Environmental Permit Variation (UP39093SG)

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July 2024- Phase One

Cliniwaste Health South Limited

Cliniwaste Health South Limited
Crossgate Drive Clinical Waste Treatment Facility
Unit A, Crossgate Drive
Queens Drive Industrial Estate
Nottingham
NG2 1LW

Installation Details

Installation Name (existing):
Crossgate Drive Clinical Waste Treatment Facility

Existing Permit Reference:
EPR/UP39093SG

Address:
Cliniwaste Health South Limited
Crossgate Drive Clinical Waste Treatment Facility
Unit A
Crossgate Drive
Queens Drive Industrial Estate
Nottingham
NG2 1LW

OS Grid Reference:
SK562380, X 456263, Y 338066

Applicant Details

Applicant Name:
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Section 1.0: Non-Technical Summary

This application relates to an existing installation operated by Cliniwaste Health South Limited ('Cliniwaste') at the Crossgate Drive Clinical Waste Treatment, which is hereafter referred to as "the installation". Cliniwaste is applying for a variation to its existing Environmental Permit (Reference: **EPR/UP3909SG**) to accommodate several operational changes at the installation:

1. Introduction of an additional waste shredder to facilitate the shredding of offensive waste (this activity is already permitted) this additional shredder, will be used in contingency for the clinical hazardous waste streams. By shredding the offensive waste and blending it with the post treated waste, will allow for innovative methodologies of disposal where plastics are able to be recovered. This supports the NHS strategy of 60:20:20, where an increased generation of offensive waste is expected to be seen and diverted from landfill.
2. Upgrades have already been made to the existing exhaust system on the autoclave, where.

- The efficiency of the boiler has been optimised through a closed loop heat recovery process in which final contaminated energy used in the process from the autoclave is returned to the start of the cycle to reduce overall energy used in the complete process. This will result in no air emissions from the autoclave exhaust.
- Due to the proposed variation in point 3, the effluent from any operation within the autoclave will be captured in an on-site holding tank. The purpose of the holding tank is to reduce air emissions and will be fitted with a three-way valve. The valve will be able to;
    i. Ensure an enclosed capture system for water potentially contaminated with pharmaceutical waste and sent for off-site disposal. This is listed as a directly associated activity.
    ii. During batch processing of orange waste, discharge to drain under our normal discharge consent license.

3. Add additional European Waste Codes to the activity references AR1 & AR2 which is the shredding and autoclaving process, to enable additional waste streams to be treated.
   This variation seeks to add the addition of infectious and medicinally contaminated sharps wastes through batch processing. This variation will allow these wastes to be treated through the autoclave and diverted from high temperature incinerators, where the capacity is much needed due to ageing infrastructure and lack of investment in new incinerators. The total capacity to be shredded and treated waste will need to change to reflect the operational capacity of the autoclave and the new activities proposed, these activities are listed within table 2.1 in this document.
4. Add additional European Waste Codes to the activity AR3/8 to include the acceptance and storage of a fuller suite of waste produced at clinical waste facilities.
5. Vary the storage of treated waste to allow operational flexibility. The storage capacity would include the need to store the waste in compacted bales pending off site transfer for recycling/recovery, in a dedicated area (area 10a on the site map) or short term within a curtain sided trailer (area 10b on the site map) pending off site transfer.

An Environmental Risk Assessment has been undertaken to include the proposed variation on the installation. It is not considered that the installation will have any unacceptable environmental impact following the variation. This can be found in document C2_6 Nottingham Environmental Risk Assessment

Section 2.0: Regulated Activities

2.1 Variations to Regulated Activities

The following table summarises the proposed variations to the regulated activities at the installation.

Table 2.1. Proposed variation to the regulated activities at the Installation.

Activity	EPR Activity Reference	Activity Description and WFD Annex I/II Designation	Proposed Limits of Activity	Change from Existing Environmental Permit
Schedule 1 Activities				
AR1	Section 5.3 A(1)(a)(ii) The disposal of hazardous waste in a facility with a capacity of more than 10 tonnes per day; involving Physico-chemical treatment. Physico-chemical treatment of hazardous waste in a shredder and autoclave	Treatment by shredding of infectious waste prior to on-site treatment. R3 Recycling/reclamation of organic substances which are not used as solvents. D9 - Physico-chemical treatment.	Hazardous waste types as specified in Table S2.2. From shredding of infectious waste to storage of shredded waste prior to onsite treatment All treatment shall take place within a building on an impermeable surface with sealed drain. No more than 39 tonnes per day of infectious waste shall be shredded. Shredded waste shall be stored within fully enclosed, waterproof and leak proof containers. Shredding of infectious waste shall not change either the maximum storage times for waste on site or the amount that can be stored.	Change the shredding allowance of infectious waste from 39 tonnes per day to 50.4 tonnes per day. Which is 18,287 tonnes per annum. The 50.4 tonnes is based on the processing capacity of the autoclave. Include the addition of non/infectious sharps and medicinally contaminated sharps. (these are listed in table 2.2 within this document) We propose to batch treat the waste: Orange and yellow wastes will remain separate.

AR2	Section 5.3 A(1)(a)(iv) Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day; involving Physico chemical treatment.	Treatment by shredding of infectious waste by batch thermal treatment in one autoclave (including post treatment compaction of treated floc.) R3 Recycling/reclamation of organic substances which are not used as solvents. D9 - Physico-chemical treatment.	Hazardous waste types as specified in Table S2.2. From treatment of waste to storage of treated floc. All treatment shall take place within a building on an impermeable surface with sealed drain. No more than 39 tonnes per day of infectious waste shall be shredded. Treated floc shall be stored within fully enclosed, waterproof, and leak-proof container, located on impermeable surfacing in a dedicated area of the storage yard for no longer than 7 days prior to offsite transfer. No more than 36 tonnes of treated floc shall be stored on site at any one time. No waste types shall be subjected to this activity other than those infectious wastes shredded in AR1.	Change this activity to include the option of a baler for the compacted treated orange and shredded offensive material. The baler will compact the floc into approx. 1m3 sized bales, to minimise carbon footprint, Cliniwaste would like to store the bales until there is enough to fill an artic vehicle, to move the waste on to be a recycled. Cliniwaste would keep the compactor in the permit for the treated yellow sharps and as contingency for other shredded/treated wastes. The shredding of 39 tonnes per day of infectious waste does not equate to: 1. to the maximum batch throughput of the autoclave, which is 2100kg per hour, based on a 24 hour throughput, this daily tonnage would need to be 50.4 tonnes. Which is 18,287 tonnes per annum. 2. Additional EWC's to be added for this activity for this variation which are listed in Table 2, under S2.2. The storage of compacted/baled material would need to change from 36 tonnes to 44 tonnes. This takes into consideration the shredded offensive waste and the addition of the new EWC codes that Cliniwaste are proposing to put through the treatment plant and bale/compact with the treated material. Cliniwaste propose to store the wrapped baled material on a curtain side vehicle located as 10a on the site map. The EWC's that Cliniwaste propose for the treated material is: 190210, this will allow for further development work to recycle the material as opposed to just sending it as RDF. The treated sharps will also be EWC: 190210, but this will go to a suitably licensed facility as the pharmaceutical residues will remain.

Activity	EPR Activity Reference	Activity Description and WFD Annex I/II Designation	Proposed Limits of Activity	Change from Existing Environmental Permit
AR3	Section 5.3 Part A(1)(a)(iv) Disposal of hazardous waste with a capacity exceeding 10 tonnes per day involving repackaging.	Repackaging of hazardous waste. R12 Exchange of waste for submission to any of the operations numbered R1 to R11. D14 Repackaging prior to submission to any of the operations numbered D1 to D13.	Repackaging is limited to: • taking a waste package (for example a bag, drum, or box) out of one cart or bulk container (for example a skip) and placing it into another cart or bulk container (for example, a skip) • taking a waste package from a cart or bulk container (for example, skip) and placing it onto a pallet or vehicle • taking a waste package from a pallet and placing it into a cart or bulk container (for example, skip) Waste shall not be transferred, removed, or separated from its primary packaging (for example bags, bins, boxes, and blister packs). Repackaging of waste shall not change either the maximum storage times for waste on site or the amount that can be stored. No waste types shall be submitted to this activity other than those hazardous wastes specified in Schedule 2, Table S2.3.	Add additional EWC's to the permit to reflect all waste streams a hospital may produce. These additional EWC codes are fixer and developer: EWC: 09 01 01* and 09 01 05*

Activity	EPR Activity Reference	Activity Description	Proposed Limits of Activity	Change from Existing Environmental Permit
Directly Associated Activities				
AR4	Steam Supply	Gas fired steam raising boiler - net thermal input approximately 1.58MWth	Includes receipt of fuel and its storage. No fuel shall be used other than gas.	The efficiency of the boiler will be optimised through installation of a closed loop heat recovery process in which final contaminated energy used in the process from the bin wash and autoclave is returned to the start of the cycle to reduce overall energy used in the complete process. This will result in no air emissions from the autoclave exhaust. Any condensate from the boiler will be captured.
AR5	Cleaning and disinfection of containers and carts.	One automated bin washer that cleans and disinfects.	Handling, cleaning and storage of containers and carts prior to dispatch. Washing and disinfection of mobile containers shall only take place in designated areas with impermeable surface and a sealed drainage system.	No changes proposed
AR6	Raw material handling and storage.	Raw material handling and storage.	From receipt and storage to point of use.	No changes proposed
New DAA relating to AR1 and schedule 1: Section 5.3 A(1)(a)(ii)	Water storage tank	Process Effluent from the autoclave.	20,000 litre water tank that continuously discharge to sewer, during orange processing. (W3A on the Site Map) The effluent from processing yellow waste will be diverted to an IBC ready for offsite disposal at a suitably licensed facility. (W3B on the Site Map)	DAA proposed to store the water from the autoclave effluent prior to sending for offsite disposal in IBC's. The storage tank is located on the site map as W3B.

