Installation Report
Celsa Manufacturing (UK) Ltd, Cardiff, Section Mill, Tremorfa Works, Seawall, Road, Tremorfa, Cardiff, CF24 5TH

On behalf of:
Celsa Manufacturing (UK) Ltd

Project Reference:
024-1973

Revision:
REV00

Date:
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Revision	**Date**	**Author(s)**	**Authorised by**	**Reason for Change**
00	20/12/24	MS	SPR	First issue to the Client

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Abbreviations

AST	Above Ground Storage Tank
ASR	Application Site Report
BAT	Best Available Technique
BGS	British Geological Survey
BREF	Best Available Techniques Reference Documents
DEFRA	Department for Environment Food and Rural Affairs
EA	Environment Agency
EAME	Earth & Marine Environmental Consultants Ltd
EMS	Environmental Management System
EPR	Environmental Permit
FRA	Flood Risk Assessment
FPP	Fire Prevention Plan
IBC	Intermediate Bulk Container
mg/l	milligrams per litre
NGR	National Grid Reference
NRW	Natural Resources Wales
Opra	Operational Risk Appraisal
PPM	Planned Preventative Maintenance
SCR	Site Condition Report
SSSI	Site of Special Scientific Interest
µg/l	micrograms per litre

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1 Introduction

1.1 Background

This document has been prepared by Celsa Manufacturing (UK) Ltd ("Celsa") and its environmental consultant Earth & Marine Environmental Consultants Ltd ("EAME") in support of a permit application (variation) as required under the *Environmental Permitting (England and Wales) Regulations 2016* concerning current and proposed activities to be undertaken at Celsa Manufacturing (UK) Ltd, Cardiff, Section Mill, Tremorfa Works, Seawall, Road, Tremorfa, Cardiff, CF24 5TH (Permit Ref. BV0767IT (the "Site").

The Authorised Company contact is Gabriella Nizam (Celsa UK, Head of Sustainability & Public Affairs).

The status log (history) for the permit is outlined in **Table *1-1***.

Table 1-1: *Celsa Section Mill Permit Log*

Description	Date	Comments
Application BV0759	02/06/2003	
Duly Made	11/06/2003	
Request for information	02/10/2003	Response on 24/10/2003
Permit determined/issued	28/11/2003	

1.2 Current Permitted Activities

The activities subject to this Permit are a 65 tonne/hour 16" section hot-rolling mill and associated activities, namely the operation of a re-heating furnace, water cooling systems, water treatment, raw material handling and storage, and product handling and storage.

The installation involves the hot-rolling of steel billet to produce various-sized steel sections. The hot billet passes through the mill's single heating stage and is then processed on rolling lines. The heating is supplied from a 44 MWTh furnace, firing on gas with a backup fuel of light fuel oil. Combustion gases pass from the furnace through a two-stage heat exchanger which preheats the combustion air. These gases are released from a single 36-metre stack.

Scale forms on the billet surface that detaches within the furnace, with any remaining after the heating stage being removed by spraying water from high-pressure water jets, which also serve to cool the billet as it is being rolled. The hot billet is first passed through a primary rolling stage, before being directed to the Section Mill finishing line, where it undergoes further rolling to the desired product dimensions.

To support these activities, there is an onsite effluent treatment plant and scale weathering process. Treated effluent is discharged directly to the sewer under Welsh Water Consent No. TE147F of 2006.

1.3 Proposed Variation Application

This permit variation application proposes the following changes to the current permitted installation:

- **Installation** of a new 140 MT/h reheat furnace with low NOx burners and future hydrogen-ready capacity. The unit will also include a new 60-metre-high stack, water treatment plant and electrical control building. The new furnace will maintain and utilise the existing pump house.
- **Removal** of the existing furnace and associated plant and equipment. The units will be decommissioned and removed once the new gas-fired furnace is commissioned.
- **Removal** of existing diesel fuel storage tank (within the permitted boundary).

The remainder of this document outlines the requirements required by Natural Resources Wales (NRW) to progress the permit variation application. The document represents the Main Installation Report submitted as part of the application package (EAME Ref. 024-1973).

1.4 Pre-Application Advice and Consultation

Pre-application advice was obtained (via email) from NRW. Where required the advice has been followed and included within this application.

1.5 Permit Boundary

The proposed variation does not alter the existing permit boundary that is outlined within Schedule 5 of the current environmental permit (Ref. BV0767IT) *i.e.* no additional land is required to implement the project.

An updated Site Condition Report (in the current required format) has been provided within the application package as additional ground information has been collected and a diesel fuel tank (within the permitted installation) has been removed (Ref. **024-1973 Celsa Permit Variation - SCR REV00**).

1.6 Schedule 1 Determination

The current environmental permit was determined and issued in 2003 (21 years ago). Since that date, the principal regulations have been subject to various reviews and updates. The status of the activities is outlined below.

Existing activity (no change proposed) – Section 2.1 A(1)(c) – Processing ferrous metals and their alloys by using hot-rolling mills with a production capacity of more than 20 tonnes of crude steel per hour.

No change – activity to remain listed as a Section 2.1A(1)(c) activity.

Replacement activity – Operation of a 140 MT/h reheat furnace with low NOx burners and future hydrogen-ready capacity.

The current furnace is a 44 MWth unit that typically runs at nearer 25 MWth due to downstream restrictions that prevent the furnace from running at the maximum net-rated thermal input. The same downstream restrictions will apply to the new furnace.

The new furnace has been designed to run using natural gas, a blend of natural gas and hydrogen and under full hydrogen. The net-rated thermal input under each scenario is outlined in **Table *1-2***.

Zone		Burners Air Capacity	100% Natural Gas		20% H_2		40% H_2		60% H_2		80% H_2		100% H_2	
		Air Flow	Natural Gas	Heat input	Blended fuel flow	Heat input	Blended fuel flow	Heat input	Blended fuel flow	Heat input	Blended fuel flow	Heat input	H_2 flow	Heat input
		(Nm^3/h)	(Nm^3/h)	(kW)	(Nm^3/h)	(kW)	(Nm^3/h)	(kW)	(Nm^3/h)	(kW)	(Nm^3/h)	(kW)	(Nm^3/h)	(kW)
1	Upper	5100	482	4924	542	4756	660	4835	843	4958	1167	5177	1895	5668
1	Lower	5100	482	4924	542	4756	660	4835	843	4958	1167	5177	1895	5668
2	Upper	5100	482	4924	542	4756	660	4835	843	4958	1167	5177	1895	5668
2	Lower	6450	610	6228	686	6015	835	6114	1067	6271	1476	6547	2397	7168
3	Upper	5100	482	4924	542	4756	660	4835	843	4958	1167	5177	1895	5668
3	Lower	5100	482	4924	542	4756	660	4835	843	4958	1167	5177	1895	5668
4	Upper	5100	482	4924	542	4756	660	4835	843	4958	1167	5177	1895	5668
4	Lower	5100	482	4924	542	4756	660	4835	843	4958	1167	5177	1895	5668
5	Upper	3200	303	3090	340	2984	414	3034	529	3111	732	3248	1189	3556
5	Lower	5100	482	4924	542	4756	660	4835	843	4958	1167	5177	1895	5668
Total		50,450	4,770	48,712	5,366	47,051	6,531	47,826	8,343	49,048	11,547	51,210	18,748	56,068
Net Rated Thermal Input (MWth)				48.712		47.051		47.826		49.048		51.21		56.068

Table 1-2: *Net rated thermal input (under different scenarios)*

The above figures are calculated on the basis that all 20 burners are operating at the maximum gas flow rate. This is not the proposed operating state of the furnace, in addition, like the current situation, downstream restrictions prevent the furnace from running at the maximum net-rated thermal input. It is therefore considered highly unlikely that the furnace will exceed the 50 MWth threshold.

The furnace activity will not be captured under the Medium Combustion Plant Directive (MCPD) or Large Combustion Plant Directive (LCPD) as the furnace uses combustion for direct heating and falls out of the scope of these directives. The furnace (under actual operating conditions, not theoretical maximum) is less than 50 MWth so does not need to be considered under Chapter III of the Industrial Emissions Directive (IED).

The process should remain as a Directly Associated Activity.

Existing activity (no change proposed) – Descaling, roughing and cooling of rolled product.

The process should remain as a Directly Associated Activity.

Existing activity (no change proposed) – Raw material handling and storage.

The process should remain as a Directly Associated Activity.

Existing activity (no change proposed) – Effluent treatment

Under Schedule 1 of *The Environmental Permitting (England and Wales) Regulations 2016* (as amended) Section 5.4 Part A(1)(a)(ii) disposal of non-hazardous waste with a capacity exceeding 50 tonnes per day - physico-chemical treatment would require listing as a separate scheduled activity.

In 2023 the ETP discharged a daily average of 31 m^3 (31 tonnes per day), averaged over 12 months (***Figure 1-1***).

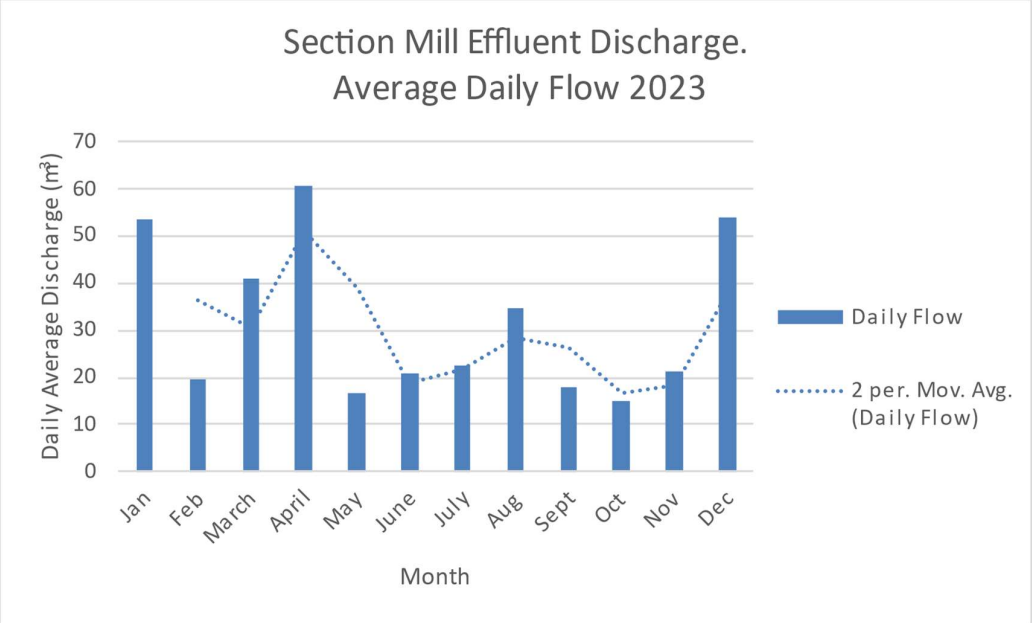


Figure 1-1: *Average daily discharge volumes (including moving average)*

The process should remain as a Directly Associated Activity.

Existing activity (no change proposed) – All handling and storage of wastes pending final removal from the installation.

The process should remain as a Directly Associated Activity.

Existing activity (no change proposed) – All handling and storage of product pending final removal from the installation.

The process should remain as a Directly Associated Activity.

Existing activity (no change proposed) – Operation of engineering workshops associated with the above specified and directly associated activities.

The process should remain as a Directly Associated Activity.

1.7 Technical Standards

The application has been produced following current NRW, Environment Agency (EA) and the Department for Environment, Food & Rural Affairs (Defra) guidance. Celsa has considered the following Appropriate Measures as representing the Best Available Techniques (BAT) for the sector and the proposed activity (***Table 1-3***).

Table 1-3: *Technical Standards and Guidance (Appropriate Measures)*

EPR Guidance	
UK Government (2023). Develop a management system: environmental permits.	https://www.gov.uk/guidance/develop-a-management-system-environmental-permits
Horizontal Guidance	
UK Government (2023). Risk assessments for specific activities: environmental permits (collection).	https://www.gov.uk/government/collections/risk-assessments-for-specific-activities-environmental-permits
UK Government (2022). Guidance Noise and vibration management: environmental permits.	https://www.gov.uk/government/publications/noise-and-vibration-management-environmental-permits
NRW (2014). Environmental permitting: H5 Site condition report.	https://naturalresources.wales/media/1215/environmental-permitting-regulations-guidance-for-applicants-h5-site-condition-report-guidance-and-template.pdf
UK Government (2024). Guidance Air emissions risk assessment for your environmental permit	https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit
BATc, Bref Notes and UK BAT	
UK Best Available Techniques (UK BAT) (Formal Draft), BAT Conclusions for the Ferrous Metals Processing (Forming) Sector (F3) (29/08/2023)	Not available (*1)
European Commission (2022). Best Available Techniques (BAT) Reference Document for the Ferrous Metals Processing Industry	https://eippcb.jrc.ec.europa.eu/sites/default/files/2022-12/FMP%20BREF_Final%20Version.pdf

Commission Implementing Decision (EU) 2022/2110 of 11 October 2022 establishing the best available techniques (BAT) conclusions, under Directive 2010/75/EU of the European Parliament and of the Council on industrial emissions, for the ferrous metals processing industry (notified under document C(2022) 7054)	https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32022D2110
European Commission. (2021). Reference Document on Best Available Techniques for Energy Efficiency.	https://eippcb.jrc.ec.europa.eu/sites/default/files/2021-09/ENE_Adopted_02-2009corrected20210914.pdf
Monitoring	
Monitoring emissions to air, land and water (MCERTS) (collection)	https://www.gov.uk/government/collections/monitoring-emissions-to-air-land-and-water-mcerts#stack-emissions-monitoring-performance-standards-and-test-procedures
Notes: (*1) – The draft UK BAT states that the document shall not be used for reference until published on GOV.UK. As of 12th December 2024, the document remains as 'Formal Draft' https://www.gov.uk/government/groups/uk-bat	

1.8 Application Package

The application package includes completed application forms that are cross-referenced to various technical documents, which are intended to address all the areas required by the variation application. The various documents included with this application package are outlined in **Table *1-4***.

