UMBRELLA ENVIRONMENTAL

PROTECTING YOUR BUSINESS

Best Available Technique Assessment

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Affiliated Organisation 2022

Together, we stand for a world beyond waste

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D1	24/10/2022	AIL	AIL	Drafted for bespoke installation application pack, Client review.
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V2	20/07/2023	AIL	AIL	Following further enhanced pre app advice from the EA further amendments to the activities table to be more reflective of the application.

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1 INTRODUCTION

This Best Available Technique (BAT) assessment accompanies the application for a bespoke waste installation by Umbrella Environmental Limited on behalf of Rock Solid Processing Limited EPR/HP3444QP at Bromborough South Dock CH62 4RY. The site location is shown in Figure 1 Site Location.

Rock Solid are contracted to reprocess the IBA arising from the Energy from Waste (EFW) plant at Protos, Grinsome Road, Chester CH2 4RB, Ince and Dublin Dublin Waste to Energy Facility, Pigeon House Road, Dublin 4. Eircode: DO4 N2 P2 . Rock Solid already hold a number of contracts of this type across the UK for the reprocessing of Incinerator Bottom Ash (IBA) to produce IBA aggregate (IBAA) and the recovery of ferrous and non-ferrous metals. The resultant products are suitable for use as recycled aggregates in place of virgin materials in unbound and bound applications. Rock Solid Processing Limited's parent company Rock Solid B.V. also have many years' extensive experience of reprocessing IBA and the production of resultant IBA aggregates in the Netherlands.

Waste that arrives via site from Ireland to dock side is unloaded via bucket loader deposited in to a trailer and is subsequently transported to the site (approx.. 200 m) for sorting and blending meaning the offload/handling of the IBA from the cargo ship onto the trailer is apart of the overall transportation of the ship and the transfer of waste (change of legal ownership) does not happen until it is tipped in the permitted area, All activities waste activities will occur within the permit boundary.This document summarises the application for a bespoke waste installations permit allowing for IBA to be accepted, stored and treated. With some appropriate IBAA material to be blended and used under a regulatory position statement.

1.1 Site Location

The site is approximately 40174 m^2 and is located at Bromborough South Dock CH62 4RY.

The National Grid Reference (NGR) is SJ 34947 84720, Eastings and Northings 334947 , 384720 and What Three Words location, ladder.values.thick.

The wider industrial area is accessed by the A 41 and New Chester road located to the west of the site, with the site itself accessed by Dock road. The site is bounded to the north west by the Dibbinsdale Brook and Port Sunlight River Park, while to the north east by Mersey Wharf and the River Mersey. The south east boundary is bounded by warehouses operated by Mersey Wharf. The south west boundary is formed by Dock Road South.

Figure 1 Site Location

1.2 Overview of Site Operations

The regulated facility will permit the annual acceptance, storage and processing of up to 240,000 tonnes of non-hazardous incinerator bottom ash (IBA) per year. The IBA will be the sole waste streams permitted for acceptance at the site. Other aggregate material will be accepted at site to blend with the processed Incinerator Bottom Ash Aggregate (IBAA) to produce an aggregate to be used in construction.

The only waste to be accepted for the IBAA produced by Rock Solid is IBA from Energy from Waste (EfW) facilities burning municipal and commercial waste. Waste will arrive by road from Protos (Ince) 120,000 tonnes p.a. This material has been proved to be non-hazardous under the Environmental Services Association (ESA) "A Sampling and Testing Protocol to Assess the Status of Incinerator Bottom Ash" (ESA Protocol). The remaining 120,000 tonnes p.a will arrive by boat from Dublin. This material is pending ESA protocol status, If material does not achieve ESA status it will be rejected from site..

The IBA and IBAA is classified in the List of Waste (LoW) with the following code:

- 19 01 12 (bottom ash and slag other than those 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

IBAA material appropriate for blending will be mixed with other aggregates to produce a waste material to be used under a regulatory position statement (RPS) 247. It enables the use of unbound incinerator bottom ash.

"This regulatory position statement (RPS) applies if you use unbound municipal incinerator bottom ash aggregate (IBAA) in certain construction activities. It also covers storage of IBAA in relation to its use."

1.3 Process Overview

Rock Solid is a processor of incinerator bottom ash (IBA). The IBA processing plants extract ferrous and non-ferrous metals to produce different grades of IBA aggregate (IBAA). All separated materials are recovered, recycled or returned to the EfW for re-incineration. The recovery of metals is the key aspect of the IBA recycling process. High efficiency of metals separation produces high quality IBAA (for use as road subbase material, pipe bedding, general fill and in concrete) and recovers more ferrous and non-ferrous metals which have a considerable commercial value and proven industry reuse potential. Over the years the process technology provider has significantly improved the process and achieved a considerable improvement in metal separation efficiency.

In order to realise the highest metal recovery, Rock Solid uses semi-mobile treatment plants. The plants are easily adjustable to specific streams of IBA. Furthermore, they can be upgraded with additional technologies to reach the optimal IBA treatment and to produce

high quality aggregates. Rock Solid has the experience and knowledge about all aspects of IBA processing and its final applications. Based on this, Rock Solid offers an all-in, proven and reliable solution for IBA treatment. The process starts at the EfW plant where the raw IBA is produced. The bottom ash is transported to the processing

site in covered trucks via the shortest road distance, where it is processed to separate the metals and produce the aggregate fractions. The aggregate fractions are stored separately and can be dispatched for use in infrastructure works as long as they comply with the requirements of performance and environmental standards.

The quantity of IBA accepted on site would be managed to remain within the limits set by the Environmental Permit, i.e. no more than 240,000 tonnes per year.

Before being accepted for processing at site, the IBA must be classified as a non-hazardous waste according to the EA Guidance WM3. The classification of the IBA produced at the incinerator is determined by the EfW facility operator. The IBA is proved to be non-hazardous under the Environmental Services Association (ESA) "A Sampling and Testing Protocol to Assess the Status of Incinerator Bottom Ash" (ESA Protocol). This document is a voluntary industry protocol and has been produced by ESA and its members with the support of the Environment Agency & SEPA to provide a reliable method for the classification and assessment of IBA from the combustion of municipal waste in an EfW facility.

The raw IBA generated at the EfW facility is transported by road and stored at the processing site of Rock Solid. The incoming quantities are monitored by the weighbridges at the EfW facility and at the processing site. The weighing data is documented in a spreadsheet on a day-to-day basis by Rock Solid. The location where the raw IBA is stored is registered by the site manager in a logbook on a monthly basis during the windrowing period. The processing site can store up to 261,882 tonnes of IBA/IBAA/material.

IBA processing and blending process are shown in Figure 2 IBA Process Flow and Figure 3 Blending Process.

Table 1 Permitted Activities

Schedule 1- Environmental Permitting Regulations		Limits of specified activity and waste types
Section 5.4 A1 (b) (iii) non-hazardous waste installation – treatment of slags and ashes.	R4: Recycling/reclamation of metals and metal compounds R5: Recycling/reclamation of other inorganic materials.	From receipt of permitted waste through to treatment and recovery of by-products (incinerator bottom ash aggregate). Treatment of incinerator bottom ash consisting of crushing, separation and screening shall be carried out in an enclosed building and on an impermeable surface with a sealed drainage.
Section 5.4 A1 (a) ii Disposal of non-hazardous waste with a capacity exceeding 50 tonnes per day involving physico-chemical treatment	D9 - Physico-chemical treatment not specified elsewhere which results in final compounds or mixtures which are discarded by means of any of the operations numbered D1 to D12	Disposal of non-hazardous waste with a capacity exceeding 50 tonnes per day involving physico-chemical treatment Treatment of leachate on site prior to discharge to local foul water system under a trade effluent consent.
Waste Operation		

Blending of IBA and materials to produce an aggregate.	R5: Recycling/reclamation of other inorganic materials. R3 Recycling/reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes)	IBAA, Blended with non waste aggregate imported to site to be used under RPS 247 Using unbound incinerator bottom ash aggregate (IBAA) in construction activities.
Raw material storage	Storage of raw materials.	Non waste aggregate stored on site in discreet piles in main storage areas.
Directly Associated Activity		
Storage and handling of waste	R13: Storage of waste pending the operations numbered R5 (excluding temporary storage, pending collection, on the site where it is produced).	From receipt of waste to dispatch off-site for recovery. Temporary storage of waste. Storage of incinerator bottom ash on impermeable surface with sealed drainage system prior to treatment in enclosed building and externally. Storage of processed incinerator bottom ash aggregate on impermeable surface with sealed drainage system. Storage of ferrous/non-ferrous metals arising from the treatment of incinerator bottom ash, on impermeable surface with sealed drainage system.
Storage of residual waste	R13: Storage of waste pending the operations numbered R5 (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 it is produced).	Residual waste to be removed from site.
Fuel Storage/chemical Storage	Diesel Hydraulic Oils Lubricating Oils	5000 litres 10 drums up to 205 litre per drum. 10 drums 205 litre per drum.
Raw material storage	Storage of raw materials.	Non waste aggregate stored on site in discreet piles in main storage areas.

Figure 2 IBA Process Flow

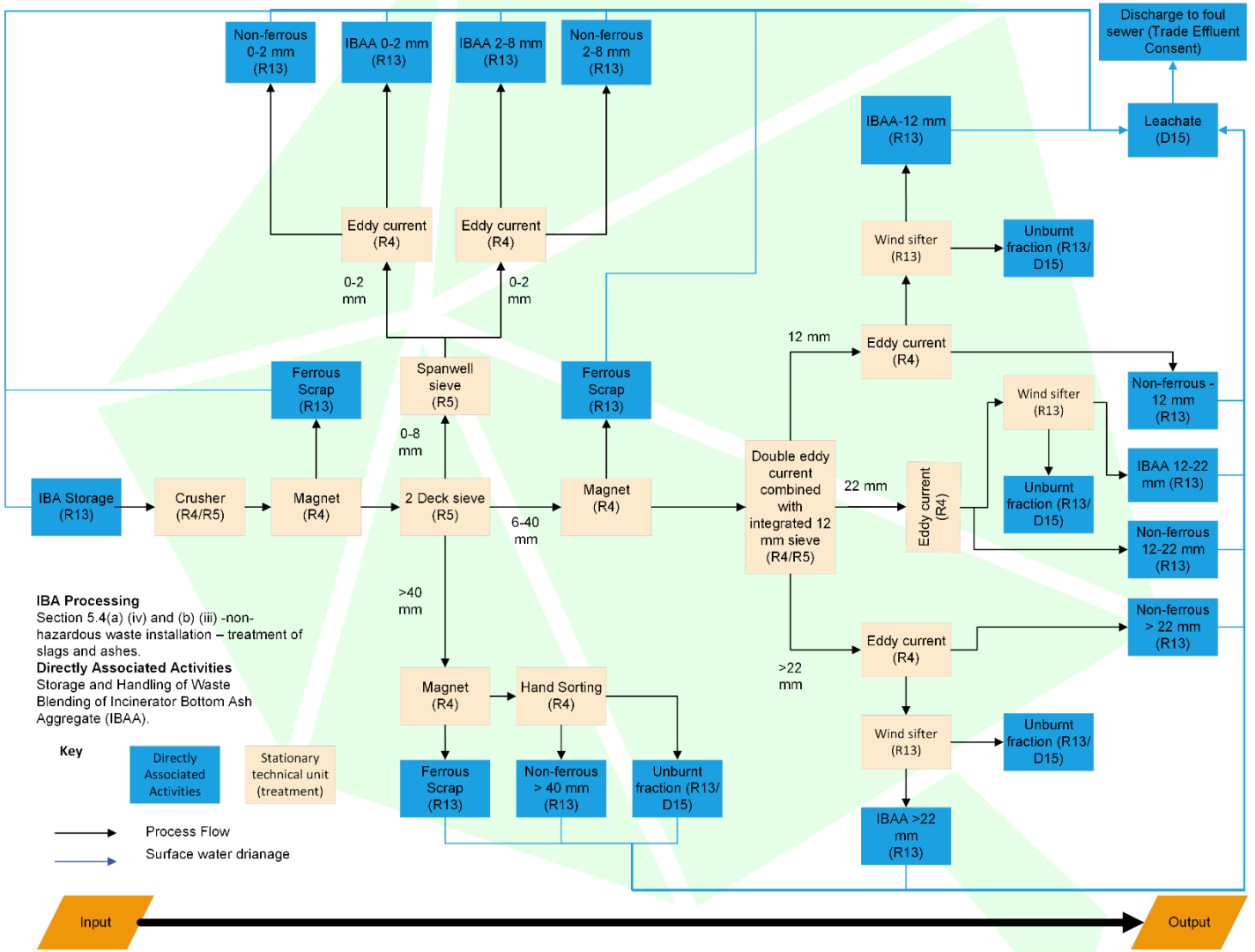
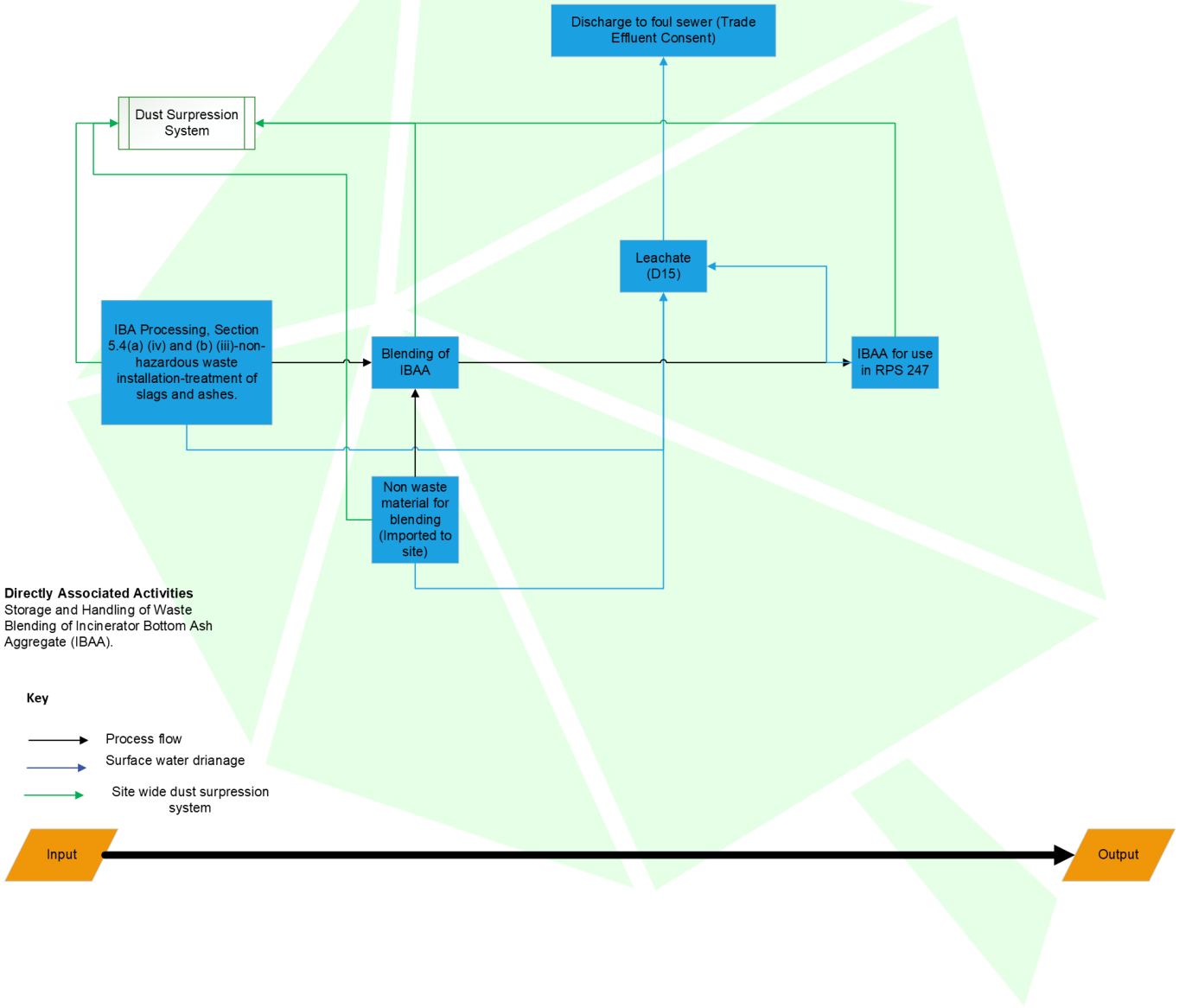


Figure 3 Blending Process



2 BAT TECHNIQUES

Originally published in August 2006, the Best Available Techniques (BAT) Reference (BREF) Document for Waste Treatment was updated in August 2018. Relevant regulatory bodies, in the EU Member states, have four years (i.e. by August 2022) to implement any changes to the indicative standards and expectations that the revised document may describe for particular waste treatment activities.

The term 'best available techniques' is defined in Article 3 (10) of the Directive as 'the most effective and advanced stage in the development of activities and their methods of operation which indicate the practical suitability of particular techniques for providing in principle the basis for emission limit values designed to prevent and, where that is not practicable, generally to reduce emissions and the impact on the environment as a whole.'

Article 3 (10) goes on to clarify further this definition as follows:

- 'best' means most effective in achieving a high general level of protection of the environment as a whole.
- 'available techniques' are those developed on a scale which allows implementation in the relevant industrial sector, under economically and technically viable conditions, taking into consideration the costs and advantages, whether or not the techniques are used or produced inside the Member State in question, as long as they are reasonably accessible to the operator;
- 'techniques' includes both the technology used and the way in which the installation is designed, built, maintained, operated and decommissioned;

This document provides a technical description of the activities to demonstrate they achieve the BAT relevant to the process.

This document should be read in conjunction with other supporting information contained within the Application pack.

2.1 Application of BAT standards to the specific process

In this BAT assessment, the following reference and guidance documents have been considered:

Commission Implementing Decision (EU) 2018/1147, of 10 August 2018, establishing best available techniques (BAT) conclusions for waste treatment, under Directive 2010/75/EU of the European Parliament and of the Council.