Activity	EPR Activity Reference	Proposed Limits of Activity	Change from Existing Environmental Permit
Waste Operations			
AR7	Repackaging of non-hazardous waste. R12 Exchange of waste for submission to any of the operations numbered R1 to R11. D14 Repackaging prior to submission to any of the operations numbered D1 to D13.	Repackaging is limited to: • taking a waste package (for example a bag, drum or box) out of one cart or bulk container (for example a skip) and placing it into another cart or bulk container (for example, a skip) • taking a waste package from a cart or bulk container (for example, skip) and placing it onto a pallet or vehicle • taking a waste package from a pallet and placing it into a cart or bulk container (for example, skip). Waste shall not be transferred, removed, or separated from its primary packaging (for example bags, bins, boxes and blister packs). Repackaging shall take place within a building on an impermeable surface with sealed drainage. Repackaging of waste shall not change either the maximum storage times for waste on site or the amount that can be stored. Bin, container, or cart washing equipment shall be purpose-built, contained and located in a designated area of the facility provided with self-contained drainage. The cart or bin wash must be designed to collect and contain all wash waters, including any spray. • No waste types shall be submitted to this activity other than those non-hazardous wastes specified in Schedule 2, Table S2.3.	No changes proposed

AR8	Storage of non-hazardous and hazardous waste. R13 Storage of waste pending any of the operations numbered R1 to R12 (excluding temporary storage, pending collection, on the site where it is produced). D15 Storage pending any of the operations numbered D1 to D14 (excluding temporary storage, pending collection, on the site where the waste is produced).	From receipt and storage of hazardous and non-hazardous waste on site to its treatment or repackaging on site; or its transfer off-site. The amount of hazardous waste stored at any one time shall not exceed 49 tonnes. The amount of non-hazardous waste stored at any one time shall not exceed 65 tonnes. The combined storage of hazardous and non-hazardous waste shall not exceed 65 tonnes at any time. All waste shall be stored inside a building. Waste shall not be stored in vehicles or vehicle trailers, unless they are being received for immediate offloading or prepared for imminent transfer (that is, they will be removed from site within 24 hours, or 72 hours if over a weekend). Infectious clinical waste shall be stored for no longer than 14 days. Non-infectious offensive waste shall be stored for no longer than 14 days. Refrigerated anatomical waste shall be stored for no longer than 14 days. Unrefrigerated anatomical waste shall be stored for no longer than 24 hours, or up to 72 hours if over a weekend. Pharmaceutical, chemical, and palletised hazardous waste shall be stored securely within designated areas of the building. The following waste types shall be stored on site for no longer than 6 months: ○ non-infectious medicines (including cytotoxic and cytostatic) ○ dental amalgam ○ other chemicals or other wastes. Notwithstanding the limits given above where a shorter storage time period is given in an agreed management plan then that period shall take precedence. No waste types shall be submitted to this activity other than those wastes specified in Schedule 2, Table S2.3.	We propose to store up to 44 tonnes of compacted baled material at any one time, this is to allow for a full articulated lorry of material to leave site, reducing the carbon footprint of multiple journeys and reduce the number of collections from the site to remove this waste. (this variation seeks to only bale: offensive/and treated orange waste) The treated yellow waste will still go into the compactor. And the compactor will be used as contingency for the offensive/treated orange waste) Add additional EWC's to the permit to reflect all waste streams a hospital may produce. These additional EWC codes are fixer and developer: EWC: 09 01 01* and 09 01 05*

AR9	Treatment by shredding of offensive waste. R3 Recycling / reclamation of organic substances which are not used as solvents. D9 Physico-chemical treatment	From treatment of waste to storage of shredded waste. No more than 39 tonnes per day of non-hazardous waste shall be treated by shredding. No more than 50 tonnes per day of non-hazardous waste shall be treated for disposal in aggregate. All shredding shall take place within a building on an impermeable surface with sealed drainage. No more than 10 tonnes of shredded offensive waste shall be stored on site at any one time. Shredded waste shall be stored within fully enclosed, waterproof and leak-proof containers. The shredding of waste shall not change either the maximum storage times for waste on site or the amount that can be stored. Bin, container or cart washing equipment shall be purpose-built, contained and located in a designated area of the facility provided with self-contained drainage. The cart or bin wash must be designed to collect and contain all wash waters, including any spray. No waste types shall be submitted to this activity other than those non-hazardous wastes specified in Schedule 2, Table S2.4.	No changes proposed

Table 2.2 below identifies the wastes that will Cliniwaste want to be added to the current tables within Schedule 2 of the permit for treatment or management at the installation.

Schedule 2 Permit Variation Requirements

Activity reference	Treatment process/ storage facility	Annex IIA/ IIB operations	Waste description	Other requested information	EWC codes	Current permit or variation?	Colour coding
S2.2 AR1 & AR2	Physico-chemical treatment of clinical waste: Shredding of waste followed by steam treatment in an autoclave*	D9 R3	Non-infectious sharps Non-infectious sharps from vaccines delivered in mass vaccination centres in the community and care homes	The waste description highlighted in red, used within the permit is very prescriptive to site-based activities, should Public Health England/ Department of Health change the waste descriptions as they did with the COVID-19 vaccination programme, this would restrict Cliniwaste's ability to take this EWC code based on the prescribed waste description. Cliniwaste would ask that the Agency change the waste description to allow for future developments.	18 01 01 18 02 01	Variation	Boxed unused sharps, orange sharps box
			Infectious waste not contaminated with chemicals or medicines may contain sharps		18 01 03* 18 02 02*		Orange Sharps box
			Infectious waste, medicinally contaminated (not cytotoxic or cytostatic) may contain sharps. Sharps from vaccinations delivered in hospitals or GP Surgeries		18 01 03*/09 18 02 02*/08		Yellow Sharps
S2.3 AR3, AR7 & AR8	Repackaging of hazardous waste prior to on-site treatment or off-site disposal	R12 D14	Water Based developer and activator solutions. Bleach Solutions and bleach fixer solutions.		09 01 01* 09 01 05*		Typically, 5ltr bottles, but any suitable container is appropriate.
*Note 1: any wastes accepted into AR1 & 2 shall exclude: Anatomical, Cytotoxic and Cytostatic Medicinal Waste, Category A High Consequence Dangerous Goods, ACDP HG4 Biological Agents, Any waste from a Containment Level 3 Laboratory, All Microbiological Cultures from any source, Any infectious waste from Pathology or any other Research Laboratories.							

Section 3.0: Environmental Management

Operations at the at the Crossgate Drive Clinical Waste Treatment Facility will be audited under Mitie's Environmental Management System during Q1 2025. Cliniwaste will be audited for the ISO14001:2015 standard. Whilst Cliniwaste is awaiting the external auditing they will continue to use their own EMS which is outlined in the document C2_D Environmental Management System Overview Nottingham.

3.1 Summary of Management System elements

The management systems in place at the site are constructed around a range of operational and maintenance procedures that minimise environmental impact while ensuring the safe and reliable operation of the alternative treatment processes for clinical waste and the sustainable operation of the site. A key element of the system is Cliniwaste's bespoke TRACE (Track, Report, Audit, Consign, Educate) tracking tool which offers full end-to-end traceability of waste consignments for all interested stakeholders, from collection, through the treatment process and to the ultimate point of disposal.

The following provides a summary of the key elements of the site's environmental management system.

3.1.1 Environmental Policy

Cliniwaste has a clearly defined environmental policy and programme covering the operations at its two operational waste management facilities, including the installation in Nottingham. The policy includes:

- a commitment to continual environmental improvement and to the prevention of pollution;
- a commitment to comply with relevant legislation, and with other requirements to which the organisation subscribes; and
- environmental objectives and key performance indicators to support the continual improvement of the installation, which are themselves subject to ongoing review.

3.1.2 Operational procedures

The management system identifies a range of procedures to facilitate both the safe and reliable treatment of clinical wastes and the sustainable operation of the installation. The procedures include:

- Comprehensive waste pre-acceptance and acceptance procedures to ensure that only wastes suitable for alternative treatment are subject to treatment in the installation;
- Cliniwaste's bespoke TRACE tracking system allowing end-to-end tracking of individual waste consignments through the treatment process;
- Operating protocols and instructions to control operations that may have an adverse impact on health and safety and on the environment;
- A preventative maintenance programme focused on key plant items designed to ensure both business continuity and the minimisation of environmental impact; and
- Documented procedures for monitoring emissions or impacts.

3.1.3 Maintenance

Planned preventative and reactive maintenance is undertaken on all key plant and equipment that could result in an adverse impact on the environment. Failure of plant and equipment and records of maintenance interventions are logged, and the data is reported to management to facilitate the scheduling of the operation of the installation, to allow revision of the planned preventative maintenance schedule and to inform future capital expenditure.

