



# **Hydro Aluminium Deeside**

Environmental Permit No. BK3638IF

**Information to support an application to vary a  
bespoke Environmental Permit**

**February 2014**

## **Contents**

|            |                                                                                                  |
|------------|--------------------------------------------------------------------------------------------------|
| 1.0        | Introduction                                                                                     |
| 2.0        | Emissions to Air, Water and Land                                                                 |
| 3.0        | Operating Techniques                                                                             |
| 4.0        | Monitoring                                                                                       |
| 5.0        | Resource Efficiency and Climate Change                                                           |
|            |                                                                                                  |
| Appendix 1 | Current site layout                                                                              |
| Appendix 2 | Proposed site layout                                                                             |
| Appendix 3 | Block diagram of continuous homogeniser, sawing and packing line                                 |
| Appendix 4 | Schematics of continuous homogeniser, cooler, sawing and packing line – plan and elevation views |
| Appendix 5 | Climate Change Agreement evidence                                                                |

## **1. Introduction**

- 1.1 Hydro Aluminium Deeside Ltd is applying to vary the current Environmental Permit due to the installation of a continuous homogenising and sawing line. This equipment will replace existing elderly equipment and will result in the creation of one new emission point from the homogeniser oven exhaust. It will also enable the removal of six existing emission points that serve as the exhausts for the current heat treatment ovens, homogenisers 1 and 2.
- 1.2 The continuous homogeniser and sawing line was purchased from Anglesey Aluminium in August 2013 with the aim of replacing the current batch homogenisers and saw.
- 1.3 The continuous homogeniser and sawing line, manufactured by Hertwich, has been in operation at Anglesey Aluminium for ten years. Similar Hertwich equipment is in operation at other Hydro casthouses. It will replace equipment that has been in operation at Hydro Aluminium Deeside for 30 years. The "new" equipment has a rated thermal input of 4.3MW and will replace two heat treatment ovens each rated at 3.2MW (6.4MW together). The aggregate thermal capacity of combustion equipment on-site will therefore be reduced by 2.1MW.
- 1.4 The new equipment will see a slight increase in theoretical maximum production, from 60,000 to 63,000 tonnes per annum, due to the ability to homogenise logs that are 7 metres long (current maximum length is 6.4m). The project includes increasing the scrap storage, segregation and sorting capacity by demolishing the old homogenisers and saw which will be replaced with new scrap bays. It should also bring positive environmental impacts through improved energy efficiency and reduced noise.
- 1.5 Following discussions with Natural Resources Wales, Hydro Aluminium Deeside is requesting a "minor technical variation" to the Environmental Permit for the installation. This is due to the new equipment being a "like-for-like" swap with the existing heat treatment and sawing machinery, albeit with additional benefits in terms of resource efficiency, emissions to air, and noise. These benefits are further described below.
- 1.6 The following information is presented to support the responses given in Application Form Part C3.

## **2. Application Form Part C3, Section 2 - Emissions to air, water and land**

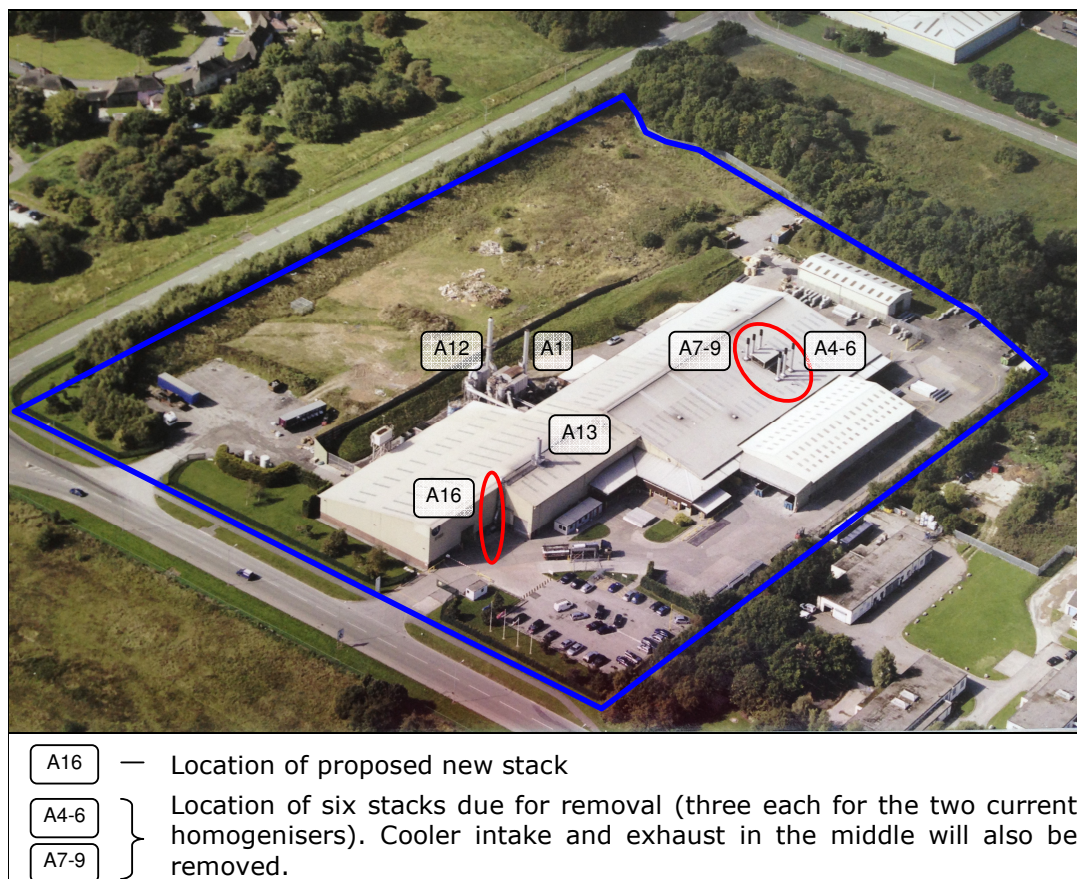
- 2.1 In Table 2 of the application form, only the new emission point has been described. Following the sequence in the current permit, this has been assigned a reference of A16. The parameters and quantities emitted are the average of three sets of results, from monitoring undertaken when the equipment was in operation at Anglesey Aluminium. The results are dated 30/06/2011, 02/04/2012 and 25/09/2012.
- 2.2 The emissions detailed in Table 2 are well below the emission limit values that were included in the Environmental Permit ELV with the exception of NO<sub>x</sub>. A furnace engineer has indicated that higher NO<sub>x</sub> emissions are typical of recuperative burners. However, NO<sub>x</sub> emissions are far lower than from the current homogenisers (see under paragraph 2.6, below).
- 2.3 The following emission points will remain, as described in Table S4.1 of the current permit:

| <b>Reference</b> | <b>Description</b>                  |
|------------------|-------------------------------------|
| A1               | Vent from bag filter plants 1 and 2 |
| A12              | Vent from bag filter plant 3        |
| A13              | Vent from holding furnace           |
| A15              | Vent from casting pit               |

- 2.4 The following emission points will be removed following successful installation and commissioning of the new equipment (subject to NRW approval):

| <b>Reference</b> | <b>Description</b>                   |
|------------------|--------------------------------------|
| A4, A5, A6       | Vents from No.1 homogenising furnace |
| A7, A8, A9       | Vents from No.2 homogenising furnace |

- 2.5 Figure 1, below, shows the location of the existing stacks and proposed emission point.