Table 1-4: *Application Documents*

Folder	Reference
Air and Noise Model Files	Air Model files (Zip file) Noise Model files (Zip file)
Application Forms	024-1973 Celsa 240613-charge-tool-variation 024-1973 Celsa Companies House Certificate 024-1973 Celsa Part-A form 024-1973 Celsa Part-c2_form 024-1973 Celsa Part-c3_form 024-1973 Celsa part-f1-form-banding-tool 024-1973 Celsa Permit Application Authorisation
BAT Assessment	024-1973 Celsa Cardiff Permit Variation - BAT Assessment REV00
Drainage Systems	Section Mill Trade Effluent to Sewer Consent 2006
Impact Assessments	**Air Impact Assessment** Cardiff, Celsa Manufacturing, Permit Variation, J10-15817A-10 F1 **Noise Impact Assessment** E3822 - Celsa New Furnace_v1-0 **Sewer Impact Assessment** H1TOOL_2.78 Welsh Water Cardiff Bay Discharge Consent
Installation Report	024-1973 Celsa Permit Variation - Installation Report REV00
Non-technical Summary	024-1973 Celsa Cardiff Variation - NTS Report REV00
Opra Assessment	CURRENT - 20161202-OPRA-SectionMill-Dec2016-final REVISED - Section Mill - opra-spreadsheet-v2-2-2024-25

Folder	Reference
Plans and Figures	024-1973 Figure A01 - Site Location REV00.pdf 024-1973 Figure A02 - Permit Boundary REV00.pdf 024-1973 Figure A03 - Environmental Receptors Within 2km REV00.pdf 024-1973 Figure A04 - Soil and Groundwater Data REV00.pdf 024-1973 Figure A05 - Existing Block Plan REV00.pdf 024-1973 Figure A06 - Existing Site Plan REV00.pdf 024-1973 Figure A07 - Existing Building Plan REV00.pdf 024-1973 Figure A08 - Existing Elevations REV00.pdf 024-1973 Figure A09 - Proposed External Layout REV00.pdf 024-1973 Figure A10 - Proposed Internal Layout REV00.pdf 024-1973 Figure A11 - NRW Aquifer Superficial Deposits REV00.pdf 024-1973 Figure A12 - NRW Aquifer Bedrock Deposits REV00.pdf 024-1973 Figure A13 - NRW Groundwater Vulnerability REV00.pdf 024-1973 Figure A14 - NRW Source Protection Zones REV00.pdf 024-1973 Figure A15 - NRW Ecology Designations REV00.pdf 024-1973 Figure A16 - NRW Ancient Woodlands REV00.pdf 024-1973 Figure A17 - NRW Flood Risk - Rivers REV00.pdf 024-1973 Figure A18 - NRW Flood Risk - Sea REV00.pdf 024-1973 Figure A19 - NRW Flood Risk - Surface Water REV00.pdf 024-1973 Figure A20 - NRW Flood Risk - Reservoirs REV00.pdf 024-1973 Figure A21 - NRW Flood Risk - Defended Areas REV00.pdf 024-1973 Figure A22 - Section Mill Emission Points to Air and Sewer REV00.pdf
Plant Technical Specifications	718243-A Tech Spec R01
Process Efficiency	BV0767IT Waste Minimisation Audit Report Jan 2019 EPRBV0767IT Sections Mill Section 2.8 Review 2022 EPRBV0767IT_section2 7_energy efficiency 2021

Folder	Reference
QEHS Management System	**Certifications** BES6001-2022 Certificate ISO9001-2015 QMS BBA-Certificate ISO9001-2015 QMS Certificate ISO14001-2015 EMS Certificate ISO45001-2018 SMS Certificate **Environmental** Aspect Register 2023 CP_A004-Environmental-policy-2024_rotated CPA002_EMS Manual CPB028_EMS Aspect Register_V4.0_2023 CPB032 Emergency Plan ECP14 Waste Management_8 ECP34 Emergency Action Plans **Quality** 521.01.1-Sept2023-Quality-Policy **Safety** CPA003-HS-Policy
Site Condition Report	024-1973 Annexe A Figure A1 Site Location REV00.pdf 024-1973 Annexe A Figure A2 Permit Boundary REV00.pdf 024-1973 Annexe A Figure A3 Environmental Receptors Within 2km.pdf 024-1973 Annexe A Figure A4 Soil and Groundwater Data REV00.pdf 024-1973 Annexe B 15704 CELSA Reheat Furnace 2024.pdf 024-1973 Annexe B Site Investigation Report 2008.pdf 024-1973 Annexe C AST Removal REV00.pdf 024-1973 Celsa Permit Variation - SCR REV00.pdf

Folder	Reference
Sustainability	**Circular Economy** crcular_ingles_web_22baja **Climate Change Agreement** CCA - Steel Sector 2022 UK Steel CCA Consultation Response 2024 **Environmental Product Declarations** Celsa Section Mill - BREG EN EPD 000188 Envirnmental-Product-Declation-S-P-07497-EPD-CELSA-UK-Section-Mill Envirnmental-Product-Declation-S-P-07499-EPD-CELSA-UK-Section-Mill-Re **Product Conformity Certification** 00004332-CPD-ENGUS AMMM000017T-revision2 CEA81CPD-3000306_IN_2023-08-22 Declaration-of-performance-All-UKCA-LRQA-062024 ECOREINFORCEMENT0001-Celsa-UK-EcoR-Certificate_Oct2023 K001i1-AMEND ProductConformityCertification-BS4449andorrelatedproducts **Sustainability Report** 9432 CELSA Steel Sustainability Report 2023 CP_A006-Sustainability-and-Responsible-Sourcing-2024_rotated Sustainability_report_en_2022 **Suststeel Certification** Suststeel Certification 2021-2026 **UK Mandatory Climate Disclosure** Celsa UK Mandatory Climate Disclosure - June 2023

The above items should be regarded as constituting the variation application. In line with the Form F1 guidance the various application sections have been submitted via email to permitreceiptcentre@naturalresourceswales.gov.uk

1.9 Fees and Payments

From 22nd January 2024 NRW issued a variation Charge Banding Tool to calculate the charge for all Tier 3 (bespoke installation) permits. This has replaced Opra as the tool to calculate variation application charges.

- Company name: Natural Resources Wales
- Company address: Income Department, PO Box 663, Cardiff, CF24 0TP
- Bank: RBS
- Address: National Westminster Bank Plc., 2 1/2 Devonshire Square, London, EC2M 4BA
- Sort code: 60-70-80
- Account number: 10014438

Notification of the BACS payment has been sent (including reference number – EPRCELSAUK0001) to banking.team@naturalresourceswales.gov.uk

2 Permitted Activities

2.1 Proposed Changes – Replacement Furnace

2.1.1 Introduction

In 2008 Celsa placed an order with Fives Steel Spain for the supply of a new 140 t/h top and bottom fired walking beam furnace for the section mill. During the initial project execution phase many parts of the furnace were supplied to site, however, the project was put on hold and was not installed (a permit variation was not submitted).

In 2019 the project was restarted, and a planning application (Ref. 19/02844/MJR) was submitted to Cardiff City Council. The planning permission was granted on 16/01/2020, however, due to the COVID-19 pandemic the project was put on hold again until January 2024 when a slightly revised specification for the plant was provided by Five Steel Spain which was subject to minor revision in June 2024 (Ref. **718243-A Tech Spec R01**).

The present specification (Ref. **718243-A Tech Spec R01**) describes the furnace design as it was designed in 2008/2009 with some modifications to the original designs based on modern developments in reheat furnace technology developed by Fives Steel Spain.

2.1.2 Existing Activity

The Cardiff Medium Section Mill (CMSM) was developed in the early 1960s and has operated continuously since that time and there has been little change in process operations at the site during this period.

In 1992 the operation was authorised under Part I of the *Environmental Protection Act 1990* and *The Environmental Protection (Prescribed Processes and Substances) Regulations 1991* (Authorisation Ref. AF8688). In 2003 the authorisation was transferred from the previous operator (Allied Steel and Wire Ltd) to Celsa Manufacturing UK Ltd. In 2003 the site was issued an Integrated Pollution Prevention and Control (IPPC) permit for the same operation (Ref. BV0767IT).

The furnace is a continuous, gas fired, inclined hearth type with a maximum rating of 44MWth. The burners are suitable for firing with both gas and light fuel oil using hot combustion air. The combustion air is preheated to approximately 450ºC by the recuperator, the hot exhaust gases supplying the heat energy. There is a single 36.6-metre-high stack (Emission Point A1), from which exhaust gases from the furnace are discharged.

Near stochiometric combustion is achieved by controlling the correct volume of air (oxygen) combusted with the fuel, to minimise excess air. The reheat furnace runs with a small amount of excess air to ensure complete combustion otherwise fuel could be wasted and smoke generated.

Fuel to air ratio is vitally important for optimum furnace efficiency and to minimise scale loss from the billets. The zonal air/gas rates are electronically metered with closed loop feedback of temperature. The combustion air is preheated by means of a flue gas recuperator to maximise energy efficiency, except for the preheat zone burners which have waste gas regeneration.

Furnace pressure is controlled automatically by a flue damper controlled by closed loop feedback of furnace pressure which ensures the efficient use of fuel. Each of the four furnace heating zones has discrete closed loop temperature feedback control of the burner valves, with cross linking to ensure proper gas ratio under all conditions, regardless of demand.

Billets are fed into the furnace singly and are moved through the inclined hearth by cross push fingers. The rate at which the billets move is controlled to provide sufficient residence time in the furnace to achieve a uniform temperature above 1150-1200°C within the billets prior to exiting the furnace. Billets exit the furnace one at a time; this action triggers the billets remaining in the furnace to move downwards through the furnace and a cold billet to be fed in at the top. The exit point has a pneumatically operated door which remains closed until a billet is ready for discharge onto the rolling stage. Billets are removed by a pusher which enters at the opposite side of the furnace through a fixed door.

Scale on the billet surface can detach within the furnace. Access doors are provided in the burner wall to permit the scale to be removed. Under normal operation these doors are closed and insulated to provide a tight seal. Scale that has accumulated on the hearth is manually scraped from the furnace into a dedicated skip on a weekly basis. Scale collecting on the furnace floor is removed during planned shutdowns when the furnace cools sufficiently to permit safe manual access for cleaning.

The furnace is lined with refractory bricks, and a hot face of mouldable refractory supported on anchor bricks. These are inspected at plant shutdowns and replaced where necessary. This activity could potentially give rise to dust. To minimise dust emissions, any ceramic fibres are double bagged and sent for off-site disposal. Dust, which accumulates in the furnace flue-ways, is removed by a specialist contractor fortnightly and disposed off-site. When operating on light fuel oil, compressed air is used for atomisation of the fuel.

A single recuperator is fitted in the horizontal section of the flue gas duct between the furnace and the stack. The recuperator is a smooth tube duplex type, which transfers heat to the incoming combustion air. The recuperator is provided with manually operated by-passes for flue gas and combustion air to ensure that overcooling of the flue gases under start-up conditions and recuperator overheating under operating conditions does not occur.

A simplified process flow is outlined in ***Figure 2-1*** that also shows areas where the proposed variation will impact (change) the existing process.

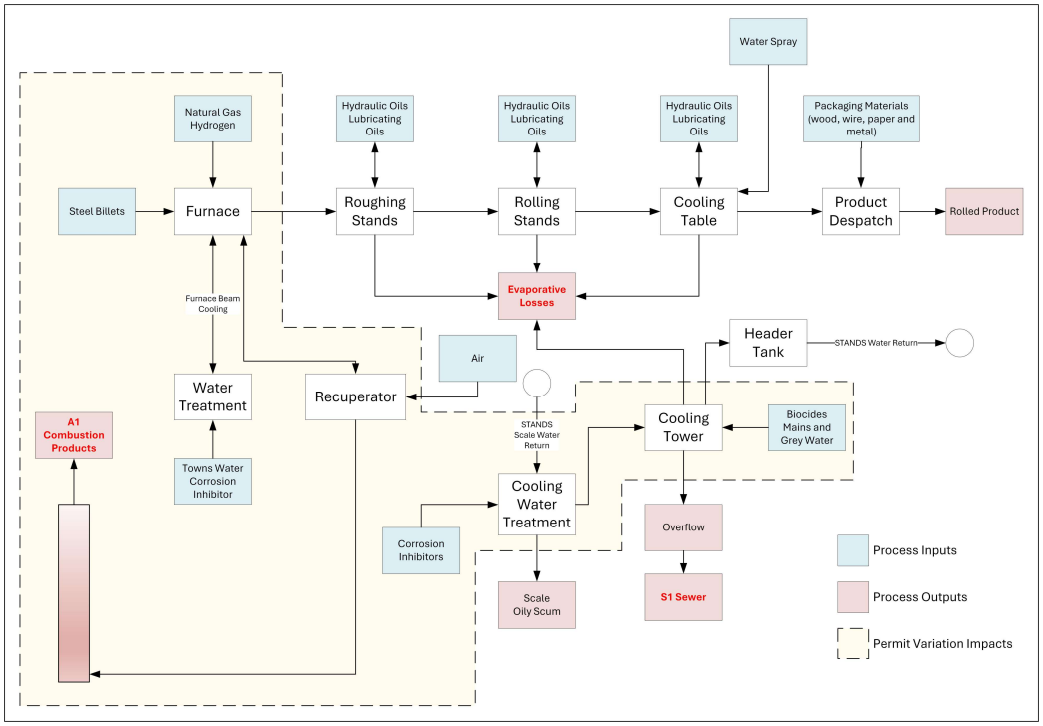


Figure 2-1: *Simplified process flow*

2.1.3 Hydrogen Ready

The supplier of the proposed furnace (Fives Steel Spain S.A) has designed the installation to use natural gas, a blend of natural gas/hydrogen or just hydrogen. The supplier specification provides data on 100% natural gas, 20%, 40%, 60%, 80% blended supply and 100% hydrogen.

Combustion and fuel handling systems (natural gas and hydrogen blends) are to be designed following ISO 13577-2 and 13577-4, which specify the safety requirements of

these systems and the requirements of a protective system of industrial furnaces and associated processing equipment.

Emissions

The higher flame speed of hydrogen increases the flame temperature locally, which can generate higher levels of NOx. Burners will be designed that manage the flame temperature and maintain at least parity of NOx levels with today's natural gas boiler technology. The combination of Hydrogen (or methane) with air will always generate NOx as a by-product due to the oxidation of Nitrogen from the air mixture.

Reheat furnaces must comply with stringent performance criteria, such as optimized heat transfer pattern in the product, very low NOx emissions, and more recently the ability to operate with very low calorific value fuel, dual-fuel firing or hydrogen. To comply with these new requirements, Fives Stein has developed a new generation of burners, called AdvanTek® Modulating Central Wide Flame (MWF).

The AdvanTek® MWF program was conducted over a period of several years, through an R&D project and Computational Fluid Dynamics (CFD), supported by a series of tests in the Fives Stein Manufacturing combustion test centre, and finally industrial tests in an existing high-capacity slab reheat furnace recently put into operation in Europe.

The burner development had several objectives, mainly to:

- obtain uniform heat pattern in the product in any furnace size and with any type of fuel,
- cut emissions such as NOx to levels far below the most stringent applicable standards, and
- optimize the burner design to facilitate installation of the burners in news furnaces or for revamping furnaces (for upgrading performances).

To reach these objectives, several industrialization steps were conducted to establish a new range of standard burners for new furnaces and revamping of existing furnaces. In addition, this burner is designed to be easily fitted in sidewalls of the furnace.

