



TRADEBE



Tradebe Solvent Recycling Limited

Hendon Dock Process Plant

Reference: **Technical Document BV4673IM**

Environmental Permit Variation: **S4 Distillation Column**

July 2022

CONTENTS

- 1 NON-TECHNICAL SUMMARY 3**
- 2 INTRODUCTION 6**
 - 2.1 Background 6
 - 2.2 Permitting History 6
 - 2.3 Need for a Variation..... 6
 - 2.4 Pre-Application Discussions 7
- 3 SITE DETAILS 8**
 - 3.1 Site Setting 8
 - 3.2 Geology, Hydrogeology and Hydrology 8
 - 3.3 Site Description 8
- 4 TECHNICAL DESCRIPTION OF CHANGES..... 10**
 - 4.1 Proposed Changes 10
 - 4.2 S4 Distillation Plant..... 10
 - 4.3 Raw Materials 18
 - 4.4 Emissions Monitoring 18
- 5 REVIEW OF IMPACT 19**
 - 5.1 Impacts 19
 - 5.1.1 Emissions to Controlled Water 19
 - 5.1.2 Emission to Sewer 19
 - 5.1.3 Emissions to Groundwater 19
 - 5.1.4 Emissions to Ground 19
 - 5.1.5 Emissions to Air 19
 - 5.1.6 Accidents 20
 - 5.1.7 Odour/Dust/Litter/Mud/Pests 20
 - 5.1.8 Noise and Vibration 20
 - 5.1.9 Vandalism..... 20
 - 5.1.10 Resource Efficiency and Climate Change 20
 - 5.1.11 Waste 20
 - 5.1.12 Risk 21
 - 5.2 Receptors 21
- 6 BAT ASSESSMENT 22**
- 7 MANAGEMENT SYSTEM..... 23**
 - 7.1 Accreditation..... 23
 - 7.2 Summary 23
 - 7.3 Planned Maintenance Programmes 23
- APPENDICES**
 - Appendix 1 – S4 Site Layout 24
 - Appendix 2 – Flowsheet 25
 - Appendix 3 – EWC CODES..... 26
 - Appendix 4 – Risk assessment summary table 28
 - Appendix 5 – BAT assessment..... 31

1 NON-TECHNICAL SUMMARY

The Hendon Dock Process Plant is located at Hendon Dock in the Port of Sunderland, in the north east of England. The site address is Hendon Dock, Sunderland, Tyne & Wear SR1 2ES and the site carries out waste solvent recovery using distillation and separation techniques.

Tradebe Solvent Recycling Limited is the operator of the Hendon Dock Process Plant and a subsidiary of Tradebe, an international company that specialises in waste reclamation and recycling solutions. Tradebe manages 85 fixed plants in Europe (Spain, UK, Italy, Germany and France), and in the United States. The company has around ,100 employees worldwide.

The undertaking at Hendon Dock is the recovery of waste solvent by distillation. Due to further opportunities in the solvent recovery sector we wish to expand our distillation capacity with the addition of 1 new distillation plant. The process design of the proposed new plant is equivalent to the existing 3 on site which are built and operated to industry good practice in accordance with the sites status of upper tier COMAH. All potential environmental impact with be controlled in line with BAT.

Expansion of the business will therefore have no significant additional impact to the environment and uplifts (in the context of waste hierarchy) some waste materials that may have previously been disposed of by incineration.

Design has been validated by robust process hazard analysis which includes all safety and environmental aspects. Design is aligned with industry standards and relevant legislation.

Expansion will help secure the future of the Hendon Dock site and its employees.

Current Situation

The Hendon Dock Site has held an Environmental Permit for over 30 years.

The facility is permitted as a Section 5.3A(1)(a)(ii) activity - disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving physico -chemical treatment - under permit EPR/BV4673IM.

Directly associated activities on the Permit include:

- Steam supply using boilers fuelled by recovered product distillate.
- Handling & storage of raw materials; recovered (product) solvents and process waste;
- Air emissions abatement using water-cooled condensing, water scrubber and recycling of vent gases to boiler 1, 2 or 3.
- Operation of utility systems including cooling water, compressed air and nitrogen;
- Treatment of process effluent.

Proposed Change

The proposal is to install and operate an additional distillation plant with an equivalent design to the existing 3 distillation plants, aligned with relevant design standards and applicable legislation.

Scope includes installation of additional bulk storage tanks within existing secondary containment areas (suitable to hold 110% of largest tank or 25% of total tank volume in bund) and additional ancillary services for the waste recovery undertaking.

The distillation plant will increase site throughput from a production of 40,000 tonnes per year to ~53,300 tonnes per year of distilled solvent product.

Thus S4 has a maximum capacity of ~13,300 tonnes per year of distilled product.

The kettle, column and a condenser, which were previously in use at the now non-operational Tradebe North Tyne site, will be used for this installation. This equipment was previously used to carry out equivalent waste recovery distillation work.

Where we intend to reuse equipment, it will be subject to robust reinspection in accordance with the required design specification to ensure it is fit for continued use. Prior to operation a formal commissioning process will be undertaken.

There are no changes to the site waste water handling or to the raw materials (waste solvent) handled on site.

The air emissions will be abated by a main condenser, a new chilled-water condenser a water-fed scrubbing column and the resulting vapours will be directed to the combustion chamber of one of the existing site boilers.

The site boilers are already permitted to burn off-gases from the distillation columns.

