Royston Environmental Permit Variation Application

Environmental Risk Assessment

Johnson Matthey PLC

Orchard Road, Royston, SG8 5HE

Prepared by:

SLR Consulting Limited

3rd Floor, Brew House, Jacob Street, Tower Hill,
Bristol, BS2 0EQ

SLR Project No.: 416.065394.00001

29 October 2024

Revision: FINAL

Basis of Report

This document has been prepared by SLR Consulting Limited(SLR) with reasonable skill, care and diligence, and taking account of the timescales and resources devoted to it by agreement with Johnson Matthey PLC (the Client) as part or all of the services it has been appointed by the Client to carry out. It is subject to the terms and conditions of that appointment.

SLR shall not be liable for the use of or reliance on any information, advice, recommendations and opinions in this document for any purpose by any person other than the Client. Reliance may be granted to a third party only in the event that SLR and the third party have executed a reliance agreement or collateral warranty.

Information reported herein may be based on the interpretation of public domain data collected by SLR, and/or information supplied by the Client and/or its other advisors and associates. These data have been accepted in good faith as being accurate and valid.

The copyright and intellectual property in all drawings, reports, specifications, bills of quantities, calculations and other information set out in this report remain vested in SLR unless the terms of appointment state otherwise.

This document may contain information of a specialised and/or highly technical nature and the Client is advised to seek clarification on any elements which may be unclear to it.

Information, advice, recommendations and opinions in this document should only be relied upon in the context of the whole document and any documents referenced explicitly herein and should then only be used within the context of the appointment.

Table of Contents

Appendices

1.0 Introduction

SLR Consulting Ltd (SLR) has been instructed by Johnson Matthey PLC (JM) to prepare an application for a variation to the Environmental Permit (Ref: EPR/BT7086IJ) (the Permit) for their Royston Site located at Orchard Road, Royston, Hertfordshire, SG8 5HE (the Site).

1.1 Methodology

This Environmental Risk Assessment (ERA) has been prepared in support of the permit variation application and has been undertaken in accordance with the Environment Agency (EA) guidance Risk assessments for your environmental permit (2016). The purpose of the assessment is to identify any significant risks that may affect receptors and demonstrate that the risk of pollution or harm will be acceptable by taking the appropriate measures to manage these risks.

This ERA uses the following approach, as set out in the EA's guidance, for identifying and assessing the risks from the proposed PFA processing facility:

Step One	Identify and consider risks for your Site and the sources of the risks;
Step Two	Identify the receptors at risk from the Site;
Step Three	Identify the possible pathways from the sources of the risks to the receptors;
Step Four	Assess the risks relevant to your specific activity and check they are acceptable and can be screened out;
Step Five	State what you will do to control risks if they are too high; and
Step Six	Submit your risk assessment as part of your application.

1.2 Proposed Development

The variation application is to authorise a number of developments at the site and to regularise previous changes agreed in writing with the Environment Agency (EA). The changes are summarised below:

1	3CR	Installation of a new Third Century Refinery (3CR) to replace the existing Platinum Group Metals Refinery (PGMR)
2	HomCat	Expansion of the existing homogeneous catalyst (HomCat) plant to replace the decommissioned Zeocat line.
3	Apollo	Addition of an iridium-based product to the platinum-based catalyst coated membrane process (currently under determination as part of Variation 16)
4	Waste Codes	Addition of EWC codes for five waste metals, previously agreed in writing with the EA

5	HomCat scrubbed draught	Re-direction of HomCat acid scrubbing from decommissioned A1 scrubbing tower to A97 PU12 scrubber, previously agreed in writing with the EA.
6	Administrative changes	Changes to update names of site processes

This ERA considers the risks to receptors associated with these specific proposals.

2.0 Identifying the Risks

This section considers the potential risks to the environment listed in the EA's guidance to identify those which will apply to the proposed changes to site operations and which require further assessment, and to screen out those which are not relevant.

The EA Guidance identifies the potential risks that may require assessment for 'most sites' as follows:

- any discharge, for example sewage or trade effluent to surface or groundwater;
- accidents;
- odour (not for standalone water discharge and groundwater activities);
- noise and vibration (not for standalone water discharge and groundwater activities);
- uncontrolled or unintended ('fugitive') emissions, for which risks include dust, litter, pests and pollutants that should not be in the discharge;
- visible emissions, e.g. smoke or visible plumes; and
- release of bioaerosols, for example from shredding, screening and turning, or from stack or open point source release such as a biofilter.

In addition, the EA guidance identifies risks from specific activities for which additional risk assessments must be completed depending on the activity being carried out and where substances are released or discharged into the environment. The EA guidance *Risk assessment for installations, waste and mining waste operations and landfill sites* indicates that the following additional risk assessments may be required for this Site:

- risks of air emissions;
- the global warming impact of your air emissions;
- risks to groundwater; and
- risks to surface water from hazardous pollutants, sanitary and other pollutants.

Potential risks can be screened out if they are not relevant for the site or by carrying out tests to check whether they are within acceptable limits or environmental standards. If they are, any further assessment of the pollutant is not necessary because the risk to the environment is insignificant. Table 2-1 provides a summary of the risks for each of the proposed changes to operations described in section 1.2, excepting the administrative changes which have no impact, identifying those that can be screened out as not relevant (grey shaded) and the type of risk assessment carried out for those that are identified as relevant.

