HALEWOOD

PAINT OPERATIONS

IPPC REPORT 2025

Permit Number A2/0703/6.4/1

Contents

Introduction

This report has been prepared to provide information in accordance with the Paint Operations IPPC Permit -

The Permit to operate a Part 'A2' installation has been issued by Knowsley Metropolitan Borough Council, under the Pollution Prevention & Control Act 1999 and the Environmental Permitting (England & Wales) Regulations 2010.

Permit Number is A2/0703/6.4/1

Address of the installation is –

Jaguar Land Rover Limited
Halewood Operations
Liverpool
L24 9BJ

Enquiries relating to this report should be sent to the above address and marked for the attention of:

[redacted]
Site Services Manager,

Report issued – February 2025.

Executive Summary

In September 2025, Jaguar Land Rover experienced a severe cyberattack that necessitated the shutdown of all global IT infrastructure. As a direct result, production at the Halewood facility ceased immediately. The plant remained non-operational for several weeks while forensic cybersecurity teams conducted root cause analysis, system integrity validation, and phased restoration of critical manufacturing systems. This prolonged outage caused significant disruption to takt time stability, labour utilisation, and adherence to the build schedule, as well as the phased, essential restoration of manufacturing systems.

In parallel with recovery activities, Halewood continued preparations for the transition to Electric Modular Architecture (EMA) production. As part of these readiness works, several major technical upgrades were implemented within the Paint Shop during 2025. These modifications were engineered to improve process control, enhance energy efficiency, reduce chemical emissions, and support long-term sustainability targets. Key engineering changes included,

Process and Equipment Upgrades

- **OEM Primer Supplier Transition**
  Migration to a new primer material specification enabled a controlled reduction in primer oven setpoint temperatures. This delivered an annual energy reduction of 550 MWh, equivalent to 101 tonnes of CO_2e avoided. The new material set also eliminated four diisocyanate-containing products, improving operator safety and regulatory compliance.
- **Pretreatment Pump Frequency Optimisation**
  Variable frequency drive (VFD) parameters were recalibrated following validation trials. This optimisation reduces electrical load on the pretreatment circulation pumps, providing an annualised cost reduction of approximately £19,000, without compromising bath agitation or chemical stability.
- **Warming Mode Implementation for Primer, Enamel, and Clearcoat Booths**
  Introduction of an automated warming mode ensures that booths operate at lower energy consumption during non-production periods. Combined savings across all three booths equate to 1,348 kWh per hour during production periods.
- **E-Coat Oven Gap Mode Logic**
  Deployment of gap-detection logic enables the electrocoat oven to enter a controlled low-fire mode when the overhead conveyor is unoccupied. This reduces thermal load, gas consumption, and component wear while maintaining system readiness for rapid re-ramp.

- **Spraybooth ARP (Air Recirculation Plenum) Gap Mode**
  When a production gap is detected, ARP temperature set points automatically reduce from 22°C to 15°C, increasing HVAC efficiency and lowering energy consumption.
- **Contrast Roof Facility Installation**
  A new robotic Contrast Roof line was commissioned between April and August. The system features high-efficiency atomisers engineered for improved paint transfer efficiency, resulting in lower overspray volumes and reduced material waste. Increased throughput capability also reduces the cost per unit by spreading fixed overheads across higher production volumes.
- **Pretreatment Bath Drop Frequency Reduction**
  Enhanced analytical monitoring and data-driven bath stability metrics enabled the extension of bath drop intervals.
- **Treatment Bath Drop Frequency Reduction** driven by bath stability metrics allowed extension of bath drop intervals.
  - Zone 4: weekly → biweekly
  - Zones 5, 7, 8, 10: biweekly → every three weeks
    This reduces chemical consumption, effluent generation, labour demand, and downtime associated with bath changeovers.

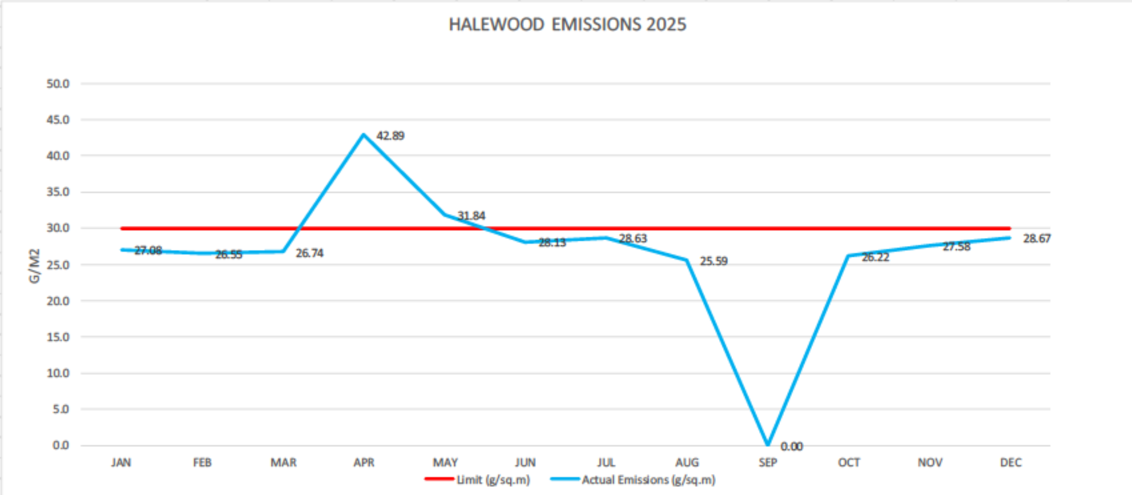
1. Mass Balance (VOC Emissions)

The table below shows the monthly Mass Balance performance for January to December 2025, based on the total area painted and solvent used.

Table 1 – Mass Balance Summary

HALEWOOD PAINT OPERATIONS - MASS BALANCE RESULTS 2025

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Total
Total Units	6970	6884	6411	1238	2687	4510	4246	3236	0	1604	3577	3779	45142
Total Area (m2)	765435	755809	701107	136133	296211	495292	466247	357089	0	176554	394795	413545	4958218
Actual Emissions (Kg)	20729	20065	18746	5839	9431	13934	13347	9137	2965	4630	10887	11858	141567
Actual Emissions (g/sq.m)	27.08	26.55	26.74	42.89	31.84	28.13	28.63	25.59	#DIV/0!	26.22	27.58	28.67	28.55
Limit (g/sq.m)	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30
Percentage of emission limit used	**90.3%**	**88.5%**	**89.1%**	**143.0%**	**106.1%**	**93.8%**	**95.4%**	**85.3%**	**#DIV/0!**	**87.4%**	**91.9%**	**95.6%**	



Technical Notes

- **Total Units:** Number of vehicles produced during the reporting month.
- **Total Area:** Total painted surface area processed during the month, expressed in square metres (m^2).
- **Actual Emissions 1:** Total volatile organic compound (VOC) emissions generated during the month, measured as solvent mass emitted.
- **Actual Emissions 2:** Normalised VOC emission rate calculated as actual Emissions 1 ÷ Total Area (g/m^2).
- **Limit:** Regulatory VOC emission limit allocated under the site's environmental permit.

NB Spike in April due to reduced build of 1238 and dip in September is the result of the cyber incident, no units built

2025 VOC Emissions and Permit Compliance Summary

A revised environmental permit was issued to the JLR Halewood Paint Shop in 2025, introducing an updated VOC emission limit of 30 g/m². Under this new regulatory threshold, the facility achieved an annual average VOC emission rate of 28.55 g/m², remaining within the permitted range.

This represents a marginal increase relative to the 24.08 g/m² achieved in 2024. The upward shift is primarily attributed to reduced production volumes in 2025, which led to lower total painted surface area. Reduced throughput reduces the efficiency of VOC normalisation, leading to an increase in the g/m² value despite stable or declining absolute solvent usage.

Solvent Usage and Recovery Data (2025)

- Total solvent consumption: 285,293 kg.
- Solvent reclaimed via recovery systems: 90,427 kg.
- Solvent removed from site for waste to energy processing: 18,681 kg to energy processing.

These figures demonstrate continued high solvent recovery efficiency within the Paint Shop's abatement systems, with most of the solvent mass being recaptured and reused, and only a limited proportion requiring off-site thermal recovery.

Solvent Management Plan Development

The JLR Halewood Paint team has engaged SLR Consulting to support the development of a comprehensive Solvent Management Plan (SMP) for the Paint Shop. While all essential solvent control activities—such as tracking, usage minimisation, recovery, and waste handling—are already embedded within existing Paint Shop processes, the SMP will consolidate these practices into a single, structured, and auditable framework.

The document will align site activities with regulatory best practice, improve traceability, and formalise the methodologies used to manage solvent inputs, outputs, and emissions across all paint-related operations. Completion of the Solvent Management Plan is scheduled for January 2026.