3.1.4 Training

Comprehensive training is undertaken by Cliniwaste to ensure that all staff members are aware of the potential environmental effects of the operation of the installation, both under normal and abnormal

circumstances. All staff are also provided with awareness training concerning the appropriate management of clinical waste, the need to prevent accidental emissions and the actions to be taken when accidental emissions occur.

More detailed, role-specific training is provided to those employees whose roles have the highest potential environmental impact. Induction training systems are in place for all new employees and contractors and ad hoc training is provided when required to reflect changes in site operations. All process operators receive awareness training so that they are aware of the implications of the permit for the site and their work activities and of the need to report deviation from the permit to appropriate responsible individuals. Training will be updated to reflect the variation to both the site and the permit.

3.1.5 Non-compliance

There are a range of established procedures in Cliniwaste's management systems for handling, investigating, communicating and reporting instances of non-compliance, including:

- failures in appropriate waste management and segregation and the subsequent quarantining of non-compliant wastes;
- actual or potential non-compliance with operating procedures or emission limits;
- environmental complaints; and
- environmental incidents and near-misses.

3.1.6 Auditing and reporting

In addition to regular internal auditing, Cliniwaste's environmental management system will become subject to ongoing review and audit by Mitie's external ISO accreditation provider by Q1 2025. Key aspects of the environmental performance of the site are routinely made available to clients and key stakeholders.

3.1.7 Records

Cliniwaste's environmental management system has a clearly defined structure and an established framework for keeping records and documentation including:

- all relevant waste management documentation;
- policies;
- roles and responsibilities;
- targets;
- procedures;
- results of audits; and
- results of reviews.

Section 4.0: Process Description

4.1 Pre- Acceptance

Cliniwaste has a range of pre-acceptance procedures in place at the installation and several long-term waste contracts with healthcare providers. The pre-acceptance procedures are designed to ensure that the waste arriving at the installation falls within a narrow range of well-defined categories, for which clear recovery and disposal routes are available.

Detailed appraisal of its contracted healthcare providers has been undertaken by Cliniwaste to demonstrate that the contracted waste each generates is suitable for management and treatment at the installation. For each waste stream and provider, Cliniwaste has established:

- The specific nature of the healthcare process from which the waste derives;
- The likely quantities of waste to be produced over the contract term;
- An audit of the waste stream;
- An analysis of the physical form of the waste and an assessment of the containers to be used to transport the waste;
- The hazards associated with the waste; and
- The storage techniques used by the provider following the production of the contracted waste but prior to collection by Cliniwaste.

The responsibility for the pre-acceptance auditing of each waste provider lies with the most technically qualified members of the Cliniwaste management team (the Compliance Manager and the Technically Competent Managers) to ensure that the wastes can be safely and appropriately managed at the installation. Cliniwaste will only agree waste management contracts subject to the successful completion of the pre-acceptance audit process. Client sites are expected to fully segregate their wastes according to the Department of Health's HTM 07-01 Safe Management of Healthcare Waste Memorandum, including the use of appropriately colour-coded packaging materials and enclosures. Cliniwaste have access to a qualified chemist should this be needed.

All audit records and contract details will be retained by Cliniwaste at the installation for the purposes of ongoing compliance auditing, verification and process control. Records will be maintained for a minimum period of six years.

Because of the pre-acceptance procedures outlined above, most of the waste received at the site will be able to be treated at the site. Cliniwaste has a series of waste disposal agreements in place with third party waste contractors so that any waste that cannot be treated on site can be safely disposed of as necessary.

4.2 Waste Acceptance

In addition to the pre-acceptance procedures outlined above, Cliniwaste also operate a range of waste acceptance criteria and management procedures at the installation to ensure further that only suitable wastes are subject to treatment in the installation.

Waste is only acceptable at the site if it is transferred to the installation in appropriately colour-coded and sealed containers. The container will be marked with barcodes which are scanned using handheld scanners at the point of collection, which allows Cliniwaste to provide full traceability for the wastes received at the site and to record the following information for each bin:

- Description and provenance of the waste;
- Details of the waste producer;
- Waste characteristics;

- Hazard and handling precautions;
- Date of collection; and
- Proposed disposal route.

For large-scale client sites, Cliniwaste provides the reusable waste storage bins directly to the clients for their use. In addition to this, Cliniwaste also operates a community collection service for low-volume waste providers (e.g. ambulance stations). At these sites, loose bags and boxes of waste are decanted into the reusable waste storage bins upon collection, prior to transfer to the installation.

Cliniwaste utilises both its own vehicles and registered third-party waste hauliers for the delivery of bins to client sites and for the subsequent collection of waste and transfer to the installation. Initial visual checks of the bin contents are made at the point of collection, which means that some inappropriate waste types can be rejected at source rather than having to be returned to the point of production.

All waste deliveries are pre-booked with Cliniwaste and, while the installation is operated 24 hours a day, the deliveries typically occur during daylight hours when the installation is fully attended for the minimisation of nuisance potential. Upon arrival at site, the delivery vehicles (which range from small vans to heavy goods vehicles) reverse into the bay for off-loading. The reception area, in common with the rest of the main processing building, is surfaced with resin-coated concrete.

Waste is only off-loaded from the delivery vehicles if sufficient storage capacity is available within the main processing area. If insufficient room is available (for example due to temporary plant breakdown) the waste will either remain on the vehicles temporarily until capacity is made available or (in the event of longer-term plant failure) will be transferred off-site to other, third-party disposal facilities. Cliniwaste have a robust Business Continuity Plan, which was tested as part of risk and resilience week during May 2025.

The waste reception area is located immediately adjacent to the off-loading area and is permanently attended so that all deliveries are fully supervised and can be subject to proper waste acceptance assessment. All deliveries must be accompanied by complete waste transfer documentation for the waste to be accepted:

- Consistency with the expected waste delivery, given the terms of the waste management contract with the waste provider; and
- Consistency with the expected nature of the waste consignment itself, as follows:
  - physical characteristics;
  - composition;
  - quantity;
  - hazard and handling precautions; and
  - date and location of production.

Any materials which have inadequate documentation are rejected and reloaded onto the delivery vehicle for return to the producer's premises. All waste deliveries undergo thorough visual inspection at the point of delivery and any obviously anomalous loads are not accepted for treatment.

Waste that is not acceptable at the installation may fall into two distinct categories:

- Quarantined waste, which is waste that Cliniwaste is licensed to accept on site, but which due to company or legal requirements may not be treated at the site. Rejected waste will be stored on site (see below for storage details) before being transferred off-site for disposal by third party contractors; or
- Rejected waste, which is waste that Cliniwaste is not licensed to accept on site (e.g. non-clinical industrial waste) and must be removed, either by Cliniwaste or the waste producer.

Any waste identified as being quarantined waste is moved to a dedicated, enclosed quarantine compound. If it can be accomplished safely, the offending materials will be unloaded from the waste bin and transferred to a dedicated quarantine bin. Failing that, the entire bin will be retained in the quarantine area. When an item is placed into quarantine, a senior operative or manager will be informed, the waste will then be re-assessed, and a rejection or a quarantine form will be completed, and the waste producer will be informed to help prevent the recurrence of the event. The waste will then be disposed of in an appropriate manner; no quarantined waste will be retained on site for a period of greater than 5 days.

Provided the waste is of an acceptable type and is accompanied by the appropriate documentation, it is then formally accepted by Cliniwaste at the installation. At this point all information recorded on the handheld scanners at the point of collection is uploaded into Cliniwaste's TRACE tracking system allowing each container to be tracked throughout the treatment process. Each bin/pallet has the following information associated with it:

- Date of arrival on-site;
- Details of the waste producer and all previous holders;
- A unique reference number;
- Packaging details;
- Intended treatment/disposal route;
- Description and provenance of the waste;
- Waste characteristics;
- Hazard and handling precautions;
- On-site storage location; and
- Identification of operatives who have taken any decisions concerning the acceptance or rejection of waste streams and the subsequent treatment or disposal routes selected.

The bins/pallets are then transferred from the reception area to an adjacent weigh scale. Each individual bin has a pre-measured tare weight, allowing the weight of each waste consignment to be readily calculated. The weight of each consignment is then automatically transferred into the TRACE tracking system record for each bin via Bluetooth.

The tracking system can also be used as an audit tool as it has been designed to allow the aggregation of data such that the following can be provided to process operators at any given instant:

- A complete inventory of the waste held at the installation, including a measure of the total waste storage capacity and a breakdown of the different waste categories stored;
- Location in the installation of the waste during storage;
- Comparison of the quantity of waste held on site against the permitted total; and
- Duration that the wastes have been stored on site.

4.3 Waste Storage

The figures included at the end of this application support document providing schematic layouts of installation following the proposed variation:

- Figure 1: Process Map for proposed variation
- Figure 2: Site Map with Emission Points and Storage Locations
- Figure 3: Site Drainage Plan

Table 4.1 provides details of the storage conditions, capacity and maximum storage duration for each of the waste streams.

