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MINING AND MINERAL PROCESSING  
MINERAL ESTATES  
WASTE RESOURCE MANAGEMENT



**NYOBOLT LIMITED**

**PRODUCTION OF PRODUCT A**

**OPERATING TECHNIQUES (PUBLIC REGISTER COPY)**

**JULY 2024**

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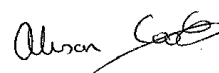
**PREPARED BY:**

Dominiqua Drakeford- Associate Director  
Allen



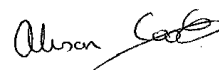
**REVIEWED BY:**

Alison Cook Technical Director



**APPROVED BY:**

Alison Cook Technical Director



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## APPENDICES

Appendix 1 – Process Flow Schematic – REDACTED

Appendix 2 – Furnace Specification – REDACTED

<b>DRAWINGS</b>	<b>TITLE</b>	<b>SCALE</b>
BM12404-001	Environmental Permit Boundary Plan	1:1,250 @ A2

## **1 INTRODUCTION**

- 1.1.1 Nyobolt Limited ('Nyobolt') have commissioned Wardell Armstrong in preparing an environmental permit application for their pilot facility producing a metal oxide, located in Haverhill, Suffolk.
- 1.1.2 Nyobolt are seeking an environmental permit to allow for piloting the production of product A, at relatively low volumes which will ultimately supply the battery manufacturing sector. Product A anodes have the ability to boost lithium-ion batteries leading to batteries storing large amounts of energy and could help to speed the adoption of electric vehicle technologies. Nyobolt is at the cutting edge of research and development in this area.
- 1.1.3 This Operating Techniques document has been prepared to set out the day-to-day management of the facility, describe the production processes and the environmental protection measures which will be implemented.
- 1.1.4 The Site will be operated in accordance with Nyobolt's Environmental Management System (EMS), a summary of which has been provided as part of the permit application.

## 2 PERMITTED ACTIVITIES

2.1.1 The production of producing product A is a listed activity within the Environmental Permitting Regulations (England and Wales) 2016, under Schedule 1, Section 4.2 Part A(1)(v).

2.1.2 The permitted activities will be limited to those specified in Table 2.1 below. Additionally, it is envisaged that there will be Directly Associated Activities (DAAs) which have the potential to cause pollution if not appropriately managed, and have a direct technical connection with installation. These are also listed in Table 2.1 below.

Table 2.1: Permitted Activities and Directly Associated Activities		
Activity	EPR 2016	Description of Activities
Production of Metal Oxide	Listed Activity under Schedule 1, Section 4.2 Part A(1)(v)	Production of Metal Oxide through a series of processes including heating, mixing, size reduction, drying, formation, deagglomeration and homogenization.
<b>Directly Associated Activities</b>		
Storage and handling of raw materials		
Storage and handling of product		
Monitoring of aqueous waste arising from occasional cleaning		
Monitoring point source emissions to air		

2.1.3 The facility is a pilot facility, and it is anticipated that this pilot facility will incrementally increase production; initially producing up to 20 tonnes of product A, increasing to 100 -200 tonnes in the subsequent year and 900 tonnes of product A per year after that.

### **3 PROCESS OVERVIEW**

#### *3.1 Process Feedstock Materials*

3.1.1 The process of producing product A involves the processing of two oxides of refractory metals; niobium pentoxide and tungsten trioxide. Both are inert and stable oxides. Both oxides do not meet criteria for classification according to Global Harmonized System for hazardous substances.

#### *3.2 Production Process Overview*

3.2.1 The production process comprises a series of steps in order to achieve blending of the two metal oxides to produce product A.

3.2.2 Initial feedstock materials are in a powdered form and are stored in bags or FIBCs prior to being processed.

3.2.3 A process flow schematic, including plant and equipment used in each step and particulate matter abatement associated with each phase is provided in Appendix 1 of this report.

3.2.4 The precursors are milled, mixed, dried, baked, deagglomerated and blended to the final material specification of the product.

3.2.5 The specification of the furnace is provided in Appendix 2 (not provided in public register copy).

3.2.6 This process does not involve the addition of, nor generate, any chemicals and no organic additives are used. This process produces product A.

