Safran Landing Systems Services UK LTD

Meteor Business Park

Application for a Variation to Environmental Permit EPR/BL0138IP

April 2026

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	Name	Job Title	Signature
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1 Introduction

This report has been produced to support Safran Landing Systems Services UK LTD (SLSS) with a variation application under the Environmental Permitting (England and Wales) Regulation (EPR) 2016[1]. The Site currently operates under Environmental Permit (EP) (reference: EPR/BL0138IP) at Meteor Business Park in Gloucester. The variation notice number is EPR/BL0138IP/V005.

The facility provides metal plating services for aircraft landing gear components as part of the aerospace refurbishment industry. Safran is installing a new zinc nickel electroplating line at the site, which requires a substantial variation to the existing environmental permit. The new line is fully installed and awaiting commissioning.

This document should be read in conjunction with the Environment Agency (EA) application forms:

- Part A - About you;
- Part C2 – General - varying a bespoke permit;
- Part C3 - Variation to a bespoke installation permit; and
- Part F1 - changes and declaration

These are provided in Appendix A of this supporting document.

[1] https://www.legislation.gov.uk/uksi/2016/1154/schedule/1

2 Permit Variation Proposal

2.1 The Site and the Operator

SLSS operates an electroplating facility at Meteor Business Park in Gloucester. The facility provides metal plating services for aircraft landing gear components as part of the aerospace refurbishment industry. The site address is:

SAFRAN Landing Systems Services UK LTD
Meteor Business Park
Cheltenham Road
Gloucester
Gloucestershire
GL2 9QH

National Grid Reference:

SO 88319 22011

The facility is located within the Meteor Business Park, approximately 4 km to the northeast of Gloucester. Figure 2.1 provides a location map of the site. Figure 2.2 shows the current site boundary whilst Figure 2.3 shows the proposed site boundary with new emission point of the new zinc nickel electroplating line.

Figure 2.1 – Site Location

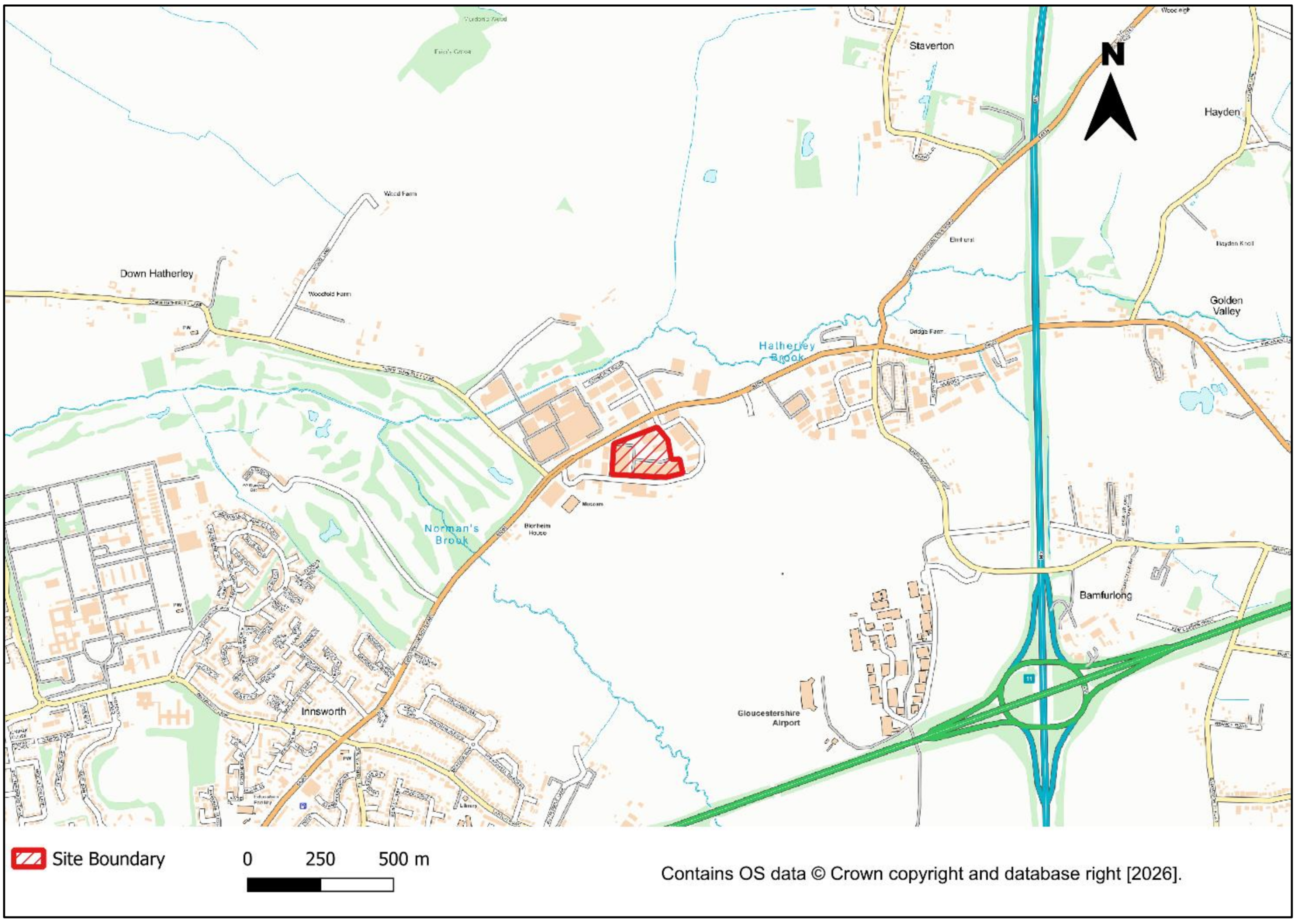


Figure 2.2 – Current Site Boundary

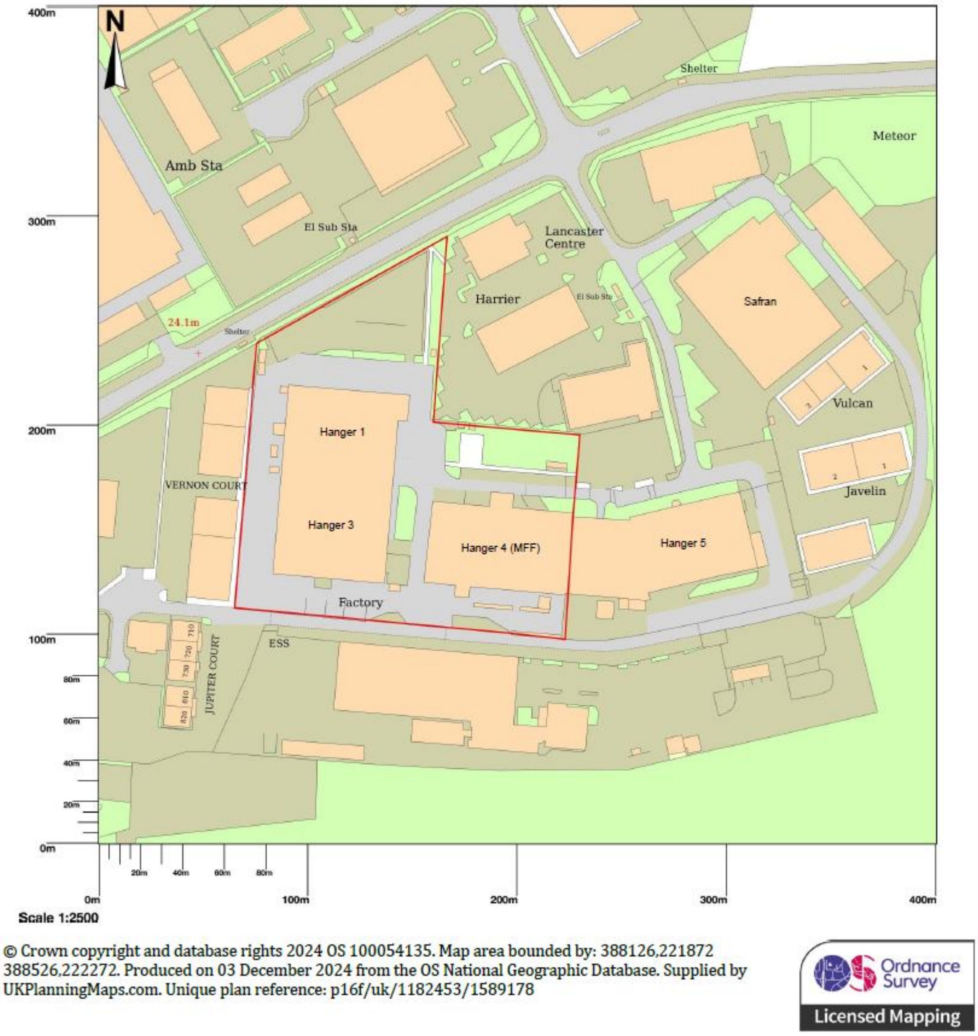
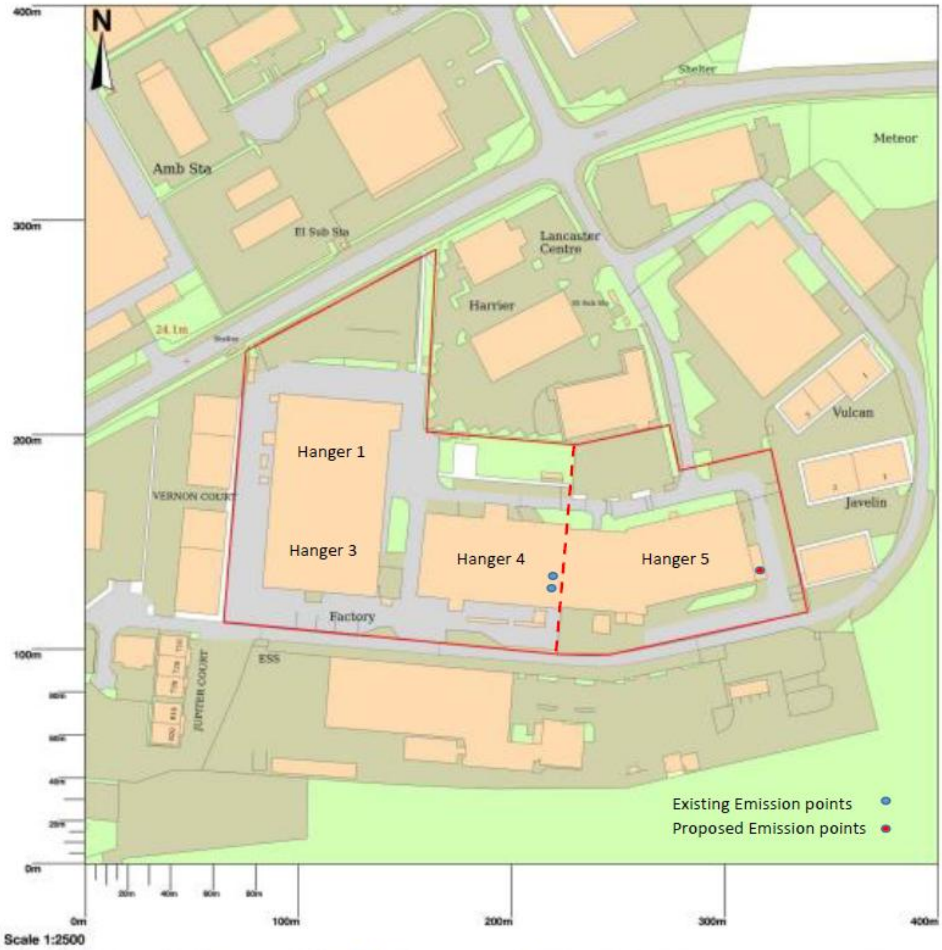


Figure 2.3 – Proposed Site Boundary



2.2 Description of Current Processes

SLSS operates an electroplating facility at Meteor Business Park in Gloucester, providing metal finishing services for aircraft landing gear components as part of the aerospace refurbishment industry. The site has operated under environmental permit EPR/BL0138IP since 2002, originally issued under the Pollution Prevention and Control Regulations 2000 and subsequently transferred to the Environmental Permitting (England and Wales) Regulations 2010. The permit has been varied twice, in 2011 (to modify monitoring frequencies) and 2017 (to reflect company name change from Messier Services Limited to Safran Landing Systems Services UK Ltd).

The facility specialises in the refurbishment and electroplating of aircraft landing gear through multiple surface treatment processes. Components requiring refurbishment are first cleaned, dismantled, and stripped of existing coatings using chemical stripping tanks. The stripped components are then shot blasted with crush nut media, degreased, and subjected to non-destructive testing (NDT). After inspection, suitable components are sent to one of three metal plating lines - cadmium, chromium, or nickel - depending on component specification and operational requirements.

Before electroplating, components undergo a series of pre-treatment processes which may include stress relief, removal of existing surface plating, removal of surface rust or corrosion, acid etching, and heating in ovens for de-embrittlement. The sequence and number of these processes vary depending on the specific metal coating to be applied. For all plating lines, components are rinsed with water between each pre-treatment process to prevent cross-contamination.