Conclusions of the Risk Assessment

The risks to the environment associated with this installation are considered to be very low, for the following reasons:

- The site is an existing facility which already operates 3 distillation columns and associated activities. Changes to noise and odour impact will therefore minimal.
- No new waste materials will be handled on site.
- The site energy use and waste production will increase accordingly, however this is off-set by the increase in solvent that is recovered rather than being incinerated. Boilers are currently fuelled with Product Grade Distillate.
- Changes to water emissions from site will be insignificant. The air emissions from the distillation column will be routed via the existing boiler, hence there will effectively be no significant change to the existing site permitted emissions.
- Although additional bulk storage tanks are being installed, they will be sited in existing bunds on existing plinths, to replace old or redundant plant.
- A new cooling system will provide cooling capacity (more effective waste recovery) – better separate main condensers from guard condensers. No significant increase in consumption of chemicals (biocides, descaling chemicals) and no change to discharge pollutant load off site and no expected change in any discharge limits.
- Expansion is recovery of more waste that may previously have been diverted to incineration. So all other cuts from process are either used as fuel or energy from waste. Any waste process is incidental to the overall increase in recovery.
- No increase in packaged waste – inputs in bulk.

2 INTRODUCTION

2.1 Background

This Technical Document has been produced to support the application for a Variation to operate an additional waste solvent recovery distillation plant on the existing site.

The site

Tradebe Solvent Recycling Limited is the operator of the Hendon Dock Process Plant and a subsidiary of Tradebe, an international company that specialises in waste reclamation and recycling solutions. Tradebe manages 85 fixed plants in Europe (Spain, UK, Italy, Germany and France), and the United States. The company has around 3,100 employees worldwide.

2.2 Permitting History

An environmental permit was issued to the site in December 2005 for a solvent recycling centre. Several subsequent variations have been made.

The site was previously permitted as a Section 5.4A(1)(a) Recovery by distillation of oils or solvents activity.

In 2013 the permitted activity was redefined in accordance with the Industrial Emissions Directive as a Section 5.3A(1)(a)(ii) activity: *Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving physico-chemical treatment.*

The existing permit allows up to 21,000tonnes/year of Product Grade Distillate to be used as boiler fuel. Furthermore, it also allows for burning of Off-Gas in Boilers 1, 2 or 3 from process and tank vents.

The process and vent gases from S4 and the new bulk storage tanks shall be incinerated by this existing abatement facility. Hence there are no changes to the permit with regards to air emissions.

2.3 Need for a Variation

The undertaking at Hendon Dock is the recovery of waste solvent by distillation.

Due to further opportunities in the solvent recovery sector we wish to expand our distillation capacity with the addition of 1 new distillation plant and 5 new bulk storage tanks.

2.4 Pre-Application Discussions

Tradebe Solvent Recycling liaises closely with the local EA officer and during regular compliance inspections they discuss ongoing environmental and permitting issues. The EA officer has been made aware of the proposed changes on site and the situation regarding the site expansion.

Basic pre-application feedback has been requested from the Environment Agency National Permitting Team and a pre-application advice – basic service request response was received on 2nd August.

The pre-application reference is EA/EPR/BV4673IM/V007.

3 SITE DETAILS

3.1 Site Setting

Tradebe's Hendon Dock Process Plant is located within the Hendon Dock area 2 km east of Sunderland city centre, on the North Sea coast. Hendon Dock is operated by the Port of Sunderland and is an operational cargo handling port covering approximately 100 hectares.

Access to the site is via the Port of Sunderland manned entrance gate with security lodge on Barrack Street. From there, approximately 1.6 km of private port authority roads lead to the site. The site is surrounded by a security fence with parking for staff and visitors. It is located adjacent to the Hendon Dock and behind the South West Breakwater of the port.

- To the west of the site there are port warehouses and the Hendon dock (linked to the River Wear to the north via the Hudson Dock);
- To the north is an area of former industrial waste land which is undergoing remediation, a recycling centre and the Northumbrian Roads Ltd highways depot;
- the North Sea lies immediately to the east. The site is protected from the North Sea by a stepped breakwater; and
- the Northumbrian Water Hendon Sewage Treatment Works is approximately 400 m to the south.

Designated sites in the vicinity are identified in Section 4.6.

3.2 Geology, Hydrogeology and Hydrology

The geology in the vicinity of the site comprises dolostone bedrock with superficial Devensian clay and silt. The site is understood to have been built on granular made ground believed to comprise largely of ash from the Consett blast furnaces and reclaimed from the sea in the late 19th / early 20th century.

There are no source protection zones within 3 km of the site. The nearest surface water features are the North Sea immediately to the east and the Hendon Dock immediately to the west which is hydraulically linked to the River Wear via the Hudson Dock.

3.3 Site Description

The proposed site layout is shown in **Error! Reference source not found.** The Tradebe site covers an area of approximately 15,000 m², approximately rectangular in shape, and is fully paved with concrete hard standing. The site contains a small number of buildings housing transport offices, workshops and welfare facilities and incorporates HGV parking / loading areas, numerous raw material storage tanks, process plant and finished product storage areas.

No changes to the site boundary are proposed as part of this variation.

The site operates as a hazardous waste reprocessing facility under Section 5.3A(1)(a)(ii) of the Environmental Permitting Regulations and is permitted under permit EPR/BV46731M.