3.2.7 Air from the furnace is extracted outside of the building via a 500mm diameter stainless steel ducts approximately 10m above ground.

3.2.8 The blended product A is then transferred from the vessel into bags.

3.2.9 Occasionally, small amounts of aqueous non-hazardous waste can arise from the process during tank cleaning or sampling. Nyobolt is already in touch with Anglian Water with regards to the correct disposal of such waste. If necessary, Nyobolt will collect such waste in IBCs and then filter/flocculate to result in a solid waste and clean water. The procedure for flocculation will be developed if required.

3.2.10 Nyobolt plans to recover waste at every step and reintroduce the material back into the process investigations into whether product A fines collected in the in-house

cyclone filtration system can be reintroduced back into the production process to maximize the efficiency of minimise losses of raw materials in the process.

## **4 FACILITY INFRASTRUCTURE**

### **4.1 Equipment and Facility Infrastructure**

4.1.1 The facility is situated wholly inside a building, and there is no storage of raw materials or product outside.

4.1.2 Vehicles/fork lift trucks delivering raw materials will enter the building via an entrance way which has shutter doors both externally and internally. This will provide a control point to allow any dust collected on vehicles to be removed within the enclosed entrance, before fork lift trucks enter the main area of the facility.

- State of the art equipment will be used for milling, mixing, drying, baking, deagglomeration and blending. Sealed metal vessels are used for the milling/mixing/drying and blending processes.

4.1.3 Initially, baking will be done in a furnace, followed by the deagglomeration stage.

4.1.4 Mobile dust extraction equipment is also available within the facility which can be moved to be located at specific points (e.g. when raw material is placed into the vessel and dust may escape).

4.1.5 The facility also has an office and analytical laboratories.

### **4.2 Facility Drainage**

4.2.1 The facility is wholly contained within a building, which comprises of impermeable surfacing and sealed drainage.

4.2.2 There are no point source emissions to water or sewer associated with the process.

Any leaks or spills identified will be water only which may include benign fines of niobium oxide or tungsten oxide.



## **5 RAW MATERIALS AND OUTGOING PRODUCT**

### **5.1 *Raw Materials***

5.1.1 In order to produce product A an adequate supply of niobium pentoxide and tungsten trioxide are required.

5.1.2 Over the course of a year, it is expected that up to 600 tonnes of niobium pentoxide, and 300 tonnes of tungsten trioxide will be required.

5.1.3 Raw materials (niobium pentoxide and tungsten trioxide) will be stored in designated areas on racking in sealed bags.

### **5.2 Final Product**

5.2.1 The product A from the final homogenisation phase is discharged into a large container via a sealed valve, which has HEPA filtration system to capture any escaped particulate matter.

5.2.2 The pilot facility is expected to eventually produce up to 900 tonnes of product A per year once the facility is fully commissioned and operational. As this is a pilot facility, these numbers are indicative. Nyobolt expects that these numbers will be revised in the next two years.

5.2.3 The final product will be of a suitable quality to supply the battery manufacturing sector.

## **6 PROCESS WASTE ARISING**

- 6.1.1 Waste arisings from the production process are expected to be negligible, due to the simple process and very high commercial value of the materials used.
- 6.1.2 Aqueous slurry waste from tank cleaning or sampling will be collected in tanks or IBCs which will then be filtered and/or flocculated resulting in solids and water. Water will be recirculated within the process, to minimise losses of water and both raw materials.
- 6.1.3 Where water will not be recirculated, it will be sampled and tested at an accredited laboratory to confirm the appropriate course of action.
- 6.1.4 Powder fines collected in the cyclone filtration system may be reintroduced into the production process where appropriate.

## **7 FACILITY MANAGEMENT**

- 7.1.1 The facility will be managed in accordance with Nyobolt's Environmental Management System.
- 7.1.2 The Facility Manager will oversee the day-to-day operations and will have overall responsibility of the implementation of the Dust Management Plan.
- 7.1.3 Facility staff will undertake training suitable for their roles.
- 7.1.4 All plant and equipment will be maintained in accordance with Nyobolt's maintenance procedures. Any equipment breakdown or failures will be rectified by a suitably qualified engineer.
- 7.1.5 All facility staff will be cognisant of the requirements of the environmental permit and make certain that they understand their roles in ensuring permit compliance.