Heat demand control is operating either on/off firing (control of the duration of the firing during on cycle at burner design capacity) for installation on Digital Furnace® or proportional mode (flow control of the burner) in conventional existing furnaces. Furthermore, the MWF burners can operate within a wide range of capacities and with almost all kind of fuels available in steel plants.

Emission Limit Values (ELVs)

This variation application has been discussed with Karl Shepherd (NRW Senior Advisor, Combustion Activities) who has advised that modelling of the hydrogen running should be undertaken using a conversion factor of 1.37, resulting in a value of 137 mg/m^3 (ELV for NOx). This is in line with the recently released guidance (UK Government, 2024).

Table 2-1: *NOx ELVs for blended natural gas and hydrogen fuel (new plant)*

Substitution of hydrogen (% v/v)	Pollutant ELV expressed as a percentage of the analogous natural gas ELV	Calculated ELV (based on Natural Gas ELV of 100 mg/m^3 NOx)
0 to 20 %	100 %	100 mg/m^3
20 to 50 %	107 %	107 mg/m^3
50 to 75 %	115 %	115 mg/m^3
75 to 90 %	125 %	125 mg/m^3
90 to 95 %	130 %	130 mg/m^3
95 to 100 %	137 %	137 mg/m^3

The supplier (Fives Steel Spain S.A) has confirmed that the highest NOx levels (130 mg Nm^3) were recorded using a 50% Hydrogen/50% Natural Gas mixture. Fives Steel Spain S.A has confirmed that this was measured in their test centre, and it is in line with what has been reported by other researchers. It seems there is a collective effect of burning hydrogen with natural gas which accelerates the flame of natural gas and creates locally high temperature zones producing more NOx. This effect is highest at 50%/50% blend on the proposed furnace burner. Based on this and the information provided within the EA/NRW guidance an ELV of 137 mg/m^3 should be achievable.

Source of Hydrogen

The potential sources for the hydrogen are outlined below (least sustainable to most sustainable):

- **Brown/black hydrogen** – This is the oldest way of producing hydrogen through coal gasification. The hydrogen is separated from 'syngas' using adsorbers or special membranes and is termed brown or black depending on the type of coal used. It is a highly polluting process, and all emissions are released into the atmosphere.

- **Grey hydrogen** – This is hydrogen produced using fossil fuel such as natural gas (methane). When natural gas is separated into hydrogen and CO_2 by Steam Methane Reforming (SMR), with the excess carbon generating CO_2. Grey hydrogen is the term used whenever the excess CO_2 is not captured but gets emitted to the atmosphere and is how most hydrogen is currently produced.

- **Blue hydrogen** – This follows a similar process to grey hydrogen, but the CO_2 emissions are captured and stored, often in underground caverns, through carbon capture and storage (CCS). This mitigates the environmental impact on climate change through the elimination of greenhouse gas emissions. There is significant work and investment being made on carbon capture, utilisation, and storage (CCUS) to develop this blue hydrogen technology.

- **Green hydrogen** – This is the ultimate low carbon fuel – and is produced from electrolysis powered by renewable electricity (wind, solar, or hydro). The process splits water and separates off the hydrogen, with no direct impact on the environment. With the decreasing cost of renewable electricity and its non-reliance of fossil fuels, experts agree green hydrogen is essential to meeting climate change goals.

Given the current conditions it is expected that the source will be either blue hydrogen or green hydrogen. However, this cannot be confirmed at the time of the application.

2.1.4 Proposed Furnace

The furnace proposed has been conceived for the reheating of billets destined for a section mill and will be a top and bottom fired walking beam type with an effective heating length of 19,000 mm. The products will be supported on a system of skid pipes which are themselves supported by a series of posts. This skid system consists of a series of alternate fixed and moving beams positioned across the furnace width which will be water cooled to maintain their mechanical strength.

The products will sit on the fixed beams and will be lifted and walked forward by the moving beams which walk in a rectangular cycle. In this manner the products are walked through the furnace, which is split into several heating zones, therefore as the products pass through each zone from the charge to the discharge end, they are progressively heated up to the desired discharge temperature.

Figure 2-2: *Fives Steel Spain Furnace*

The furnace various zones are outlined below:

- **Preheating zone** – Both the upper and lower heating zones will be equipped with FIVES STEIN newly developed central wide flame burners which will ensure optimum heat transfer within the heating chamber. This burner arrangement was chosen to be as symmetrical as possible and has the advantage that the upper and lower heating of the products can be controlled more easily to ensure minimum bending as the products enter the fired heating zone, since excessive bending can cause tracking problems which would inevitably lead to problems when transferring the products onto the discharge rolls with the consequence being loss of production. This arrangement also has the added advantage that as production falls then the rows of side burners can be cascaded, switched off, to ensure optimum combustion efficiency. This means that the length of the recuperation zone “increase”, impossible to attain before with the typical proportional control system.

- **Heating zone** – We also propose as in the preheating zone, central wide flame burners. Side firing in heating zones was chosen to allow the possibility of progressively switching off rows of burners in line with production changes, this allows for maximum economy of energy.

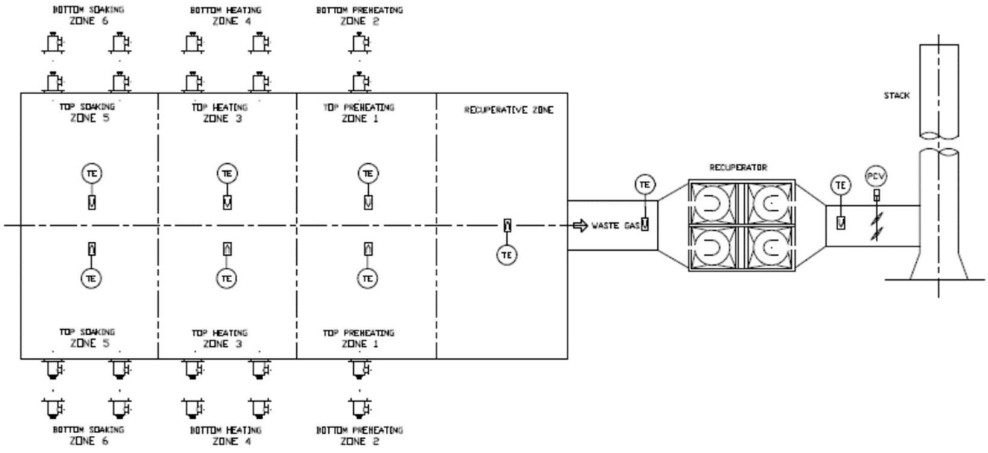


Figure 2-3: *General furnace layout*

- **Soaking zone** – The upper and lower soaking zones are equipped with side central wide flame burners of optimum efficiency as in the preheating and heating zones.

- **Recuperative zone** – This zone is fundamental for the consumption of the furnace. It should, in effect, permit maximum recuperation of energy from the waste gases before exhaust to the recuperator for preheating the combustion air. Too long and it will impose wall temperatures which are too high in the heating zone. Too short and it will lead to waste gas temperatures too hot in the flues.

2.1.5 Water Treatment

The furnace cooling water will be circulating in a closed loop circuit. The main advantages of this type of system are that water loss due to evaporation is minimised, it is easier to control and regulate water quality, water consumption is reduced and the potential environmental health and safety (EHS) impacts from the use of cooling towers and the risk of Legionella bacteria is removed.

Hot water from the different furnace cooling circuits will be collected in headers and will deliver water to the main return line. This water will be cooled down in four forced draft air coolers. During normal operation, all units will operate with all of them at a lower cooling fan motor speed. In case of maintenance of one of the units, the system can continue working, however, at maximum ambient temperature, the cooling water exit temperature will increase. The control of the air cooler units will be done in continuous mode by changing the speed of the motors instead of switching units on or off depending on the temperature conditions. Once the water is cooled in the air coolers, it will be

pumped to the furnace's main entry pipe and distributed to the different headers and cooling circuits as described before.

2.2 Proposed Changes – Removal of Existing Furnace

After the installation and permitting of the new furnace, the existing furnace will be decommissioned and removed. All plant and equipment shall be removed as per the previously supplied decommissioning /site closure procedure.

2.3 Proposed Changes – Removal of Existing Diesel Fuel Storage Tank

The current furnace could be fired using a light fuel oil. This facility and associated above ground storage tank (AST) has been subject to decommissioning and removal (**Photograph *2-1***).

Photograph 2-1: *AST before removal*

The decommissioning process is described within the Site Condition Report (Ref. **024-1973 Celsa Permit Variation - SCR REV00**).

3 General Management Measures

3.1 Management System

Celsa Manufacturing (UK) Ltd has implemented and maintains an Environmental Management System (EMS) that is certified to ISO14001:2015 (Certificate No. ES113432). The management system meets all the BAT 1 requirements outlined within the General BAT conclusions for the ferrous metals processing industry (European Commission, 2022). The specific requirements of BAT 1 are outlined in **Table *3-1***.

Table 3-1: *EMS Requirements (BAT 1)*

Requirement	Comments
i. commitment, leadership, and accountability of the management, including senior management, for theimplementation of an effective EMS;	Inherent requirement of the certified ISO14001 EMS (Clause 5.1).
ii. an analysis that includes the determination of the organisation's context, the identification of the needs and expectations of interested parties, the identification of characteristics of the installation that are associated with possible risks for the environment (or human health) as well as of the applicable legal requirements relating to the environment;	Inherent requirement of the certified ISO14001 EMS (Clause 6.1).
iii. development of an environmental policy that includes the continuous improvement of the environmental performance of the installation;	Inherent requirement of the certified ISO14001 EMS (Clause 5.2).
iv. establishing objectives and performance indicators in relation to significant environmental aspects,including safeguarding compliance with applicable legal requirements;	Inherent requirement of the certified ISO14001 EMS (Clause 6.2)
v. planning and implementing the necessary procedures and actions (including corrective and preventive actions where needed), to achieve the environmental objectives and avoid environmental risks;	Inherent requirement of the certified ISO14001 EMS (Clause 8.1).

Requirement	Comments
vi. determination of structures, roles and responsibilities in relation to environmental aspects and objectives and provision of the financial and human resources needed;	Inherent requirement of the certified ISO14001 EMS (Clause 5.3).
vii. ensuring the necessary competence and awareness of staff whose work may affect the environmental performance of the installation (e.g. by providing information and training);	Inherent requirement of the certified ISO14001 EMS (Clause 7.2 and 7.3).
viii. internal and external communication;	Inherent requirement of the certified ISO14001 EMS (Clause 7.4).
ix. fostering employee involvement in good environmental management practices;	Inherent requirement of the certified ISO14001 EMS (Clause 7.3).
x. establishing and maintaining a management manual and written procedures to control activities with significant environmental impact as well as relevant records;	Inherent requirement of the certified ISO14001 EMS (Clause 7.5).
xi. effective operational planning and process control;	Inherent requirement of the certified ISO14001 EMS (Clause 8.1).
xii. implementation of appropriate maintenance programmes;	Inherent requirement of the certified ISO14001 EMS (Clause 8.1).
xiii. emergency preparedness and response protocols, including the prevention and/or mitigation of the adverse (environmental) impacts of emergency situations;	Inherent requirement of the certified ISO14001 EMS (Clause 8.2).
xiv. when (re)designing a (new) installation or a part thereof, consideration of its environmental impacts throughout its life, which includes construction, maintenance, operation and decommissioning;	Inherent requirement of the certified ISO14001 EMS (Clause 8.1).
xv. implementation of a monitoring and measurement programme; if necessary, information can be found inthe Reference Report on Monitoring of Emissions to Air and Water from IED Installations;	Inherent requirement of the certified ISO14001 EMS (Clause 9.1).
xvi. application of sectoral benchmarking on a regular basis;	Inherent requirement of the certified ISO14001 EMS and as outlined with the Corporate Sustainability Report.

Requirement	Comments
xvii. periodic independent (as far as practicable) internal auditing and periodic independent external auditing in order to assess the environmental performance and to determine whether or not the EMS conforms to planned arrangements and has been properly implemented and maintained;	Inherent requirement of the certified ISO14001 EMS (Clause 9.2).
xviii. evaluation of causes of nonconformities, implementation of corrective actions in response to nonconformities, review of the effectiveness of corrective actions, and determination of whether similar nonconformities exist or could potentially occur;	Inherent requirement of the certified ISO14001 EMS (Clause 10.2).
xix. periodic review, by senior management, of the EMS and its continuing suitability, adequacy and effectiveness;	Inherent requirement of the certified ISO14001 EMS (Clause 9.3).
xx. following and taking into account the development of cleaner techniques.	Inherent requirement of the certified ISO14001 EMS (Clause 10.3) and the public commitments outlined within the Corporate Sustainability Report.

The EMS continues to be maintained and is externally audited (by Bureau Veritas) whilst delivering all indicative Best Available Technique (BAT) requirements for an effective management system. The current management systems will be updated to include the revised plant and equipment.

Celsa Manufacturing (UK) Ltd also operates a certified ISO 45001:2018 Occupational health and safety management systems and a certified ISO9001:2015 quality management system. These systems will also be applied to the to the revised processes.

3.2 Management Plans

In line with the statutory guidance and BAT requirements (BAT 1) the following environmental management plans and inventories have been established and will be maintained as part of the EMS (**Table *3-2***).

Table 3-2: *Environmental Management Plans and Inventories*

Plan	Comments
Chemicals Management System (BAT 1 xxii. and BAT 3)	Chemicals are managed in-line with current EHS requirements i.e. *The Control of Substances Hazardous to Health Regulations 2002* (as amended). All systems are part of the certified ISO45001 Safety Management System (SMS).
Emissions Management Plan (BAT 1 xxi. and BAT 2) (BAT 1 xxiv. and BAT 5)	A new standalone inventory of emissions to air and water has not been created for the installation. Celsa operates a certified ISO14001 EMS that includes a Register of Environmental Aspects and Impacts. This process has been established to document all environmental emissions and impacts. The emissions management system operated by Celsa also covers other than normal operating conditions (OTNOC).
Residuals Management Plan (BAT 1 xxviii. and BAT 34(a))	Where residuals are produced, they shall be managed and disposed of off-site in line with the current ISO14001 EMS procedures *e.g.* Ref. ECP14 Waste Management.
Accident Management Plan (BAT 1 xxiii. and BAT 4(a)) (BAT 1 xxiv. and BAT 5)	The installation operates a certified ISO14001 management system that includes documented procedures for establishing, implementing and maintaining processes needed to prepare for and respond to potential emergencies (throughout the permitted installation). The installation operates a standard procedure as part of the ISO14001 EMS and ISO 45001 SMS. The plan Ref. ECP34 Emergency Action Plans will be revised and updated (as required) considering the proposed changes.
Site condition report (SCR)	A revised and updated SCR is provided with the variation application (**Ref. 024-1973 Celsa Permit Variation - SCR REV00**).