The main activities are the distillation and separation of solvents by controlled application of heat and controlled condensation of the vapour. The main equipment constitutes using a kettle, reboiler heat exchanger, distillation column and vent condensers with feed and product tanks.

Inputs for recovery are typically contaminated mixtures of solvents and or water. Separation of the constituent components is by virtue of their differing boiling points. Distillation can be batch, continuous or semi-continuous.

Pre-acceptance and acceptance of materials to site align with industry good practice and BAT with reference to EA Guidance.

The site operates 3 distillation plants of similar design and this Variation is the expand by adding a 4th plant. All plants and systems have been subject to robust hazard analysis (e.g. HAZID, HAZOP, LOPA, FMEA.). Any significant modifications are subject to formal Management of Change procedure.

All distillation plants are operated and maintained under PSSR (Pressure Systems Safety Regulations 2000) and all tanks for storage of material for recovery and recovered product is at atmospheric pressure. All plants have Basic Plant Control Systems (BPCS) and Safety Instrumented Systems (SIS) layers of protection in accordance with BS61511 to maintain safe operating envelope. Trips to automatically shut down the plant are configured on temperature, level and pressure.

All plants have emergency relief.

All plants and storage tanks are within secondary containment and site has additional tertiary containment areas. All storage tanks are designed and maintained in accordance with HSG176 including automated overfill protection. All vessels are covered by site fire protection system and there is a network of gas detection monitors across site.

The entire process including all storage is fully contained and connected to site VOC abatement system.. Emissions controls are in line with Permit conditions and reported 6 monthly to the Environment Agency.

Discharge of non-process aqueous arisings is in accordance with Permit Conditions via an on-line TOC analyser segregated and analysed before discharge to sea.

Contaminated and process aqueous arisings are shipped off site via registered carrier to permitted treatment facility.

Boiler and cooling blowdowns are routed via private sewer to Treatment works at Hendon in accordance with an Agreed Specification

Any residues from the distillation processes are shipped to a waste treatment facility for blending into Secondary Liquid Fuel.

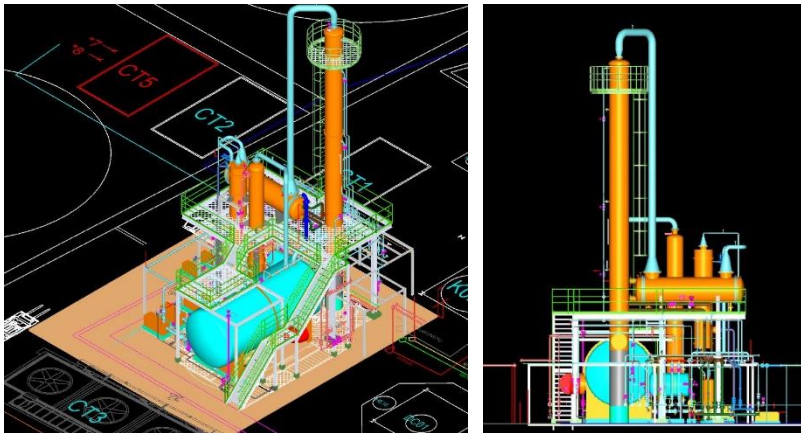
There are currently no outstanding improvement conditions or actions from EA CAR visit reports.

4 TECHNICAL DESCRIPTION OF CHANGES

4.1 Proposed Changes

The project will be to prepare and install a distillation plant along with additional storage tanks and ancillary equipment onto the Hendon dock site. The main column is shown in Figure 4.1a – screenshots from planned design.

Figure 4.1a: Screenshots of Planned Design



The new distillation plant will be designated 'S4'.

The plant will be sited within the existing installation boundary – as shown on the Site Layout plan at **Appendix 1**.

In addition, a flowsheet has been included at **Appendix 2** to this document which defines how key vessels and equipment will be linked and includes all instrumented systems and detail on the design criteria.

4.2 S4 Distillation Plant

S4 distillation plant will be used to recover waste solvents through the process of liquid/gas separation utilising differences in material physical properties to achieve sufficient product purity. Distillation is the process of evaporating a liquid and condensing the vapour to form a distillate. Depending upon the solvent mixture, economics and customer requirements materials are recovered on behalf of customers or for own open market sales or internal use for thinners or PGD.

S4 distillation plant will consist of a packed column with horizontal kettle, external reboiler and condenser. Steam is used to heat the material via the external reboiler and cooling water is used to condense the vapours back into a liquid. Materials will be processed as a batch or semi continuous process depending upon the components being separated. S4 distillation plant is an equivalent design to existing 3 plants in operation. The equipment configuration enables the processing of a variety of streams, ranging from flash recovery to azeotropic separation.

Throughput of S4 is ~13,000 tonnes/year finished product.

A computer-based software system will be used to monitor pressure, level, temperature and flows and also provides automation of control loops and alarm/trip systems.

The new S4 Plant will consist of:

- Kettle (sourced from North Tyne)
- Column (sourced from North Tyne)
- Reboiler
- Main condenser
- Vent Condenser (sourced from North Tyne, there was the main condenser, while here we are increasing the condensation capacity)
- Separation vessels.
- Cooling Tower (sourced from North Tyne)
- Chiller

The distillation column has 28 bubble cap trays, the column is 12 m tall (without structure/supports) and 0.84 m in diameter.

The feed flowrate is regulated by the control system to an operator specified rate.

