Environmental Permit Variation Application

Non-Technical Summary

Prepared for: Lincoln Storm Limited

Environmental Permit Ref: EPR/KB3002CW

CONTENTS

1.0 Introduction

This Non-Technical Summary (NTS) accompanies the application for a bespoke Installation EPR/KB3002CW at Lincoln Storm Ltd UK, Worle Quarry, Kewstoke Road, Weston-Super-Mare, Somerset, BS22 9LF, The site Location is shown on the **Site Plan (Document MA6)**.

The site historically was a quarry where minerals and stones were removed for construction etc., latterly the area has had an industrial and waste use. A majority of the permitted area has been used as a waste site since 2011.

The only waste accepted to site is shown in Table 2-2. Waste will be brought in by approved contractors (registered waste carriers).

This document summarises the application for a bespoke waste installation permit allowing for Lithium-Ion batteries and other associated waste streams to be accepted, processes, production of Storm Black for onward transportation and use (non-waste) or further processing (waste).

2.0 Application

To:

- Allow for:
  - the production of Storm Black ™ (a 'black mass' product) from the treatment of waste lithium-ion batteries; and
  - the storage of waste lithium-ion batteries and lithium-ion battery materials, in anticipation of the EWC codes for this material changing to hazardous.

  See Table 1-1 below (Permitted Activities)
- Add a number of additional EWC codes to include all forms of lithium-ion battery material (see Table 2-2 below).
- Increase the permitted area to include a greater proportion of Worle Quarry, to allow more distributed storage of lithium-ion battery material in structures specifically designed for that purpose (including fire detection, fire suppression and containment).
- Given the evolution of classifications for Lithium-ion battery materials:
  - Add the schedule 1 listed activity S5.3 Part A(1) (a) ii) Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving physico-chemical treatment; and
  - Add the schedule 1 listed activity S5.6 Part A(1) (a) Temporary storage of hazardous waste with a capacity exceeding 50 tonnes.

Table 2-1
Permitted activities

Permitted Activities			
Activity reference	**Activity listed in Schedule 1 of the EP Regulations**	**Description of specified activity and WFD Annex I and II operations**	**Limits of specified activity and waste types (codes)**
AR1 – Treatment of hazardous wastes from Li-ion battery **shredding process**	S5.3 A(1)(a)(ii) Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving physico- chemical treatment	Treatment of more than 10 tonnes of hazardous wastes a day for the purpose of recovery. **Shredding** for onward recovery of hazardous materials generated by drying and separating/'sorting' the constituent materials from Lithium-ion batteries R4 Recycling/reclamation of metals and metal compounds.	Treatment operations shall be limited to: ▪ Treatment within an integrated plant. Consisting only of drying in a rotary drier, mechanical sorting, and separation: sieving of hazardous waste into different components for recovery. ▪ Treatment for recovery shall be no more than 40 tonnes per day. ▪ Treatment consisting only of shredding, drying and granulation and separation of permitted wastes into different components for recovery. ▪ Treatment shall only take place within a building only when the shredding activity is within water for charged ('wet' materials) or with air extraction for uncharged or discharged ('dry') materials to prevent risk of fire and explosions. ▪ All pre shredding activities shall be carried out at all times using water to prevent any risk of fires or explosions. ▪ Specific lithium-Ion battery fire suppression technology (including lithium-ion extinguishers and fire blankets) will be used in all areas. ▪ All treatment activities shall be carried out at all times within DSEAR requirements. ▪ All activity will take place within the buildings on impermeable surfaces with sealed drainage as shown in **Appendix 00: Site Plans and Sensitive Receptors**. Subject to any other requirements of this permit wastes shall be stored for no longer than 6 months prior to recovery. Waste types are as specified in the **Table 2.2 below**. Input Material examples of waste types include: 16 06 05, 19 10 05*, 19 10 06, 20 01 33*, 20 01 34. Outputs of the process: Storm Black (non-ferrous metal powder), Copper 19 12 03, Aluminum 19 12 03, Polymer (PPPE) 19 12 12, Heavy Fraction 19 12 02

AR2 – Treatment of hazardous wastes from Li-ion battery **drying process**	S5.3 A(1)(a)(ii) Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving physico- chemical treatment	Treatment of more than 10 tonnes of hazardous wastes a day for the purpose of recovery. **Drying to remove moisture from shredded lithium ion battery materials** for onward recovery of hazardous materials generated by separating the constituent materials from Lithium-ion batteries R4 Recycling/reclamation of metals and metal compounds.	Treatment operations shall be limited to: ▪ Treatment within an integrated plant. Consisting only of drying in a rotary drier, mechanical sorting, and separation: sieving of hazardous waste into different components for recovery. ▪ Treatment for recovery shall be no more than 40 tonnes per day. ▪ Treatment consisting only of shredding, drying and granulation and separation of permitted wastes into different components for recovery. ▪ Treatment shall only take place within a building only when the shredding activity is within water for charged ('wet' materials) or with air extraction for uncharged or discharged ('dry') materials to prevent risk of fire and explosions. ▪ All pre shredding activities shall be carried out at all times using water to prevent any risk of fires or explosions. ▪ Specific lithium-Ion battery fire suppression technology (including lithium-ion extinguishers and fire blankets) will be used in all areas. ▪ All treatment activities shall be carried out at all times within DSEAR requirements. All activity will take place within the buildings on impermeable surfaces with sealed drainage as shown in **Appendix 00: Site Plans and Sensitive Receptors.** Subject to any other requirements of this permit wastes shall be stored for no longer than 6 months prior to recovery. Waste types are as specified in the **Table 2.2 below**. Input Material examples of waste types include: 16 06 05, 19 10 05*, 19 10 06, 20 01 33*, 20 01 34. Outputs of the process: Storm Black (non-ferrous metal powder), Copper 19 12 03, Aluminum 19 12 03, Polymer (PPPE) 19 12 12, Heavy Fraction 19 12 02