Table 2-1 Scope of Risk Assessment

Risk Type	Relevant	Justification	Type of Risk Assessment
1. 3CR			
Air emissions	Yes	Release of NH_3, NH_4Cl, Cl_2, NOx, VOC and HCl from wet scrubber	Quantitative assessment: Air Quality Detailed Dispersion Modelling and Impact Assessment. Photochemical ozone creation potential (POCP) assessment using the H1 methodology
Global Warming Impact	Yes	Direct and indirect releases from heat and power requirements (grid and on-site CHP).	Quantitative using emissions factors
Groundwater	No	No direct or indirect releases to groundwater	Not required
Surface Water	No	Indirect emissions to surface water from scrubber liquor treated in site effluent treatment plant and released to sewer. No net increase increase in volume or pollution load as a result of the change.	Not required
Accidents	Yes	Potential for emissions from equipment failure etc.	Qualitative
Odour	Yes	Emissions to air of NH_3, VOCs	Qualitative
Noise & Vibration	Yes	Use of new mechanical equipment	Semi-quantitative
Fugitive emissions	Yes	Emissions to air of VOCs	Qualitative
Visible emissions	Yes	Wet scrubbing will occasionally produce a visible water-based plume	Qualitative
Bioaerosols	No	None emitted	Not required
2. HomCat Expansion			
Air emissions	Yes	VOCs	Quantitative assessment: Air Quality Detailed Dispersion Modelling and Impact Assessment. Photochemical ozone creation potential (POCP) assessment using the H1 methodology
Global Warming Impact	No	Direct and indirect releases from heat and power requirements (grid and on-site CHP) but there is no net increase in gas or electricity use by replacing Zeocat with HomCat expansion.	Not required

Risk Type	Relevant	Justification	Type of Risk Assessment
Groundwater	No	No direct or indirect releases to groundwater	Not required
Surface Water	No	Indirect emissions from aqueous liquor treated in site effluent treatment plant and released to sewer. There is no net increase in volume or pollution load released to sewer as a result of this change.	Not required
Accidents	No	Potential for emissions from equipment failure etc. However, the risks are similar to existing authorised HomCat process and the same mitigation techniques will be used.	Not required
Odour	No	Emissions to air of ammonia, acetic acid but risks are similar to existing authorised HomCat process and the same mitigation techniques will be used.	Not required
Noise & Vibration	No	No new noise emitting equipment will be introduced.	Not relevant
Fugitive emissions	No	Emissions to air: risks are similar to existing authorised HomCat process and the same mitigation techniques will be used.	Not required
Visible emissions	No	Plume from wet scrubber risks are similar to existing authorised HomCat process and the same mitigation techniques will be used.	Not required
Bioaerosols	No	None emitted	Not relevant
3. Apollo Iridium Product			
Air emissions	No	Small amounts of hydrogen, oxygen and nitrogen only. It is considered that any impacts will be negligible. No change from risk assessment carried out for Variation 16.	Not required.
Global Warming Impact	No	Direct release of small amounts of Hydrogen. Indirect releases from energy supply. No change from risk assessment carried out for Variation 16.	Not required.
Groundwater	No	No direct or indirect releases to groundwater	Not relevant.
Surface Water	No	Small quantity of condensate discharge is routed to the site	Not required.

Risk Type	Relevant	Justification	Type of Risk Assessment
		drainage and treated in the site effluent plant, but this does not contain any potentially polluting substances. No change from risk assessment carried out for Variation 16.	
Accidents	No	Potential for emissions from equipment failure etc. No change from risk assessment carried out for Variation 16.	Not required.
Odour	No	No odorous materials are used or produced by the facility	Not relevant.
Noise & Vibration	No	No new noise emitting equipment will be introduced.	Not relevant.
Fugitive emissions	No	No significant releases of fugitive emissions are anticipated	Not relevant.
Visible emissions	No	No visible plume	Not relevant.
Bioaerosols	No	None emitted	Not relevant.
4. Additional Waste Codes			
Air emissions	No	Air emissions are released from waste melting process but are not changed by additional waste codes.	Not required:
Global Warming Impact	No	Energy is used in melting process but is not changed by additional waste codes	Not required.
Groundwater	No	No direct or indirect releases to groundwater	Not relevant.
Surface Water	No	Aqueous emissions from air emissions scrubber but additional waste codes will not affect amount and composition of existing aqueous emissions	Not required
Accidents	No	Additional waste codes will not increase existing accident risks and scenarios.	Not required
Odour	No	Use of wastes will not affect odour risk	Not relevant
Noise & Vibration	No	Additional waste codes will not include any new noise emitting equipment	Not relevant
Fugitive emissions	No	Additional waste codes will not affect fugitive emissions	Not required:
Visible emissions	No	Additional waste codes will not affect visible emissions.	Not required.
Bioaerosols	No	None emitted	Not relevant

Risk Type	Relevant	Justification	Type of Risk Assessment
5. Homcat Scrubbed draught			
Air emissions	Yes	Potential emissions of HCl emissions via stack A97 No impact on POCP from substances emitted.	Quantitative assessment of site-wide combined impacts has already been carried out by existing Air Quality Detailed Dispersion Modelling and Impact Assessment undertaken for V16 as change was already in place at that point.
Global Warming Impact	No	No change in energy use as a result of this change as it uses an existing scrubbing system.	Not relevant.
Groundwater	No	No direct or indirect releases to groundwater	Not relevant.
Surface Water	No	Aqueous emissions from air emissions scrubber. No net effect on effluent quality released to sewer as any increase to PU12 releases are offset by the same decrease from the old scrubber.	Not required
Accidents	Yes	Potential loss of HomCat process control could affect gas composition to PU12	Qualitative.
Odour	No	Not relevant as odour is not affected by the change	Not relevant
Noise & Vibration	No	Not relevant as no new noise emitting equipment is proposed by the change.	Not relevant
Fugitive emissions	No	Moving the abatement to PU12 from HomCat has no net change in risks as both processes have similar mitigation measures in place	
Visible emissions	No	Visual impacts are not altered by this change.	Not required
Bioaerosols	No	None emitted	Not relevant

3.0 Site Setting and Receptors

This section identifies the potentially sensitive receptors in the vicinity of the Site that could be harmed (at potentially significant risk) by emissions from the activities within the proposed PFA processing facility.

The guidance requires all receptors that are near the Site and could reasonably be affected by the proposed activities to be identified and considered as part of the ERA. The following distances have been used to identify the relevant receptors:

- a 2km radius for SSSIs and other sites of cultural and ecological; and

- a radius of 500m from the proposed permit boundary has been adopted for all other potentially sensitive receptors (for example, residential, commercial, industrial, agricultural and surface water receptors).

3.1 Site Setting

The site is centred on National Grid Reference TL 34824 41498 and located in the north-western part of Royston, between the town centre and the A505 Royston bypass. The site lies within the Orchard Road Industrial Estate. A number of residential, commercial and agricultural receptors are located in close proximity to the site. In addition, two SSSIs and several other conservation sites lie within 2km of the site boundary.

A summary of the immediate surrounding land use is provided in Table 3-1.