2. Continuous Monitoring (Air Emissions)

2.1 Introductory Notes

Thermal Oxidiser Monitoring

Emissions from the Thermal Oxidisers are continuously monitored for both carbon monoxide (CO) concentration and combustion temperature. The system records an average data point every 15 minutes to ensure high-resolution performance tracking and regulatory compliance.

If the 15-minute averaged CO concentration exceeds the prescribed emission limit, the control system automatically initiates an alarm event. This triggers both an audible/visual alert and the generation of an alarm record sheet for investigation and corrective action. In addition to the short-interval monitoring, a rolling 24-hour average is calculated using all 15-minute readings. This long-term average must also remain below the specified emission threshold to maintain compliance.

Further details regarding alarm thresholds, frequency, and event classifications are provided in Tables 2 and 2a of the report.

CO Concentration and Temperature

- 15-minute average   200mg/m^3
- 24-hour (daily mean) 100mg/m^3
- Enamel Incinerator Alarm Temperature -710 ˚C
- E-Coat RTO Alarm Temperature - 780 ˚C
- Primer RTO Alarm Temperature - 780 ˚C

2.2 Summary of Continuous Monitoring Alarms

Table 2 – Summary of 15 min alarms

Reference	Thermal Oxidiser	Date	Time	CO (mg/m³)	Cause
1	Enamel Incinerator	6/3/2025	05:15 – 05:30	218.7	
2	Enamel Incinerator	18/3/2025	05:45 – 06:00	227	
3	Enamel Incinerator	20/3/2025	05:45 – 06:00	202.5	
4	Enamel Incinerator	21/3/2025	05:45 – 06:00	229.9	
5	Enamel Incinerator	25/3/2025	05:15 – 05:30	219.3	

The root cause of the incinerator breaches in March was an issue with a damper limit switch not set correctly, resulting in intermittent operation failures and spikes in exhaust gas temperature. The analyser then recalibrated itself to this temperature, resulting in breaches being recorded when the temperature dropped back to normal, until it recalibrated back to the correct temperature. This error was corrected by the installation team in week 16 ready for start up 22/4/25.

NB 30/6/25 E-Coat RTO in bypass – Over temperature sensor failure.

Table 2a – Summary of 24-hour alarms

Reference	Thermal Oxidiser	Date	Time	CO (mg/m³)	Cause
			No Alarms		

Table 2b – Summary of running in by-pass

Reference	Thermal Oxidiser	Date	Time	CO (mg/m³)	Cause
1	E-Coat RTO	16/5/25	3:30 – 13:45	N/A	Used the over temperature sensor to run RTO, replaced part at weekend when kit had cooled enough to work on

2.3 Monitoring System Notes & Initiatives

At JLR Halewood Paint Shop, PROTEA CO analysers and Yokogawa data collection units are used to monitor stack CO emissions released into the atmosphere. The data required by the IPPC permit is stored in four locations: the Yokogawa data collector, Yokogawa trend recorder, a central data acquisition PC, and a folder with hard copies of daily printed reports.

The 2025 non-continuous monitoring event, initially scheduled for 7–9 October 2025, was postponed due to production uncertainties arising from the September cyber incident. Following internal assessment, the decision to defer the monitoring activity was communicated to KMBC on 23 September 2025, along with notification that a revised schedule would be arranged in coordination with Socotec.

Subsequently, on 4 October 2025, we provided KMBC with the confirmed rescheduled monitoring dates of 13–15 January.

UKAS TESTING 1015

LNO 19581 Jaguar Land Rover Halewood 2026

STACK EMISSIONS SUMMARY REPORT

SOCOTEC

Release Point	Units	Particulate Matter Result	Particulate Matter Limit	Total VOCs Result	Total VOCs Limit	Oxides of Nitrogen (as NO2) Result	Oxides of Nitrogen (as NO2) Limit	Carbon Monoxide Result	Carbon Monoxide Limit	Test Dates	Flow Rate (m^3/hr)	Reference Conditions
Primer RTO	mg/m^3	1.2	3	3.4	20	10.0	100	8.3	100	13/01/2026	38628	STP Wet Gas
	g/hr	46	-	133	-	396	-	322	-			
Ecoat RTO	mg/m^3	1.1	3	0.3	20	5.4	100	4.4	100	14/01/2026	23688	STP Wet Gas
	g/hr	27	-	3.8	-	127	-	104	-			
Recuperative Thermal Oxidiser	mg/m^3	1.4	3	0.3	20	67	100	23	100	14/01/2026	15628	STP Wet Gas
	g/hr	22	-	13	-	1053	-	365	-			

	Particulate Matter	Total VOCs	Oxides of Nitrogen	Carbon Monoxide
Standard Reference Method	BS EN 13284-1	BS EN 12619	BS EN 14792	BS EN 15058
Accreditation Status of Test	UKAS & MCERTS	UKAS & MCERTS	UKAS & MCERTS	UKAS & MCERTS

	Units	Particulate Matter Result	Particulate Matter Limit	Total VOCs Result	Total VOCs Limit	Reference Conditions
Basecoat 64	mg/m^3	0.7	3	8.6	-	STP Wet Gas
	g/hr	58	-	703	-	
Basecoat 69	mg/m^3	0.15	3	1.1	-	STP Wet Gas
	g/hr	12	-	88	-	
Primer 79	mg/m^3	0.81	3	38	-	STP Wet Gas
	g/hr	70	-	2367	-	
Contrast 74	mg/m^3	0.84	3	5.8	-	STP Wet Gas
	g/hr	41	-	289	-	
Contrast 72	mg/m^3	0.12	3	8.4	-	STP Wet Gas
	g/hr	7.6	-	522	-	
Contrast 73	mg/m^3	0.16	3	8.5	-	STP Wet Gas
	g/hr	8.8	-	469	-	
Contrast 75	mg/m^3	0.17	3	0.32	-	STP Wet Gas
	g/hr	4.6	-	8.6	-	

Test Dates	Flow Rate (m^3/hr)	Reference Conditions
15/01/2026	82106	STP Wet Gas
15/01/2026	79924	STP Wet Gas
15/01/2026	85373	STP Wet Gas
15/01/2026	49443	STP Wet Gas
13/02/2026	62233	STP Wet Gas
13/02/2026	55222	STP Wet Gas
13/02/2026	26639	STP Wet Gas

BS EN 12619
UKAS & MCERTS

As a comparison from 2024 to 2025 JLR noticed the following:

- **CO –** Increased CO readings due to lower temperature in January than November. When testing was completed in 2024 it was done in November which had 230 heating degree days. For 2025 monitoring the sampling was completed in Jan 2026 with a heating degree day recording of 342. The higher number of heating degree days in Jan 2026 means that it was a colder month. This means

  that more fuel will have been used to maintain the required heat in RTO's, explaining the increase in CO from 2024 to 2025 monitoring.

- **VOC's and NO2 –** VOC and Oxides of Nitrogen decreased in most cases showing an efficient combustion process. The change is testing parameters YOY such as oxygen content and flue gas velocity was negligible indicating that the change was mainly due to random variation in the process.

- **Particulate Matter –** All RTO's showed an increase in Particulate matter for 2024 to 2025 in comparable testing conditions. All other stack monitoring remained consistent YOY. The source of the increase in particulate matter is hard to determine as it could be the result of many things. Going forward, we endeavour to take more detail of testing condition which could affect particulate matter i.e.number of vehicles during test period, outside weather, testing times, etc.

3. Energy

3.1 Energy Usage

Paint Operations energy data for 2025, shown in the table below –

Table 3a – Energy Usage (Information supplied by EQUANS)

Jaguar Paint 2025 IPPC Information			
Energy Source	**As Delivered (MWh) (Paint shop usage)**	**Primary Energy Consumption At Source (MWh) plant totals**	**Fraction of Total (%)**
Electricity (Public Supply)*	19,554.60	80,376.68	38.5
Firm Gas	56,767.54	63,611.70	30.4
Boiler House (Interruptible Gas & Gas Oil Standby) **	3,246.97	64,939.36	31.1
Total	79,569.11	208,927.73	100.0

* Based on delivered figures multiplied by a generation loss correction factor of 2.6.
**From January, 2007, standby fuel is Gas oil

Notes:		
Electricity:		
Direct Electricity Use	(kWh pa)	19,187,871
Dedicated HP Paint Compressors	(kWh pa)	0
General & High Quality LP Compressed Air	(kWh pa)	366,734
Total	(kWh pa)	19,554,604
Primary Energy:Supplied Electricity Ratio		4.11
Hence primary Energy Use	(kWh pa)	80,376,675
Firm Gas:		
Total Jaguar Firm Gas use	(kWh pa)	63,611,698
Estimated Use at Paint	(%)	89.2
Hence Paint Estimated Use	(kWh pa)	56,767,543
Interruptible Gas & Gas Oil & MFO:		
Total Jaguar Int Gas & MFO use	(kWh pa)	64,939,360
Estimated Use at Paint	(%)	5
Hence Paint Estimated Use	(kWh pa)	3,246,968
Information Compiled by:	S.Dutton	
Date:	12/01/2026	
Data Sources:	JLR Halewood Monthly Energy Mega File/Power radar Paint Daily energy report	