The Reboiler steam supply will be controlled by the PLC system using 15 barg steam. Bottoms material can be discharged once the batch is complete to the residue tank or recirculated back the kettle. A bottoms cooler will be available with associated flow monitoring and control to be used to either

- (i) Cool a bottoms product being removed to a storage location
- (ii) Cool material being recirculated back to the kettle at the end of a production run prior to material pump out

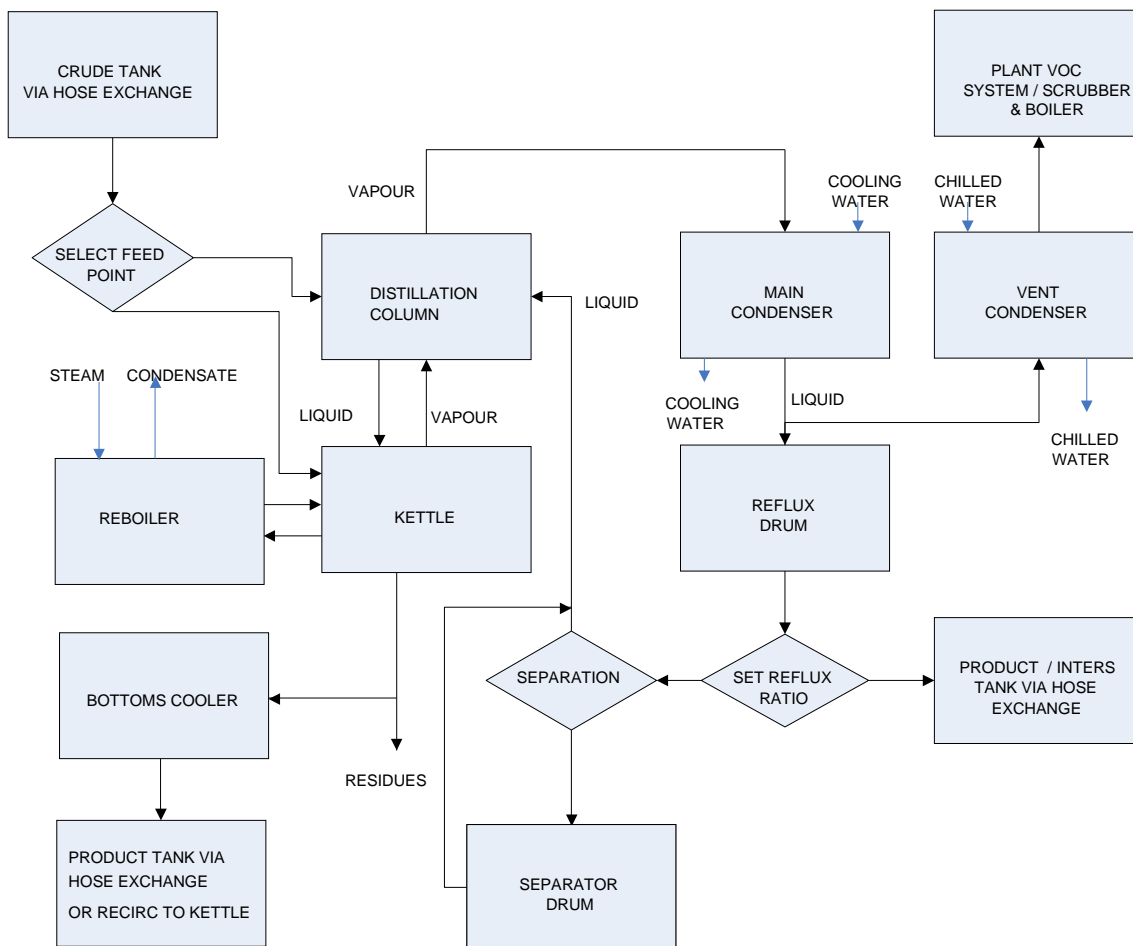
The column overhead vapours are cooled in a vertical condenser. Condensed solvent is collected in a reflux drum and recycled back to the top of the column for further purification or if within specification will be split off through the product system. A separator drum can be introduced into the reflux system to permit phase separation of immiscible materials.

Vent vapour from the system shall be fed through a vent condenser. This heat exchanger will be a guard condenser in line main condenser.

A vacuum pump system is available to allow the plant to be run under vacuum conditions

The distillation system will be equivalent to the existing 3 units and will be aligned to all relevant industry standards. Procurement of most key plant is complete and aligned with specifications outlined in below table. Other equipment procured as the project progresses may differ slightly from below specifications but will not change impact on environmental aspects outlined in this document Figure 4.1b represents a simplified layout of the distillation system.

Figure 4.1b: Simplified Layout of the Distillation System



The kettle has layers of protection to protect the vessel against mechanical failure. The final layer of protection for the kettle is an independent mechanical pressure relief valve (PRV) combined with alarmed bursting disc. The next layer down is a hardwired output from a SIL pressure transmitter that will trip the steam supply in the event of high pressure activation. This SIS layer is aligned with industry best practice BS 61511. The initial layer of protection is a pressure transmitter which will alarm and trip the steam supply via the PLC system if the set points are activated.

The steam system final layer of protection is from mechanical PRV's on the 17 barg steam supply. The steam supply to S4 has two block valve fitted, SIL and BPCS, which will close to isolate the steam supply in the event of a low level BPCS process trip or high level SIL trip. Note the steam main protection is provided at source by a mechanical relief device within the boiler house.