- Best Available Techniques (BAT) Reference Document for Waste treatment Industrial Emissions Directive 2010/75/EU (Integrated Pollution Prevention and Control); EUR 29362 EN; Publications Office of the European Union, Luxembourg, 2018;
- Commission Implementing Decision (EU) 2019/2010 Of 12 November 2019 establishing the best available techniques (BAT) conclusions, under Directive 2010/75/EU of the European Parliament and of the Council, for waste incineration.

- Best Available Techniques (BAT) Reference Document for Waste Incineration; EUR 29971 EN; Publication Office of the European Union, Luxembourg, 2019

A summary of all relevant BAT contained in the BAT conclusions document have been collected in Table 6 BAT Assessment. The table references the relevant documents within the application pack that describe how compliance with BAT is met or will be met in the future, within the timescales allowed by the BAT conclusions document.

The assessment of Best Available Technologies reference documents has found the following to be relevant to the Bromborough site:

- Improve the overall environmental performance of the plant: this requires the implementation of the following:

Environmental Management System (EMS): the applicant currently operates according to a Management System, which is described in Environmental Management System ref. 016.1_05_002

  - , which is part of the wider company EMS designed in accordance with the international standard ISO 14001.

o Set up and implement an output quality management system: the processes outputs are the IBAA and the leachate. Monitoring of the quality of the IBAA is carried out through implementation of the Code of Practice IBAA UK (appendix A).

- Reduce the environmental risk associated with the storage, handling and transfer of waste: this is achieved by carrying out all transfer of IBA/IBAA in sheeted lorries, enforcing speed limits on site and on an impermeable site surface with a sealed drainage system capturing the leachate produced due to rainfall on the waste. Accident mitigation measures are listed in Section 13 of the 016.1_05_002 (EMS). Storage and processing of the leachate is described in Section 17.1.
- Optimisation of water consumption and prevention of emissions to soil and water: this is achieved through the use of a segregated drainage systems for roof water and site runoff.
- Prevent or limit the environmental consequences of accidents and incidents: incidents and accident management is described in Section 12 and in Section 13 of the 016.1_05_002 (EMS)

3 PRE ACCEPTANCE OF WASTE

Waste is accepted from only pre-approved sites via an agreed contract and waste description. No ad-hoc waste deliveries are accepted to site.

Individual waste deliveries are inspected on arrival on site and during the tipping process. If waste is deemed to be non-compliant the Technically Competent Manager (TCM) or appropriately trained employee can reject the waste and send it back to the producer.

An annual Waste Transfer Note will be used for IBA/IBAA that arrives from the pre-approved suppliers which will record amounts, day of transfer and type of waste, including EWC code. This can also evidenced and further verified via weighbridge reports from both the EfW facility and the Rock Solid site weighbridge.

3.1 Procedures for the pre-acceptance of waste

3.1.1 Waste Acceptance Criteria

A Waste pre-acceptance procedure has been put in place to ensure that the materials provided by the IBA Producer are suitable for the intended end use.

The key stages of the pre-acceptance process are presented below.

3.1.1.1 IBA Information

As part of compliance with the ESA Protocol, the IBA provided to Rock Solid undergoes chemical characterisation and hazard assessment according to the EA "*Guidance on the classification and assessment of waste Technical Guidance WM3*".

Key parameters and hazard assessment of key hazardous properties (HP4, HP8, HP7, HP14) is carried out twice a month.

A comprehensive characterisation and full hazardous properties assessment (HP1 -HP15) is carried out annually.

Using a statistical approach described in the Protocol, the waste material is classified and assigned the List of Waste (LoW).

Characterisation data is required from the waste producer before dispatch from their site along with the following information:

- Description of the waste, including EWC code.
- Source of the waste

All potential customers (IBA producer) shall be required to submit all characterisation data and hazard assessments of the IBA before any processing will be carried out.

3.1.1.2 Acceptance Criteria

The TCM (or nominated alternative) shall review the information provided by the waste producer to determine whether an appropriate assessment has been undertaken in accordance with the ESA Protocol.

Subject to being classified as non-hazardous, the IBA may be acceptable without further testing.

Where the hazard assessment has not been provided or is deemed insufficient, Rock Solid will not accept the applicable IBA for processing. The client is responsible for the IBA to be stored at a designated area away from the approved IBA and report this to Rock Solid.

Records of waste classification and assessment will be kept by the client, and can be made available upon request, to demonstrate that the above described assessment procedures have been followed.

Only IBA classified as 19 01 12 bottom ash and slag other than those mentioned in 19 01 11 and 19 12 12 "bottom ash and slag other than those containing hazardous substances" may be accepted on site for processing.

As per Rock Solid Processing Limited quality protocol see Table 2 List Of Waste
If enough information is provided during pre-acceptance, the IBA can be approved for delivery to the site.

The site's Waste Acceptance Criteria described below incorporates the statutory requirements of the Duty of Care legislation.

3.1.1.3 Initial Inspection

All deliveries of incoming IBA will be inspected regularly for compliance with the Rock Solid's IBA Acceptance Criteria (016.1_05_002 (EMS) S.

If non-compliant material is observed the client will be contacted and in case the client didn't do so already the IBA will quarantined.

3.1.1.4 IBAA Factory Production Control Manual

If large volumes of non-compliant waste are observed within a load, then the load is refused entry. If small volumes of non-compliant waste are observed, then loads will either be refused entry to site or if possible, non-compliant material will be removed by hand (if safe to do so).

The following information about incoming loads is recorded by the client and retained:

- Date and time;
- EWC code;
- Place of origin;
- Quantity (weight or volume);
- Carrier & supplier; and
- Outcome of the visual inspection.

The details of rejected loads including but not limited to; the date, time, nature and quality, place of origin, quantity and carrier are recorded and retained.

3.2 Compliant IBA

This below and describes the IBA which is complaint to the IBA Acceptance Criteria and will be accepted for processing. Non-complaint material will not be accepted for processing.

Figure 4 Compliant IBA

- The granular material looks fine graded
- Does not contain big lumps of unburned material
- The IBA looks light to dark grey

Non-compliant IBA

Figure 5 Non-compliant IBA

- The IBA contains huge lumps of recognizable unburned parts (plastic, paper, textile, refuse bags)
- The IBA looks blackish

4 WASTE ACCEPTANCE PROCEDURES

The only waste to be accepted on site for processing is IBA or IBAA from Energy from Waste (EfW) facilities burning municipal and commercial waste, which has been proved to be non- hazardous under the Environmental Services Association (ESA) "A Sampling and Testing Protocol to Assess the Status of Incinerator Bottom Ash" (ESA Protocol). Details are reported inTable 2 List Of Waste.

Table 2 List Of Waste

Waste code	Description
19	**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	**Waste from incineration or pyrolysis of waste**
19 01 12	Bottom ash and slag other than those mentioned in 19 01 11(not containing hazardous substances)
19 12	**Wastes from the mechanical treatment of waste (for example sorting, crushing, compacting, pelletising)not otherwise specified**
19 12 12	Other wastes (including mixtures of materials)from mechanical treatment of wastes other than those mentioned in 191211 Incinerator Bottom Ash Aggregate only

To ensure only permitted wastes are accepted, waste acceptance criteria have been implemented and are maintained and communicated to all relevant staff.

The Waste Acceptance Procedure includes the following:

- A pre-acceptance procedure where IBA characterisation and hazard assessment data, according to the WM3 guidance (under the ESA Protocol) is required to be submitted by all potential suppliers.
- Initial inspection where all incoming deliveries are checked for compliance with the acceptance criteria.

The permit holder will only accept those wastes that comply with the permit. Non- conforming loads will be rejected And removed from site.

The Waste Acceptance Criteria are described in detail in the Company's "IBAA Factory Production Control Manual" in appendix A

The only type of 19 12 12 mechanically treated waste shall be from incineration processes.

5 WASTE STORAGE AND TREATMENT

5.1 Storage Areas

IBA and IBAA are stored in the designated storage area, where the materials are deposited on the impermeable concrete surface see site plan 100104167-MMD-00-00-DR-A-1101 - Proposed Site Block Plan.

Table 3 Storage quantities

Containment Type	Material Stored	Storage Capacity (tonnes)	Secondary containment arrangements	Fate of drainage serving the storage area
40yd RoRo skips	Ferrous metal fractions	9	Located within bunded area	Sealed drainage system to leachate treatment plant
40yd RoRo skips	Non-ferrous metal fractions	27		
Metal Storage Bays x 2	Non-ferrous metal fractions, stainless steel and copper mix	36		
Bay	Unburnt IBA material to be returned to EfW	18.4		
Bunded, lined storage area with sealed drainage system	IBA (Storage Area 1,2,3 & 4)	up to 39,286 across all bays		
Bunded, lined storage area with sealed drainage system	IBA/IBAA/ (Storage area 5)	up to 10,528		

Containment Type	Material Stored	Storage Capacity (tonnes)	Secondary containment arrangements	Fate of drainage serving the storage area
Bunded, lined storage area with sealed drainage system	IBA/IBAA 6	up to 10,528		
Bunded, lined storage area with sealed drainage system	IBAA/Aggregates (Storage area 7)	Up to 201,540		
IBAA	External Bays	63		

5.2 Waste Handling

Wastes are stored internally and externally prior to further treatment. The unprocessed IBA is imported to the site and stored.

IBA and IBAA are stored in the designated storage area, where the materials are deposited on the impermeable concrete surface.

To enable appropriate management of material within the storage area, once a day the IBA is formed into stockpiles using either a 360-swing shovel or bucket loader.

IBA and IBAA will be stored to a maximum height of approximately 8 m and a storage capacity of approx.. 261,882 tonnes.

5.3 Waste Treatment Summary

- IBA is delivered to site.
- Regular visual inspection of the IBA for signs of contamination/ non-compliant material (see EMS 016.1_05_002).
- Driver is instructed to unload in a designated area segregated from other wastes.
- IBA is then stockpiled prior to being fed to the mobile plant via swing shovel.
- The mobile plant crushes the IBA and through a series of magnets and non-ferrous separators, separates the metals form the aggregate material.

- Other metals such as copper and electric motors and unburnt organics such as paper and plastics are handpicked.
- The aggregate material is separated into 5 size fractions:
    - 0-2mm IBAA
    - 2-8mm IBAA
    - 8-12mm IBAA
    - 12-22mm IBAA
    - 22-40mm IBAA
- The ratio between these fractions are depending on the particle size distribution of the IBA. The produced tonnages per fractions are reported by daily reports to the TCM.
- Samples of each of the IBAA fractions are prepared in accordance with Rock Solid's Sampling Procedure to produce laboratory samples. It can be decided that after processing the IBAA fractions are put together in:
    - 0-4mm by combining the 0-2mm and 2-8mm fractions
    - 12-40mm by combining the 8-12mm, 12-22mm and 22-40mm fractions
- When this is decided the sampling strategy will be adjusted to this.
- IBAA samples are tested in accordance with the site specific testing plan.

5.3.1 Blending Activity

Up to 50,000 tonne per annum of raw not waste aggregate may be imported to site to blend with IBAA to produce a material to a clients specification for se as a waste most notably RPS 247. If required all IBAA produced on site may be blended making the activity a directly associated activity as per Table 1 Permitted Activities.

5.4 Leachate Treatment

Leachate will be collected via the drainage system and pass through the leachate treatment process prior to be discharged to the local foul water drainage system under a Trade Effluent Consent (TEC) permission. See drainage plan 100104167-MMD-00-00-DR-A-1101 - Proposed Site Block Plan.

Figure 6 Leachate treatment process

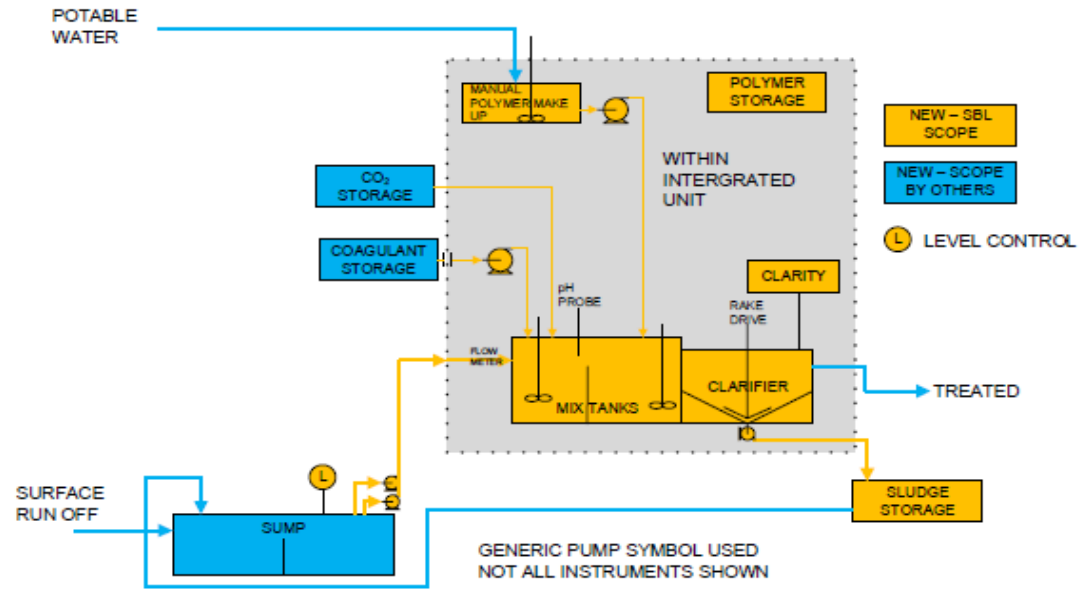


Plate 3: Proposed Process Block Diagram

(Siltbuster https://www.siltbuster.co.uk/)

5.4.1 Process description

The Surface Run Off (SRO)to be treated will collect within a new sump with a weir into the pumping chamber part. Two surface mounted pumps (VSD) will operate as duty/assist. As the sump fills, the duty pump will operate. In the event that the level still rises, the assist pump activates. These pumps operate under the control of the level monitor in this sump and will be mounted within a frame.

The SRO is then pumped through the flow meter and into the Mix Tank. Within the Mix Tank, Coagulant is dosed into the First Chamber and the dose rate is controlled based on the signal from the flow meter. pH of the Surface Run Off is reduced using carbon dioxide (CO_2). The signal from the pH meter operates a solenoid valve to introduce CO_2 into the First Chamber. When the pH reaches the set level the solenoid valve closes. The CO_2 bottles in the cage are connected via a manifold to the solenoid valve. The SRO then flows by gravity into the Second Section where polymer is added.

The amount of polymer added is controlled from the upstream flow meter. The polymer is added and slowly mixed. The chemically conditioned SRO enters the settlement area of the iHB40R unit where the solids settle to the base whilst the treated SRO overflows out of the unit. Within the base of the iHB40R unit a rake gently agitates the settled solids, which reduces the risk of the sludge rat holing. This also enables the sludge to thicken slightly. The settled solids are then pumped out via the Sludge Pump into the Sludge Tank.

The outlet of the plant will be monitored.

6 DRAINAGE

The integrity of surfaces and the drainage systems will be checked as part of routine site inspections.

The surface water drainage system will be kept clear to ensure capacity is retained and all water run-off is collected.

All site run off except roof water will be directed to a leachate treatment plant with a treatment capacity of 40 m^3/hour, a collection sump of 50 m^3 and a storm attenuation of 3,137 m^3 (6 hours) which accounts for a 35 % climate change buffer and an a 1 in 100 year storm duration of 6 hours.

Details of the drainage system can be found in the Site Layout Plan (100104167-MMD-00-00-DR-A-1101 - Proposed Site Block Plan).

Site discharges final effluent to the foul drainage system under a Trade Effluent Consent (TEC).

Roof water and access road water will be removed uncontaminated from site via rainwater downpipes and an underground pipe network, attenuation tanks and then discharged to the existing united utility surface water located to the east of the site.

All areas are subject to regular housekeeping and the site is tidied and checked prior to closing for the day. All working areas are swept and cleared to remove debris as and when required.

Following a spillage, surface cleaning, drain clearance and residue removal will be undertaken, as will checks to the integrity of the site's surfaces and infrastructure.

7 TRAINING FOR SITE STAFF

7.1 Training Needs Assessment

All new and existing site staff are subject to a specific training regime based on their responsibilities at the site to ensure all operations are carried out without harm to the environment or amenity of the surrounding area. Training in all aspects of the site and waste operations at the site with regard to the individual responsibilities of the site staff will help to prevent incidents occurring which may have an adverse impact on the environment and/or the employees and their co-workers.

7.2 Emergency Procedures Training

In addition to normal operating conditions as specified in the site rules, employees must also be trained in dealing with eventualities which may occur outside the scope of normal operating conditions, so they are aware of how to deal with these situations in advance of an occurrence.

7.3 Recognition of Waste Types Training

All employees will be given induction training and subsequent training to identify waste types which are permitted for acceptance at the site under the site's Environmental Permit (EP) and those wastes which are not. This will include specific training to identify those common wastes which may be found following deposit and are not permitted at the site and will also include more obscure wastes and how to handle these wastes safely. All employees will be advised that they will refer any unrecognisable or unknown wastes to site manager/TCM, who will, in turn, follow procedures outlined in the EMS and/or contact the EA to agree a suitable method for removal.

This training will be provided to all site users who handle waste on site and those in charge of administration and reporting. In-depth training will also be provided to drivers responsible for collecting wastes from the site of production. They will be trained to identify any wastes not covered by the EP for the site and inform the producer that an alternative facility must be sought for any non-compliant wastes.

Staff will also be trained in BAT procedures ensuring **only** the following EWC codes are accepted on site.

EWC	Material	Tonnes p.a.
19 01 12	IBA	Up top 120,000
19 12 12		Up top 120,000
	Total	**240,000**

7.4 Plant and Equipment Preventative Maintenance Training

This training is provided specifically for the vehicle and plant operators in order to ensure that all plant and machinery is checked regularly to prevent any occurrences which may lead to any adverse impacts on the environment or human.