To plate the component, it is immersed in a tank containing plating solution. An electrical current is passed between the component and metal anodes suspended in the tank, causing the metal in solution to deposit onto the aircraft part. After plating, excess solution is allowed to drain before the component is rinsed with cold and then hot water. The plated component is then heated in an oven to a specified temperature and allowed to cool to room temperature (de-embrittlement process) before undergoing final non-destructive testing.

All existing plating lines are contained within Hangar 4, with a concrete containment pit beneath them to provide secondary containment for process solutions. The facility currently operates three electroplating lines: a chromium plating line discharging to atmosphere via Emission Point A1, and nickel and cadmium plating lines discharging via Emission Point A2. Both stacks discharge at 14.8 meters above ground level. The chromium line incorporates a wet-type recirculating mist eliminator built into the exhaust stack as part of the abatement system.

Process effluent from all plating lines is treated via an on-site effluent treatment plant and recirculated back to the process on a closed-loop basis. There is no process effluent discharge to sewer or controlled waters. The effluent treatment process separates two streams: general plating rinses and cyanide-bearing rinses. Cyanide-bearing rinses are oxidized prior to joining the rest of the rinse water in an ion exchange reservoir. The rinses are then pumped through a pressure filter where organics are adsorbed and solids trapped on a bed of activated carbon. The rinses pass through cation and anion exchangers for removal of ionic contaminants before returning to the plating plant. Regeneration effluent and carbon filter backwash effluent are treated in the effluent treatment tank through a series of PLC-controlled operations that generate sludge. After feeding to a filter press, the sludge is converted to semi-dry filter cake that is disposed of off-site as special waste. Liquid waste from either the effluent treatment plant or the plating plant, including spent process solutions, is piped to waste holding tanks located within the concrete pit, and then transferred to licensed waste carrier tanks for off-site disposal.

The facility has operated continuously since 2002 under IPPC/IED regulation, maintaining compliance with permit conditions and demonstrating effective environmental management of electroplating operations. The current variation application seeks to add a new zinc nickel electroplating line to provide an alternative coating technology to the existing processes, introducing one new emission point (A3) to atmosphere.

This variation application does not propose any modifications to the existing chromium plating line (Emission Point A1). The chromium line will continue to operate under current permit conditions with the existing emission limit of 5 mg/m³ for total chromium. The existing nickel-plating line will also continue to operate during the transition period. However, the manual cadmium plating facility will be phased out and replaced by the new automated zinc nickel facility.

2.3 Description of Changes

SLSS are proposing the variation due to the planned installation of a new zinc nickel electroplating and passivation facility, which will replace the current manual cadmium plating facility that is being phased out. The new facility will include (but is not limited to) the following processes:

- Automatic degreasing of components using SuperBee 300 LF solution (10% concentration in deionized water) in a single-load automatic degrease line
- Alkaline zinc nickel electroplating using Dipsol IZ-C17+ LHE plating solution in an automatic plating line capable of handling multiple loads
- Passivation treatment using Dipsol IZ-264 passivation solution to enhance corrosion resistance of plated components
- In-line water break testing at two stations to verify component cleanliness before plating and before passivation

- Treatment of process effluent through a high-flowing closed-loop water treatment system, including carbon filtration, deionisation plant operation, chemical dosing, settlement, and vacuum evaporation

- Storage of concentrated waste effluent in a 30 cubic meter storage tank with appropriate secondary containment, pending off-site disposal via licensed road tanker collection

Under normal operation, all process effluent will be treated and recirculated within the closed-loop system, maintaining the facility's established zero discharge policy to sewer or controlled waters. The current anticipation is that no other waste types apart from process effluent from SLSS' electroplating operations at the Meteor Business Park site will be treated, nor will any wastes from off-site sources be accepted.

The new zinc nickel facility represents significant investment and modernisation compared to the current manual cadmium plating operations at the Meteor Business Park site and looks to improve environmental performance through automation, enhanced process control, and transition to more sustainable coating technologies.

The use of additional plant and processes will result in additional permitted activities to be included in Table S1.1 of the environmental permit (as described in the following section) and the following changes will arise with regard to emissions:

- Addition of new emission point to air resulting from the zinc nickel plating and passivation facility, emission point reference A3

- Extension of the permitted site boundary to accommodate the new zinc nickel facility infrastructure, including plating tanks, passivation equipment, water break test stations, and associated extraction systems

- No changes to existing emission point A1 (chromium plating line), which will continue to operate under current permit conditions during the transition period

- Phased removal of cadmium plating operations from emission point A2 as the new zinc nickel facility becomes fully operational, with A2 subsequently serving only the nickel plating line

2.3.1 Site Boundary Extension

The current permitted site boundary, as defined in the original permit BL0138 issued in 2002 and shown edged in green on the site plan in Section 1.1.2 of the permit, encompasses the existing electroplating operations within Hangar 4 and associated infrastructure. The proposed zinc nickel facility requires additional floor space extending beyond this boundary into Hanager 5, as shown in Figure 2.3 (i.e., does not extend onto previously undeveloped land). A new concrete containment pit beneath Hangar 5 will be used to store zinc-nickel line final effluent.

2.3.2 Process Chemistry and Key Differences

The zinc nickel process employs alkaline chemistry rather than the acid-based systems used in existing cadmium or chromium plating. Component transfer between the degrease, water break testing, and zinc nickel plating/passivation areas is conducted via wheeled trolleys moved and handled by Safran operators. The key process difference is the co-deposition of zinc and nickel in a controlled alloy composition.

2.3.3 Enhanced Water Treatment

The new facility integrates into existing effluent treatment infrastructure but includes additional treatment capacity not present in current operations. Process effluent from carbon filter backflushing and deionisation plant regeneration undergoes chemical dosing, settlement, and vacuum evaporation - a new treatment step that concentrates waste and recovers clean water for recirculation. The concentrated waste stream is stored in a new 30 cubic meter storage tank with appropriate secondary containment, pending off-site disposal via licensed road tanker collection.

2.3.4 Emissions and Monitoring

The proposed emission limits for the new zinc nickel facility are 10 mg/m³ for total nickel (consistent with the existing permit limit for emission point A2) and 5 mg/m³ for total zinc (consistent with Best Available Techniques guidance from the Surface Treatment of Metals and Plastics BRef and Environment Agency Guidance Note EPR 2.07). The emission point will incorporate local exhaust ventilation and abatement systems equivalent to those on the existing nickel plating line. Monitoring of emissions from emission point A3 will be conducted twice yearly, maintaining consistency with the monitoring frequency established in the 2012 permit variation for existing emission points.

This variation does not propose modifications to the existing chromium plating line (Emission Point A1), which will continue operating under current permit conditions with the existing emission limit of 5 mg/m³ for total chromium.

2.3.5 Final Effluent Waste Storage at Hangar 5

This variation application also covers the request to add a final effluent waste storage facility located at Hangar 5 on site. The proposed containment facility will incorporate comprehensive containment measures, including bunding designed to contain a minimum of 110% of the largest primary container or 25% of the total storage volume, whichever is greater. The bunds will be constructed from impermeable materials with consideration given to prevent incompatible chemicals from mixing, and will be fitted with spillage detection systems and sumps for early leak identification and containment. SLSS will provide adequate bunding of tanks through the installation of a concrete bund with a minimum height of 250mm to ensure compliance with environmental protection requirements and industry best practices for hazardous waste storage.

2.4 Requested Amendments to the Environmental Permit

The following amendments to Permit BL0138IP are proposed in line with the scope of the changes requested within this permit variation.

The proposed variation introduces the following amendment to Table 1.1.1 Activity under Schedule 1 of the Regulations/ Associated Activity (shown in bold, blue text).

Table 2.1 – Proposed Amendment to Table 1.1.1: Activities

Activity under Schedule 1 of the Regulations/ Associated Activity	Description of specified activity	Schedule 1 Activity Reference (if applicable)	Limits of specified activity
Cleaning Plant	Cleaning of components prior to being electroplated	None	Surface preparation operations before plating.
Pre-treatment/ wax line	Treatment/ segregation of parts of component that are/ are not going to be plated.	None	Process operations to specifically prepare only parts of the component which are to be plated.
Storage of raw materials	Storage of chemicals used in the plating process.	None	Chemicals to be stored in the designated lockable caged area.
Storage of liquid waste	Storage of liquid waste generated as part of the effluent treatment process.	None	Waste holding tank to be contained within the concrete pit.
Cadmium Plating	Cadmium plating of aircraft landing gear	2.3 A(1)(a)	Components immersed in cadmium plating tank, excess solution removed with swill water. Releases to atmosphere via extraction system.
Nickel Plating	Nickel plating of aircraft landing gear	2.3 A(1)(a)	Components immersed in nickel plating tank, excess solution removed with swill water. Releases to atmosphere via extraction system.
Chrome Plating	Chrome plating of aircraft landing gear	2.3 A(1)(a)	Components immersed in chrome plating tank, excess solution removed with swill water. Releases to atmosphere via extraction system.
Effluent Treatment Plant	Treatment of rinse water by ion exchange.	None	Treated water is recirculated back to process. Regeneration effluent from ion exchange plant reduced in volume before off-site disposal.
Zinc-Nickel Plating	***Zinc-Nickel plating of aircraft landing gear***	2.3 A(1)(a)	***Components immersed in zinc-nickel plating tank, excess solution removed with swill water. Releases to atmosphere via extraction system.***

The proposed variation introduces the following amendment to the Table 2.5.2: Waste stored on site (shown in bold, blue text).

Table 2.2 – Proposed Amendment to Table 2.5.2: Waste Stored on Site

Description of waste	Location of storage on site	Manner of storage	Storage conditions
Final Effluent	Concrete containment pit , Hangar 4.	Holding Tank 1	4,000 litre capacity storage tank, designed with separate bund walls able to hold 110% of the tank capacity. Tank and its bund located within the concrete pit.
Waste Acid	Concrete containment pit , Hangar 4.	Holding Tank 2	4,000 litre capacity storage tank, designed with separate bund walls able to hold 110% of the tank capacity. Tank and its bund located within the concrete pit.
Waste Alkali	Concrete containment pit , Hangar 4.	Holding Tank 3	4,000 litre capacity storage tank, designed with separate bund walls able to hold 110% of the tank capacity. Tank and its bund located within the concrete pit.
Waste Cyanide	Concrete containment pit , Hangar 4.	Holding Tank 4	4,000 litre capacity storage tank, designed with separate bund walls able to hold 110% of the tank capacity. Tank and its bund located within the concrete pit.
Filter cake	Filter cake	Enclosed lockable skip	Consigned for disposal as special waste.
Final Effluent	***Concrete containment pit , Hangar 5.***	***Holding Tank***	***storage tank, designed with separate bund walls able to hold 110% of the tank capacity. Tank and its bund located within the concrete pit.***

The proposed variation introduces the following amendment to the Table 6.1.1: Emission points into air (shown in bold, blue text).

Table 2.3 – Proposed Amendment to Table 6.1.1: Emission Points into Air

Emission point reference/description	Source	Location of emission point
A1	Extraction on Chrome Plating Line	Grid reference 388340,222000
A2	Extraction on Nickel and Cadmium Plating Line	Grid reference 388340,222010
A3	***Extraction on Zinc-Nickel Plating Line***	Grid reference 388442, 222012

The proposed variation introduces the following amendment to the Table 6.1.2: Emission limits into air (shown in bold, blue text).

Table 2.4 - Proposed Amendment to Table 6.1.2: Emission Limits into Air

Parameters	Emission Point			Reporting Period
	A1	**A2**	***A3***	
Total Cadmium mg m^{-3}	-	0.05	-	Twice a year
Total Nickel mg m^{-3}	-	10	***10***	Twice a year
Total Chromium mg m^{-3}	5	-	-	Twice a year
Total Zinc mg m^{-3}	-	-	***5***	Twice a year

The proposed variation introduces the following amendment to the Table S2: Reporting of monitoring data (shown in bold, blue text).

Table 2.5 - Proposed Amendment to Table S2: Reporting of Monitoring Data

Emission point reference/description	Emission point	Reporting Period	Period begins
Cadmium mg m^{-3}	A1	Bi Annually	01/09/02
Nickel mg m^{-3}	A2, ***A3***	Bi Annually	01/09/02
Chromium mg m^{-3}	A2	Bi Annually	01/09/02
Zinc mg m^{-3}	***A3***	***Bi Annually***	***01/05/26***
Delivered electricity MWh		Annually	01/09/02
Primary electricity (delivered x 2.6) MWh		Annually	01/09/02
Primary carbon dioxide (primary electricity x 0.166) te		Annually	01/09/02
Delivered gas MWh		Annually	01/09/02
Filter Cake kg		Annually	01/09/02
Total Liquid Waste te		Annually	01/09/02

3 Operations

3.1 Zinc-Nickel Plating Line

3.1.1 Process Description

The new Zinc-Nickel Plating & Passivation facility will replace the current manual Cadmium plating facility, which is due to be phased out.