Table 3-1 Surrounding Land Uses

Boundary	Description
North	Local transport network (including the A505), commercial premises beyond which lies a ditch, a solar farm and agricultural land.
East	Commercial premises, residential properties and recreational facilities.
South	Local transport network, industrial and commercial premises, a railway line, beyond which lies residential premises, an educational facility and a recreational area.
West	Industrial and commercial premises, local transport network (A505) and agricultural land.

The surrounding land uses and receptors within 500m are identified on Drawing 003 Environmental Site Setting Plan. Cultural and Natural Heritage receptors and European designated sites within 2km are identified on Drawing 004 Cultural and Natural Heritage Receptors.

The immediate surrounding land use is described in detail below.

3.1.1 Commercial and Industrial

Commercial and industrial premises lie in all directions of the site's permit boundary. The closest of which lie adjacent to the west and 10m north, east and south of the permit boundary.

3.1.2 Local Transport Network

York Way and Orchard Road lie adjacent to the north and south of the permit boundary respectively. Additionally, the A505 lies approximately 100m north and 245m west of the permit boundary.

A railway line lies approximately 230m south of the permit boundary.

3.1.3 Open ground / Agricultural

Agricultural land lies approximately 160m north and 390m west of the permit boundary.

3.1.4 Residential

Residential properties as part of the wider Royston area lie approximately 40m east and 240m south of the permit boundary.

3.1.5 Solar Farm

Bassingbourn Solar Farm lies approximately 290m north of the permit boundary.

3.1.6 Educational

The Tannery Drift First School lies approximately 445m south of the permit boundary.

3.1.7 Recreational

Royston Bowling Club lies approximately 260m south of the permit boundary. A playground lies approximately 85m east of the permit boundary.

3.1.8 Surface Water Features

A ditch lies approximately 130m north of the permit boundary.

3.1.9 Geology, Hydrogeology and Hydrology

3.1.9.1 Geology

A review of the British Geological Survey (BGS) map[1] reveals that the site is underlain by bedrock of Holywell Nodular Chalk Formation, comprising of chalk which formed between 100.5 and 89.8 million years ago during the Cretaceous period.

3.1.9.2 Hydrogeology

Multi Agency Geographical Information for the Countryside (MAGIC)[2] Map identifies the bedrock at the site as a Principal Aquifer, which is defined as:

> *"layers of rock or drift deposits that have high intergranular and/or fracture permeability, meaning they usually provide high level of water storage and transmission. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifers."*

The site is not underlain by superficial aquifer.

The site lies within Source Protection Zone (SPZ) III.

3.1.9.3 Hydrology

The site lies in an area of high soluble rock risk ground water vulnerability.

3.1.9.4 Flooding

The site lies in Flood Zone 1[3], defined as an area with low probability of flooding.

3.1.10 Ecology

3.1.10.1 European/Internationally Designated Sites

A search of MAGIC Map identified that there are two Sites of Special Scientific Interest (SSSI) within the 2km of the site boundary:

- Therfield Heath (SSSI) lies approximately 665m southwest; and
- Holland Hall (Melbourn) Railway Cutting lies approximately 1415m east of the permit boundary.

[1] British Geological Survey, Available at www.bgs.ac.uk, accessed in September 2022

[2] Multi Agency Geographical Information for the Countryside Map (MAGIC), available at https://magic.defra.gov.uk/MagicMap.aspx, accessed in September 2022

[3] Flood Map for Planning, available at https://flood-map-for-planning.service.gov.uk/, accessed in September 2022

3.1.10.2 Other Designated Sites

Searches on MAGIC confirmed there are none of the following within 2km of the permit boundary:

- Special Areas of Conservation;
- Special Protection Areas; or
- RAMSAR.

3.1.10.3 Nationally/Locally Designated Sites

A review of MAGIC Map identified Therfield Heath Local Nature Reserve lies approximately 665m southwest.

Searches on MAGIC confirmed there are none of the following within 2km of the permit boundary:

- Areas of Outstanding Natural Beauty (AONB);
- National Nature Reserves (NNR);
- National Parks;
- RSPB Reserves;
- Ancient Woodland; or
- Biosphere Reserves.

A review of the Nature and Heritage Conservation screening (Appendix A) report confirmed that seven Local Wildlife Sites (LWS) lie within 2km of the site boundary:

- Therfield, south of Tumulus;
- Royston Chalk Pit;
- Shaftesbury Green;
- Green Lane S. of Royston;
- Melbourn;
- Therfield Green Lane; and
- Icknield Way, A505 North of Gallows Hill.

3.1.10.4 Cultural Heritage

A review of MAGIC Map confirmed that all listed buildings lie to the east and southeast of the permit boundary. The closet of which is Number 2 and 4, including front railings a Grade II listed building, which lies approximately 390m east. The closest Grade I listed building 23, Kneesworth Street lies approximately 770m southeast and the closest Grade II* listed building, 17-21, Kneesworth Street lies approximately 790m southeast of the permit boundary.

A review of MAGIC Map confirmed that 16 Scheduled Monuments lie within 2km of the permit boundary, the closest of which, Sites revealed by air photography lies 875m northwest of the permit boundary.

Searches on MAGIC Map confirmed there are none of the following within 2km of the EP boundary:

- Registered Parks and Gardens; or

- Registered Battlefields;

3.2 Environmental Receptors

Local receptors within 500m of the Site are recorded in Table 3-2, along with natural and cultural receptors within 2km.

