A summary of Management System associated with a proposed variation to incorporate gas to grid operations at the Westwood Anaerobic Digestion Facility

The predominant change in site operations as part of this variation application is to incorporate gas to grid operations in addition to existing activities at the Westwood Anaerobic Digestion Facility and to increase annual permitted throughput from 65,000 tonnes to 105,000 tonnes per annum.

In summary, this proposal includes:

1. Increase the permitted waste annual throughput from 65,000 to 105,000 tonnes.
2. There will be no increase or changes to the current permitted area boundary or expansion in the geographical footprint of the site.
3. The current 1140m^3 Raw Waste Buffer Tank (RWBT) will be replaced with a new tank of the same capacity;
4. Total initial design Digester storage capacity of 12,620m^3 will remain unchanged, comprised of 4,560m^3 (2 x 2280m^3 digesters) to continue to serve the CHP engines and 8,060m^3 (2 x 2280m^3 and 1 x 3500m^3 digesters) for gas generation to the national grid.
5. Digesters 1, 3, and 4 will be rebuilt to the current dimensions. The current Digester 2 will remain in use for CHP generation.
6. Digester 5 was never built as part of the original installation except for the concrete base, although the design storage capacity of the tank was included in the original secondary containment maximum design capacity. Digester 5 will be constructed but with a larger tank diameter than the original planned digester but at the same height as the other 4 digesters at 14 metres. A new digester 5 will have a diameter of 17 metres instead of 14 metres.
7. Pasteuriser tanks 1 & 2 will be rebuilt to the same diameter but with an increased height from 7 to 8 metres high which is significantly less than the height of the digesters and the RWBT, which will increase the storage capacity of each tank from 140m^3 to 166m^3. These will be equipped with a digestate cooling system.
8. The current redundant 140m^3 Fats, Oils and Greases (FOG) tank will remain and will be recommissioned as a Dirty Water Tank to store captured rainwater from within the bund for treatment pending discharge to the onsite pond.
9. An additional gas holder will be installed to serve the Gas to Grid operations. The existing gas holder serving the CHP engines will remain.
10. An additional gas flare will be installed to serve the Gas to Grid operations. The existing gas flare serving the CHP engines will remain but will be relocated adjacent to the new Gas to Grid auxiliary flare.
11. Installation of Gas to Grid infrastructure including, but not limited to, a Biogas Upgrade Plant (BUP), Gas Entry Unit (GEU) and propane storage.
12. The current 3 x CHP engines (1 x 0.8 MW, 2 x 1.63MW) will remain in operation. The existing emissions stack will remain unchanged.
13. A new replacement carbon filtration system will be installed to treat extracted channelled air from the waste reception and process building pending emission to air via a stack to aid dispersion. This will include new replacement ventilation and extraction ducting with point source extraction vents/hoods positioned close to all predominant sources of odour within the building.
14. The existing below ground sump in the waste reception building is no longer used for its original intended purpose to store treated feedstock and for digester return. As such, the odour concentration within the sump is significantly less and therefore the existing cockle biofilter treating the extracted channelled air from the sump has been isolated and decommissioned (as agreed with the Environment Agency) and can be removed from the permit as a specified abatement system.

15. A new sealed separator room will be purpose built to house the Borger screw press separator for digestate screening together with a contaminates skip. Extracted air from the separator building will be channelled through to a new acid scrubber for treatment prior to emission to air via a stack to aid dispersion. This is a new abatement system and emission point to be specified in the permit.
16. Digestate Storage Tank 1 will be subject to a full de-grit, cleaned out and then recommissioned with improvements pending use for PAS110 compliant digestate storage. The headspace of this tank will be extracted through to the same purpose designed acid scrubber serving the screening room. Currently the headspace of Storage Tank 1 is extracted through to a containerised woodchip biofilter. This biofilter is now redundant and will be replaced by the acid scrubber to provide effective odour abatement.
17. Gas boilers will be installed to provide heat for Digesters 3, 4, and 5 for Gas to Grid generation with an emission stack. This is a new point source emission to be specified in the permit.
18. Improvements to the existing clay lined secondary containment bund where required.

No new waste types are to be accepted as part of this application.

The site will continue to accept predominantly source segregated food waste from domestic, commercial and industrial sources intended for consumption.

An integrated Environmental Management System (IEMS) has been produced for all site operations and associated activities which identifies and minimises the risk of pollution so far as reasonably practicable. This includes, for example, but not limited to, accidents, incidents, non-conformances, site closure and manging complaints.