AR3 – Treatment of hazardous wastes from Li-ion battery **separation ('sorting') process**	S5.3 A(1)(a)(ii) Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving physico- chemical treatment	Treatment of more than 10 tonnes of hazardous wastes a day for the purpose of recovery. **Separating materials** for onward recovery of hazardous materials the constituent materials from Lithium-ion batteries R4 Recycling/reclamation of metals and metal compounds.	Treatment operations shall be limited to: ▪ Treatment within an integrated plant. Consisting only of drying in a rotary drier, mechanical sorting, and separation: sieving of hazardous waste into different components for recovery. ▪ Treatment for recovery shall be no more than 40 tonnes per day. ▪ Treatment consisting only of shredding, drying and granulation and separation of permitted wastes into different components for recovery. ▪ Treatment shall only take place within a building only when the shredding activity is within water for charged ('wet' materials) or with air extraction for uncharged or discharged ('dry') materials to prevent risk of fire and explosions. ▪ All pre shredding activities shall be carried out at all times using water to prevent any risk of fires or explosions. ▪ Specific lithium-Ion battery fire suppression technology (including lithium-ion extinguishers and fire blankets) will be used in all areas. ▪ All treatment activities shall be carried out at all times within DSEAR requirements. All activity will take place within the buildings on impermeable surfaces with sealed drainage as shown in **Appendix 00: Site Plans and Sensitive Receptors.** Subject to any other requirements of this permit wastes shall be stored for no longer than 6 months prior to recovery. Waste types are as specified in the **Table 2.2 below**. Input Material examples of waste types include: 16 06 05, 19 10 05*, 19 10 06, 20 01 33*, 20 01 34. Outputs of the process: Storm Black (non-ferrous metal powder), Copper 19 12 03, Aluminum 19 12 03, Polymer (PPPE) 19 12 12, Heavy Fraction 19 12 02

AR4– Hazardous waste repackaging	S5.3 A(1)(a)(iv) Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving repackaging	Treatment of more than 10 tonnes of hazardous wastes a day for the purpose of recovery. R4: Recycling/reclamation of metals and metal compounds.	Li based batteries, 16 06 05 will be handled as if they were hazardous in anticipation of reclassification of this waste type. Li based batteries from electric vehicles shall be stored separately from other batteries. Li based batteries shall be stored to prevent them from: ▪ coming into contact with any liquids ▪ being damaged ▪ being exposed to high temperatures No waste shall be stored for longer than 6 months. Waste types as specified as hazardous waste in the Table of Wastes. From receipt and storage of hazardous waste prior to despatch off site. Treatment consisting of repackaging of hazardous waste (Batteries only). ▪ All treatment and storage must take place within the buildings on impermeable surface with sealed drainage as shown on **Appendix 00: Site Plans and Sensitive Receptors.** All batteries shall be stored in appropriate containers within a building on impermeable surfaces with a sealed drainage system. Li based batteries from electric vehicles shall be stored separately from other batteries. Li based batteries shall be stored to prevent them from: ▪ coming into contact with any liquids ▪ being damaged ▪ being exposed to high temperatures Repackaging of waste shall not change either the maximum storage times for waste on site or the amount that can be stored. No waste shall be stored for longer than 6 months. Waste types as specified as hazardous waste in the **Table 2.2 below**. In the event 19 10 05* is received it will be stored separately and subject to the above handling.

AR5 – Hazardous waste storage (Batteries)	S5.6 A(1)(a) Temporary storage of hazardous waste in a facility with a total capacity exceeding 50 tonnes pending any of the activities listed in Section 5.1, 5.2 and 5.3	Temporary storage of more than 50 tonnes of hazardous waste pending disposal or recovery. D15: Storage pending any of the operations numbered D1 to D14 (excluding temporary storage, pending collection, on the site where it is produced). 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).	Storage of hazardous waste pending transfer for treatment off site if required (whole batteries or shredded material). No waste shall be stored for longer than 6 months. Storage must take place within the pre-processing storage building on impermeable surface with sealed drainage as shown on **Appendix 00: Site Plans and Sensitive Receptors.** All batteries shall be stored within a building on an impermeable surfaces with a sealed drainage system. Li based batteries from electric vehicles shall be stored separately from other batteries. Li based batteries shall be stored to prevent them from: ▪ coming into contact with any liquids ▪ being damaged ▪ being exposed to high temperatures Waste types restricted to the hazardous wastes listed in the **Table 2.2 below**.

	Directly Associated Activity		
AR – 6 Pre-treatment storage	Storage of Lithium Batteries prior to on site treatment	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)	From receipt of non-hazardous lithium batteries to storage prior to onsite treatment. Lithium batteries shall be stored within storage buildings on impermeable surfaces with sealed drainage as shown on **Appendix 00: Site Plans and Sensitive Receptors.** Li based batteries from electric vehicles shall be stored separately from other batteries. Li based batteries shall be stored to prevent them from: • coming into contact with any liquids • being damaged • being exposed to high temperatures Subject to any other requirements of this permit wastes shall be stored for no longer than 6 months prior to recovery. Waste types are limited to those specified in the **Table 2.2 below**.
AR – 7 Power supply	Medium Combustion Plant with appropriate abatement fitted	Power supply	Up to 5 MCP
AR- 8 Raw materials	Raw materials handling and storage	Handling and storage of raw materials, including fuel and chemicals.	Receipt and storage of any raw materials directly associated with the permitted activities on site. All liquid raw materials shall be stored in sealed containers/tanks within bunded areas or within plant with storage with integral bunds. No more than 1300 litres diesel to be on site at any one time.
AR – 9 Post-treatment storage	Storage of residual waste produced as part of the on-site treatment of Lithium Batteries.	Handling and storage of residual waste from the Lithium battery shredding and treatment sorting activity.	From the production of the residual waste to the storage of such waste prior to the removal off site for treatment or disposal elsewhere. Storage of all residual wastes must be in-line with the most suitable BAT requirements. Storage of produced Storm Black (self-assessed) will be handled and stored in accordance with all input and output material. Shown on **Appendix 00: Site Plans and Sensitive Receptors.**No waste shall be stored for longer than 6 months.
AR10 – sealed drainage	Drainage	Sealed drainage system	No surface water or process water to escape site. 100,000 Litre tank on site as sump. Contaminated water to be tankered away.
AR11- Non-hazardous waste transfer station (Batteries and antifreeze only)		Storage of non-hazardous waste before transfer off site. 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).	From receipt and temporary storage of non-hazardous wastes (batteries only) before transfer off site for recovery. Storage of all wastes must be in-line with the most suitable BAT requirements. Storage of batteries must take place within buildings on impermeable surface with sealed drainage as shown **Appendix 00: Site Plans and Sensitive Receptors.**No waste shall be stored for longer than 6 months. Waste types and quantity restricted to the wastes listed in the **Table 2.2 below**.