## **8 CONTROL OF AMENITY ISSUES**

### **8.1 *General***

8.1.1 Nyobolt have designed their facility to ensure that amenity issues are fully and adequately controlled.

8.1.2 An Amenity and Accident Risk Assessment is provided as part of the environmental permit application.

8.1.3 Environmental monitoring will be undertaken in accordance with the permit conditions.

### **8.2 *Point Source Emissions to Air***

8.2.1 There will initially be only one point source emission to air connected to the furnace limiting production throughput at 100tpa. In future, a second point may be added, subject to the production volume increase to 900tpa. The vents from the furnace will connect to a stainless-steel duct, which directs the emission outside of the building at ~10m height.

8.2.2 A H1 Screening Assessment has been undertaken which screens out the emissions at stage 1 of the assessment, requiring no further modelling. The H1 Screening Tool and Technical Note are provided as part of the permit application.

8.2.3 Future expansion may include additional furnaces, and the H1 Screening Tool has factored this into account (i.e. the emissions have been multiplied by four).

### **8.3 *Dust and Particulate Emissions***

8.3.1 Nyobolt has identified key points in their process which may give rise to the escape of dusty materials, for example:

- Loading/unloading of products in and out of plant and equipment and into containers;
- The milling/grinding of inorganic oxide powder;
- Inappropriate storage of powders.

8.3.2 Nyobolt will install localised dust extraction systems within the facility, which will extract dust and feed to a HEPA filter. Mobile HEPA systems will be used locally to eliminate any exposure to dust. Further detail is provided in the Dust Management Plan.

8.3.3 The activities will be carried out in accordance with the approved Dust Management Plan.

#### 8.4 **Noise**

8.4.1 A Noise Survey has been undertaken and appropriate noise attenuation has been designed and will be installed around the parts of the milling equipment generating noise. Further detail including the results of the noise survey are provided as part of the Best Available Techniques Assessment submitted as part of this application.

#### 8.5 **Odour**

8.5.1 The process uses inorganic oxide powder, and is unlikely to give rise to odour, particularly odour detectable beyond the facility building.

8.5.2 In the event that strong odour is detected, the source will be investigated and Nyobolt will take suitable remedial action.

#### 8.6 **Litter**

8.6.1 The facility will not accept any wastes as part of the production process.

8.6.2 Any packaging from the delivery of raw materials will be collected and removed off site for recovery, or where necessary, disposal as appropriate.

8.6.3 Any litter generated by Nyobolt staff will be placed into an appropriate receptacle pending off site removal.

8.6.4 The facility will be kept clean and tidy at all times.

#### 8.7 **Pests**

8.7.1 The process uses only inorganic oxide powders, which are unlikely to attract pests and vermin. No waste will be accepted to the facility.

8.7.2 In the event that signs of pest infestation are identified within the facility, a suitably qualified contractor will be appointed.

#### 8.8 **Fire**

8.8.1 The process uses raw materials (inorganic oxide powders), which are not combustible nor self-igniting.

8.8.2 The furnace will be fitted with cooling fans.

8.8.3 Fire extinguishers will be available and located at readily accessible points within the facility.

## **9 RECORD KEEPING**

9.1.1 Records of the following will be made and kept, either in electronic or hard copy format;

- Details of inspections of plant or infrastructure and any maintenance required;
- Details of any complaints received and the action taken to resolve them.

9.1.2 A log will be maintained with the results of daily amenity inspections and any actions taken as a consequence of these inspections. Records of any pollution incidents and actions taken to remediate them will also be made and kept.

9.1.3 Records will be kept regarding staff training.

9.1.4 Records will be maintained at the Site Office and will be made available to the Environment Agency on request.

9.1.5 Records will be kept for a minimum of two years and in line with any statutory requirements. Records of pollution incidents will be maintained indefinitely in order to inform the eventual permit surrender.