The detailed process flow is shown in Figure 3.1.

Figure 3.1 – Zinc-Nickel Plating Line Process Flow

Sequence	Description	Chemical	Man / Auto	Scope
1	Strip Facility	NH^4NO^3	Man	Out Of Scope
2	Fix Component to Lifting Fixture		Man	Out Of Scope
3	Auto Load			
4	Degrease	10% SuperBee 300 LF	Auto	
5	CWR 1.1		Auto	
6	CWR 1.2	DI Water < 100µS/cm	Auto	
7	HWR	DI Water < 100µS/cm	Auto	
8	Auto Unload			
9	Remove Component from Lifting Fixture		Man	Out Of Scope
10	Grit Blast		Man	Out Of Scope
11	Fit Component to Cage		Man	Out Of Scope
12	Auto Load			
13	Online WBT (dip)	DI Water < 100µS/cm	Semi-Auto	
14	Auto Unload			
15	Auto Load			
16	ZnNi	Dipsol IZ-C17+	Auto	
17	CWR 2.1		Auto	
18	CWR 2.2	DI Water < 100µS/cm	Auto	
19	HWR (2nd Pass)	DI Water < 100µS/cm	Auto	
20	Hot Air Dryer	Air @ 85°C max	Auto	
21	Auto Unload			
22	Remove Component from Cage		Man	Out Of Scope
23	Fix Component to Lifting Fixture		Man	Out Of Scope
24	Auto Load			
25	Online WBT (dip)	DI Water < 100µS/cm	Semi-Auto	
26	Auto Unload			
27	Auto Load			
28	Reactivation	0.1% HCl	Auto	
29	CWR 3.1		Auto	
30	CWR 3.2	DI Water < 100µS/cm	Auto	
31	Passivation	Dipsol IZ-264	Auto	
32	CWR 3.1 (2nd Pass)		Auto	
33	CWR 3.2 (2nd Pass)	DI Water < 100µS/cm	Auto	
34	HWR (3rd Pass)	DI Water < 100µS/cm	Auto	
35	Hot Air Dryer (2nd Pass)	Air @ 85°C max	Auto	
36	Auto Unload			
37	Remove Component from Lifting Fixture		Man	Out Of Scope
38	Deembrittlement Oven		Man	Out Of Scope

In terms of activity capacity, the line can process a maximum of two components per hour. The site operates for 24 hours per day and for up to 50 weeks per week, resulting in a maximum of 16,800 components plated per year on the line. The plating is applied to a thickness of 12.5 microns.

The process comprises the following stages:

1. Degrease Stage

Component handling is performed on Hangers provided by SLSS, which are fixed to Flight Bars supplied with the Degrease station. The automatic Degrease Line processes a single load at a time, using a 10% SuperBee 300 LF / 90% DI (deionised) Water solution to remove oils, greases, and surface contaminants from components prior to plating.

2. Post-Degrease Transfer and Grit Blast

After the Degrease stage, the component(s) are removed manually from the hangers and loaded onto a wheeled trolley for transfer to the Grit Blast. Grit blasting provides mechanical surface preparation to ensure optimal adhesion of the subsequent plating layers.

3. Water Break Test

Following Grit Blast, components are taken to the Water Break Test station for manual cleanliness verification. The new Zinc-Nickel Plating Facility includes an in-line "Water Break Test" station, where component cleanliness can be manually verified before Plating and before Passivation. This quality control step ensures that any residual contaminants are identified and addressed before proceeding to the plating stage.

4. Plating Preparation

After Water Break testing is completed and passed, the component is ready to be loaded onto the Plating/Passivation Line. Plating is performed in dedicated processing cages, fitted by SLSS with supplementary anodes and agitation jets in a dedicated tooling area. This configuration ensures uniform plating coverage and consistent quality across all component surfaces.

5. Zinc-Nickel Plating and Passivation

Once the component loads have been prepared, they are taken to the Zinc-Nickel plating/Passivation area via wheeled trolleys for loading into the automated process line. The automatic Zinc-Nickel Plating and Passivation Line handles multiple loads simultaneously, improving throughput and operational efficiency.

The plating process utilises an alkaline Zinc-Nickel solution (Dipsol IZ-C17+ LHE) to deposit a protective Zinc-Nickel alloy coating onto component surfaces. Following plating, components undergo passivation using Dipsol IZ-264, which enhances corrosion resistance and provides additional surface protection.

6. Post-Passivation and De-embrittlement

After the Zinc-Nickel and Passivation process is complete, the component loads are taken back to the tooling area via trolleys. The final process stage involves baking the components in a De-embrittlement Oven. This thermal treatment relieves hydrogen embrittlement induced during the plating process, ensuring component mechanical integrity is maintained.

Water Treatment System:

The Water Treatment System operates as a high-flowing closed-loop process designed to maintain rinse water quality and minimise freshwater consumption. All rinse water is recirculated through a 5 m^3/h Deionised (DI) Water Plant at approximately 1,500 litres per hour (LPH), with capacity to accommodate higher chemical dragout figures.

Water make-up to the closed-loop is sourced from Towns Water supply and treated by an 1,800 LPH Reverse Osmosis (RO) Plant to reduce conductivity and remove metal ions. Effluent arising from backflushing of Carbon Filters and regeneration of DI Plant resins is treated by Chemical Dosing, Settlement and Vacuum Evaporation before being stored in a 30 m^3 Storage Tank for eventual off-site disposal via Road Tanker take-away.

3.1.2 Location

The Zinc-Nickel Plating Line is located at Hangar 5 on site. The location of the facility and associated emission point (A3) is shown in Figure 2.3.

3.1.3 Operation Hours

The plant will operate 24 hours a day, seven days per week, in line with operational requirements. This operating profile ensures that the facility can meet production demands while maintaining consistent quality standards.

3.2 Management

SLSS recognises the importance of managing any potential environmental impacts of their operations and have processes and procedures in place, aiming to achieve continuous improvement regarding environmental performance.

These procedures will be reviewed for compliance by SLSS against the EA's requirements (Best Available Technique (BAT)) and any required changes following the permit variation will be incorporated into the current environmental management system (EMS). This is a live document that defines the processes, procedures and controls the SLSS adheres to in order that all its operations are carried out safely.

The EMS covers all aspects pertaining to management and monitoring environmental performance at the site and it will be updated to ensure that it will be compliant with the updated permit, in line with guidance from the EA[2]. A summary of what is contained within the EMS is provided within this document (see Section 8).

Members of the team at the SLSS have defined roles and responsibilities to ensure that all aspects of environmental performance of applicable activities and processes are managed, controlled and reported in a timely manner to comply with any regulatory controls as defined within the permit. An internal audit programme is devised on an annual basis ensuring that all parts of the management systems (as defined within thie EMS management manual) are reviewed to ensure that they continue to meet the requirements of ISO 14001:2016.

The internal audits are undertaken by appropriately trained and / or capable auditors and recorded on an audit / inspection form together with any audit findings on a non-conformance report. Audit findings are then captured on a SLSS approved platform Fabriq, actions are then tracked through departmental quick response quality control reviews.

Staff at all levels have the appropriate training for their responsibilities with a tiered training framework and records of this training are maintained. SLSS will ensure that all persons understand the importance of their training and experience and how they can work effectively to ensure safe working, they will also ensure that personnel are aware of the health and safety consequences of their work activities and the benefits of following safe working practices. It is ensured that records of training, education, qualification and experience are maintained. Hardcopies of training certificates are held by the Quality department.

SLSS understands the importance of documented procedures covering the operation and maintenance of these procedures are included as part of the environmental management system. These will be regularly reviewed and updated as required. The management system will also ensure that monitoring and reporting of results to the EA will comply with the requirements of the permit.

3.3 Maintenance

The Operations Manager has the ultimate responsibility for the effective maintenance of plant and equipment throughout the facility. There are two types of maintenance associated with the Zinc-Nickel plating line and associated infrastructure: planned maintenance and unplanned maintenance.

Planned maintenance is regular maintenance completed at timescales specified for the process. The SLSS maintenance team will undertake all maintenance on the Zinc-Nickel plating line and associated equipment. A detailed maintenance schedule covering daily, weekly, monthly, quarterly, 6-monthly and annual checks is provided in Appendix B: Maintenance Procedures.

Unplanned maintenance covers breakdown of plant and other emergencies, generally initiated when there is a divergence from normal operating parameters as specified by manufacturers. Issues requiring operator intervention outside of the routine maintenance programme will be identified by the operator and an appropriate response initiated in accordance with the site's emergency procedures.

Site shutdown and start-up procedures are provided in Appendix C: Shutdown and Start-up Procedures. The Major Accident Prevention Plan (MAPP) is provided in Appendix D.

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

All maintenance activities, both planned and unplanned, will be documented and retained in accordance with the site's Environmental Management System for a minimum of four years and will be available for inspection by the Environment Agency upon request.

4 Comparison with Relevant Guidance

A Best Available Techniques (BAT) assessment has been undertaken for the new proposed Zinc-Nickel plating line operations. A comparison against Reference Document on Best Available: Techniques for the Surface Treatment of Metals (STM) and Plastics (BRef)[3] and against EA guidance: The Surface Treatment of Metals and Plastics by Electrolytic and Chemical Processes (EPR 2.07)[4] have been provided separately below.

4.1 Best Available Techniques (BAT) Assessment against BRef

A comparison against BAT conclusions in the STM BRef is provided in Table 4.1, evaluating the new elements of the permit variation.

[3] European Commission (2006). Best Available Techniques Reference Document on the Surface Treatment of Metals and Plastics Industry. Integrated Pollution Prevention and Control (IPPC).
[4] Environment Agency (2009). The Surface Treatment of Metals and Plastics by Electrolytic and Chemical Processes (EPR 2.07)

Table 4.1– BAT Review: Conformity with BAT Conclusions in BRef

Item	BAT	Description of BAT	Description of Proposed Facilities
5.1. GENERAL BAT			
1.1 Management Techniques			
1.1	1	Environmental Management BAT is to implement and adhere to an Environmental Management System (EMS) incorporating: definition of environmental policy; planning and establishing procedures; implementation with attention to structure, training, communication, documentation, and maintenance; checking performance and corrective action; review by senior management. Supporting measures include: examination by accredited certification body; preparation of environmental statement; implementation of EMAS/ISO 14001. Specific features: environmental impact from operation and decommissioning; development of cleaner technologies; sector benchmarking on energy, water, raw materials, emissions, waste.	An Environment Management System (EMS) is in place and the latest version was updated in June 2026. A copy of the EMS that SLSS follows is submitted with this report. A number of supporting documents are referenced with the EMS which cover specific areas as per the BAT requirement.
1.1	2	Housekeeping and Maintenance BAT is to implement a housekeeping and maintenance programme including training and preventative actions to minimise specific environmental risks.	Site procedures fully detail staff training and competency assessments requirements. SLSS training framework includes HSE Induction for all staff. Maintenance Manual are in place and provided in Appendix B.
1.1	3	Minimising Effects of Reworking BAT is to minimise environmental impacts of reworking by management systems requiring regular re-evaluation of process specifications and quality control jointly by customer and operator. Includes: ensuring specifications are correct, up to date, compatible with legislation, applicable, attainable, measurable; discussing proposed changes; training operators; ensuring customers aware of process limitations.	The proposed changes have been reviewed and all required process specification and quality control are documented within SLSS TECH DOC REVIEW (WP071) procedure within the Quality Management system.
1.1	4	Benchmarking the Installation BAT is to establish benchmarks enabling performance monitoring on ongoing basis and against external benchmarks. Essential areas: energy usage, water usage, raw material usage. Record and monitor all utility inputs by type (electricity, gas, LPG, water). System to action data includes: identifying responsible person; rapid notification of variations; investigations into performance variations.	BAT will be used where appropriate to minimise the consumption of raw materials, resources, waste, vibration, odour, energy, and water use. SLSS has a sustainability program in place to monitor the benchmarks, driven by group targets of 50% reduction by 2030. This utilises monitoring of Energy, Utilities, Waste and sustainable resourcing.
1.1	5	Process Line Optimisation and Control BAT is to optimise individual activities and process lines by calculating theoretical inputs and outputs for selected improvement options. For automatic lines, BAT is to use real-time process control and optimisation.	The proposed procedure has been designed to be compliant with these BAT requirements. The plating/passivation process line is to be run automatically with parts moved between tanks at correct timing automatically without manual intervention For automatic lines, real-time process control and optimisation is specified in the procedure design.
1.2 Installation Design, Construction and Operation			