Table 2-2
Waste List

European Waste code	Description
06	WASTES FROM INORGANIC CHEMICAL PROCESSES
06 03	Wastes from the MFSU of salts and their solutions and metallic oxides
06 03 15*	Metallic oxides containing heavy metals
06 03 16	Metallic oxides other than those mentioned in 06 03 15
06 03 99	Wastes not otherwise specified
06 04	Metal-containing wastes other than those mentioned in 06 03
06 04 05*	Wastes containing other heavy metals
06 04 99	Wastes not otherwise specified
06 13	Wastes from inorganic chemical processes not otherwise specified
06 13 99	Wastes not otherwise specified
11	WASTES FROM CHEMICAL SURFACE TREATMENTS AND COATING OF METALS AND OTHER MATERIALS; NON-FERROUS HYDRO-METALLURGY
11 01	Waste from chemical surface treatments and coating of metals and other materials (for example galvanic processes, zinc coating processes, pickling processes, etching, phosphating, alkaline de-greasing, anodising)
11 01 98*	Other wastes containing dangerous substances
11 01 99	Wastes not otherwise specified
12	WASTES FROM SHAPING AND PHYSICAL AND MECHANICAL SURFACE TREATMENT OF METALS AND PLASTICS
12 01	Wastes from shaping and physical and mechanical surface treatment of metals and plastics
12 01 03	Non-ferrous metal filings and turnings
12 01 04	Non-ferrous metal dust and particles
12 01 99	Wastes not otherwise specified
16	WASTES NOT OTHERWISE SPECIFIED IN THE LIST
16 01	End-of-life vehicles
16 01 21*	Hazardous components other than those mentioned in 16 01 07 to 16 01 11 and 16 01 13 and 16 01 14
16 01 22	Components not otherwise specified
16 01 99	Wastes not otherwise specified
16 03	Off-specification batches and unused products
16 03 03*	Inorganic wastes containing hazardous substances
16 03 04	Inorganic wastes other than those mentioned in 16 03 03
16 06	Batteries and accumulators
16 06 05	Other batteries and accumulators
16 06 06*	Separately collected electrolyte from batteries and accumulators
16 09	Oxidising substances
16 09 04*	Oxidising substances not otherwise specified

16 10	Aqueous liquid wastes destined for off-site treatment
16 10 01*	Aqueous liquid wastes containing hazardous substances
16 10 02	Aqueous liquid wastes other than those mentioned in 16 10 01
19 01	WASTES FROM WASTE MANAGEMENT FACILITIES, OFF-SITE WASTE WATER TREATMENT PLANTS AND THE PREPARATION OF WATER INTENDED FOR HUMAN CONSUMPTION AND WATER FOR INDUSTRIAL USE
19 01	Wastes from incineration or pyrolysis of waste
19 01 12	Bottom ash and slag other than those mentioned in 19 01 11
19 01 17*	Pyrolysis wastes containing hazardous substances
19 01 18	Pyrolysis wastes other than those mentioned in 19 01 17
19 01 99	Wastes not otherwise specified
19 02	Wastes from physico/chemical treatment of waste (including dechromatation, decyanidation, neutralisation)
19 02 03	Premixed wastes composed only on non-hazardous substances
19 02 04*	Premised wastes composed of at least one hazardous substance
19 02 11*	Other wastes containing hazardous substances
19 02 99	Wastes not otherwise specified
19 10	Wastes from shredding of metal-containing wastes 19 10 01 iron and steel waste
19 10 02	Non-ferrous waste
19 10 03*	Fluff-light fraction and dust containing hazardous substances
19 10 05*	Other fractions containing hazardous substances
19 10 06	Other fractions other than those mentioned in 19 10 05
19 12	Wastes from the mechanical treatment of waste (for example sorting, crushing, compacting, pelletising) not otherwise specified
19 12 02	Ferrous metal
19 12 03	Non-ferrous metal
19 12 11*	Other wastes (including mixtures of materials) from mechanical treatment of waste containing hazardous substances
19 12 12	Other wastes (including mixtures of materials) from mechanical treatment of wastes other than those mentioned in 19 12 11
20	MUNICIPAL WASTES (HOUSEHOLD WASTE AND SIMILAR COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL WASTES) INCLUDING SEPARATELY COLLECTED FRACTIONS
20 01	Separately collected fractions (except 15 01)
20 01 33*	Batteries and accumulators included in 16 06 01, 16 06 02 or 16 06 03 and unsorted batteries and accumulators containing these batteries
20 01 34	Batteries and accumulators other than those mentioned in 20 01 33
20 01 40	Metals
20 01 99	Other fractions not otherwise specified

2.1 Site Location

The site is located within the disused Worle Quarry in the area of Kewstoke to the north of Weston-Super-Mare. The National Grid Reference (NGR) for the site is ST 35142 63205 and the site location is illustrated in **Site Plans and Sensitive Receptors**.