Plan	Comments
Energy Efficiency Plan (BAT 1 xxxv. and BAT 10(a))	Celsa operates a formal ISO14001 EMS. This includes monitoring and tracking the consumption of raw materials and energy throughout the installation. A formal energy efficiency plan (for this part of the installation) is not proposed due to the existing ISO14001 systems.
Water Management Plan (BAT 1 xxvi. and BAT 19(a))	Celsa operates a formal ISO14001 EMS. This includes monitoring and tracking the consumption of raw materials including water use. A formal water management plan (for this part of the installation) is not proposed due to the existing ISO14001 systems.
Fire Prevention Management Plan (FPMP)	Not deemed relevant to this variation application.
Noise and Vibration Management Plan (BAT 1 xxvii. and BAT 32)	A separate noise and vibration management plan has not been produced; however, noise and vibration controls and management systems are considered within the site-wide EMS *i.e.* it is a recognised environmental aspect of the site operations.
Dust and Bio-aerosol Management Plan	Not deemed relevant to this variation application.
Odour Management Plan	Not deemed relevant to this variation application.
Pest Management Plan	Not deemed relevant to this variation application.

It is important to note that these are subject to amendment as they form a part of the Celsa operational QEHS Management System.

3.3 Operations and Maintenance

The company uses a "risk" based approach for assessing the criticality of site equipment in terms of Health, Safety, Environment requirements. As well as the criticality of the plant the equipment is given a priority which determines how quickly an unplanned failure of said equipment is responded to.

The site will establish and will maintain a Planned Preventative Maintenance (PPM) schedule for the new operations in-line with manufacturer's recommendations. This will identify all critical environmental equipment that is used to mitigate or prevent environmental impacts. All records associated with these activities will be maintained on-site and controlled as part of the ISO14001 management system. Any breakdown or

malfunction of plant or equipment that could result in abnormal emissions of dust or odours and/or increased energy or resource consumption will be dealt with promptly and process operations adjusted until normal operations can resume. Any such events are recorded in the site diary and on the company ProSafety system.

3.4 Accidents

A Hazard and Operability Study (HAZOP) is a structured and systematic examination of a planned or existing process or operation to identify and evaluate problems that may represent risks to personnel or equipment or prevent efficient operation.

Fives will conduct a systematic HAZOP study for the installation during the engineering phase. This study is conducted in close cooperation with Celsa and shall consider Celsa's specific requirements for the installation.

The site has established and maintains an Accident Management Plan which is subject to regular review and update and is controlled via the EMS. The plan details site drainage, site services, location of hazardous materials (*e.g.* fuels and oils), emergency response equipment, pollution control points *etc*. Where required the emergency plan will be revised to take in to account any identified deficiencies.

Appropriate spill kits and absorbents will be available throughout the site. These will be subject to regular inspection to ensure stock levels are maintained. All operatives will be trained in their use.

The current accident plan (CPB032 Emergency Plan) and associated action plans (ECP34 Emergency Action Plans) are live documents within the EMS which are subject to review and update.

The management of accidents, Incidents, complaints, and non-conformances are managed through the existing processes that form part of the ISO 14001 EMS.

3.5 Incidents and Non-conformances

Accidents, Incidents, complaints, and non-conformances are to be handled through the existing processes that form part of the ISO 14001 EMS.

3.6 Site Security

There are multiple levels of security to prevent/control unauthorised access to the Site. The entrance point is secured and maintained by security staff and a CCTV system has

been installed which includes remote monitoring and provides full-service maintenance. Escalation (*i.e.* post-detection/alarm response) is provided.

3.7 Staff Competence

Celsa Manufacturing (UK) Ltd will provide centralised engineering, technical, transport, administration, and environmental support (as required). Celsa Manufacturing (UK) Ltd will provide a comprehensive training programme for the site and the proposed operations in-line with the required competency requirements (*e.g.* general environmental awareness, maintenance and operational activities, accident, and emergency response). This training will be provided to all site operatives.

3.8 Records that Demonstrate your Management System

Records relating to the operation of the site are to be handled through the existing processes that form part of the ISO 14001 EMS. All records relating to the operation of the installation will be maintained as per the stated procedures.

3.9 Access to your Permit

Access to the permit will be through existing internal systems (*i.e.* intranet and on-site noticeboard). Where contractors undertake work within the site the requirements of the permit will be actively brought to their attention.

3.10 Permit Surrender and Closure

Upon cessation of activities, the following site closure plan will be initiated:

- disconnection of electrical supply and make safe;
- drain down and empty any tanks;
- remove all plant and equipment down to slab level;
- remove and dispose of all remaining waste materials in line with current regulatory requirements; and
- undertake site surrender SCR monitoring (*i.e.* provide the evidence necessary to demonstrate to NRW that the site does not pose a pollution risk and is in a satisfactory state).

4 Process Efficiency

4.1 Energy Efficiency

As part of Celsa's ISO 14001 Environmental Management System, Celsa has identified its potentially significant environmental aspects, whilst considering its legal requirements. Objectives and targets are set on an annual basis to deliver continual improvement in the management of these environmental aspects, this includes energy usage. Celsa is careful to ensure that its processes are efficient to minimise the use of energy and to avoid waste.

There is no fuel oil use associated with this variation; all power is provided via either electrical supply (via the National Grid), natural gas and (within around 2 years) hydrogen.

4.1.1 Energy Use within the Installation

The energy usage within the installation has been calculated by identifying and reviewing all the new plant and equipment within the scope of the installation.

Direct releases occur where primary energy is converted to heat and/or electricity at the installation. Indirect releases are those associated with the consumption of electricity or heat generated elsewhere (*i.e.* third-party supply or from an off-site power station). The conversion factor from electricity delivered to primary is 2.4 as per current guidance. This considers both generation losses and transmission losses associated with the transfer across the National Grid. The total and specific energy consumption for the installation (as a whole) is outlined within **Table *4-1***.

Table 4-1: *Energy sources and annual consumption, Section Mill (Total), 2019*

Source	Type	Delivered (MWh/year)	Conversion Factor	Primary (MWh/year)
Electricity from public supply	Indirect emissions	22,954	2.4 (1)	55,089
Gas (Natural)	Direct emissions	120,951	-	120,951
Total		**143,905**		**176,040**
Notes: (1) https://www.gov.uk/guidance/assess-the-impact-of-air-emissions-on-global-warming				

4.1.2 Carbon Dioxide Emissions as a Result of Energy Use

The reporting of direct and indirect emissions of carbon dioxide resulting from the consumption or generation of energy by the activities covered in the permit is included as part of this overall reporting of environmental emissions. Environmental emissions relating to the consumption of energy at the installation are related to emissions arising from the use of natural gas and/or hydrogen at the site itself and indirectly from the use of fossil fuels at the power station providing the electricity to the installation. The estimated carbon emissions are outlined within **Table *4-2***.

Table 4-2: *Energy sources and annual carbon dioxide emissions, 2019*

Source	Type	Primary (MWh/year)	CO_2 Factor	CO_2 (tonnes/year)
Electricity from public supply	Indirect emissions	55,089	0.166 (1)	9,144.774
Gas (Natural)	Direct emissions	120,951	0.190 (1)	22,980.69
Total		**176,040**		**32,125.464**

Notes:

(1) CO_2 conversion factor (electricity and gas) is from https://www.gov.uk/guidance/assess-the-impact-of-air-emissions-on-global-warming

4.1.3 Greenhouse Gas Permit

Where an operator undertakes an activity covered by the UK Emissions Trading Scheme (UK ETS) a greenhouse gas (GHG) emissions permit is required. The facility (Ref. CELSA Manufacturing (UK) Ltd - Sections Mill) holds a current GHG Permit (Ref. UK-W-IN-12612, ID: 1000627). As the current permit refers to the existing furnace it will need to be varied to account for the new furnace arrangement and the potential hydrogen firing potential.

4.1.4 Climate Change Levy

Climate change agreements are voluntary agreements made by UK industry and the Environment Agency to reduce energy use and carbon dioxide (CO_2) emissions. In return, operators receive a discount on the Climate Change Levy (CCL), a tax added to electricity

and fuel bills. The Environment Agency administers the CCA scheme on behalf of the whole of the UK.

CELSA currently operates under a Climate Change Levy Agreement (CCLA) within the UK Steel Association sector. UKSA/CELSA/N/00001 will apply to the varied installation.

4.1.5 Management of Energy Use

Celsa is committed to managing and reducing the environmental impact of its operations (wherever possible). Energy reduction programmes are established and maintained throughout the business. The aim of this is to evaluate the environmental impact Celsa's activities (*i.e.* buildings, processes and transport) and identify opportunities for improvement. These opportunities can be reflected in the site improvement objectives (if deemed feasible). In all cases these objectives form part of the ISO 14001 EMS. In addition, the regular monitoring of site energy consumption and the planned preventative maintenance of equipment is carried out on a regular inspection cycle.

4.1.6 Energy Efficiency – Furnace Upgrade

The furnace proposed has been conceived for the reheating of billets destined for a section mill and will be a top and bottom-fired walking beam type with an effective heating length of 19,000 mm. The products will be supported on a system of skid pipes which are themselves supported by a series of posts. This skid system consists of a series of alternate fixed and moving beams positioned across the furnace width which will be water-cooled to maintain their mechanical strength.

The products will sit on the fixed beams and will be lifted and walked forward by the moving beams which walk in a rectangular cycle. In this manner the products are walked through the furnace, which is split into several heating zones, therefore as the products pass through each zone from the charge to the discharge end, they are progressively heated up to the desired discharge temperature. The furnace is provided with top and bottom-fired zones. The controls to limit (optimise) energy consumption associated with the new furnace include:

- **Optimising furnace length** – Furnace length is dictated by the residence time required to attain the heating requirements for a reference product. The shorter the furnace, the greater the compromise with heating quality and the higher the fuel consumption. The furnace length will comprise a long unfired recuperative zone to recuperate the maximum amount of energy contained in the waste gases.

- **Division of heating zones** – A short soaking zone to heat the products as late as possible while respecting a good temperature uniformity of the product. A division sufficiently fine of the other zones to be able to permanently adapt to the changes in production (burner cascading). A symmetrical heating of the products is employed to avoid bending, especially in the heating zone where the differential temperatures in the product will be greatest.

- **Preheating of combustion air** – The level of preheating of the combustion air is a compromise between the performance of the furnace, the price of the recuperator and the quality of the air ductwork and the associated NOx emission levels. The very high combustion air temperature at the exit of the recuperators results in energy savings that reduce the furnace-specific consumption and therefore, the overall greenhouse gas emissions.

- **Excess air** – All the equipment for combustion control should be conceived to allow operation with excess air as low as possible without the risk of incomplete combustion.

- **Fuel selection** – The fuel used in this installation will be natural gas and full hydrogen (in the future). However, it will be capable of working with different blends of natural gas and hydrogen based on its availability.

- **Minimise thermal losses** – The number and size of furnace openings will be kept to a minimum to limit thermal losses. To this end, the side charge and discharge openings are as small as possible in relation to the products to be processed and the door opening periods are kept to a minimum. Viewing ports with Pyrex glass covers are in the furnace side casing for burner observation. The distance between moving beam support posts has been increased to its maximum to reduce the number of posts and so reduce the number of slots in the hearth to a minimum.

- **Heating strategy** – In order to reduce consumption, heating will be applied as late as possible, reducing to a minimum possible the power of the lower zones while bearing in mind the need for symmetrical heating to avoid problems of bending of the products, especially as they enter the heating section of the furnace. Product bending could cause tracking problems in the furnace. The objective is to attain the required thermal quality of the products at discharge with furnace wall temperatures lower than the acceptable limits.

Full details on the process are outlined in the technical specifications Ref. **718243-A Tech Spec R01**.

4.2 Raw Materials

There are minimal raw materials associated with this variation application apart from the water treatment chemicals, corrosion inhibitors and routine maintenance materials (*e.g.* hydraulics oils, and grease lubrication). The materials associated with the installation (as a whole) are outlined in the last Waste Minimisation and Water Use Efficiency Audit (Ref. **BV0767IT Waste Minimisation Audit Report Jan 2019)**.

Raw materials are constantly under review for improved performance and environmental effects, and this forms an integral part of the Environmental Management System (EMS). Operating procedures are regularly reviewed to ensure that optimum use is made of all chemicals. Materials are selected based on their efficiency and effectiveness as well as environmental compatibility and quality following procedures within the Quality Management System (QMS) and EMS and Control of Substances Hazardous to Health (CoSHH) requirements. As part of the COSHH requirements, safety data sheets are maintained on-site. An inventory of raw materials used within the installation will be maintained following the requirements of the site's EMS and Safety Management System (SMS).

Lubricating and hydraulic oils are required to support the high level of mechanical processing within the installation. The oils are delivered to the site in bulk tankers to a central bulk delivery point area, each type of oil having a dedicated connection point. During a delivery a site operator will be present and ensure that the delivery hose is connected to the appropriate point, each point is also labelled. Hydraulic oils within the hydraulic systems require cooling, this is provided by indirect cooling using water from the main water system.

Preventative maintenance of the lubricating and hydraulic system pipework is routinely undertaken to prevent leakage. Tanks are fitted with level controls, which accurately indicate the level in the tank. The control system operated on the site can determine a drop in the tank level and hence quickly identify any leaks. This is alerted to the control operator via the annunciation panel and permits prompt action. These systems form part of the controls to minimise oil leakage into the water systems and consequently minimise the oil level in the scale.

The list of above-ground storage tanks (ASTs) associated with the installation is outlined in **Table 5-2**.

4.3 Water Use

There are two sources of water used within the installation (as a whole) namely, mains water and commercial grade water. There are four main water circuits:

- furnace closed circuit cooling system;
- hydraulic oil closed circuit cooling system;
- de-scaling and mill cooling water system; and
- cooling bed stock evaporative cooling system.

Both closed-circuit cooling systems require only small quantities of freshwater top-up. This water is supplied from the town's water mains supply.

The mill recirculatory water system is primarily to cool the mill rolls and to transport the mill scale liberated from the surface of the hot stock. Water to the de-scaling and mill cooling circuit uses commercial water to make up for evaporative losses. The system is recycled through the clarifier water treatment plant, which separates scale and oil from the cooling water. The water is subsequently cooled and reused, minimising the quantity of fresh water from the commercial supply into the system and replacing the volume lost due to evaporation. The fine scale from the clarifier is decanted to a centrifuge, which concentrates the sludge to a relatively dry scale, maximising water recovery to the system.

Approximately half of the rainwater that falls on buildings is drained into the mill cooling water system, thus reducing commercial water requirements. The remainder is discharged to the combined foul water drainage system. During heavy rainfall, the quantity of water entering this system may exceed evaporative losses and will give rise to the discharge of water from the cooling tower cold well to the sewer.