**Figure 1.** Aerial view showing locations of proposed stack and current stacks. Site boundary shown in blue.

- 2.6 Emissions from the current batch homogenisers are not currently subject to emission limit values, and have not been measured for several years. Results from a sampling exercise undertaken in 1995 are shown below. Note that the former HMIP limits were somewhat higher than current standards, with  $650 \text{ mg/m}^3$  for  $\text{NO}_x$  compared to the current  $60 \text{ mg/m}^3$  limit. It is presumed that each of the six stacks serving the batch homogenisers have a similar emissions profile.

Deeside Homogeniser Results, 22/03/95  
Temp at gas sampling position:  $566^\circ\text{C}$

Homogeniser Furnace No.2, Stack No.3  
Sampling time: 10:15 to 15:32

|                                        | Average              | Range                      | HMIP Limits           |
|----------------------------------------|----------------------|----------------------------|-----------------------|
| Stack gas temperatures                 | $557^\circ\text{C}$  | $425 - 587^\circ\text{C}$  | –                     |
| Emission concentrations                |                      |                            |                       |
| Carbon monoxide                        | $48 \text{ mg/m}^3$  | $0 - 115 \text{ mg/m}^3$   | $100 \text{ mg/m}^3$  |
| Oxides of nitrogen (as $\text{NO}_2$ ) | $162 \text{ mg/m}^3$ | $106 - 211 \text{ mg/m}^3$ | $650 \text{ mg/m}^3$  |
| Sulphur dioxide                        | $8 \text{ mg/m}^3$   | $0 - 27 \text{ mg/m}^3$    | $2250 \text{ mg/m}^3$ |

- 2.7 An environmental assessment of the possible emissions from the continuous homogeniser has been conducted using the Environment Agency's H1 software. A copy of this assessment has been included on the CD ROM that accompanies this application. Screenshots from the assessment are shown below.

| Number  | Description | Location or Grid Reference | Activity or Activities | Effective Height<br>metres | Efflux Velocity<br>m/s | Total Flow<br>m3/hr |
|---------|-------------|----------------------------|------------------------|----------------------------|------------------------|---------------------|
| e.g. A1 |             | North stack                |                        | 150                        | 25                     | 5,000               |
| 1       | A15         | New homogeniser exhaust    | Continuous homogeniser | 13                         | 8.2                    | 5218                |

**Figure 2.** Air release points. Note: the input figure for stack velocity was taken from monitoring conducted at Anglesey Aluminium by ESG in September 2012.

| Number | Substance                               | Meas'ment Method | Operating Mode (if relevant) | Data relating to Long Term effects |                     |                 | Data relating to Short Term effects |                     |                 | Annual Rate<br>tonne/yr | ELV Conc.<br>mg/m3 |
|--------|-----------------------------------------|------------------|------------------------------|------------------------------------|---------------------|-----------------|-------------------------------------|---------------------|-----------------|-------------------------|--------------------|
|        |                                         |                  |                              | Conc.<br>mg/m3                     | Release Rate<br>g/s | Meas'ment Basis | Conc.<br>mg/m3                      | Release Rate<br>g/s | Meas'ment Basis |                         |                    |
| e.g.   | sulphur dioxide                         | Estimated*       | 70% load                     | 1510                               | 3000                | annual avg      | 1510                                | 3000                | hourly avg      | 55,000                  | 2000               |
| 1      | Particulates (PM10) (24 hr Mean)        | Estimate         |                              | 5                                  | 0.00725             | Permit ELV x    | 5                                   | 0.00725             | Permit ELV      | 0.07                    | 5                  |
| 2      | Hydrogen chloride                       | Estimate         |                              | 5                                  | 0.00725             | Permit ELV x    | 5                                   | 0.00725             | Permit ELV      | 0.003                   | 5                  |
| 3      | Carbon monoxide                         | Estimate         |                              | 150                                | 0.21742             | Permit ELV x    | 150                                 | 0.21742             | Permit ELV      | 1.27                    | 150                |
| 4      | Methane                                 | Estimate         |                              | 50                                 | 0.07247             | Permit ELV x    | 50                                  | 0.07247             | Permit ELV      | 0.24                    | 50                 |
| 5      | Nitrogen Dioxide                        | Estimate         |                              | 60                                 | 0.08697             | Permit ELV x    | 30                                  | 0.04348             | Permit ELV x    | 5.12                    | 60                 |
| 6      | Hydrogen fluoride (as F) (Monthly Mean) | Estimate         |                              | 1                                  | 0.00145             | Permit ELV x    | 1                                   | 0.00145             | Permit ELV      | 0.01                    | 1                  |
| 7      | Sulphur Dioxide (1 Hour Mean)           | Estimate         |                              | 50                                 | 0.07247             | Permit ELV x    | 50                                  | 0.07247             | Permit ELV      | 0.01                    | 50                 |

**Figure 3.** Air Emissions Inventory. Concentration inputs based on permit ELV's in place at Anglesey Aluminium.

| Number | Substance                               | Long Term EAL | Short Term EAL | Long Term   |             |              | Short Term  |             |               |
|--------|-----------------------------------------|---------------|----------------|-------------|-------------|--------------|-------------|-------------|---------------|
|        |                                         | µg/m3         | µg/m3          | PC<br>µg/m3 | % PC of EAL | > 1% of EAL? | PC<br>µg/m3 | % PC of EAL | > 10% of EAL? |
| 1      | Particulates (PM10) (24 hr Mean)        | -             | 50.0           | 0.173       | -           |              | 3.30        | 6.59        | No            |
| 2      | Hydrogen chloride                       | -             | 750            | 0.173       | -           |              | 3.30        | 0.439       | No            |
| 3      | Carbon monoxide                         | -             | 10,000         | 5.18        | -           |              | 98.8        | 0.988       | No            |
| 5      | Nitrogen Dioxide                        | 40.0          | 200            | 2.07        | 5.18        | Yes          | 19.8        | 9.88        | No            |
| 6      | Hydrogen fluoride (as F) (Monthly Mean) | 16.0          | 160            | 0.0369      | 0.231       | No           | 0.659       | 0.412       | No            |
| 7      | Sulphur Dioxide (1 Hour Mean)           | -             | 350            | 1.73        | -           |              | 33.0        | 9.41        | No            |

**Figure 4.** Air Impact Screening.

| Number | Substance        | Air Bkgrnd Conc.<br>µg/m3 | Long Term   |                                 |              | Short Term   |             |                                 |
|--------|------------------|---------------------------|-------------|---------------------------------|--------------|--------------|-------------|---------------------------------|
|        |                  |                           | PC<br>µg/m3 | % PC of headroom (EAL - Bkgrnd) | PEC<br>µg/m3 | % PEC of EAL | PC<br>µg/m3 | % PC of headroom (EAL - Bkgrnd) |
| e.g.   |                  | 12                        |             |                                 |              |              |             |                                 |
| 5      | Nitrogen Dioxide | 13                        | 2.07        | 7.66                            | 15.1         | 37.7         | 19.8        | 11.4                            |

**Figure 5.** Air Impact Modelling. Background NO<sub>2</sub> concentration is based on annual hourly mean data from the nearest monitoring site, Isycoed (adjacent to the north-east corner of Wrexham Industrial Estate).