Table 3b – Energy Comparison with Previous Years

	2020 (units)	2021 (units)	2022 (units)	2023 (units)	2024 (units)	2025 (units)
Volume	85162	69701	61574	48986	59730	45142
	2020 (MWh)	2021 (MWh)	2022(MWh)	2023(MWh)	2024(MWh)	2025(MWh)
Electricity	29109	26915	24096	19767	23760	19554
Electricity per unit	**0.34**	**0.39**	**0.39**	**0.39**	**0.40**	**0.43**
Gas	57950	49045	42748	56027	64241	56767
Gas per unit	**0.68**	**0.70**	**0.69**	**1.11**	**1.08**	**1.26**
Total	87059	75960	66844	75794	88001	76321
Total per unit	**1.02**	**1.09**	**1.09**	**1.51**	**1.47**	**1.69**
Plant wide	2020 (KWh)	2021 (KWh)	2022(KWh)	2023(KWh)	2024(KWh)	2025(KWh)
HP Compressed air	0	0	0	0	0	0
LP Compressed air	1838257	1948564	900499	498278	2072631	366734
	21.59	**27.96**	**14.62**	**9.91**	**34.70**	**8.12**

During the work in putting this years report together it was noticed that an error in recording the LP compressed air figures in the IPPC 2024 report where the same for 2023 and 2024 (498278) this has been amended in this years report.

In 2023, we had access to reliable energy consumption data through the FAROS system and the reports provided by the Equans team. This data was lost when the contract with Equans ended. As a result, in 2024 we were required to estimate paint shop consumption based on its assumed percentage of total plant usage.

Once we recognised the impact of losing this data, JLR addressed the issue by installing dedicated meters on the paint shop air dryers. This allowed us to accurately capture energy usage again through Power Radar.

3.2 Energy Initiatives

Production and Energy Use Impact Following the September Cyber Incident

The 27.82% reduction in production volume in 2025 was directly attributable to the major cyber incident in September, which led to a prolonged shutdown of Halewood's manufacturing systems. This reduction in throughput led to an increase in per-unit energy intensity, as fixed and semi-fixed energy demands continued despite the lower build schedule.

Although process efficiencies ensured that per-unit gas and electricity consumption remained relatively low compared with 2024, normalisation against a significantly reduced unit count resulted in overall increases of

- 7.23% in electricity consumption per unit
- 15.38% in gas consumption per unit

These increases do not reflect reduced efficiency but instead demonstrate the impact of sustained baseline energy requirements during periods of low or interrupted production.

Examples of Additional Energy Demand During the Disruption

Following the cyber incident, several energy-intensive mitigation activities were required to prevent product loss and maintain process integrity. Intensive mitigation activities were needed to prevent product loss and maintain process integrity:

- Interior seam sealed units already in the system required manual transfer through all subsequent thermal processes. These units must undergo controlled baking to complete the chemical curing reaction; failure to do so would have resulted in scrappage. Full Paint Shop operation—including ovens, booths, conveyance systems, and thermal equipment was required solely to salvage in process units.
- EMA (Electric Modular Architecture) bodies continued to require processing to ensure programme milestones for the transition to electric vehicle production remained on schedule. To support this, core equipment—including Spray Booths, Air Recirculation Plenums (ARPs), Regenerative Thermal Oxidisers (RTOs), and Paint Recirculation Banks (PRBs)—was required to remain operational, contributing additional electrical and thermal load during a period of otherwise reduced throughput.
- In 2025, the Paint Shop transitioned to a single-shift production model. However, due to operational and business demands, the shift duration had to be extended to meet production targets. While necessary, this critical decision resulted in an increase in energy consumption.

2026 Outlook

- The installation of the new Electrocoat Regenerative Thermal Oxidiser (RTO), initially planned for late 2025, has been delayed due to the cyber incident. Restricted procurement capability prevented Jaguar Land Rover from issuing the necessary purchase orders for the steel access platform required ahead of installation.
- As a result, the installation programme has been rescheduled. The updated timeline is as follows,
-
    - **Platform installation:** April–May 2026
    - **Commissioning:** June 2026
    - **Operational switchover:** July 2026

This RTO upgrade remains a key component of Halewood's emissions control strategy and will significantly improve compliance robustness and long-term environmental performance.

During the commissioning phase of the new RTO, there will be a period in which the analysers are transferred to the new system. To mitigate any associated risks during this transition, we will undertake manual monitoring of the equipment to ensure it continues to operate as intended. The following key performance indicators (KPIs) will be checked:

- Daily visual inspection for any smoke emissions from the RTO stack
- Verification of actual operating temperature three times per day during running periods
- Daily confirmation of the presence of a strong blue flame, indicating optimal combustion

This monitoring approach was presented to KMBC, who formally agreed to the proposal on 16 January 2026.

4. Waste

4.1 Waste Initiatives

Lean Manufacturing and Waste Minimisation Practices

Paint Operations utilises established Lean Manufacturing methodologies, including Kaizen continuous improvement principles, to minimise all forms of waste across the production process. Kaizen, defined as “continuous improvement,” focuses on systematically identifying and eliminating non-value-added activities. Within the Paint Shop, this philosophy is applied to reduce unnecessary raw material consumption, optimise resource use, and prevent waste generation at the source.

Materials approaching the end of their operational life are segregated at the point of disposal, enabling effective recycling or recovery where feasible. A key example is the management of purge solvents,

- Used purge material is collected, reclaimed, and distilled via specialist contractors, producing a lower-grade solvent suitable for cleaning and maintenance activities.
- As overall solvent use reduction targets become more stringent, this approach will present increasing operational challenges due to the reduced availability of reclaimable solvent volumes.
- Paint Operations also leads several sitewide recycling initiatives, covering plastics, cardboard, paper, and other commonly used materials. These programmes support Jaguar Land Rover’s internal waste performance objectives.
- In 2025, we explored opportunities to recycle a new plastic exterior component. However, the volume of waste generated was insufficient to establish a viable recycling route or achieve the anticipated savings.

- Zero waste directly to landfill, and no more than 0.45% of waste from second-tier activities being sent to landfill.

We have simplified our recycling centres on process decks by consolidating bins for bottles, paper, cans, etc., into one station: DMR (dried mixed recycling).

In 2025, the Paint Shop's non-hazardous waste increased from 3.6 kg to 4.5 kg and hazardous waste from 8.0 kg to 10.8 kg.

This overall waste increased from 11.6 kg to 15.3 kg per vehicle.

Other working groups are exploring alternative disposal routes for different waste streams to divert from landfills. Leadec also conducts regular waste bin audits across the site to assess segregation and recycling of all materials, promoting greater awareness of staff behaviour

4.2 Waste Data

The tables below show the waste streams from Paint Operations and quantities sent for disposal or recycling, for the calendar year January to December 2025.

Table 4 – Non-Hazardous Waste Data (Information supplied by Leadec & Nalco)

Non-Hazardous Waste	Source	Quantity Generated (tonnes)	Storage Location and Container	Frequency of collection	Contractor	Final Destination and Method of Disposal	R & D Codes	EWC Codes
General Waste	Packaging, biodegradable & domestic waste	59.4	Black bins at lineside transferred to 35 yd^3 skip at Recycle Centre	Daily	Leadec/Bagnall & Morris	Viridor Waste 2 Energy, Runcorn	R1	200301
Contaminated water	NH Paint	0.3		Annual	Leadec/Robert Hopkins	TFS - Waste 2 Energy (AEB, Holland)	R1	80120
Paint Co-Agulation Process Waste (liquid)	Overspray treatment	118.7	Advanced CoAg disposal tank	Every 8 weeks	Nalco	WasteCare Ltd,Bootle, Liverpool	D9	80116
Contrast Roof Polythene	Contrast Roof	23.8	1100 litre Taylor Bins	4 bins per shift	25 ltr	New Horizon Plastics - Recycled intpo LDPE pellets for re-use in new applications	R3	150102
Aqueous	Demin Plant	2.70	Skip	As required	Leadec/CCC	Waste to energy	R1	80120

Table 4a – Hazardous Waste Data (Information supplied by Leadec)