Table 4.1. Revised waste storage provision at the installation

Storage structure or facility	Colour coding	Waste type	Maximum storage capacity	Maximum storage duration
Segregated internal bin storage area. Location 9 on the site map.	Orange	Infectious clinical waste	49 tonnes	14 days
	Yellow	Infectious clinical waste contaminated with chemicals and/or pharmaceuticals		14 days
Internal refrigerated store location 7 on the site map	Red	Anatomical waste		14 days
Segregated internal storage area. Location 9 on the site map	Purple	Cytostatic and cytotoxic medicinal waste		
	Other hazardous waste streams	Fixer, amalgam, developer & chemicals.		6 months
	Other non-hazardous waste streams	Chemicals & metallic packaging	65 tonnes	
	Blue	Non-hazardous Medicinal waste		
Segregated internal storage area or enclosed roro. Location 9 or 13 on the site map.	Yellow/black tiger bags	Offensive waste/gypsum waste		14 days internally 7 days externally
Compactor skips/ Baled floc Location 10a or b on the site map.	None	Post-treated/ shredded waste	44 tonnes	

Following waste acceptance and segregation the various waste streams are stored in the dedicated and demarcated internal storage areas identified above. All bins always remain lidded to avoid the potential for fugitive emissions or odour, other than when the bins are being loaded or unloaded. Only rigid containers over 5 litres will be palletised, the containers will be stored upright, a maximum of 2.2 metres height including the height of the pallet and wrapped in clear wrap so the contents are easily visible.

The internal storage areas are surfaced in resin-coated concrete which allows for the rapid clean-up and disinfection of the site in the event of a waste spillage. With the exception of the bin wash area, there is no connection to drain from the internal storage areas which minimises the potential for accidental release to the environment.

Procedures for the safe management and storage of waste are included in Cliniwaste's Environmental Management System (EMS). All operatives are trained in the proper segregation of wastes and in the observance of the specific requirements for their safe storage (location, capacity, cleaning, etc).

4.4 Waste Treatment

The installation is classified as an "Alternative Treatment" plant for clinical waste, being any facility that can render safe clinical waste through the use of heat, chemicals or irradiation. Rendered safe can be defined as:

1. The reduction in the number of infectious organisms in the waste such that no additional precautions are required to protect workers or the public against infection by the waste;
2. The destruction of anatomical waste such that it is no longer recognisable;
3. The destruction of sharps such that they are no longer in their original form and are unusable;
4. The destruction of chemical components of medicinal waste.

The efficacy of steam treatment technologies in the rendering safe of clinical waste is generally assessed by comparison with the State and Territorial Association on Alternate Treatment Technologies (STAATT) standards for clinical waste treatment. If a technology can consistently achieve as a minimum the Level III STAATT standard, i.e. a 4 log10 inactivation of the microbial population of the waste, then it provides an adequate level of treatment.

The installation houses a single high-capacity Bondtech autoclave, which has proven to be robust, it is proven technology that achieves the required Level III STAATT deactivation of clinical waste. It's design, featuring a fixed pressure vessel with no moving parts, offers high reliability, availability and low maintenance requirements.

The following provides a brief outline of the proposed future operation of the installation treatment process.

4.4.1 Offensive waste treatment through Shredder Two- Location A3b on the site map

Shredder two's primary purpose is to mechanically treat offensive waste. Operators will stream a steady flow of offensive waste bins from the designated storage area to the waste shredder and place it within an automated bin tipper. The bin barcode will then be scanned and, provided that the control system receives confirmation that the contents of the bin are suitable for treatment, the bin will then be lifted, and its contents tipped into a receiving hopper mounted on top of the waste shredder. The empty bin will then be removed by the operator and relocated to the bin washing area for sterilisation and subsequent reuse. The shredder installed is that of the same specification as the one used for the hazardous clinical waste and houses an LEV system that is fitted with an air filter, a HEPA filter and a carbon filter.
Once shredded the contents will be placed into a larger cart ready to tip into the compactor or baling machine. Should this shredder need to be used for hazardous waste, then it will undergo a cleaning regime prior to it being used again for offensive waste, to ensure no non-hazardous waste is contaminated.

4.4.2 Hazardous Clinical Waste pre-shredding – Location A3a on the site map.

When required by the treatment schedule, operators will move a treatable waste storage bin of hazardous waste from the designated storage area to the waste shredder and place it within an automated bin tipper.

The proposed hazardous wastes able to be shredded at any one time are listed below and Cliniwaste propose that these wastes are processed by colour batch, so that the byproduct can be treated appropriately.

- **Batch One:** Infectious waste bags and sharps (orange colour) 180101, 180103*, 180201, 180202* and 200199
- **Batch Two:** Infectious waste contaminated with pharmaceuticals including sharps: (yellow colour) 180103*/09, 180202*/08 and 200199

Cliniwaste do not intend to shred nor treat the below wastes:

- Any anatomical waste
- Any waste containing Cytotoxic and Cytostatic Medicines
- Infectious wastes from Pathology or other research facilities (Cliniwaste will verify if the producer, produces this waste from their Pre-Acceptance Audit, which is issued prior to accepting waste into

the installation, Cliniwaste will communicate strict acceptance advice and ask that the producers segregate and label any pathology/research bins with a specific bin label, this will then be able to be kept separate, a secondary visual check is performed upon acceptance and this specific waste can be routed to a high temperature incinerator facility.)

- Clinical wastes that contain Advisory Committee for Dangerous Pathogens (HCDP) Hazard Group 4 or any Containment Level 3 Laboratory Waste.
- Clinical wastes that are classified as Category A Wastes, these will still be diverted directly from producer to a high temperature incinerator.
- Microbiological Cultures from any source

The bin barcode will then be scanned and, provided that the control system receives confirmation that the contents of the bin are suitable for treatment, the bin will then be lifted, and its contents tipped into a receiving hopper mounted on top of the waste shredder. The empty bin will then be removed by the operator and relocated to the bin washing area for sterilisation and subsequent reuse.

Since the Bondtech autoclave does not agitate the waste during the steam treatment cycle, it is necessary to shred the waste in advance of the steam treatment cycle to allow for the reliable and repeatable sterilisation of the waste to meet the required Level III STAATT standard. Pre-shredding will remove any bulky items that may impede the even distribution of the steam through the waste during the treatment cycle. It will also render the waste unrecognisable.

The Ulster shredder installed at the installation is of a twin-motor design featuring a pair of electrically driven, contra-rotating shafts equipped with a series of cutting blades and enclosed within a robust housing. Waste will be discharged from the hopper at the top of the shredder and pulled between the two rotating bladed shafts by their contra-rotating motion, causing it to be shredded. The shredded waste will then be discharged from the shredder to a steel autoclave bin located immediately below the shredder. The shredding process will significantly reduce the volume of the clinical waste such that, on average, each autoclave bin will receive the contents of three or four waste storage bins, approximately 300kg of waste in total.

The shredder is proposed to be used for infectious waste that may be pharmaceutically contaminated – including sharps. Cliniwaste have conducted many pre acceptance audits and expect at worse case there would be undischarged syringes, IV bags or sharps containing residual amounts of liquid. The NHS is required to separate unused medicinal wastes and chemical wastes into separate streams that would not be seen in the proposed waste to be shredded and treated via the autoclave. These are diverted into the medicinal waste stream (blue tops) and single stream chemical collections. There is expected to be minimal liquid residues, however any liquid residues or 'liquor' generated from this proposed operation will be collected in an IBC and sent offsite for incineration.

Each autoclave bin is labelled with a unique barcode identifier, and this will be scanned before and after the shredding process, with the details uploaded to the TRACE tracking system to ensure the continuation of the traceability of each waste consignment. The contents of a waste storage bin will not be split between two autoclave bins and the contents of a waste storage bin will not be shredded and added to an autoclave bin unless an operator is sure that the autoclave bin has sufficient remaining capacity to accommodate the additional material. Once full, the autoclave bin will be moved using a forklift truck (FLT) to a temporary storage area adjacent to the autoclave, pending treatment. A lid will be added to the clave carts to prevent any fugitive emissions.

The shredding of untreated waste has the potential to lead to the emission to air of odour, bioaerosols, particulate matter and VOC's. To reduce these emissions the shredder is fully enclosed during operation and is connected to a Local Exhaust Ventilation (LEV) system. The LEV is fitted with carbon and High-Efficiency Particle Arrestance (HEPA) filters to abate the shredder emissions prior to release to atmosphere via a vent in the roof of the main processing building (shown as emission point A3a and b on the overall site map). The filter is equipped with a pressure drop sensor which provides indication of the

filter's condition. A significant pressure drop will trigger an alarm and necessitate the replacement of the filter before the shredder can return to operation. These emissions are also required to be monitored in accordance with the permit under condition S3.1.

4.4.3 Autoclave loading.

When the autoclave is available for use, an operative will remove the lids for the specific batch of waste being treated and move the steel autoclave bins onto a loading platform at the front of the autoclave using the FLT. There, the bin identification details will again be scanned as a final check to ensure that only waste which can be adequately treated in the autoclave is subject to steam treatment. Providing that the autoclave bin contents are acceptable, the bin is then moved automatically by the loading platform into the body of the autoclave pressure vessel.

The autoclave has the capacity to hold seven autoclave bins, each holding approximately 300kg of shredded waste, so each treatment cycle will have a target weight of around 2,100kg. Once the vessel has been fully loaded, the autoclave door will be closed automatically and sealed, and the automated processing cycle will be started.