- 2.8 Using the permit emission limit values that applied at Anglesey Aluminium as inputs, the H1 assessment screens out the emissions of all parameters in both the long and short term, with the exception of nitrogen dioxide, which exceeds 1% of the long term EAL. With this value added to the background level the overall percentage of the EAL is 37.7%.
- 2.9 For air impact screening, both long and short term results are below the relevant thresholds, above which detailed modelling may be required (70% for Long Term %PEC of EAL and 20% Short Term %PC of headroom).

- 2.10 A separate run of H1 was completed using a higher input for NO<sub>2</sub>, based on the average of three sampling exercises undertaken at Anglesey Aluminium in 2011-2012. The results of this show that emissions are not screened-out as insignificant, with a predicted process contribution of 9.6% and 18.4% of the long term and short term EALs (respectively) – see Figure 6, below.

| Number | Substance             | Long Term EAL     | Short Term EAL    | Long Term |             |              | Short Term |             |               |
|--------|-----------------------|-------------------|-------------------|-----------|-------------|--------------|------------|-------------|---------------|
|        |                       | µg/m <sup>3</sup> | µg/m <sup>3</sup> | PC        | % PC of EAL | > 1% of EAL? | PC         | % PC of EAL | > 10% of EAL? |
| 1      | Particulates (PM10) [ | -                 | 50.0              | 0.173     | -           |              | 3.30       | 6.59        | No            |
| 2      | Hydrogen chloride     | -                 | 750               | 0.173     | -           |              | 3.30       | 0.439       | No            |
| 3      | Carbon monoxide       | -                 | 10,000            | 5.18      | -           |              | 98.8       | 0.988       | No            |
| 5      | Nitrogen Dioxide      | 40.0              | 200               | 3.85      | 9.61        | Yes          | 36.7       | 18.4        | Yes           |
| 6      | Hydrogen fluoride (as | 16.0              | 160               | 0.0369    | 0.231       | No           | 0.659      | 0.412       | No            |
| 7      | Sulphur Dioxide (1 H  | -                 | 350               | 1.73      | -           |              | 33.0       | 9.41        | No            |

**Figure 6.** H1 result using higher input for NO<sub>2</sub> based on average of three measured results rather than permit ELV (111.47mg/m<sup>3</sup> rather than 60mg/m<sup>3</sup>)

| Number | Substance        | Air Bkgnd Conc.<br>µg/m <sup>3</sup> | Long Term               |                                   |                          | Short Term   |                         |                                   |
|--------|------------------|--------------------------------------|-------------------------|-----------------------------------|--------------------------|--------------|-------------------------|-----------------------------------|
|        |                  |                                      | PC<br>µg/m <sup>3</sup> | % PC of headroom<br>(EAL - Bkgnd) | PEC<br>µg/m <sup>3</sup> | % PEC of EAL | PC<br>µg/m <sup>3</sup> | % PC of headroom<br>(EAL - Bkgnd) |
|        |                  | e.g. 12                              |                         |                                   |                          |              |                         |                                   |
| 5      | Nitrogen Dioxide | 13                                   | 3.85                    | 14.3                              | 16.9                     | 42.2         | 36.7                    | 21.1                              |

**Figure 7.** Air Impact Screening result based on higher NO<sub>2</sub> input.

- 2.11 When combined with the existing background concentration of NO<sub>2</sub>, the predicted environmental concentration is 42.2% of the long term EAL of 40µg/m<sup>3</sup>. This leaves 58% of "headroom" before the EAL is at risk of being breached. According to H1 Guidance, detailed dispersion modelling may be required if the PEC is 70% of the EAL, which is not the case. The short term result is marginally over the 20% threshold for %PC of headroom, above which detailed modelling may be required.
- 2.12 Using either the former permit ELVs or measured results as inputs to H1, the results indicate that the statutory environmental quality standard for NO<sub>2</sub> is not at risk of being breached due to additional emissions from the continuous homogeniser. It is thought that any further detailed modelling is likely to show a lower process contribution than that calculated in H1, and there are no air quality management areas nearby, or sensitive human or ecological receptors that will be impacted from the additional contribution of NO<sub>x</sub> to air.
- 2.13 The overall process contribution from the installation as a whole will decrease as the new emission source will replace six emission points serving the two batch homogenisers (i.e. the continuous homogeniser will be replacing an existing emissions source which has higher emission concentrations). The aggregate thermal capacity for the permitted installation will fall from 17.9MW to 15.8MW as the continuous homogeniser has a rated thermal input of 4.3 MW and will be replacing two batch homogenisers with an aggregate thermal input of 6.4MW.
- 2.14 A further run of H1 was completed based on a stack height of 18m – see Figure 8. There is no appreciable gain in terms of emissions dispersal, as NO<sub>2</sub> emissions are still not screened-out as insignificant in the long term (see Figure 6). A further consideration regarding stack height is that planning permission would be required for a stack of 18-20 metres. Considering the efflux velocity and thermal buoyancy of the plume (gases will be exiting at approximately 300°C), it is proposed that a

13m high stack would enable effective dispersal of combustion product emissions from the continuous homogeniser.

| Number | Substance             | Long Term | Short Term | Long Term |             |              | Short Term |             |               |
|--------|-----------------------|-----------|------------|-----------|-------------|--------------|------------|-------------|---------------|
|        |                       | EAL       | EAL        | PC        | % PC of EAL | > 1% of EAL? | PC         | % PC of EAL | > 10% of EAL? |
|        |                       | µg/m3     | µg/m3      | µg/m3     | %           |              | µg/m3      | %           |               |
| 1      | Particulates (PM10) [ | -         | 50.0       | 0.0731    | -           |              | 1.78       | 3.55        | <b>No</b>     |
| 2      | Hydrogen chloride     | -         | 750        | 0.0731    | -           |              | 1.78       | 0.237       | <b>No</b>     |
| 3      | Carbon monoxide       | -         | 10,000     | 2.20      | -           |              | 53.3       | 0.533       | <b>No</b>     |
| 5      | Nitrogen Dioxide      | 40.0      | 200        | 0.877     | 2.20        | <b>Yes</b>   | 10.7       | 5.33        | <b>No</b>     |
| 6      | Hydrogen fluoride (as | 16.0      | 160        | 0.0170    | 0.106       | <b>No</b>    | 0.355      | 0.222       | <b>No</b>     |
| 7      | Sulphur Dioxide (1 H  | -         | 350        | 0.731     | -           |              | 17.8       | 5.07        | <b>No</b>     |

**Figure 8.** H1 result based on 18m high stack (equivalent to A13, Holding Furnace). NO<sub>2</sub> still unable to be screened-out as insignificant.