The same training will be provided to senior management enabling a dual-level maintenance programme.

7.5 Duty of Care Training

All employees dealing with consignments of waste will be trained in the completion of Duty of Care Waste Transfer Notes and Consignment Notes .

7.6 Plant Operation Training

Any employees who are required to operate loading or treatment plant for the movement or processing of waste will be required to undertake the necessary qualifications for the operation of the specific item of plant in question. This will be required prior to operating the plant and will be obtained through necessary externa certification programmes.

Regardless of general plant operation certification, all operatives will be fully inducted in the operation of the specific make and/or model of plant used on site.

7.7 Permit and EMS Training

All employees will be inducted into the operating conditions as prescribed in the EP for the site. Whilst much of the above training will provide specific guidance on many aspects of these documents, all employees will be made aware of the location of the EP in the site office. All managerial positions will be made fully aware of the sites operating conditions.

8 MONITORING

8.1 General Management

The company have detailed written procedures and recording systems covering all aspects of site and company operations.

8.2 Plant and Equipment, Preventative Maintenance

Site management will undertake or delegate additional preventative maintenance checks on a daily basis to ensure, where possible, the machinery is mechanically sound, as described in the section below.

Fuels and combustible liquids from site vehicles (forklift trucks etc.) will be controlled by ensuring each vehicle has undergone the relevant preventative maintenance checks.

Any spillages of fuel will be cleared immediately by depositing sand or absorbents on the affected area and removed to the quarantine area or to a dedicated skip to await removal to a suitably permitted facility.

All items of plant and equipment (and any additional items of plant which may be hired in to cover busier periods) are subject to preventative maintenance checks to ensure their safe operation and to prevent any potential situations which may give rise to faults or malfunction.

Much of the plant and equipment on site and all vehicles in the fleet are subject to annual manufacturer maintenance to ensure proper working order in the form of service contracts. site manager/TCM will undertake or delegate additional preventative maintenance checks on a more frequent basis to ensure i.e. daily, before, during and at the end of each working day to ensure (where possible) the machinery is mechanically sound. These checks will be carried out using the preventative maintenance table in the EMS 016.1_05_002..

8.3 Accidents and Incidents

The system for the identification of potential accidents, incidents and emergency situations is through risk assessments which are routinely undertaken in accordance with the operator's health and safety policy.

In order to prevent or reduce potential accidents, incidents and emergency situations at the site, BAT is using the techniques given below:

- At introduction of new contract/working practices, procedures are established to deal with potential accidents/incidents from specific hazards, identified from experience.
- Risks are assessed on an ongoing basis and as work proceeds.
- Rock Solid Processing Limited uses its expertise to provide method statements that include recognised emergency procedures which are then briefed to all site staff and any subcontractors.
- If an accident, incident or near-miss occurs, the accident reporting procedure is used to investigate and remedy the cause. Any accident or incident that falls into the RIDDOR category shall be reported accordingly and submitted to HSE within 10 days of the occurrence.

- Site management meet regularly to review the causes of any accident/ incident and corrective and preventative actions implemented to address them. This may lead to changes in working practices, training and staff information briefings to ensure that the root cause is understood and addressed.
- Investigations are undertaken by company Management.
- Meeting the requirements of S5.06 Section 2.8.

The manner in which the facility is managed is a critical element in ensuring emissions from the site operations are minimised. Therefore, the management of the facility ensures:

- Staff are competent to manage and operate the facility i.e. fit and proper persons
- Strict waste pre-acceptance and acceptance are procedures are in place
- Procedures and control techniques in place to minimise potential emissions to air, land and water
- Operational procedures as detailed in the EMS 016.1_05_002 are in place to minimise the risk of emissions having regard to the waste types being accepted and the waste processing activities at the facility
- Operational procedures are in place to minimise the risk of odours having regard to the waste types being accepted and the waste processing activities at the facility
- Appropriate storage and handling procedures are in place
- Waste despatch procedures are in place
- Provision of a impermeable surface with appropriate kerbing to prevent escape to adjacent permeable areas
- Containment bays provided on site for the secure storage of the waste
- Wastewater management procedures in place
- There is an EMS 016.1_05_002 in place for Rock Solid Processing Limited to ensure standards are maintained, including incidents and complaints management procedures,
- Techniques in place for prevention and minimisation of resource consumption e.g. Energy efficiency, use of raw materials

8.4 Monitoring

If required all monitoring is carried out by trained personnel and recorded on suitable forms or on digital media which is available to site managers for checking and reviewing site operations. Information is readily available to regulators on request.

Monitoring could b a result of complaint or request by the EA for dust, noise and vibration.

8.5 IBAA Monitoring

Rock Solid has an on-site laboratory to analyse and control the produced non-ferrous mix and IBAA.

- the non-ferrous metal produced by the plant is tested by crushing and rolling the material so that the

mineral fraction is turned into dust, leaving the non-ferrous metals intact. As a result, the dust can be separated and the percentage of non-ferrous metals in the produced mix can be calculated. Rock Solid analyses the non-ferrous mix and IBAA according to the Dutch Technical Standard (NTA 8191) for the 'sampling and determination of the metal content in Incinerator Bottom Ash and nonferrous concentrate'. This standard describes the method to determine the metal content in a reliable and scientific way.

- Rock Solid analyses the non-ferrous mix and IBAA on a daily or weekly basis during the processing campaigns. All results are documented by spreadsheet.
- IBAA is tested for its metal content. Although Rock Solid aims to recover the maximum metal possible, in general, there is still a small percentage left in the IBAA. The results of the tests are used to adjust the settings of the Eddy currents to maximise and recover more metals out of the IBA when possible and process a higher quality and cleaner aggregate (low quantities of metals in the aggregate improve the quality of the aggregate).

Rock Solid also sends regular samples of IBAA to external laboratories to test its chemical properties and assess the following:

- Conformance to the requirements of applicable aggregate standards for bound and unbound end uses (e.g. BS EN 13242 and BS-EN 12620).
- Potential environmental impact of its intended bound and unbound end uses (e.g. pipe bedding, road sub-base, concrete).

Table 4 IBA treatment air emissions monitoring

Parameter	Standards	Minimum Monitoring Frequency	BAT-AEL
Dust	EN 13284-1	Once every year	2-5 mg/Nm^3

8.6 Emergency Planning

The EMS and Noise and Vibration and Management Plan (NVMP) will have detailed Emergency plans these plans are reviewed at least every two years or sooner following any incident.

Drills are undertaken regularly at least every 6 months to test emergency procedures and ensure staff are confident of the actions to take in the event of an emergency. All drills are documented and any problems highlighted are used to review the procedures if necessary

9 WASTE RECOVERY OR DISPOSAL

Rock Solid Processing Limited are committed to pushing the wastes they handle and produce as far up the waste hierarchy as possible and the specialisation in low volumes of difficult to handle wastes has given a particular emphasis to this ethos.

The company record and analyse all energy use and have policies and procedures in place which emphasise the need to avoid unnecessary use and to identify savings and efficiencies, meeting the requirements of S5.06 Section 2.7 as shown Table 5 Energy use

10 RAW MATERIALS AND JUSTIFICATIONS

Table 5 Energy use

Schedule 1 activity	Description of raw material and composition of raw material	Maximum amount daily	Annual throughput	Description of how raw material is used including main hazards	Justification for use (Form B3 Q6d)	Reducing waste arising from raw materials
Section 5.4(a) (iv) and (b) (iii) -non-hazardous waste installation – treatment of slags and ashes.	Electricity	Unknown as new site will be monitored for first year to identify.	Unknown as new site will be monitored for first year to identify.	No hazards associated other than slips, trips, falls etc.	Treating waste for further recovery to reduce waste to landfill.	N/A
S5.4 A(1) (b) (ii) Disposal of non-hazardous waste with a capacity exceeding 50 tonnes per day involving physico-chemical treatment	Electricity	Unknown as new site will be monitored for first year to identify.	Unknown as new site will be monitored for first year to identify.	No hazards associated other than slips, trips, falls etc.	Treating waste for further recovery to reduce waste to landfill.	N/A
Directly Associated Activity						
Storage and handling of waste	Electricity/Diesel	Unknown as new site will be monitored for first year to identify.	Unknown as new site will be monitored for first year to identify.	No hazards associated other than slips, trips, falls etc.	Treating waste for further recovery to reduce waste to landfill.	N/A
Blending of Incinerator Bottom Ash Aggregate (IBAA).	Electricity/Diesel	Unknown as new site will be monitored for first year to identify.	Unknown as new site will be monitored for first year to identify.	No hazards associated other than slips, trips, falls etc.	Treating waste for further recovery to reduce waste to landfill.	N/A

Raw material storage	Electricity/Diesel	Unknown as new site will be monitored for first year to identify.	Unknown as new site will be monitored for first year to identify.	No hazards associated other than slips, trips, falls etc.	Treating waste for further recovery to reduce waste to landfill.	N/A

11 CLOSURE AND DECOMMISSIONING

11.1 Site Condition Report

A Site Condition Report (SCR) has been produced as part of this application, site condition report 010.1_05_007.

11.2 Decommissioning Plan

A Decommissioning Plan has been prepared meeting S5.06 section 2.11 and is shown below. The plan follows the general principles as detailed below:

- If the site is to be dismantled all equipment, buildings etc. will be disposed of having full regard to the waste hierarchy.
- Buildings and pipe work will be checked and any infrastructure likely to contain asbestos material will be inspected and removed only using suitably authorised contractors.
- The dismantling and re-use of the majority of the equipment through sale to interested third parties the remainder to be scrapped; and
- The scrapping of the majority of the equipment probably through a single contractor with only a small proportion salvaged for re-use at some point in the overall process.

11.3 Sequence of Decommissioning

Final use, after the final transfer of waste has been despatched from the site, electrical systems will be isolated and locked off leaving only lighting and what circuits are considered necessary for on-going inspection and maintenance in place. All systems will be double checked and labelled to ensure there are no unmarked live systems on the site.

The drainage system and water supply will remain intact.

Dismantling - In line with the waste hierarchy efforts will be made to seek a buyer for all the plant and equipment. Either as a whole or in suitable lots.

Scrapping - If no suitable parties are found to purchase the plant it will be scrapped, again either as a whole or in suitable lots.

After plant has been removed - The whole internal area will be subject to a thorough inspection testing remaining electrical circuits labelling testing.

Deep cleaning the building, floors and removing all residues off-site to a suitably permitted facility.

11.4 Monitoring

Throughout the period of decommissioning the plant and building will be checked at least weekly when dismantling work is not being undertaken and daily when it is. Checks will ensure the integrity of the site surface is being maintained and the risk of spillage or pollution is being kept to a minimum. Contractors will be required to make

their own checks and make these available during such checks. Once plant has been removed periodic checking will be carried out giving regard to the risk if any the use of the area may pose.

11.5 Permit Surrender

If the permit is to be surrendered a scheme of sampling and analysis of the soil beneath the site maybe undertaken if during communications with the EA it is deemed required.

If analyses show any contamination to be present which would interfere with the succeeding use of the site this will be removed or treated to bring the round/groundwater into an acceptable condition for the surrender of the permit and completion of the SCR to the satisfaction of the EA or the relevant regulatory body at that juncture.

12 ENVIRONMENTAL PERMITTING REGULATIONS

The permit application meets all aspects of the EPR by virtue of being part site application and part installation application.

The site is subject to a planning application which will give due consideration to all local and national planning policies in relation to waste disposal and recycling /recovery.

Meeting the requirements of S5.06 Section 4.2

13 HABITATS

There is an designated HABITAT which has been assessed in the Environmental Risk Assessment (ERA). With mitigation in place impact should be LOW. See ERA 016.1_05_002 activity risk tables 1- 4.

New Ferry SSSI

"The site is in Unfavourable Recovering due to declines in Pintail by more than 50% compared to numbers at designation. Further investigation is required to understand decline in Pintail numbers across the whole estuary, however, historically New Ferry supported healthy numbers of Pintail. The mudflats within this unit provides an important feeding habitat for redshank, black-tailed godwit, curlew, dunlin, ringed plover and oystercatcher which feed here at low tide and roost on the exposed mudflats. There is no net loss of mudflat extent in this unit. Mudflat comprises of fine sand with a large expanse of mud at northern end of the shore. There is an increased cover of Spartina in the upper shore in this unit. Further surveys are required to monitor changes in mudflat/sandflat habitat."

Table 6 BAT Assessment

BAT No.	Topic	Brief Description	BAT	BAT-AEL	Operating to BAT?	BAT-AEL derogation needed?	Comments
1	Environmental Management System (EMS)	In order to improve the overall environmental performance, BAT is to implement and adhere to an environmental management system (EMS)	Implement and adhere to an EMS that incorporates key features identified	N/A	Yes	No	The organisation currently operates according to a Management System. Rock Solid Processing Limited also operate to the requirements of ISO 14001 which this site will be encompassed by. The key features of the Management system are described in the EMS 016.1_05_002
2	Improve the overall environmental performance of the plant	In order to improve the overall environmental performance of the plant, BAT is to use all of the techniques given below	a. Set up and implement waste characterisation and pre-acceptance procedures b.Set up and implement waste acceptance procedures c. Set up and implement a waste tracking system and inventory d. Set up and implement an output quality management system	N/A	Yes	No	Waste acceptance limited to approved contractors and pre booked deliveries from source sites see 016.1_05_002 (EMS). See Rock Solid Code of Practice IBAA UK (Appendix B Code of Practice IBAA UK).The only waste to be accepted on site for processing is IBA from Energy from Waste (EfW) facilities burning municipal waste, which has been proved to be non-hazardous under the Environmental Services Association (ESA) “A

BAT No.	Topic	Brief Description	BAT	BAT-AEL	Operating to BAT?	BAT-AEL derogation needed?	Comments
			e. Ensure waste segregation				Sampling and Testing Protocol to Assess the Status of Incinerator Bottom Ash" (ESA Protocol). Only two waste streams is accepted on site EWC 19 01 12 and 19 12 12, no further need for segregation. Monitoring of water discharge from site at the leachate plant as required. Technical Description and BAT assessment document, ref. 016.1_05_004.
3	Emissions to water and air	Techniques to facilitate the reduction of emissions to water and air.	Establish and to maintain an inventory of waste water and waste gas streams, as part of the environmental management system.	N/A	Yes	No	Control of leachate from the waste storage is achieved by a leachate treatment plant which discharges in to local foul sewer under a trade effluent consent (TEC) after it has under gone treatment shown in 016.1_05_002 EMS section 9.2. and section 5.4 in 016.1_05_004 BAT Assessment Emissions of odour is not associated with these two waste streams and is controlled by general procedures in the EMS and the EMP as well as described in the BAT Assessment.

BAT No.	Topic	Brief Description	BAT	BAT-AEL	Operating to BAT?	BAT-AEL derogation needed?	Comments
4,5	Storage of waste, handling and transfer procedures	Reduce the environmental risk associated with the storage, handling and transfer of waste , use all of the techniques given.	a. Optimised storage locations; b. Adequate storage capacity; c. Safe storage operation; d. Separate area for storage and handling of packaged hazardous waste. Set up and implement handling and transfer procedures	N/A	Yes	No	The IBA will be delivered to the site tipped and stored on a impermeable surface with a sealed drainage system. Any leachate generated by rainfall will be caught on the impermeable site surface and directed to the sealed drainage system for treatment in the leachate treatment plant. All Metals will either be stored in a container on the impermeable site surface or in clearly designated bays. The storage areas for IBA and IBAA will be outside. This storage area will be served by a dust suppression system to dampen the surface area during periods of dry weather or during activities which may increase the risk of dust occurring. The IBA undergoes quenching at the point of production and, as a result, is delivered to the site slightly damp, thus limiting potential for dust release. The sites EMP will be implemented to manage the risk of dust occurring from the activities.

BAT No.	Topic	Brief Description	BAT	BAT-AEL	Operating to BAT?	BAT-AEL derogation needed?	Comments
							Application of water to waste will be limited in order to reduce leachate. The IBA and IBAA when dampened in a controlled manner will create a cementation layer 'crust' that prevents dust being generated. The IBA treatment process involves a crushing, sieving/grading, magnet and eddy current separators to recover metals and produce a quality aggregate. Hand sorting is also used to pick out further unburnt pieces which are sent back to the EfW facility of origin for further combustion to minimise waste generation. All metals extracted from the process are stored in containers on the concrete surface. The amount of unburnt material is no more than 5 % and on average will be less than 1 %. The treatment process will be controlled to ensure the best recovery and resultant quality of the output material. This will be controlled on a daily basis with typically 75% recovery of

BAT No.	Topic	Brief Description	BAT	BAT-AEL	Operating to BAT?	BAT-AEL derogation needed?	Comments
							the non-ferrous and 90% recovery of the ferrous metals.
6, 7	Water monitoring	Monitoring of emissions to water	Monitoring of key parameters at key locations for relevant emissions to water as identified by the inventory of waste water streams	N/A	Yes	**Not applicable** to the process.	
8	Air monitoring	Monitoring of channelled emissions to air	Monitor channelled emissions to air with at least the frequency given, and in accordance with EN standards or ISO, national or other international standards of an equivalent scientific quality	N/A	Yes	**Not applicable** to the process.	
9	Air monitoring	Monitoring of diffused emissions to air	Emissions of organic compounds to air from the regeneration of spent solvents, the decontamination of equipment containing POPs with solvents, and the physico-	N/A	Yes	**Not applicable** to the process.	