Table 3-2 Environmental Receptors

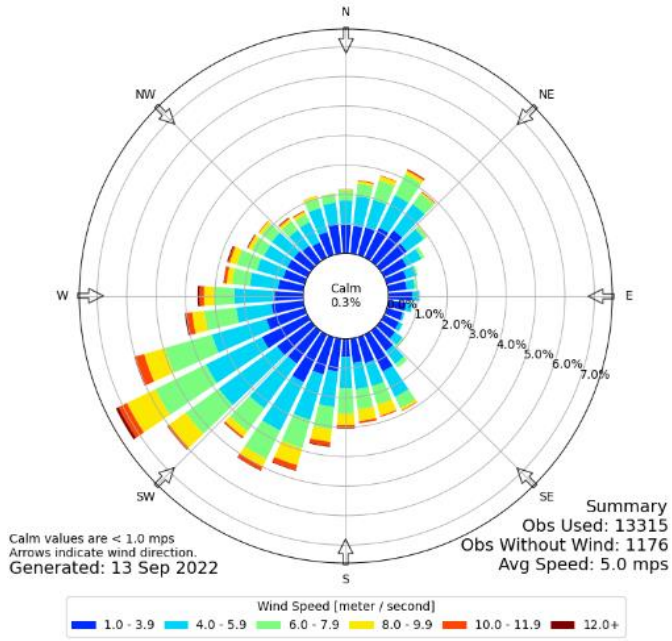
Receptor Name	Receptor Type	Direction from Site	Approximate Distance from Site Boundary (at nearest point) (m)
Local receptors within 500m of the Environmental Permit Boundary as shown on Drawing 003 Environmental Site Setting			
Orchard Road Industrial Estate	Commercial and industrial	West	Adjacent
York Way	Local Transport Network	North	Adjacent
Orchard Road	Local Transport Network	South	Adjacent
Orchard Road Industrial Estate	Commercial and industrial	North, east and south	10
Residential	Residential	East	40
Playground	Recreational	East	85
A505	Local Transport Network	North/West	100/245
Ditch	Surface Water Features	North	130
Agricultural Land	Agricultural Land	North	160
Railway Line	Local Transport Network	South	230
Residential	Residential	South	240
Royston Bowling Club	Recreational	South	260
Bassingbourn Solar Farm	Solar Farm	North	290
Agricultural Land	Agricultural Land	West	390
Tannery Drift First School	Educational	South	445
Cultural and ecological receptors within 2km of the EP boundary as shown in Drawing 004 Cultural and Natural Heritage.			
Number 2 and 4, including front railings	Listed Buildings (Grade II)	East	390
Therfield Heath	Sites of Special Scientific Interest	Southwest	665
Therfield Heath	Local Nature Reserve	Southwest	665
23, Kneesworth Street	Listed Building (Grade I)	Southeast	770
17-21, Kneesworth Street	Listed Building (Grade II*)	Southeast	790

Receptor Name	Receptor Type	Direction from Site	Approximate Distance from Site Boundary (at nearest point) (m)
Sites revealed by air photography	Scheduled Monument	Northwest	875
Holland Hall (Melbourn) Railway Cutting	Sites of Special Scientific Interest	East	1415

3.3 Windrose

A wind rose from Cambridge Meteorological Station, located approximately 21km northeast, providing the frequency of wind speed and direction from 2018 - 2022 is presented in Figure 3-1 below. The wind rose shows that winds from the southwest are most frequent. Winds from the north, east and south are less frequent.

Figure 3-1 Cambridge Meteorological Station



4.0 Environmental Risk Assessment

This section considers the potential pathways between source and receptor and where appropriate, the assessment demonstrates how the risk of pollution or harm can be mitigated by measures to manage these risks and/or block the pathways. An assessment in terms of hazards posed, receptors and pathways, along with management and residual risks for the following hazards is presented for each of the four proposed changes to the activities, in accordance with the risks identified in Table 2-1 of this report.

4.1 3CR

4.1.1 Relevant Impacts

The following impacts are identified as requiring assessment for the 3CR activity (see Table 2-1):

- Air emissions
- Global Warming Impact
- Accidents
- Odour
- Noise & Vibration
- Fugitive Emissions
- Visible Plume

4.1.2 Air Emissions

Emissions to air from the 3CR activity include NH_3, NH_4Cl, Cl_2, NOx, VOC and HCl. These all have potential impacts on air quality. NOx and VOC emission also have photochemical ozone creation potential.

4.1.2.1 Air Quality Impacts

The emissions from the proposed 3CR activity have been included in a detailed dispersion modelling and Air Emissions Risk Assessment (refer Appendix B), in combination with the existing releases from the installation and the other changes proposed in this variation. An assessment against air quality standards for the protection of human health was carried out for all offsite locations. For nearby designated conservation areas, assessment against critical levels for the protection of vegetation and ecosystems and critical loads for nitrogen and acid deposition was carried out. Two scenarios were modelled, representing:

1. The operation of all existing stacks, and the addition of two proposed 3CR stacks;

2. Proposed stacks with 3CR, omitting all five PGMR stacks.

The Report is included in Section 5 AERA of the application and concludes:

- The maximum offsite concentrations of carbon monoxide, particulates, acetic acid, ammonia, hydrogen chloride, ammonium chloride, nitrous oxide and ethanal are screened out as insignificant for all years, for both scenarios modelled.
- Maximum offsite process contributions (PC) to NO_2 concentrations are not screened out, but the predicted environmental concentrations (PEC) are below the air quality objectives.
- Maximum offsite chlorine concentrations are not screened out for Scenario 1, but they are below the short-term Environmental Assessment Level (EAL). There is no long-term EAL for chlorine. For Scenario 2, offsite chlorine concentrations are screened out as insignificant for all years.
- Predicted concentrations of non-methane volatile organic compounds (NMVOC) are compared against EALs for dimethylformamide (DMF), which has the most stringent standard. Maximum offsite annual average NMVOC concentrations are not screened out for either scenario, but they are well below the long-term EAL for DMF, and PCs to annual average NMVOC concentrations are screened out at all sensitive human health receptors. Hourly average offsite NMVOC concentrations are screened out as insignificant for all years, for both scenarios.
- The daily average NOx PCs are not screened out for any of the designated conservation areas; the annual average PCs are screened out for six of the local wildlife sites (LWS). The annual and daily average PECs are below the respective critical levels.

- At all designated conservation areas except Therfield Heath, the annual average NH_3 concentrations are screened out as insignificant. At Therfield Heath, the more stringent critical level was used and the PCs are not screened out for all five years of meteorological data considered. The background concentration, 1.9 µg/m^3, already exceeds the critical level of 1 µg/m^3.
- In both scenarios, the maximum PCs to nitrogen deposition are screened out for six of the LWSs compared against the most stringent value of the critical load range. Against the higher critical load value, PCs to nitrogen deposition at all sites except Therfield Heath are screened out. For all sites, the existing total nitrogen deposition rates exceed the most stringent critical load value.
- The maximum PCs to acid deposition are screened out at relevant habitats at all designated conservation areas, for both scenarios.