### **3. Operating Techniques**

- 3.1 The continuous homogeniser, sawing and packing line will be operated and maintained in accordance with the manufacturer's (Hertwich) requirements. Hertwich will also be involved during the installation and commissioning of the equipment, and in the training of operations and maintenance personnel. The equipment is considered to represent "BAT" for the heat treatment of extrusion ingot. Similar equipment is in operation at many other aluminium manufacturing sites, including several "remelt" sites operated by Hydro Aluminium.
- 3.2 The layout of the equipment is detailed in Appendices 2 to 4, below.
- 3.3 The objectives of the project are to improve energy efficiency and increase finished product length to 7 meters by installing a new (used) continuous homogenising furnace including sawing/stacking/packing of extrusion ingots. The project also includes increasing the scrap storage, segregation and sorting capacity by demolishing the old homogenisers and saw which will be replaced with new scrap bays. The plant capacity will remain at net 63,000 tonnes/year.
- 3.4 Emissions from the continuous homogeniser will comprise combustion products only. These will be controlled and minimised as follows.
- 3.5 The furnace is fuelled with natural gas only and fired using recuperative burners. The design of the burners allows the use of hot exhaust to pre-heat the incoming combustion air and fuel gas to boost efficiency.
- 3.6 Burner efficiency will be maintained through real time monitoring of process variables via a dedicated computer system, and scheduled preventative maintenance.
- 3.7 Regarding noise, the new homogeniser is rated at 80dB(A), while noise inside the plant from current operations has been measured at 80-100dB(A). It is thought that the new equipment will reduce overall noise due to removing the need for a manually-operated laydown station and subsequent reduced "chiming" of logs as they will not be being turned through 90 degrees after being lifted from the casting pit (as is currently the case). The process is automated as soon as the logs are lowered on to the new laydown station. Noise from sawing operations will also be reduced, as both the cutting and the collection of sawn offcuts (butt ends) will take place inside an acoustic enclosure.
- 3.8 An internal noise survey has been commissioned for June 2014, following installation and commissioning of the equipment. This will serve to update internal noise exposure monitoring previously undertaken at our site. It would also be possible to run the annual environmental noise survey at this time rather than the usual November/December date in order to provide additional noise data as soon as possible.

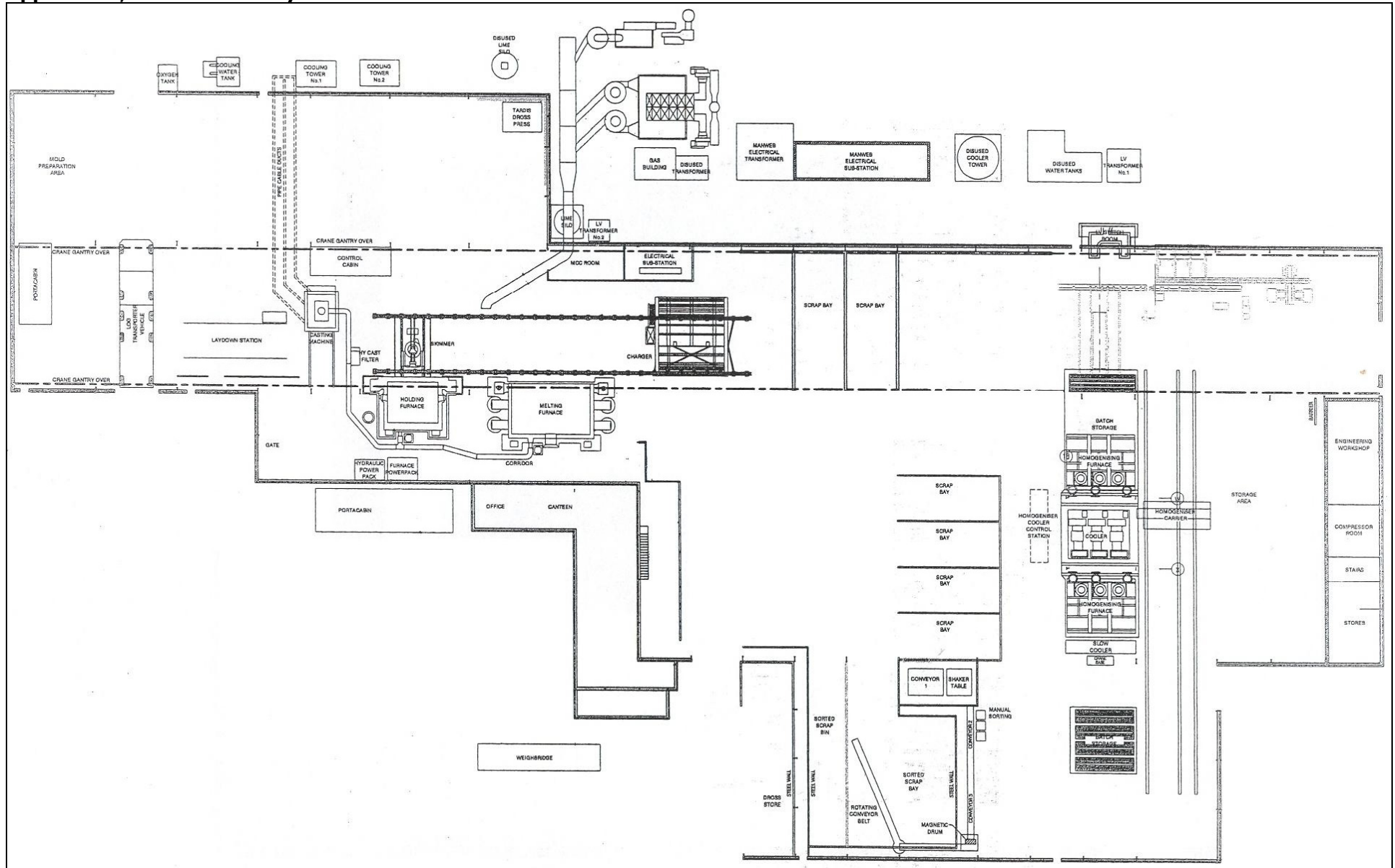
## **4. Monitoring**

- 4.1 Measures for monitoring emissions detailed in Table 2 of Application Form C3... Stacks A1, A12 (serving the bag plants) and A13 (holding furnace stack) are subject to continuous monitoring of particulate emissions using an MCERTS-certified CEM. The remaining parameters detailed in Table S4.1 of the Environmental Permit are subject to extractive sampling which takes place twice a year for stacks A1 and A12 and annually for A13. Periodic monitoring is undertaken by MCERTS-qualified personnel.
- 4.2 The batch homogenisers currently in use have no emission limit values prescribed in the environmental permit and are not subject to monitoring requirements. The continuous homogeniser will consume less gas and emit lower concentrations of substances. Following commissioning of the equipment, a monitoring exercise will be undertaken to confirm that this is the case. It is thought that further ongoing periodic monitoring would not be necessary, in line with current permit requirements. The design of the stack serving the continuous homogeniser exhaust has not yet been finalised – this will be completed in consultation with NRW to ensure that any potential monitoring requirements can be met.
- 4.3 Environmental monitoring is undertaken in the form of an annual noise survey, which measures noise emanating from site operations at a point close to residential property. This monitoring is undertaken by an experienced contractor, using a standard methodology (BS4142). It is proposed to conduct this survey soon after commissioning of the new equipment (June 2014), to provide data on environmental noise levels as soon as possible.