BAT No.	Topic	Brief Description	BAT	BAT-AEL	Operating to BAT?	BAT-AEL derogation needed?	Comments
			chemical treatment of solvents for the recovery of their calorific value.				
10	Odour emission	Monitoring of odour emissions	Monitoring of odour emissions using EN or ISO standards are the specified frequency	N/A	Yes -	No	IBA and IBAA are not considered to be malodorous or offensive. The waste pre-acceptance and acceptance procedures in place ensure that only IBA is accepted for treatment at the facility. The Environmental Risk Assessment, ref. 016.1_05_003 did not identify odour as a significant risk. The following odour management risk measures are in place: -Leachate treated on site and disposed of to foul drainage via a TEC. -All vehicles, plant and machinery will be operated and maintained in accordance with manufacturer's specifications or annually whichever is more frequent.
11	Annual monitoring of resource consumption	Annual consumption of water, energy and raw materials as well as the annual	Direct measurements, calculation or recording, e.g. using suitable meters or invoices	N/A	Yes	No	Raw materials to be used at the installation will be the following: Fuel for the mobile plant and

BAT No.	Topic	Brief Description	BAT	BAT-AEL	Operating to BAT?	BAT-AEL derogation needed?	Comments
		generation of residues and waste water.					vehicles; All equipment is periodically inspected in accordance with manufacturers' guidelines and manuals. This will ensure that the equipment operate efficiently, minimising the consumption of raw materials. Site and equipment maintenance are described in Section 15.8 of the 016.1_05_002 (EMS)
12, 13, 14	Emission to air	Prevent and reduce odour emissions and diffuse emission to air .	To prevent or, where that is not practicable, to reduce odour emissions, set up, implement and regularly review an odour management plan, and implement BAT techniques given.	N/A	Yes	No	IBA and IBAA are not considered to be malodorous or offensive. The waste pre-acceptance and acceptance procedures in place ensure that only IBA is accepted for treatment at the facility. The Environmental Risk Assessment, ref. 016.1_05_003 did not identify odour as a significant risk. The following odour management risk measures are in place: - Leachate treated on site and disposed of to foul drainage via a TEC -All vehicles, plant and

BAT No.	Topic	Brief Description	BAT	BAT-AEL	Operating to BAT?	BAT-AEL derogation needed?	Comments
							machinery would be operated and maintained in accordance with manufacturer's specifications or annually whichever is more frequent.
15, 16	Use of flaring	Avoid use of flaring and reduction of emission to air when using.	Avoid use of flaring and reduction of emission to air when using.	N/A	Yes	**Not applicable** to the process	
17, 18	Noise and Vibrations	Prevention and reduction of noise and vibration emissions.	Implement and regularly review a noise and vibration management plan. Use one of the given techniques for noise reduction.	N/A	Yes	No	The following noise management risk measures are in place: - Plant and equipment is inspected and maintained in line with manufacturer's recommendations. - Site speed limit (10 mph). - Comply with permitted operational hours in planning. See Noise and Vibration Management plan for mitigation, ref. 016.1_05_006 did not identify Noise as a significant risk.
19	Emissions to water	Optimisation of water consumption and prevention of emissions to soil and water.	a. Water management; b. Water recirculation; c. Impermeable surfaces; d. Reduce impact from overflows and failures;	N/A	Yes	No	In order to prevent emissions to soils and waters, the following risk management measures are in place: - Leachate collected via an

BAT No.	Topic	Brief Description	BAT	BAT-AEL	Operating to BAT?	BAT-AEL derogation needed?	Comments
			e. Roofing of waste storage and treatment areas; f. Segregation of water streams; g. Adequate drainage infrastructure; h. Detection and repair of leaks; i. Appropriate buffer storage capacity.				sealed drainage system and impermeable site surface. - Leachate treated on site and disposed of to foul drainage via a TEC - Fuel/oil storage is in accordance with the Oil Storage Regulations and provided with secondary containment. All stored within security perimeter. - SOPs and training provided to all relevant staff. - Limited vehicle movements on site. - Spill kits on site and employees are trained in their use and disposal. The 016.1_05_002 EMS contains descriptions of impermeable surfaces and drainage infrastructures of the site.
20	Emissions to water	Water treatment according to pollutant targeted	Treat waste water using an appropriate combination of the given techniques.	N/A	Yes	No	No point source emission to water.

BAT No.	Topic	Brief Description	BAT	BAT-AEL	Operating to BAT?	BAT-AEL derogation needed?	Comments
21	Emissions from accidents and incidents	Prevent or limit the environmental consequences of accidents and incidents	Use techniques given as part of the accident management plan.	N/A	Yes	No	In order to prevent emissions to soils and waters, the following risk management measures are in place: - All vehicles delivering and collecting materials to/from the site are sealed containerised and sheeted. - All waste transfers are overseen by a competent person. - All waste stored on an impermeable site surface and with a sealed drainage system. - Fuel/oil storage is in accordance with the Oil Storage Regulations and provided with secondary containment. All stored within security perimeter. - SOPs and training provided to all relevant staff. - Limited vehicle movements on site. - Spill kits on site and employees are trained in their use and disposal. The Environmental Risk Assessment 016.1_05_003 contains details of the incident

BAT No.	Topic	Brief Description	BAT	BAT-AEL	Operating to BAT?	BAT-AEL derogation needed?	Comments
							risk management measures. The 016.1_05_002 EMS contains descriptions of impermeable surfaces and drainage infrastructures of the site.
22	Material efficiency	Use materials efficiently	Substitute materials with waste	N/A	Yes	No	Raw materials to be used at the installation will be the following: • Fuel for the mobile plant and vehicles All equipment is periodically inspected in accordance with manufacturers' guidelines and manuals. This will ensure that the equipment operate efficiently, minimising the consumption of raw materials. Site and equipment maintenance are described in Section 15.8 of the 016.1_05_002 EMS
23	Energy Efficiency	Use energy efficiently	a. Energy efficiency plan; b. Energy balance record.	N/A	Yes	No	To ensure energy efficiency, all plant and machinery is operated and maintained in accordance with manufacturer's specifications or annually whichever is more frequent. Due to the scale of the

BAT No.	Topic	Brief Description	BAT	BAT-AEL	Operating to BAT?	BAT-AEL derogation needed?	Comments
							operations the energy consumption is relatively low. Should opportunities for energy saving arise, these would be considered and implemented and the energy saving documented.
24	Reuse of packaging	Reduce the quantity of waste sent for disposal	Maximise the reuse of packaging	N/A	Yes	**Not applicable** to the process	
25	Emission to air	In order to reduce emissions to air of dust BAT is to apply BAT 14d and to use one or a combination of the techniques given below.	d. Water injection into the shredder	N/A	Yes	No	The process of IBA crushing and sieving may generate dust. Small amounts of water are used in the process to dampen the IBAA resulting from the process and avoid diffuse dust emissions. All processing occurs inside.
26 - 32	Emissions to air, Mechanical treatment in shredders of metal waste, Treatment of WEEE containing VFCs and/or VHCs: emissions to air, Treatment of WEEE containing VFCs and/or VHCs:Explosions, BAT conclusions for the mechanical treatment of	Reduce emissions to air of dust, Improve the overall environmental performance, reduce emissions of organic compounds to air, Prevent emissions due to explosions, reduce emissions to	Apply BAT and use one or a combination of the techniques given.	N/A	Yes	**Not applicable** to the process.	

BAT No.	Topic	Brief Description	BAT	BAT-AEL	Operating to BAT?	BAT-AEL derogation needed?	Comments
	waste with calorific value, BAT conclusions for the mechanical treatment of WEEE containing mercury	air of organic compounds.					
33-39	Overall environmental performance	Reduce odour emissions and to improve the overall environmental performance, BAT is to select the waste input. Carry out the pre- acceptance, acceptance and sorting of the waste input (see BAT 2)	Ensure the suitability of the waste input for the waste treatment, e.g. in terms of nutrient balance, moisture or toxic compounds which may reduce the biological activity.	N/A	Yes	**Not applicable** to the process.	
40	Overall environmental performance	In order to improve the overall environmental performance, BAT is to monitor the waste input as part of the waste pre-acceptance and acceptance procedures	Monitoring the waste input, e.g. in terms of: — content of organics, oxidising agents, metals (e.g. mercury), salts, odorous compounds; — H2 formation potential upon mixing of flue-gas treatment residues, e.g. fly ashes, with water.	N/A	Yes	No	The waste to be accepted at the site are those set out in 016.1_05_009 List of Waste. The permit holder will only accept those wastes that comply with the permit. Non-conforming loads will be rejected. Waste is pre booked and assessed and only comes from pre approved clients. Incoming waste will be brought to the site by customers own vehicles but will be pre booked in to ensure compliance with waste

BAT No.	Topic	Brief Description	BAT	BAT-AEL	Operating to BAT?	BAT-AEL derogation needed?	Comments
							acceptance. Each load would be subject to strict acceptance criteria and would be inspected prior to being stored prior to treatment. The waste acceptance procedure will incorporate all requirements of the Duty of Care, include the address/location and identity of the producer, the physical appearance of the waste, the amount of waste being accepted and an identifiable EWC Code however will take the form of an annual transfer note as only pre approved contracted suppliers of waste will enter site.
41	Emissions to air	In order to reduce emissions of dust, organic compounds and NH3 to air, BAT is to apply BAT 14d and to use one or a combination of the techniques given	a. Adsorption; b. Biofilter; c. Fabric filter; d. Wet scrubbing	N/A	Yes	No	The process of IBA crushing and sieving may generate dust. Small amounts of water are used in the process to dampen the IBAA resulting from the process and avoid diffuse dust emissions. No channelled emission to air are generated form site. See 016.1_05_005 EMP

BAT No.	Topic	Brief Description	BAT	BAT-AEL	Operating to BAT?	BAT-AEL derogation needed?	Comments
42,44	BAT conclusions for the re-refining of waste oil	In order to improve the environmental performance, BAT is to monitor the waste input as part of the waste pre-acceptance and acceptance procedures and reduce emissions of organic compounds to air	Monitoring of the waste input in terms of content of chlorinated compounds (e.g. chlorinated solvents or PCBs). Use of material and energy recovery techniques.	N/A	Yes	**Not applicable** to the process.	
45	physico-chemical treatment of waste with calorific value	reduce emissions of organic compounds to air,	a. Adsorption; b. Cryogenic condensation; c. Thermal oxidation; d. Wet scrubbing	N/A	Yes	**Not applicable** to the process.	
46, 47	regeneration of spent solvents	improve the overall environmental performance and reduce emissions to air	a. Material recovery; b. Energy recovery a. Recirculation; b. Adsorption c. Thermal oxidation; d. Condensation or cryogenic condensation;. e. Wet scrubbing	N/A	Yes	**Not applicable** to the process.	
48, 49	thermal treatment of spent activated carbon, waste catalysts and excavated contaminated soil	improve the overall environmental performance and reduce emissions to air	a. Cyclone See Section; b. Electrostatic precipitator (ESP); c. Fabric filter; d. Wet scrubbing; e.	N/A	Yes	**Not applicable** to the process.	

BAT No.	Topic	Brief Description	BAT	BAT-AEL	Operating to BAT?	BAT-AEL derogation needed?	Comments
			Adsorption; f. Condensation; g. Thermal oxidation				
50	water washing of excavated contaminated soil	Reduce emissions to air	a. Adsorption; b. Fabric filter; c. Wet scrubbing	N/A	Yes	**Not applicable** to the process.	
51	decontamination of equipment containing PCBs	Improve the overall environmental performance and reduce channelled emissions	a. Coating of the storage and treatment areas; b. Implementation of staff access rules to prevent dispersion of contamination; c. Optimised equipment cleaning and drainage; d. Control and monitoring of emissions to air; e. Disposal of waste treatment residues f. Recovery of solvent when solvent washing is used Organic solvent is collected and distilled to be reused in the process.	N/A	Yes	**Not applicable** to the process.	

BAT No.	Topic	Brief Description	BAT	BAT-AEL	Operating to BAT?	BAT-AEL derogation needed?	Comments
52, 53	Overall environmental performance and emission to air	Monitor key process parameters for emissions to air and water specified in the corresponding tables.	Monitoring of specified process parameters.	N/A	Yes	**Not applicable** to the process.	
1	Environmental Management System (EMS)	In order to improve the overall environmental performance, BAT is to implement and adhere to an environmental management system (EMS)	Implement and adhere to an EMS that incorporates key features identified	N/A	Yes	No	The organisation currently operates according to a Management System. Rock Solid Processing Limited have implemented an Environmental Management Rock Solid Processing Limited also operate to the requirements of ISO 14001 which this site will be encompassed by The key features of the Management system are described in the 016.1_05_002 EMS
2	BAT is to determine either the gross electrical efficiency, the gross energy efficiency, or the boiler efficiency of the incineration plant as a whole or of all the relevant parts of the incineration plant.	In the case of a new incineration plant or after each modification of an existing incineration plant that could significantly affect the energy efficiency, the gross electrical efficiency, the gross energy efficiency, or	Apply BAT and use one or a combination of the techniques given.	N/A	Yes - compliant now	**Not Applicable** to the process	

BAT No.	Topic	Brief Description	BAT	BAT-AEL	Operating to BAT?	BAT-AEL derogation needed?	Comments
		the boiler efficiency is determined by carrying out a performance test at full load. In the case of an existing incineration plant that has not carried out a performance test, or where a performance test at full load cannot be carried out for technical reasons, the gross electrical efficiency, the gross energy efficiency, or the boiler efficiency can be determined taking into account the design values at performance test conditions. For the performance test, no EN standard is available for the determination of the boiler efficiency of incineration plants. For grate-fired incineration plants,					

BAT No.	Topic	Brief Description	BAT	BAT-AEL	Operating to BAT?	BAT-AEL derogation needed?	Comments
		the FDBR guideline RL 7 may be used					
3	BAT is to monitor key process parameters relevant for emissions to air and water including those given below.	Emission from process	Apply BAT and use one or a combination of the techniques given.	N/A	Yes	**Not Applicable** to the process	
4	Emissions	BAT is to monitor channelled emissions to air with at least the frequency given below and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.	Apply BAT and use one or a combination of the techniques given.	N/A	Yes	**Not Applicable** to the process	
5	Monitoring Emissions	The monitoring can be carried out by direct emission measurements (e.g. for the pollutants that are monitored	Apply BAT and use one or a combination of the techniques given.	N/A	Yes	**Not Applicable** to the process	

BAT No.	Topic	Brief Description	BAT	BAT-AEL	Operating to BAT?	BAT-AEL derogation needed?	Comments
		continuously) or by monitoring of surrogate parameters if this proves to be of equivalent or better scientific quality than direct emission measurements. Emissions during start- up and shutdown while no waste is being incinerated, including emissions of PCDD/F, are estimated based on measurement campaigns, e.g. every three years, carried out during planned start-up/shutdown operations.					
6	Monitoring Emissions	BAT is to monitor emissions to water from FGC and/or bottom ash treatment with at least the frequency given below and in accordance with EN standards. If EN standards are not available, BAT is to	Emissions to water, Bottom ash treatment	N/A	Yes	Yes	The organisation currently operates according to a Management System. Rock Solid Processing Limited have also implemented an Environmental Management System to the requirements of ISO 14001 which this site will work towards certification. Waste acceptance limited to

BAT No.	Topic	Brief Description	BAT	BAT-AEL	Operating to BAT?	BAT-AEL derogation needed?	Comments
		use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.					approved contractors and pre booked deliveries from source sites see 016.1_05_002 EMS. Only two waste streams are accepted on site EWC 19 01 12 and 19 12 12, no further need for segregation. See Rock Solid Code of Practice IBAA UK app A 016.1_05_004 BAT Assessment. assessment) : the code of practice ensure that the quality if the IBAA produced from IBA fulfils the technical requirements for the specific purposes and meets the existing legislation and standards applicable to products, and use of IBAA will not lead to overall adverse environmental or human health impacts. Technical Description and 016.1_05_004 BAT Assessment.
7	Monitoring Emissions	BAT is to monitor the content of unburnt substances in slags and bottom ashes at the incineration plant	Monitor unburnt material	N/A	Yes - compliant by 31/07/2022	No	Any unburnt material received by site will be returned to producer. Maximum of 5 % expected on average 1% is expected to be present.

BAT No.	Topic	Brief Description	BAT	BAT-AEL	Operating to BAT?	BAT-AEL derogation needed?	Comments
		with at least the frequency given below and in accordance with EN standards.					
8	Monitoring Emissions	For the incineration of hazardous waste containing POPs, BAT is to determine the POP content in the output streams (e.g. slags and bottom ashes, flue-gas, waste water) after the commissioning of the incineration plant and after each change that may significantly affect the POP content in the output streams.	Apply BAT and use one or a combination of the techniques given.	N/A	Yes	**Non Applicable** to this process.	
9	General environmental and combustion performance	BAT 9. In order to improve the overall environmental performance of the incineration plant by waste stream management (see BAT 1), BAT is to use all of the techniques (a) to (c) given below,	Apply BAT and use one or a combination of the techniques given.	N/A	Yes	**Non Applicable** to this process.	

BAT No.	Topic	Brief Description	BAT	BAT-AEL	Operating to BAT?	BAT-AEL derogation needed?	Comments
		and, where relevant, also techniques (d), (e) and (f).					
10	General environmental and combustion performance	In order to improve the overall environmental performance of the bottom ash treatment plant, BAT is to include output quality management features in the EMS (see BAT 1).	Waste acceptance	N/A	Yes	No	Waste acceptance limited to approved contractors and pre booked deliveries from source sites see 016.1_05_002 EMS. See Rock Solid Code of Practice IBAA UK (appendix A).The waste to be accepted at the site are those set out in 016.1_05_009 List of Waste. The only waste to be accepted on site for processing is IBA from Energy from Waste (EfW) facilities burning municipal waste, which has been proved to be non-hazardous under the Environmental Services Association (ESA) "A Sampling and Testing Protocol to Assess the Status of Incinerator Bottom Ash" (ESA Protocol). The code of practice ensure that the quality if the IBAA produced from IBA fulfils the technical requirements for the specific

BAT No.	Topic	Brief Description	BAT	BAT-AEL	Operating to BAT?	BAT-AEL derogation needed?	Comments
							purposes and meets the existing legislation and standards applicable to products, and use of IBAA will not lead to overall adverse environmental or human health impacts.
11	General environmental and combustion performance	In order to improve the overall environmental performance of the incineration plant, BAT is to monitor the waste deliveries as part of the waste acceptance procedures (see BAT 9 c) including, depending on the risk posed by the incoming waste, the elements given below.	Apply BAT and use one or a combination of the techniques given.	N/A	No	**Not Applicable** to this process.	
12	General environmental and combustion performance	In order to reduce the environmental risks associated with the reception, handling and storage of waste, BAT is to use both of the techniques given below.	Waste Storage	N/A	Yes	No	Waste will be stored on an impermeable site surface and serviced by an sealed drainage system. Waste quantities stored will be according to the site Environmental Permit.