4.1.2.2 Photochemical Ozone Creation Potential

Emissions of nitrogen oxides and VOCs from the 3CR process have a photochemical ozone creation potential. This is summarised in Table 4-1:

Table 4-1-1 POCP for emissions from the 3CR Process

Substance	Annual mass (tonnes)	POCP per tonne[4]	POCP
VOC B – Methyl IsoButyl Ketone	2.08	49	102.09
NOx	0.55	2.8	1.53

The annual mass of emissions from the 3CR process that contribute to photochemical ozone creation potential are relatively small and are therefore not considered significant. Furthermore, the POCP value for each of the substances are all at the lower end of the POCP scale, which ranges up to 138). The overall POCP for the 3CR Process is 103.62 per year.

4.1.3 Global Warming Impact

The 3CR process results in direct releases of CO_2 from the burning of natural gas in the calcination stage and use of on-site steam and power generation, as well as indirect releases from the use of grid electricity. The Global Warming Potential is summarised in Table 4-2:

Table 4-2 Global Warming Potential of 3CR

Source	Estimated annual Energy Consumption	Conversion factor (t/MWh)	Tonnes CO2e
Steam (site CHP)	8,101 MWh	0.219[5]	1,773
Natural gas	1,582 MWh	2.02[6]	3,196
Electricity (site CHP)	2,011 MWh	0.588	1,183
Electricity (grid)	4,199 MWh	0.207[6]	869

[4] H1 Annex F – Air Emissions: Appendix A - Photochemical Ozone Creation Potential

[5] Site specific CHP factors provided by Johnson Matthey

[6] https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2023

The impacts arising from energy use will be minimised through process design incorporating computer control systems to minimise energy use and systems for heat recovery, and through plant maintenance and staff training. Overall, the efficiency of the new plant will be much better than the old plant it is replacing.

The 3CR process also includes multiple measures to manage energy efficiency and hence reduce the impact on global warming potential, a summary is set out below:

- The energy from the Local Exhaust Ventilation (LEV) air will be recovered via a heat exchanger to warm the incoming air.
- High efficiency motors.
- Using inverters where appropriate to reduce energy consumption.
- Steam condensate recovery from air handling units.
- Heat recovery from process streams has been considered during design and will be applied where viable, however it is not generally practicable in process applications. This is because most heating operations are small scale batch processes where steam is used to boil process liquors. As these unit operations take place at the same temperature and are batch in nature there is limited useful waste heat available for recovery from process.
- Steam condensate will be recovered in a hot well and be returned to the onsite boiler house or CHP for steam generation. The conductivity of the condensate will be monitored in local headers within 3CR, failures of conductivity will raise PLC alarms and highlight the potential for vessel damage.
- All steam, hot water and hot process pipework will be lagged.
- All hot vessels and process equipment will be lagged.
- The 3CR refinery layout has been designed to optimise material flow which will reduce energy consumption due to the unnecessary movement of materials in process. This will also minimise wasted heat due to inefficiencies in design, for example hot process streams will lose minimal heat due to process delays and hence require minimal reheating.
- All processes with heating (electrical, steam or natural gas) will have temperature monitoring and be PLC controlled to ensure optimised operations with respect to the use of energy and raw materials.
- Low energy lighting and use of natural light wherever possible.
- Automated processes.
- The building has been designed with energy efficiency in mind and meets all building regulations.
- The building HVAC system will have a heat recovery unit for incoming and outgoing air to minimise energy consumption.

4.1.4 Surface Water

Aqueous effluent from the 3CR process will be treated in the existing values recovery process (VRP) in the same way as the existing PGMR. The VRP treats effluent from a number of processes at the site and separates precious metals and other pollutants into a concentrated waste stream which is tankered off-site for further treatment elsewhere. The remaining cleaned effluent is sent to the site effluent treatment plant (SETP) for further treatment before discharge to sewer under a Trade Effluent Discharge Consent with Anglian Water Services.

The 3CR process will not add any new or different chemicals to the effluent stream and will not increase the volume of the effluent stream from that generated by the existing PGMR process. It is therefore considered that there is no additional risk to the eventual receiving water as a result of the proposed changes and that the existing treatment and controls are satisfactory.

4.1.5 Accident Risk Assessment

The potential consequences from accidents and mitigation of risks are summarised in Table 4-2. It is considered that the mitigation measures proposed for the new activity will mean that the risk of impacts from accidents on receptors will be low.

Table 4-2 3CR Accident Risk Assessment

What do you do that can harm and what could be harmed			Managing the Risk	Assessing the Risk		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Probability of exposure**	**Consequence**	**What is the overall risk**
What has the potential to cause harm?	What is at risk what do I wish to protect?	How can the hazard get to the receptor?	What measures will you take to reduce the risk? – Who is responsible for what?	How likely is this contact?	What is the harm that can be caused?	What is the risk that still remains? The balance of probability and consequence
Spillage of materials or loss of containment (liquids)	Surface Water; Commercial, residential and ecological receptors.	Release to sewer; Air.	UN approved containers used for liquids. Site Traffic management plan including trained FLT operatives. Surface drains discharge to site effluent treatment plant for treatment Spill kits deployed around site Position of ammonia storage within the centre of the site and away from the site boundary reduces risk of off-site odour. No other odours are likely due to the draughting abatement plant. Local procedures are in place which ensures any on-site odours are investigated promptly. All vessels have continuous level and high level detectors which will alarm, if out of safe working parameters. The whole building is also bunded in line with R&CE bund specification, with segregation of incompatible materials, and will hold all vessel spills. Pressure is measured at process and across the abatement plant. It will alarm if it goes out of parameters. Operators are trained to investigate and deal with pressure changes.	low	Odour nuisance/ contamination;	Low