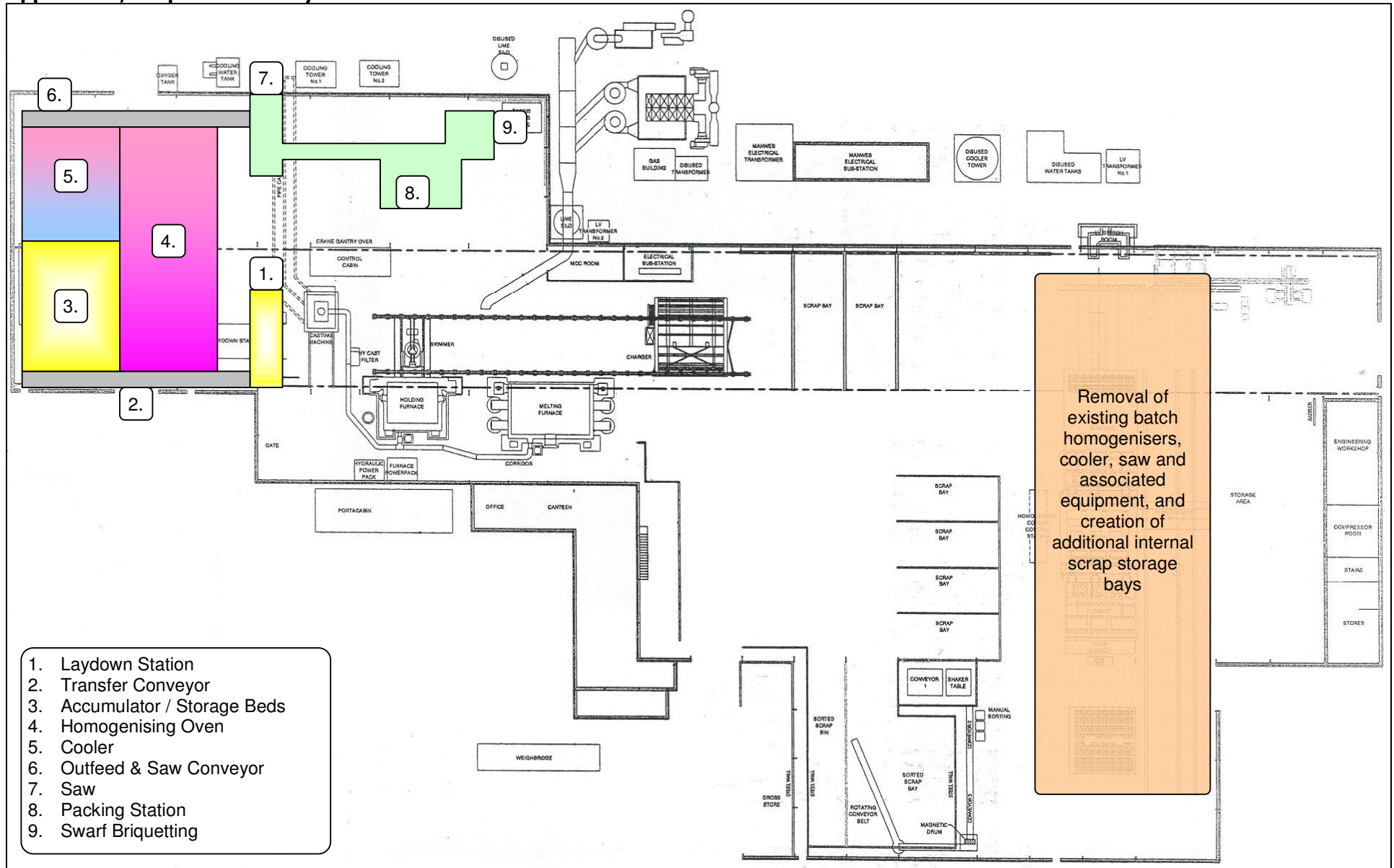
## **5. Resource Efficiency and Climate Change**

- 5.1 Regarding basic measures for improving energy efficiency, energy consumption is monitored to provide input to both site-based and corporate level performance indicators. This will continue following the installation of the new equipment.
- 5.2 One of the key benefits envisaged is that gas consumption will be reduced compared to the batch homogenisers. The new equipment will enable greater control over the heat treatment process, will have a higher level of insulation compared to the current homogenisers, and is equipped with an efficient recuperative burner design.
- 5.3 The raw materials and other materials used will not change from those currently in use. Currently, cast aluminium extrusion ingot logs are fed into one of two homogenisers for heat treatment, then transferred to a separate chamber for controlled cooling. Each load is then transported to the saw for cutting and packing. These operations consume synthetic saw lube, plastic banding and wooden bearers. These materials will continue to be used, albeit in a more automated, continuous process than current operations.
- 5.4 Regarding waste avoidance, recovery and disposal, the automated sawing and packing line incorporates swarf briquetting equipment. It is hoped that this will enable the swarf (aluminium turnings) from the cutting operation to be returned to the production process and recycled on-site. Swarf is currently collected for off-site reprocessing and in 2013 accounted for 4% of the total waste leaving the site. This is the second largest waste stream, after dross at 82%. Overall, 99% of all waste was recycled (off-site) in 2013.