The site is located in a mixed-use area. The closest residential receptors lie within Worle approximately 20m to the north with further properties to the east, south, and west. Areas of woodland border the site above the

quarry to the south, east and west. The Worlebury golf course lies 40m to the west. The main access to the site is via Lower Kewstoke Road which is located adjacent to the site's northern EP boundary.

An area of Ancient Woodland called Worle Wood lies 195m to the north west of the site.

The EP boundary and site layout is shown in the accompanying site plan. The location of the site is shown in the accompanying material **Site Plans and Sensitive Receptors** and an aerial view is shown in Figure 1 below.

Figure 1: Aerial Photo of site location

3.0 Permitted Operations

The permit variation recognises the uncertainty of the classification of Lithium-Ion batteries materials, the uncertainty of competent authorities of the appropriate BASEL and EWC classification of Lithium Ion battery material and, not with standing the position is still uncertain, this application operates on the basis that all the material could be potentially hazardous waste. The permitted operations are set out in Table 1, above.

3.1 Waste Acceptance

Waste accepted at the site is restricted to that described in Table 1 (List of New Waste Codes) of this application pack. As a minimum, the waste acceptance procedure will include: (1) Address/location; (2) Identity of producer; (3) Amount of waste being accepted; (4) Identifiable EWC Code (from those shown in Table 2 above); and (5) the physical appearance of the waste. The Site will only accept waste that is permitted and complies. Non-conforming wastes will be rejected or if identified after delivery, isolated and returned to producer. Incoming waste will be brought to the site by registered waste carriers. Each load would be subject to the waste acceptance procedure and would be inspected by the Technically Competent Manager (TCM) or appropriately trained individual prior to being stored and prior to treatment.

3.2 Waste storage

Annual waste storage is shown in the table below. All waste is stored under cover, on impermeable surfacing. The site has sealed drainage.

Table 3-1 Annual waste storage

EWC	Material	Tonnes per year
16 06 05	Incoming: Cells and modules (large solid waste), including dry cells [5]	11,356.8 [1]
19 12 03	*Produced*: Aluminium and copper	2,730 [2]
19 12 12	*Produced*: Polymer	1,240.2 [3]
19 12 02	*Produced*: metal faction	< 250 [4]
Other input materials (*these may be used but primary feedstock will be cells and modules*)		
19 10 05*/ 06	Incoming: Shredded LIBs	< 5,200
16 03 04	Incoming: Separated Foil Fraction (cathode and anode)	< 2,000
Other outputs (*waste water, tankered off site from sealed system when no longer re-usable*)		
16 10 01*	*Produced*: water used for aqueous shredding	780
Total Tonnes Per Year		23,557
Other non-waste subject to storage plan		
Not applicable	*Storm Black* ™ *(a non-ferrous powder that has satisfied the End of Waste criteria)*	6,240

[1] 218.4 MT x 52; [2] 52.5 MT x 52; [3] 23.85 MT x 52; [4] 2% of material processed; [5] Some electric vehicle (EV) packs my be received for onward transfer under TFS of < 2,000 MT per year.

Total storage at any one time is shown in the table below.

Table 3-2 Total Storage at any time

Material and fraction size	Max Volume	Size of pile or container	Storage location	Max time on site	Combustible Y/N
Cells and modules, including dry cells (16 06 05) Large solid waste	500 MT 218.4 MT in operational plan	Tent 2: 151.2 m^3 Tent 4: 236.25 m^3 Tent 5: 151.2 m^3	Tents 2, 4 and 5	30 days 7 to 14 operational plan	Y
Aluminium and copper granules (19 12 03) 0.8mm-2mm	60 MT 52.5 MT in operational plan	Tent 1: 61.37 m^3 Tent 3: 46.03 m^3	Tent 1 and 3	30 days 7 to 14 operational plan	Y
Storm Black Product (post-end of waste) (sub<0.2mm)	300 MT 200 MT in operational plan	Tent 3: 153.43 m^3	Tent 3	30 days 7 to 14 operational plan	Y
Polymer (PP/PE) (19 12 12) 2mm to 3mm	30 MT 23.85 MT in operational plan	Tent 1: 136.80 m^3 Tent 3: 54 m^3	Tent 1 and 3	30 days 7 to 14 operational plan	Y
Shredded LIBs (19 10 05* or 19 10 06) 30mm to 40mm	200 MT -	-	New tent if received	30 days 7 to 14 operational plan	Y
Separated foil fraction (anode/cathode)	50 MT -	-	New tent if received	30 days 7 to 14 operational plan	Y
EV Packs (16 06 05) Large solid waste	35 MT -	-	New Tent if received	30 days 7 to 14 operational plan	Y

3.3 Waste handling and processing

In the operations for which the permit variation is sought volumes of throughput and stock are based on the inputs and outputs of the process. The production flow is shown in the diagram below.

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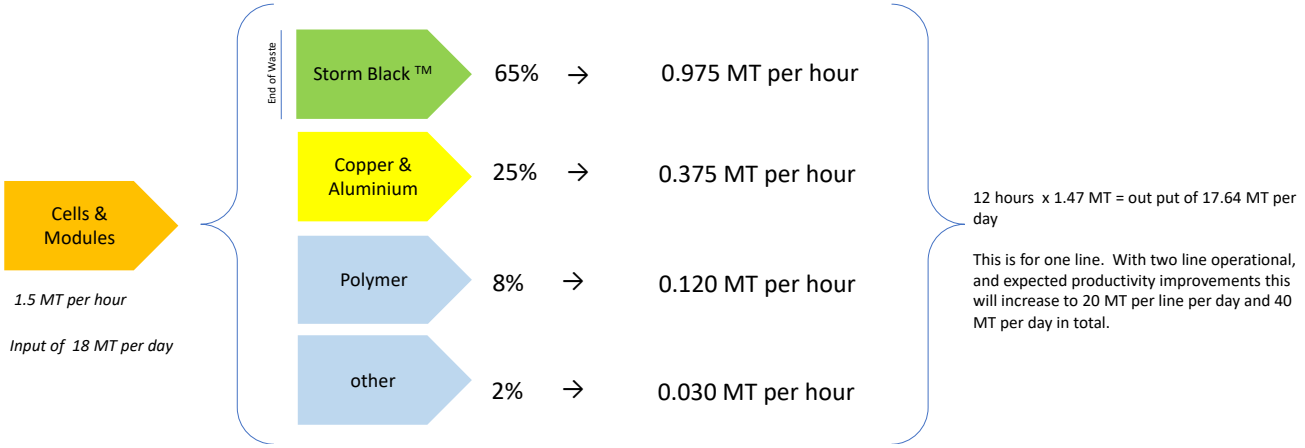
Figure 3-1: Production Flow