BAT No.	Topic	Brief Description	BAT	BAT-AEL	Operating to BAT?	BAT-AEL derogation needed?	Comments
13	General environmental and combustion performance	In order to reduce the environmental risk associated with the storage and handling of clinical waste, BAT is to use a combination of the techniques given below.	Apply BAT and use one or a combination of the techniques given.	N/A	Yes	**Not Applicable** to this process.	
14	General environmental and combustion performance	In order to improve the overall environmental performance of the incineration of waste, to reduce the content of unburnt substances in slags and bottom ashes, and to reduce emissions to air from the incineration of waste, BAT is to use an appropriate combination of the techniques given below.	Apply BAT and use one or a combination of the techniques given.	N/A	Yes	**Not Applicable** to this process.	
15, 16, 17	General environmental and combustion performance	In order to improve the overall environmental performance of the incineration plant and to reduce emissions	Apply BAT and use one or a combination of the techniques given.	N/A	Yes	**Not Applicable** to this process.	

BAT No.	Topic	Brief Description	BAT	BAT-AEL	Operating to BAT?	BAT-AEL derogation needed?	Comments
		to air, BAT is to set up and implement procedures for the adjustment of the plant's settings, improve supply chains, appropriately designed waste water systems.					
18	General environmental and combustion performance	In order to reduce the frequency of the occurrence of OTNOC and to reduce emissions to air and, where relevant, to water from the incineration plant during OTNOC, BAT is to set up and implement a risk-based OTNOC management plan as part of the environmental management system (see BAT 1)	Apply BAT and use one or a combination of the techniques given.	N/A	Yes	**Not Applicable** to this process.	
19, 20	Energy Efficiency	Improve resource efficiency of plant and energy efficiency of the plant.	Apply BAT and use one or a combination of the techniques given.	N/A	Yes	**Not Applicable** to this process.	

BAT No.	Topic	Brief Description	BAT	BAT-AEL	Operating to BAT?	BAT-AEL derogation needed?	Comments
21, 22, 23, 24	Emissions to air	Diffuse Emissions	Apply BAT and use one or a combination of the techniques given.	N/A	Yes	**Not Applicable** to this process.	
25	Emissions to air	Diffuse Emissions	Apply BAT and use one or a combination of the techniques given.	N/A	Yes	**Not Applicable** to this process.	
26	Emissions to air	Diffuse Emissions	Apply BAT and use one or a combination of the techniques given.	N/A	Yes	**Not Applicable** to this process.	
27	Emissions to air	Diffuse Emissions	Apply BAT and use one or a combination of the techniques given.	N/A	Yes	**Not Applicable** to this process.	
28	Emissions to air	Diffuse Emissions	Apply BAT and use one or a combination of the techniques given.	N/A	Yes	**Not Applicable** to this process.	
29	Emissions to air	Diffuse Emissions	Apply BAT and use one or a combination of the techniques given.	N/A	Yes	**Not Applicable** to this process.	
30	Emissions to air	Reduced channelled emissions to incinerator water	Apply BAT and use one or a combination of the techniques given.	N/A	Yes	**Not Applicable** to this process.	

BAT No.	Topic	Brief Description	BAT	BAT-AEL	Operating to BAT?	BAT-AEL derogation needed?	Comments
31	Emissions to air	Reduced channelled mercury emissions to air	Apply BAT and use one or a combination of the techniques given.	N/A	Yes	**Not Applicable** to this process.	
32	Emissions to Water	Reduce contamination of water and reduce emissions to water.	Waste water streams (e.g. surface run- off water, cooling water, waste water from flue-gas treatment and from bottom ash treatment, drainage water collected from the waste reception, handling and storage areas (see BAT 12 (a)) are segregated to be treated separately based on their characteristics and on the combination of treatment techniques required. Uncontaminated water streams are segregated from waste water streams that require treatment. When recovering hydrochloric acid and/or gypsum from the scrubber's	N/A	Yes	No	Impermeable site surface provided for storage areas, Sealed drainage system. Leachate collected via an sealed drainage system and impermeable site surface. Leachate treated on site and disposed of to foul drainage via a TEC.

BAT No.	Topic	Brief Description	BAT	BAT-AEL	Operating to BAT?	BAT-AEL derogation needed?	Comments
			effluent, the waste waters arising from the different stages (acidic and alkaline) of the wet scrubbing system are treated separately				
33	Emissions to Water	Reduce use of water in incineration process.	Apply BAT and use one or a combination of the techniques given.	N/A	Yes	**Not Applicable** to this process.	
34	Emissions to Water	Treatment of leachate	Preliminary and primary treatment Physico-chemical treatment Final solids removal	N/A	Yes	No	The leachate from the site run off is stored and processed on site in the leachate treatment plant prior to being discharged to the foul drainage system via a TEC.
35	Material efficiency	Treat IBA Separately	In order to increase resource efficiency, BAT is to handle and treat bottom ashes separately from FGC residues.	N/A	Yes	No	Tow waste stream to be accepted at site EWC 19 01 12 and 19 12 12 See List of Wastes 016.1_05_009. Waste acceptance controlled by 016.1_05_002 EMS
36	Material efficiency	Treat IBA	a. Screening and sieving b. Crushing c. Aeraulic separation d. Recovery of ferrous and non-ferrous metals e. Ageing f. Washing	N/A	Yes	No	Processing of IBA in to IBAA and removal of ferrous and non-ferrous materials covered in Rock Solid Code of Practice IBAA UK (appendix A of 016.1_05_004 BAT Assessment).

BAT No.	Topic	Brief Description	BAT	BAT-AEL	Operating to BAT?	BAT-AEL derogation needed?	Comments
37	Noise	Prevent or reduce noise emissions	a. Appropriate location of equipment and buildings b. . Operational measures c. Low-noise equipment d. Noise Attenuation e. Noise-control equipment/ infrastructure	N/A	Yes	No	Noise prevention and control measures described in 016.1_05_006 NVMP And 016.1_05_002 EMS

UMBRELLA ENVIRONMENTAL

PROTECTING YOUR BUSINESS

9 Goldington Road Bedford MK40 3JY

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andrew@umbrellaenvironmental.co.uk

Mob: 07498 671713

Drawings

River Mersey

N

Price's Way

0 50 100 m

Key:

Permit Boundary

Drawing Title: Permit Boundary

Ref: 016.1_09_001

Scale: 1:1400 (A3)

Date: 2022-11-30

Revison: REV A

Drawn By: AIL

Address: Rock Solid Processing Ltd, Bromborough South Dock

Changelog:
- N/A

RockSolid
FROM WASTE › TO VALUE

UMBRELLA ENVIRONMENTAL
PROTECTING YOUR BUSINESS

N

River Mersey

Museum

Fire Station

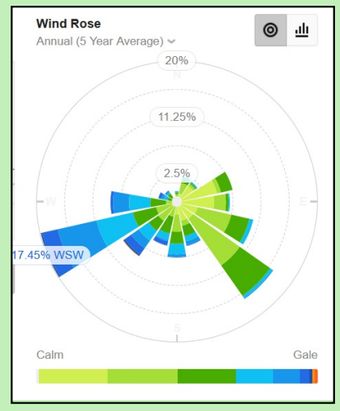
PO

Port Sunlight

0 250 500 m

Key:

- Permit Boundary
- 1 Km Buffer
- Heritage ID
- Non Designated Site ID
- Non Designated Site Area
- Critical Infrastructure ID
- Critical Infrastructure Area
- Designated Site ID
- Designated Site Area
- Commercial ID
- Commercial Area
- Recreational ID
- Recreational Areas
- Public Use ID
- Public Use Area
- Agricultural ID
- Agricultural Area
- Residential ID
- Residential Area



Drawing Title:	Sensitive Receptors 1 km
Ref:	016.1_09_002
Scale:	1:8500 (A3)
Date:	2022-11-30
Revison:	REV A
Drawn By:	AIL
Address:	Bromborough South Dock CH62 4RY

Changelog:
- N/A

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FROM WASTE › TO VALUE

Key:

- Permit Boundary
- 2 Km Buffer
- Heritage ID
- Non Designated Site ID
- Non Designated Site Area
- Critical Infrastructure ID
- Critical Infrastructure Area
- Designated Site ID
- Designated Site Area
- Commercial ID
- Commercial Area
- Recreational ID
- Recreational Areas
- Public Use ID
- Public Use Area
- Agricultural ID
- Agricultural Area
- Residential ID
- Residential Area

N

River Mersey

Museum

Sports/Leisure Centre

Sports/Leisure Centre

Bebington

Port Sunlight

Rock Ferry

Spital

PO

Wind Rose
Annual (5 Year Average)
20%
11.25%
2.5%
7.45% WSW
Calm
Gale

0 500 1,000 m

Drawing Title:	Sensitive Receptors 2 km
Ref:	016.1_09_003
Scale:	1:16000 (A3)
Date:	2022-11-30
Revison:	REV A
Drawn By:	AIL
Address:	Bromborough South Dock CH62 4RY

Changelog:
- N/A

RockSolid
FROM WASTE › TO VALUE

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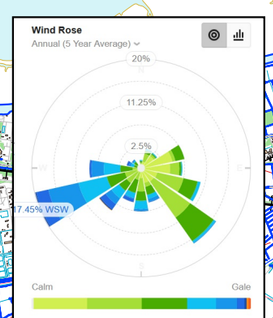
PROTECTING YOUR BUSINESS

River Mersey

1
2
3
4
5
6
7
8

N

0 2.5 5 km



Key:

- Permit Boundary
- 10 Km Buffer
- Designated Site ID
- Designated Site Area

Drawing Title: Sensitive Receptors 10 km

Ref: 016.1_09_004

Scale: 1:79895 (A3)

Date: 2022-11-30

Revison: REV A

Drawn By: AIL

Address:Bromborough South Dock CH62 4RY

Changelog:
- N/A

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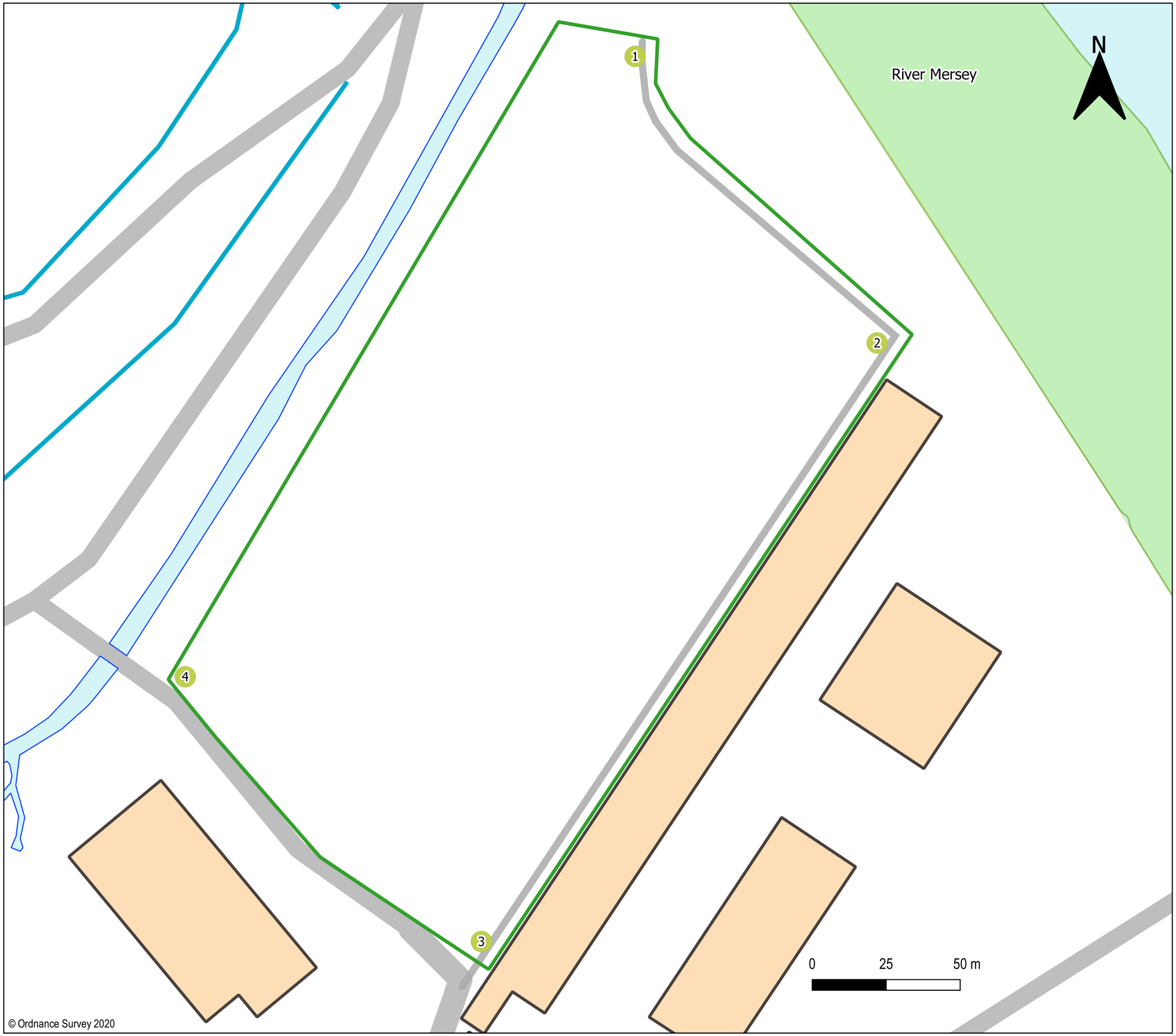

Key:

- Permit Boundary
- Monitoring Locations

Drawing Title: Monitoring Locations
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Scale: 1:1200 (A3)
Date: 2022-11-30
Revison: REV A
Drawn By: AIL
Address: Bromborough South Dock CH62 4RY

Changelog:
- N/A

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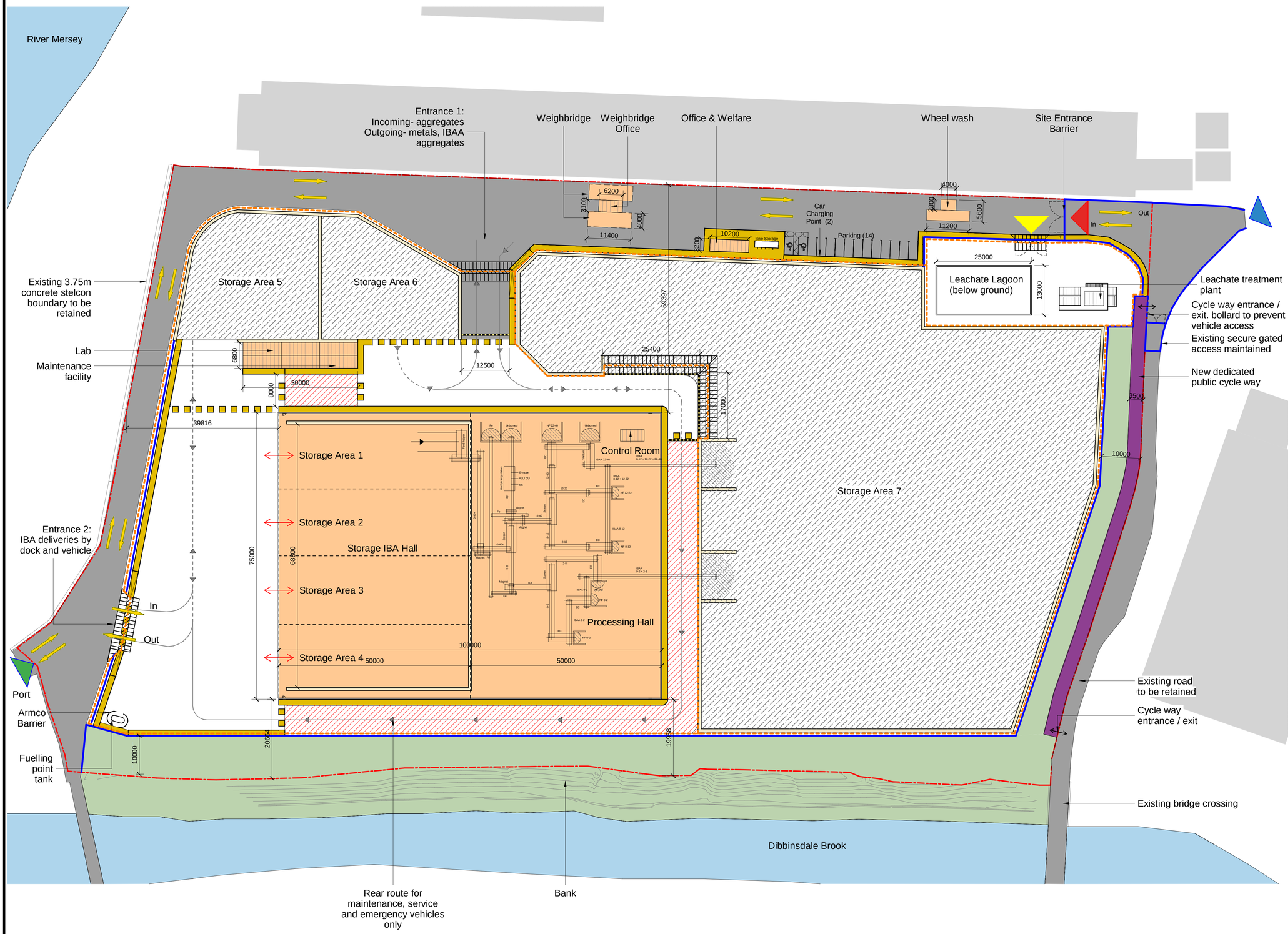

Notes

1. Do not scale from this drawing.
2. All dimensions are in millimetres unless otherwise stated.
3. This drawing is indicative only. This drawing is based upon information presented to Mott MacDonald for the purposes of RIBA Stage 2 Concept Design. Mott MacDonald are not responsible for the accuracy of the information. Any drawing errors or discrepancies should be brought to the attention of Mott MacDonald.
4. The designs shown are subject to detailed site survey, investigations, the CDM Regulations and the comments and/ or approval of various relevant Local Authority Officers, Statutory Undertakers, etc.
5. Any areas shown are approximate only and have been measured off preliminary drawings as the likely measured areas of the current design. These may be affected by future design development and construction tolerances.
6. This drawing is to be used for the purposes of assisting with design development and is not to be used for construction.
7. This drawing is to be read in conjunction with all relevant documents and drawings, including those from other disciplines.
8. No unauthorised use, disclosure, storage or copying.

