Permit for the Wednesbury Waste Management Resource Centre have been detailed in section A.1. It is proposed to add an additional listed activity under S5.3 Part A(1)(a)(ii), although the Permit already contains 11 other activities under S5.3 Part A(1)(a)(ii). This will allow operation of the nitrous oxide destruction process, which is only being added as a listed activity because of aggregation as the permit already contains a number of part A(1) activities above the threshold). The additional activity itself would be below the installation threshold (0.28 tonnes per day of hazardous wastes would be treated) and is very low risk and provides a signicant environmental benefit by removal of a greenhouse gas that would otherwise contribute to atmospheric emissions. As a result, the variation has been submitted as a normal variation following discussions with the Agency. An emission point in conjunction with the process will only emit nitrogen and oxygen to atmosphere.

### C3.1b Waste quantities and capacity of operation

A total maximum gross weight 1.12 tonnes of waste per day would be processed, containing a maximum of 0.28 tonnes per day of nitrous oxide that would be treated through the destruction unit. Waste would be from EWC 16 05 04* which is already permitted for storage at the site. In connection with the activity, up to 25 tonnes would be stored in the nitrous oxide building at any one time.

## C3.2 EMISSIONS TO AIR, WATER AND LAND

### C3.2.a Point source emissions to air

The only point source emissions to air will be nitrogen and oxygen from air emissions point A1. Emissions will comprise 65 tonnes per annum of nitrogen and 37.2 tonnes per annum of oxygen. These emissions are of no environmental significance.

### C3.2.b Point source emissions to water (other than sewers)

There will be no changes to emissions from the Site to water as a result of this variation application. The process has no emissions to water.

### C3.2.c Point source emissions to sewer

There is currently a discharge to sewer although this variation will not result in any changes to the sewer discharge. The process has no emissions to sewer.

### C3.2.d Point source emissions to land

There will be no changes to emissions to land as a result of this variation application. The process has no emissions to land.

## C3.3 SUPPORTING INFORMATION

### C3.3.a Technical standards

The Site is currently operational and has been managed in accordance with the application documents, submitted at the time of application for the Permit, and also in accordance with any subsequent submissions made to discharge Permit improvement conditions, or pre-operational conditions, or submitted in support of later permit variation applications. These are referenced in the Permit, Schedule 1, Table S1.2 (Operating techniques). The application

documents submitted previously fully describe the operation and processes, although have been augmented by the recent submission of the Biffa's Standard Operating Procedures (SOPs) as part of the recent Regulation 61 Chemical Waste Sector permit review..

The above documents are unaffected by this variation application.

The following technical guidance documents are provided by the Environment Agency for use in EP-regulated installations and are also relevant:

- BATC – Best Available Techniques Conclusions for waste treatment

The operating techniques referred to above, and also the proposals within this variation application, are fully in accordance with the standards within the BAT conclusions document, as applicable. A summary of BAT compliance is documented in section D1.1.

**C3.3.b General requirements**

The variation to the Permit involves the destruction of low volumes (0.28tonnes per day) of nitrous oxide. The only emissions from the process are nitrogen and oxygen, which will be released via emission point A1 to atmosphere. This emission is of no environmental significance or harm and replaces potential emissions of nitrous oxide that is a greenhouse gas. This is a positive environmental benefit.

The release of nitrogen and oxygen does not create an odour issue and no odour management plan would be required.

The Validation Report for the destruction unit has shown that noise impact is not significant and no further measures are required.

**C3.3.c Types and amounts of raw materials (Schedule 1 activities only)**

There are no changes required to the raw materials which will be used in the installation as a result of this variation application.

**C3.3.d Information for specific sectors**

The variation will result in the addition of a nitrous oxide destruction process. This has already been described in section C2.6. The process is simple and low risk and only treats small volumes of nitrous oxide on a daily basis, with up to 0.28 tonnes per day being treated at maximum capacity. Nitrous oxide is treated by heating over a catalyst to cause decomposition of the nitrous oxide to nitrogen and oxygen as below:

$2N_2O \longrightarrow 2N_2 + O_2$

There are no side reactions from this process.

Normal pressure within the system is 2500 Pascals. Inlet temperature is around $27^0$C, and a heat exchanger heats the nitrous oxide to $296^0$C prior to the catalyst. Following decomposition, the outlet gases are around $403^0$C before passing into the heat exchanger, which recovers heat and recycles into the process, and exit at around $109^0$C. Refer to User Manual at Appendix 5.

The destruction unit is fitted with continuous monitoring including temperature, pressure, flow rate and nitrous oxide concentrations before and after the catalyst. The unit will automatically close an electromechanical valve to prevent releases of nitrous oxide to atmosphere in the event of a failure of the process.