Waste Storage Plan: inputs and outputs



The site will start with one line and, as shown in the plans, move to two lines, increasing the throughput. On this basis, volumes and weights received, processed and despatched are planned as follows:

Table 3.3 Throughputs and storage

	C & M 2.4 MT (3 High)	Storm Black ™ 2.0 MT (1 high)	Polymer 0.45 MT (3 high)	Al & Cu 1.50 MT (2 high)	**Total MT in each tent**
Tent 1	-	-	17.1 MT	30 MT	**47.1 MT**
Tent 2	60.0 MT	-	-	-	**60 MT**
Tent 3	-	200 MT	6.75 MT	22.5 MT	**229.25 MT**
Tent 4	98.4 MT	-	-	-	-
Tent 5	60.0 MT	-	-	-	-
Total material held on site	218.4 MT	200 MT	23.85 MT	52.5 MT	**494.75 MT**
One line only in operation					
Weeks of production (storage period)	*2.275*	*3.33*	*2.385*	*2.02*	***~ 2***
Annual throughput	*5,678 MT*	*3,120 MT*	*620 MT*	*1,365 MT*	***10,783***
Daily arrival	*21 MT*	-	-	-	*21 MT*
Daily departure	-	*12 MT*	*2.4 MT*	*5.25 MT*	*19.65* [1]
Two lines in operation					
Weeks of production (storage period)	*1.136*	*1*	*1.193*	*1.01*	*~ 1*
Annual throughput	*11,350 MT*	*6,240 MT*	*1,240 MT*	*2,730 MT*	*21,560*
Daily arrival	*42 MT*	-	-	-	*42 MT*
Daily departure	-	*24 MT*	*4.8MT*	*10.50 MT*	*39.30 MT* [1]

[1] *In practice containers will arrive and depart less frequently than every day, but the average can be expected to be one 20 MT container each day, in and out with one line operational and two 20 MT containers in and out when two lines are operational.*

Permit variation is for 1000 MT to be held on site at any time, given space for additional material to be held

Permit variation is for 30,000 MT annual throughput given targeted production efficiencies

Permit variation is for 100 MT daily processing given targeted production efficiencies

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A schematic of the site's production areas and its process flows is shown below.

Figure 3-2: Plan of production area and process flows

Wet processing zone

This zone takes **charged** batteries, cells and modules and shreds, dries and separates in a continuous integrated process to produce the Storm Black product.

Dry processing zone

This zone takes **uncharged and discharged** batteries, cells and modules and shreds, dries and separates in a continuous integrated process to produce the Storm Black product.

Al/Cu separation zone

This zone takes mixed **aluminium and copper** output of the Storm Black production process and separates these out into bags of the two separate metals.

Waste battery treatment on site consists of aqueous shredding, drying and dry shredding and preparation of input materials into metals, powders and polymers for recovery. The stages of the continuous process are:

- **Aqueous shredding:** for the reduction in size of the batteries and to neutralise the electrical charge (Dry shredding for uncharged or discharged materials**)**;
- **Drying** in a specialist rotary dryer to separate out the moisture from the material; and
- **Separation**: where the different input materials are: separated into metals, powder (Storm Black) and PP/PE polymer; and gravity assisted separation of aluminium and copper granules.

The process is described below, in addition to process flow diagrams for each stage of the recovery process (Figures 1, 2 and 3). More detail is provided **in OTEMS (M10) Appendix 01: SSOP 4 Treatment and Recycling Operations Procedures.**

3.4 Aqueous Shredding

The aqueous shredding process will reduce the size of the material and neutralise the charge in the material. The throughput is 5 MT per hour but we will only be running 1.5MT per hour as this is in line with the throughput of the last stage (Dry Shredding/Separation).

Feed into the shredding process will be recognised as:

- Other Batteries and accumulators – 16 06 05.

The materials are fed into the aqueous shredder where they are shredded and the electric charge is neutralised. The water in the shredder is filtered and purified in the closed loop system whereby no water needs to be drained.

After the shredder, the material is fed onto a cascading dewatering feed conveyor. The excess water is captured and fed back into the aqueous shredder.

The material is then fed into the rotary dryer for the next stage of the process.

The output fractions are:

- Shredded 16 06 05

No waste is produced by the aqueous shredding process.

Prior to shredding steel handles and ends of battery packs may be removed. This is classified as 19 12 02.

The process is illustrated below in Figure 3.3.

For dry materials, these are shredded under an extraction system and fed directly into the separation line.