4.4.4 Steam treatment. Shown as location A2 on the site map.

The Bondtech autoclave system is a fully automated treatment plant which will feature a large capacity pressure vessel capable of being loaded with seven autoclave bins. Once the autoclave has been loaded and the pressure vessel door has been closed and sealed, the autoclave exhaust valve will be opened, and steam will be passed from the site boiler through the steam ejector connected in the exhaust pathway. The steam ejector will create an initial vacuum in the autoclave to extract any air present in the pressure vessel that would otherwise prevent the effective and immediate heat-up of the waste to be processed.

After the initial vacuum is completed, the exhaust valve will be closed, and heat and moisture will be introduced in the form of steam generated by the facility's boiler. Steam will be added until the autoclave equilibrates at a temperature of 145°C and a pressure of 3 bar. The combination of high temperature, pressure and moisture, in conjunction with the use of steel autoclave bins will rapidly conduct heat to their contents, will ensure that all the waste materials will achieve the necessary conditions for sterilisation. A treatment cycle will be deemed to be completed once the necessary temperature and pressure levels are maintained for a period of 15 minutes. The autoclave is equipped with safety interlocks to ensure that the vessel cannot be opened until the conditions of time, temperature and pressure have been met.

The autoclave operations will be governed by a Programmable Logic Controller (PLC) connected to the operator's control panel and a variety of monitoring probes, to ensure that the parameters of time, temperature and pressure required to sterilise the waste are met and continually maintained. The results of the operation of each processing cycle will be automatically recorded for a permanent record and associated automatically by the TRACE system with the records of each waste consignment treated in the cycle.

Once the waste has been exposed to the required conditions of time, temperature and pressure, the steam supply will be stopped, and the autoclave exhaust valve will be re-opened. The steam ejector will be utilised to return the atmosphere within the pressure vessel to ambient pressure. At this point the treatment cycle, which will typically last for about thirty minutes, will be complete.

Any potential emissions to air from the autoclave will be captured by the steam ejector, with emissions subsequently passing through a condenser prior to being contained withing a water holding tank which is located on the inside of the building. The water tank will house a three-way valve to ensure the system can act as an enclosed system to capture any effluent or the ability to switch the valve when processing infectious waste only, so this effluent can be drained under the current discharge consent license to sewer.

There will be no venting to atmosphere in normal operating parameters, however during an emergency, there is an emergency vent, that will release directly to atmosphere. Should this occur, Cliniwaste would inform the Environment Agency with the details of the incident including date, time, duration, and the investigative parameters of why this occurred. The emergency vent is shown on the site map as A2.

4.4.5 Waste compaction- location 11 on the site map.

Cliniwaste's permit already allows the use of a compactor to reduce the volume of treated/shredded waste at the installation and has been very successful. The waste compactor takes the treated infectious waste and shredded offensive waste and compacts the waste into an enclosed skip. This enclosed skip is then taken to an RDF facility for processing. Cliniwaste would like to keep this option as business contingency and its primary use for treated yellow waste. As Cliniwaste are not demonstrating at this point that we are treating the pharmaceutical element of the waste, this byproduct, will need to be sent for offsite incineration.
Cliniwaste will intend to primarily use the baling equipment listed in 4.4.6 to maximise the efficiency of the operation and reduce the carbon footprint of moving the byproduct of treated orange and shredded offensive waste which is a valuable resource.

Once the autoclave cycle is complete, the autoclave pressure vessel door can be opened and allows for the removal of the clave bins by the FLT and transfer to a holding area. The bins' identification details will be re-scanned, and the bins weighed on the waste out scales, with the details uploaded to the TRACE tracking system. The autoclave bins will then be rotated into a receiving hopper on an internal waste compactor unit or a baling machine, there may or may not be mechanically treated offensive waste present in the unit already.

The waste compactor will compress the waste held in the receiving hopper and discharge the sterilised waste into an enclosed skip. When full, the skip will be removed from site by a licensed waste carrier and transferred to a permitted facility.

4.4.6 Waste Baling- location 12 on the site map

The waste baling machine will accept three to four clave bins of treated/shredded material, depending on the density of the material, which forms to make a one metre cubed bale, the bale will be wrapped at the exit point to ensure the waste material is consolidated and kept secure. The wrap will act as a layer to ensure integrity of the waste and reduce any potential odours.

The purpose of the baling machine is to allow the material to be condensed and loaded onto a curtain sided articulated trailer, which will then be transported to a plastics recycling facility, where the facility will extract virgin plastic materials through varying technologies. Through doing this any waste that can be recycled will be contributing to a circular economy effect.

Research has shown that over 90% of the material is recyclable and could meet end of waste criteria, as opposed to being sent for RDF which may or may not go to an energy recovery facility in this country.

4.4.7 Boiler plant & Heat Recovery

To provide the autoclave, its exhaust system (i.e. the steam ejector) and the bin washing facility with a supply of steam, the installation includes a dedicated packaged steam boiler, which is fired on natural gas.

The boiler is located external to the main processing building in a shipping container. The boiler vents through a flue affixed to the shipping container (shown as emission point A1 on the site map) above the roof height of the neighbouring main processing building.

Since the steam demand of the autoclave during the course of the treatment cycle will be variable, the boiler will be equipped with an insulated steam drum to accumulate steam of the required working pressure and to thus provide a buffer for the process. The use of the steam drum will allow the boiler to operate in steady state conditions, which will significantly extend its operational lifetime.

The boiler water will be dosed with water softener, oxygen scavenging chemicals and corrosion inhibitors to maximise its operational reliability and lifetime.

A closed loop design for energy recovery has been installed on site. The improved efficiency will reduce the energy use in fuel and electrical power as well as reductions in the overall emissions to atmosphere as a consequence of the increased efficiency. The system captures available excess energy from the autoclave process within a central energy store in the form of hot water. This hot water is then used to preheat the water within the steam boiler cycle which is directly injected back into the autoclave for the next process. Energy is also recovered from ancillary plant items (in particular from the bin wash) and transferred to heat the water within the steam cycle.

The overall heat recovery process is estimated to reduce overall energy demand by approximately 10% and also reduces the energy required to cool the drain wastewater through an air-cooled condensing system.

4.4.8 Bin Wash (location A4 on the site map)

All bins utilised for the storage of treatable hazardous waste are washed on site using a dedicated bin washing facility within the main processing building. The bin wash, which is an enclosed system, utilises a disinfectant solution and steam provided from the boiler plant to clean all the bins thoroughly prior to reuse. The disinfectant chemicals are stored within the bin wash area prior to use on a self-bunded tray.

Once cleaned, the bins are tipped out within the bin wash area, with all effluent being discharged to a gully leading to the foul sewer. Clean and empty bins are then transferred by operatives to the external storage yard prior to being collected and returned to client sites for reuse.

Cliniwaste already hold a discharge consent license with Severn Trent Water for the process and cleaning effluent. This is in the attachments sent with the variation ‘C2 4A Discharge Consent 11.204SVL’

The drainage plan is shown in figure 3 of this document.

Section 5.0: Raw Materials

The proposed variation to the installation will not entail the use of additional raw materials.

The site maintains an inventory of raw materials consumed on site as part of its management systems. Cliniwaste reviews this inventory on at least an annual basis taking into consideration best practice environmental options in addition to the effectiveness of the materials in their intended function, cost and all relevant legislation, particularly including the COSHH (Control of Substances Hazardous to Health) Regulations.

A summary of the main and auxiliary raw materials used at the installation is shown in Table 5.1 below. The data within the table are estimates based on the likely future utilisation of the installation following the proposed variation. Usage levels will be monitored against the waste throughput of the installation to ensure the maximum efficiency of raw material utilisation.

Table 5.1. Raw materials inventory.

Raw material and function	Chemical nature/ composition	Typical Annual Usage	Fate of Material	Environmental Impact	Alternatives
Maintenance materials					
Oils	Petroleum-derived mineral oils	650 l	The majority will be removed as waste and renewed during maintenance activities.	Potential negative impact on trade effluent, surface water and groundwater quality	No viable alternative
Grease	Mineral-oil-derived grease with lithium-based additives	350 kg			
Boiler water treatment chemicals					
Oxygen scavenger	Aqueous solution of sodium bisulphite	120 l	100% discharged to foul sewer during boiler water blowdown	Readily absorbed into soil environment. High biodegradability. Depletes oxygen content in water courses.	Alternatives are available but none with a significantly lower environmental impact
Scale inhibitor	Aqueous solution of sodium hexametaphosphate	120 l		Potential negative impact on trade effluent, surface water and groundwater quality, if spilled	No viable alternative
PH control	Aqueous solution of sodium hydroxide	120 l			
Water softener	Sodium chloride briquettes	120 kg		No significant risk is posed to the environment by the material	No viable alternative
Cleaning chemicals					
General purpose sanitiser and deodoriser	Mixture of detergents, surfactants and fragrance chemicals	1,000 l	Following cleaning activities, waste solution (which is diluted for use) is discharged to the foul drain	Potential negative impact on trade effluent, surface water and groundwater quality, if spilled	Alternative cleaning/ disinfectant materials are available but have a comparable environmental impact
Bin wash disinfectant	Aqueous solution of chlorophenol, terpene, propanol and surfactants	1,900 l			
Floor cleaner	Aqueous solution of sodium nitrilotriacetate, sodium hydroxide, glycol ether and a bactericidal agent	1,000 l			

Section 6.0: Energy

While the safe, reliable and repeatable treatment of clinical waste is the overriding requirement for the sustainable operation of the installation, the efficient use of energy is also a key part of the management system objective to bring about continuous improvement at the site. To this end, Cliniwaste has

developed an energy efficiency plan to minimise the use of energy at the installation by the implementation of both technical improvements and changes to behavioural and operational practice. Central to the plan are the following practices:

- The purchase of energy efficient equipment;
- Maintenance and operation of equipment in an efficient manner; and
- Continual and periodic review of operations and identification of areas or practices that would result in improved energy efficiency.