## **10 COMPLAINTS PROCEDURE**

- 10.1.1 Emergency contact information will be displayed at the facility entrance and members of the public are able to contact Nyobolt Ltd on the designated telephone number.
- 10.1.2 If a complaint is received a summary record will be made in the daily log. Full details will be provided in an incident form.
- 10.1.3 Staff will be responsible for handling complaints and recording them onto the correct form, training will be provided to ensure staff understand their responsibilities and the complaint procedure.
- 10.1.4 Management will review the activities that may have given rise to the complaint and carry out an assessment to determine the source of the issue, and whether any remedial action is necessary, for example reevaluating the abatement system in place.

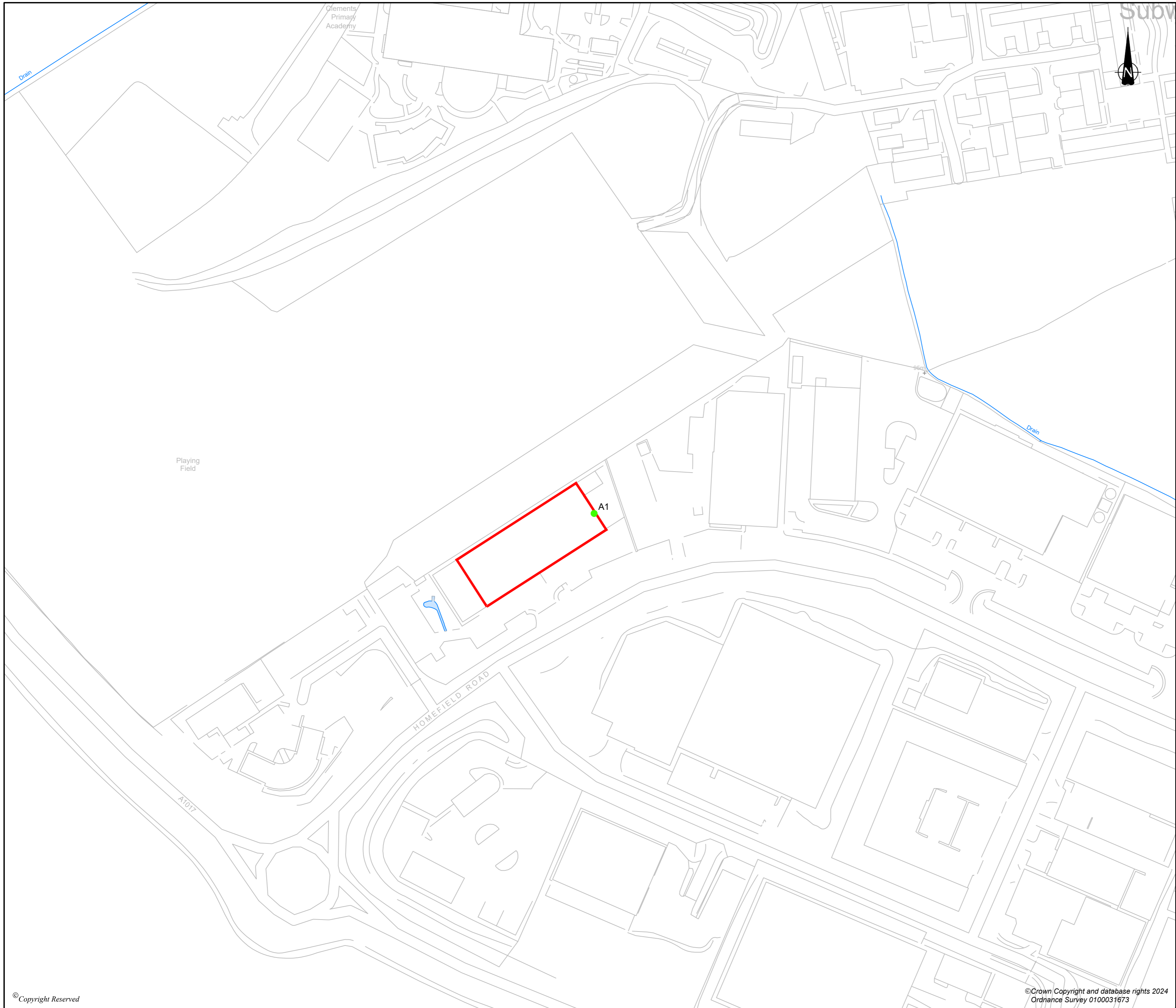
## **11 SITE CLOSURE**

- 11.1.1 The Site Closure Plan has been developed to ensure that the site will be safely decommissioned without causing pollution or harm and the site is returned to a satisfactory state, that is, a similar condition to that which existed prior to permit issue.
- 11.1.2 All raw materials will be removed from the site in an appropriate manner. Where possible these will be returned to the supplier, possible under a sale or return agreement, otherwise they will be sent for reuse or recycling at a suitable permitted facility.
- 11.1.3 Appropriate contingency plans will be in operation in case of any spillage/leak or fire of the materials or waste. All process plant will be emptied and if necessary, cleaned prior to dismantling to minimise the potential for fugitive emissions.
- 11.1.4 Soil samples will be undertaken, if appropriate, so that the condition of the site at decommissioning can be compared to that at commencement of the facility.
- 11.1.5 Protection of the environment will be a priority and no risk to air, land, water or human health will be experienced during closure and decommissioning of the facility, which will be subject to the Environmental Management System requirements.



## APPENDICES

## DRAWINGS



DO NOT SCALE FROM THIS DRAWING

KEY