1.2	1	Storage of Chemicals and Workpieces/Substrates BAT specific to surface treatment sector: avoid generating free cyanide gas by storing acids and cyanides separately; store acids and alkalis separately; reduce fire risk by storing flammable chemicals and oxidising agents separately; reduce fire risk by storing spontaneously combustible chemicals in dry conditions separately from oxidising agents; avoid contamination from spillages and leakages; avoid corrosion of storage vessels and systems. To minimise additional processing, prevent degradation of metal workpieces/substrates by: shortening storage time; controlling corrosivity of storage atmosphere; using corrosion preventing coating or packaging.	SLSS operate a chemical storage procedure in line with COSHH and Safran procedures/guidelines, all chemical storage across site remains as per the existing permit with annual reviews against the site's legal obligations and EA audit findings.
1.3 Agitation of Process Solutions			
1.3	1	BAT is to agitate process solutions to ensure movement of fresh solution over work faces by: hydraulic turbulence; mechanical agitation of workpieces; low pressure air agitation in specific applications. NOT BAT to use: low pressure air agitation with heated solutions (increases energy demand); cyanide solutions (increases carbonate formation); solutions with substances of concern; high pressure air agitation (high energy consumption).	Proposal agitation design follows BAT principles. Agitation Systems:4 automatic connections for recirculated flushing (agitation circuits) required to connect to Component Cages with flowrates 2 x 50LPM max and 2 x 30LPM max; Flowrates monitored and controlled to 2LPM accuracy down to 10% of maximum flow; Air agitation systems supplied with air generated by central single stage air-cooled side channel blower unit fitted with sound attenuating box.
1.4 Utility Inputs - Energy and Water			
1.4	1	Electricity - high voltage and large current demands BAT is to benchmark utilities. For electricity: reduce consumption by minimising reactive energy losses (cos $\varphi > 0.95$); reduce voltage drop; keep bus bars short with sufficient cross-sectional area; use individual anode feeding; maintain rectifiers regularly; install modern electronically-controlled rectifiers; increase conductivity of process solutions; use modified wave forms.	All power onsite passes through a voltage optimiser.
1.4	2	Heating When using electric immersion heaters, BAT is to prevent fires by monitoring tank manually or automatically to ensure it does not dry out.	Heated tanks have associated controls: ON-OFF button at PLC control screens to enable heater function in maintenance manual mode. Temperature of tank controlled by PLC; Temperature controller mounted on main panel used to set over-temperature alarm condition.
1.4	3	Reduction of Heating Losses BAT is to reduce heating losses by: seeking heat recovery opportunities; reducing air extracted across heated solutions; optimising process solution composition and working temperature range; insulating heated solution tanks (double skinned, pre-insulated, or applying insulation); insulating surface of heated tanks using floating insulation sections. NOT BAT to use air agitation with heated process solutions.	Selected tanks lagged on exterior for energy conservation; Process Solution Heating: Process solutions above 35°C heated using electric immersion heaters with heating coils mounted on side of tanks and lagged for energy conservation. Chiller: Chiller will be installed outside to south side of Hangar 5; Operation of chiller and recirculating pumps automatically controlled following temperature signals from tank temperature probes; 1 off iC408 Packaged Air Cooled i-Chiller – R410A Refrigerant with thermal duty cooling 17kW.

1.4	4	Cooling BAT is to: prevent over-cooling by optimising process solution composition and temperature range; use closed refrigerated cooling system for new or replacement systems; remove excess energy by evaporation where appropriate; install evaporator system in preference to cooling system where energy balance shows lower requirement; design, locate and maintain open cooling systems to prevent legionella formation. NOT BAT to use once-through water cooling systems except where local water resources allow or water can be re-used.	The designed procedure has closed-loop cooling and evaporation system specified with no once-through water cooling. Cooling System: Closed refrigerated cooling system with 1 off iC408 Packaged Air Cooled i-Chiller – R410A Refrigerant; Thermal duty cooling 17kW; Fluid type: Water/Ethylene Glycol 25%; Fluid supply temperature: 6°C; Fluid return temperature: 12°C; Ambient air: 25°C; Operation of chiller automatically controlled following temperature signals from tank temperature probes. Evaporation: High-flowing closed-loop water treatment process
1.5 Waste Minimisation of Water and Materials			
1.5	1	Water Minimisation In-Process BAT is to minimise water usage by: monitoring all points of water and materials usage; recording information on regular basis; recovering water from rinsing solutions by techniques in BAT; re-using in process suitable for water quality; avoiding need for rinsing between activities by using compatible chemicals.	The proposed procedure has a comprehensive closed-loop water treatment system with recirculation and evaporation: This is a high-flowing closed-loop process with all rinse water recirculated through 5m³/h DI Plant. SLSS also has a sustainability program in place to monitor the benchmarks, driven by group targets of 50% reduction by 2030. This utilises monitoring of Energy, Utilities, Waste and sustainable resourcing.
1.5	2	Drag-in Reduction BAT for new lines or upgrades is to reduce drag-in of surplus water from prior rinsing by using eco rinse (or pre-dip) tank. Build-up of particulates controlled by filtering. Eco-rinse cannot be used in certain applications (carousel, coil coating, reel-to-reel, etching, degreasing, nickel lines, anodising).	Not applicable as an Eco-rinse (pre-dip) cannot be used with etching or degreasing / in nickel lines because of increased quality problems.
1.5	3	Drag-out Reduction BAT is to use techniques to minimise drag-out of materials from process solution. It is BAT to use one or more of the following techniques to minimise the drag-out of materials from a process solution in jig processing lines: Arrange workpieces to avoid retention of process liquids by jigging at an angle and jigging cup-shaped components upside down; Maximise draining time when withdrawing jigs (limited by process solution type, quality requirements, and transporter duty time); Regularly inspect and maintain jigs to ensure no fissures or cracks and that jig coatings retain hydrophobic properties; Arrange with customers to manufacture components with minimal spaces to trap process solution or provide drainage holes; Fit drainage ledges between tanks canted back to the process tank; Spray-rinse, mist or air spray excess process solution back into the process tank (limited by process solution type and quality; can be overcome by spraying in enclosure or using low-pressure sprays; legionella controlled by design and maintenance).	The proposed procedure has a comprehensive drag-out reduction system with optimised draining times, low-pressure spray-rinse in enclosure, and legionella control measures specified. Jig design framework are optimised by using flight bar. .

1.5	3.1	Reduction of Viscosity BAT is to reduce viscosity by optimising process solution properties: lowering chemical concentration; adding wetting agents; ensuring chemicals don't exceed recommended values; optimising temperature and conductivity.	The process solution has been optimised with the detailed requirement and methodology record in document WP0097 Laboratory Process Control Requirements and WP0194 Laboratory Vat Analysis Methods.
1.5	4	Rinsing BAT is to reduce water consumption using multiple rinsing. Reference value for water discharged: 3-20 l/m²/rinse stage. Spray techniques important for achieving lower end of range. BAT is to conserve process materials by returning rinse-water from first rinse to process solution. Exceptions where rapid dilution required: hexavalent chromium passivation, etching, zincate dipping, pickling, activating, colour lightening; where loss in quality caused by too much rinsing.	The proposed procedure has a closed-Loop System: All rinse water recirculated through 5m³/h DI Plant to minimise water use. Spray bars are installed as required in BAT to use spray techniques for rinsing. The water discharge rate is dependent on the parts processed. However, when sizing the evaporator, the estimation calculation is the following: For the 100 LPH unit operating over a period of 30 days the approximate volume of water treated will be 72,000 litres with around 700 litres of effluent waste after 8 hours super concentration (100 times concentration). The above figures suggest an instantaneous concentrate flowrate of 0.09 m^3/hr.
1.6 Materials Recovery and Waste Management			
1.6	1	Prevention and Reduction BAT is to prevent loss of metals and other raw materials by: reducing and managing drag-out; increasing drag-out recovery using ion exchange, membrane, evaporation; preventing loss through overdosing by monitoring concentration; recording and benchmarking usage; reporting deviations to responsible person. Most consistently achieved by analytical control (SPC) and automated dosing.	The procedure has a comprehensive system for drag-out reduction, recovery and concentration monitoring as specified below: Drag-out Reduction: Process design with multiple rinse stages and spray rinsing. Drag-out Recovery: Closed-loop DI Water System with Duplex Demineraliser, Backwash Pump, Regeneration Pump, UV Light, Vacuum Evaporator, Chemical dosing (Caustic and Acid Dosing Pumps). Concentration Monitoring: Conductivity sensors on Final Cold Water rinses and Hot Water rinse; pH Monitoring on ZnNi tank, Passivation tank, Reactivation tank. Automated Dosing: Chemical Transfers controlled with manual ball valves; Caustic Dosing Pump and Acid Dosing Pump for in-line pH correction; Dosing pumps draw directly from IBC's or suitable containers. Data Collection: System capable of collecting and logging data from all analogue sensors; Trend format display with ability to track back historically.

1.6	2	Re-use BAT is to recover metal as anode material using techniques and in combination with drag-out recovery.	Zinc anodes are used to replenish the metal within the solution and will be dissolved within the dissolution tank in line with production volume. Nickel anodes are insoluble and not depleted within the plating procedure so require minimal to no replacement (only due to damage within tanks)
1.6	3	Materials Recovery and Closing the Loop BAT is to conserve process materials by returning rinse-water from first rinse to process solution using combination of techniques (cascade rinsing, ion exchange, membrane, evaporation). Closing the loop achieves high raw material utilisation and can: reduce use and cost of raw materials and water; achieve low emission limit values; reduce end-of-pipe waste water treatment need; reduce overall energy usage when combined with evaporation; reduce chemical use for treating recovered materials; reduce loss of conservative materials such as PFOS.	The proposed procedure has a closed-Loop System: All rinse water recirculated through 5m³/h DI Plant to minimise water use.
1.6	4	Recycling and Recovery After prevention and reduction, BAT is to: identify and segregate wastes and waste waters; recover and/or recycle metals from waste waters; re-use materials externally where quality and quantity allow; recover materials externally (phosphoric acids, chromic acids, spent etching solutions, etc.); recover metals externally.	Waste streams include: • Carbonate waste (Addition to existing waste steam for this due to CAD process) • Filter cartridges (Addition to existing waste steam for used cartridges) • Effluent waste from Evaporator. The final waste water will be stored in 30m³ Effluent Storage Tank for eventual off-site disposal via Road Tanker take-away.
1.6	5	Other Techniques to Optimise Raw Material Usage Different electrode yields: BAT is to control metal concentration according to electrochemistry by: external dissolution of metal with electroplating using inert anodes; replacing soluble anodes with membrane anodes; using insoluble anodes where proven.	Soluble Zinc anode balls are used within the mild steel cage to replenish the zinc concentration within the external dissolution tank. This is then transferred to the main ZnNi plating tank on completion of relevant testing.
1.7 General Process Solution Maintenance			
1.7	1	BAT is to increase process bath life and maintain output quality by: determining critical control parameters; maintaining within established limits by removal of contaminants using suitable processes.	The specific contaminant removal procedures following BAT are covered within WP0097 Laboratory Process Control Requirements
1.8 Waste Water Emissions			

1.8	1	Minimisation of Flows and Materials to be Treated BAT is to minimise all water usage and to eliminate or minimise use and loss of materials, particularly priority substances.	Water Minimisation: • Closed-loop system with all rinse water recirculated; • Vacuum Evaporator for concentration; • Condensate feedback to reduce make-up requirement. Materials Minimisation: • Drag-out reduction through process design; • Materials recovery through closed-loop system; • Chemical dosing controlled via Caustic and Acid Dosing Pumps.
1.8	2	Testing, Identification and Separation of Problematic Flows BAT is to test impact of changing chemical solutions prior to use; identify, separate and treat problematic flows (oils/greases, cyanide, nitrite, chromates, complexing agents, cadmium).	Chemical analysis trials completed on the ZnNi solution and the process is covered within WP0194 Laboratory Vat Analysis Methods.
1.8	3	Discharging Waste Water BAT is to monitor and discharge waste water. BAT guidance provides emission ranges to water for various parameters (Ag, Al, Cd, CN free, Cr(VI), Cr total, Cu, F, Fe, Ni, Phosphate, Pb, Sn, Zn, COD, HC Total, VOX, Suspended Solids).	Not applicable as the final waste water taken for off-site disposal.
1.8	4	Zero Discharge Techniques Zero discharge is not BAT as it generally involves high power consumption and produces wastes difficult to dispose of.	Not applicable as the final waste water taken for off-site disposal.
1.9 Waste			
1.9	1	BAT for waste minimisation given in Section 5.1.5 and for materials recovery and waste management in Section 5.1.6.	Covered under Sections 5.1.5 and 5.1.6 above.
1.10 Air Emissions			