Key to Symbols

- Site boundary
- Security fence
- Existing site entrance by road
- Existing site entrance from the port
- Service entrance to treatment plant
- Proposed building
- 3.8m high push walls (Legioblock)
- Storage areas
- Roadway
- Landscaping/ BNG zone
- Buildings adjacent to site
- Direction of travel
- 250mm high impermeable bund
- Entrance and exit to storage building
- New public cycle way
- 1.5m wide pedestraian path with 600mm armco type safety barriers
- River/ Brook
- Emergency/maintenance access
- Vehicle barrier
- Vehicle rollover bund

Reference Drawings

- IBA route through site: Ship - Storage Hall - Processing Hall - Processed - Remove Maximum metals - metals divided up into storage bays next to Storage Hall - IBA aggregates stored in large bays - Aggregate collected as required
- Stockpiles are approximately 8-10m high
- IBA is transferred from the Port to the Storage Hall by a 6-wheel industrial CAT dumper
- IBA is transferred from Storage Hall to Processing Hall by level load shovel truck
- IBA when transported by lorry has a typical load of about 30 tonnes per lorry, this would required an Arctic lorry measuring approximately 2.55m wide x 16.5m long, vehicle tracking has been carried out for the site
- Location of fire water tank and pumps to be confirmed

Rev	Date	Drawn	Description	Ch'k'd	App'd
P2	29/09/2022	CM	For Review and Comment	CB	DC
P1	22/09/2022	CM	For Review and Comment	CB	DC

Status Stamp

PLANNING

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W www.mottmac.com

Client

Covanta

Title

Bromborough Dock IBA Processing Facility
Proposed Site Block Plan

Designed	C.McLeod	LB	Eng. Check		
Drawn	C. McLeod	CM	Coordination	L. Baxter	LB
Dwg. Check	C.Beale	CB	Approved	D. Tetlow	DT

MMD Project Number	Scale at A1	Seq. Number	Security
100104167	1:500		STD

Suitability Description	Suit. Code
For Review and Comment	S3

Drawing Number	Rev
100104167-MMD-00-00-DR-A-1101	P2

1:500 0 25m 50m

Appendices

App A

Code of Practice on the quality and end-use of Incineration Bottom Ash Aggregate (IBAA) in Works

Rock Solid

Thinking Solid Solutions

Index

Inhoud

1. Introduction

This Code of Practice (CoP) is developed in order to implement a quality protocol system to ensure the quality of incinerator bottom ash aggregates (IBAA) Rock Solid is producing and a standard Rock Solid will use when IBAA is applied in its end-use in civil projects. IBAA can be used as a secondary aggregate compliant with the applicable local Highways Manuals and can be used as a constituent of a granular material compliant with the Standards for Highway Works 600 and 800 series. In Part A of this CoP the quality protocol is described that Rock Solid BV will use to secure that all IBAA, which Rock Solid is producing by processing IBA, will meet all requirements set by the next relevant standards for application in road construction:

- Standards for Highway Works 600 and 800 series
- Devon and Cornwall Highway manual

Also, this Code of Practice will describe a risk based quality system to identify the environmental risks, which may be applicable by the application of IBAA as a general fill or as subbase material. This system, described in Part B of this protocol, will be used by Rock Solid to identify possible risks and to work out precaution measurements which will be taken in case the IBAA will be used in a certain project.

1.1 Organization

Rock Solid BV is responsible for the production and quality of IBAA produced at their processing locations in the UK. These activities are performed by or on behalf of Rock Solid.

Rock Solid BV is based in the Netherlands at:

Keesomstraat 10G, 1821 BS Alkmaar, The Netherlands, Tel: +31 72 5409222

For the UK, Rock Solid BV is represented by Mr. Mark Wederell, Tel: +44 (0)7465 706506

1.2 IBAA in relation to the EU Waste Frame Directive

When using IBAA, it is important that the aggregate ceases to be waste. In the Waste frame Directive criteria are set-out that have to be taking into account before a waste ceases to be waste. According to this criteria, IBAA ceases to be waste when it has undergone a recovery, including recycling, operation and complies with specific criteria to be developed in accordance with the following conditions:

- IBAA is commonly used for specific purposes;
- there is an existing market or demand for IBAA;
- the use is lawful and the IBAA fulfils the technical requirements for the specific purposes and meets the existing legislation and standards applicable to products
- the use of IBAA will not lead to overall adverse environmental or human health impacts.

In the next paragraphs it is set out in which manner IBAA produced and end-used by Rock Solid BV is fulfilling these requirements.

1.2.1 Criteria 1: Recovery, including recycling and operation

Incineration bottom ash (IBA) is produced during the incineration of household and commercial waste in an Energy from Waste (EfW) plant. This waste is incinerated on a grate where all non-combustible parts are falling through the grate, are quenched with water and stored in a bunker. IBA itself consists of mineral parts like slags, porcelain and glass, ferrous parts and non-ferrous. IBA itself is not suitable for the use as an aggregate. To produce IBAA out of IBA, the IBA is processed. By this process, all ferrous and non-ferrous parts are recovered by magnets, eddy current separators and handpicking. Also, the unburned pieces are sorted out. The end product is an aggregate with a particle size between 0 and 40 mm and is named IBAA. A flow diagram of the process is attached in Annex 1.

1.2.2 Criteria 2: there is an existing market or demand for IBAA

In the UK, the EfW-industry has grown fast in the last decade. According to the Landfill Directive, the amount of biodegradable municipal waste that is landfilled must be reduced to 50% in 2009 and another extra 35% in 2016 (compared to 1995 levels). Because of this, new EfW-plants were built to meet the standard. The production of IBA grew substantially during the last decade. Most of the current IBA is processed into IBAA. The IBAA is commonly used in a wide range of end-uses, like asphalt, embankments and subbases replacing virgin materials. Till 2015, 7,000,000 tons of IBAA has been used in these type of projects.

1.2.3 Criteria 3: IBAA fulfils the technical requirements for the specific purposes and meets the existing legislation and standards applicable to products

In part A of this CoP, a quality protocol is set out that describes how the IBAA, produced by Rock Solid BV, is managed. The specific IBAA purposes are embankments and subbase for road construction. Therefore, technical requirements are described in the Standards for Highway Works 600 and 800 series according to the BS-EN 13285 and BS-EN 13242. By managing the quality of the IBAA according to this quality protocol, it is ensured that the IBAA fulfils all requirements described in these Standards for Highway Works.

1.2.4 Criteria 4: the use of IBAA will not lead to overall adverse environmental or human health impacts.

When using IBAA, one has to make sure that the use will not harm the environment. It can happen that IBAA leaches various substances, like metal- and salt ions. Therefore, one has to ensure that the groundwater will not be polluted when using IBAA. Legislation on the protection of groundwater is set in the EU Groundwater Directive 2014, in which protective instructions and obligations are set out. The purpose of both directives is that the groundwater is protected:

- in such a way that deterioration in the quality of such bodies of water is avoided and in order to reduce the level of purification treatment required in the production of drinking water
- by the objective to achieve water quality levels that do not give significant impacts on, and risks to, human health and the environment.

- by avoiding, preventing and reducing detrimental concentrations of harmful pollutants in groundwater
- by adopting measures to prevent and control groundwater pollution, including criteria for assessing good groundwater chemical status and criteria for the identification of significant and sustained upward trends and for the definition of starting points for trend reversals.

To fulfil these purposes, one has to ensure that, when using IBAA in civil engineering projects, the IBAA itself or the leachate, which can be produced from IBAA, does not get into contact with the groundwater. In Part B of this CoP, it is described how a work, in which IBAA is used, has to be designed and controlled.

PART A: Quality Protocol for the use of unbound Incinerator Bottom Ash Aggregate in civil engineering works and road constructions

2. General information about the production process

Rock Solid is a processor of incinerator bottom ash (IBA) whereby ferrous and non-ferrous metals are extracted and recycled and IBAA is produced. The recovery of metals is an important aspect in the recycling of IBA. Not only because of the financial benefits due to the on-going rising metals prices, but also because of the improved quality of produced IBAA and its reuse as subbase material, general fill and concrete. Over the years the techniques and insights on metal separation improved significantly.

In order to realise the highest metal recovery, Rock Solid uses semi-mobile treatment plants. The plants are easily adjustable to specific streams of IBA. Furthermore, they can be upgraded with additional technologies to reach the optimal IBA treatment and to produce high quality aggregates.

Rock Solid has the experience and knowledge about all IBA aspects: from the IBA production till the final application. Based on this, Rock Solid offers an all-in, solid and a carefree solution for IBA treatment.

The process starts at the EfW plant where the raw IBA is produced. The bottom ash is transported to the processing site of Rock Solid. From there, the raw IBA is processed whereby the ferrous and non-ferrous metals are separated. The aggregates are hold separately and can be send off to infrastructural works when they comply to the requirements set in part B of this CoP.

Since a limited amount of raw IBA is produced at the incinerator, the processing takes place two times a year. In each campaign, around 25,000 – 35,000 tons of raw IBA is processed. The raw IBA is collected and stored on-site until there is at least 25,000 tons. Processing 25,000 tons takes about five weeks and 35,000 tons about seven weeks.

A flow diagram of the process can be found in Annex 1.

3. Acceptance and storage

3.1 Acceptation of raw IBA

Before Rock Solid BV accepts unprocessed IBA it has to be demonstrated by the EfW-plant that the IBA is proven to be categorized as a non-hazardous waste.

The raw IBA produced at the incinerator is analysed on hazardousness by the EfW-plant. The EfW-plant tests according to WRc Report UC 9390.03, 'A SAMPLING AND TESTING PROTOCOL TO ASSESS THE STATUS OF INCINERATOR BOTTOM ASH'. This document is an voluntary industry protocol and has been produced by ESA and its members with the support of the Environment Agency to provide a reliable

method for the classification and assessment of IBA from the combustion of municipal waste in an EfW-plant.

3.2 Storage of IBA and IBAA

3.2.1 Raw IBA storage

The raw IBA generated at the EfW-plant is transported and stored at the processing site of Rock Solid. The incoming quantities are monitored by the weighbridges at the EfW-plant and at the processing site. The weighing data are documented in a spreadsheet on a day to day basis by Rock Solid. The location where the raw IBA is stored is registered by the site manager in a logbook on a monthly base. The processing site can store up to 70,000 tons of IBA.

3.2.2 IBAA storage

The IBAA must be aged during at least 42 days (six weeks) before it can be used in a project. The aging period is calculated from the moment the raw IBA is released from the incinerator. The site manager of Rock Solid registers the produced IBAA quantities and ageing time in a logbook. When the IBAA is stored at a location of the end-user, the end-user is responsible for the IBAA storage facilities on their site and the monitoring of the ageing. The data needed for this are provided by the site manager of Rock Solid.

Rock Solid will consult the end-user about the storage requirements. For inside storage, good ventilation is of importance. Rock Solid sets out the requirements for storage, loading, weighing and transport together with the end-user. The 6-weeks storage may take place at a location provided by the end-user. Rock Solid will determine with the end-user how it will be ensured that the IBA will be stored at least for 6 weeks before it is end-used.

3.2.3 Loading and transport

Loading and transport of IBAA is performed by subcontractors of Rock Solid or by the end-user. The site manager of Rock Solid monitors and documents the loaded quantities by the weighbridge on a day to day basis. Rock Solid checks whether the transport vehicles suitable for transporting IBAA and the transport company has the right permits to transport IBAA.

3.2.4 Personal protective equipment (PPE)

Personal protective equipment (PPE) is recommended when handling IBAA. Use suitable dust masks/respirators in poorly ventilated areas. Wear safety glasses with side shields if there is a risk of dust formation during handling. Safety jackets and safety shoes are mandatory on-site.

4. Controls on the IBAA production

Rock Solid has an on-site laboratory to analyse and control the produced non-ferrous mix and IBAA. First of all, the non-ferrous mix produced by the plant is tested. The mix always contains a certain percentage of minerals, depending on the settings of the Eddy-current recovery machines. The analysing involves crushing and rolling the mineral fraction to dust, whereby the non-ferrous metals remain intact because of its hardness. As a result, the percentage of non-ferrous metals in the produced mix can be calculated.

Secondly, the produced IBAA is tested on its metal content. Although Rock Solid aims to recover the metals as much as possible, in general there is still a small percentage left in the IBAA. The results of the tests are used to adjust the settings of the Eddy currents to recover more metals out of the IBA and process a 'clean' aggregate. This is important because less metals in the aggregate improve the quality of the aggregate.

Rock Solid analyses the non-ferrous mix and IBAA according to the Dutch Technical Standard (NTA 8191) for the 'sampling and determination of the metal content in Incinerator Bottom Ash and non-ferrous concentrate'. This standard describes the method to determine the metal content in a reliable and scientific way.

Rock Solid analyses the non-ferrous mix and IBAA on a daily or weekly basis during the processing campaigns. All results are documented by spreadsheet.

5. Sampling and testing

5.1 Test requirements

To test whether the IBAA fulfils the requirements according to the 'Standards for Highway Works 600 and 800 series' and the 'Devon and Cornwall Highway manual for type 803 aggregates', Rock Solid does various tests.

The IBAA has to comply with European Standard (EN) 13285 for unbound mixtures according to the Standards of Highway Works type 803 when applied as a subbase material. EN 13285 specifies the requirements for unbound mixtures used for construction and maintenance of roads, airfields and other trafficked areas. The requirements are defined with cross-reference to EN 13242.

The IBAA properties needs to be tested according to EN 13242:

- Particle size distribution (EN 933-1);
- Resistance to fragmentation (EN 1097-2);
- Water-soluble sulphate (EN 1744-1);

- Resistance to Freezing & Thawing (EN 1367-2)

Next to that, the IBAA needs to be tested according to BS 812-124 and BS 1377 for:

- Frost Heave (BS 812-124)
- Plasticity Index (BS 1377)

When IBAA is used as a general fill, it is classified as a 6F5 material by the Highway Works 600 series. Class 6F5 material also has to comply to EN 13285 and BS 812. Therefore, four tests are needed:

- Particle size distribution (EN 933-1);
- Resistance to fragmentation (EN 1097-2);
- Water-soluble sulphate (EN 1744-1);
- Maximum Dry Density (BS 812-124)

Table 1 shows the test frequencies. In general, Rock Solid runs processing campaigns of around seven weeks for two times in a year.

Test	**BS test reference**	**Test frequency**
Particle size distribution	EN 933-1	1 per week
Resistance to fragmentation (LA)	EN 1097-2	1 per campaign
Water soluble sulphate	EN 1744-1	2 per campaign
Resistance to Freezing & Thawing	EN 1367-2	1 per year
Frost Heave	BS 812-124	1 per year
Plasticity Index	BS 1377	1 per year

Table 1: testing frequencies for aggregates from inert waste (according to Environmental Agency)

5.2 Sampling and sample size

Samples are taken directly from the conveyor belt of the processing plant and not from the pile. Before the IBAA production starts, on-site employees are instructed by Rock Solid about the sampling procedure and sampling dividing. A sampling form (see Annex 2) is used for the registration of each sample.

Rock Solid produces five aggregate streams at their mobile processing plant: 0-2 mm, 2-8 mm, 8-12 mm, 12-22 mm, 22-40 mm. A sample of ten kilos (one bucket) is taken twice a week from each aggregate stream.

Since Rock Solid tests the IBAA as a 0-40 mm product, the different streams have to be mixed again before sent to a laboratory. To create a mix that gives a good representation of all IBAA, Rock Solid weighs the quantities of the produced aggregates during the first days of the processing campaign with a wheel loader. These weights will be used to determine the distribution in the produced aggregates and will be monitored throughout the processing campaign

The samples are collected in plastic containers and divided (quartered), if needed, by Rock Solid according to EN 932-2: '*Tests for general properties of aggregates. Methods for reducing laboratory samples*'. The containers are marked with the project number and grain size. Samples send to the

laboratories are marked with the project number, grain size and other relevant information for the laboratory.

For the particle size distribution test, 10 kilos per stream per week are send to a laboratory. For the other tests, samples are send once a month. See the EN-protocols referred in table 1 for specific information about the sample sizes and tests.

5.3 Calibration and maintenance requirements for the laboratory and measuring equipment

Rock Solid uses external laboratories to conduct the tests. The laboratories are certified for the requested tests and certification under the United Kingdom Accreditation Service (UKAS) is checked by Rock Solid every year.

5.4 Registration of the laboratory test results

The laboratory test results are reported by the laboratory by a report and certificate to Rock Solid. The results are checked and documented by Rock Solid. The results are presented on a product certificate which will be distributed to the end user to ensure that the delivered IBAA fulfils the requirements according to the applicable standards.

PART B: The use of Incinerator Bottom Ash Aggregate (IBAA) in civil engineering works and road construction

In this chapter, the requirements are set out for the use of IBAA as an aggregate in civil engineering works and as subbase material in road construction.