The cooling bed stock evaporative cooling system consists of storage tank pumps and spray jets, which spray water onto the hot rolling stock to cool it. This cooling is tightly controlled to ensure the correct tensile strength of the material for straightening and to minimise water use. Commercial-grade water is used in this system.

Dedicated steam cleaners are used in roll preparation, and scraping or mopping is used in preference to hosing. Where wash-water is required trigger controls are fitted on all hoses, hand lances and other washing equipment.

Water usage is monitored by monthly meter readings. The water usage figures are presented in the monthly management information packs, and any trend deviations are highlighted for investigation. The water systems are subject to preventative maintenance to minimise leaks, although leaks from the mill recirculatory system are not considered to be a significant source of water loss.

The water use associated with the installation (as a whole) is outlined in the last Waste Minimisation and Water Use Efficiency Audit (Ref. **BV0767IT Waste Minimisation Audit Report Jan 2019)**.

Full details on the new furnace are outlined in the technical specifications Ref. **718243-A Tech Spec R01**.

4.4 Waste

The principal waste is scrap metal from billets which do not meet the quality control specification (downgraded material) and the trimmings from the section rolling to produce the final product. The scrap metal is sent to the EAF for recycling.

Other solid waste will include mill scale, packaging waste, spent refractories, and replacement plant equipment (*e.g.* mill rolls, guides *etc.*). All this waste is sent for recycling. The waste-handling activities from the site are undertaken by appropriately licensed contractors.

Liquid waste arisings comprise the oil residue skimmed from the surface of the clarifier to a holding tank. This is disposed of as hazardous waste, via an appropriately licensed contractor. The storage tank is located within a bunded area (**Table 5-2**). Other liquid wastes are mainly waste oils. These are collected in drums or sumps, (before removal by an appropriately licensed contractor). These are regularly inspected for integrity and to identify the need for emptying.

No new waste streams are anticipated due to this variation.

4.4.1 Waste Minimisation, Recovery and Disposal

Where residuals are produced, they shall be managed and disposed of off-site in line with the current ISO14001 EMS procedures. The proposed variation does not alter or change in any way the waste types or volumes associated with the installation.

The last full waste minimisation and water use efficiency audit was undertaken in 2019 (Ref. **BV0767IT Waste Minimisation Audit Report Jan 2019)**.

5 Emissions to Air, Water and Land

5.1 Point Source Emissions to Air

Schedule 3 (Table S3.1) of the current environmental permit (Ref. EPR/EP3738NG) outlines the point source emissions to air from the installation. The required changes, associated with this variation application, are outlined in **Table *5-1***.

Table 5-1: *Point source emissions to air*

Emission Point Ref.	Source	Operational Status	Status
A1	Reheat Stack	-	Remove from permit
A2	Roll Lathe Shop LEV	Intermittent	No change
A3	Roll Lathe Shop LEV	Intermittent	No change
A4	Roll Lathe Shop LEV	Intermittent	No change
A5	Fuel Oil Storage Tank Vent	-	Remove from permit
A6	Stacker Hydraulics Area Mineral Oil Tank (tank breather)	Intermittent	No change
A7	Cooling Bed Hydraulics Area Mineral Oil Tank (tank breather)	Intermittent	No change
A8	Cooling tower	Intermittent	No change
A9	Roof vent	Intermittent	No change
A10	Roof vent	Intermittent	No change
A11	Roof vent	Intermittent	No change
A12	Reheat Stack (60 metres)	Normal operation	New emission point
A13	Purge vents (maintenance) (1)	Intermittent	New emission point
A14	Roofline building ventilator (note this is a linear vent)	Intermittent	New emission point

Emission Point Ref.	Source	Operational Status	Status
Notes: [1] Manual valves before and after the air coolers and purges/vents to be installed to isolate them during maintenance operations.			

The air emission points are outlined in Figure A22 (Ref. **024-1973 Figure A22 - Section Mill Emission Points to Air and Sewer REV00**).

5.2 Point Source Emissions to Surface Water

There are no existing and no new point source emissions to surface water.

5.3 Point Source Emissions to Sewer

Waste waters generated from the cooling and de-scaling activities within the installation are collected and pass through a treatment plant which cleans the water so that it can be recycled for re-use as coolant water.
The waste waters are initially discharged into the scale pit. Here some larger scale settles out and is removed offsite on a weekly basis. Water entrained with the scale readily drains back from this collection process back into the scale pit. Water in the pit, together with finer scale and oil, is pumped into a single Unifloc clarifier, with a capacity of 2600m^3.

Flocculants are added to the clarifier, pumped from Integral Bulk Containers (IBCs) stored adjacent to the clarifier. This promotes scale settlement which collects at the bottom of the clarifier cone. Rakes at the bottom of the clarifier direct the fine scale to the centre of the unit, where it is removed by diaphragm pumps to a vacuum drum. The vacuum drum concentrates the sludge to form a relatively dry scale, the water together with residual oil, is returned into the clarifier. The scale is removed as cake into a skip, then transferred to the scale weathering area. From here it is transferred off-site for further processing for re-use. In the event of a breakdown of the vacuum drum, the sludge can be removed to the settlement pit for thickening, the overflow being pumped back to the water system.

The clarifier also removes the oily scum from the water surface using skimmers into a holding tank, from where it is disposed of as hazardous waste. The tank is located within a bunded area and inspected twice daily to monitor the level of oil and drain off the water fraction, each inspection being logged. The water fraction is returned to the water system.

When nearly full, an appropriately licensed waste carrier is brought on-site to remove the collected oil.

Clarified water passes to the hot well from where it is pumped to the top of the forced-draught cooling tower and cooled as it falls through the tower into the cold well. At this stage, the cooled water is pumped with biocides by pumps connected to the storage tanks for these materials. The cooled water is returned to the main header tank where corrosion inhibitor is added, before re-use in the process cooling and de-scaling operations.

During shutdown when the system inventory drains back and periods of heavy rainfall, water from the cooling tower cold well overflows into sewer via an oil interceptor. The oil interceptor is fitted with oil collection equipment for off-site disposal by appropriately licensed contractor.

The installation includes a single emission point to the sewer (Ref. S1) that is consented to by Welsh Water (No. TE147F of 2006) (Ref. **Section Mill Trade Effluent to Sewer Consent 2006**). No new emission points to the sewer are to be added to the permit.

The sewer emission point is outlined in Figure A22 (Ref. **024-1973 Figure A22 - Section Mill Emission Points to Air and Sewer REV00**).

5.4 Point Source Emissions to Groundwater

There are no existing and no new point source emissions to groundwater.

5.5 Point Source Emissions to Land (via Soakaway)

There are no existing and no new point source emissions to land.

5.6 Fugitive Environmental Emissions

5.6.1 Introduction

Some types of emission may cause pollution but do not have set limits within permit conditions. In permits, these are termed emissions not controlled by emissions limits or fugitive emissions. For there to be a potential impact there needs to be a source, pathway, and receptor (**Figure 5-1**).

Figure 5-1: *Fugitive emissions (Source - Pathway - Receptor)*

The principal means of pollution prevention is the careful handling and storage of potentially polluting substances. In most cases, this is determined by the level of containment of a substance, *i.e.* spill prevention. Three levels of containment have been considered:

- **Primary Containment** – *e.g.* a drum, vessel, pipe, bag, *etc*. containing the substance.
- **Secondary Containment** – *e.g.* a bund, double wall vessel or pipe, vent pipe, catch-pit *etc*. designed to retain the substance in the event of a failure of primary containment.
- **Tertiary Containment** – additional measures provided to contain an unplanned release (*e.g.* an oil interceptor in a surface water drain, a concrete hardstanding for road tankers offloading to a bulk storage tank, *etc*.).

In all cases, the actual technique (*i.e.* the physical control) is supplemented by effective management control through the development and use of appropriate operational procedures with the overall aim of breaking the S-P-R pollution linkage.

5.6.2 Sources – Land, Surface Water, Sewer or Groundwater

On-site sources that could lead to potential fugitive emissions to land, surface water, sewer or groundwater include:

- leaks and spills from the handling, storage and use of chemicals;
- leaks and spills from the on-site plant and equipment;
- losses to ground from the handling and loose storage of dry materials; and
- fire water run-off and infiltration.

5.6.3 Source - Air

Operations which may give rise to fugitive emissions of dusty materials are:

- **Furnace refractory works** – During refractory works the furnace is kept under negative pressure thus preventing the escape of dust. The replacement of the refractories is undertaken during plant shutdown periods, typically three times per year. The waste refractories are placed in skips and since they are large solid pieces are not prone to dust generation. Ceramic fibres are dealt with under health and safety requirements and are double-bagged and sealed before offsite disposal. Any dust which accumulates in the furnace flue ways is periodically removed by a specialist waste contractor using a vacuum to extract the dust into closed skips for subsequent off-site disposal.

- **Scale removal from the furnace** – Scale is removed from the furnace hearth weekly, via the furnace access doors. The scale is manually scraped into purpose-made handling bins which are subsequently emptied into a dedicated, labelled, dry scale skip. Once full this skip is removed off-site for reuse. The scale, being large flakes and large dense particles, is not prone to the liberation of dust. All handling takes place inside the building and thus eliminates the possibility of the wind creating dust problems. Scale accumulating on the floor of the furnace can be removed only during shutdowns. This material is similarly removed manually and transferred to the dedicated scale skip, which is also located within the main building. Like the hearth scale, the likelihood of dust generation is low.

Both operations are undertaken within the main rolling mill building.

5.6.4 Pathways and Receptors

It is important to note that a pathway, such as groundwater, can be both a pathway and a receptor for site-derived fugitive emissions.

Geology

Made Ground was shown in the site investigation to have a thickness of between 2.4 and 3.5 m and was underlain by clay (marine and estuarine alluvium). The full thickness of the drift deposits was not established in the site investigation, but previous investigations showed a maximum drift thickness of approximately 20 metres.

The alluvium and Made Ground are underlain by the Mercia Mudstone. The Mercia Mudstone comprises a red structureless mudstone with occasional siltstones and is of a substantial thickness (estimated at 400 m from the geological map cross-section).

Borehole logs were obtained for three boreholes drilled across the steelworks site for geotechnical purposes in the early 1970s. These indicate that the Made Ground varies

across the steelworks site with a maximum depth recorded of 7.5 m. The Mercia Mudstone is shown on the logs to be present at a depth of approximately 20 metres below ground level (mbgl).

Groundwater

The site is underlain by a non-aquifer. In this area, this assessment arises from the presence of the Mercia Mudstone beneath the site. A non-aquifer is a rock formation which is regarded as containing insignificant quantities of groundwater. However, some non-aquifers can yield water in sufficient quantities for domestic use and supply base flow to rivers. The site investigation has shown that there is perched groundwater present within the Made Ground, which is relatively permeable. Groundwater level data collected for the wider site indicates that groundwater flows in a southeasterly direction, towards the Severn Estuary.

The site is not located within a groundwater Source Protection Zone (SPZ).

Hydrology

The installation is located approximately 500 metres from the northern edge of the Bristol Channel. There are no surface water features present within the site, but historical maps show that a stream used to run along the northern site boundary. It is uncertain as to whether this stream was culverted or filled in on construction of the site. The 1:50,000 OS map does not show any streams in the vicinity of the site, with the nearest major surface water features being a stream approximately 2 km to the north of the site and the estuary of the Rhymney River approximately 1.5 km to the northeast.

5.6.5 Site Surfacing

Celsa has designed appropriate impermeable tertiary containment surfaces for all operational areas, taking into consideration collection surface water capacities, surface thicknesses, strength/ reinforcement, falls, materials of construction, permeability, resistance to chemical attack and inspection and maintenance procedures.

Where required (based on risk) the operational areas have been equipped with impervious surfaces, spill containment kerbs, sealed construction joints and a connection to a sealed drainage system.

5.6.6 Subsurface Structures

Celsa has established and recorded the routing of all the installation drains and subsurface pipework. Inspection and maintenance programmes for all subsurface

structures have been established and will be implemented as per the planned preventive maintenance schedule.

5.6.7 Vessels and Above-Ground Storage Tanks (ASTs)

The vessels and ASTs associated with the installation (as a whole) are outlined in **Table *5-2***.

Table 5-2: *Installation Vessels and ASTs*

Description	Contents	No. ASTs	Volume (litres)	Secondary Containment
Stacker hydraulics area	Mineral oil	1	6,000	Double skinned
Cooling bed hydraulics area running tank	Mineral oil	1	5,576	Double skinned
Cooling bed hydraulics area running tank	Mineral oil	1	6,000	Double skinned
Pomini stands	Mineral oil	1	15,000	Double skinned
Pomini stands	Mineral oil	1	10,000	Double skinned
Glamorfa stands	Mineral oil	1	2,700	Double skinned
Glamorfa stands	Mineral oil	1	6,800	Double skinned
Glamorfa stands	Mineral oil	1	1,500	Double skinned
Skids and peel bar area	Mineral oil	1	2,700	Contained in a brick sump system
Skids and peel bar area	Mineral oil	1	2,036	Contained in a brick sump system
Bulk oxygen for lancing	Liquid oxygen	1	14,500	Pressurised vessel
Furnace hydraulic station	Hydraulic oils	1	3,500	Within furnace installation

5.6.8 Storage areas for IBCs, drums, and bags

Storage areas shall have appropriate signs and notices and shall be clearly marked out, and all containers and packages should be clearly labelled. All raw materials are supplied

and stored in labelled UN-approved containers. Incompatible substances shall be kept apart, segregated and/or isolated in line with HSG71 (Health and Safety Executive, 2009).

Where spillage of any stored substance could be harmful to the environment, the area shall be appropriately kerbed or bunded.

Containers shall be stored with lids, caps and valves secured and in place. This approach shall also be applied to nominally emptied containers. All containers, drums and small packages are regularly inspected (at least weekly). Procedures shall be in place to deal with damaged or leaking containers.

Gas cylinders (when present for maintenance activities) shall be located within a Health and Safety Executive (HSE) approved static gas cylinder storage cage. Should incompatible cylinders be stored they shall be separated following the British Compressed Gases Association (BCGA) Codes of Practice and Guidance Notes. It is important to note that gas cylinder use (associated with Hot Work) would be following the permit-to-work system.

5.6.9 Management Controls

Emergency spillage kits will be available and will be regularly inspected. Emergency spill kit training is provided to all relevant employees.

All accidents will be logged and investigated, and actions will be undertaken to prevent reoccurrence. The site environmental management plans will be reviewed annually. All emergency preparedness controls form part of the certified ISO14001 EMS.

5.7 Odour

Based upon the nature of the proposed operations, and their location (concerning sensitive receptors) no significant odour issues are anticipated. Thus, an odour management plan has not been produced.