Description	Source	Quantity Generated (in tonnes, unless otherwise stated)	Storage Location and Container	Frequency of Collection	Contractor	Final Destination and Method Of Disposal	R & D Codes	EWC Codes
Effluent Plant Filter Cake Solid	Trade Effluent Plant	51.40	Filter cake discharged into 14 yd^3 skip and exchanged	Every 6 weeks	Leadec/Robert Hopkins	TFS - Waste 2 Energy (AEB, Holland)	R1	110109*
Effluent Plant Tankered Filter Cake Sludge	Trade Effluent Plant	78.86	Tankered	As required	Leadec/Future Industrial	15% (solids after processing) to landfill at Veolia, Whitemoss	D9	110109*
Paints and Thinners	Paintshop/Garage Repair-colour changes - redundant products	24.14	Stored in 205 ltr drums then transferred to the HWTS	As required	Leadec/Robert Hopkins	Solvent recovery at Tradebe, Morecambe	R2	080111*
Hydropurge	Purging paint spray lines at colour change	166.94	Paint Mix Bu k Tank 12,000 ltrs	Fortnightly	Leadec/Future Industrial/WasteCare	5% (solids after processing) to landfill	D9	080119*
Sealers	Paintshop Hazardous Sealer	2.10	Stored in 205 ltr drums then transferred to the HWTS	As required	Leadec/Robert Hopkins	TFS - Waste 2 Energy (Albox-Espana)	R1	080409*
Solvent Rags/Cloths/Filters	Solvent wiping / cleaning / air filters	2.11	Red bins at lineside transferred to 14 yd^3 skip at Waste Transfer Station	As required	Leadec/Robert Hopkins	TFS - Waste 2 Energy (AEB, Holland)	R1	150202*
Plastic & Steel Containers	Chemical Handling	1.23	Transfer Station / West drum compound	As required	Leadec/Robert Hopkins	Plastics to Mallory Oils, Metals to EMR	R3 R4	150110*
Empty Paint Tins	Paintshop general areas	0.05	Transfer Station / West drum compound	As required	Leadec/Robert Hopkins	Recycling EMR	R4	150110*
Spent Purge Solvent	Purging paint spray lines at colour change in Primer and Clearcoat processes.	85.78	Paint Mix Bu k Tank 12,000 ltrs	As required	Gage Products	Solvent recovery at Augean, Avonmouth	R2	080111*
Phosphate	Zone 6	5.60	Stored in 205l drums and transferred to HWTS	As required	Leadec/Robert Hopkins	TFS - Waste 2 energy (AEB)	R1	110106*
PPE Parco Contaminated	M18	0.20	Stored in Wastesafes and transferred to HWTS	As required	Leadec/Robert Hopkins	TFS - Waste 2 energy (Renova)	R1	150202*
Contaminated Pipework		0.72	Stored in Wastesafes and transferred to HWTS	As required	Leadec/Robert Hopkins	Metal recycling - European metal recycling	R4	170409*
Zone 6 Matrial	Dilution issue Dec 25	43.58	Tankered	One off	Leadec/Future Industrial	15% (solids after processing) to landfill, Veolia, Whitemoss	R4	110111*
Coolant		0.06	Stored in 25l drums and transferred to HWTS	As required	Leadec/Robert Hopkins			160114*
Alkaline washings		2.08	Tanker	As required	Leadec/Future	Future	D9	110111*
Acid washings		9.14	Tanker	As required	Leadec/Future	Future	D9	110111*
Paint Sludge		4.60	Stored in 205l drums and transferred to HWTS	As required	Leadec/Robert Hopkins	ATM(Waste to energy)	R1	080113*
Contaminated Plastics		1.48	Stored in 205l drums and transferred to HWTS	As required	Leadec/Robert Hopkins	Recycling (MTB)	R3	150110*
Contaminated Metal	Empty paint tins	0.05	Skip	As required	Leadec/Robert Hopkins	Metal recycling - European metal recycling	R3	170409*
Paint Solids		0.08	Stored in 205 l drums and transferred to HWTS	As required	Leadec/Robert Hopkins	ATM(Waste to energy)	R1	080117*
Paint Scrapings		5.70	Stored in 205l drums and transferred to HWTS	As required	Leadec/Robert Hopkins	ATM(Waste to energy)	R1	080117*
Bonderite MAD 150		0.10	Stored in 25l drums and transferred to HWTS	As required	Leadec/Robert Hopkins	ATM(Waste to energy)	R1	110106*
Degreaser		0.05	Stored in 25l drums and transferred to HWTS	As required	Leadec/Robert Hopkins			120301*
Bonderite 958		1.00	Stored in IBC	As required	Leadec/Robert Hopkins	ATM(Waste to energy)	R1	160305*
Oil		0.02	Stored in 205l drums and transferred to HWTS	As required	Leadec/Robert Hopkins	Malory Oils	R9	130205*
Pfinder 13/18		1.10	Stored in drums and transferred to HWTS	As required	Leadec/Robert Hopkins	ATM(Waste to energy)	R1	120112*

5. Water

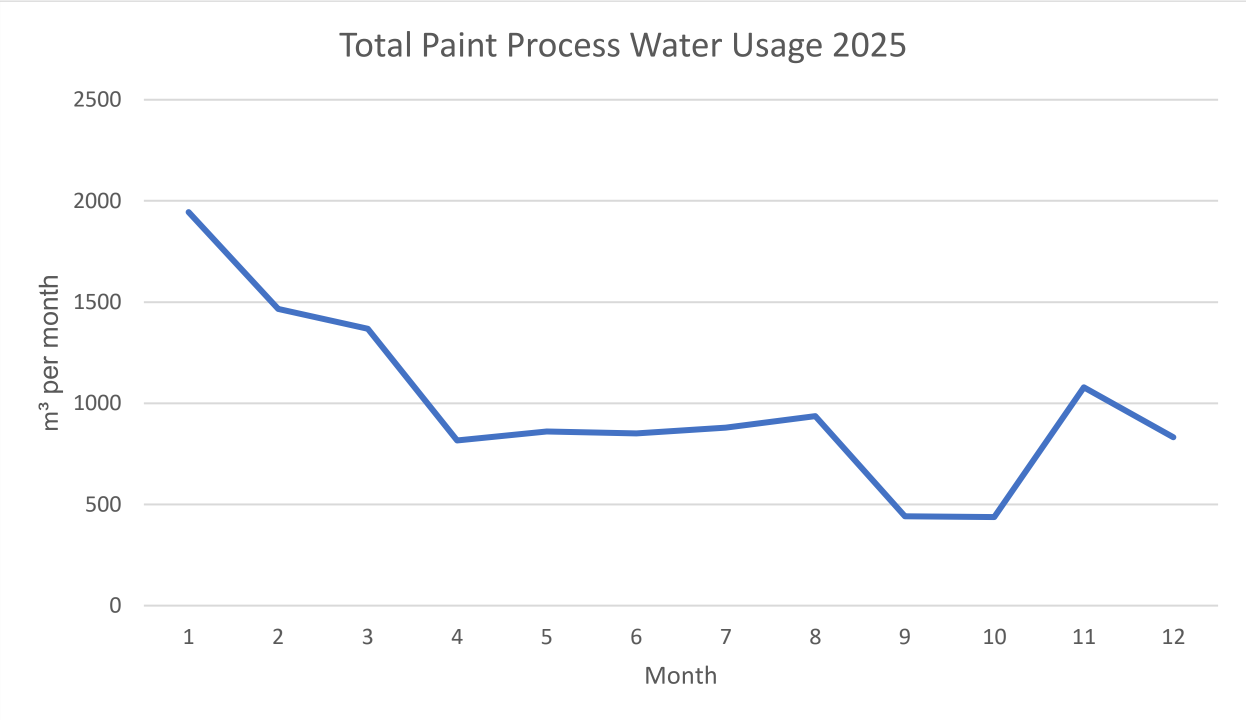
5.1 Water Data

Two principal sources of water used within the Paint Operations processes –

- Process Water (incoming potable water from the utility provider)
- Demineralised Water (higher quality water from our internal plant)

Process water is used for the first cleaning stages in the Pre-treatment process. The graph below shows the monthly usage of process water in cubic metres for 2025