The installation of the closed loop heat recovery system in itself is critical to reducing the energy demand of this site through the recovery of thermal energy having a positive effect on the consumption of fuel and electrical power.

6.1 Predicted Energy Consumption

Primary energy at the site is obtained from natural gas and electricity.

Predicted basic energy data, based on the expected treatment of 18,250 tonnes of clinical waste per annum, are provided below in Table 6.1.

Table 6.1: Predicted annual energy consumption.

Energy Source	Energy Consumption		
	Delivered, MWh	Primary, MWh	% of Total (Primary)
Electricity from public supply	250	650	6%
Electricity from on-site generation	-	-	-
Imported steam/hot water	-	-	-
Natural gas	10,500	10,500	94%
Oil	-	-	-
Coal	-	-	-
Total	**10,750**	**11,150**	**100%**

Based on converting the energy consumption values by standard factors, the equivalent carbon dioxide (CO_2e) emissions associated with the activities undertaken within the regulated installation are estimated below in Table 6.2.

Table 6.2: Predicted annual carbon dioxide emissions.

Energy Source	Annual emissions of CO_2e to the environment (tonnes)	Conversion Factors (kg/ MWh)
Electricity (National Grid)	151	233
Natural Gas	1,932	184
Total	**2,083**	

A range of energy efficiency measures will be deployed to minimise the ongoing energy consumption of the installation. Key to this is the minimisation of heat loss associated with the provision of steam to the autoclave, which is the dominant use of energy at the site:

- The boiler, autoclave and associated pipework are fully insulated to minimise heat losses;
- The boiler will be subject to regular maintenance and combustion efficiency optimisation;

Steam will be provided to the autoclave from a steam drum, which helps to regulate pressure fluctuations in the autoclave steam demand and allows the boiler to operate in steady state condition as far as possible, optimising its efficiency;

- The use of the replacement autoclave will allow the return of condensate to the boiler for reuse, thus minimising the discharge of warm water to drain.
- The closed loop energy recovery process will minimise natural gas and electrical power required in ancillary plant (particularly the bin wash) therefore reducing overall emissions.

Section 7.0: Monitoring

The existing Environmental Permit for the installation provides monitoring schedules for the following:

- Emissions to air
- Emissions to surface water
- Emissions to sewer
- Fugitive emissions of bioaerosols
- Waste treatment efficacy

Given the use of directly equivalent waste treatment technologies associated with the proposed variation to the installation, it is considered that the monitoring schedules identified in the existing Environmental Permit remain relevant to the varied installation and should not be amended significantly.

7.1 Pre-operational

Given the change in processing equipment associated with the proposed variation, it will be necessary to demonstrate the treatment efficacy for the proposed types of clinical waste in the plant before the plant can commence full operation. As Cliniwaste intend to send the byproducts for incineration (treated waste, effluent from batch processing and liquor.) There is no need to demonstrate any additional treatment processes. As there is a change in the waste type, (sharps being processed) this will need validation.

Cliniwaste have consistently maintained the required validation and efficacy testing of the current plant in relation to infectious material to Level III STAATT standard for waste treatment and also the proper control of the emissions of fugitive bioaerosol emissions into the workplace whilst being operational.

Section 8.0: Environmental Risk Assessment

The following provides an assessment of the potential impact for the installation following the proposed change in waste treatment equipment.

8.1 Emissions to air

Table 8.1 below lists the emission points to air at the Cliniwaste installation and the proposed changes to them associated with the variation to the site. The positions of the emission points are demonstrated in Figure 2 to this application support document and a Nottingham Site Emissions Monitoring plan is also provided as an addendum.

Table 8.1: Emission points to air

Release point reference	Source	Potential emissions	Techniques used to minimise emissions
A1	Gas-fired boiler exhaust	Combustion gases (CO and NOx)	Preventative maintenance programme plus regular combustion efficiency checks. Low NOx burner. Closed loop energy recovery system.
A2	Autoclave exhaust system (emergency venting only)	Microbial emissions and Volatile Organic Compounds (VOCs)	Steam ejector and condenser system that reduces the steam back to condensed water, any VOC's will be removed within the enclosed water tank.
A3 a & b	Shredder Local Exhaust Ventilation	Microbial emissions, VOCs and particulate matter	HEPA filter, bio aerosol monitoring carried out in line with HCW:AM, VOC carried out in line with BSEN:12619 Particulate matter carried out in line with BSEN: 13284-1
A4	Bin wash	Microbial emissions	Enclosed bin washing system, bio aerosol monitoring carried out in line with HCW:AM

As currently, it is considered that the emissions to air from the autoclave and waste shredder will be adequately controlled with the proposed abatement technologies and no numerical emission limit values for these emissions are proposed.

There is no replacement to the boiler since the last variation, therefore the same boiler emissions as the previous variation apply.

Table 8.2. Boiler emissions concentrations

Pollutant	Measured emissions (mg/Nm^3)
NOx (as nitrogen dioxide, NO_2)	140
Carbon monoxide (CO)	63

The key emission parameters for the boiler are provided in Table 8.3.

Table 8.3. Key boiler emission parameters

Parameter	Value
Stack height	4m
Effective stack height	0m
Temperature	235°C
Volumetric flow rate	1,574 Nm^3/h
NO_2 emission rate (long term, g/s)	0.061
NO_2 emission rate (short term, g/s)	0.031
CO emission rate (g/s)	0.027

In line with the EA assessment guidance, for the assessment of long-term concentrations of NO_2 against the air quality standard for the protection of human health, it has been assumed that 100% of the NOx emitted from the boiler will convert to NO_2; short-term NO_2 impacts have been calculated based on the assumption that 50% of the emitted NOx will convert to NO_2.

The effective stack height can be used to derive dispersion factors which can be used to estimate the maximum environmental concentrations that could result from the operation of the boiler. These concentrations can then be contrasted with the UK Air Quality Standards for the pollutants of interest to assess their acceptability. Table 8.4 provides the results for the screening assessment for the boiler emissions.

Table 8.4. Screening impact assessment for the gas boiler at the installation

Pollutant	Assessment Period	Air Quality Standard (µg/m³)	Process Contribution (PC) (µg/m³)	PC: % of AQS	Background (µg/m³)	PC: % of Headroom (AQS – Background)
Nitrogen dioxide (NO_2)	1 Hour Mean (99.79th percentile)	200	119	60%	26.4	69%
	Annual Mean	40	9.1	23%	13.2	34%
Carbon monoxide (CO)	8-hour Mean	10,000	107	1.1%	345	1.1%

None of the predicted impacts are in exceedance of the UK Air Quality Standards and can hence be considered acceptable. However, some of the predicted concentrations of nitrogen dioxide resulting from the operation of the boiler are significant, as defined by the EA assessment guidance; these results are highlighted in red in Table 6.4. It should also be noted, these results are based on the operation of the boiler at 100% of the time without the use of the proposed closed loop energy recovery system, which would be expected to reduce emissions from the boiler stack.

In such circumstances, more detailed air quality assessment of these emissions using a dispersion modelling methodology is typically mandated. However, Cliniwaste is currently investigating options for the installation of a stack so that the impact of the boiler emissions can be substantially reduced. A revised screening assessment will be undertaken once this stack height increase has been affected.

8.2 Emissions to sewer

As currently, following the proposed variation to the installation the emissions to sewer will comprise:

- Condensate captured from the autoclave exhaust systems following discussions with Severn Trent Water.
- Boiler water blowdown;
- Effluent from the internal bin washing facility;
- Effluent from general cleaning, sanitation and housekeeping activities; and
- Domestic wastewater from offices and amenities.

Following the proposed variation, however, the process effluent from treating the medicinal sharps waste, will be discharged into a holding tank and this tank will retain the potential medicinally contaminated water, until it is tankered offsite.
There is no change in effluent from the washing of the bins, boiler blowdown, general housekeeping or domestic wastewater and this will remain under the current discharge consent license.

Cliniwaste does not believe that there will be any overall increase in the volume of effluent generated by the installation because of the proposed variation to the installation. Monitoring of the microbial loading of the emissions to sewer will be undertaken periodically as part of the ongoing assessment of the efficacy of the waste treatment process and in line with Healthcare Waste Appropriate Measures.

8.3 Emissions to surface water

The proposed variation to the installation will not result in any emissions of polluting substances to surface water. As currently, the only emission to the public surface water drain is the discharge of clean, uncontaminated rainwater runoff from the installation's roof and yard. There is no discharge to the surface water drain from waste storage or waste treatment areas.

8.4 Accident risk

Given that the installation will be subject to the same management controls and risk minimisation practices that Cliniwaste adopts currently, it is not considered that the proposed variation will result in any increase in the overall risk that the installation presents to the environment through accidents and incidents.

8.5 Odour

The installation operates an Odour Management Plan, a copy of which is provided in supporting document C2_6 Nottingham Odour Management Plan 2024 for this installation. The requirements of the plan are considered throughout the day-to-day operation of the site and Cliniwaste will continue to adapt the plan to reflect the changing circumstances at the installation.