1.10	1	When extraction applied, BAT is to use techniques to minimise air discharge.	The proposed procedure has the following design to minimise air discharge: Fume Extraction System: • Lids fitted to extracted process tanks; • Lip extraction ducts on both long sides of process tanks; Fume blow down fans in transporter canopy to direct fumes back towards extraction lip ducts; • Maximum of two lids open at any one time for short period; • Manual and automatic electric damper control within riser ducts; • Lip ducts fitted with clean-out doors; All tank lip sidearms exhaust to ducts/risers, connecting to common manifold, then exiting building; • Exhaust Fan (Centrifugal direct driven) and Stack located outside, East façade of Hangar 5. Emissions to air from the proposed zinc-nickel line have been assessed in accordance with Environmental Agency technical guidance. It is concluded that overall, the impacts of the Site's emissions from proposed Zinc-Nickel line on local air quality are considered to be acceptable.
1.11 Noise			
1.11	1	BAT is to identify significant noise sources and reduce where impacts significant by using appropriate control measures (closure of bay doors, minimising deliveries, engineered controls like silencers, acoustic enclosures).	An environmental noise impact assessment has been undertaken to assess potential impacts on sensitive receptors off site in terms of noise, based on current guidance and best practice. The assessment concludes that the noise impacts of the proposed site operation would be below the Lowest Observed Adverse Effect Level. No noise mitigation measures are required.
1.12 Groundwater Protection and Site Decommissioning			

1.12	1	BAT is to protect groundwater and assist decommissioning by: considering eventual decommissioning during design; situating materials within contained areas; recording history of chemicals; updating information yearly; using information for installation shutdown; taking remedial action for potential contamination.	Containment: • Bunding design capable of containing minimum 110% of largest primary container or 25% of total volume; • Bunds constructed from impermeable material; • Consideration given to prevent incompatible chemicals from mixing; • Bunds fitted with spillage detection and sump; • SLSS to provide adequate bunding of tanks by concrete bund (250mm high). Design Considerations: • Environmental impact from operation and eventual decommissioning of unit considered at design stage; • Safran site has Climate Change Risk Assessment in place; • Site Emergency Plan and Tactical Plan and Fire Risk Review in place. • Shutdown procedure in place. Site Decommissioning: Prior to decommissioning the site, a survey will be carried out in conjunction with the Leasing Agent to identify pollution arising from operational activity carried out on site. The Leasing Agent and Safran Landing Systems Services UK Ltd will then agree a procedure for returning the land to a condition where there is no impact on site condition arising from activities carried out while occupying the site.
5.2 BAT FOR SPECIFIC PROCESSES			
2.1 Jigging			
2.1	1	In jig (rack) lines, BAT is to arrange jigging to minimise loss of workpieces and maximise current carrying efficiency.	The proposed procedure will utilise flight bar system. The flight bar system is designed to maximise the efficiency. It keeps the components at the same fitting position across processing tanks. The flight bar system is also designed to minimise the resistant joint on plating component.
2.2 Jig Lines - Drag-out Reduction			
2.2	1	BAT is to prevent drag-out by: arranging workpieces to avoid liquid retention; maximising draining time; regularly inspecting jigs; arranging with customers for minimal spaces; fitting drainage ledges; spray-rinsing excess solution back into tank.	Draining times and spray rinsing are designed to reduce drag-out.
2.3 Barrel Lines – Drag-out Reduction & 2.4 Manual Lines			

2.3 – 2.4	1	Barrel Lines – Drag-out Reduction Manual Lines	Not applicable. No barrel processing is included in the facility design. Not applicable. The proposed procedure is fully automatic processing lines. All process lines are automated with transporters.
2.5 Substitution for and/or Control of Hazardous Substances			
2.5	1	BAT is to use less hazardous substances. Specific cases include: EDTA (use biodegradable substitutes or alternative methods; minimize release; ensure no EDTA released to waste water); PFOS (minimize use by monitoring surface tension, minimizing air emissions, controlling air emissions); Cyanide (use closed loop technology; cyanide degreasing not BAT); Zinc cyanide (substitute with acid zinc or alkali cyanide-free zinc); Copper cyanide (substitute with acid or pyrophosphate copper); Cadmium (plate in closed loop system); Hexavalent chromium (replace with trivalent chromium or chromium-free technique for decorative uses; reduce air emissions for plating; operate on closed loop basis); etc.	The proposed procedure is Cyanide-free zinc plating process. The details on chemical selection and procedures for monitoring are provided in WP0097 Laboratory Process Control Requirements.
2.6 Substitution for Polishing and Buffing			
2.6	1	Substitution for Polishing and Buffing	Not applicable. No polishing or buffing operations on site.
2.7 Substitution and Choices for Degreasing			
2.7	1	BAT is to liaise with customer to minimise oil/grease and select environmentally friendly degreasing systems; use physical methods for excessive oil (centrifuge, air knife, hand wiping); replace cyanide degreasing; replace solvent degreasing; use long-life aqueous degreasing systems with solution regeneration; use combination of techniques or specialist techniques for high performance cleaning.	The components for plating arrive onsite have already been degreased in prior stages. The degreasing in the proposed procedure is only to remove minimal contact grease. Best suitable degreasing system has been designed.
2.8 Maintenance of Degreasing Solutions			
2.8	1	To reduce materials usage and energy consumption, it is BAT to use one or a combination of the techniques for maintenance and extending the life of degreasing solutions.	Not applicable. While degreasing is included in the procedure, this section addresses specific techniques for extending degreasing solution life. The proposed procedure has a single-use aqueous degrease system (10% SuperBee 300 LF) without detailed regeneration or extended-life procedures.
2.9 – 2.13 Other Operations			
2.9	1	Pickling and Other Strong Acid Solutions.	Not applicable. No pickling and other strong acid solutions operations on site.
2.10	1	Recovery of Hexavalent Chromating Solutions	Not applicable. No recovery of hexavalent chromating solutions operations on site.
2.11	1	Anodising	Not applicable. No recovery of anodising operations on site.

2.12	1	Continuous Coil – Large Scale Steel Coil	Not applicable. The proposed procedure is jig/rack processing for discrete components, not continuous coil coating. Large-scale steel coil techniques do not apply.
2.13	1	Printed Circuit Boards (PCBs)	Not applicable. The proposed procedure is for aerospace landing gear component plating, not PCB manufacturing. PCB-specific techniques do not apply.

4.2 BAT Assessment against EPR 2.07

A comparison against BAT conclusions in EPR2.07 is provided in Table 4.2, evaluating the new elements of the permit variation.

Table 4.2 – BAT Review: Conformity with BAT Conclusions in EPR2.07

Section	Description	Description of Proposed Facilities
1. MANAGING YOUR ACTIVITIES		
1.1 **Energy Efficiency**		
1.1.1	High efficiency dewatering techniques to minimise drying energy	The following design are in place to minimise drying energy: • Hot Air Well Dryer with electric motorised operated lid; • Maximum temperature 85°C; • Drying cycle 5.0 min for plating stage, 10.0 min for passivation stage; • Pre-heating in Hot Water Rinse Tank before entering Dryer.
1.1.2	Minimisation of water use and closed circulating water systems	The proposed procedure utilises high-flowing closed-loop process with all rinse water recirculated through $5m^3/h$ DI Plant.
1.1.3	Using spent cooling water (raised in temperature) for rinsing purposes	The proposed procedure has a closed refrigerated cooling system with fluid supply temperature 6°C and return temperature 12°C. No coolant will be discharged during standard operation.
1.1.4	Automated control for DC rectifiers	The proposed procedure has the below design following BAT: • Four air cooled rectifiers service each ZnNi bath (1 x 16v 1500 Amps, 2 x 16v 250 Amps, 1 x 16v 150Amps); • 5% ripple max between 5% and 95% of maximum output; • Rectifier controls current at constant current density within pre-set band; • Failure to remain within band alarmed back to PLC.
1.1.5	Electrolytic processes operating under thermally stable conditions without need for heating or cooling	Process solutions above 35°C heated using electric immersion heaters; Process solutions below 35°C heated using electric immersion heaters; Temperature controlled by PLC with over-temperature alarm; Chiller installed for cooling with automatic control following temperature signals. This temp range is specified in the WP0097 Laboratory Process Control Requirements optimisation of chemistry will be dictated by test piece analysis
1.1.6	Minimum use of fume extraction consistent with COSHH Regulations	Extraction system designed to comply with relevant legislation
1.1.7	Inverter speed control or flow damper for fume extraction centrifugal fans	The following design are in place: • Exhaust Fan (Centrifugal direct driven) with high efficiency motor and inverter drive; • Manual and automatic electric damper control within riser ducts; • Automatic damper installed outside to balance air flow when tank lid opened or shut.
1.2 **Efficient Use of Raw Materials and Water**		
1.2.1	Ion exchange or other treatment unit to re-circulate rinse waters	All rinse water recirculated through $5m^3/h$ DI Plant.
1.2.2	Closed loop operation with three to four stage cascade rinsing	There are multi-stage cascade rinsing with closed-loop: Degrease Line: CWR 1.1, CWR 1.2 (DI Water < 100µS/cm), HWR (DI Water < 100µS/cm). ZnNi Plating Line:CWR 2.1, CWR 2.2 (DI Water < 100µS/cm), HWR (2nd Pass) (DI Water < 100µS/cm).

		Passivation Line: CWR 3.1 (2nd Pass), CWR 3.2 (2nd Pass), HWR (3rd Pass).
1.2.3	Spent pickle acid for pH control in effluent treatment facility	There is in-line pH correction via dosing of acid and NaOH.
1.2.4	Proprietary plating electrolytes with low dissolved solids concentration	The following solutions are in use: Degrease = 10% SuperBee 300 LF / 90% DI Water; Alkaline ZnNi Plating = Dipsol IZ-C17+ LHE; Passivation = Dipsol IZ-264. These are proprietary systems designed for efficient operation.
1.2.5	Minimise drag-out by maximising drainage time over tank or in separate drainage tank	Process Schedule with specific draining times: Degrease 2.0 min drain; ZnNi 2.0 min drain; Passivation 2.0 min drain; Cold rinses 1.0-2.0 min drain; Hot rinses 2.0 min drain. Transporter logic with "Smart Parking" function to optimise movements.
1.2.6	ECO-rinse tank(s) to reduce mass drag-out and subsequent rinse-water consumption	ECO-rinse (pre-dip) tank not applicable for nickel lins based on BRef. An Eco-rinse (pre-dip) cannot be used with etching or degreasing / in nickel lines because of increased quality problems.
1.2.7	Electrochemical metals recovery technology for unreturned drag-out	The following design are in place: Closed-loop system with evaporation and ion exchange for drag-out recovery; Zinc Nickel Dissolution Tank for correction of bath chemistry; Carbonate Removal via Carbolux 50 Unit.
1.2.8	Evaporation technology in conjunction with 3-5 stage cascade rinsing for closed loop operation	Multiple cascade rinsing stages (3-8 stages depending on process) are in place.
1.2.9	Hydrogen peroxide in pickling tanks to reduce NOx emission and acid consumption	Not applicable as no hydrogen peroxide used.
1.2.10	Low temperature processes consistent with good metal deposition rate; lids on tanks operating at 60°C and above	The following design are in place: Process solutions above 35°C heated using electric immersion heaters; Selected tanks lagged on exterior for energy conservation; Lids fitted to extracted process tanks; Maximum temperature in Dryer 85°C; Heated tanks with associated controls including ON-OFF button and temperature controller.
1.2.11	Recycle trade effluent to less critical rinsing stages	The proposed procedure has a closed-loop system with recirculation of rinse waters through DI Plant and condensate feedback to common sump.
1.2.12	Proprietary cleaners allowing lower operating temperature	Proprietary cleaners used are these currently approved and already used on site.
1.2.13	Low temperature biological cleaner system in place of traditional alkaline soak cleaner	Not applicable.
2. OPERATIONS		
2.1 Material Storage and Handling		
2.1.1	Prevention of fugitive emissions to air from material handling and storage	The process is managed via the air extraction system, and vented through the main stack. The fugitive emission is negligible from material handling and storage.
2.1.2	Prevention of accidents during material handling and storage	The following design are in place: IBC containers located within own bunds;

		Bunding design capable of containing minimum 110% of largest primary container or 25% of total volume; Bunds constructed from impermeable material; Bunds fitted with spillage detection and sump. Process area layout, equipment and ancillaries will be designed to minimise entrapment, spillage and dripping of chemicals (where possible). Emergency access and egress procedures will be designed to allow personnel to safely evacuate the process area in an emergency situation. There will be a sufficient number of emergency stop buttons/pulls distributed throughout the process area in accessible locations. A recovery system will be provided to evacuate the transporter systems and recover an 800kg load from the bottom of any of the Process Tanks. MAJOR ACCIDENT PREVENTION PLAN is in place. - SLSS.C13.MAPP.09.2025 Detection and alarm systems in place, safe operating procedure to ensure risk of volatile chemistry mixing minimised, Crisis management plan in place. Safran Group Policy for use of Chemicals Procedure No. GRP-0049 Edition 3 Revision 3 to be referenced as well as Standard 4_6 by MFF to determine carcinogens, and Risk Assessments during storage, handling, use and disposal etc.
2.2 Surface Preparation		
2.2.1 Mechanical	Ensure emissions from local exhaust ventilation do not have adverse environmental impact	Not applicable. No mechanical preparation on site.
2.2.2 Degreasing using Organic Solvents	Must comply with Solvent Emissions Directive requirements; Control point source emissions to air, fugitive emissions, solvent recovery, disciplined use of lids, use of sealed end-loading degreasers with solvent vapour condensation	The following design are in place: 3-Stage Degrease process with 10% SuperBee 300 LF / 90% DI Water (aqueous degreaser, not solvent-based);
2.2.3 Chemical Cleaning using Aqueous Cleaners	Key control areas: energy consumption, fugitive emissions to air, rinse water efficiency, cleaning fluid lifetime, disposal of spent cleaners	This BAT has been covered by the above BAT section 1.2 Efficient Use of Raw Materials and Water
2.2.4 Pickling	Key control areas: rinse water economy, prevention and control of point source and fugitive emissions to air, pickle efficiency, acid regeneration, acid recycling, use of biodegradable inhibitors; Two or three stage cascade pickling with continuous feed and discharge; Minimum two stages of cascade rinsing with agitation	Not applicable. No pickling on site.
2.3 Surface Treatment		
2.3.1 Electroplating	1.The main areas of control are: •rinse water economy – see Section 1 •mass drag-out reduction •return of drag-out •recovery of higher value metals from drag-out which cannot be returned •energy consumption – see section 1 •prevention of fugitive emissions to air – see section 3	This BAT has been covered by the above BAT section 1.2 Efficient Use of Raw Materials and Water and 2.1 Material Storage and Handling.