6. The use of IBAA in civil engineering works

It is known from IBAA that it can leach components which may be harmful to the environment, especially to groundwater. When using IBA, one has to ensure that contact with groundwater is prohibited. In this paragraph a system is described which is used to prevent the contact with groundwater when using IBAA. Contact with groundwater can happen in two ways:

- By rainwater which percolates through the IBA and then flows down into groundwater
- By contact with groundwater directly when IBAA is used in the groundwater

A proper design of how IBAA is used is made to prevent contact with groundwater in either of the two above described manners.

6.1 Design of the civil engineering work

When using IBAA as a building material, a design is needed to prevent contact with groundwater so no harmful components, which may leach from IBAA, will contaminate the groundwater. In the next paragraphs is described how a design of the works will be made to ensure this by:

a. a description of the manner in which the requirements of chapter 4.3, 4.4, 4.5 and 4.6 are met;
b. a site plan, longitudinal and transverse cross-sections

The work is designed on a final settlement of consolidation that is calculated for a period of fifty years, plus a margin of error of 30% of the calculated consolidation (see 4.4).

Taking these steps into account in the design ensures that the work complies to the requirements set by the DIRECTIVE 2006/118/EC on the protection of groundwater against pollution and deterioration.

6.2 Determining groundwater level

To prevent direct contact of IBAA with the groundwater the IBAA has to be applied at least 0,5 meter above groundwater level. This distance is needed to prevent the direct contact with groundwater because of capillary upstream through the material which is present under the IBAA.

To ensure this the ground level needs to be determined over a three month period. The design height of the groundwater is set at the maximum level of groundwater measured in this 3 month period or is based on the groundwater data of the location if available.

An expert company is hired by Rock Solid to determine the groundwater level and capillary upstream. The results of this analysis is documented and reported by Rock Solid.

6.3 Settlement

The consolidation of the soil can be import aspect of the IBAA foundation. Consolidation is a process by which soils decrease in volume. In general it is the process in which reduction in volume takes place by expulsion of water under long term static loads.

The settlement of the consolidation is measured by an expert company before the start of the construction. During the construction, the settlement is measured on a weekly basis. Also, a calculation of the settlement is made after the completion of the work. At last, the settlement over a period of fifty years is calculated. This maps out the consolidation effects over a long term period whereupon preventive measures can be taken. The results of the analysis are monitored and documented by Rock Solid and available for the relevant parties.

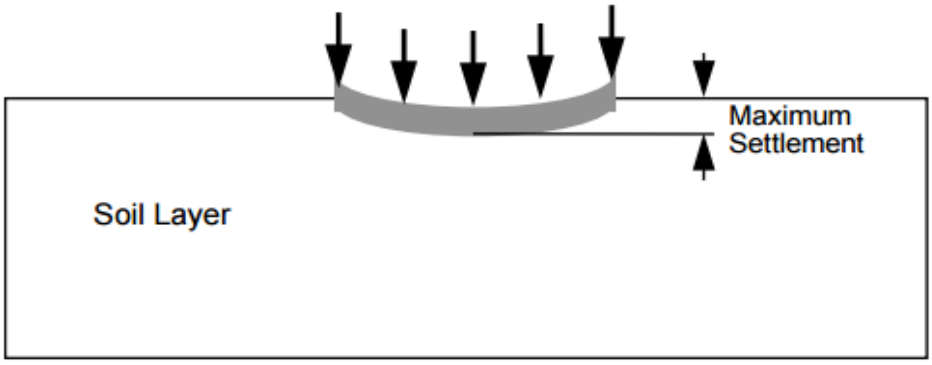


Figure 1: soil consolidation

6.4 Insulation

To prevent that IBAA gets in contact with rainwater The IBAA should be covered with an insulating layer. This layer could consist for instance out of asphalt within three months of the first layer of IBAA. If IBAA is used as foundation layer for roads, a clean-shoulder construction is needed (figure 2). That is, a clean building material, not being an IBAA, is applied under the edges of the road, surfacing over a width equal to the thickness of the IBAA layer and with a minimum width of 0,3 meter.

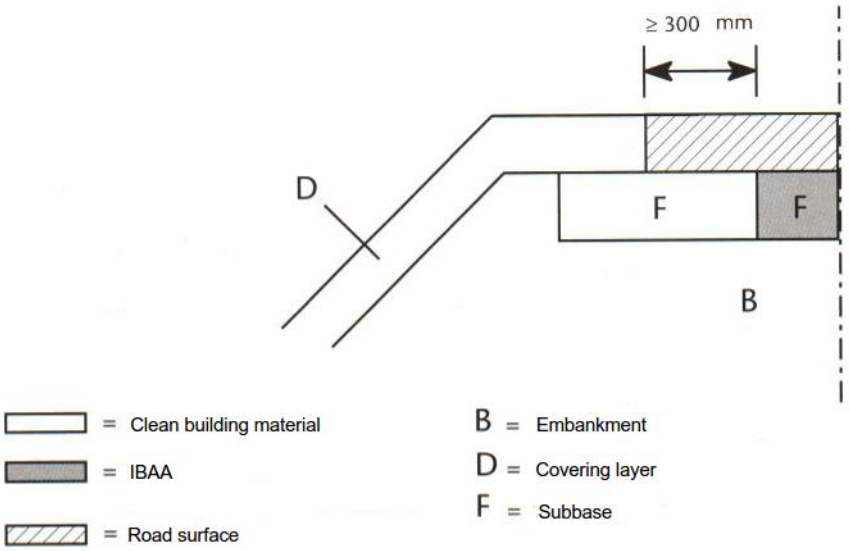


Figure 2: clean shoulder construction

6.5 Final design

The final design is documented in a report by Rock Solid together with the end-user. The final design of the work needs to be approved by an expert company and the local authorities. On forehand, Rock checks if all the criteria are covered in the design.

6.6 Management and control of the work

Monitoring wells are being installed for monitoring the status and quality of the groundwater from the day that the first layer of IBA is applied. The number of wells is at least one upstream and one downstream of the works. Also, the consolidation needs to be monitored from the day the first layer of IBA is applied. An expert company will do the measurements. Rock Solid will monitor and document all data resulting from these measurements.

7. Failures and complaints

7.1 Failures

The site manager of Rock Solid monitors and documents the failures in the IBAA production process. This consists of:

- Description of the failure
- corrective action needed
- responsible manager
- evaluation of corrective / preventive measure

Weaknesses and failures are documented in a report and is available for the relevant parties. The site manager of Rock Solid is responsible for monitoring and documenting the failures. If corrective measures are taken after investigation, Rock Solid will check if preventive measures can be put in place.

7.2 Complaints

The site manager of Rock Solid is responsible for the administration of complaints about the IBAA production and the handling of it. Complaints are recorded in writing and published in a report.

The site manager is the first contact person for all parties. The site manager communicates and analyses the complaint internally within Rock Solid. Results of the complaint investigation is communicated by letter to the complainer within one month. When the investigation takes longer, the complainer will be informed.

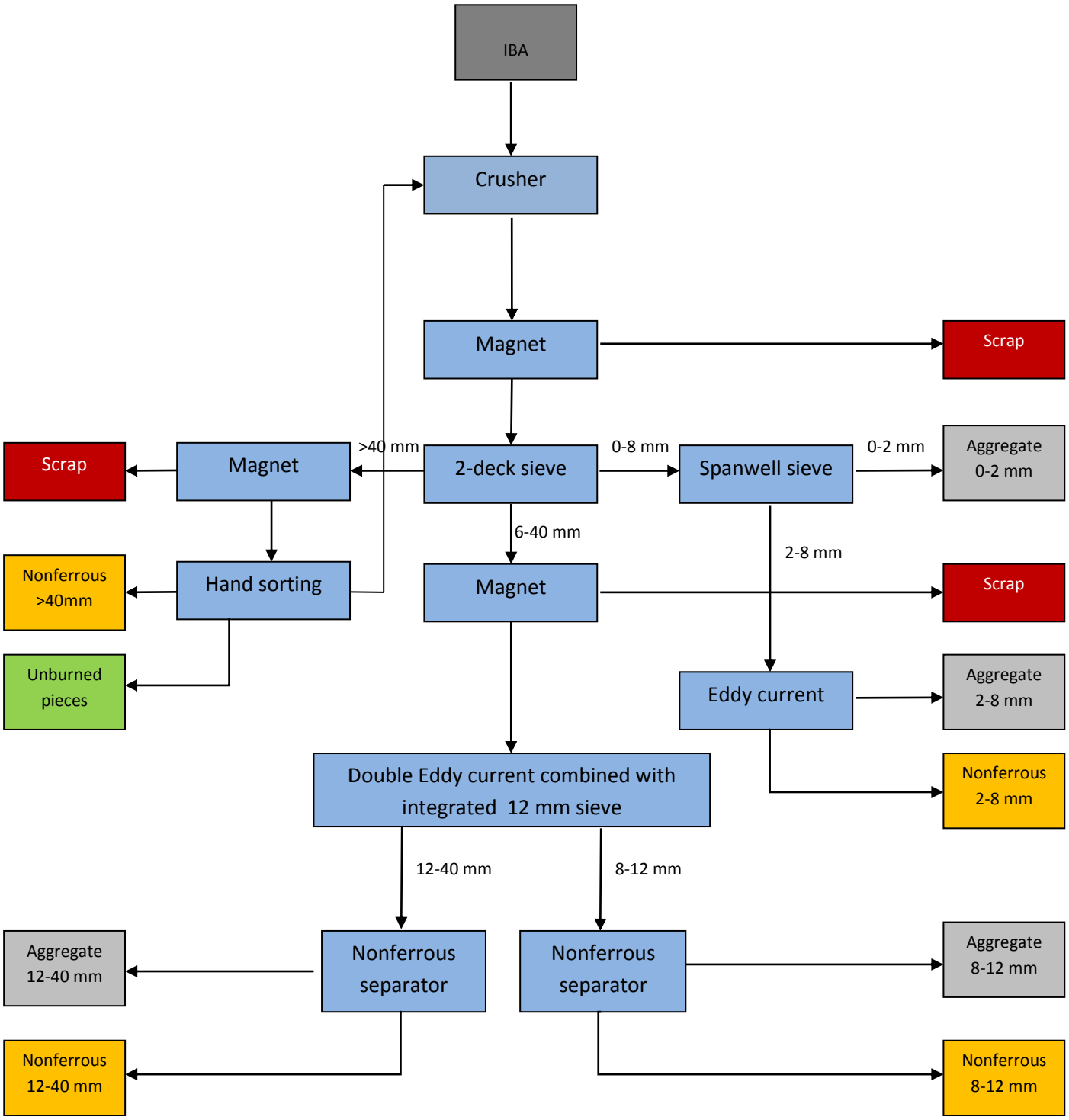
8. Annexes

Annex 1 – IBA processing flow diagram

Annex 2 – Sample registration form

Rock Solid
Thinking Solid Solutions

Annex 1: IBA processing diagram



Annex 2

Sample registration form

Name project/work:

Grain stream:

Frequency: **5 grabs of 2 kilo** (10 kilos per day per stream)

Grab number	Grain size	Date	Time
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

App B

IBAA FACTORY PRODUCTION CONTROL MANUAL

1. INTRODUCTION

The Factory Production Control Manual (also referred to as the FPC Manual) details the measures and procedures put in place by Rock Solid BV. (Rock Solid) to control the production of aggregates from Incinerator Bottom Ash (IBA), called IBAA, in accordance with their internal quality protocol.

The internal quality protocol sets out the criteria for the production and use of recycled aggregates from IBA.

Rock Solid are based in Alkmaar (Netherlands), and operate mobile plants around the UK. The FPC relates to the operation of all mobile plants for recycling of IBA, to produce a high quality aggregate (IBAA) for resale.

This document has been produced to reflect Rock Solid's commitment to producing high quality aggregates for end users and reducing the volume of waste through recovery and recycling activities. This document will also give confidence that recycled aggregates have been produced in accordance with a strict internal sampling and testing regime, to a recognised approved industry specification, have been fully recovered and are suitable for the designated end uses.

1.1. OBJECTIVES

The objective of the FPC manual is to;

- Demonstrate that the recovery methods used to produce aggregates from IBA are undertaken in a consistent manner, and that the end products produced have been fully recovered and are suitable for the intended end uses.
- Provide users with the confidence that the IBAA produced is of a high quality and conform to an approved industry specification.
- Provide users with the confidence that the IBAA produced is suitable for use within a designated market sector(s).

2. FPC REVIEW

The Factory Production Control Manual and associated method statements will be reviewed annually by Senior Management to ensure their ongoing suitability and effectiveness.

The FPC Manual will be reviewed and revised upon the implementation of any changes that may affect it's suitably and effectiveness.

Records of all FPC Manual reviews will be retained by Rock Solid.

3. RESPONSIBILITIES

3.1. SENIOR MANAGEMENT

A representative from Rock Solid's Senior Management is responsible for ensuring that the FPC Manual is implemented, maintained and followed by all relevant staff members.

Senior Management will be responsible for communicating the information detailed within this document to all relevant parties including sub-contractors and product users (where applicable).

Other senior management (or management nominated individuals) responsibilities include:

- Providing adequate training to operational staff on the importance of following the Method Statements of Production found in Section 8 of this document.
- Identifying customer demands and production targets (e.g. quantities, locations of production and types of products).
- Management of material stockpiles.
- Ensuring good practices are implemented and maintained on-site.

3.2. OPERATIONAL STAFF

Operational staff will be responsible for ensuring that they carry out operational activities in accordance with the Method Statements of Production detailed in Section 8 of this document.

Operational staff are responsible for reporting any faults, breakages, incidents or non-compliant material to Senior Management immediately upon discovery.

3.3. SUB-CONTRACTORS

Any sub-contractor operations undertaken on site relating to the processing operations are the responsibility, and where applicable, will be under the supervision of Senior Management or the Technically Competent Manager (TCM).

4. TESTING PLAN

The IBA produced at energy from waste facilities is characterised and classified according to the EA WM3 Guidance under the Environmental Services Association (ESA) "A Sampling and Testing Protocol to Assess the Status of Incinerator Bottom Ash" (ESA Protocol) by the client (EfW-plant). Before Rock Solid will take responsibility for IBA processing (see section 6.), the IBA has to be proven to be non-hazardous by the client.

When the IBA is processed to produce aggregate (IBAA), the crushing and separation processes produce different size fractions.

IBA is a heterogeneous material composed of a number of constituents. The broad constituents' categories in IBA are the following:

- inert materials: ceramics and glass
- ferrous metals
- non-ferrous metals
- clinker and slag: stony residues of the burning process often fused together.
- paper, plastics and other non-combustibles

The process of IBA treatment to IBAA is a physical treatment and will not change the chemical composition of the material.

However, the different constituents of the IBA will either be removed (e.g. metals and non-combustibles) or be crushed and sieved into different fractions (e.g. clinker, inert).

This leads a different ratio between constituents in the IBAA outputs compared to the starting IBA, and therefore a different concentration of substances.

Therefore, for the initial characterisation of the IBAA outputs, it is important to include a comprehensive analytical suite to highlight the substances that are affected by the process and assess their significance in terms of classification of the IBAA and suitability of the materials for use as an aggregate.

A testing plan will be produced for each site where the mobile plant will be deployed to include the type and frequency of testing to be applied to the final products (IBAA fractions).

The testing plan includes an initial period of characterisation of the materials, with frequent sampling, in order to build the body of data necessary for a comprehensive characterisation of the material and to determine the level of variability of the parameters within the same materials. The comprehensive characterisation is specific to the type of process and the input IBA.

Once a comprehensive characterisation of IBAA has been carried out, a compliance regime characterised by less frequent sampling may be applied to the same process (same or comparable equipment, IBA originated in the same EfW). Parameters tested during the compliance regime are determined by the analysis of the data from the comprehensive characterisation and by the requirements of relevant standards.

5. SAMPLING PROCEDURE

A sampling procedure for the Rock Solid IBAA production process has been produced. This applies to the process using Rock Solid's mobile plants with equivalent specifications and performance.

The sampling procedure has been produced to take into account the process producing the material and the characteristics of the material.

6. WASTE ACCEPTANCE CRITERIA

The only waste to be accepted for the aggregate produced by Rock Solid is IBA from Energy from Waste (EfW) facilities burning municipal waste, which has been proved to be non-hazardous under the Environmental Services Association (ESA) *"A Sampling and Testing Protocol to Assess the Status of Incinerator Bottom Ash"* (ESA Protocol).

The IBA is classified in the List of Waste (LoW) with the following code:

- ***19 01 12 (bottom ash and slag other than those containing hazardous substances).***

To ensure only permitted wastes are accepted the following waste acceptance criteria have been implemented, and are maintained and communicated to all relevant staff.

6.1. WASTE ACCEPTANCE CRITERIA

A Waste pre-acceptance procedure has been put in place to ensure that the materials provided by the IBA Producer are suitable for the intended end use.

The key stages of the pre-acceptance process are presented below.

6.1.1. IBA information

As part of compliance with the ESA Protocol, the IBA provided to Rock Solid undergoes chemical characterisation and hazard assessment according to the EA "*Guidance on the classification and assessment of waste Technical Guidance WM3*".

Key parameters and hazard assessment of key hazardous properties (HP4, HP8, HP7, HP14) is carried out twice a month.

A comprehensive characterisation and full hazardous properties assessment (HP1 -HP15) is carried out annually.

Using a statistical approach described in the Protocol, the waste material is classified and assigned the List of Waste (LoW).

Characterisation data is required from the waste producer before dispatch from their site along with the following information:

- Description of the waste, including EWC code.
- Source of the waste

All potential customers (IBA producer) shall be required to submit all characterisation data and hazard assessments of the IBA before any processing will be carried out.

6.1.2. Acceptance Criteria

The Technically Competent Manager (TCM) (or nominated alternative) shall review the information provided by the waste producer to determine whether an appropriate assessment has been undertaken in accordance with the ESA Protocol.