Any complaints received are managed in accordance with the documented Problems, Complaints and Improvements Procedure. All complaints received are recorded and an investigation is undertaken to identify the potential source of the odour. This includes a record of any remedial actions required. Complaints are reviewed as part of the Biogen Integrated Management System (IMS). Details of any complaints received are cross referenced against real time weather records using the onsite weather station connected to the live Skylink Pro system which is remotely accessible.

Biogen adopt a proactive approach to potential odour releases and subsequent complaints, and as such have undertaken a full review of the foreseeable situations which might compromise the sites' ability to prevent and or minimise odour from operations. This includes a documented Environmental Accident Management Plan, Odour Management Plan (OMP) (**document reference WWOMP1**) and Fugitive Emissions Management Plan (**document reference WWFEMP1**) which identify the sites activities likely to generate odour and addresses the procedures and control measures in place through engineering, including both software control and hardwired controls as part of our HAZOP process.

Biogen as an entity are accredited under the EU Skills Competence Management System. All Biogen employees must complete a minimum number of required training days each year to demonstrate and increase the level of ongoing continued competence. A Skills and Competency Training Matrix is maintained for all employees.

Multiple standalone site specific documents form part of the IEMS including, but not limited to, (in no particular order):

- Environmental Accident Management Plan
- Odour Management Plan (**document reference WWOMP1**)
- Noise Management Plan
- Bioaerosol Risk Assessment and Management Plan; and
- Contingency Arrangements for Equipment or System Failure.

All the above referenced documents are periodically reviewed. Any necessary changes or additional measures required as a result of the gas to grid expansion proposals and increase in tonnage in annual throughput will be updated and incorporated into all relevant documents.

All changes or additional measures required as a result of the proposals will be in accordance with Best Available Techniques (BAT) conclusions and BAT Associated Emissions Limits (AEL) (**document reference WWBAT1**). These are laid out in the Best Available Techniques Reference Document (BREF) for Waste Treatment; Industrial Emission Directive 2010/75/EU) Integrated Pollution Prevention and Control) 2018. Chapter 6 stipulates the BAT conclusions for waste operations in general and specifically for biological treatment of waste. Sites permitted before August 2018 were required to comply with BAT conclusions and AELs by 17 August 2022.

Biogen have an established Feedstock Pre-acceptance Procedure (**document Reference WWFPAP1**), which demonstrates how Biogen meets the requirements of BAT and those in sections 2.1.2. of Sector Guidance Note IPPC S5.06. Pre-acceptance requires a 3-stage sign-off by a representative from the Operations, Compliance and Laboratory/Research team. Samples are requested and analysed where appropriate, this is done on a risk basis. The procedure also details the need to obtain:

- Information on the nature of the waste
- The composition and characterisation of the waste
- Handling requirements; and
- associated hazards.

Where appropriate, a representative sample of the waste is taken from the customer and analysed ensuring the collected sample is representative providing justification for any deviations. The procedure is directly linked to an established Feedstock Pre- Acceptance Form (**document reference WWFPAF1**) which is completed prior to any of the waste being accepted.

No changes or additional measures are required to existing pre-acceptance waste procedures as a result of the proposed gas to grid expansion plans and increase in annual maximum throughput. Established pre-acceptance procedures are proven to be highly effective and the proposed increase in annual throughput will not result in the acceptance of any new waste types. The increase in annual tonnage will be from an increase in the volume of existing waste streams and will only be accepted if listed in the permitted waste list under Table S2.2 of the current environmental permit in accordance with condition 2.3.4.

Biogen have an approved Feedstock Agreement which stipulates that the customer must notify Biogen if there is a deviation from the feedstock described in their Agreement. This is a legally binding document which has legal advisory input. It is signed by the customer and includes:

- Whether there are any special handling requirements with respect to health and safety of personnel or in respect of the environment;
- Any hazards associated with the waste;
- Haulier details, including Waste Carriers Licence details;
- ABPR approval where applicable; and

- the type of vehicle the waste will be transported in.

Biogen undertake an extensive sampling program and work with an external laboratory. Routine samples are taken prior to acceptance and then either on a 6-monthly or 12-monthly basis which is determined on a risk basis.

Biogen has a Delivery Offloading Procedure (**document Reference WWDOP1**), which includes a requirement for the weighbridge operator to confirm the load with the driver at the point of weigh-in and prior to tipping. They also check the EWC/LOW code, and the Waste Transfer Notes (WTN)/Duty of Care (DOC) written description and ensure they are booked in on the pre-agreed commercial schedule. When waste is tipped the loads will continue to be is visually inspected for any non-conforming items, and material will again be visually assessed for any obvious contamination prior to loading into the hoppers. In the event contamination is identified, it is quarantined to one side and photographs taken and the relevant persons notified as per the Contaminated Feedstock Procedure (**document Reference WWCFP1**).