	2.You should give full consideration to using substances other than cadmium, chromium(VI) and other hazardous materials. Where alternatives are not available, you must provide proper controls.	Not applicable. The proposed procedure is Zinc-Nickel plating.
	Where appropriate for the process you should: 3.Maximise stages of cascade rinsing, with agitation where appropriate.	Multiple cascade rinsing stages (3-8 stages depending on process) are in place with agitation.
	Where appropriate for the process you should: 4.Use ion exchange or other treatment units to re-circulate rinse waters.	All rinse water recirculated through 5m³/h DI Plant.
	Where appropriate for the process you should: 5.Use proprietary plating electrolytes that have a low concentration of dissolved solids and operate with minimum energy requirements for heating or cooling. These should avoid cadmium where possible and should require relatively simple effluent treatment.	The details on chemical selection and procedures for monitoring are provided in WP0097 Laboratory Process Control Requirements.
	Where appropriate for the process you should: 6.Replace EDTA by QUADROL in autocatalytic copper systems.	Not applicable.
	Where appropriate for the process you should: 7.Minimise drag-out by maximising the drainage time of the work over the tank or in a separate drainage tank.	Process Schedule with specific draining times: Degrease 2.0 min drain; ZnNi 2.0 min drain; Passivation 2.0 min drain; Cold rinses 1.0-2.0 min drain; Hot rinses 2.0 min drain. Transporter logic with "Smart Parking" function to optimise movements.
	Where appropriate for the process you should: 8.Use ECO-rinse tank(s) to reduce mass drag-out and subsequent rinse-water consumption.	Not applicable.
	Where appropriate for the process you should: 9.Use electrochemical metals recovery technology for unreturned drag-out.	Not applicable.
	Where appropriate for the process you should: 10.Use evaporation technology in conjunction with 3-5 stage cascade rinsing to allow closed loop operation.	Multiple cascade rinsing stages (3-8 stages depending on process) are in place with close loop operation.
	Where appropriate for the process you should: 11.Generate turbulence by hydraulic power and eductors.	Not applicable. Not relevant.
	Where appropriate for the process you should: 12.Use electrodialysis technology for the re-oxidation of chromium (VI) reduced to chromium (III) in chromic acid anodising electrolytes.	Not applicable. Not Chromium plating.
	Where appropriate for the process you should: 13.Use hydrogen peroxide in the pickling tanks to reduce NOx emission and acid consumption.	Not applicable. No pickling tanks.
	Where appropriate for the process you should: 14.Employ low temperature processes consistent with good metal deposition rate. You should use lids on process tanks operating at 60°C and above, and you should consider hexagons or croffles for all manually operated tanks.	The following design are in place: Process solutions above 35°C heated using electric immersion heaters; Selected tanks lagged on exterior for energy conservation; Lids fitted to extracted process tanks; Maximum temperature in Dryer 85°C; Heated tanks with associated controls including ON-OFF button and temperature controller.

	Where appropriate for the process you should: 15.A minimum of 4 and preferably 5 stages of cascade rinsing after chromic/sulphuric acid etch, with techniques for minimising drag-out. Consider alternatives to chromic/sulphuric acid as an etchant.	Not applicable. No chromic/sulphuric acid etch.
	Where appropriate for the process you should: 16.Provide jig or barrel supports whilst draining for manually operated process tanks.	Not applicable. The line is fully automatic.
	Where appropriate for the process you should: 17.Use continuous filtration and removal of sludge from phosphating process tanks.	Not applicable. No phosphating process tanks.
2.3.2 Anodising	Main control areas: rinse water economy, mass drag-out reduction, energy consumption, prevention of fugitive emissions, removal of dissolved aluminium, chromium(VI) plating; Heat recovery from sealing baths; Recovery of caustic etch if high consumption; Closed loop rinsing not BAT for anodising; Use PFOS-free surfactants	Not applicable. No anodising process.
2.3.3 Electropolishing	Main control areas: rinse water economy, mass drag-out reduction, energy consumption, prevention of fugitive emissions, prolongation of descaling and electropolishing process fluids, NOx control	Not applicable. No electropolishing process.
2.3.4 Plating on Plastics	Main control areas: rinse water economy, mass drag-out reduction and return, energy consumption, prevention of fugitive emissions, prolongation of process fluid life in pre-treatment stage	Not applicable. No plating on plastics.
2.3.5 Autocatalytic Plating	Main control areas: rinse water economy, mass drag-out reduction, energy consumption, prevention of fugitive emissions, prolongation of process fluid life, avoidance of cadmium salt brighteners in autocatalytic nickel, disposal of spent process fluid, avoidance of EDTA in autocatalytic copper	Not applicable. No autocatalytic plating process.
2.3.6 Dip Treatments	Main control areas: rinse water economy, mass drag-out reduction, energy consumption, prevention of fugitive emissions, prolongation of process fluid life	All rinse water recirculated through 5m³/h DI Plant. Mass drag-out reduction and minimising energy consumption has been considered in the design.
2.4 Rinsing		
2.4 Rinsing	Multistage cascade rinsing; Closed-loop or recirculation systems with rinse water treatment (ion exchange, reverse osmosis, electrodialysis, evaporation); Conductivity probes; Water meters on each line; Flow restrictors; Minimized drag-out by employing drainage time of at least 20 seconds for rack work and 30 seconds for barrelled work; Drag-in – drag-out tanks (ECO rinse system); Continuous filtration and removal of sludge from phosphating tanks; Recycling of trade effluent to less critical rinsing stages	The process has comprehensive multi-stage cascade rinsing with closed-loop recirculation and evaporation in place.
2.5 Drying		
2.5 Drying	You should consider using the following BAT in order to save energy: 1.Centrifugal drying for small work. 2.Providing lids for hot water tank driers. 3.Providing a continuous bleed-off from hot-water driers as supply for the preceding cascade rinsing system, with equivalent water feed to hot	Hot water rinse is used prior to hot air dryer. Lids are utilised on both operations.

	water tank driers to make-up for evaporative loss and the bleed to the rinsing tanks.	
3. EMISSIONS AND MONITORING		
3.1 Point Source Emissions to Water		
3.1.1 Handling	Use buffer storage tanks for process fluid dumps; Ensure peak loads do not exceed effluent treatment facility capacity; Operate batch or continuous basis with adequate monitoring; Prevent process effluent by-passing treatment plant	Not applicable as the final waste water taken for off-site disposal.
3.1.2 Treatment Objectives	Removal of dissolved metals (basis metals and plating metals); Control of trade effluent pH within Sewerage Undertaker's consent limits; Formal consent limits for suspended solids, oil and grease, sulphate, detergents, COD, cyanide	Not applicable as the final waste water taken for off-site disposal.
3.1.3 Primary Treatment	Reduction of Cr(VI) to Cr(III) in turbulent tank reactor; Cyanide oxidation in turbulent tank reactor; Precipitation of dissolved metals by pH adjustment (6-10); Separation of precipitate in void tank settler or lamellar clarifier with chemical pre-treatment; Sludge discharge to secondary settlement tank	Not applicable as the final waste water taken for off-site disposal.
3.1.4 Secondary/Tertiary Treatment	Filtration to remove fine suspended solids to achieve trade effluent consent limits for metals of 1-3mg/l; Trade effluent may be recycled to less critical rinsing steps to reduce input water usage by up to 30%; End-of-pipe treatment with activated carbon, bone charcoal, selective cationic ion-exchange, membrane filtration, reverse osmosis	Not applicable as the final waste water taken for off-site disposal.
3.2 Point Source Emissions to Air		
3.2.1 Extraction System Design	1. If you use local exhaust ventilation (LEV) to control harmful substances, you should use the minimum extraction rates that enable COSHH requirements to be met; and where possible extraction should not be used at all, as described above.	Rigorous testing regime currently in place through 3rd party contractor to ensure legal compliance to COSHH. This is to be extended to incorporate zinc nickel. In house chrome mist testing to ensure efficiency during operations.
	2. Process tank lip ducts should be located with at least a 50mm gap between the top of the tank and the bottom of the lip duct.	Not applicable. The proposed design follows the BAT design as specified in Bref: Lids cover all process stations where vapour, fumes or aerosols are generated at any time except during loading and unloading of the stations. The reduction in extraction rate increases may be more than 90 %.
	3. Fume extraction through the upper sides of process tanks is not recommended.	
	4. A mist eliminator should be installed in the suction side of the extraction fan, with mist-eliminator drainage and washings being discharged to the effluent treatment facility.	No scrubber included.
3.2 Fugitive Emissions to Air		
3.3.1 Fugitive Emission Inventory	Where opportunities for reductions exist, submit regularly updated inventory of fugitive emissions	The process is managed via the air extraction system and vented through the main stack. The fugitive emission is negligible from material handling and storage.
3.3.2 Storage Vessel Venting	Simple water scrubber fitted to vent outlet of hydrochloric acid tonnage storage vessels (for use during filling operations)	No vent scrubbers included.

3.3.3 Fume Extraction Maintenance	Regularly clean fume extraction ducting and mist eliminators	Maintenance: Lip ducts fitted with clean-out doors. Maintenance Manual: The lip extraction ducts should be externally inspected on a weekly basis and cleaned if required. Clean out hatches are provided on the rear wall of the lip ducts. These should be opened, and the internals inspected and cleaned every 3 months.

5 Emissions and Monitoring

5.1 Emissions to Air

All of the emission points on site are listed in Table 5.1, inclusive of the new proposed emission point.

Table 5.1 – Point Source Emissions to Air

Emission Point Reference	Source	Location
A1	Chromium Plating	See Figure 2.3
A2	Nickel Plating	
A3	Zinc-Nickel Plating	

There will be no changes to emissions arising from existing emission points A1 and A2. The variation will introduce a new emission point A3, which serves as the main stack for the process tank extraction system for the new proposed Zinc-Nickel plating line.

The nature of the emissions arising from A3 will primarily consist of vapours from the new process line, which may contain Zinc and Nickel.

Further details regarding the new emission point are provided in Table 5.2. Emission rates and stack parameters for the new emission point have been provided by SLSS.

Table 5.2 – Proposed New Point Source Emissions to Air

Release point ref.	Point Source Description	Location X, Y (m)	Stack height (m)	Stack diameter (m)	Actual Flow Rate (m^3/s)	Flow Rate under Reference Condition (m^3/s)	Exhaust temp (°C)
A3	Zinc-Nickel Plating Exhaust	388442, 222012	13.86	0.77	3.00	2.75	25

Note: Reference conditions are 273K, 101.3kPa without correction for water vapour

5.2 Emissions to Water

The proposed variation does not introduce any additional emission points to water. All the final wastewaters will be stored in 30m³ Effluent Storage Tank for eventual off-site disposal via Road Tanker take-away.

5.3 Odour

The proposed changes will not introduce a source of odorous emission or affect current production operations, which do not give rise to odour effects at off-site receptors.

5.4 Noise and Vibration

The nature of the noise emissions arising from the new Zinc-Nickel plating line will primarily consist of noise from the fume extraction system (centrifugal fan and actuated fresh air damper) as listed in the below Table 5.3.

Table 5.3 – Noise Emission Sources

Plant	Model	Modes	Description
Centrifugal Extraction Fan	CHVN900 Centrifugal fan 30kW 415V 3ph 50 Hz	OFF (Local)	Extraction fan is completely disabled
		ON (Local)	Extraction fan is enabled and running. Extraction fan uses a fixed speed set within the inverter along with a ramp up time.
Pressure Switch	24V DC	-	-
Actuated extraction damper	TBC	All lids on process line closed.	XV002 opens when all lids are closed.
		One or more lids open on the process line.	XV002 closes when one or more lids are open.
Actuated extraction damper limit switch	Kinetrol	-	-

An environmental noise impact assessment has been undertaken to assess potential impacts from the proposed changes on sensitive receptors off site in terms of noise, based on current guidance and best practice.
The sounds caused by the proposed development are all considered as industrial noise, therefore British Standard 4142: 2014+A1: 2019 is the main guidance for the assessment, along with the other relevant references, to assess the potential noise impact on the nearby sensitive receptors.