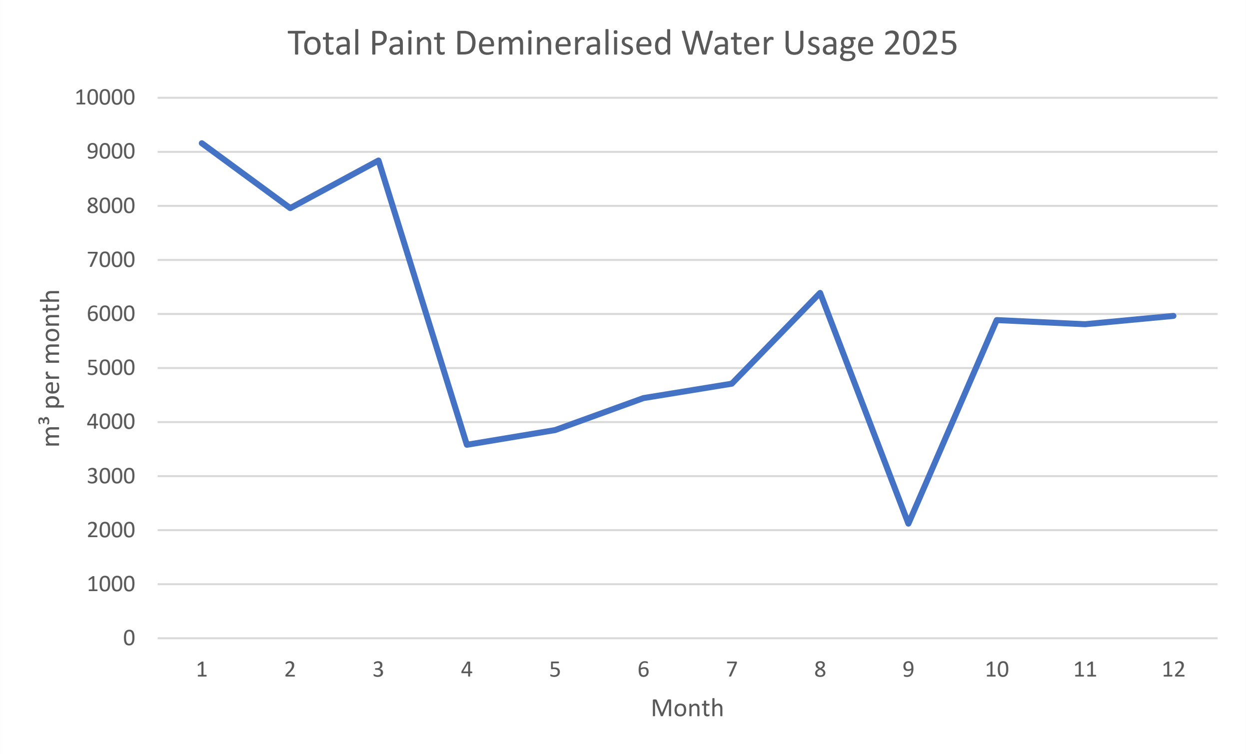
Graph 5a – Process Water Usage



Demineralised (or "Demin") water is higher quality water used in many processes, including the final cleaning stages of the Pre-treatment, as well as polishing and repair procedures. Demineralised water is also used to achieve the set relative humidity in all spray booths to improve paint quality.

The graph below represents the total demineralised water monthly usage in cubic metres, for 2025:

Graph 5b – Demineralised Water Usage



At the start of the year, we were recovering from invasive shutdown work that required tanks to be emptied as to allow overhead conveyor work to be completed, this is the reason for the peak in water at the beginning of the year. The drop in water usage in September is the result of the cyberattack in September. Other variance in water usage is down to refreshing process tanks using a data driven approach.

Tank Drop Information

Deluge – Every 2 weeks
Tank 1 – Every 2 weeks
Tank 2 – Every 2 weeks
Tank 3 – Not dropped
Tank 4 – Every 2 weeks
Tank 5 – Every 3 weeks
Tank 6 – Not dropped
Tank 7 – Every 3 weeks
Tank 8 – Every 3 weeks
Tank 9 – Annually
Tank 10 – Every 3 weeks
Tank 11 – Every 3 weeks

Table 5C details the Paint Shop's water usage from the last 6 years. Weekly tank drops are still performed to maintain production quality irrespective of production volumes.

Table 5c – Water Comparison with Previous Years

	2020 (units)	2021 (units)	2022 (units)	2023 (units)	2024 (units)	2025 (units)
Volume	85162	69701	61574	48986	59730	45142
	2020 (m^3)	2021 (m^3)	2022 (m^3)	2023 (m^3)	2024 (m^3)	2025 (m^3)
Process Water	41635	35605.0	37282.5	21344.0	20456.0	11910.5
Process Water Per Unit	**0.49**	**0.51**	**0.61**	**0.44**	**0.34**	**0.26**
Demineralised Water	107824	92060.0	78663.3	62239.0	90491.0	68721.0
Demineralised Water Per Unit	**1.266**	**1.321**	**1.278**	**1.271**	**1.515**	**1.522**
Total water	149459	127665	115945.8	83583.0	110947.0	80631.5
Total Water Per Unit	**1.75**	**1.83**	**1.88**	**1.71**	**1.86**	**1.79**

5.2 Water Initiatives

Actions within the Jaguar Land Rover Environmental Management System, along with company scorecard metrics, drive water-use reduction activities. The JLR Water Focus Group shares best practices and water-saving initiatives across all JLR manufacturing sites and reviews performance against targets.
A more data-driven approach has improved our understanding of the pre-treatment process, leading to changes in our tank drop frequencies.

The site services team are in the definition phase of projects for water recycling and borehole water abstraction. If successful, the water recycling project could re-use 80% of effluent wastewater generated from paint shop processes. Due to the ever-present demand for the highest quality for paint finish it is unlikely that the recycled water will be used within the paint shop process.

Water Breaches (consent limit is 1700m^3)

- 9/4/24 - 2139m^3

The corrective actions agreed with United Utilities in 2024 to prevent further breaches were implemented. A detailed investigation into the suspected breaches concluded that the setup of the effluent flow meter was inadequate. The flow meter is now serviced and calibrated twice yearly by MCERTS accredited engineers.

Water Discharge

Parameters for waste water discharge for the Halewood site are documented in United Utilities permit 693T17020HWD1. The site undertakes periodic sampling of 3 separate streams referred to as effluent plant, trade effluent and surface water to ensure compliance against the parameters set.

The site has a single discharge point located in Finished Vehicle Despatch compound. This is the point at which all parameters must not be exceeded. Appendix A attached shows the sampling results for trade effluent; and appendix B is an example of how maximum daily flow is monitored on the site.

6. Materials

6.1 Material Review

All hazardous chemical products (liquids, powders, etc.) at JLR must go through the Materials Review Process. Occupational Hygiene and Toxicology ensure that all products meet company standards and that the lowest-harm product is selected for each process. As a standard, all products known to be carcinogenic, mutagenic, and reprotoxic are prohibited for use, and where immediate removal is not possible, they must be strictly controlled. Toxicology works closely with suppliers and product owners to seek and implement safer alternatives. The site continues to be supported by industry suppliers

and various company forums to identify and share Best-In-Class initiatives across all JLR sites.

At JLR, we adopt a continuous improvement approach which includes.

- the constant monitoring of materials for ingredients that are identified for removal due to their adverse environmental effects, either by legislative dictates or by JLR policy.
- new materials that enable reductions in material resources, including water and energy
- new materials that reduce emissions to the environment

This is managed by the Materials Engineering department, in conjunction with Product Engineering and Global Manufacturing Engineering, with support and input from our incumbent Material Suppliers and New Material Suppliers, whom Raw Materials Purchasing also manages.

As part of our Purchasing Strategy, we contractually encourage suppliers to adopt a continuous improvement approach to deliver on our Sustainability and Environmental goals.

6.2 Raw Material Inventory

Tables 6a to 6g summarise the principal materials used in the installation, including quantities used in 2025, chemical compositions, and known alternatives.

Table 6a – RM1 Solvents (Data supplied by Gage Products Ltd)