What do you do that can harm and what could be harmed			Managing the Risk	Assessing the Risk		
Dust from spillage of solid raw materials	nearby commercial /industrial and residential properties and open land;	Air	Reagents used in liquid solutions where possible and are pumped into vessels from UN approved containers. LEV containment used for materials handling. Use of plastic liners for bagging in and out material. Building HVAC system designed to minimise exposure in event of spill.	low	Nuisance/ contamination	low
Mixing of incompatible material in secondary containment	nearby commercial /industrial and residential properties and open land;	Air	Separate draughts systems are in place acid and ammonia draughts. Secondary containment will be cleaned out immediately by operators if a spill occurs or after hygiene washing. All scrubbers will be bunded.	low	Odour	negligible
Fire	nearby commercial /industrial and residential properties and open land;	Air (smoke) Land (fire-water run-off) Water (fire-water run-off)	Fire detection in place, building constantly occupied, built to building regulations, fire hydrant next to building and on-site fire team. Automatic sprinklers drain to sump which would then be pumped to bulk fire water holding tanks. Once sampled it will be treated appropriately before discharge to sewer. Three sides of the building are surrounded by road and the building is compartmentalised to reduce risk of fire spreading within. On site fire team.	medium	Smoke nuisance; firewater run-off to sewer, road network ad open land	low
Failure of containment infrastructure	Land, groundwater, surface water (sewer);	Land	Level control on vessels and automatic control of feed. All scrub tanks segregated by duty and chemical compatibility. Internal bunds will capture any spills which will be collected in the sump and sump contents will be tested before disposal.	low	Percolation to land and groundwater	low

What do you do that can harm and what could be harmed			Managing the Risk	Assessing the Risk		
			Internal and external bunds are routinely maintained, all bunds are under a condition monitoring schedule.			
Failure of plant and/or abatement system (eg power outage)	nearby commercial /industrial and residential properties and open land;	Air	If extraction system fails the process will be automatically shut down to safety where heating of the processes will stop and limit the reactions. Pressure dissolvers will shut down and contain their processes within the reactor, thus mitigating any fugitive emissions from these potentially high emission sources. Back-up power for critical abatement plant and UPS for control systems will be implemented. Safe re-start of the plant will be carried out as according to emergency procedures and plan. The steam is automatically shut off in the event of scrubber failure. Key abatement parameters will be continuously monitored and if any measurements are out of range this will cause a process alarm within the Programmable Logic Controller (PLC). Operators will be trained to deal with these. A Planned Preventative Maintenance (PPM) system will be in place to reduce the likelihood of a mechanical failure, the abatement plant will be part of this PPM schedule.			
Security and vandalism – unplanned release	Surface water (via sewer), commercial, residential and ecological receptors	Surface and groundwater, air and land.	JM Royston is a highly secure site where staff are required to go through security clearance before being allowed to work. The site is covered by an external security fence and there is no access available from the public. The site is supervised at night in addition to the security cameras present throughout.	Low	Nuisance / contamination	**Low**

4.1.6 Odour

Odour may arise from the use of raw materials, intermediates and emissions from the process, which include ammonia. A qualitative assessment of accident risk is provided in Table 4-4 which assesses the probability of exposure in terms of the likelihood of the receptors being exposed to the hazard.

The assessment concludes that it is not anticipated that the new 3CR plant will emit any odours at concentrations likely to cause concern to members of the public, due to the location of the plant in the centre of site and the mitigation measures in place.

Table 4-4 3CR Odour Risk Assessment

What do you do that can harm and what could be harmed			Managing the Risk	Assessing the Risk		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Probability of exposure**	**Consequence**	**What is the overall risk**
What has the potential to cause harm?	What is at risk what do I wish to protect?	How can the hazard get to the receptor?	What measures will you take to reduce the risk? – Who is responsible for what?	How likely is this contact?	What is the harm that can be caused?	What is the risk that still remains? The balance of probability and consequence
Odorous raw materials and emissions	Potentially sensitive receptors as listed in Table 2-2 and detailed on Drawing 003, including commercial/industrial properties and residential properties.	Fugitive and point source releases to air	It is not expected that the activities on site will give rise to significant levels of odour, due to the types of raw materials and processes used to abate emissions. Solvents used in the process, ethanol and propanol are only slightly odorous. Emissions of gaseous pollutants are not strongly odorous. The following odour mitigation measures will be in place: • The 3CR plant is located in a building within the centre of the installation which reduces the risk of odour detection by receptors. • The plant is designed to ensure that no odours are detectable outside of the building. • All process vessels will be suitably draughted and ducted to the scrubbed draught systems. • Odour releasing raw materials will not be stored within the building unless appropriate extraction to the scrubber system and bunding facilities are in place. • In the event of suspected odour issues from 3CR these will be investigated and reported in accordance with R&CE accident and indecent investigation and reporting procedures.	Low	Nuisance	**Low**

4.1.7 Noise and Vibration

A noise assessment has been carried out in accordance with BS4142 for the changes associated with the 3CR proposals. These are the only changes in the variation application which will affect noise emissions.

The assessment, which is provided in Section 7 of this application, concludes that while the additional plant is predicted to result in a minor increase of 1 to 2 dB at the nearest sensitive receptors, this increase is not expected to significantly alter the existing noise impact. Whilst the identified difference between the rating level and the baseline background sound level may appear high, the absence of noise complaints associated with the Site, and the robust assessment presented, indicates that the Site is operating with a low noise impact.

4.1.8 Fugitive Emissions

Uncontrolled or unintended emissions may arise from the processing, storage and handling of materials at the site. The EA's guidance states that these may include dust, litter, pests and pollutants that should not be in the discharge.

A qualitative assessment of accident risk is provided in Table 4-5 which assesses the probability of exposure in terms of the likelihood of the receptors being exposed to the hazard.

4.1.9 Visible Emissions

The wet scrubbing used as abatement for emissions to air will occasionally produce a visible water vapour during cool conditions with high humidity.

The new abatement system includes caustic and acid gas scrubbing which are emitted through separate stacks to optimise scrubbing efficiency and reduce the likelihood of visible plumes being created.

This new system is an improvement on the current PGMR abatement plant where there are occasional releases of HCl and Ammonia in parallel which created an ammonium chloride visible plume. The use of dedicated stacks and improved process control and abatement efficiency for the 3CR plant is designed to separate these emissions and reduce the likelihood of the visible plume occurring. The concentrations of HCl and Ammonia will be so low that in the event of the stack emissions mixing, they are unlikely to produce a visible plume.