## C3.4 MONITORING

### C3.4.a Monitoring of emissions

As stated in section C3.2c and C3.3b, above, the only emissions resulting from this variation are oxygen and nitrogen, which are released back to atmosphere. There are of no environmental consequence and will not be monitored at the emissions point. It should be noted that BAT does not require monitoring for these, nor for nitrous oxide which is treated in the facility to produce oxygen and nitrogen. Therefore, no new sampling points will be required in connection with the variation.

There are no releases to water, sewer or land. Therefore, no changes will be required to existing sampling points at the facility.

### C3.4.b Point source emissions to air only

There will be sampling points provided in relation to point source emissions to air as a consequence of this variation as only nitrogen and oxygen are released. Therefore, it has not been necessary to provide an assessment of any sampling points.

## C3.6 RESOURCE EFFICIENCY AND CLIMATE CHANGE

This variation application is not for a landfill or a recovery of hazardous waste on land activity and does not include landfill gas engines and therefore it has not been deemed necessary to provide any information in relation to section 6 of the Part C3 permit application form.

# D1 BAT ASSESSMENT AND CONCLUSION

## D1.1 BAT Assessment

The guidance relating to the Part C3 form does not require a justification for meeting BAT we we state we meet the standards. However, we have summarised the applicable sections below, and indicated where the variation will follow existing site documentation and procedures that meets BAT or whether any additional requirements have been introduced.

From an assessment of the BAT Conclusions, only the General BAT conclusions 1 to 24 would appear to apply, since BAT conclusions 25 onwards relate to other sectors or treatments that the process does not fall under.

The process is a nitrous oxide destruction process, involving heating of a gas over a heated catalyst to decompose to oxygen and nitrogen which are then released to atmosphere via an air emission point, with the release being of no environmental significance and the destruction of the nitrous oxide being a significant positive environmental benefit through the removal of a potential greenhouse gas emission. This is clearly a physico-chemical treatment process for a gas. BAT conclusions from BAT 25 onwards relating to the following areas do not apply to this process and so have not been considered further:

- mechanical treatment of waste, treatment of WEEE,
- mechanical treatment of waste with calorific value
- biological treatment of waste
- aerobic treatment of waste
- anaerobic treatment of waste
- MBT treatment of waste
- physico-chemical treatment of solid or pasty wastes
- refining of waste oil
- physico-chemical treatment of waste with calorific value
- regeneration of spent solvents
- thermal treatment of spent activated carbon/waste catalysts/contaminated soil
- water washing of contaminated soil
- decontamination of equipment containing PCBs
- water based liquid waste

In consideration of General BAT Conclusions 1 to 24, applicability and compliance is set out below:

BAT1 – Implement and adhere to an environmental management system (EMS). **COMPLIANT** – the site already operates to an EMS as outlined in the Regulation 61 response for the BAT review of the permit and a copy of the ISO14001 certificate of registration is included at Appendix 2 of this application. An alternative was proposed in relation to retention of firewater including pumping to one of the site storage tanks, however the nitrous oxide process will not affect this requirement.

BAT2 – Improve overall environmental performance by waste characterisaton, acceptance, tracking and segregation etc. **COMPLIANT** – the nitrous oxide is a well defined input and will be subject to strict acceptance, storage and tracking procedures as the material will be subject to secure storage and disposal in line with requirements of various government agencies sending the waste to the site.

BAT3 – Reduce emissions to water and air. **COMPLIANT** – there are no emissions to water and only point source emissions of oxygen and nitrogen to atmosphere which has no environmental impact.

BAT4 – Reduce environmental risk from storage of waste. **COMPLIANT** – the nitrous oxide cannisters will be stored in cages in a secure building and are located close to the processing equipment thereby minimising unnecessary handling. Storage capacity will be maintained by processing each batch of nitrous oxide cannisters received prior to accepting further deliveries.

BAT5 – Reduce environmental risk from handling and transfer of waste. **COMPLIANT** – The EMS includes a training matrix for staff, and suitably maintained equipment, including ATEX forklift trucks where required is in use at the site. Wastes are stored within cages within the nitrous oxide building and transferred to an enclosed system for processing to prevent fugitive emissions.

BAT6 – Monitor key process parameters in emissions to water. **NOT APPLICABLE** – there are no emissions to water from the process.

BAT7 – Monitor emissions to waster at required frequency. **NOT APPLICABLE** – there are no emissions to water from the process.

BAT8 – Monitor channelled emissions to air.

BAT9 – Monitor diffuse emissions of organic compounds to air from spent solvents etc. **NOT APPLICABLE** – the process does not involve any processes relating to spent solvents

BAT10 – Periodically monitor odour emissions. **NOT APPLICABLE** – the nitrous oxide process handles nitrous oxide contained within metal cannisters and extracts and treats the nitrous oxide in a sealed process with air locks to prevent potential fugitive emissions. The system will not therefore result in any odour.