The column displays a differential pressure calculated from kettle and column top pressures which will alarm and trip the steam block valve in the event of activation. The top of the column has a hardwired SIL pressure transmitter that will trip the SIL steam block valve in the event of high

pressure activation; an additional pressure transmitter is used via the PLC system to alarm and trip the BPCS steam block valve.

The reflux drum normal operational control is achieved using a level transmitter, alarms are controlled via the PLC system, if the high level is activated it will trip the BPCS steam block valve.

The vent condenser vent line is fitted with a hardwired SIL temperature transmitter which if activated at high level will alarm and trip the SIL steam block valve.

Plant readings are continuously monitored from designated Control room and separate PLC based HMI (Human machine interface)

The column will operate within the following normal ranges:

	Normal Operational Range	Alarm	Trip	SIL trip
Kettle Temperature	40 to 160 °C	165 °C	168 °C	170°C
Kettle Pressure	-12 to 4 psi	5.5 psig	6.5 psig	15 psig
Kettle Level	10 to 85%	95%	98%	
Reflux Drum Level	20 to 55%	60%	85%	
Column Differential Pressure	0 to 2.5 psi	3.5 psi	4 psi	
Column Pressure	-13 to 2.5 psi	2.5 psi	3 psi	10 psig
Vent Temperature	12 to 24 °C	22 °C	26 °C	28°C

Diameter	0.84 m
Height (tan to tan)	12 m
Type	28 Bubble cap trays; Koch 'flexitrays' with 381mm spacing
Material of construction	316L Stainless Steel
Design Code	TBC after Vac support rings calculated
Design Pressure	2.07 barg
Design Temperature	200 °C
Testing Requirements	As design

Kettle (ex North Tyne)

Diameter	2.895 m (inside)
Height (tan to tan)	5.795 m
Volume	43 m ³
Material of construction	BS1501-316 S11 Stainless Steel (04/96)
Design Code	PD5500 Cat 2: 2000 or EN 13445
Design (vessel)	2.1 barg / FV @ 200°C

Reflux Drum

Diameter	0.61 m (TBC)
Height (tan to tan)	1.07 m (TBC)
Volume	0.34 m ³ (TBC)
Material of construction	316L Stainless Steel (min)
Design Code	PD5500 Cat 2: 2000 or EN 13445
Design (vessel)	2.07 barg / FV @ 200°C

Main Overheads Condenser

Heat Exchanger Type	Shell & Tube
Material of construction	316L Stainless Steel (min)
Surface area	200 - 280 m ²
Number of passes	1
Condensing side	Tube
Design (tube)	2.07 barg @ 200°C
Design (shell)	6.0 barg @ 200°C
Tube details	TBC

Vent Condenser (ex North Tyne)

Heat Exchanger Type	Shell & Tube
Material of construction	316L Stainless Steel
Surface area	147 m ²
Number of passes	1
Condensing side	Tube
Design (tube)	50 psig / FV
Design (shell)	6.0 barg @ 200°C
Tube details	600 off ½" schedule 10 tubes, 3.66 m long on a square pitch of 30 mm

Separator Drum (ex North Tyne)

Diameter	1.0 m
Height (tan to tan)	1.47 m
Volume	1.4 m ³
Material of construction	316L Stainless Steel
Design Code	PD5500 Cat 2: 2000 or EN 13445
Working Parameters	6.6 barg / FV @ 100°C
Additional details	Horizontal tank. Vertical view port (580 x 30mm) with inspection lamp (opposite port)

Reboiler

Heat Exchanger Type	Shell & Tube
Material of construction	316L Stainless Steel
Surface area	80-120 m ² , 1 pass
Product side	Tube
Steam flow rate	500 – 7,000 kg/hr (Steam @ 15 barg)
Design (tube)	2.07 barg @ 200°C
Design (shell)	17.0 barg @ 210°C
Tube details	TBC

Bottoms Cooler

Heat Exchanger Type	Plate or Shell & Tube (TBC)
Material of construction	316L Stainless Steel
Surface area	100 m ² (TBC)
Number of passes	By design
Design	6.6 barg / FV @ 200°C

Recirculation / Bottoms Pumps

Pump type	Centrifugal
Material of construction	316L Stainless Steel
Seal type	Double mechanical (TBC)
Pump duty	70 m ³ /hr @ 20 meters head (TBC)
Motor details	11 kW, 1,500 rpm (TBC)
Motor Certification	3 phase, 50 Hz, ATEX T4

Reflux Pumps

Pump type	Centrifugal
Material of construction	316L Stainless Steel
Seal type	Double mechanical (TBC)
Pump duty	27 m ³ /hr @ 30 meters head (TBC)
Motor details	8 kW, 2,900 rpm (TBC)
Motor Certification	3 phase, 50 Hz, ATEX T4

Cooling Tower

Tower type	Cross flow cooling tower
Material of construction	304 Stainless Steel Basin
Water Temperatures	Water flow 69.40 L/S Thermal heat rejection 4,016 kW Basis 32 C entering, 22 C leaving (17 C wet bulb)
Recirculation Pump duty	346 m ³ /hr @ 50 meters head
Fan Motor details	55 kW, 2,900 rpm
Fan Motor Certification	3 phase, 50 Hz, ATEX Zone 2, T3, IIB (min)

Chilled Water

Material of construction	304 Stainless Steel Basin
Water Temperatures	Basis 8 C entering, 3 C leaving (10 C wet bulb)
Recirculation Pump duty	150 m ³ /hr @ 50 meters head
Fan Motor details	45 kW, 2,900 rpm
Fan Motor Certification	3 phase, 50 Hz,

Storage Tanks

The tanks in the Tank Farm store flammable materials at ambient temperature and pressure designed in accordance with HSG176. The basis of safety for the storage tanks is to protect from over pressurisation using a pressure relief valve in addition to a flame engulfment hatch.