Table 4-5 3CR Fugitive Emissions

What do you do that can harm and what could be harmed			Managing the Risk	Assessing the Risk		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Probability of exposure**	**Consequence**	**What is the overall risk**
What has the potential to cause harm?	What is at risk what do I wish to protect?	How can the hazard get to the receptor?	What measures will you take to reduce the risk? – Who is responsible for what?	How likely is this contact?	What is the harm that can be caused?	What is the risk that still remains? The balance of probability and consequence
Pests	Adjacent commercial/industrial properties, residential properties and open ground.	Land, Water, Air	No materials are used in, or produced by, the proposed activity which would be expected to attract pests. In the unlikely event that birds, vermin or pests are identified on site, a specialist pest control contractor will be employed to undertake measures to remove the animals from the Site.	Negligible	Nuisance	Negligible
Litter from packaging	Adjacent commercial/industrial properties, residential properties and open ground.	Land, Air	No materials are used in, or produced by, the proposed activity which would be expected to generate litter. The proposed activities take place within enclosed building.	Negligible	Nuisance	Negligible
Dust from raw materials, processing and products	Adjacent commercial/industrial properties, residential properties and open ground.	Air	Reagents are used in liquid solutions where possible and pumped directly to reactor vessels. Local extraction and ventilation (LEV) containment is used for materials handling. Use of plastic liners for bagging in and out material. Building Heating, ventilation, and air conditioning (HVAC) system is designed to minimise exposure in event of spill of dusty material. The activities take place in an enclosed building.	Low	Nuisance	Low
Fugitive emissions from the process	Adjacent commercial/industrial properties, residential properties and open ground.	Air	Foreseeable sources of fugitive emissions have been identified and will be suitably draughted and ducted to the scrubbing system. JM have designed the plant and storage vessels to minimise fugitive emissions from the plant. All vessels which may give rise to fugitive emissions are attached to a suitable draught system including their own vent systems.	Low	Nuisance	Low
Runoff from process buildings and site surfaces	Adjacent commercial/industrial properties, residential properties and open ground.	Land, Surface Water	The site benefits from an impermeable surface and sealed drainage such that run-off will be capture in the site drainage system. The activities take place within a central location of the site such that run-off is unlikely to leave the site boundary.	Low	Nuisance	Low

What do you do that can harm and what could be harmed			Managing the Risk	Assessing the Risk		
			The site surface and drainage system will be regularly inspected to ensure it is in good condition. Any weaknesses will be repaired immediately using temporary solutions and with permanent measures implemented as soon as practicable. All liquids and hazardous materials will be stored in secure, fit for purpose, containment located on impermeable surfacing within bunded areas. The bunds will be capable of containing at least 110% of the volume of the largest container within the bund or 25% of the total tank volume within the bund, whichever is the greater. Any rainwater within the bunds will be pumped through an oil interceptor to drain.			

4.2 HomCat Expansion

The following impacts are identified as requiring assessment for the HomCat expansion activity (see Table 2-1):

- Air emissions

In all other respects, the decommissioning of the Zeocat line and expansion of the HomCat process will not result in any increase in emissions or impacts for any of the risk types assessed, as summarised in Table 2-1, compared with the existing authorised activities.

4.2.1 Air Emissions

4.2.1.1 Air Quality Impacts

The emissions from the proposed 3CR activity have been included in a detailed dispersion modelling and Air Emissions Risk Assessment, in combination with the existing releases from the installation and the other changes proposed in this variation. An assessment against air quality standards for the protection of human health was carried out for all offsite locations. For nearby designated conservation areas, assessment against critical levels for the protection of vegetation and ecosystems and critical loads for nitrogen and acid deposition was carried out.

The report is included in Section 5 AERA of the application.

4.2.1.2 Photochemical Ozone Creation Potential

Emissions of VOCs from the HomCat process have a photochemical ozone creation potential. The VOC include a range of substances as set out in Table 5.4 of the AERA provided in Section 5 of this application but have not been speciated by mass. Therefore, the POCP has been calculated based on the range of the component with the lowest impact (acetone) and the highest impact (xylene. This is presented in Table 4-2:

Table 4-2 POCP for emissions from the HomCat Process

Substance	Annual mass (tonnes)	POCP per tonne[7]	POCP
Best case 100% acetone	2.163	9.4	20.3
Worst case 100% xylene	2.163	101	218.5

The annual mass of emissions from the 3CR process that contribute to photochemical ozone creation potential will lie somewhere between the range shown above. The values are relatively small and are therefore not considered significant.

4.3 Apollo Iridium Product

The manufacture of an iridium based product using the existing Apollo process will not result in any increase in emissions or impacts for any of the risk types assessed, as summarised in Table 2-1, compared with the existing authorised activities. Therefore it is considered that no risk assessment is required for this change.

[7] H1 Annex F – Air Emissions: Appendix A - Photochemical Ozone Creation Potential

4.4 Additional Waste Codes

The variation to include additional waste codes for use in the novel metals process is not considered to present any additional changes in emissions and impacts compared with the existing wastes. Therefore, it is considered that no risk assessment is required for this change.

4.5 HomCat Scrubbed Draught

The following impacts are identified as requiring assessment for the HomCat Scrubbed Draught (see Table 2-1):

- Air emissions;
- Accidents;

4.5.1 Air emissions

The HomCat scrubbed draught treated in the PU12 scrubber has the potential to release emissions of HCl. However, the combined PU12 scrubber exhaust is operated to meet an emission limit value of 3mg/m^3.

Quantitative assessment of these releases as part of site-wide combined impacts has already been carried out by the Air Quality Detailed Dispersion Modelling and Impact Assessment undertaken for V16, as the diversion of the HomCat scrubbed draught to PU12 change was already in place at that time (and authorised by written agreement). The air emissions risk assessment did not identify any adverse effects of significance.

The releases of HCl do not have any photochemical ozone creation potential.

4.5.2 Accidents

An assessment of accident risk associated with the change has been made using hazard study (HAZOP) methodology in line with BAT and the Johnson Matthey Group EHS Risk Matrix. Table 4-6 summarises the impacts associated with accidents, mitigation measures and resulting risk.