Biogen's IMS utilises an electronic management software system that stores all data relating to pre-waste acceptance. This same management system captures any issues with loads and the action taken via the 'incident log' module. In addition to the electronic IMS, our weighbridge software captures all input and outputs to the site.

Biogen's monitoring of incoming waste with unique customer references, dates, time of arrival, tank level monitoring, digestate outloads, etc allow for accurate monitoring of tank volumes. However, as the process will continue to operate on a continuous digester feeding and flow process both for gas to engines and gas to grid, it is not possible to definitively pinpoint the exact location (albeit with the knowledge of retention times at each stage it is possible to give an indication), this differs to a batch process that allows full identification at each stage. However, on a risk basis, we will continue to take low risk material (i.e. food waste that was intended for consumption), and where liquid feedstocks are involved, we will continue to apply customer site visits/audits and sample analysis.

As part of the Westwood expansion plans, the ventilation and extraction system within the waste reception and process building will be completely replaced and upgraded. This will include point source extraction system positioned above all predominant odour courses. This will extract channelled air through to a carbon filtration system for treatment prior to emission to air via a 12 metre high stack to aid dispersion. The negative air extraction system serving the waste reception and process building will provide a minimum of three air changes per hour. A new purpose built digestate screening room housing a Borger separator will be served by a negative air extraction providing a minimum of ten air changes per hour. This system will extract channelled air through to an acid scrubber for treatment prior to emission to air via a 4 metre stack to aid dispersion. A documented Odour Abatement Maintenance Procedure will specify the parameters routinely tested on the carbon filter and acid scrubber. The current biofilter is subject to the process monitoring requirements specified in Table S3.4 of the current environmental permit.

The waste reception hall and process building will continue to be served by sealed drainage which operates on a two bay storage system pending processing with both bays to be periodically cleared to demonstrate stock rotation. The waste reception bays can store a maximum of approximately 400 tonnes of feedstock at any one time prior to processing which will remain unchanged. The two bay storage system allows for stock rotation and helps demonstrate the 'first in, first out' principle. In the unlikely event of prolonged plant or equipment malfunction, documented actions in accordance with the Contingency Arrangements for Equipment or System Failure (**document reference WWCAE1**) procedure would be implemented. This includes in the event of an incident or accident which could

affect digestate quality. In the unlikely event further acceptance or processing of feedstocks stopped or restricted, feedstocks would be diverted to an alternative facility for processing. Biogen has a total of 12 waste food anaerobic digestion facilities across the country with the closest sites being at Twinwoods in Bedfordshire (approximately 7 miles), Bygrave (approximately 38 miles) and Hoddesdon (approximately 54 miles) in Hertfordshire.

All equipment and plant will continue to be operated and maintained by fully qualified, trained and experienced staff. All relevant employees need to demonstrate continued operational competence and receive periodic training. Each employee has a tailor made Skills and Training Competency Matrix.

The new air extraction and carbon filtration system treating extracted channelled air from the waste reception and process building will be designed and engineered for the size of the existing building and to maintain the optimum air residence time within the abatement system (carbon bed contact time). No expansion or modifications are required to the footprint and capacity of the existing waste reception and process building as a result of the proposed gas to grid expansion proposals. The existing maximum 400 tonnes storage capacity at any one time within the waste reception bays will remain unchanged but processed with an increased throughput. Daily front end processing times will increase from the current 07:00hrs to 19:00hrs (Monday to Friday) and 07:00hrs to 13:00hrs (Saturday) to 06:00hrs to 00:00hrs Monday to Friday, and 06:00hrs to 18:20hrs Saturday and Sunday. Operations will be manned overnight.

An additional 40,000 tonnes of incoming feedstock per annum to 105,000 tonnes a year equates to an annual increase of approximately 38% from the current 65,000 tonnes per annum. This is equivalent to a daily increase from the current approximate 178 tonnes per day to a maximum 288 tonnes a day accepted for 365 days a year.