Raw Material/ Function	Annual Usage (kg or L)	Process	Fate:% to: Product, ETP, Air, Waste	Practical Alternatives	Storage Location and Type*	Chemical Nature/ Composition	Risk Phrase
RM1 - Solvents							
Purge Solvent - CN 31306	108,696 L	Purge solvent	70% to reclaim tank, 30% to Stay-Clean®	None	Paint & Oil Stores 2,000 litres max in 1000 litre IBCs. 10,000 litre bulk tank at Paint Mix	Hydrocarbons,C9,aromatics 20-50%, n-Butyl Acetate 10-30%, Ethylbenzene 0-20%, Xylene 0-20%, Isopropyl Alcohol 0-5%, n-Butyl Alcohol 0-5%, Isobutyl Alcohol 0-5%, Toluene 0-5%, Methyl Isobutyl Ketone 0-5%, Acetone 0-5%, Isopropyl Acetate 0-5%, Ethyl Acetate 0-5%	H225 H318 H336 H373 H304 H411
Line cleaning solvent - CN 33380	50,743 L	Line cleaning solvent for use as a cleaning solvent in all spray booths and used to flush / clean systems	25% to Stay-Clean®, 75% to reclaim tank	None	Paint & Oil Stores 3200 litres max in 205 litre drums. 10,000 litre bulk tank at Paint Mix	Xylenes 20-50%, Ethylbenzene 5-20%, n-Butyl Acetate 5-20%, n-Butyl Alcohol 1-10%, Methyl Ethyl Ketone 0-10%, 1-Methoxy-2-Propanol Acetate 0-10%, Propylene Glycol Ether 0-10%, Isopropyl Alcohol 0-5%, Methyl Isobutyl Keytone 0-5%, Isopropyl Acetate 0-5%, Ethanol 0-1%, Ethyl Acetate 0-5%, Toluene 0-1%, n-Propyl Alcohol 0-1%, Acetone 0-1%, Cumene 0-1%	H226 H318 H336 H373 H304 H411
CN 10241Cutting solvent - Xylene	9,840 L	Primer 2 and clear coat cutting solvent	100% to air via Paint emissions	None	Paint & Oil Stores 1640 litres max in 205 litre drums	Xylenes >75% Ethylbenzen 5-20%	H226 H312 H332 H315 H373 H304
CN 10440	6,636 L	Clear coat cutting solvent	100% to air via Paint emissions	None	Paint & Oil Stores 2 x 1000 litre Tote tanks	Hydrocarbons,C9,aromatics ≤100	H226 H336 H335 H304 H441
CN 71718	3,321 L	Cleaning of stainless steel floors	100% to air	None	Paint & Oil Stores 205 litre drums	2-Butoxyethanol 19.8-50%	H302 H312 H332 H315 H319
Thinners	1,075 L	Solvent used in garage repair	100% to air	None	Paint & Oil Stores 25 litre kegs	Acetone 10-30%, Xylene 10-30%, Toluene 10-30%, Secondry Butyl Alcohol 5-<10%, Propan-2-ol 5-<10%, Ethanol 5-<10%, Hydrocarbons,C7, nalkanes, isoalkanes 5-<10%, Methyl Acetate 5-<10%, Methyl Ethyl Keytone 5-<10%, N-Butyl Acetate 5-<10%, Iso Propyl Acetate 5-<10% Ethyl Acetate 5-<10% Methanol 2.5-<5%, Tetrahydrofuran 0.5-<1%	H225 H332 H315 H319 H361d H371 H336 H373 H304 H441
CN 36701	6,500 L	Water based purge solvent for use in the basecoat booth for cleaning and purging the equipment, also used to flush system for new paint colours	90% to reclaim tank, 10% to Stay-Clean®	None	Paint & Oil Stores 3,000 litres max in 1000 litre IBCs. 2,000 litres in totes at Paint Mix	2-(2-Butoxyethoxy) Ethanol 50-75%, Hexyl Cellosolve 5-20%, Triethanolamine 5-20%, 2-(hexyloxyethoxy) ethanol 1-15%, Diethanolamine 0-5%	H302 H312 H314 H318

The Paint Shop has engaged with Gage Products Ltd about the possibility of practicable alternatives, but nothing is available since transitioning over to no VOC Hydropurge in 2019

Table 6b – RM2 Paint & E/Coat (Data supplied by BASF & Axalta)

Raw Material/ Function	Annual Usage (kg or L)	Process	Fate:% to: Product, ETP, Air, Waste	Practical Alternatives	Storage Location and Type*	Chemical Nature/ Composition
RM2 - Paints and E-Coat						
Generic Clearcoat	126000	Clearcoat Spray Booths	Vehicle Surface / Air / Waste	None	1000 litre steel tote bunded in the paint mix building and paint and oil stores. Max storage 20 Totes	CAS 64742-95-6 solvent naphtha (petroleum), light arom. (<0,1% benzene) 15 - < 20 % CAS 95-63-6 1,2,4-trimethylbenzene 15 - < 20 % CAS 71-36-3 n-butanol 5 - < 7 % CAS 1330-20-7 xylene 5 - < 7 % CAS 68002-25-5 1,3,5-Triazine-2,4,6-triamine, polymer with formaldehyde, butylated 3 - < 5 % CAS .no number. EC 918-811-1 Solvent naphtha (petroleum), heavy arom 3 - < 5 % CAS 108-67-8 mesitylene 2 - < 2.5 % CAS 100-41-4 ethylbenzene 1 - < 2 % CAS 1445-45-0 trimethyl-orthoacetate 1 - < 2 % CAS 103-65-1 n-propylbenzene 1 - < 2 % EC 400-830-7A mixture of: a-3-(3-(2H-benzotriazol-2-yl)-5-tert-butyl-4-hydroxyphenyl)propionyl-w-hydroxypoly(oxyethylene); a-3-(3-(2H-benzotriazol-2-yl)-5-tert-butyl-4-hydroxyphenyl)propionyl-w-3-(3-(2H-benzotriazol-2-yl)-5-tert-butyl-4-hydroxyphenyl)propionyloxypoly(oxyethylene) 0.5 - < 1 % CAS 41556-26-7 bis(1,2,2,6,6-pentamethyl-4-piperidyl) sebacate 0.3 - < 0.5 %
Generic primer	73791	Primer Spray Booths	Vehicle Surface / Air / Waste	None	1000 litre steel tote or 200 litre steel drums bunded in the paint mix building and paint and oil stores. Max storage 60 drums and 5 totes	EC: 918-668-5 Hydrocarbons, C9, aromatics ≤12% EC: 905-588-0 Reaction mass of ethylbenzene and xylene CAS: 85940-94-9 Hexane, 1,6-diisocyanato-,homopolymer, Me Et ketone oxime-blocked <10% CAS: 25068-38-6 reaction product: bisphenol-A-(epichlorhydrin); epoxy resin ≤5% CAS: 123-86-4 n-butyl acetate ≤4.1% CAS: 68036-97-5 1,3,5-Triazine-2,4,6-triamine, polymer with formaldehyde, butylated methylated ≤5% CAS: 71-36-3 butan-1-ol ≤2.9% CAS: 68308-64-5 Quaternary ammoniumcompounds, cocoalkylethyldimethyl, Et sulfates <0.1%
Generic water borne basecoat	162840	Basecoat spray booths	Vehicle Surface / Air / waste	None	1000 & 200 litre steel containers bunded in the paint mix building / Paint and Oil Stores. Max storage 30,000 litres	CAS: 111-76-2 2-butoxyethanol ≤10% CAS: 71-36-3 butan-1-ol <3% CAS: 64742-48-9 Hydrocarbons, C11-C12, isoa kanes, <2% aromatics ≤3% CAS: 126-86-3 2,4,7,9-tetramethyldec-5-yne-4,7-diol <1% EC: 400-830-7 A mixture of: α-3-(3-(2Hbenzotriazol-2-yl)-5-tert-butyl-4-hydroxyphenyl)propionyl-ω-hydroxypoly(oxyethylene); α-3-(3-(2H-benzotriazol-2-yl)-5-tert-butyl-4-hydroxyphenyl) propionyl-ω-3-(3-(2H-benzotriazol-2-yl)-5-tert-butyl-4-hydroxyphenyl)propionyloxypoly (oxyethylene) ≤0.3% CAS: 121-44-8 triethylamine ≤0.2% CAS: 1065336-91-5 Reaction mass of bis(1,2,2,6,6-pentamethyl-4-piperidyl) sebacate and methyl 1,2,2,6,6-pentamethyl-4-piperidyl sebacate ≤0.2% CAS: 50-00-0 formaldehyde <0.1%
E-coat Resin	228340	Electrocoating process	Vehicle Surface / Air / Effluent Treatment Plant	None known	28,000 litre Bulk Tank near wax kitchen - unbunded plus additional day storage tank of 3,500 litres	LER - 17%, ISO - 7%, Solvent - 2.5% Water 57%
Pigment Paste	39400	Electrocoating process	Vehicle Surface / Air / Effluent Treatment Plant	None known	5x 1400kg Steel tote in Paint and Oil Stores and E-coat Mix Room	LER 12%, Titandioxide - 25%, Water - 30% other pigments 22%
EC Butoxipropanol	4780	Electrocoating process	Vehicle Surface / Effluent Treatment Plant	None known	12 x 180 litre steel drum Paint and Oil stores and E-coat Mix Room	Butoxipropanol 100%
Formic Acid	5250	Electrocoating process	Vehicle Surface / Effluent Treatment	None known	Paint stores and e-coat mix room max. 35 x 25kg plastic drum	Formic acid 50%, water 50%

The materials for the Electrocoating process were previously converted to a reduced-energy material in 2019, enabling the oven temperatures to be lowered.