Table 4-6 HomCat Scrubbed Draught Accident Risk Assessment

What do you do that can harm and what could be harmed			Managing the Risk	Assessing the Risk		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Probability of exposure**	**Consequence**	**What is the overall risk**
What has the potential to cause harm?	What is at risk what do I wish to protect?	How can the hazard get to the receptor?	What measures will you take to reduce the risk? – Who is responsible for what?	How likely is this contact?	What is the harm that can be caused?	What is the risk that still remains? The balance of probability and consequence
Fire – adverse reaction of VOCs with acidic species in PU12 scrubbed draught	nearby commercial /industrial and residential properties and open land;	Air (smoke) Land (fire-water run-off) Water (fire-water run-off)	Operational and procedural controls (the use physical isolation and lock-offs) along with control system improvements (password protection on key process stages) have been applied to prevent the process emitting VOCs at the wrong process stage to the Scrubbed draft.	medium	Smoke nuisance; firewater run-off to sewer	low
Unabated release caused by abatement plant failure or system (eg power outage)	nearby commercial /industrial and residential properties and open land;	Air	If extraction system fails the process will be automatically shut down to safety where heating of the process will stop and limit emissions. The Scrubber control system has a UPS. Safe re-start of the plant will be carried out as according to emergency procedures and plan. In the event of a power failure the activity will be automatically shut down immediately. A Planned Preventative Maintenance (PPM) system will be in place to reduce the likelihood of a mechanical failure, the abatement plant will be part of this PPM schedule.	low	Short term impact on Air Quality	low

What do you do that can harm and what could be harmed			Managing the Risk	Assessing the Risk		
Security and vandalism – unplanned release	Surface water (via sewer), commercial, residential and ecological receptors	Surface and groundwater, air and land.	JM Royston is a highly secure site where staff are required to go through security clearance before being allowed to work. The site is covered by an external security fence and there is no access available from the public. The site is supervised at night in addition to the security cameras present throughout.	Low	Nuisance / contamination	low

5.0 Conclusion

This ERA has been undertaken in accordance with EA guidance in support of the environmental permit variation application for the proposed changes to the activities carried out at the Royston Site.

The assessment has screened the risks that are relevant to the proposed changes to the facility, identified the potential receptors and provided an assessment of the risk taking into account he proposed mitigation measures.

The assessments conclude that with the implementation of the proposed risk management measures described, potential hazards from the proposed changes to the activities at the Royston Site are not likely to be significant and no further assessment is required.

Appendix A Nature and Heritage Screening Report

Royston Environmental Permit Variation Application

Environmental Risk Assessment

Johnson Matthey PLC

SLR Project No.: 416.065394.00001

29 October 2024

Appendix B Cambridge Consultants Dispersion Modelling Report

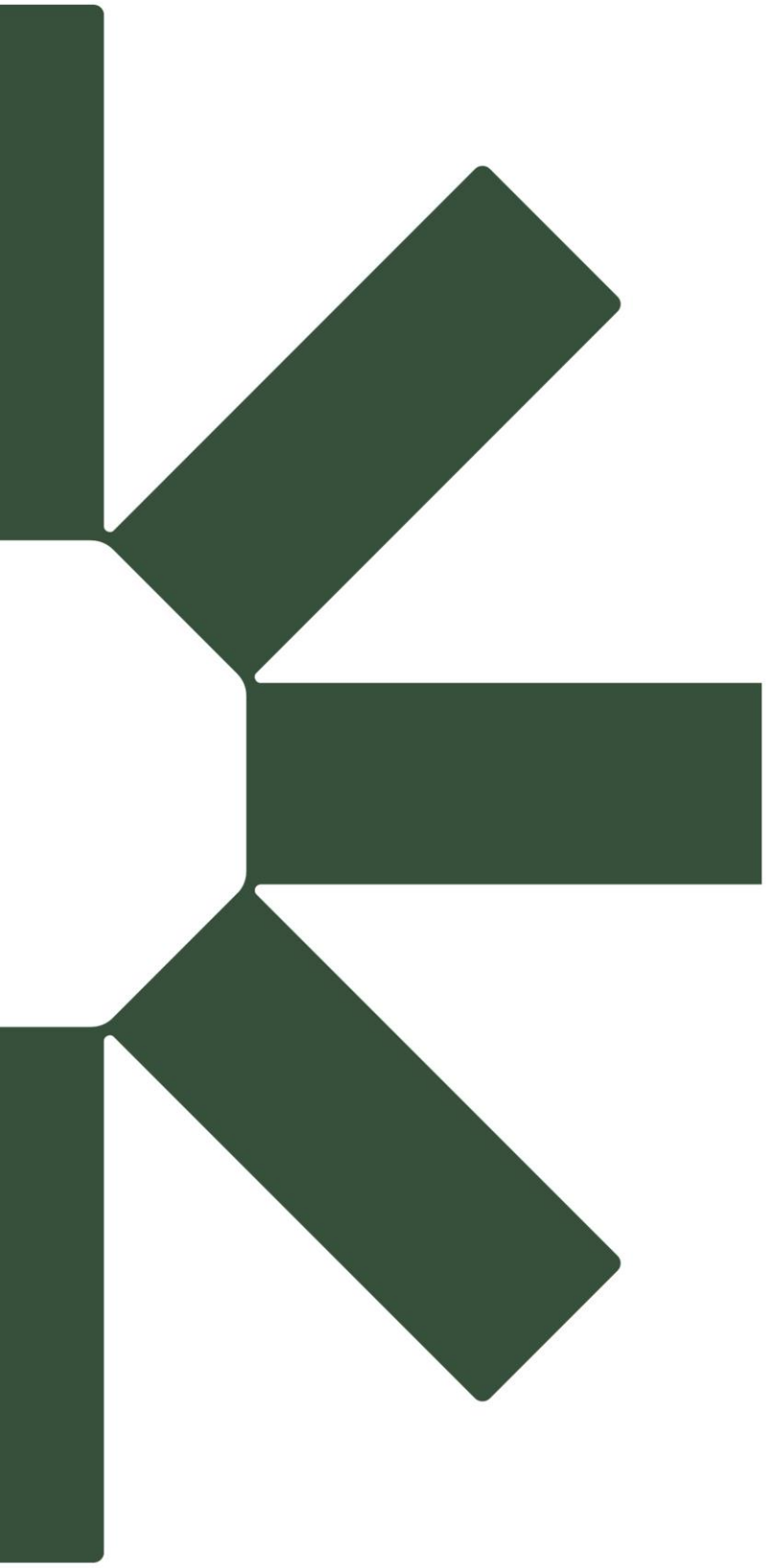
Royston Environmental Permit Variation Application

Environmental Risk Assessment

Johnson Matthey PLC

SLR Project No.: 416.065394.00001

29 October 2024



Making Sustainability Happen