Although the installation represents a very low risk, monitoring will be undertaken by site staff as part of the weekly site inspections. The presence or otherwise of any offensive odours shall be recorded. If an odour is recorded, the possible source(s) shall be investigated by site staff and preventative action taken. All actions taken shall be recorded within the site diary.

Celsa believes that the operations give no reasonable cause for offence or annoyance regarding odour.

5.8 Pests

Based upon the nature of the proposed operations, no significant pest issues are anticipated. Given the limited nature of the potential pest issues, a pest management plan has not been produced.

Although the installation represents a very low risk, monitoring will be undertaken by site staff as part of the weekly site inspections. The presence or otherwise of any pests shall be recorded.

6 Noise and Vibration

6.1 Introduction

Within this section, noise should be taken to refer to noise and/or vibration as appropriate, and detectable beyond the site boundary. Where noise issues are likely to be relevant, the operator is required, in the application, to provide information on the following:

- the main sources of noise and vibration associated with the installation;
- the nearest noise-sensitive sites;
- conditions/limits imposed under other regimes (*e.g.* planning);
- the local noise environment;
- any environmental noise measurement surveys, modelling or any other noise measurements; and
- any specific local issues and proposals for improvements.

The level of detail supplied should be in keeping with the risk of causing noise-related annoyance at sensitive receptors.

6.2 Noise Impact Assessment

An assessment has been undertaken considering the potential sources and associated impacts on the nearest sensitive receptors near the installation following the most relevant national and local standards and guidelines. The assessment is presented within a standalone report Ref. **E3822 - Celsa New Furnace_v1-0**.

6.3 Noise and Vibration Management Plan

A separate noise and vibration management plan has not been produced; however, noise and vibration controls and management systems are considered within the site-wide EMS *i.e.* it is a recognised environmental aspect of the site operations.

7 Emission Limits and Monitoring

7.1 Monitoring of Emissions to Air

7.1.1 Point source emissions to air

The monitoring approach will meet the requirements of the current guidance - Monitoring stack emissions: guidance for selecting a monitoring approach (Environment Agency, 2023). The required BAT standard (BAT 7) for air emissions is outlined in **Table 7-1**.

Table 7-1: *Air emission monitoring standards (BAT 7)*

Emission Point	Test	BAT Standard
A12	CO	Annual testing EN 15058
A12	Dust	Annual testing EN 13284-1 **Note:** Given the installation will burn natural gas and or hydrogen this is not seen as relevant.
A12	NOx	Continuous for any stack with NOx mass flows > 15 kg/h. Once every 6 months for any stack with NOx mass flows between 1 kg/h and 15 kg/h. Once every year for any stack with NOx mass flows < 1 kg/h. EN 14792
Note: No monitoring requirements associated with A2, A3, A4, A6, A7, A8, A9, A10, A11, A13 or A14. There are no changes to any of these emission points. Emission points A1 and A5 will be removed from the permit as they have been/will be removed.		

NRW is required to set emission limit values (ELVs) based on Commission Implementing Decision (EU) 2022/2110 of 11 October 2022 establishing the best available techniques (BAT) conclusions, under Directive 2010/75/EU of the European Parliament and of the Council on industrial emissions, for the ferrous metals processing industry (European Commission, 2022).

The BAT-Associated Emission Limits (BAT-AELs) (BAT 20), as outlined in the Ferrous Metals Processing Industry BATc, are summarised in **Table *7-2***.

Table 7-2: *BAT-AELs air emission (BAT 20)*

Emission Point	Parameter	BAT Standard
A12	Dust	Source - BATc FMP, Table 1.7 (Hot rolling) **< 2 – 10 mg/Nm^3** Daily average or average over the sampling period. The BAT-AEL does not apply if the dust mass flow is below 100 g/h.
A12	NOx	Source - BATc FMP, Table 1.9 Reheating (100% natural gas), new plants - **80 – 200 mg/Nm^3** - Reheating (Other fuels) - **100 – 350 mg/Nm^3 (1)** NOx ELV under blended firing **(4)** - **100 – 137 mg/Nm^3 (Table 2-1)** Daily average or average over the sampling period. No indicative emission level (Daily average or average over the sampling period)
A12	CO	Source - BATc FMP, Table 1.9 Reheating (100% natural gas) - **No BAT-AEL** Reheating (Other fuels) - **No BAT-AEL** Daily average or average over the sampling period. Indicative emission level (Daily average or average over the sampling period) Reheating (100% natural gas) - **10 – 50 mg/Nm^3** Reheating (Other fuels) - **10 – 50 mg/Nm^3**

Notes:

(1) The higher end of the BAT-AEL range may be higher and up to 550 mg/Nm^3 when using a high share of coke oven gas or of CO-rich gas from ferrochromium production (> 50 % of energy input). No mention of hydrogen firing within the BATc Guidance.

(2) No BAT-AELs associated with A2, A3, A4, A6, A7, A8, A9, A10, A11, A13 or A14.

(3) Emission points A1 and A5 are to be removed from the permit.

(4) The UK Regulators have recently produced guidance concerning ELVs for hydrogen combustion plant greater than 1 MW thermal input (MWth) (UK Government, 2024).

7.1.2 Fugitive emissions to air

No ambient air quality monitoring is proposed.

7.2 Monitoring of Emissions to Surface Water

There are **no** direct emissions to surface water from the installation.

7.3 Monitoring of Emissions to Sewer

There is a single emission point to the sewer from the cooling system. The Welsh Water discharge consent (Ref. No. TE147F of 2006) states that wastewater resulting from the process may contain traces of suspended solids, oils, grease, and dissolved metals at a pH between 6.0 and 11.0. The Second Schedule of the discharge consent outlines the following emission limits:

- Total suspended solids of the trade effluent shall not exceed 400 mg/l.
- Total Metals (Cu+Pb+Zn+Ni+Cr) shall not exceed 2.5 mg/l.
- Total Copper shall not exceed 1 mg/l.
- Total Lead shall not exceed 1 mg/l.
- Total Nickel shall not exceed 1 mg/l.
- Total Zinc shall not exceed 1 mg/l.
- Total Chromium shall not exceed 1 mg/l.
- Free or emulsified oil and grease shall not exceed 100 mg/l.

The installation is permitted to discharge 500 m^3 (24-hour period) and a maximum of 21 m^3 per hour. Flow monitoring is undertaken and recorded by Celsa (**Table 8-1**).

The BAT Standard, as outlined in the Ferrous Metals Processing Industry BATc, is summarised in **Table *7-3***.

Table 7-3: *Sewer emission monitoring standards (BAT 8)*

Emission point	Test	BAT Standard
S1	Total suspended solids (TSS)	Monthly (2) EN 872 **Note:** Celsa conducts monthly monitoring.
S1	Total organic carbon (TOC)	Monthly EN 1484 **Note:** This sewage undertaker does not require this to be monitored. Celsa has not included this within the current monitoring suite.
S1	Chemical oxygen demand (COD)	Monthly No EN available **Note:** This sewage undertaker does not require this to be monitored although Celsa conducts monthly monitoring.
S1	Hydrocarbon oil index (HOI) (1)	Every 3 months EN ISO 9377-2 **Note:** Celsa conducts monthly monitoring.
S1	Metals/ metalloids (1) Cd, Cr, Fe, Ni, Pb, Zn	Every 3 months Various EN standards available (*e.g.* EN ISO 11885, EN ISO 15586, EN ISO 17294-2) **Note:** Celsa conducts monthly monitoring.

Emission point	Test	BAT Standard
Notes: (1) In the case of an indirect discharge to a receiving water body, the monitoring frequency may be reduced to once every 3 months if the downstream wastewater treatment plant is designed and equipped appropriately to abate the pollutants concerned. (2) Monitoring frequencies may be reduced to once every month if the emission levels are proven to be sufficiently stable. For metals/ metalloids, the monitoring only applies when the substance/parameter is identified as relevant in the wastewater stream based on the inventory mentioned in BAT 2. Mercury has been excluded based on previous IPPC assessments and Welsh Water consent processes.		

The BAT-Associated Emission Limits (BAT-AELs), as outlined in the Ferrous Metals Processing Industry BATc, are summarised in **Table *7-4***.

Table 7-4: *BAT-AELs indirect release to water (BAT 31)*

Emission Point	Parameter	BAT Standard (1) (2)
S1	Hydrocarbon oil index (HOI)	0.5 – 4 mg/l
S1	Cd	1 – 5 µg/l
S1	Cr	0.01 – 0.1 mg/l
S1	Fe	1 – 5 mg/l
S1	Ni	0.01 – 0.2 mg/l
S1	Pb	5 – 20 µg/l
S1	Zn	0.05 – 1 mg/l
Notes: (1) The averaging periods are defined in the general considerations. (2) The BAT-AELs may not apply if the downstream wastewater treatment plant is designed and equipped appropriately to abate the pollutants concerned, provided this does not lead to a higher level of pollution in the environment.		

7.4 Monitoring of Environmental Performance Levels

The original mill was commissioned in 1964 and updated in 1985 to produce a range of medium steel section products, including angles, flats and channels in a range of sizes and lengths up to 15.5 metres. In 2003, after a successful commissioning period, the mill began producing equal and unequal angles, standard and UPN channels, and flat bars from 60 mm to 300 mm.

The BAT-associated environmental performance levels (BAT-AEPLs) for specific energy consumption for feedstock heating in hot rolling, are outlined in the Ferrous Metals Processing Industry BATc, is summarised in **Table *7-5***.

Table 7-5: *BAT-AEPLs for specific energy consumption (BAT 11 and BAT 39)*

Process & Products	Units	BAT-AEPL
Hot rolling – Feedstock reheating – Beams, billets, rails, tubes	MJ/t	1,400 – 2,200
Steel products at the end of the rolling process – Beams, billets, rails, tubes	MJ/t	100 – 300 (1)
Notes: (1) Yearly average.		

The specific water consumption BAT-AEPLs are outlined in **Table *7-6***.

Table 7-6: *BAT-AEPLs for specific water consumption (hot rolling) (BAT 19)*

Process & Products	Units	BAT-AEPL
Hot rolling	m^3/t	0.5 – 5
Notes: Based on a yearly average.		

7.5 Monitoring of Process Variables

The furnace system incorporates Digital combustion control where the heat demand is controlled by the firing duration of the burners (ON/OFF) rather than by the modulation of the air and fuel flows. The burners are sequentially impulse-fired, and each burner is

controlled individually. This allows the de-coupling of the flame profile and atmosphere control from the furnace production rate and results in:

- greater fuel efficiency and reduced greenhouse gas emissions;
- perfect control of the flame shape and heat distribution for unbeatable product quality;
- reduced scale formation; and
- reduced complexity, meaning less maintenance.

The provided Human Machine Interface (HMI) includes 9 displays showing the configuration of each zone, common areas and image of the control loops with indication of the following data:

- zone temperature;
- combustion air pressure;
- totalisation of fuel;
- control status, alarms and events;
- set points;
- furnace pressure;
- waste gas temperature; and
- cooling water.

Approximately 50 process values will be recorded in the measured value archive and stored in time files. The storage period will be one month. All stored process values can be shown on the control room screen. The following values will be recorded:

- zone temperature;
- combustion air pressure;
- furnace pressure;
- waste gas temperature;

- recuperator element temperature;
- hot air temperature; and
- alarm and events.

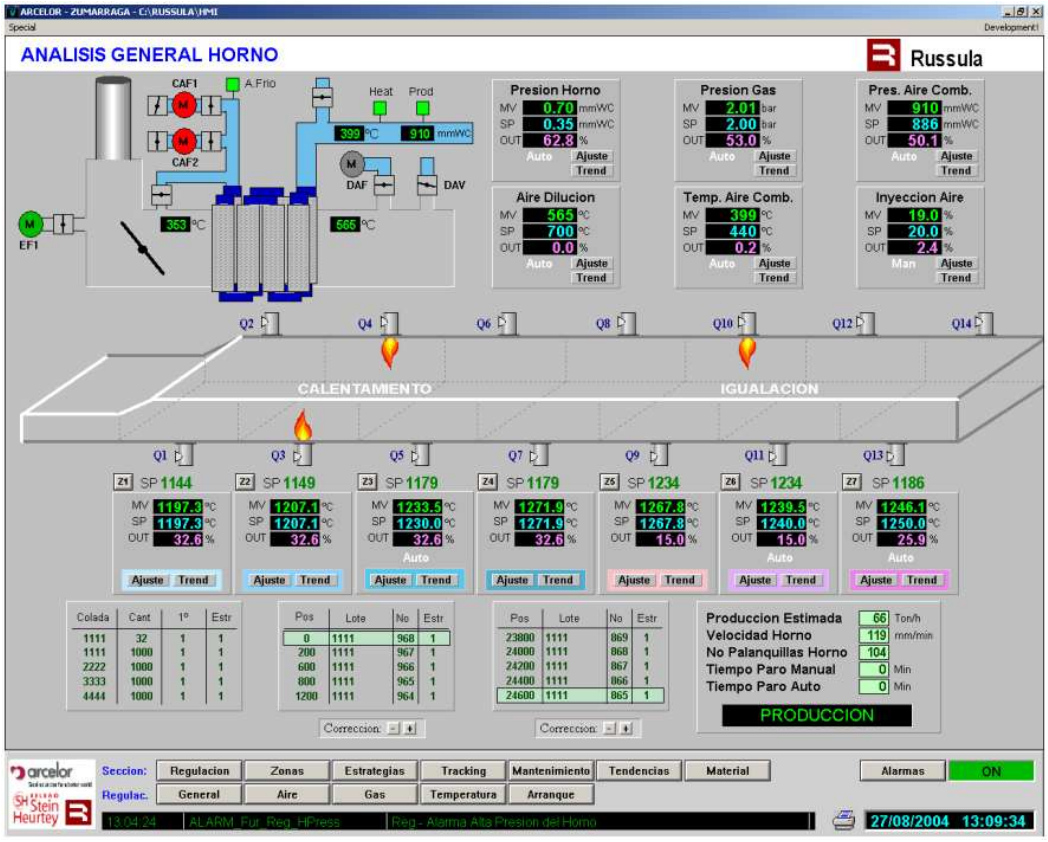


Figure 7-1: *HMI – Furnace control system*

7.6 Monitoring of Emissions to Land

There are **no** emissions to land from the installation.

7.7 Monitoring of Emissions to Groundwater (via soakaway)

There are **no** emissions to groundwater from the installation.

7.8 Monitoring of Noise Emissions

No formal (ongoing/planned) environmental noise surveys are proposed once the installation is operational. This will be subject to review if complaints are received.

7.9 Monitoring of Odorous Emissions to Air

Based upon the nature of the proposed operations and their location (concerning sensitive receptors) no significant odours are anticipated (*i.e.* the installation represents a very low risk). No formal odour monitoring is therefore proposed.