Table 6c – RM3 Sealers & Waxes (Data supplied by Henkel Technologies)

Raw Material/ Function	Annual Usage (kg or L)	Process	Fate:% to: Product, ETP, Air, Waste	Practical Alternatives	Storage Location and Type*	Chemical Nature/ Composition
RM3 - Sealers and Waxes						
Duplex Sealer Teroson PV 3133	**125786 Kg**	Sealer line	Vehicle Surface / air	Non-PVC tapes	Bulk tank near admin building - Unbunded	Hydrocarbons, C11-C12, isoalkanes, < 2% aromatics (1- < 3 %), Fatty acids, C18-unsatd., dimers, reaction products with polyethylenepolyamines (0,1- < 1 %)
Terolan 1984 Roof Ditch Sealer	**305 Kg**	Sealer line	Vehicle Surface / air	Expanding Tapes	Day Tank located on Paint Floor - Un bunded	Naphtha (petroleum), hydrotreated heavy Benzene < 0,1 % = < 2.5%, Calcium oxide = < 2.5%, Fatty acids, C18-unsatd., dimers, reaction products with polyethylenepolyamines = < 2.5%
Reflow Wax Pfinder AP13/18	**17139 L**	Reflow wax booth	Vehicle surface / air	Water based wax	Wax kitchen Bulk Tank - bunded	Solvent free rust prevention. Corrosive inhibitors, paraffin oil etc
One compartment Polyuethane sealer IDH-744475	**7 L**	Sealer line / Watertest Repair / Containment	Vehicle surface approx 100%	None known	Paint and Oil Store Twelve 310ml cartridges per metal box	Polyurethane based one compartment paintable adhesive / sealant
NVH Dampener Teroson RB 8275 JA	**31200 Kg**	NVH Robot Cell	Vehicle Surface approx 100%	Bitumen Pads	Wax Kitchen 1200Kg stell totes, two lineside @ pumping station	Rubber Based, Sulfur <10%, Calcium Oxide <5%, Zinc bis <1%, Zinc dis <1%, Benzothiazole-2-thiol <0.25%

Henkel Technologies has previously introduced Teroson PV 3133 as a replacement for Teroson 1979 JFS. 3133 has a lower VOC content and is less dense, lowering the weight of our vehicles and improving fuel performance.

Table 6d – RM4 Garage Repairs (Data supplied by Axalta)

Raw Material/ Function	Annual Usage (kg or L)	Process	Fate:% to: Product, ETP, Air, Waste	Practical Alternatives	Storage Location and Type*	Chemical Nature/ Composition
RM4 - Garage Repairs						
Tints	228 L	Garage Repair	Product / Air	None known	12 x 1 litre steel tins in flammable cupboard Garage Repair Area and Paint and Oil Stores	**CAS 1330-20-7 xylene 20 -< 25%** **CAS 123-86-4 n-butyl acetate 20 -< 25%** **CAS 108-65-6 2-methoxy-1-methylethyl acetate 5 -< 7%** **CAS 100-41-4 ethylbenzene 5 -< 7%** **CAS 108-83-8 2,6-dimethylheptan-4-one 3 -< 5%** **CAS 123-92-2 isopentyl acetate 2 - < 2.5%** **CAS 64742-95-6 solvent naphtha (petroleum), light arom. (<0,1% benzene) 1 - < 2%** **CAS 763-69-9 ethyl 3-ethoxypropionate 1 - < 2%** **CAS 108-88-3 toluene 0.1 - < 0.2%** **CAS 688-84-6 2-ethylhexyl methacrylate 0.1 - < 0.2%**
Binders	500 L	Garage Repair	Product / Air	None Known	Max 40 x 1-5 litre steel tins in flammable cupboard in Garage Repair Area and Paint and Oil Stores	**CAS 64742-95-6 solvent naphtha (petroleum), light arom. (<0,1% benzene) 15 - < 20 %** **CAS 95-63-6 1,2,4-trimethylbenzene 15 - < 20 %** **CAS 71-36-3 n-butanol 5 - < 7 %** **CAS 1330-20-7 xylene 5 - < 7 %** **CAS 68002-25-5 1,3,5-Triazine-2,4,6-triamine, polymer with formaldehyde, butylated 3 - < 5 %** **CAS .no number. EC 918-811-1 Solvent naphtha (petroleum), heavy arom 3 - < 5 %** **CAS 108-67-8 mesitylene 2 - < 2.5 %** **CAS 100-41-4 ethylbenzene 1 - < 2 %** **CAS 1445-45-0 trimethyl-orthoacetate 1 - < 2 %** **CAS 103-65-1 n-propylbenzene 1 - < 2 %** **EC 400-830-7A mixture of: a-3-(3-(2H-benzotriazol-2-yl)-5-tert-butyl-4-hydroxyphenyl)propionyl-w-hydroxypoly(oxyethylene); a-3-(3-(2H-benzotriazol-2-yl)-5-tert-butyl-4-hydroxyphenyl)propionyl-w-3-(3-(2H-benzotriazol-2-yl)-5-tert-butyl-4-hydroxyphenyl)propionyloxypoly(oxyethylene) 0.5 - < 1 %** **CAS 41556-26-7 bis(1,2,2,6,6-pentamethyl-4-piperidyl) sebacate 0.3 - < 0.5 %**
Thinners	800 L	Garage Repair	,,	None Known	60 x 5-25 litre tins stored in flammable cupboard in Garage Repair Area and Paint and Oil Stores	**CAS 108-10-1 4-methylpentan-2-one ≥25 - ≤30%** **CAS 64742-95-6 solvent naphtha (petroleum), light arom ≥10 - ≤25%** **CAS 123-86-4 n-butyl acetate ≥10 - ≤25%** **CAS 95-63-6 1,2,4-trimethylbenzene ≤11%** **CAS 1330-20-7 xylene ≤10%** **CAS 100-41-4 ethylbenzene ≤2.5%**
Primer Filler	120 L	Garage Repair	Product / Air	None Known	12 x 5 litre tins strored in flammable cupboards in garage repair area and Paint and Oil Stores	**CAS 123-86-4 n-butyl acetate ≥10 - ≤25%** **CAS 1317-65-3 Limestone ≥10 - ≤25%** **CAS 1330-20-7 xylene ≤10%** **CAS 100-41-4 ethylbenzene ≤3%** **CAS 110-12-3 5-methylhexan-2-one ≤3%** **CAS 13463-67-7 titanium dioxide ≤1%** **CAS 1333-86-4 carbon black, non respirable ≤1%** **CAS 14808-60-7 Quartz ≤0.3%**
Activator	409 L	Garage Repair Area	Product / Air	None Known	Max 90 x 1-5 litre tins or plastic containers in Garage Repair Area or Paint and Oil Stores	**CAS 28182-81-2 Hexamethylene diisocyanate, oligomers ≥50 - ≤75%** **CAS 123-86-4 n-butyl acetate ≥25 - ≤50%** **CAS 2530-83-8 [3-(2,3-epoxypropoxy)propyl]trimethoxysilane <3%** **CAS 64742-95-6 solvent naphtha (petroleum), light arom. ≤3%** **CAS 4083-64-1 4-isocyanatosulphonyltoluene 4083-64-1 ≤0.3%**
Repair Clear Coat	585 L	Garage Repair Area	Product / Air	None Known	5-25 litre tins in Garage Repair Area or Paint and Oil Stores	**Polymeric aspartate - ≥25 - ≤50%** **CAS 123-86-4 n-butyl acetate ≥25 - ≤50%** **CAS 623-91-6 diethyl fumarate <3%** **CAS 112-07-2 Ethylene glycol butyl ether acetate ≤3%** **CAS 41556-26-7 bis(1,2,2,6,6-pentamethyl-4-piperidyl) sebacate ≤1%** **CAS 82919-37-7 methyl 1,2,2,6,6-pentamethyl-4-piperidyl sebacate ≤0.3%**

Table 6e – RM5 Paint Overspray Treatment Plant (Data supplied by Nalco Water)

Raw Material/ Function	Annual Usage (Lts)	Process	Fate:% to: Product, ETP, Air, Waste	Practical Alternatives	Storage Location and Type*	Chemical Nature/ Composition
RM5 - Stay-Clean						
715D+ Defoamer	1130	Coagulation treatment plant	Effluent Treatment / waste	n/a	Stayclean Facility 1000litre tote – bunded	Hydrated Middle Distilate 50-<=100 % 1 Octanol 1- <25% Hydrotreated Light Distilate 20- <25 %
93033 HCL	12120	Coagulation treatment plant	Effluent Treatment / waste	n/a	Stayclean Facility 1000litre tote – bunded	Sodium Hypochlorite 10- 20 %
74824 Biocide	1360	Coagulation treatment plant	Effluent Treatment / waste	n/a	Stayclean Facility 1000litre tote – bunded	5-chloro-2-methyl-2H-isothiazol-3-one and 2-Methyl-2H-isothiazol-3-one 3- <5 %
PK9516 Paint Kill	7290	Coagulation treatment plant	Effluent Treatment / waste	n/a	Stayclean Facility 1000litre tote – bunded	Glyoxalated acrylamide 1 - <2.5% Alukinium Chloride hydroxide 25- < 30%
Nalco 8735	560	Coagulation treatment plant	Effluent Treatment / waste	n/a	Stayclean Facility 1000litre tote – bunded	Sodium Aluminate 10 -<20% Sodium Hydroxide 10- <20 % Sodium Nitrate 1 - < 2.5%
71308 Polymer	250	Coagulation treatment plant	Effluent Treatment / waste	n/a	Stayclean Facility 1000litre tote – bunded	2-Hydroxyethel Methacacrylate 0.5 < 1 % Hydrotreateed Light Distilate 25- <30 %