It is not considered that the proposed variation to the installation will adversely affect the potential of the site to cause odour nuisance. As at present, the design and operation of the installation are intended to minimise the potential for odour emissions and are considered sufficiently robust:

- All potentially odorous materials are delivered to site in sealed containers;
- No long-term waste storage is undertaken;
- Waste handling activities will be minimised as far as is practical and undertaken almost exclusively within the main processing building;
- All waste will be stored in appropriate containers; and
- All processing of untreated waste (via shredding and steam treatment) will be undertaken in enclosed systems with emissions passed through exhaust abatement systems prior to release to atmosphere.

Odour is checked daily and recorded in the Site Diary.

8.6 Noise and vibration

Cliniwaste have completed a desktop risk assessment for noise and vibration impact of the installation and there are no noise or vibration emissions likely to cause a pollution.
Noise is checked daily and recorded in the Site Diary.

8.6.1 Receptors

The installation is in Queens Drive Industrial Estate in Nottingham and consequently lies more than 700m away from the nearest noise-sensitive receptors, which are domestic properties in The Meadows in Rushcliffe (to the South-east of the installation).

No complaints regarding noise or vibration are understood to have been received concerning the operation of the installation since Cliniwaste assumed operational control of the site in 2019.

8.6.2 Internal noise sources

Most of the noise sources in the facility are located internally within the main processing buildings whereas the definition of noise, for the purposes of the Environmental Permitting Regulations, is taken to refer to noise and vibration that is detectable beyond the site boundary. Key noise sources are defined as those that contribute to the potential for environmental nuisance.

Surveys of occupational noise levels at the site have been undertaken historically to meet the requirements of the Noise at Work Regulations. No noise levels were found within the installation in exceedance of the Noise at Work Regulations First Action Level of 85dB L_{Aeq}. Given that the doors to the main processing building are kept closed during the operation of the installation, with the exception of brief periods during waste deliveries and collections, the breakout of the noise from the internal waste treatment activities to the environment is necessarily limited. The internal noise sources are thus considered to represent an insignificant contribution to the overall emissions of noise from the installation.

8.6.3 External noise sources

The key remaining external noise sources at the installation are:

- The transfer and storage of cleaned empty waste bins in the external yard prior to their distribution to client waste sites;
- The gas-fired boiler plant, which is located within a fully enclosed shipping container and is not considered a significant potential noise source; and
- On-site vehicle movements associated with the delivery of clinical waste to the installation, the return of empty bins to client waste sites and the uplift of both treated, compacted waste and non-treatable hazardous waste materials to third party disposal facilities.

The proposed variation is considered unlikely to result in any change to the external noise environment as the level of vehicle movement will remain the same. While the site is operational for 24 hours a day, deliveries and waste collections will generally continue to be scheduled for daylight hours to minimise the potential for noise nuisance.

Given the location of the installation near the centre of a busy industrial estate, the vehicle movements will likely be an insignificant fraction of the vehicle movements experienced in the industrial estate as a whole. The significant distance between the site and receptor locations further means that it is considered unlikely that the site will contribute to an adverse noise impact.

8.7 Fugitive emissions

The key potential fugitive emission from the installation is the emission to air of bioaerosols from the shredding and steam treatment of hazardous clinical waste. The risk presented to the environment by these potential releases is minimised using fully enclosed processing systems equipped with appropriate abatement systems and by the fact that the processes are located internally within the main processing building. Bioaerosol emissions are monitored annually in the air and on surfaces within the workplace using spiked tracer organisms.

It is considered that the proposed variation to the installation will not lead to any increase in the risk of fugitive bioaerosol emissions.

An emissions monitoring plan cab be found in the document 'Nottingham Emissions Monitoring Plan'

8.8 Visible emissions

The site does not generally exhibit any visible emissions, and none are expected following the proposed variation. Visible plumes could potentially occur from the steam boiler flue under certain conditions.

Figure 1: Process Map for Proposed Variation.