When waste is tipped, the load will be visually inspected for any non-conforming items, and material will again be visually assessed for any obvious contamination prior to loading into the hoppers. In the event contamination is identified, it is quarantined to one side and photographs are taken and the relevant persons notified as per the Contaminated Feedstock Procedure (**document reference WWCFP1**). The team are familiar with the waste acceptance criteria for the site and the need to report deviation from this. Likewise, the team will raise any other hazards resulting from waste streams that could impact on process safety, occupational safety or the environment. Biogen undertake frequent occupational and environmental monitoring, the frequency of which may be reviewed if necessary following feedback on feedstocks. Contamination tends to be objects which could cause mechanical damage to front end processing equipment as opposed to hazardous waste materials. However, to ensure this does not pose a risk, training is also provided to employees on hazardous waste, and this is also covered under the Disposal of Hazardous Waste Procedure.

Due to the continuous nature of the anaerobic digestion process at Westwood, the two Hammermills can typically process approximately 12 tonnes an hour each which is equivalent to 216 tonnes of feedstock per day each or 432 tonnes per day combined (typical 18 hour operational shift). The maximum storage capacity at any one of time of 400 tonnes will not increase as a result of this proposed variation application neither will the maximum storage time feedstock is temporarily stored within the waste reception hall which will remain a maximum of 48 hours.

Following de-packaging, feedstocks will be subject to maceration down to 12mm particle size prior to discharge into the Raw Waste Buffer Tank (RWBT). The macerators can process up to 25 tonnes an hour and the Netzch pump which discharges processed material to the Raw Waste Buffer Tank (RWBT) can pump approximately 50m^3 per hour. All plant and equipment is maintained in

accordance with a site specific documented Equipment Inspection and Calibration Schedule. No new front end processing equipment will be required as part of the gas to grid expansion proposals. Removed packaging will continue to be subject to hot washing followed by compaction to reduce the moisture content prior to be stored in container pending removal to landfill for disposal.

Segregation in the Westwood process therefore generally relates to the different stages of treatment where control measures are in place to ensure partially treated material cannot come into contact with fully treated material. This is controlled through engineering, including both software control and hardwired controls as part of our HAZOP process. An example of a procedure that covers these controls is the Pasteuriser Fill Discharge Procedure, the HACCP Plan, and Process Flow and Hazard Identification for HACCP Production.

To achieve the optimum biological conditions, we will continue to agitate the contents of the newly constructed RWBT to ensure a homogenous mix within 1140m^3 tank. The waste pre-acceptance process would rule out any incoming material that couldn't be mixed at the waste acceptance stage or in the RWBT, or at the very least, would identify maximum volumes that could be accepted at any one time/over a period. Biogen have an established Research Team who form part of the pre-waste acceptance team and provide feedback and advice on new feedstocks and process monitoring.
From the RWBT stage, a homogenous mix will be discharged into the five Digesters. This will change from the current 4 x 2280m^3 digesters to 4 tanks at 2280m^3 each and 1 at 3500m^3 (comprised of 2 x 2280m^3 digesters to serve the CHP engines and 2 x 2280m^3 and 1 x 3500m^3 to serve the gas to grid operations). Digesters 1, 3 and 4 will be rebuilt to the current dimensions. Digester 5 was never built as part of the original installation. Digester 5 will now be constructed but with a larger tank diameter than the original planned digester but at the same height as the other 4 digesters at 14 metres. The new digester 5 will have a diameter of 18 metres instead of 14 metres.

Pasteurisation will then take place post digestion in 2 x 160m^3 tanks. Pasteurisers 1 & 2 will be rebuilt to the same diameter as the existing tanks but with an increased height of 7 to 8 metres high which is significantly less than the height of the digesters and the RWBT, which will increase the storage capacity of each pasteuriser from 140m^3 to 166m^3. There will remain a total of 3 temperature probes (top, middle and bottom) within each tank have to reach a temperature of 70.7^oC for a minimum period of 65 minutes prior to discharge.

Fully pasteurised digested material is then fed to the Borger separator to screen material down to less than 2mm. The Borger separator is operated and maintained in accordance with the documented Borger Press Operation Procedure. The remaining screened contaminants will be removed offsite in covered containers pending disposal elsewhere. Currently screening takes place in the open with no odour abatement. A new purpose built sealed screening room will be constructed with extracted air channelled through to a new acid scrubber for treatment prior to emission to air via a 4 metre stack.

Screened PAS110 QP digestate will continue to be stored within 3 existing 9700m^3 Digestate Storage Tanks pending removal offsite for land spreading for agricultural benefit. The headspace of digestate storage tank 1 will be extracted and channelled through to the acid scrubber treating air from the screening room. Inlet concentrations and outlet emissions from the acid scrubber will be tested for odour concentration, H_2S and NH_3 every six months. Digestate storage tanks 2 and 3 will remain open tanks with a Hex-a-block floating cover.