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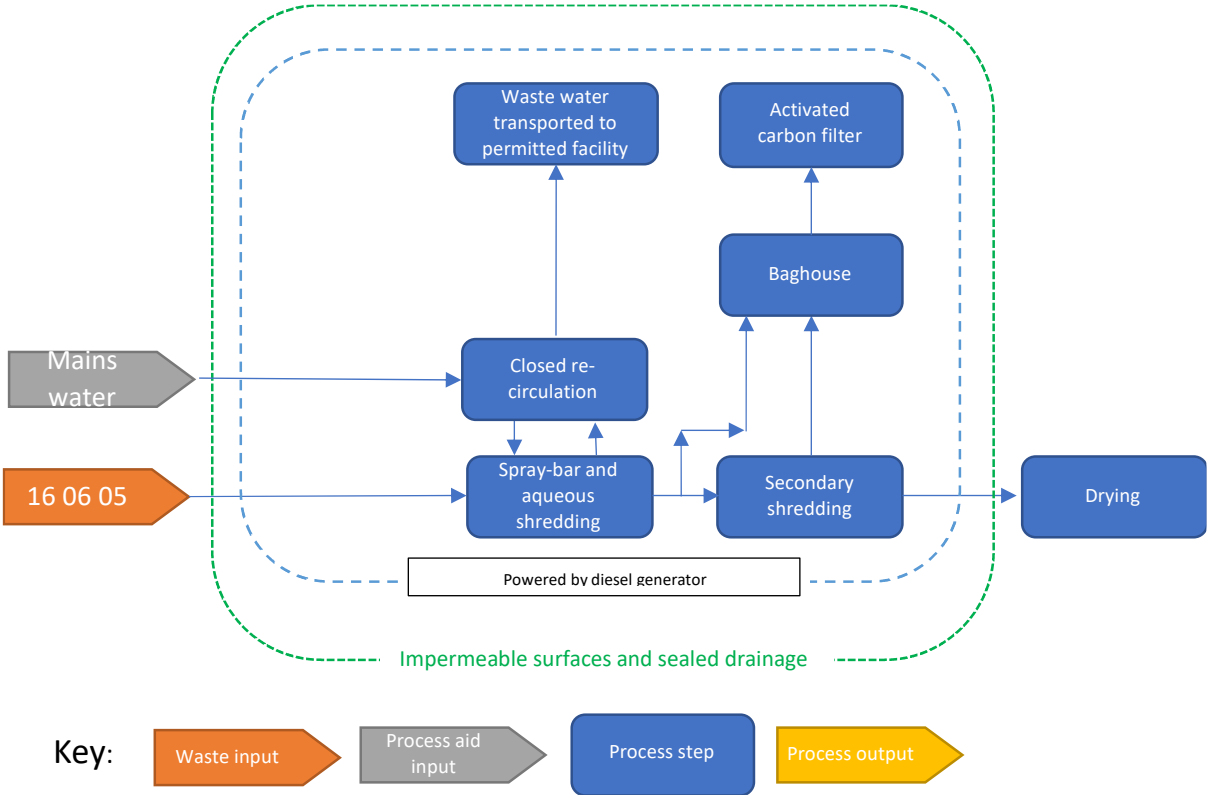
Figure 3.3: Aqueous shredding process



3.5 Rotary Dryer

The drying process reduces moisture content in the material to less than 1%. The throughput is 3MT per hour, but we will only be running 1.5MT per hour as this is in line with the throughput of the last stage (Dry Shredding/Separation).

Feed into the drying process will be recognised as:

- Non-ferrous shredded fraction from 16 06 05

Materials are fed into the infeed hopper where they are transported via conveyor into the Rotary Dryer. Material is heated to 150^{o}C with the temperature reducing to 130^{o}C and then to 110^{o}C.

Any potential dust during the process is entirely captured by bag house filters and the steam from the drying passes through active carbon filtration.

The output fractions are:

- Dry shredded 16 06 05

No waste is produced by the drying process.

The resultant 'dry' material will be fed into the dry separation process where different materials are separated. The process is illustrated below in Figure 3.4.

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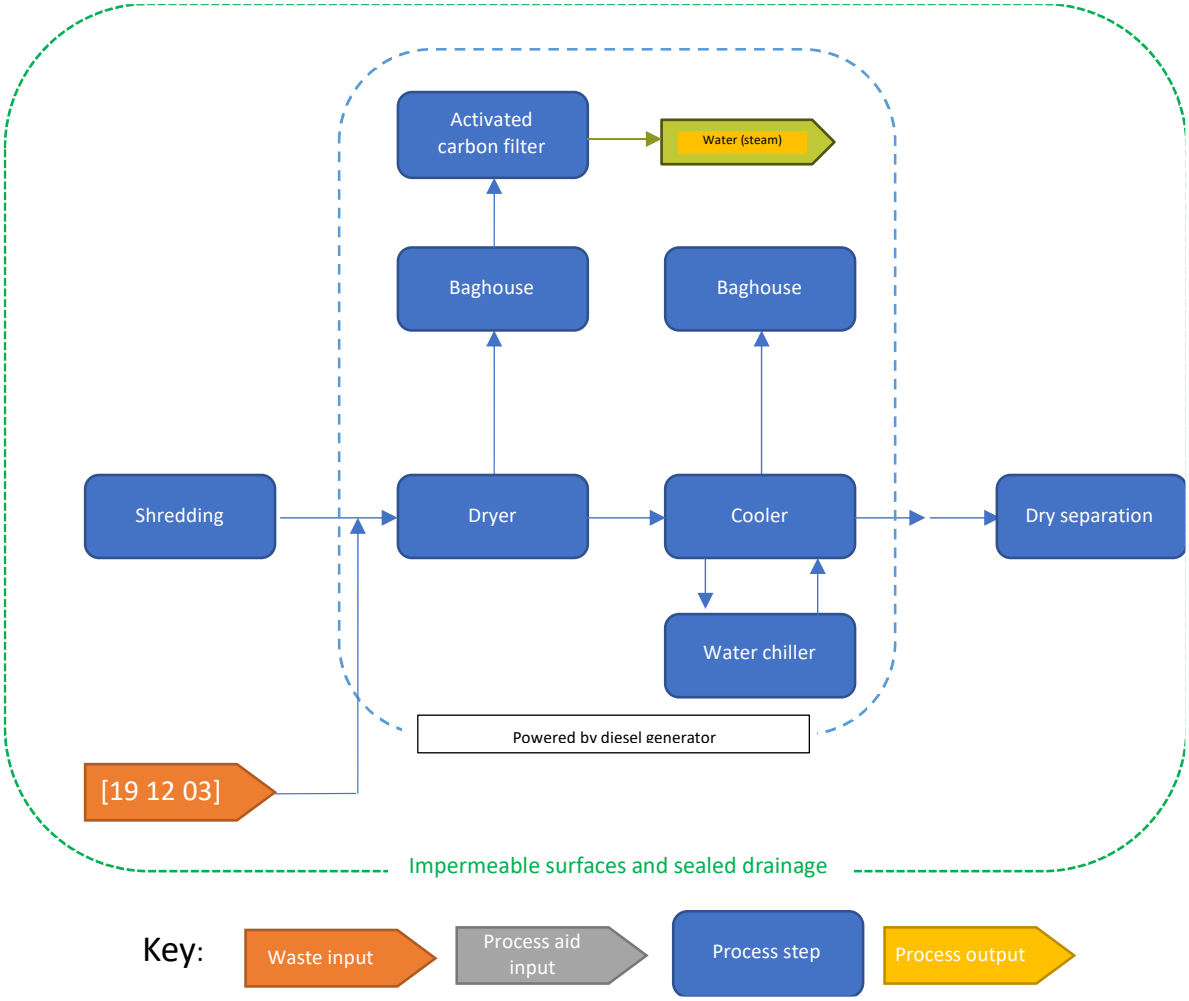
Figure 3.4: Rotary Dryer