BAT11 – Monitor annual consumption of water, energy and raw materials. **COMPLIANT** – These are monitored and reported under the permit and form part of our EMS for the site. The addition of the nitrous oxide process will use additional energy but will be subject to this existing monitoring and reporting requirement. The nitrous oxide process also uses heat exchanges to recycle heat from exhaust gases back into inlet gases for energy efficiency purposes.

BAT12 – Set up an odour management plan to reduce odour emissions. **NOT APPLICABLE** – there are no odour emissions from the process and therefore an odour management plan will not be required as a result of the variation.

BAT13 – Odour minimisation techniques. **COMPLIANT** – although the process does not generate odour, nitrous oxide is decomposed by a physico-chemical treatment process to oxygen and nitrogen which are not odorous.

BAT14 – Reduce diffuse emissions to air. **COMPLIANT** – the process extracts nitrous oxide from larger cannisters and treats within an enclosed system prior to discharge of the resulting nitrogen and oxygen via a point source emission point. Smaller cannisters are fed into a piercing device (GEDS system), with potential fugitive/diffuse emissions of nitrous oxide being controlled by provision of an air lock system. This meets the requirements for minimising the potential diffuse emission sources (these are confined to just the GEDS system piercing chambers which is fitted with airlocks to provide containment and all nitrous oxide is extracted to the heated catalyst to decompose to oxygen and nitrogen which are of no environmental impact.

BAT15 – Use flaring only for safety reasons. **NOT APPLICABLE** – the process does not require use of flares.

BAT16 – Reduce emissions for flares. **NOT APPLICABLE** – the process does not require use of flares.

BAT17 – Noise and vibration management plan. **NOT APPLICABLE** – the nitrous oxide destruction process will not introduce any significant level of noise or vibration. The Validation Report for the destruction unit contained at Appendix 6 demonstrates that the unit did not result in a significant increase in noise in a quiet room. The unit will be located within a building and is extremely unlikely to have any perceptible impact outside or beyond the site boundary. Therefore, no measures are required under this item and a noise and vibration management plan is not required.

BAT18 – Techniques to reduce noise and vibration. **COMPLIANT** – The equipment complies with requirement to be for appropriate location and noise attenuation, being housed within a building on site. Further, the equipment is of low noise generation, complying with the requirement for low-noise equipment.

BAT19 – Emissions to sewer. **NOT APPLICABLE** – the process does not have any emissions to sewer.

BAT20 – Treat waste water using appropriate techniques. **NOT APPLICABLE** – the process does not generate any effluent.

BAT21 – Accident management plan. **COMPLIANT** – the Regulation 61 submission made for the recent BAT review of the permit included details of the site's Fire Risk Assessment and DSEAR Assessment as well as the Emergency Plan, which all form part of the EMS, and includes measures that comply with the requirements within this BAT item.

BAT22 – Substitute materials with waste. **COMPLIANT** – There are no raw materials, only energy for which see below. The process however decomposes nitrous oxide which is a potential greenhouse has and returns back to atmosphere as oxygen and nitrogen, effectively restoring this back to the original raw materials and with a positive environmental benefit.

BAT23 – Energy efficiency. **COMPLIANT** – the Regulation 61 submission made for the recent BAT review of the permit provided detail in relation to energy efficiency and confirmed that an energy efficiency plan forms part of our EMS. Further, the nitrous oxide destruction process, whilst using energy to destroy a greenhouse gas, uses heat exchanges which take heat from the exhaust gases (nitrogen and oxygen) and feed back into the inlet gas (nitrous oxide), thereby making the process as energy efficient as possible.

BAT24 – Reuse of packaging. **COMPLIANT** – the nitrous oxide destruction process treats nitrous oxide contained in metal cannisters. All metal cannisters, once emptied, will be collected and sent for recovery/recycling as metallic packaging.

## D1.2 CONCLUSION

The storage and treatment of nitrous oxide cannisters represents a low risk to the environment and removes a potential greenhouse gas that would otherwise contribute to atmospheric emissions. As assessment of the process shows that this complies with all applicable BAT requirements.

# DRAWINGS

# APPENDIX 1

# LIST OF DIRECTORS

# APPENDIX 2

# ISO14001 CERTIFICATE OF REGISTRATION

# APPENDIX 3

# MEDCLAIR DU2000 TECHNICAL BRIEF, REVISION A2

# APPENDIX 4

# GEDS GAS EXTRACTION AND DISPOSAL SYSTEM PRODUCT SHEET

# APPENDIX 5

# DU2000-M1 MEDCLAIR USER MANUAL, REVISION A2

# APPENDIX 6

# VALIDATION REPORT "TEST OF MDU NITROUS OXIDE FROM MEDCLAIR, No6365, November 2020