5.5 Monitoring

This section describes the proposed monitoring strategy for emissions monitoring for the new emission point considered within this variation, which will align with what is already contained within the permit for existing emission points.

SLSS is committed to monitoring its pollutant releases as covered in the permit and has an appropriate management structure in place to ensure monitoring is effectively carried out and reported to the Environment Agency in a timely manner.

5.5.1 Monitoring Emission to Air

Pollutant emission levels are dependent on the design of extraction system, as well as the abetment technologies used. The emissions are controlled by the plant design and adherence to appropriate operating parameters.

Sampling and analysis, using methods agreed with the Agency will be conducted to determine the concentration and mass release of substances emitted from the new proposed release points A3. The monitoring data of all relevant pollutant from emission point A1, A2 and the new proposed A3 will be reported bi-annually.

5.5.2 Monitoring Emissions to Water

There are no direct emissions to water from the existing operation and the proposed Zinc-Nickel plating line.

For the proposed Zinc-Nickel plating line, all final waste water will be stored in 30m³ Effluent Storage Tank for eventual off-site disposal via Road Tanker take-away.

As there are no emissions to water from the installation, monitoring of emissions to water is not required for the activities covered by this permit variation.

5.5.3 Off-Site Monitoring

Off-site monitoring (e.g., odour, noise, dust, etc.) is not considered necessary given the low potential environmental impact of the proposed changes to the permit.

6 Impact Assessment

An impact assessment has been undertaken for the proposed new Zinc-Nickel plating line to assess the potential environment impact from its emissions and to evaluate those impacts in line with sensitive receptors which may be affected by activities undertaken at the Site.

The impacts of releases from activities at the Site are discussed in this section and include:

- Environmental Risk Assessment for Emissions to Air and subsequent detailed dispersion modelling; and
- Noise Impact Assessment.

A site condition assessment was also undertaken to establish a baseline record of the condition of the land at the time of permit variation.

6.1 Summary of Emissions to Air

The following section collates the information presented in the assessment of emissions to air and summarises the impacts in terms of the following:

- Calculation of Process Contribution (PC) from emission points to air on site;
- Estimation of Predicted Environmental Concentration (PEC);
- Conclusions

The below scenarios have been modelled to assess the impact from the proposed emission point for the new Zinc-Nickel line:

- Baseline Scenario (BS): Current existing site operation with emission point A2 modelled (no Zinc or Nickel emissions from A1, therefore no need of considerations);
- Do Something Scenario (DS): New Zinc-Nickel line in operation with emission points A2 and proposed A3 modelled.

Sources of emissions to air from the Site are described in Section 3 of this report, as well as the Air Quality Impact Assessment report, presented in Appendix E. Details of the stack parameters modelled for each of the emission points are provided in Table 6.1. Details of the emission rates for all modelled pollutants is presented in Table 6.2.

Table 6.1 – Modelled Stack Parameters

ID	X (m)	Y (m)	Height (m)	Diameter (m)	Flow Rate (Am^3/s)	Flow Rate (Nm^3/s)	Exit Temp (°C)	Exhaust Moisture Content (%)	Exhaust O_2 Content (%)
A2	388340	222010	14.4	1.97	21.28	19.64	23	1.63	20.9
A3	388442	222012	13.86	0.77	3.00	2.75	25	N/A	20.9

Note: Reference conditions are 273K, 101.3kPa without correction for water vapour

Table 6.2 –Emission Rates

Emission Point ID	Pollutants	Emission Rates (g/s)	Data Source
A2	Nickel	5.75×10^{-05}	SOCTEC Emission Testing Report
A3	Zinc	6.05×10^{-03}	Indicative BAT Standards
A3	Nickel	5.50×10^{-03}	BREF typical emission range

6.1.1 Environmental Assessment Levels (EALs)

The EA's Guidance[5] provides methods for quantifying the environmental impacts of emissions to all media. The EA guidance contains long and short-term Environmental Assessment Levels (EALs) and Environmental Quality Standards (EQS) for releases to air derived from a number of published UK and international sources. For the pollutants considered in this study, these EALs and EQS are equivalent to the AQS and AQOs set in force by the Air Quality Strategy for England, Scotland Wales and Northern Ireland.

Table 6.3 sets out those AQS, AQOs, and EALs that are relevant to the assessment with regard to human receptors. There is no direct AQS/O or EAL for Zinc, therefore Zinc concentration is compared with Zinc oxide EAL.

Table 6.3 – Air Quality Standards, Objectives and Environmental Assessment Levels

Pollutant	AQS/AQO	Averaging Period	Value
Nickel	AQS	Annual mean	20 ng/m^3
	EAL	1-hour mean	0.7 µg/m^3
Zinc oxide	EAL	1-hour mean	1000 µg/m^3
	EAL	Annual mean	50 µg/m^3

Table 6.4 sets out the deposition limits of heavy metals that are relevant to the assessment.

Table 6.4 – Deposition Limits of Heavy Metals

Pollutant	Deposition Limits (mg/m^2/day)
Nickel	0.11
Zinc	0.48

6.2 Impact Assessment of Emission to Air

A detailed dispersion modelling assessment has been undertaken to assess the impact from the proposed emission point for the new Zinc-Nickel line, which is presented in Appendix B.

The dispersion modelling assessment has included all emission points to air listed in Table 6.2. The model has been based on all sources operating for all hours of the year (8,760 hours) and a conservative assessment has been demonstrated by using worst-case meteorological data for the reporting of results and inclusion of the impacts of buildings. A summary of those receptors experiencing the highest pollutant concentration as a predicted Process Contribution is presented in Table 6.5.

Human receptors included in the assessment are long-term receptors (e.g., residential properties). Ecological receptors comprise those at the nearby Prior's Grove Local Wildlife Site (LWS) and Cotswold Beechwoods Special Area of Conservation (SAC). While the Environment Agency screening assessment identifies zinc and nickel as pollutants of concern, there are currently no established assessment levels for air emissions of these metals at ecological receptors. Consequently, the assessment focuses on pollutant deposition at the ecological receptor locations, which are compared against relevant deposition limits on soil and leaves.

[5] Environment Agency. Guidance: Air emissions risk assessment for environmental permit. Published 2016. Available at: https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit#environmental-standards-for-air-emissions

Table 6.5 - Maximum Impacts at Human and Ecological Receptors

Pollutant averaging period (unit)	AQS / EAL	Max. DS PC	DS PEC	% max. DS PC of AQAL	% DS PEC of EAL
Human receptors					
Nickel Annual mean (ng/m^3)	20	11.51	11.86	57.5%	59.3%
Nickel 1 Hour Mean ($\mu g/m^3$)	0.7	0.41	0.41	58.5%	58.6%
Zinc Annual Mean ($\mu g/m^3$)	50	0.01	0.02	<0.1%	<0.1%
Zinc 1 Hour Mean ($\mu g/m^3$)	1000	0.45	0.47	<0.1%	<0.1%
Nickel Deposition ($\mu g/m^2/day$)	110	29.83	30.75	27.1%	30.0%
Zinc Deposition ($\mu g/m^2/day$)	480	32.60	59.13	6.8%	12.3%
Ecological receptors					
Nickel Deposition ($\mu g/m^2/day$)	110	1.81	2.72	1.6%	24.7%
Zinc Deposition ($\mu g/m^2/day$)	480	1.97	28.50	0.4%	5.9%

All maximum results predicted by the model are below the relevant assessment metric for human receptors and ecological receptors. As such, it is considered that the impacts of the Site's emissions from proposed Zinc-Nickel line on local air quality are acceptable at human health receptors in the proximity of the Site.

6.3 Impact Assessment of Noise

An environmental noise impact assessment was undertaken to evaluate the potential noise impacts from the new Zinc-Nickel plating line at the Safran Landing Systems Services UK Ltd site at Meteor Business Park, Gloucester. The assessment focused on operational noise from the new plant, particularly the Zn-Ni Extraction Stack fume extraction system, which includes a 30 kW centrifugal fan that will be inverter driven.

The site is located in an industrial and commercial area, with the nearest noise sensitive receptors (NSRs) identified as:

- NSR1: Cotswold Court Park off the B4063 (northeast)
- NSR2: Residential dwellings off Bamfurlong Lane (northeast)
- NSR3: Fern Court off Down Hatherley Lane (northwest)
- NSR4: Residential dwellings off Cheltenham Road E (southwest)

The new Zinc-Nickel plating line is proposed to operate 24 hours a day, seven days per week.

Details of the assessment are presented in Appendix F: Noise Impact Assessment.

6.3.1 Assessment Methodology

The noise impact assessment was undertaken in accordance with British Standard 4142:2014+A1:2019 "Methods for rating and assessing industrial and commercial sound" (BS4142). A computational noise model was assembled using CadnaA software and populated with noise emission data from the new sound sources and measured existing sound sources. Standard noise propagation calculations were used to predict plant operation noise levels at the nearest noise sensitive receptors, in accordance with ISO 9613-2:1996.

The assessment considered the following significant operational plant sound sources:

- Existing stacks (chrome extraction and nickel/cadmium plant)
- Chiller
- Paint strip booth extract

- Boiler stack
- New Zinc-Nickel plating line plant associated with extraction stack

All plant was assumed to be operating 24/7 as a worst-case scenario.

6.3.2 Predicted Noise Levels and BS4142 Assessment

The predicted specific sound levels of the new plant noise at the nearest receptors are shown in Table 6.6 below. As indicated in Table 6.6, the newly installed zinc nickel line plant noise will not increase the existing site noise at the NSRs.

Table 6.6 - Summary of Predicted Sound Levels of New Plant Operation on the Nearest Facades

Receptor(s)	Sound Pressure Level, dB $L_{Aeq,T}$ (highest noise levels on façade) – Daytime (changes compared with only existing site noise)	Sound Pressure Level, dB $L_{Aeq,T}$ (highest noise levels on façade) – Night-time (changes compared with only existing site noise)
NSR1_ Cotswold Court Park	16 (+0)	16 (+0)
NSR2_ Residential dwellings off Bamfurlong Lane	16 (+0)	19 (+0)
NSR3_ Fern Court off Down Hatherley Lane	8 (+0)	9 (+0)
NSR4_ Residential dwellings off Cheltenham Road E	16 (+0)	18 (+0)

The assessment indicates that the predicted specific sound levels generated by the new Zinc-Nickel plating line plant would result in Low impacts on residential NSRs during both daytime and night-time periods. Rating levels are predicted to be well below background sound levels at all NSRs.

Daytime Assessment:

The difference between the rating level and background sound level at all NSRs indicates that the specific sound source would have a low impact, in accordance with BS4142 criteria.

Night-time Assessment:

Similarly, during the night-time period, the predicted sound levels generated by the new plant would result in Low impacts on residential NSRs, with rating levels remaining below background sound levels.

The assessment concludes that the noise impacts of the new Zinc-Nickel plating line operation would be below the Lowest Observed Adverse Effect Level (LOAEL) at the nearest residential receptors. The new plant will not increase existing site noise levels at the NSRs in any significant manner. Therefore, no noise mitigation measures are required.

It is noted that operational vibration impacts were scoped out of the detailed assessment, as due to the typically low vibration levels likely to be generated and the separation distances to sensitive receptors, operational activities would not result in perceptible vibration impacts.

6.4 Site Condition Assessment

As part of this permit variation application, SLSS is requesting to extend the site boundary to incorporate additional land at Hangar 5 for the new Zinc-Nickel plating line and associated effluent waste storage facilities.

A Site Condition Report has been prepared in accordance with Environment Agency guidance to establish a baseline record of the condition of the land at the time of permit variation. The report documents the current state of the site, including soil and groundwater conditions, to enable a comparison to be made at the time of permit surrender or subsequent variations. The full Site Conditioning Report is provided in Appendix G.

The site was built in the period after the Second world War, circa 1947 as part of the infrastructure for the Gloucestershire Airport. The site has been used for Aerospace engineering purposes since being built with no recorded environmental issues, however the continual use during this period has in all likelihood increased the potential for soils to contain higher than normal levels of trace element s. Hanger 5 has only been in operation as part of the SLSS site since 2021 with prior occupation by Dowty Propellors. There are no pollution incidents that may have effected the land on site.

There is no recorded baseline. The site has however conducted periodic testing of ground waters through 2002-2017 through various boreholes located across site. This testing showed levels of 3 VOCs -

- 1,1,1 Trichloroethane
- 1,1 Dichloroethane
- 1,1 Dichloroethene

This recording is shown on database IPPC Groundwater Results 2002-2017

A secondary session of borehole testing was completed in 2025 to identify contamination of groundwater including Hanger 5

No soil sampling was carried out across the site.