3.6 Dry Separation Process

During the dry separation process, different input materials are separated. The final fractions are metals, powders, and polymers.

Feed into this process will be recognised as:

- Dry shredded 16 06 05 fraction The material is fed into the pre-shredder where material is reduced in size in preparation for the next shredding step. All dusts are collected as Storm Black powder (Product) by the dust filters.

In the main shredder, materials are separated from one another and again all dusts are collected as Storm Black powder by the dust filter.

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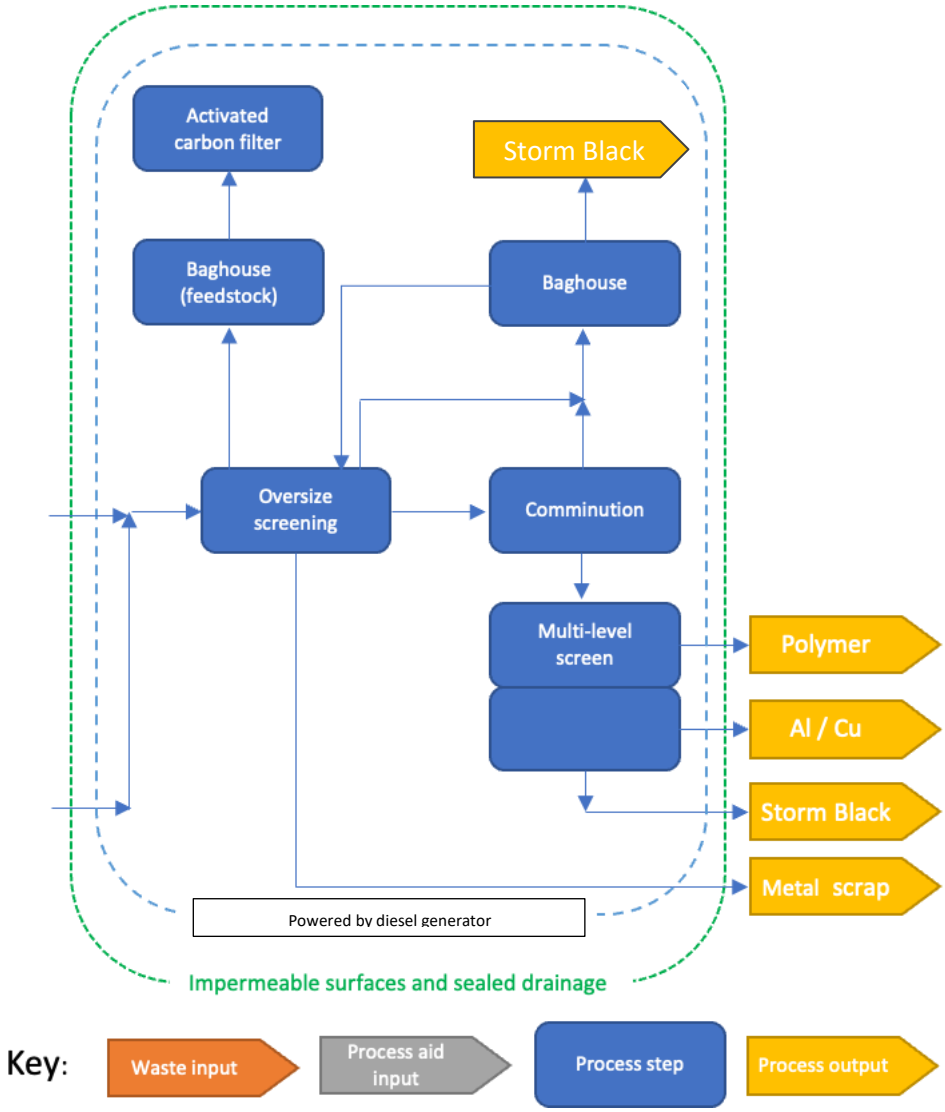
Following the main shredder, the loose materials are separated into different fractions. All materials are collected into each fraction into bulk bags to be transported to our customers facilities.

The output materials are:

- Non-ferrous metal powder (including filter dust) – which is transported to refining facilities to create new input materials for battery manufacturing; - Product "Storm Black"
- Copper – 19 12 03 which is transported to refining facilities to create new copper products;
- Aluminium – 19 12 03 which is transported to refining facilities to create new aluminium products;
- Polymers (PVDF) – 19 12 12 which is transported to plastic products manufacturer.
- A small amount of heavy fractions – 19 12 02.