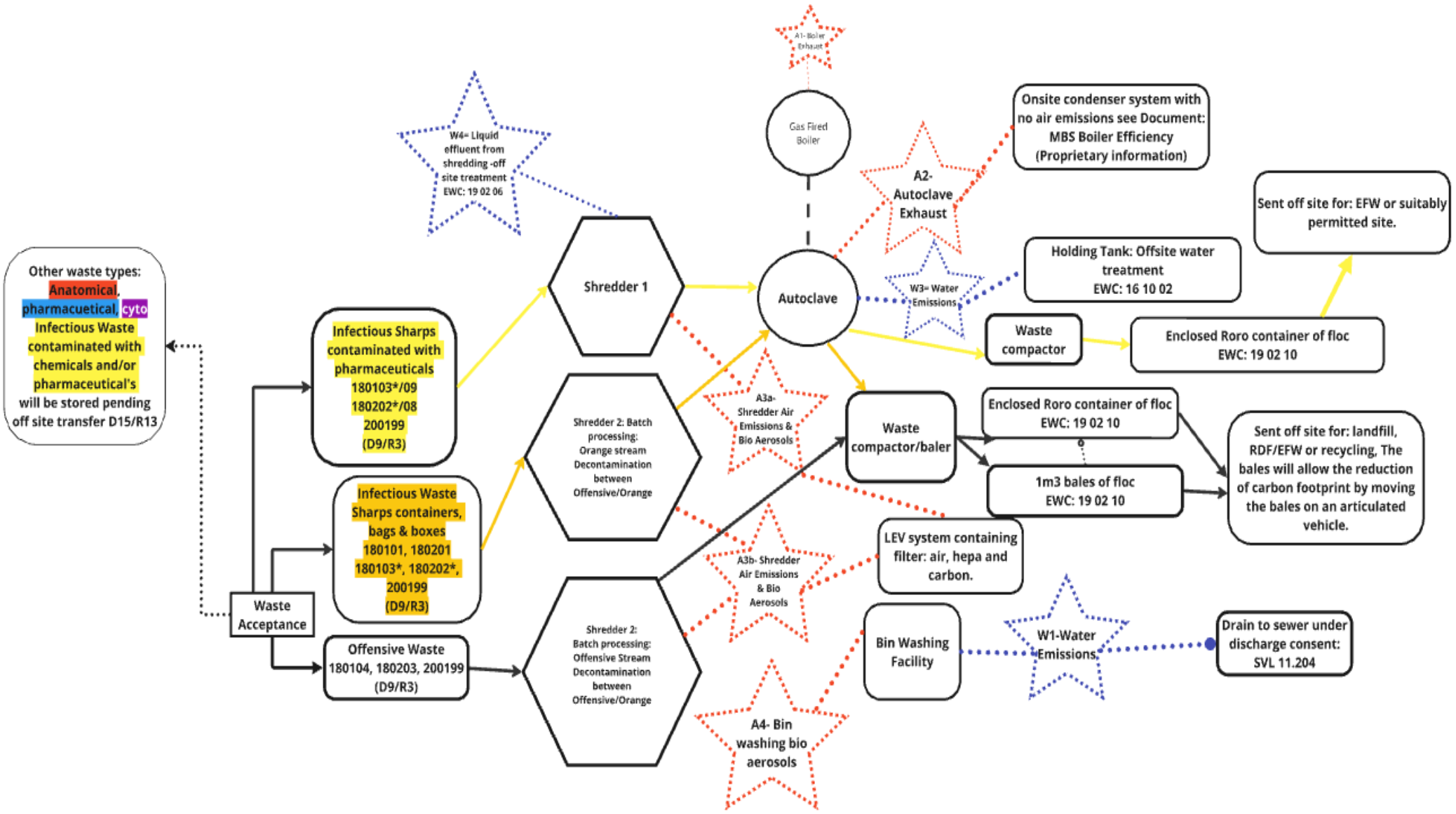
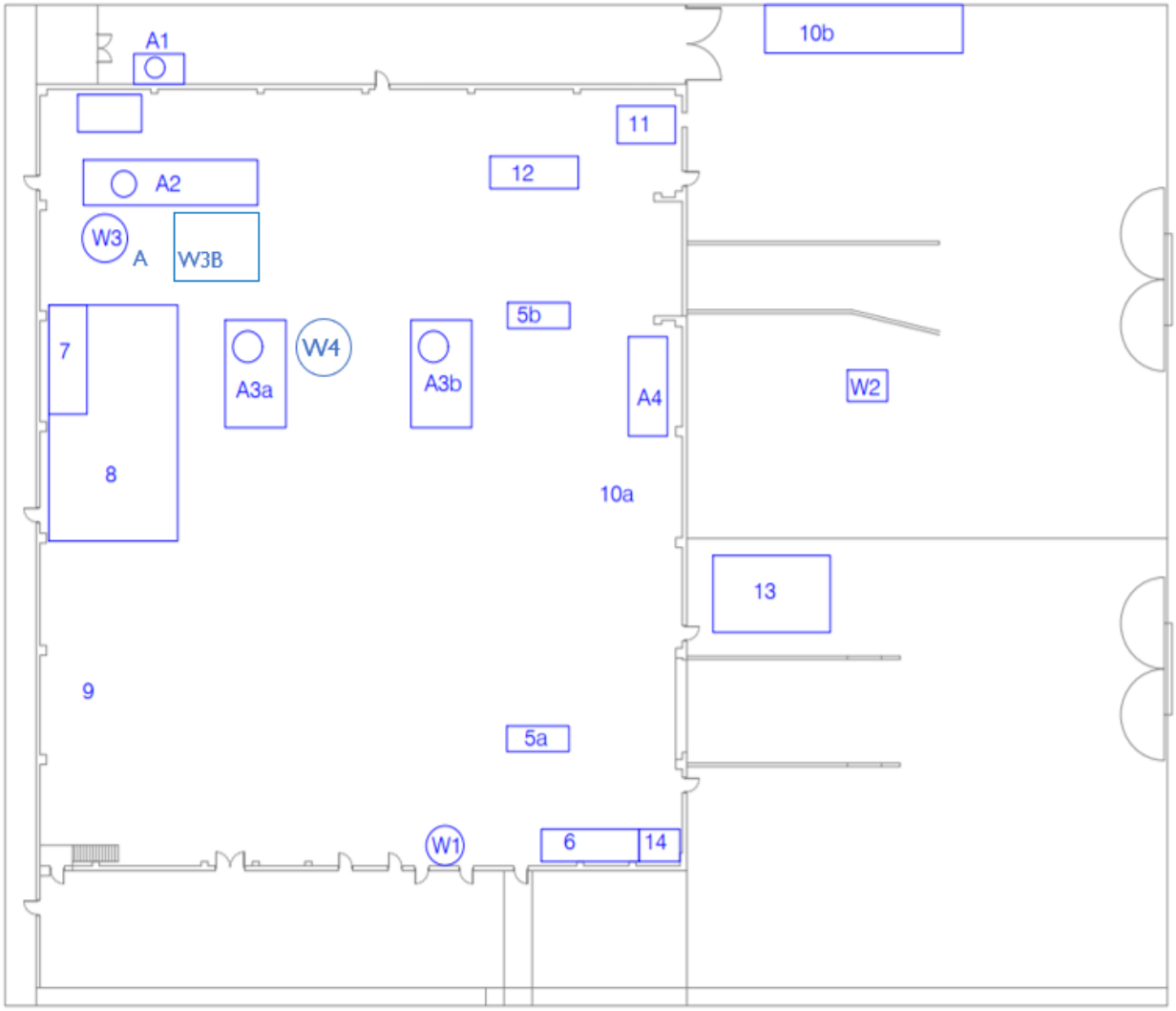
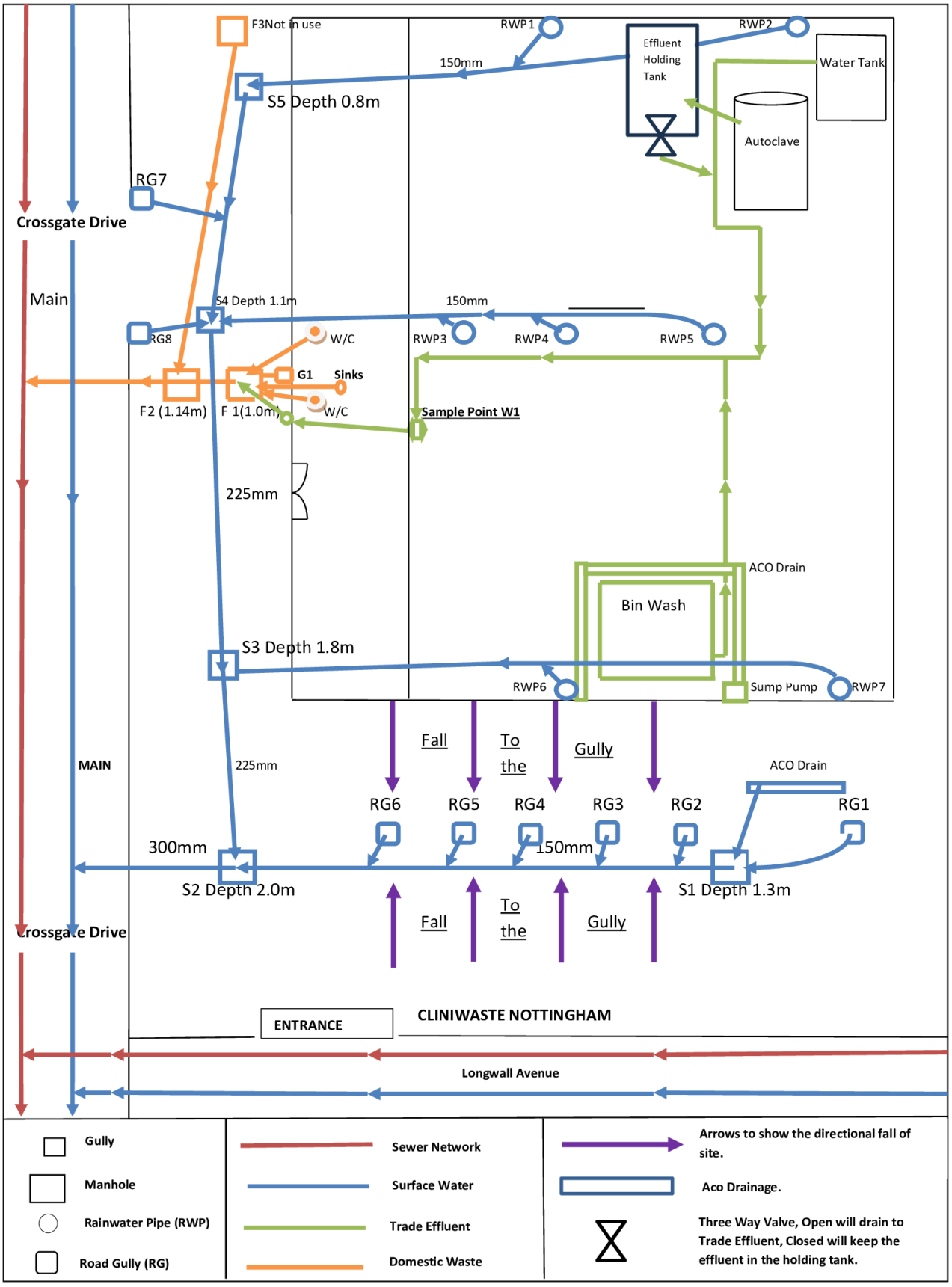


Figure 2: Site Map with Air Emission Points and Storage Locations



Location Map Area	Description
A1	Boiler
A2	Autoclave
A3A / A3B	Shredder/s
A4	Bin Wash
W2	Surface Water Drain
W3	Condensate Holding Tank
5A / 5B	Weighing Scales
6	Quarantine Area
7	Fridge
8	Non-Hazardous Waste Storage Area
9	Hazardous Waste Storage Area
10A 10B	Internal Storage for Bales of Treated/Shredded Material Curtain Sided Trailer for bales of Treated/Shredded Material
11	Compactor Skip for Treated/Shredded Material
12	Baler & Wrapper for Treated/Shredded Material
13	Enclosed Roro for Un-Shredded Offensive Waste
14	Raw Materials Storage
Emission Points	**Description**
A1	Boiler Exhaust Stack
A2	Autoclave Exhaust (Emergency Vent Only)
A3 A & B	Shredder One (A3B) & Shredder Two (A3A)
A4	Bin Wash
W1	Water Sampling Location for W1 on Site Drainage Plan: Boiler Blow Down, Autoclave Condensate, Bin Washing Effluent & Domestic Effluent.
W2	Surface Water on Drainage Plan: Clean Uncontaminated Roof & Yard Water.
W3A	Condensate Water/Process Effluent Holding Tank (Discharge to Sewer)
W3B	2 x IBCs for Effluent Generated Whilst Processing Yellow Waste
W4	Liquor containment point, from any liquid residues from shredding the waste (IBC)

Figure 3: Site Drainage Plan



Appendix A: Odour Management Plan

Please see document: Nottingham Odour Management Plan 2024.

Appendix B: Evidence of Technical Competence

Three individuals are nominated as having the necessary technical competence to operate the Clinical Waste Treatment Facility:

Name	Ms Kerry-Anne Burton	Mr Scott Wadsworth
Email address	kerry.burton@cliniwaste.co.uk	scott.wadsworth@cliniwaste.co.uk
Telephone Number	07389 792 530	07389 792 519

wamitab

Continuing Competence Certificate

This certificate confirms that

Kerry-Anne Burton

Has met the relevant requirements of the Continuing Competence scheme for the following award(s) which will remain current for two years from 08/07/2020

CW	Clinical Waste
TMH	Treatment - Hazardous Waste
TSH	Transfer - Hazardous Waste

Expiry Date: 08/07/2022

Verification date: 23/06/2020
Authorised:

WAMITAB Chief Executive Officer

Learner ID: 30888
Certificate No.: 5166754
Date of Issue: 08/07/2020

CIWM Chief Executive Officer

The Chartered Institution of Wastes Management

00149672

Continuing Competence Certificate

This certificate confirms that

Scott Wadsworth

Has met the relevant requirements of the Continuing Competence scheme for the following award(s) which will remain current for two years from 19/07/2023

HW	Healthcare Waste
TMH	Treatment - Hazardous Waste
TSH	Transfer - Hazardous Waste

Expiry Date: 19/07/2025

Verification date: 15/07/2023
Authorised:

Professional Services Director

Learner ID: 29092
Certificate No.: 5230358
Date of Issue: 19/07/2023

CIWM Chief Executive Officer

The Chartered Institution