## Appendix 1, Current Site Layout

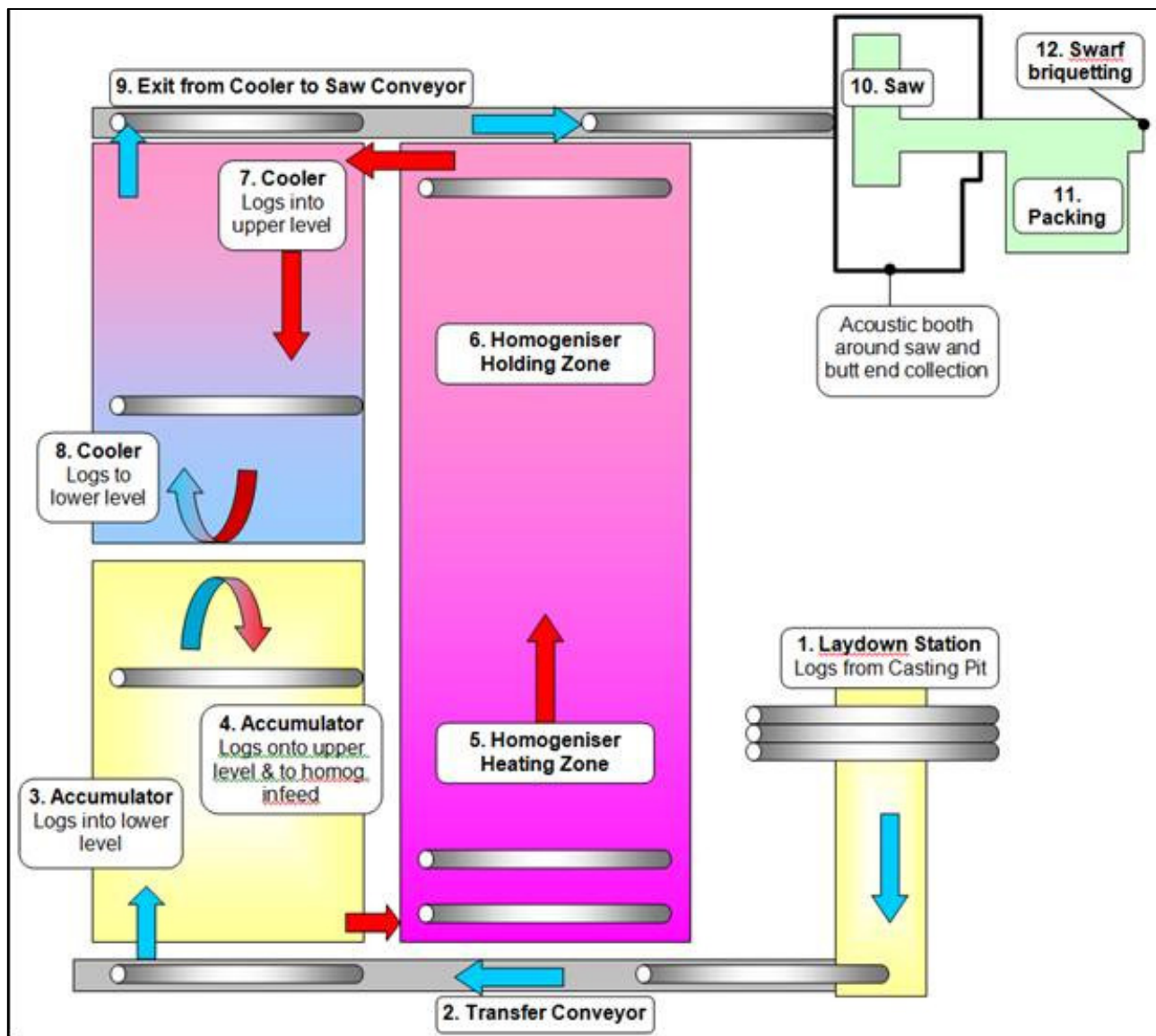


## Appendix 2, Proposed Site Layout



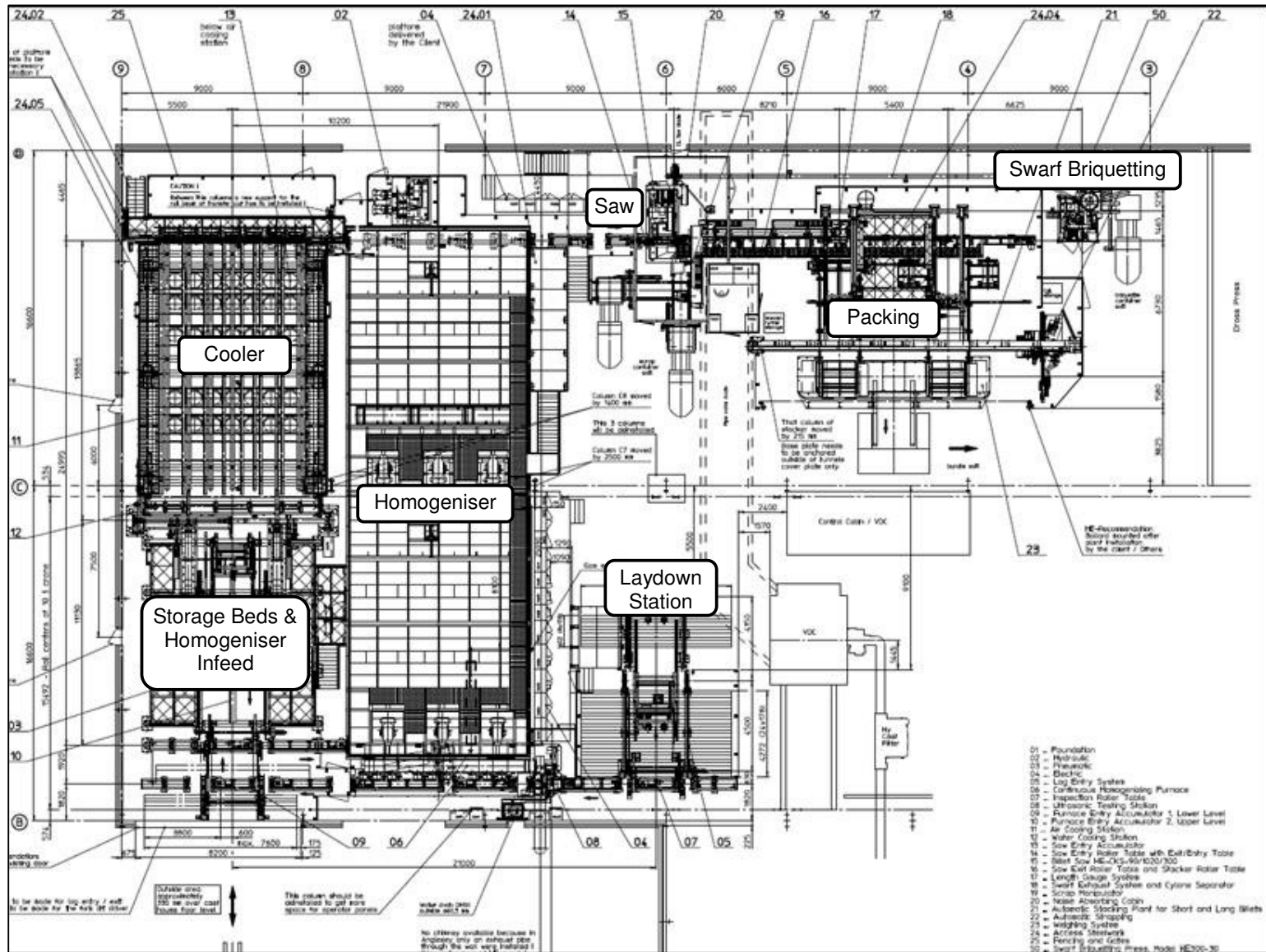
### Appendix 3

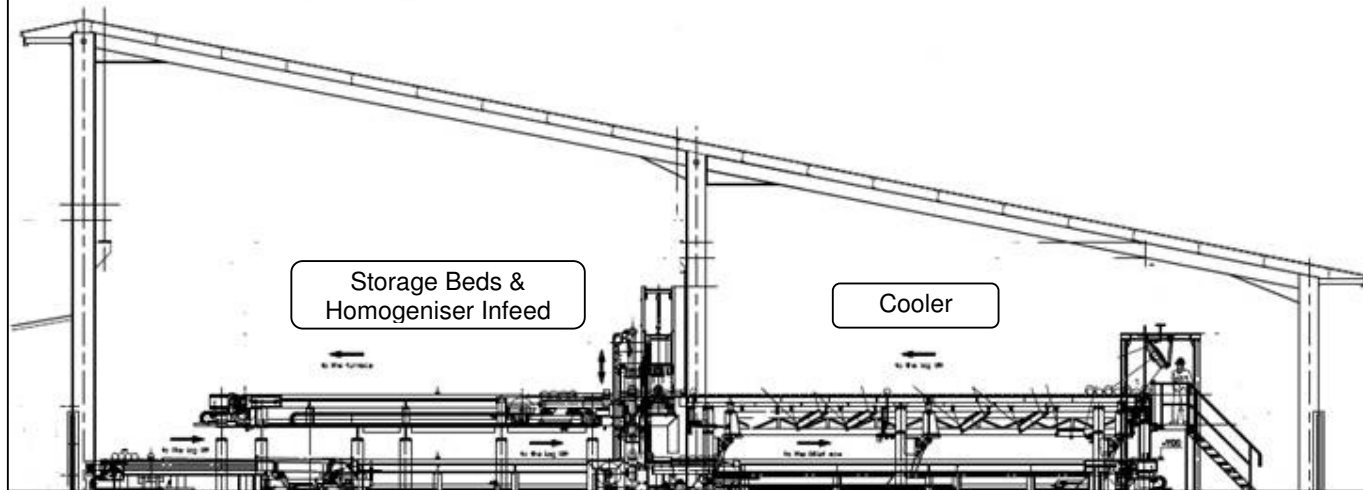
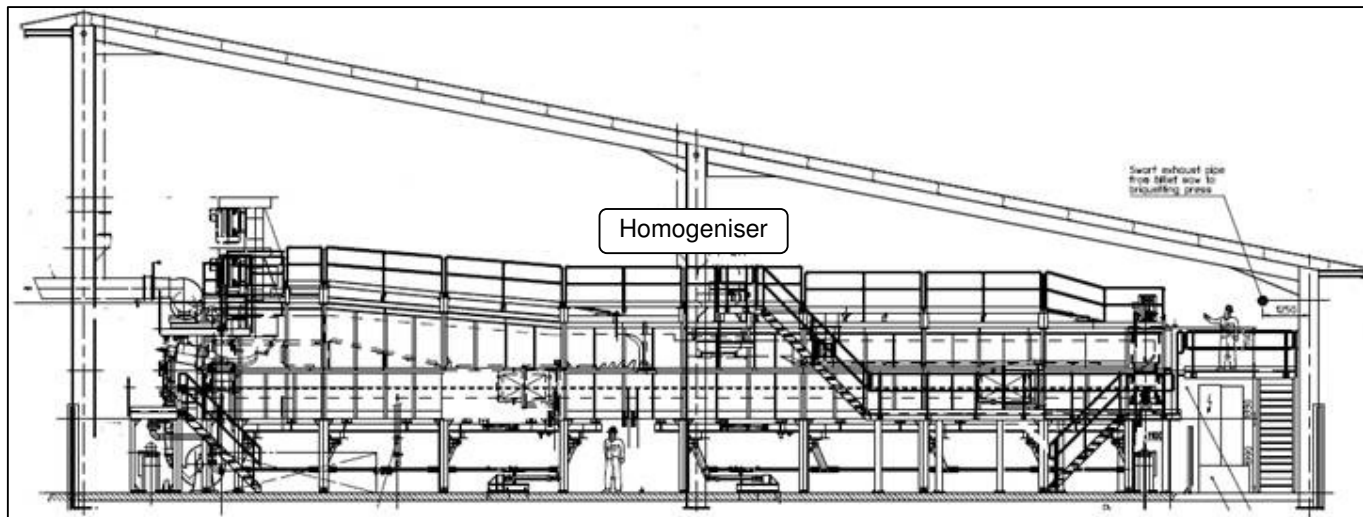
#### Block diagram of Continuous Homogeniser, Sawing and Packing Line



Note: the Accumulator and Cooler are two-storey structures where logs are moving on both levels, in opposite directions (lower level movements are indicated by blue arrows, upper level movements by red arrows).

# Appendix 4, Schematics Continuous Homogeniser, Cooler, Sawing and Packing Line (plan and elevation views)





## Appendix 5, Evidence of Participation in a Climate Change Agreement

CCA Evidence (Hydro Aluminium Deeside is highlighted on p.2 of EA list)