Subject to being classified as non-hazardous, the IBA may be acceptable without further testing.

Where the hazard assessment has not been provided or is deemed insufficient, Rock Solid will not accept the applicable IBA for processing. The client is responsible for the IBA to be stored at a designated area away from the approved IBA and report this to Rock Solid.

Records of waste classification and assessment will be kept by the client, and can be made available upon request, to demonstrate that the above described assessment procedures have been followed.

Only IBA classified as 19 01 12 “bottom ash and slag other than those containing hazardous substances” may be accepted on site for processing.

Table 1: Acceptable Wastes according to Rock Solid Quality Protocol

Waste Code	Description of Waste
Wastes from the mechanical treatment of waste not otherwise specified (for example sorting, crushing, compacting, pelletising)	
19 01 12	bottom ash and slag other than those mentioned in 19 01 11

If enough information is provided during pre-acceptance, the IBA can be approved for delivery to the site.

The site’s Waste Acceptance Criteria described below incorporates the statutory requirements of the Duty of Care legislation.

6.2. INITIAL INSPECTION

All deliveries of incoming IBA will be inspected regularly for compliance with the Rock Solid’s IBA Acceptance Criteria (see Annex A).

If non-compliant material is observed the client will be contacted and in case the client didn’t do so already the IBA will quarantined.

If large volumes of non-compliant waste are observed within a load, then the load is refused entry. If small volumes of non-compliant waste are observed, then loads will either be refused entry to site or if possible, non-compliant material will be removed by hand (if safe to do so).

The following information about incoming loads is recorded by the client and retained:

- Date and time;
- EWC code;
- Place of origin;
- Quantity (weight or volume);

- Carrier & supplier; and
- Outcome of the visual inspection.

The details of rejected loads including but not limited to; the date, time, nature and quality, place of origin, quantity and carrier are recorded and retained.

7. OPERATIONS

All IBAA production operations, including handling and storage are undertaken in accordance with the site's dust control measures which minimise and prevent the generation of dust.

7.1. WASTE STORAGE

Stockpiles of IBA are segregated in a dedicated area and managed in a safe condition by plant machinery while awaiting processing.

7.2. SORTING

Sorting operations are conducted by mechanical means to ensure that the aggregate produced is of a high quality.

During the process ferrous and non-ferrous metals are separated from the aggregate materials and unburnt organic materials are handpicked.

7.3. MAINTENANCE AND CALIBRATION

Maintenance of the processing equipment is sub-contracted to the equipment provider (NRC). They are responsible for maintenance and calibration of all equipment.

As part of their duties, they will visually inspect site plant and equipment is on a daily basis prior to activities commencing. Where defects or damage are detected these are repaired prior to use.

All site plant and equipment is maintained to the manufacturer's specifications to ensure safe and efficient working. In addition, all plant and equipment is serviced in situ, by suitably experienced site personnel.

The processing site is inspected on a daily base by the laboratory technician. In case a non-conformity is observed he will either report this to the Head of Processing or to the TCM.

8. METHOD STATEMENT

- IBA is delivered to site.
- Regular visual inspection of the IBA for signs of contamination/ non-compliant material (see Annex A).
- Driver is instructed to unload in a designated area segregated from other wastes.
- IBA is then stockpiled prior to being fed to the mobile plant via swing shovel.
- The mobile plant crushes the IBA and through a series of magnets and non-ferrous separators, separates the metals form the aggregate material.
- Other metals such as copper and electric motors and unburnt organics such as paper and plastics are handpicked.
- The aggregate material is separated into 5 size fractions:
    - 0-2mm IBAA
    - 2-8mm IBAA
    - 8-12mm IBAA
    - 12-22mm IBAA
    - 22-40mm IBAA
- The ratio between these fractions are depending on the particle size distribution of the IBA. The produced tonnages per fractions are reported by daily reports to the TCM.
- Samples of each of the IBAA fractions are prepared in accordance with Rock Solid's Sampling Procedure to produce laboratory samples. It can be decided that after processing the IBAA fractions are put together in:
    - 0-4mm by combining the 0-2mm and 2-8mm fractions
    - 12-40mm by combining the 8-12mm, 12-22mm and 22-40mm fractions
- When this is decided the sampling strategy will be adjusted to this.
- IBAA samples are tested in accordance with the site specific testing plan.

9. FINISHED PRODUCTS - TESTING

9.1. TESTING FREQUENCIES

Following the processing of the IBA, testing will be undertaken to ensure the material complies with the relevant standards.

Samples of the IBAA will be collected by either management or operational staff and sent for testing at the on-site mobile laboratory (physical characterisation) and predetermined UKAS accredited laboratory. Details of the aggregate properties, relevant test methods and test frequencies for each aggregate product can be found in the site specific testing plans, which specify types and frequencies of tests to be carried out.

The relevant annex of the relevant BS EN standard, along with the waste industry relevant guidance, were consulted to determine the properties to test and the required frequencies.

Where the results of the testing meet the specifications of the relevant BS EN standards and Waste guidance, IBAA will be temporarily stored pending either use within a designated sector or resale.

Where a material does not meet the relevant standards it will either be reprocessed or retested.

Testing results will be retained on site and can upon request be submitted to client.

10. PRODUCT DELIVERY

Product Delivery Documentation such as a Product Dispatch Note, will be maintained for each load of IBAA dispatched and will include the following information:

- Date of supply;
- Customers name and contact details;
- Product description to aggregates standard and customer specification;
- Name and contact details of producer, including site address of production;
- Quantity supplied by weight / volume.

The delivery documentation will also state that the product has been produced in accordance with the internal quality protocol.

11. TRAINING

Staff will be trained for the parts of this Factory Production Control Manual, for which they are responsible for including but not limited to:

- Waste pre-acceptance and acceptance procedure (Site Manager);
- Procedure for non-compliant wastes and output products (Site Manager);
- Sampling and testing (Lab technician);
- Product inspections (Lab technician and IBAA sales manager).

All training records will be retained.

12. RECORDS MANAGEMENT

Records of all relevant controls, inspections, calibrations, changes and training will be retained for a minimum of 2 years as per the minimum requirement of the internal quality protocol.

The Method statements detailed in Section 8 of this document will be maintained and reviewed periodically to ensure the procedures reflect current site operations.

All documents retained on site that relate to this FPC Manual will be available upon request for inspection.

IBAA FACTORY PRODUCTION CONTROL MANUAL

13. REVISION HISTORY

Date	Author	Approval	Changes	Pages
09.05.19	Andrea Petrolati	First Draft	N/A	N/A
26.07.19	Peter Bleeker/Andrea Petrolati	Second Draft	N/A	N/A
29.07.19	Peter Bleeker/Andrea Petrolati	Final Draft 01	N/A	N/A
22.07.20	Georgina Leach	FD 02	Incorporated within UK EMS, new document reference, no changes to content.	All
16.11.20	Peter Bleeker	02	Paragraph 8	7

IBAA FACTORY PRODUCTION CONTROL MANUAL

ANNEX A IBA ACCEPTANCE CRITERIA

This Annex describes the IBA which is complaint to the IBA Acceptance Criteria and will be accepted for processing. Non-complaint material will not be accepted for processing.

Compliant IBA:

- The granular material looks fine graded
- Does not contain big lumps of unburned material
- The IBA looks light to dark grey

Non-compliant IBA:

- The IBA contains huge lumps of recognizable unburned parts (plastic, paper, textile, refuse bags)
- The IBA looks blackish

App C

STANDARD OPERATING PROCEDURE SAMPLING AND REDUCTION (EN 932-1)

1. ACTIVITY

This operating procedure details process for sampling method for IBAA and non-ferrous metals.

2. SIGNIFICANT HAZARDS

Moving vehicles and mobile plant, mechanical hazards, manual handling, trips and falls, dust, weather influences, noise, lighting/visibility and other hazards associated with surroundings.

3. CORRESPONDING RISK ASSESSMENT

Risk Assessment – Process Sampling -RA.03.HB.

4. PPE REQUIREMENTS

Standard: Hard Hat, high visibility clothing, safety glasses, safety boots, RPE/dust mask (FFP3) and gloves.

Additional: Ear plugs or muffs depending on noise/dust at site during sampling.

5. EQUIPMENT

The following equipment is used for sampling:

- Sampling equipment (sampling scoop and or sampling box)
- Metal plate or board
- 10 litre lidded buckets
- Marker and labels or stickers
- Sampling plan and registration form
- This work instruction.

6. KEY CONTACT DETAILS

Emergency Contact: Stephan Roos, Operations Manager 07365 488924.

7. STAGE BY STAGE METHOD OF WORK

7.1 DAILY PLANNING

Planning

The lab technician will meet the Site Manager and undergo a site induction**.**

The lab technician will attend daily planning meeting on sampling days with the Site Installation Manager. Means of communication, daily sampling requirements for IBA, IBAA and non-ferrous metal sampling and any new instructions will be discussed. Eight 2-way radios are distributed to Site Manager, Site Installation Manager, Mobile Plant Operators (3), Lab Technician and Picking Line cabin, and communications agreed.

Access to Processing area

The lab technician must notify the NRC Site Installation Manager when access is required to the site. For each sampling visits, access to the processing pad must be authorised by the Site Installation Manager, prior to accessing the processing area. Approval to access the processing area must be granted by NRC Site Installation Manager via 2-way radio every time access is sought, and area required to access. The Site Installation will notify the Plant Operators that pedestrians are accessing processing area. Mobile plant will cease movement or reduce speed to 5 mph, if safe to do so, whilst pedestrians are in the processing area.

IBA and IBAA sampling

The lab technician will require access to the IBAA piles to take samples. Access to the IBA piles is NOT PERMITTED until all plant has been shut-off and isolated. The Site Installation Manager (NRC) must confirm isolation and grant permission to access the site for IBA sampling. IBAA Sampling from the process discharge stream will be carried out by the wheeler loader whenever possible. For hand samples the lab technician must notify the NRC Site Installation Manager when access is required to the site. For each sampling visits, access to the processing pad must be authorised by the Site Installation Manager, prior to accessing the processing area.

Non-ferrous metal sampling

The lab technician will require access to the non-ferrous metal collection skips. Access to the plant processing area is NOT PERMITTED until all plant has been shut-off and isolated unless accompanied by the Site Installation Manager. The Site Installation Manager must confirm isolation and grant permission to access the site for non-ferrous metal sampling.

7.2 SAMPLING

Depending on the situation on site and the suitability of sampling the ideal sampling method can change. The following methods per fractions are preferred:

00/02 --> 7.2.1;

02/08 --> 7.2.1; 00/04 (combined 00/02 & 02-08)

08/12 --> 7.2.2;

12/22 --> 7.2.2;

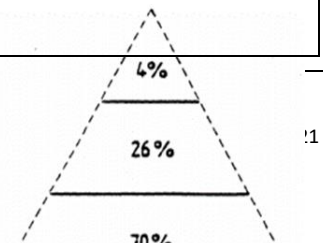
22/40 --> 7.2.3 04+ (combined 08/12, 12/22 & 22/40)

7.2.1 HOMOGENEOUS MIXED

Use a sampling scoop to gather 27 increments in the proportion 1-7-19 (upper-middle-lower).

Make sure the increments are taken from all sides of the pile and that they do not differ more than 25% in mass from each other.

1. Choose a spot to take an increment;



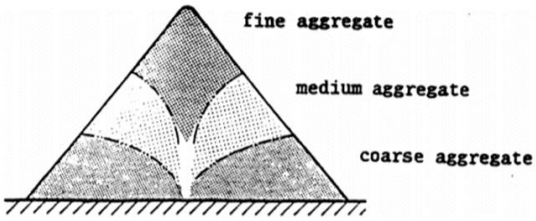
2. Dig away 2 times the upper size of the grain (use the metal plate if the material likely to move down the pile);
3. Take an increment and put this in a bucket;
4. Repeat this procedure until all 27 increments are taken.

The 27 increments will make a total of approximately 20 litre material.

7.2.2 HETEROGENEOUS MIXED

Use a sampling scoop to gather 27 increments in the proportion 1-7-19 (upper-middle-lower). Take a good look at the way the pile is built before starting.

Make sure the increments are taken from all sides of the pile and that they do not differ more than 25% in mass from each other.



1. Choose a spot to take an increment;
2. Dig away 2 times the upper size of the grain; (use the metal plate if the material likely to move down the pile)
3. Take an increment and put this in a bucket;
4. Repeat this procedure until all 27 increments are taken.

The 27 increments will make a total of approximately 20 litre material.

7.2.3 SAMPLING FROM THE DISCHARGE STREAM

Where safe to do so, use a sampling box to take the increments. Interrupt the discharge stream completely with a fluent motion and put the material in a bucket. Where unsafe to sample by hand from the discharge stream, ask the wheeled loader driver to access the stream

Take at least two increments and make sure that the sampling box is not more than 50% filled with material.

The two increments cannot be more than 25% different in mass. They will make a total of approximately 20 litre material.

7.3 SAMPLE REDUCTION

There are two accepted methods which are accepted to reduce the sample. The first one is preferred.

1. Reduction of a bulk sample using a riffle box;
2. Reduction of a bulk sample by quartering.

7.3.1 RIFFLE BOX

Check if the riffle box is free of contamination and ready to use. Put (a part of) the sample into the riffle box and keep the part that's needed and throw away the part that isn't.
Repeat this procedure until the needed amount is achieved.

7.3.2 QUARTERING

Put the bulk sample on a clean working surface and mix it thoroughly by heaping it up to form a cone.
Turn the cone of with a shovel to form a new one and repeat this procedure 3 times.
Deposit each shovelful on the peak of the new cone in a way that the aggregate runs down all sides of the cone and is evenly distributed and well-mixed.
Flatten the third cone, by inserting the shovel repeatedly and vertically into the top of the cone, to form a flat heap which has a uniform thickness and diameter.

Quarter the flat heap along two diagonals intersecting at right angles. Discard one pair of opposite quarters and the procedure if needed with the remainder

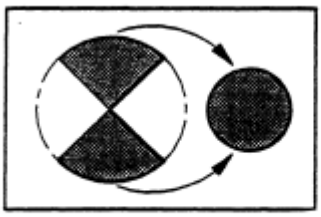


Figure 2: Reduction of a sample by quartering

7.4 STORAGE

The samples should be stored in an airtight bucket in a cool place (not in the sun). In house testing should be carried out within 7 days. The sample should be marked like Sitename IBAA_Grading_date_Sample nr
e.g. GG_IBAA_2-8_150719_1 of 4

8. MONITORING REQUIREMENTS

Site activities will be monitored by the Site Manager in cooperation with the Site Installation Manager. A Site Inspection [OS.01.06.F01] will be carried out daily by the Site Manager.
Daily laboratory testing results will be recorded and reported as set out within the quality control procedures [OP.04].
A Nonconformity Report [BS.04.03.F01] will be raised for any works/activities not conforming with applicable standards for the works in accordance with the contract.
Accidents, Incidents and Near Miss occurrences with be reported and investigated in accordance with the Accident, Incident, near miss occurrences procedure [OS.01.03].
Audits will be carried out at planned intervals in accordance with the audit programme [BS.04.02.F01].

STANDARD OPERATING PROCEDURE SAMPLING AND REDUCTION (EN 932-1)

9. ENVIRONMENTAL MANAGEMENT

All employees will be trained in emergency procedures, including spillage procedure. Dust suppression with be in operation in periods of dry weather. Noise monitoring will be carried out periodically in accordance with planning conditions.

10. QUALITY MANAGEMENT

References:

EN 932-1:1997 Tests for general properties of aggregates. Methods for sampling.

11. REVISION HISTORY

Revision Date	Version	Approved by:	Summary of changes	Affected pages
28.04.20	D1	AP	N/A	N/A
22.07.20	D2	GL	Document incorporated within UK EMS, document reference issued, no change to content.	ALL
25.11.20	I1	AP	Changes to content and renamed sampling and reduction within IMS procedure template.	ALL
16.06.21	I2	KSZ	Planning section 7.1 and Monitoring added	Pg 1,2.4

STANDARD OPERATING PROCEDURE SAMPLING AND REDUCTION (EN 932-1)

APPENDIX A SAMPLING RECORD

SAMPLING RECORD	
Sample Code:	
Date Sampling:	
GENERAL INFORMATION	
Location of sampling:	Carried out by (Company): Rock Solid Sampler: C. Mefa
MATERIAL	
Type of material: IBAA / NF	
Description: 0-2 / 2-8 / 8-12 /12-22 / 22-40 /0-8 / 8-40 (delete what's not applicable)	
SAMPLING METHODOLOGY	
Place and point of sampling: (in case this differs from instruction)	
Access problems that affected areas or volumes of material sampled:	
Safety measures taken:	
Procedure (describe procedure adopted):	
Equipment used:	
Number of increments/samples collected:	
Increment size/sample size:	
Observations during sampling:	
PACKAGING, PRESERVATION, STORAGE AND TRANSPORT DETAILS	
Type of buckets used: 5l / 10l	
Number of buckets used:	
Storage details:	
DEVIATIONS FROM SAMPLING PLAN	

App D

SAMPLING RECORD

SAMPLING RECORD	
Sample Code:	
Date Sampling:	
GENERAL INFORMATION	
Location of sampling:	Carried out by (Company): Rock Solid Sampler: C. Mefa
MATERIAL	
Type of material: IBAA	
Description: 0-2 / 2-8 / 8-12 /12-22 / 22-40 (delete what's not applicable)	
SAMPLING METHODOLOGY	
Place and point of sampling: (in case this differs from instruction)	
Access problems that affected areas or volumes of material sampled:	
Safety measures taken:	
Procedure (describe procedure adopted):	
Equipment used:	
Number of increments/samples collected:	
Increment size/sample size:	
Observations during sampling:	
PACKAGING, PRESERVATION, STORAGE AND TRANSPORT DETAILS	
Type of buckets used: 5l / 10l	
Number of buckets used:	
Storage details:	
DEVIATIONS FROM SAMPLING PLAN	