The storage tanks have layers of protection to protect the vessel against overfill. The final layer of protection for the storage tank is an independent level switch. The initial layer of protection is a level transmitter which will alarm and trip the operational actuated valve via the PLC system if the set points are activated. The alarm activation needs to be correctly managed thus preventing activation of a higher level of protection.

The tanks will be connected to the site VOC collection and abatement system.

The tanks will be installed in existing bunded secondary containment (reference Appendix 1). Secondary containment is sized in accordance with EPR guidance and COMAH Regulations to hold 25% of total stored volume or 110% of largest tank therein.

Storage Tanks

Tanks 31-33

Tank Type	Dished end on legs
Material of construction	304L Stainless Steel
Volume	42 m ³ each
Design Temperature	20°C
Design Pressure	+/- 50 mbar

Tanks 36 & 37

Tank Type	Flat sloped bottom with cone top
Material of construction	304L Stainless Steel
Volume	200 m ³ each
Design Temperature	50°C
Design Pressure	+/- 50 mbar

4.3 Raw Materials

There are no proposed changes to the raw materials used on site or typical inventory declared under COMAH.

4.4 Emissions Monitoring

No changes to emissions monitoring required for this variation. Emissions from new plant will be via existing emissions points.

Monitoring will continue to be conducted in line with the Permit and any Variation to Permit issued there after.

5 REVIEW OF IMPACT

5.1 Impacts

We would consider the impact of the proposed changes to not be not environmentally significant. Various aspects have been documented throughout the Technical Document. Further specific issues linked to Permit are discussed below.

5.1.1 Emissions to Controlled Water

For the current activities, rainwater runoff from roofs and gutters and bund water is discharged into the local surface water drainage system.

This surface water is routed to a large interceptor where it is stored prior to discharge to the North Sea at emission point W2. This emission point is included in the existing environmental permit.

There will be no change in the emissions to controlled waters in accordance with Permit conditions.

5.1.2 Emission to Sewer

The current emissions to sewer are from the process plant and from the cooling towers and water softener. Discharges are piped directly through dedicated pipework to the adjacent Hendon Sewage Treatment Works.

There will be no significant change in the emissions to sewer

5.1.3 Emissions to Groundwater

There are no direct releases to ground water from the current installation activity and the proposed changes will not add any discharges to ground water.

5.1.4 Emissions to Ground

There are no direct discharges to ground from site. The process areas on site are concreted and served by an appropriate above ground drainage system.

5.1.5 Emissions to Air

There will be no changes to emissions to air from the proposed variation.

The S4 distillation plant emissions to air will be abated using the main condenser, a chilled-water vent condenser and a water-scrubber. Emissions from the scrubber will be routed via a Boiler for disposal via incineration as per the existing permit conditions.

The permit requires no change to monitoring or emission limits.

5.1.6 Accidents

There is no additional risk from the proposed changes from potential impacts arising from abnormal conditions including local site flooding, leakage to ground, leakage from bunds.

The site falls under the COMAH Regulations 2015 and hence the control of major accidents and management is a high priority for the site.

5.1.7 Odour/Dust/Litter/Mud/Pests

The incoming waste solvent for recovery and outgoing products are delivered by bulk tanker and stored in enclosed vessels material. Access roads and the site are all paved.

There are no issues with odour or pests at the site and the proposed changes will have no effect.

The site does not have dust, litter or mud issues and the proposed changes will have no effect.

Overall, it is considered that the current measures in place to manage and control odour, dust, litter, mud and pests are appropriate and there will be no impact from the proposed changes.

5.1.8 Noise and Vibration

The potential for noise from present operations is deemed to be low and this will continue to be the case when the proposed changes are introduced. There are no current noise limits for the facility. The potential for noise emissions to cause nuisance off site is considered to be minor, and consequently no further assessment has been undertaken. No noise management plan is required.

5.1.9 Vandalism

The site is within the Port of Sunderland area, surrounded by a security fence and monitored with CCTV. The site does not have a history of vandalism and no additional risk to the activities on site is anticipated. The site is manned 24 hours a day and 365 days a year.

5.1.10 Resource Efficiency and Climate Change

The proposed changes have no significant impact on resource efficiency or greenhouse gas emissions. Recycling of waste solvent can divert material from being incinerated. This plant increases the site capacity to remove waste solvent from the supply chain.

It is noted that the site is permitted to burn (ref to Table S3.1) up to 21,000 tonnes per year of Product Grade Distillate (PGD) fuel in the boilers. PGD is a by-product of solvent recovery.

The site is currently burning ~9,000 tonnes per year, and installation of S4 will increase this value to approximately 12,000 tonnes per year.

5.1.11 Waste

The proposed changes have no significant impact on waste emissions. Process residues from distillation are sent as Secondary Liquid Fuel in Cement Kilns. The current site emission can be up to 200 tonnes per month.

It is expected that the addition of S4 will increase this on a pro-rata basis (by ~70 tonnes) to 270 tonnes per month.