|                                                             |                                                                                                               |               |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|---------------|
| Climate Change Levy: Reduced Rate Certificate                                                                                                                                                                                  |                                                                                                               | 31 May 2013   |
| (For the purposes of Paragraph 44 of Schedule 6 to the Finance Act 2000)                                                                                                                                                       |                                                                                                               |               |
| The Environment Agency certifies that the following facilities in the Aluminium sector are to be taken as being covered by a climate change agreement made between the Environment Agency and the Aluminium Federation (AFED): |                                                                                                               |               |
| Last Updated: 31 May 2013                                                                                                                                                                                                      |                                                                                                               |               |
| Facility Identifier                                                                                                                                                                                                            | Facility Address                                                                                              | Approval Date |
| AFED/F00001                                                                                                                                                                                                                    | JBM International Ltd, Kingsilver Refinery, Hixon, ST18 0PY, England                                          | 01 Apr 2013   |
| AFED/F00003                                                                                                                                                                                                                    | Magnesium Elektron Limited, PO Box 23, Rake Lane, Swinton, M27 8DD, England                                   | 01 Apr 2013   |
| AFED/F00004                                                                                                                                                                                                                    | Metallic Protectives Ltd, Units 1,2,3 The Cobalt Centre, South Park, Kineton Road, Southam, CV47 0FD, England | 01 Apr 2013   |
| AFED/F00005                                                                                                                                                                                                                    | W Whitehead Alloys Ltd, 2 - 4 Buck Street, Middlesbrough, TS2 1LW, England                                    | 01 Apr 2013   |
| AFED/F00006                                                                                                                                                                                                                    | Bridgnorth Aluminium Ltd., Stourbridge Road, Bridgnorth, WV15 6AU, England                                    | 01 Apr 2013   |
| AFED/F00007                                                                                                                                                                                                                    | Mil-Ver Metal Company Ltd, Coronel Avenue, Rowley Green Ind. Estate, Coventry, CV6 6AP, England               | 01 Apr 2013   |
| AFED/F00008                                                                                                                                                                                                                    | Euramax Coated Products Limited, Brunel Road, Corby, NN17 4JW, England                                        | 01 Apr 2013   |
| AFED/F00009                                                                                                                                                                                                                    | Powdertech Ltd, 108 Churchill Road, Bicester, OX26 7XD, England                                               | 01 Apr 2013   |
| AFED/F00010                                                                                                                                                                                                                    | CMK (Treatments) Ltd, Park Street, Oldbury, B69 4LH, England                                                  | 01 Apr 2013   |
| AFED/F00012                                                                                                                                                                                                                    | LBL Finishers, Gunstore Road, Hilsea, Portsmouth, PO3 5HL, England                                            | 01 Apr 2013   |
| AFED/F00013                                                                                                                                                                                                                    | Birmingham Powder Coatings, Clonmel Road, Stirchley, Birmingham, B30 2BU, England                             | 01 Apr 2013   |
| AFED/F00014                                                                                                                                                                                                                    | Sims F E Mottram Ltd, Oakes Green, Sheffield, S9 3WS, England                                                 | 01 Apr 2013   |
| AFED/F00017                                                                                                                                                                                                                    | Evans and Reid Alloys Ltd, Anchor Works, Anchor Road, Coseley, WV14 9NA, England                              | 01 Apr 2013   |
| AFED/F00018                                                                                                                                                                                                                    | Tandon Metallurgical Group Ltd, Radnor Park Industrial Estate, Congleton, Cheshire, CW12 4XE, England         | 01 Apr 2013   |
| AFED/F00019                                                                                                                                                                                                                    | Aspect Powder Coatings Ltd, Aspect House, Coneygre Ind. Estate, Birmingham New Road, Tipton, DY4 8XP, England | 01 Apr 2013   |
| AFED/F00020                                                                                                                                                                                                                    | Avon Metals Ltd, Ashville Works, Bristol Road, Gloucester, GL2 6DA, England                                   | 01 Apr 2013   |
| AFED/F00021                                                                                                                                                                                                                    | Coleshill Aluminium Ltd, Gorsey Lane, Coleshill, B46 1JU, England                                             | 01 Apr 2013   |
| AFED/F00022                                                                                                                                                                                                                    | Barley Chalu Limited, Ayton Road, Wymondham, NR18 0QH, England                                                | 01 Apr 2013   |
| AFED/F00023                                                                                                                                                                                                                    | Timet UK Limited, PO Box 704, Witton, Birmingham, West Midlands, B6 7UR, England                              | 01 Apr 2013   |
| AFED/F00024                                                                                                                                                                                                                    | Timet UK Limited, PO Box 57, Ystrad Road, Swansea, SA1 1XD, Wales                                             | 01 Apr 2013   |
| AFED/F00025                                                                                                                                                                                                                    | Kodak Polychrome Graphics, Howley Park Estate, Morley, Leeds, LS27 0QT, England                               | 01 Apr 2013   |
| AFED/F00026                                                                                                                                                                                                                    | Norton Aluminium Ltd, Norton Green Lane, Norton Canes, Cannock, WS11 3PS, England                             | 01 Apr 2013   |
| AFED/F00027                                                                                                                                                                                                                    | Silberline Ltd, Banbeath Road, Leven, KY8 5HD, Scotland                                                       | 01 Apr 2013   |
| AFED/F00028                                                                                                                                                                                                                    | Sapa Profiles Limited, Sawpit Industrial Estate, Tibshelf, Alfreton, DE55 5NH, England                        | 01 Apr 2013   |

environment-agency.gov.uk 1 of 2

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**Climate Change Levy: Reduced Rate Certificate**

31 May 2013

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|-------------|----------------------------------------------------------------------------------------------------------------------|-------------|
| AFED/F00029 | Sapa Profiles Limited, Tewkesbury Road, Cheltenham, GL51 9DT, England                                                | 01 Apr 2013 |
| AFED/F00030 | Agfa-Gevaert UK Manufacturing, Coal Road, Leeds, LS14 2AL, England                                                   | 01 Apr 2013 |
| AFED/F00031 | Novelis Can, Litho & Recycling, Latchford Locks Works, Warrington, WA4 1NP, England                                  | 01 Apr 2013 |
| AFED/F00032 | London & Scandinavian Metallurgical Co, Fullerton Road, Rotherham, S60 1DL, England                                  | 01 Apr 2013 |
| AFED/F00033 | Hoganas (Great Britain) Ltd, Munday Works, 58-66 Morley Road, Tonbridge, TN9 1RP, England                            | 01 Apr 2013 |
| AFED/F00034 | Hydro Aluminium Extrusions Ltd, Pantglas Industrial Estate, Bedwas, CF83 8DR, Wales                                  | 01 Apr 2013 |
| AFED/F00035 | Hydro Aluminium Deeside Ltd, Bridge Road, Wrexham Ind. Estate, Wrexham, LL13 9PS, Wales                              | 01 Apr 2013 |
| AFED/F00036 | Architectural Powder Coatings Limited, Blaydon Industrial Park, Chainbridge Road, Blaydon-on-Tyne, NE21 5NZ, England | 01 Apr 2013 |
| AFED/F00037 | United Anodisers Ltd, Field Mills, Red Doles Lane, Leeds Road, Huddersfield, HD2 1YG, England                        | 01 Apr 2013 |
| AFED/F00038 | United Anodisers Ltd, Wallingford Road, Uxbridge, UB8 2SR, England                                                   | 01 Apr 2013 |
| AFED/F00039 | The Brock Metal Company, Walsall Road, Cannock, WS11 3NR, England                                                    | 01 Apr 2013 |
| AFED/F00040 | Aleris Recycling (Swansea) Ltd, P O Box 38, Swansea, SA5 4YG, Wales                                                  | 01 Apr 2013 |
| AFED/F00041 | Befesa Salt Slags Ltd, Fenns Bank, Whitchurch, SY13 3PA, England                                                     | 01 Apr 2013 |
| AFED/F00043 | Alcoa European Mill Products, PO Box 383, Kitts Green, Birmingham, B33 9QR, England                                  | 01 Apr 2013 |
| AFED/F00044 | W Hallam Castings Ltd, Coulman Road Ind. Estate, Thorne, Doncaster, DN8 5JU, England                                 | 01 Apr 2013 |
| AFED/F00045 | Aluminium Powder Company Ltd, Penrhos Works, PO Box 4, Holyhead, LL65 2UJ, Wales                                     | 01 Apr 2013 |
| AFED/F00046 | Aluminium Powder Company Ltd, Forge Lane, Minworth, Sutton Coldfield, B76 1AF, England                               | 01 Apr 2013 |
| AFED/F00047 | Powdertech (Corby) Ltd, Cockerell Road, Pheonix Parkway, Corby, Northants, NN17 5DU, England                         | 01 Apr 2013 |