8 Environmental Assessment

8.1 Introduction

This section of the technical submission provides a summary of the assessment of the environmental significance of the emissions from the installation by looking at the Site in the context of its environmental setting and UK guidance for such assessments.

8.2 Best Available Techniques (BAT) Assessment

A BAT assessment has been undertaken in consideration of the current relevant standards:

- UK Best Available Techniques (UK BAT) (Formal Draft Only), BAT Conclusions for the Ferrous Metals Processing (Forming) Sector (F3) (29/08/2023);
- European Commission (2022). Best Available Techniques (BAT) Reference Document for the Ferrous Metals Processing Industry (European Commission, 2022); and
- European Commission (2022). Best Available Techniques (BAT) conclusions, under Directive 2010/75/EU of the European Parliament and of the Council on industrial emissions, for the ferrous metals processing industry (EU 2022/2110) (European Commission, 2022).

Please note that the draft UK BAT states that the document shall not be used for reference until published on www.GOV.UK. As of 12th December 2024, the document remains as a 'Formal Draft Only'. As required the draft has not been used (for reference) within the BAT assessment[1].

The results of the BAT assessment are summarised within a separate attachment Ref. **024-1973 Celsa Cardiff Permit Variation - BAT Assessment REV00**.

No actions have been identified.

8.3 Air Emissions Risk Assessment

An Air Emissions Risk Assessment (AERA) has been undertaken following current statutory guidance (UK Government, 2024) (Ref. **Cardiff, Celsa Manufacturing, Permit**

1 https://www.gov.uk/government/groups/uk-bat

Variation, J10-15817A-10 F1). As required a copy of the air dispersion model files is included within the variation submission (Ref. **Air Model Files**).

As the new furnace will be hydrogen-ready, its emissions status will change over time as it moves from operating on natural gas to 100% hydrogen. The AERA report describes detailed modelling of relevant emissions from a 100% natural gas-fuelled furnace and a 100% hydrogen-fuelled furnace to cover the highest possible emissions of all potential pollutants.

The modelling approach was agreed with Natural Resources Wales (NRW) via email correspondence between Karl Shepherd (Senior Specialist Advisor – Radioactivity and Industrial Policy at Natural Resources Wales) and Dr Imogen Heard (Air Quality Consultants) on 27th August 2024. Specifically, it was agreed that a conversion factor of 1.37 should be used to calculate NOx emissions from the hydrogen-fuelled plant, resulting in a value of 137 mg/m^3.

For human health receptors, modelled Predicted Environmental Concentrations (PECs) of all pollutants are less than the respective assessment levels at all locations where there is relevant exposure, under both emissions scenarios.

For the designated ecological sites, although modelled PECs exceed the critical loads at some locations, the corresponding Process Contributions (PCs) remain below 1% of the AQS in both emissions scenarios and are, therefore, considered insignificant.

It is, therefore, concluded that the air quality impacts of the proposed installation will not be significant.

No actions have been identified.

8.4 Noise Impact Assessment

An assessment has been undertaken considering the potential sources and associated impacts on the nearest sensitive receptors in the vicinity of the site following the most relevant national and local standards and guidelines. The assessment is presented within a standalone report Ref. **E3822 - Celsa New Furnace_v1-0**.

The summary of the assessment states:

- Attenuation is required to the exhaust stack in order to reduce the likelihood of impacts from the introduction of the building extension. The exact required will be identified following specification of specific plant items.

The assessment indicates that the proposed plant items will not introduce additional impacts over the existing on-site activities. Accordingly, the measures applied to the proposed items are appropriate and BAT requirements are considered to be met.

8.5 Emissions to Sewer Impact Assessment

The discharge from the permitted installation enters the Welsh Water (WW) sewer under consent (Consent No. TE147F of 2006) via emission point S1 before entry into the WW sewer located within Rover Way. The effluent is then transferred to the WW Cardiff Wastewater Treatment Works (WWTW) located on Tide Fields Road (Discharge Consent Ref. AN0303701).

The treatment provided at wastewater treatment plants can involve preliminary treatment (removal of grit and gravel and screening large solids), primary treatment (settlement of larger suspended, generally organic matter), secondary treatment (biological breakdown and reduction of residual organic matter) and tertiary treatment (methodology to address different pollutants using different treatment processes). The WW Tide Fields Road site provides treatment up to and including secondary treatment.

The secondary treated sewage effluent from the WW WWTW is discharged to the Severn Estuary via a 4.2 km long discharge pipeline (**Figure *8-1***).

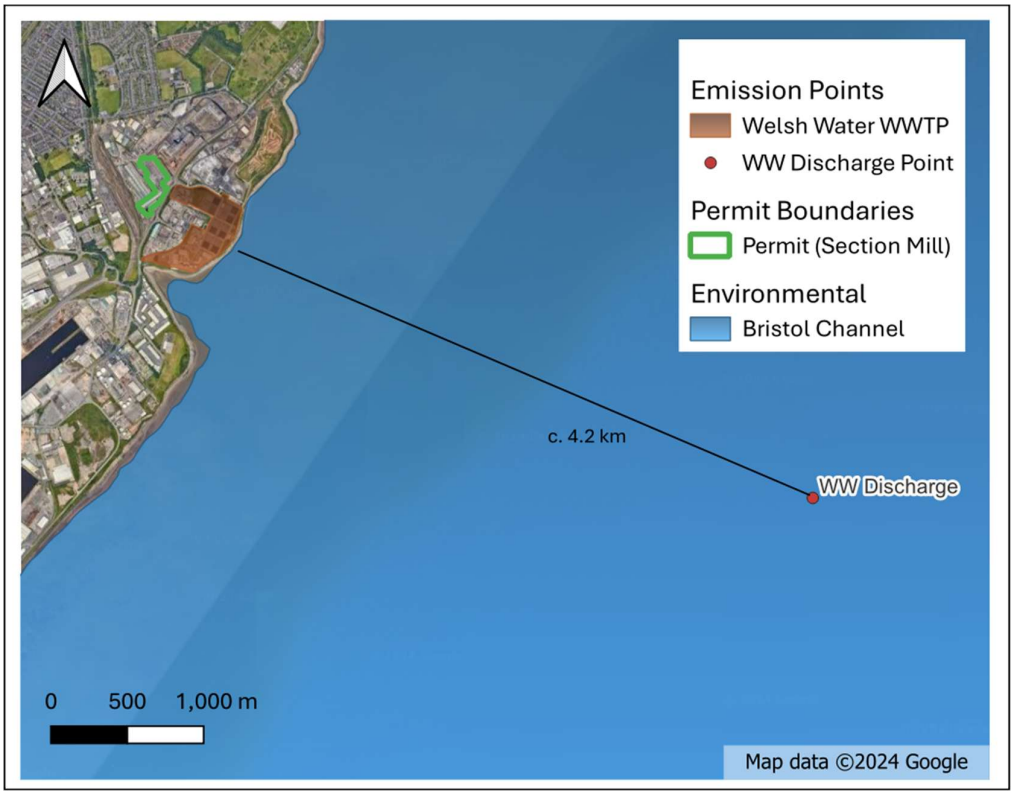
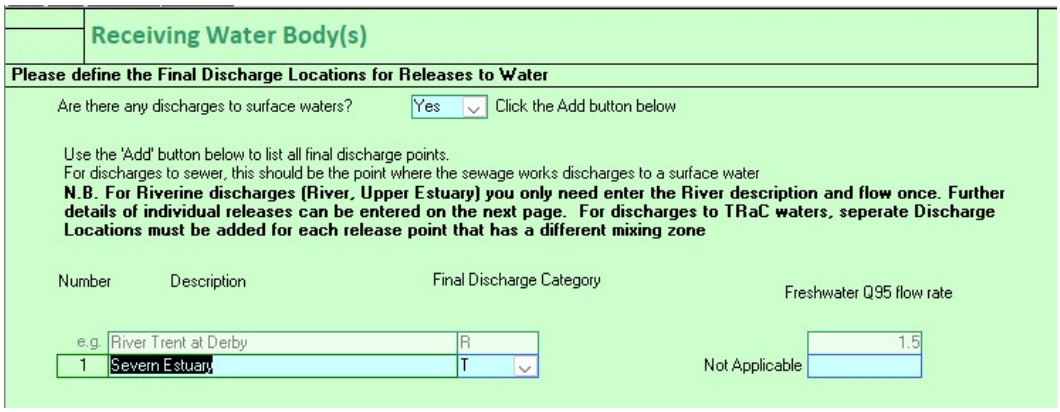


Figure 8-1: *WW WWTP Discharge Point*

In line with the current guidelines H1 has been used to undertake a screening assessment of the proposed discharge to the sewer via emission point S1. The various screen captures from the assessment process are outlined below.

8.5.1 Receiving Water Body



8.5.2 Water Discharge Release and Flow Data

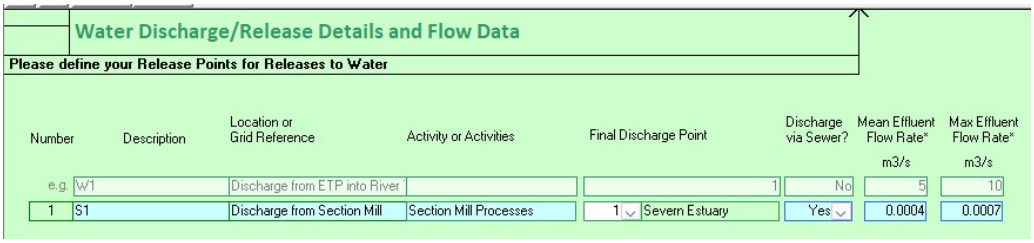
The installation is permitted under the WW discharge consent to release the following:

- The maximum quantity of trade effluent discharged on any day (being any continuous 24-hour period) shall not exceed 500 cubic metres.
- The highest rate at which trade effluent may be discharged shall not exceed 21 cubic metres per hour.

The process has not and does not require the maximum available discharge volumes (daily or hourly) listed in the WW discharge consent. In 2023 the Celsa treatment plant discharged a daily average of 31 m^3 (31 tonnes per day), averaged over 12 months (***Figure 1-1***).

Table 8-1: *Annual mean and max flow rates (based on 2023 data)*

Month	Daily Average (m^3)	Flow Rate (m^3/s)
January	53.5	0.00062
February	19.5	0.00023
March	41.2	0.00048
April	60.7	0.00070
May	16.6	0.00019
June	20.7	0.00024
July	22.5	0.00026
August	34.6	0.00040
September	18.0	0.00021
October	15.1	0.00017
November	21.4	0.00025
December	53.9	0.00062
Daily Average	31.5 m^3	Annual Mean – 0.00036 m^3/s Annual Maximum – 0.00070 m^3/s



Water Discharge/Release Details and Flow Data

Please define your Release Points for Releases to Water

Number	Description	Location or Grid Reference	Activity or Activities	Final Discharge Point	Discharge via Sewer?	Mean Effluent Flow Rate* m3/s	Max Effluent Flow Rate* m3/s
e.g.	W1	Discharge from ETP into River		1	No	5	10
1	S1	Discharge from Section Mill	Section Mill Processes	1 Severn Estuary	Yes	0.0004	0.0007

8.5.3 Release Concentrations

The facility undertakes monthly monitoring of the discharge from emission point S1 to the Welsh Water sewer. The results for 2024 are summarised in ***Table 8-2***.

Table 8-2: *Assessment of release to sewer (S1), Jan to Nov 2024*

	2024														
Month	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**			
Sample Reference	22388756	22472856	22561308	22665543	22761096	2670845	2681910	2699163	2713706	24535374	24634404				
Date	24-Jan-24	21-Feb-24	01-Mar-24	-	02-May-24	10-Jun-24	01-Jul-24	05-Aug-24	04-Sep-24	07-Oct-24	04-Nov-24				
Time	12:00:00	12:00:00	12:00:00	12:00:00	12:00:00	12:00:00	12:00:00	12:00:00	12:00:00	12:00:00	12:00:00	12:00:00			
													Average	**Max**	**WW Limit**
Free/ Emulsified Oil & Grease (mg/l)	2.07	7.78	2.93	1.07	14.3	2	1	4.64	6.87	3.77	2.98		4.5	14.3	100 mg/l
pH	7.7	8.1	8	7.5	8.1	7.9	7.5	8	8.2	8.1	7.5		7.9	8.2	6 to 11
Total Suspended Solids (mg/l)	10	37	14	11	15	10	9	12	9	6	8		13	37	400 mg/l
COD (mg/l)	118	139	134	-	-	-	11	-	-	-	-		101	139	None
Copper, total as Cu (mg/l)	0.049	0.221	0.049	0.025	0.102	0.026	0.017	0.054	0.044	0.037	0.051		0.061	0.221	1 mg/l
Lead, total as Pb (mg/l)	0.000	0.002	0.000	0.000	0.001	0.006	0.000	0.000	0.001	0.001	0.001		0.001	0.006	1 mg/l
Nickel, total as Ni (mg/l)	0.097	0.154	0.080	0.100	0.072	0.027	0.081	0.053	0.046	0.046	0.091		0.077	0.154	1 mg/l
Chromium, total as Cr (mg/l)	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.004		0.001	0.004	1 mg/l
Zinc, total as Zn (mg/l)	0.022	0.076	0.024	0.024	-	0.010	0.006	0.006	0.008	<0.006	0.020		0.022	0.076	1 mg/l
Total Metals (mg/l)	0.169	0.455	0.154	0.150	0.176	0.070	0.105	0.115	0.100	0.085	0.167	0.000	0.145	0.455	2.5 mg/l

A full comparison of existing and proposed discharge conditions is outlined in ***Table 8-3***.

Table 8-3: *Comparison of existing WW consent and BAT-AELs*

Parameter	Current WW Discharge Consent (S1)	2024 Annual Average Conc. (mg/l)	2024 Maximum (mg/l)	BAT-AELs [*4 *2]
pH	6 to 11	7.9	8.2	-
COD	-	101 mg/l	139 mg/l	-
Total Suspended Solids (TSS)	400 mg/l	13 mg/l	37 mg/l	-
Oils and Grease [*1]	100 mg/l	4.5 mg/l	14.3 mg/l	0.5 – 4 mg/l
Cadmium	-	-	-	0.001 – 0.005 mg/l [*3]
Chromium	1 mg/l	0.001 mg/l	0.004 mg/l	0.01 – 0.1 mg/l [*3]

Parameter	Current WW Discharge Consent (S1)	2024 Annual Average Conc. (mg/l)	2024 Maximum (mg/l)	BAT-AELs *4 *2
Iron	-	-	-	1 – 5 mg/l
Copper	1 mg/l	0.061 mg/l	0.221 mg/l	-
Lead	1 mg/l	0.001 mg/l	0.006 mg/l	0.005 – 0.02 mg/l *3
Nickel	1 mg/l	0.077 mg/l	0.154 mg/l	0.01 – 0.2 mg/l
Mercury	-	-	-	0.0001 – 0.0005 mg/l
Zinc	1 mg/l	0.022 mg/l	0.076 mg/l	0.05 – 1 mg/l *3
Total Metals (Cu, Zn, Pb, Cr, Ni)	2.5 mg/l	0.145 mg/l	0.455 mg/l	-

Notes:

*1 – BAT-AEL is for Hydrocarbon oil Index (HOI), WW uses Free or emulsified oil and grease.