5.1.12 Risk

An Environmental Risk Assessment has been carried out and is summarised in **Appendix 4**.

The effect of the change will have a low impact on the environment.

5.2 Receptors

The main receptors around the site which potentially could be impacted by the proposed changes on site are identified below. The website www.magic.defra.gov.uk has been consulted.

The Tradebe site is located within an industrial port area. The closest residential property is around 730 m to the west-south-west. There are no public footpaths located near the site. The England Coast path diverts at least 600 m inland past this location. The nearest bathing beach is 2 km to the north at Roker Rocks. The proposed changes will not impact on people on the land surrounding the site. Existing training of site operators combined with suitable work instructions will ensure no impact to site staff from the proposed changes.

The following designated sites have been identified as the nearest of each type .

Table 5.2: Nearest protected sites

Designation	Nearest site(s)	Approximate minimum distance from Tradebe Hendon Dock
MCZ	Coquet to St Mary's, Berwick to St Mary's	16 km
SAC, SSSI	Durham Coast	2.0 km
SPA, Ramsar	Northumbria Coast	2.0 km
LNR	Tunstall Hills	2.8 km

MCZ – marine conservation zone, SAC – special area of conservation, SSSI – site of special scientific interest, SPA – special protection area, Ramsar - a wetland site designated to be of international importance under the Ramsar Convention on Wetlands, LNR – local nature reserve.

Owing to the limited changes to site emissions, there will be no change to their impact on the identified protected site receptors.

6 BAT ASSESSMENT

The existing prescribed activity meets the permit requirements and can be considered to use Best Available Techniques. The proposed changes do not affect the main prescribed activity.

Refer to **Appendix 5**.

7 MANAGEMENT SYSTEM

7.1 Accreditation

The Tradebe Management System achieves certification (UKAS Accredited Certification Body) for:

- ISO 9001:2015 Quality Management
- ISO 14001:2015 Environmental Management
- ISO 45001: 2015 Occupational Health and Safety

7.2 Summary

No changes to the structure of the management system are proposed for the purposes of this variation.

Existing procedures are in place and suitable changes to the work instructions will be made.

7.3 Planned Maintenance Programmes

Planned programmes of inspection, maintenance and testing are in place to ensure the integrity of the equipment and infrastructure at the Hendon Dock site. The existing measures used to monitor the condition of the containment will be suitable to cover the proposed changes.

APPENDIX 1 – S4 SITE LAYOUT

Refer to Separate Document: *Appendix 1 - S4 Plant Layout.pdf*

APPENDIX 2 – FLOWSHEET

Refer to Separate Document: *Appendix 2 - S4 Flowsheet (S-PR256).pdf*

APPENDIX 3 – EWC CODES

03 02 01* Non Halogenated wood preservatives	Wastes from wood preservation
03 02 02* Organochlorinated wood preservatives	
03 02 05* Other wood containing preservatives containing dangerous substances	
04 02 14* Wastes from finishing containing organic solvents	Wastes from the textile industry
04 02 16* Dyestuffs and pigments containing dangerous substances	
05 01 05* Oil Spills	Wastes from Petroleum refining
07 01 03* Organic Halogenated solvents, washing liquids and mother liquors	Wastes from the manufacture, formulation, supply and use (MFSU) of basic organic chemicals
07 01 04* Other organic solvents, washing liquids and mother liquors	
07 02 03* Organic Halogenated solvents, washing liquids and mother liquors	Wastes from the MFSU of plastics, synthetic rubber and man made fibres
07 02 04* Other organic solvents, washing liquids and mother liquors	
07 03 03* Organic Halogenated solvents, washing liquids and mother liquors	Wastes from the MFSU of organic dyes and pigments (except 06 11)
07 03 04* Other organic solvents, washing liquids and mother liquors	
07 04 03* Organic Halogenated solvents, washing liquids and mother liquors	Wastes from the MFSU of organic plant protection products (except 02 01 08 and 02 01 09), wood preserving agents (except 03 02) and other biocides
07 04 04* Other organic solvents, washing liquids and mother liquors	
07 05 03* Organic Halogenated solvents, washing liquids and mother liquors	Wastes from the MFSU of pharmaceuticals
07 05 04* Other organic solvents, washing liquids and mother liquors	
07 07 03* Organic Halogenated solvents, washing liquids and mother liquors	Wastes from the MFSU of fine chemicals and chemical products not otherwise specified
07 07 04* Other organic solvents, washing liquids and mother liquors	

08 01 11* Waste paint and varnish containing organic solvents or other dangerous substances	Waste from the MFSU of coatings (paints, varnishes and vitreous enamels), sealants and printing inks
08 01 17* Waste from paint or varnish removal containing organic solvents or other dangerous substances	
08 01 21* Waste paint or varnish remover	
08 03 12* Waste ink containing dangerous substances	Wastes from MFSU of printing inks
08 04 11* Adhesive and sealant sludges containing organic solvents or other dangerous substances	Wastes from MFSU of adhesives and sealants
08 04 13* Aqueous sludges containing adhesive or sealants containing organic solvents or other dangerous substances	
09 01 03* Solvent based developer solutions	Wastes from the photographic industry
11 01 13* Degreasing wastes containing dangerous substances	Wastes from chemical surface treatment and coating of metals and other materials
13 07 01* Fuel Oil and Diesel	Wastes of liquid fuels
13 07 02* Petrol	
13 07 03* Other fuels (including mixtures)	
14 06 01* Chlorofluorocarbons, HCFC's, HFC	Waste organic solvents, refrigerants and propellants
14 06 02* Other halogenated solvents and solvent mixtures	
14 06 03* Other solvents and solvent mixtures	
16 01 13* Brake fluids	End of life vehicles from different means of transport and wastes from dismantling end of life vehicles and vehicle maintenance
16 01 14* Antifreeze fluids containing dangerous substances	
16 03 05* Organic wastes containing dangerous substances	Off specification batches and unused products
16 03 06 Organic wastes other than those mentioned in 16 03 05	
16 05 08* Discarded organic chemicals consisting of or containing dangerous substances	Gases in pressure containers and discarded chemicals
16 07 08* Wastes containing oil	Wastes from transport tank, storage tank and barrel cleaning (except 05 and 13)
16 07 09* Wastes containing other dangerous substances	