The Biogen AD process is very simplistic in terms of emission points due to its sealed nature. Digesters 1 and 2, the RWBT and both Pasteurisers will be connected to the common gas line feeding

the CHP engines. Both engines will continue to be subject to annual MCerts emissions testing in accordance with Table S3.1. The remaining 3 digesters will be connected to the gas to grid gas holder.

The Jenbacher 416 CHP engines will continue to be utilised at Westwood to generate electricity and heat. Heat from the engines will continue to be utilised to heat Digesters 1 and 2 and the pasteuriser tanks. New gas boilers will be used to heat Digesters 3, 4 and 5. Use of the auxiliary flares on site will be minimised as much as possible and only used during essential plant maintenance. The existing flare will remain to serve the gas holder for the CHP engines. The gas to grid operations will be covered by a new flare installation. Records of operating hours of both flares will be submitted annually to the Environment Agency. One of the benefits of having two CHP's allows us to continue to generate electricity and heat whilst one CHP engine is offline for essential planned maintenance.

The new gas to grid expansion plans in simplistic terms will utilise the same waste acceptance procedures, front end processing and digestion as currently in place to serve the CHP engines for electricity generation. However, following digestion, gas from digesters 3, 4 and 5 will be directed through a gas scrubber then onto a newly installed gas holder. From here, gas will be directed to a Biogas Upgrade Plant (BUP) where other gases from the gas stream will be removed through membrane separation. Following upgrade, gas will be directed to the Gas Export Unit (GEU) where propane injection will increase the calorific value of the biomethane prior to export to the national grid as biomethane via a pipeline with a typical methane content of >97%. Methane compression can also take place pending export offsite via road tanker as a contingency for example when gas to grid is unavailable.

A Plant Monitoring Spreadsheet is used to record daily electricity export and import (kWh) readings as well as the amount of electricity consumed by the facility. Also recorded on SCADA includes for example, but not limited to, the generation meter, parasitic meter (CHP electricity consumption), CHP operating (run) hours, the number of CHP start-ups and gas to grid exportation. CHP heat will be used to heat Digesters 1 and 2 (37.1 - 40.4^{o}C mesophilic), the pasteurisers (70.7^{o}C for 65 minutes), and to heat the building.

In respect of wastewater streams, the Westwood AD Facility will continue to have a sealed drainage system. All leachates from the incoming feedstocks will continue to be captured within a purpose designed sealed drainage system within the waste reception hall to a below ground sump which is then directed into the process for full treatment or discharged directly to the RWBT. This ultimately then forms our final digestate which meets full PAS 110 QP compliance and is not classified a waste but instead is recognised as a product. The same is also true of any condensates produced in the treatment process, these will be fed back into the process to undergo full treatment and form our end PAS 110 product.

Bund water captured within the secondary containment area will either be returned back into the process for treatment to form part of our PAS110 QP product or discharged to the onsite attenuation pond subject to ammonia testing. The volume of bund water returned back into the process is recorded daily on a Plant Monitoring Spreadsheet. There will be no discharge of contaminated effluent to surface waters or groundwater.

In December 2023, Biogen obtained their Carbon Reduce certification following a successful audit verification process. The audit is based on the ISO 14064 Standard for Greenhouse Gas quantification, reporting and verification and 2023 was the first year Biogen had participated in the scheme. An extensive amount of data for 2022 was gathered from across the business to form the base year information. The sources of the data included, but not limited to:

- plant monitoring spreadsheets (biogas produced, electricity production and consumption, water usage etc)
- weighbridge movements (incoming, outgoing and internal movements)
- business mileage, air and rail travel claims
- accommodation (number of nights stayed on behalf of the business); and
- supplier invoices/statements (all-star fuel cards and electricity suppliers for imported electricity, air conditioning service records and HV inspection records).

What this base year data highlighted was the areas of our business which have the greatest impact on our carbon footprint. In addition to our internal systems, we are reviewing our engagement with our supply chains. Suppliers who provide us with accurate emissions data and who engage with carbon reduction will also improve our carbon footprint.

Our focus on sustainability and carbon reduction also increases opportunities for the business when tendering for feedstock, engaging with investors and other stakeholders such as the Environment Agency and local authorities.

A documented Site Closure Plan is to ensure the site is in a satisfactory condition in the event permitted activities ceased and the permit is surrendered to ensure that the site would not pose a risk to public health, to the environment and/or to local amenities.

A documented Internal Audit and Management Review Schedule identifies all internal policies and procedures which are subject to periodic review. All changes or alterations made to any policy, procedure, process or activity are documented and recorded as part of the IMS providing a full audit trail.