*2 – The BAT-AELs may not apply if the downstream wastewater treatment plant is designed and equipped appropriately to abate the pollutants concerned, provided this does not lead to a higher level of pollution in the environment.

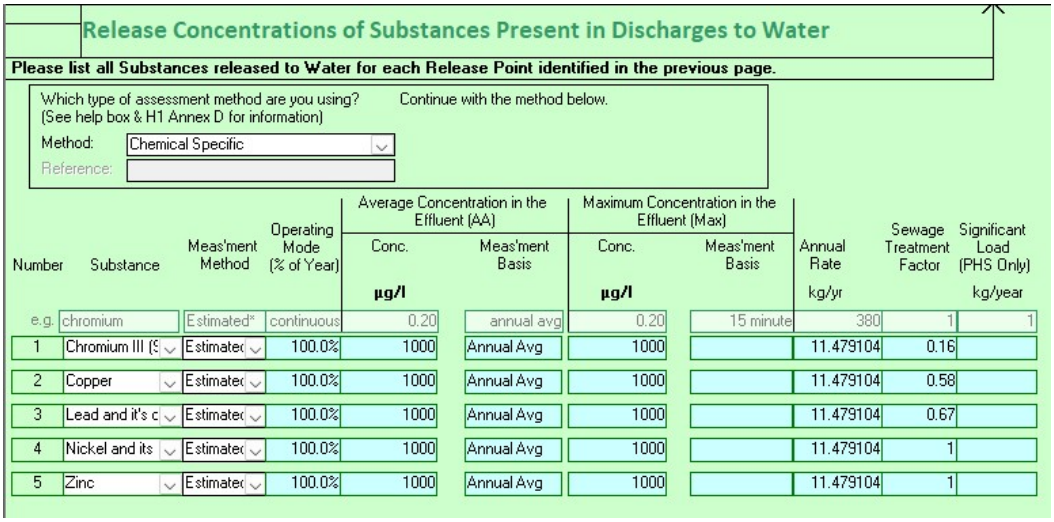
*3 – The BAT-AEL only applies when the substance(s)/parameter(s) concerned is identified as relevant in the wastewater stream based on the inventory mentioned in BAT 2.

*4 – Table 1.21 BAT-associated emission levels (BAT-AELs) for indirect discharges to a receiving water body (filtered to select those as relevant to All Processes).

*5 – The hardness of the Severn Estuary concerning the Cadmium EQS has been selected as 100-200 mg/l Ca CO3).

In line with the guidance, BAT-AELs have only been applied where the substance(s)/parameter(s) concerned have been identified as relevant *i.e.* present in the wastewater stream. As there has been no change to the permitted process or materials the existing consent determinands are still considered appropriate and, therefore, have been subject to the impact assessment.

As can be seen within **Table 8-3** compliance against the current WW consent is generally very good with no exceedances identified in 2024 (January to November). The H1 assessment has undertaken a conservative (worst case) approach and utilised the Welsh Water consented level versus the current (significantly lower) actual discharge concentrations.



Release Concentrations of Substances Present in Discharges to Water

Please list all Substances released to Water for each Release Point identified in the previous page.

Which type of assessment method are you using? (See help box & H1 Annex D for information) Continue with the method below.

Method: Chemical Specific

Reference:

Number	Substance	Meas'ment Method	Operating Mode (% of Year)	Average Concentration in the Effluent (AA) Conc. µg/l	Average Concentration in the Effluent (AA) Meas'ment Basis	Maximum Concentration in the Effluent (Max) Conc. µg/l	Maximum Concentration in the Effluent (Max) Meas'ment Basis	Annual Rate kg/yr	Sewage Treatment Factor	Significant Load (PHS Only) kg/year
e.g.	chromium	Estimated*	continuous	0.20	annual avg	0.20	15 minute	380	1	1
1	Chromium III (S	Estimated	100.0%	1000	Annual Avg	1000		11.479104	0.16	
2	Copper	Estimated	100.0%	1000	Annual Avg	1000		11.479104	0.58	
3	Lead and it's c	Estimated	100.0%	1000	Annual Avg	1000		11.479104	0.67	
4	Nickel and its	Estimated	100.0%	1000	Annual Avg	1000		11.479104	1	
5	Zinc	Estimated	100.0%	1000	Annual Avg	1000		11.479104	1	

The relevant Sewage Treatment Factors (STFs) are outlined in ***Table 8-4***.

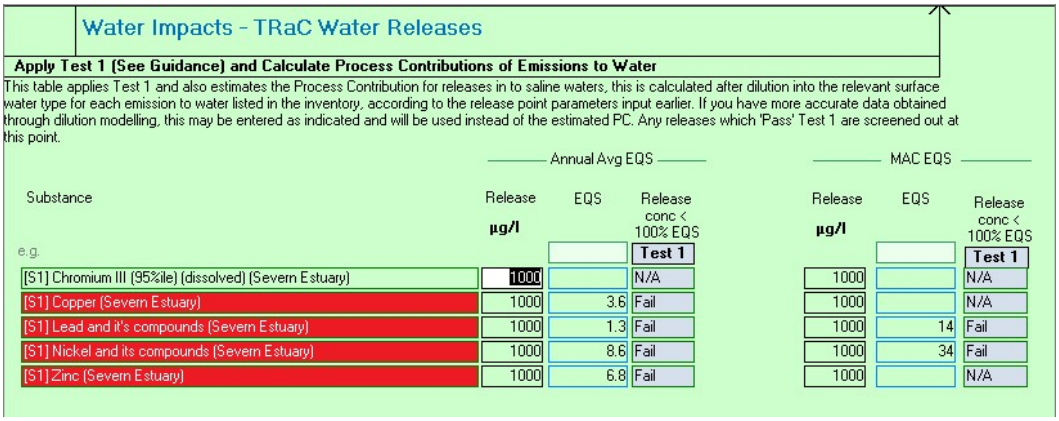
Table 8-4: *Sewage Treatment Factors (proportion remaining)*

Substance	STRF - activated sludge	STRF for water filter
Chromium and compounds - as Cr	0.16	0.52
Copper (dissolved)	0.58	0.58
Lead (dissolved)	0.67	0.67
Nickel (dissolved)	1	1
Zinc (dissolved)	1	1

8.5.4 Water Impacts – TRaC Water Releases (Part A)

TraC screening Test 1 – Does the concentration of the substance in the discharge exceed 100 percent of the EQS?

This test is devised to quickly screen out substances. If the concentration of the substance in the discharge is <100 percent EQS, the substance cannot cause the EQS to be exceeded in the receiving water and, if the receiving water already exceeds EQS, then the discharge will not exacerbate this problem. This test can be carried out without needing any data for the receiving water.



Water Impacts - TRaC Water Releases

Apply Test 1 (See Guidance) and Calculate Process Contributions of Emissions to Water

This table applies Test 1 and also estimates the Process Contribution for releases in to saline waters, this is calculated after dilution into the relevant surface water type for each emission to water listed in the inventory, according to the release point parameters input earlier. If you have more accurate data obtained through dilution modelling, this may be entered as indicated and will be used instead of the estimated PC. Any releases which 'Pass' Test 1 are screened out at this point.

Substance	Annual Avg EQS Release µg/l	Annual Avg EQS EQS	Annual Avg EQS Release conc < 100% EQS Test 1	MAC EQS Release µg/l	MAC EQS EQS	MAC EQS Release conc < 100% EQS Test 1
e.g.						
[S1] Chromium III (95%ile) (dissolved) (Severn Estuary)	1000		N/A	1000		N/A
[S1] Copper (Severn Estuary)	1000	3.6	Fail	1000		N/A
[S1] Lead and it's compounds (Severn Estuary)	1000	1.3	Fail	1000	14	Fail
[S1] Nickel and its compounds (Severn Estuary)	1000	8.6	Fail	1000	34	Fail
[S1] Zinc (Severn Estuary)	1000	6.8	Fail	1000		N/A

TraC screening Test 2 – Is the discharge to a riverine estuary or direct to a low water channel within an estuary?

No, proceed to Test 3.

TraC screening Test 3 – Is the discharge to a location with restricted dilution/dispersion characteristics?

No, the discharge point is located 4.2 km into the Severn Estuary, proceed to Test 4.

TraC screening Test 4 – Is the discharge either to a location less than 50m offshore from where the seabed is at Chart Datum or to a location where the seabed is less than 1m below Chart Datum?

No, the discharge point is located 4.2 km from the shoreline. The discharge point is always submerged and there is never less than 1 metre of water above the pipe at the lowest ride level, proceed to Test 5.

8.5.5 Efflux Volume Test – TRaC Water Releases

TraC screening Test 5 – Is the Effective Volume Flux of the discharge greater than the Allowable Effective Volume Flux?

The background concentrations utilised within the assessment have been obtained from the Water Quality Archive operated and maintained by the Environment Agency (EA). The following locations have been used to obtain background data:

River Severn Estuary Hope Fixed Station (Sampling point Ref. MD-00000004). This is an active monitoring site, there are 185 samples taken between 2023 and 2007. Data for

2020 - 2023 has been obtained for Copper, Lead, Nickel, and Zinc. No data is available for Chromium. In line with EA guidance, if no background data is available, background concentrations for each substance should be assumed to be 50 per cent of the EQS-AA.

The EA/NRW sourced background data (used within H1) is summarised in **Table *8-5***.

Table 8-5: *EA/NRW background sampling - Sampling point Ref. MD-00000004*

Parameter	No. of Samples	Minimum	Maximum	EQS AA	Background Mean or 50% of EQS-AA (H1 Input)
Chromium	-	-	-	4.7	2.35
Copper	23	1.3	8.9		2.04
Lead	23	0.04	0.24		0.06
Nickel	23	0.63	1.70		0.94
Zinc	23	1.4	10.0		3.6

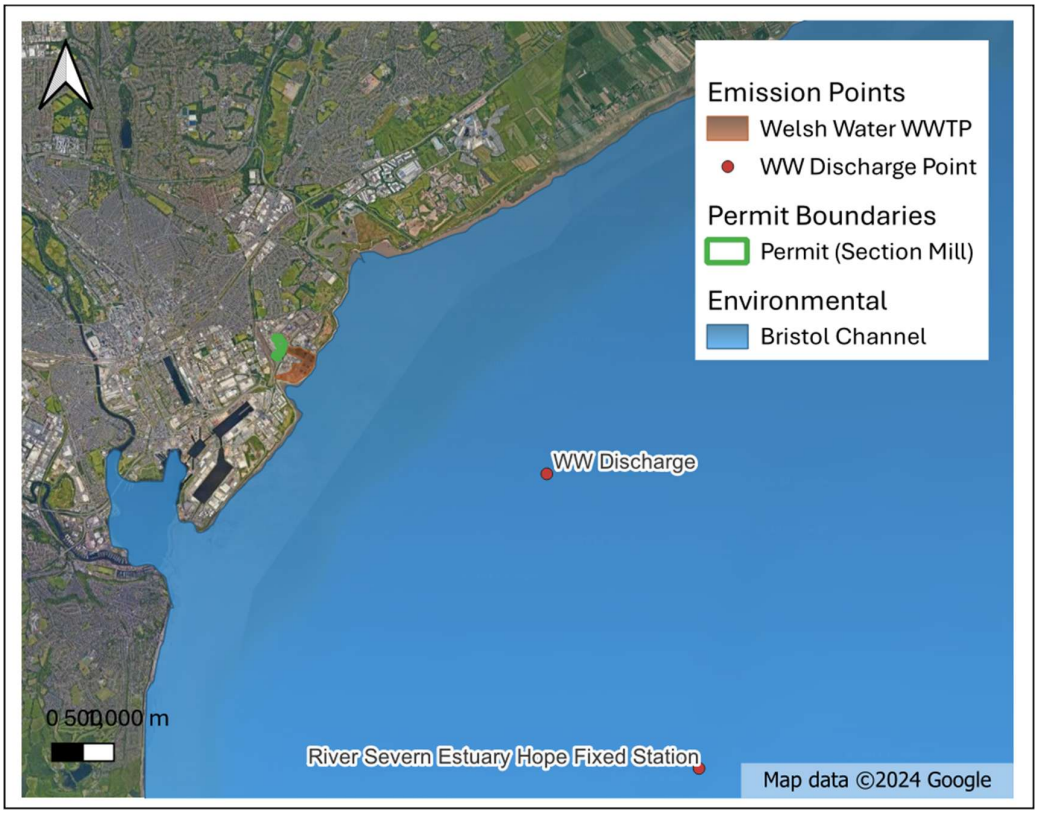


Figure 8-2: *WW discharge point and EA background monitoring site*

Effective Volume Flux - TRaC Water Releases

Apply Test 5 (See Guidance) and compare the Effective Volume Flux of your discharge with the Allowable Effective Volume Flux

This table applies Test 5 and enables you to enter the depth of the TRaC water discharge. From this data the Allowable Voumne Flux for your location can be calculated and compared with the Effective Volume Flux of your discharge.

Description:	Location:	TRaC Water Release Depth Below Chart Datum (m):
S1	Discharge from Section Mill	1

		Annual Avg EQS				MAC EQS					
Release Point and Substance	Background Conc	Release Conc	Effluent Flow	EQS AA	EVF (AA)	Release Conc	Effluent Flow	EQS MAC	EVF (MAC)	Allowable EVF	Test 5
[S1] Chromium III (95%ile) (dissolved)	2.35	1,000.00	0.00	4.70	0.02	1,000.00	0.00	32.00	0.00	1.00	Pass
[S1] Copper	2.04	1,000.00	0.00	1.00	-0.35	1,000.00	0.00			1.00	Pass
[S1] Lead and it's compounds	0.06	1,000.00	0.00	1.20	0.32	1,000.00	0.00	14.00	0.05	1.00	Pass
[S1] Nickel and its compounds	0.94	1,000.00	0.00	4.00	0.12	1,000.00	0.00	34.00	0.02	1.00	Pass
[S1] Zinc	3.60	1,000.00	0.00	10.90	0.05	1,000.00	0.00			1.00	Pass

Using worst-case conditions all parameters pass Test 5. According to EA Guidance, the discharge is therefore insignificant and is not liable to cause pollution.

8.5.6 Significant Loads – TraC waters Part B Screening

Test 1: Is the Significant Load exceeded?

According to EA Guidance, the discharge is insignificant and is not liable to cause pollution.

No actions have been identified.

8.6 Improvement Programme

No potential improvement actions have been identified.