- SITE BOUNDARY
- A1 POINT SOURCE EMISSION TO AIR

A	First Issue	18/10/24	HRK	LP	LP
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REVISION	DETAILS	DATE	DRAWN	CHKD	APPD
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CLIENT  
**NYOBOLT LTD**

PROJECT  
**UNIT 1 A & B, HOMEFILED ROAD,  
HAVERHILL**

DRAWING TITLE  
**ENVIRONMENTAL PERMIT BOUNDARY PLAN**

DRG No.	BM12404-001	REV	A	SUIT. CODE
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DRG SIZE	A2	SCALE	1:1250	DATE	18/10/24
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DRAWN BY	SJB	CHECKED BY	LP	APPROVED BY	LP
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**STOKE-ON-TRENT**

Sir Henry Doulton House  
Forge Lane  
Etruria  
Stoke-on-Trent  
ST1 5BD  
Tel: +44 (0)1782 276 700

**BIRMINGHAM**

Two Devon Way  
Longbridge Technology Park  
Longbridge  
Birmingham  
B31 2TS  
Tel: +44 (0)121 580 0909

**BOLTON**

41-50 Futura Park  
Aspinall Way  
Middlebrook  
Bolton  
BL6 6SU  
Tel: +44 (0)1204 227 227

**BRISTOL**

Temple Studios  
Temple Gate  
Redcliffe  
Bristol  
BS1 6QA  
Tel: +44 (0)117 203 4477

**BURY ST EDMUNDS**

Armstrong House  
Lamdin Road  
Bury St Edmunds  
Suffolk  
IP32 6NU  
Tel: +44 (0)1284 765 210

**CARDIFF**

Tudor House  
16 Cathedral Road  
Cardiff  
CF11 9LJ  
Tel: +44 (0)292 072 9191

**CARLISLE**

Marconi Road  
Burgh Road Industrial Estate  
Carlisle  
Cumbria  
CA2 7NA  
Tel: +44 (0)1228 550 575

**EDINBURGH**

Great Michael House  
14 Links Place  
Edinburgh  
EH6 7EZ  
Tel: +44 (0)131 555 3311

**GLASGOW**

24 St Vincent Place  
Glasgow  
G1 2EU  
Tel: +44 (0)141 428 4499

**LEEDS**

36 Park Row  
Leeds  
LS1 5JL  
Tel: +44 (0)113 831 5533

**LONDON**

Third Floor  
46 Chancery Lane  
London  
WC2A 1JE  
Tel: +44 (0)207 242 3243

**NEWCASTLE UPON TYNE**

City Quadrant  
11 Waterloo Square  
Newcastle upon Tyne  
NE1 4DP  
Tel: +44 (0)191 232 0943

**TRURO**

Baldhu House  
Wheal Jane Earth Science Park  
Baldhu  
Truro  
TR3 6EH  
Tel: +44 (0)187 256 0738

**International office:**

**ALMATY**

29/6 Satpaev Avenue  
Hyatt Regency Hotel  
Office Tower  
Almaty  
Kazakhstan  
050040  
Tel: +7(727) 334 1310