Table 6f – RM6 Pre-treatment (Data supplied by Henkel Technologies)

Raw Material/ Function	Annual Usage (kg or L)	Process	Fate:% to: Product, ETP, Air, Waste	Practical Alternatives	Storage Location and Type*	Chemical Nature/ Composition
RM6 - Pre-treatment						
Zinc phosphating - Bonderite M-ZN 958 R22	**33659 kg**	Zinc phosphate – zone 6	Effluent Treatment	None known	20000litre Bulk Tank - bunded	Phosphoric Acid 5-10%, Zinc Bis 10-25%, Manganese Bis 10-20%, Ni salts 1-5%, Ammonium hydrogen fluoride 1-2.5%, Nitric Acid 1-5%
Alkaline liquid cleaner – Bonderite C-AK-1 1574	**28604**	Pre-treatment – zone 1-3	Foul sewer	None known	15000 litre bulk tank – bunded	Potasium Hydroxide >25%, Tetrasodium 1-5%, Tetrapotassium pyrophosphate 5-10%
Phosphate Accelerator – Bonderite m-ad 150	**11752 kg**	Zinc phosphate accelerator – zone 6	Effluent treatment	None known	10000 litre bulk tank - bunded	Na Nitrite 20-40%
Phosphate crystal refiner – Bonderite M-AC 50	**430 kg**	Zinc phosphating – zone 5	Effluent Treatment	None known	15kg Bags at paint line and Paint and Oil Store	Tetrasodium 10-20%, Sodium Hydroxide 0.5-2.0%
Surfactant additive – Bonderite c-ad 1270	**2600 kg**	Alkaline cleaner – surfactant – zone 1-3	Effluent Treatment	None Known	200litre drums at paint line and Paint and Oil Store - bunded	Surfactant blend, Alcohols C12-18, ethoxylated 68213-23-0
Phosphate passivator – Bonderite M-PT 54 NC	**5673 kg**	Zinc phosphate Passivator – zone 9	Effluent treatment	None Known	23kg pails at paint line and Paint and Oil Store - bunded	Dihydrogen hexafluorozirconate 3-7%, ammonium hexafluorozirconate 1-3%
Alkaline pH Adjuster – Bonderite M-AD 565	**5681 kg**	Zinc phosphate additive – zone 6&7	Effluent Treatment	None Known	23kg pails at paint line and Paint and Oil Store - bunded	Sodium Hydroxide 5-10%
Phosphate flocculent Bonderite M-AD FE-1	0	Zinc phosphate additive – zone 6	Effluent Treatment	None known	23kg pails at paint line and Paint and Oil Store - bunded	Iron trinitrate >25%, Nitric Acid 1-5%
Zinc supplement Bonderite m-ad zn-2	0	Zinc phosphate additive – zone 6	Effluent Treatment	None known	23kg at paint line and Paint and Oil Store - bunded	Zinc nitrate > 25%
Fluoride supplement - Bonderite M-AD 339L	**11915 kg**	Fluoride phosphate additive – zone 6	Effluent Treatment	None known	650kg tote at paint line in bunded and locked off area	Potassium Hydrogendifluoride 7-25%
Fluoride supplement - Bonderite M-AD 100	**529 kg**	Ph adjuster – zone 1-3	Effluent Treatment	None known	23kg pails at paint line and Paint and Oil Store - bunded	Phosphoric Acid >50%

Table 6g – RM7 Effluent & Demin Plant (Data supplied by EQUANS)

Raw Material/ Function	Annual Usage (kg or L)	Process	Fate:% to: Product, ETP, Air, Waste	Practical Alternatives	Storage Location and Type*	Chemical Nature/ Composition	Comments
RM7 - Effluent & Demin Treatment Plant							
Iron (III) Chloride	11,368kg	Effluent Treatment Plant	Effluent Treatment	None known	10,000 litre Bunded Bulk Tank – ETP	40% Ferric chloride solution	Quantities from JLR Stores System Delivery Quantities
Sodium Hydroxide	20,000kg	Effluent Treatment Plant	Effluent Treatment	None known	28,780 litre Bunded Bulk Tank – ETP	NaOH 25%, water 75%	Quantities from JLR Stores System Delivery Quantities
Hydrochloric Acid	348kg	Effluent Treatment Plant	Effluent Treatment	None known	16,700 Bunded Bulk Tank – ETP	Hydrochloric acid 32%, water 68%	Quantities from JLR Stores System Delivery Quantities
Anti-Foam	575 ltrs	Effluent Treatment Plant	Effluent Treatment	None known	25 ltr Drum. ETP	GE Betz Foamtrol AF4033, solution of fatty acid, polyol and silica	Quantities from JLR Stores System Delivery Quantities
Polymer	0kg	Effluent Treatment Plant	Effluent Treatment	None known	25 litre drum. ETP	GE Betz AE1125. Anionic polyacrylamide in emulsion 30-60%, Distillates (petroleum), hydrotreated light > 20%	Quantities from JLR Stores System Delivery Quantities - Local Stock
Sodium Hydroxide	0 kg delivered	Demin Plant	Effluent treatment	None known	33,000 litre Bunded Bulk Tank – Demin Plant	NaOH 46.6%, water 53.4%	Tank Redundant and empty
Sodium Hydroxide	34,000kg	New Demin Plant	Effluent treatment	None known	10000kg bunded tank	NaoH 32%	Quantities from JLR Stores System Delivery Quantities
Hydrochloric Acid	0 kg delivered	Demin Plant	Effluent Treatment	None known	33,000 litre Bunded Bulk Tank – Demin Plant	Hydrochloric acid 32%, water 68%	Tank Redundant and empty
Hydrochloric Acid	39,000kg	New Demin Plant	Effluent Treatment	None known	10000kg bunded tank	HCL 32%	Quantities from JLR Stores System Delivery Quantities
Continuum AEC3152	0kg	Demin Plant	Effluent Treatment	None known	1000 litre Bunded Bulk Tank – Demin Plant	1-5% Hydrogen Chloride	From Veolia
Castrol Perfecto T32 No 10 Centac Air Compressor	0 Litres	No.2 Compressor House	Waste	None known	600 litres Machine sump – Demin Plant	Petroleum distillates>60%, tributyl phosphate 0.1-<1%	Oil Change/machine service
Hydraulic Oil Filter Press	0 litres	Effluent Treatment Plant	Waste	None known	150 litre Machine sump	Mineral oil 100%	Oil top up
Biomate 5702	0kg	Demin Plant	Effluent Treatment	None known	Bunded storage tank max 1000 litres – Demin Plant	Sodium Hypochlorite >10%, Sodium Carbonate <20%, Sodium Hydroxide 0.5 - 2%	From Veolia
Techtrol Gold No 12 Centac Air Compressor	0 Litres	No.2 Compressor House	Waste	None known	600 litres Machine sump – Demin Plant	70% Polypropylene Glycol 30% Pentaerythritol Tetraester	No oil required at service

Conclusions

Environmental Management and Operational Performance Summary

In parallel with the ongoing optimisation of manufacturing equipment and paint process technologies, Paint Operations continues to maintain full compliance with the Jaguar Land Rover **Environmental Management System (EMS)**. The EMS framework systematically identifies, controls, and reduces environmental impacts associated with Paint Shop activities. This is achieved through the deployment of defined internal objectives and targets, supported by structured management programmes, documented procedures, and regular performance reviews. Policy deployment mechanisms ensure that environmental responsibilities are cascaded effectively across operational teams.

Key Conclusions from the 2025 Environmental Report

- **Solvent Mass Balance Compliance**
  All solvent-use metrics remained within the permitted thresholds defined by the site's environmental permit. Mass balance calculations confirm that VOC use and emissions remained within regulatory tolerances throughout the reporting period.
- **Significant Energy Efficiency Improvements**
  Numerous energy reduction initiatives contributed materially to Jaguar Land Rover's broader Net Zero Carbon 2030 strateg**y**. These included process optimisation, automation enhancements, and improved thermal and electrical control systems. Despite the impact of the cyber incident, the underlying process energy efficiency continued to improve
- **Reduced Water Consumption Through Data-Driven Management**
  The implementation of enhanced data analytics and increased monitoring frequency enabled more responsive control of water usage. This resulted in measurable reductions in consumption across pretreatment, spray booth, and ancillary cleaning operations
- **Maintained EMS Certification and Legal Compliance**
  All mandatory EMS certification requirements and legal obligations were upheld. Compliance controls remained robust, ensuring risks, hazards, and environmental impacts associated with paint operations were effectively managed and mitigated.
- **Increase in Total Waste per Unit**
  Total waste generated per unit increased from 11.6 kg to 15.3 kg. This rise was driven primarily by the September cyber incident, which significantly reduced annual build volume. Lower throughput increased normalised waste intensity despite no significant change in overall waste handling efficiency