The baseline conditions established in the Site Condition Report will enable SLSS to demonstrate, at the time of permit surrender, that the land has been returned to a satisfactory state, having regard to the condition of the land at the time of permit variation.

7 Resource Efficiency

7.1 Raw Material Consumption

Chemical dosing and raw material throughput for electroplating operations are determined dynamically based on:

- Production throughput requirements
- Vat analysis results conducted per procedure WP0194 Laboratory Vat Analysis Methods (Appendix H)
- Real-time chemistry monitoring and adjustment

Actual usage will be recorded and reported as part of routine permit compliance monitoring.

This approach ensures optimal chemical efficiency while maintaining process quality standards.

7.1.1 Chemical Management and Procurement

Raw materials consumption at SLSS is managed through a comprehensive procurement control system. All chemicals are subject to the Order Quantity Control Procedure (C4), with maximum stock levels defined to maintain COMAH Lower Tier status. Procurement authorisation requires Environmental Chemist approval, ensuring materials are purchased only when necessary and in appropriate quantities.

The site operates a computer-based spreadsheet (COMAH Excel spreadsheet) that itemises maximum stocks available for storage as raw materials. This system is reviewed regularly by the HSE & Laboratory Supervisor or Company Environmental Chemist, with any changes in overall quantities reported to the Business Support Manager for appropriate action.

7.1.2 Materials Optimisation

The site employs several techniques to optimise raw material usage:

- **Drag-out reduction**: Process design incorporates multiple rinse stages and optimised draining times to minimise loss of process materials

- **Materials recovery**: Closed-loop systems recover and recycle process materials where technically feasible

- **Inventory control**: Shop stock levels are monitored monthly by the Environmental Chemist and MFF Projects Team Leader to prevent over-ordering and material degradation

7.2 Water Consumption

7.2.1 Water Treatment System

The site has implemented a closed-loop water treatment system incorporating:

- **5 m^3/h DI Plant**: All rinse water is recirculated through deionisation equipment to minimise freshwater requirements

- **Vacuum Evaporator**: Concentrates waste streams, reducing disposal volumes and allowing condensate feedback to reduce make-up water demand

- **Cascade rinsing**: Multiple rinse stages utilise water efficiently before discharge

7.2.2 Water Consumption Targets

Water minimisation forms part of the site's sustainability programme, driven by Safran Group targets of 50% reduction by 2030. Monthly monitoring of water consumption is undertaken, with deviations investigated and corrective actions implemented where necessary.

7.3 Energy Efficiency

Energy consumption at the installation is managed through the site's Environmental Management System, with gas and electricity consumption monitored and reported to the Environment Agency annually. The site operates a sustainability programme aligned with Safran Group targets of 50% reduction in energy consumption by 2030.

The site has implemented several measures to optimise energy consumption through electrical system, heating system, cooling system and ventilation.

The site participates in energy benchmarking activities as part of the Safran Group sustainability programme. Key performance indicators include:

- Energy usage per unit of production
- Electricity consumption trends
- Gas consumption trends
- Energy intensity ratios

These metrics are reviewed monthly at policy deployment meetings and annually at management review meetings.

Gas and electricity consumption at the site are monitored and reported to the Environment Agency every year. Depending on production throughput, consumption associated with the current site operations is currently (based on 2025 data):

- Natural gas – 7,024 MWh/y.
- Electricity – 3,552 MWh/y.

An estimation of the additional energy usage based on the system requirements is based on standard assumptions with regard to operational hours, and is as follows:

- Natural gas: None.
- Electricity: 2,346 MWh/y.

7.4 Waste Disposal

The proposed Zinc-Nickel line will not generate extra filter cake.

The estimated effluent from the proposed Zinc-Nickel line is 8,400 L per annum. The effluent waste will be stored in in 30 m³ tanks following evaporator treatment and disposed of under the Hazardous Waste Regulations 2005 by Licensed Waste Carriers to Licensed Waste Sites.

Waste minimisation forms part of the site's continual improvement programme, with targets set annually and reviewed at management review meetings. The site aims to:

- Reduce waste generation through process optimisation
- Increase recycling rates where technically and economically feasible
- Minimise disposal to landfill
- Reduce hazardous waste generation through material substitution where possible

8 Environmental Management System and Emergency Response

SLSS operates an integrated management system that fully incorporates Safety, Health, Environment and Quality (SHEQ) Management Systems, certified to ISO 14001:2016. The Environmental Management System (EMS) has been established to enable the organisation to proactively improve environmental performance and reduce the environmental impact of activities carried out by staff, visitors and contractors on site. The full EMS is provided in Appendix I. Major Accident Prevention Plan is provided in Appendix D.

8.1 Environmental Management Framework

The organisation has determined internal and external issues relevant to its purpose and ability to achieve EMS intended outcomes. This includes consideration of:

- Political, Economic, Social, Technological, Environmental and Legislative factors (PESTEL analysis)
- SWOT analysis (Strengths, Weaknesses, Opportunities, Threats)
- Needs and expectations of interested parties including regulatory authorities, suppliers, contractors, workers, customers and community services

The EMS encompasses all operations at the Gloucester facility, including:

- Metal finishing and electroplating (cadmium, chromium, nickel, zinc-nickel)
- Materials processing and heat treatment
- Chemical storage and handling
- Effluent treatment operations
- Waste management systems

The system operates on a Plan-Do-Check-Act (PDCA) cycle, ensuring continual improvement whilst maintaining compliance with environmental legislation and COMAH requirements.

Top management demonstrates active leadership through regular "I for Environment" campaigns, monthly policy deployment reviews, direct oversight of environmental objectives and resource allocation for environmental programmes. The Environmental Policy commits to preventing pollution, minimising environmental impact, complying with legal requirements and operating responsibly with consideration for community impacts.

8.2 Environmental Management Framework

The Managing Director ensures all hazards associated with site activities are assessed for risk, considering routine and non-routine activities, external hazards, contractor activities, changes to systems and processes, emergency situations and human behaviour.

Legal requirements are determined with reference to the HSE website and Legislation Update Service, with new requirements recorded within management review meetings and communicated to all personnel.

All changes to the business are managed in line with Safran Standards and WP161 Change Management Procedure, ensuring risks are identified before implementation with appropriate mitigation measures.

8.3 Emergency Preparedness and Response

The company has identified potential emergency situations including tank leakage/rupture, chemical spillage during additions, overflow due to operator error, fire in adjacent areas, inadvertent mixing of incompatible plating solutions and toxic gas release (hydrogen cyanide).

Detection and Response Systems:

- HCN gas detection systems installed in MFF basement linked to alarm system
- 24-hour security monitoring with emergency coordination
- Trained spill response teams with chemical spill kits at strategic locations
- Basement spillage procedure (EMS 4.4.7.4) for plating solution releases
- Evacuation procedures (WP0079) with annual drills

Emergency Equipment:

- Spillage containment kits positioned around site
- Clay matting/drain covers for external incidents
- Fire detection and suppression systems
- Emergency communication systems linked to security lodge

Major Accident Prevention:

The site maintains a Major Accident Prevention Policy (MAPP) addressing inventory control to prevent exceeding Lower Tier thresholds, segregation protocols preventing mixing of incompatible chemicals, permit-to-work systems for basement access during production and contractor management requiring risk assessments.

Off-Site Communication:

- Annual public notification leaflet to adjacent Staverton area sites
- Risk cards held at security for emergency services
- Coordination with Gloucestershire Airport emergency plans
- Environment Agency notification protocols

Aquatic Environment Protection:

- All site drainage passes through interceptors before discharge
- Emergency response prioritises preventing entry to Normans Brook (700 m SW) and Hatherley Brook (50 m N)
- Spill response targets <1 kg chemical loss to drainage systems
- Basement bunding prevents escape of process solutions

Atmospheric Releases:

- Local Exhaust Ventilation (LEV) systems minimise airborne chemical releases
- Prevailing south-easterly winds considered in emergency planning
- Dispersion modelling completed for worst-case scenarios
- Air quality monitoring protocols established

8.4 Monitoring and Performance Evaluation

Routine Monitoring

- Monthly stock level verification by Environmental Chemist
- Bi-weekly tank content analysis by Laboratory Team
- Weekly bund integrity inspections (basement areas)
- Monthly spillage kit checks by Process Operatives
- Bi-annual LEV testing with records maintained
- Chrome mist testing every two weeks

Compliance Evaluation

- Legislation updates via Legislation Update Service (monthly)
- Annual compliance review in Management Review meetings
- Environment Agency inspections under IPPC Permit BL0138IP
- Internal audits annually per ISO 14001 requirements
- BSI certification audits for EMS maintenance

Management Review

Management review meetings undertaken at least annually in accordance with ISO 14001 and 45001 requirements, attended by the Managing Director and relevant interested parties, reviewing all pertinent aspects with actions taken as required.

8.5 Incident Management and Continuous Improvement

All personnel required to record incidents (accidents, near misses, deviations, environmental spills) via Non-conformance Report or Fabriq portal. The HSE Supervisor defines corrective actions, records actions and monitors progress until closure. Structured Accident Investigation procedures involve staff from relevant business areas and subject matter experts.

SLSS operates a continual improvement procedure with a Continual Improvement Manager controlling the system. All projects and programmes controlled through change management process and reviewed against continual improvement in line with company aims. Staff encouraged to raise improvement ideas annually through Improve application on Smartsheet portal.

8.6 Training and Competence

SLSS ensures only personnel with suitable qualification and experience are employed on work tasks with potential to cause harm. The company takes action to ensure training requirements are met, monitors training effectiveness, conducts personnel appraisals regarding competence and maintains records of training, education, qualification and experience.

Staff awareness maintained through company intranet access, notice boards, regular company briefings (all staff attending) and monthly Company Brief by Managing Director covering HSE aspects.

9 Information

9.1 Records

SLSS maintains comprehensive documentation systems to ensure compliance with environmental management requirements and regulatory obligations. All records are:

- **Legible and accessible**: Documents are stored both electronically and as hard copies where appropriate, ensuring ease of retrieval and review
- **Compiled promptly**: Records are created as soon as reasonably practicable following the relevant activity or observation
- **Version controlled**: Where amendments are made, both original records and subsequent changes are documented and retrievable, maintaining a complete audit trail
- **Retained appropriately**: All environmental records are retained for a minimum period as specified by regulatory requirements, typically four years or until permit surrender

Records are stored securely with controlled access to ensure confidentiality whilst remaining available to authorised personnel and regulatory authorities as required.

9.2 Reporting

All reports required to comply with the permit will be provided to the Environment Agency to the address that will be provided. The reports will be retained in accordance with the procedures outlined in the appropriate sections of the permit.

9.3 Notification

SLSS will notify the Environment Agency without delay following the detection of:

- Any malfunction, breakdown or failure of equipment or techniques, accident or emission of a substance not controlled by an emissions limit which has caused or may cause significant pollution; and
- Any significant adverse environmental effect.

All notifications will be recorded and reported in line with the appropriate sections of the permit

Terms and Definitions

Term	Definition
AQS	Air Quality Standard
AQO	Air Quality Objective
BAT	Best Available Technique
BRef	Reference Document on Best Available Technique
BS	Baseline Scenario
COMAH	The Control of Major Accident Hazards (COMAH) Regulations 2015
Defra	Department for Environment, Food and Rural Affairs
DI	Deionised
DS	Do Something Scenario
EA	Environment Agency
EAL	Environmental Assessment Level
EMS	Environmental Management System
EP	Environmental Permit
EPR	Environmental Permitting Regulations
EQS	Environmental Quality Standards
EU	European Union
FIBC	Flexible Intermediate Bulk Container
IPCC	Integrated Pollution Prevention and Control
LEV	Local Exhaust Ventilation
LOAEL	Lowest Observed Adverse Effect Level
LPH	Litres per hour
LWS	Local Wildlife Site
MAPP	Major Accident Prevention Plan
mg/l	Milligram per litre
mg/m^3	Milligram per cubic metre
m/s	Metres per second
NSR	Noise Sensitive Receptor
PDCA	Plan-Do-Check-Act
PEC	Predicted Environmental Concentration
PESTEL	Political, Economic, Social, Technological, Environmental and Legislative
PC	Process Contribution
PCB	Printed Circuit Boards
SAC	Special Area of Conservation
SHEQ	Safety, Health, Environment and Quality
STM	Surface Treatment of Metals
SWOT	Strengths, Weaknesses, Opportunities, Threats
µg/l	Microgram per litre
$\mu g/m^3$	Microgram per cubic metre

Appendix A – Permit Variation Application Forms

Appendix B – Maintenance Procedures

Appendix C – Site Shutdown and Start-Up Procedures

Appendix D – Major Accident Prevention Plan

Appendix E – Air Quality Impact Assessment

Appendix F – Noise Impact Assessment

Appendix G – Site Condition Report

Appendix H – WP0194 Laboratory Vat Analysis Methods

Appendix I – Environmental Management System