No waste is produced by the process.

Figure 3.5: Dry separation process



3.7 Hours of Operation

The site operates from 7am to 7pm weekdays (Monday to Friday) with no operations taking place on weekends or bank holidays.

3.8 Emission Points (Air)

Point source emissions are any channelled emission to air or water. All point source emissions have been identified below.

Table 3.4 Point source emissions

Emission Point ID	Description	Emission
1	Diesel generator	NOx, THC, CO, PM (see C2.5)
2	Diesel generator	NOx, THC, CO, PM (see C2.5)
3	Diesel generator	NOx, THC, CO, PM (see C2.5)
4	Rotary Dryer	H_2O (as steam)
5	Diesel generator	NOx, THC, CO, PM (see C2.5)
6	Diesel generator	NOx, THC, CO, PM (see C2.5)

3.9 Site sealing and drainage

The site's drainage and sealing arrangements comprise:

- A surround (other than where the fall line does not require it) of sealed (bunded) concrete blocks which ensures any surface water runs into the drainage system.
- Aco drains leading to the sub-surface drains, which, in turn flow into two large concrete bottomed interceptors. These interceptors receive run off from all drains in the quarry.
- The final interceptor is fitted with a pump. The pump is activated by a float and when the float rises to the specified level (below the pipe leading to the – now sealed – soakaway) the pump activates.
- The pump pushes water through pipes to a 100,000 litre tank. The tank is emptied (by tanker) when it approaches 50,000 litres.

Further information on drainage and sealing is provided in the **Fire Prevention Plan (MA3 and referenced and incorporated within this OTEMS at Appendix 1 as SSOP Annex 03).**

3.10 Site Management

A Technically Competent Manager (TCM) manages the operation and attends site in compliance with the regulatory defined attendance requirement. Individuals such as site supervisors or yard managers can be trained to carry out ongoing site operations, office and plant operations in lieu of the TCM when not in attendance.

During hours of operation there will be a minimum of one member of staff on site, who will be fully conversant with the requirements of the Environmental Permit and the **Environmental Management System (provided in document MA10 (Operating Techniques and Environmental Management System (OTEMS))** regarding the

following: (1) waste acceptance and control procedures;(2) operational controls and environmental monitoring; (3) maintenance; (4) record keeping; (5) emergency action plans; and (6) fugitive emissions.

4.0 Technical Standards

The following technical standards have been utilised in the design and development of the proposed activities, the preparation of this Environmental Permit application, and will govern permitted site activities:

- Sector Guidance Note IPPC S5.06 'Guidance for the Recovery and Disposal of Hazardous and Non-Hazardous waste' May 2013
- European Directive 2010/75/EU — on industrial emissions
- Noise and vibration management: environmental permits[2]
- Develop a management system: environmental permits.[3]
- Integrated Pollution Prevention and Control Reference Document on Best Available Techniques on Emissions from Storage July 2006
- Control and monitor emissions for your environmental permit[4]
- Containment systems for the prevention of pollution (C736)[5]
- Best Available Techniques (BAT) Reference Document for Waste Treatment Industrial Emissions Directive 2010/75/EU (Integrated Pollution Prevention and Control); EUR 29362 EN; Publication Office of the European Union, Luxembourg, 2018
- Best Available Techniques (BAT) Reference Document for Waste Incineration; EUR 29971 EN; Publication Office of the European Union, Luxembourg, 2019

As an 'installation' under the Industrial Emissions Directive the permitted site must achieve 'BAT'. Best Available Techniques (BAT) means the available techniques which are the best for preventing or minimising emissions and impacts on the environment. Techniques include both technology used and the way the installation is designed, built, maintained, operated and ultimately decommissioned.

5.0 Risk assessment and management

An **Environmental Risk Assessment (ERA)** is provided in this application pack (**Environmental Risk Assessment (MA11)**). The **ERA** identifies the sites setting, environmental hazards caused by the waste activity and the

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[2] https://www.gov.uk/government/publications/noise-and-vibration-management-environmental-permits/noise-and-vibration-management-environmental-permits

[3] https://www.gov.uk/guidance/develop-a-management-system-environmental-permits

[4] https://www.gov.uk/guidance/control-and-monitor-emissions-for-your-environmental-permit

[5] https://www.ciria.org/

operators mitigation methods whether than be hard engineering or managerial procedures. This mitigation is designed to protect the environment from fugitive emissions or point source emissions if stated.

The site is operated by **Lincoln Storm Ltd.** An Operating Techniques and Environmental Management System (OTEMS) has been created detailing the sites operations and any environmental controls (**Operating Techniques and Environmental Management System (OTEMS) (MA10)**). The OTEMS explains the site's operations, maintenance procedures and describes the emergency response in the event of an accident and /or incident.

5.1 Noise Management Plan

During the pre-application stage the EA identified that a **Noise Impact Assessment (NIA)** (**Noise Impact Assessment (NIA) (MA8)**) was required and a **Noise and Vibration Management Plan (NVMP)** to address any risks and issues identified (**Noise and Vibration Management Plan (NMVP) (MA9)**).

5.2 Odour Management Plan

During the pre-application stage the EA were requested to identify if an Odour Management Plan (OMP) was required. The EA identified that it was not and the **Environmental Risk Assessment (ERA) ((MA11))** presented with this application pack further supports this.

5.3 Dust Management Plan

During the pre-application stage the EA were requested to identify if a Dust Management Plan (DMP) was required. The EA identified that it was not and the **Environmental Risk Assessment (ERA) ((MA11))** presented in this application further supports this. However, one has been prepared and is available if required.

5.4 Fire Prevention Plan

During the pre-application stage the EA were requested to identify if a **Fire Prevention Plan (FPP)** was required. The EA identified that it was required and the **Environmental Risk Assessment (ERA) ((MA11))** presented in this application further supports this. The FPP is provided with this application pack (**Fire Prevention Plan (MA3)**)