APPENDIX 4 – RISK ASSESSMENT SUMMARY TABLE

Hazard	Receptor	Pathway	Risk (prior to risk management)	Probability of exposure (how likely is contact)	Justification for magnitude	Consequence (how severe could consequences be prior to risk management)	Risk management techniques (how can risk best be managed to reduce magnitude)	Overall risk (magnitude of risk after management)
Emissions to Controlled Waters	Harm to human health, pollution of marine environment,	Existing drain to sea	Medium	Low	Controlled release from bunded site via interceptor. Not a Marine Conservation Zone.	Medium	Testing prior to discharge. Operator training.	Low
Emissions to Sewer	Sewerage undertaker	Existing drain connections to sewer	Low	Low	Redirection of cooling water allows more consistent discharge to sewer	Low	Regular monitoring at sample points to be undertaken.	Very Low
Emissions to Air	Harm to local receptors	Air	Low	Very Low	Distance to receptors. No change to existing emissions.	Low	Monitoring of emissions.	Very Low

Emissions to Land	Solvent enters groundwater	Land	Low	Low	Not in SPZ or aquifer.	Low	SPMP in place – inspection of containment systems.	Low
Energy / Resource Efficiency	Increased energy usage. CO2 emissions.	Diffuse, Air	Low	Low	Purpose of plant is to recycle solvent and divert from incineration routes. Boilers burn PGD	Low	ISO 14001 in place to continually monitor and manage energy usage.	Very Low
Accidents	Fire	Air, Water	Medium	Medium	Site is UT COMAH, loss of smoke, firewater	Medium	Various, including: DSEAR RA and HAC SMS Design	Low
Noise	Nuisance – local receptors.	Air	Low	Low	Plant location is not near to receptors.	Low	Good engineering practices.	Very Low
Odour	Nuisance – local receptors.	Air	Low	Low	Plant location is not near to receptors. Limited odour sources.	Low	Vents abated. Housekeeping checks in place.	Very Low

Waste	Residues recovered as fuel	Air	Low	Low	Residues kept to a minimum. Low proportion of feed.	Low	Approved waste handler used.	Low
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APPENDIX 5 – BAT ASSESSMENT

A summary of the Best Available Techniques Conclusions (BATC) in various EU decision documents establishing best available techniques (BAT) conclusions (under Directive 2010/75/EU) have been reviewed in relation to this variation.

Two tables are included below which summarises how the proposed changes meet the criteria for in BAT Reference Document:

- Table 5.1: Common Waste Water and Waste Gas Treatment/Management Systems in the Chemical Sector
- Table 5.2 Waste Treatment

Table 5.1 – CWW

BATC	Short description	Applicability to proposed change	BAT?
1	Environmental management system required	ISO14001 certificated system in place	Yes
2	Information on inventory & characteristics	Chemicals have been identified, assessed and quantified in section 4	Yes
3	Monitor key process parameters	Existing cooling tower monitoring is automated as part of the control system	Yes
4	Monitor emissions to water	Batch and Continuous sampling undertaken before discharge	Yes
5	Monitor diffuse VOC to air	No VOC sources under normal conditions	Not applicable
6	Odour monitoring	No odorous substances	Not applicable
7	Minimise volume/pollutant load	Existing automated cooling tower operation ensures efficient operation	Yes
8	Segregate uncontaminated waste streams	Achieved by operator training and management system procedures and work instructions	Yes
9	Buffer storage based on risk	Existing interceptor tank used – quarantined & sampled before discharge	Yes
10	Integrated waste water management & treatment strategy to meet BAT AELs	Mass emissions of key pollutants COD and suspended solids are small and fall below the thresholds for the BAT AELs	Yes
11	Pre-treat waste water where necessary	No pre-treatment needed	Not applicable
12	Use appropriate final WWT techniques	No treatment needed – confirmed by sampling	Yes

BATC	Short description	Applicability to proposed change	BAT?
13	Waste management plan	No solid waste generated	Not applicable
14	Sludge volume reduction	Not required	Not applicable
15	Enclose sources for air emissions	No air emissions	Not applicable
16	Integrated waste gas management	No waste gases	Not applicable
17	Flaring only for safety	No flaring required	Not applicable
18	Flare design	Not applicable	Not applicable
19	Diffuse VOC reduction techniques	No VOCs present under normal conditions	Not applicable
20	Odour management plan	No odours	Not applicable
21	Odour management techniques	No odours	Yes
22	Noise management plan	Operations covered by existing plan	Not applicable
23	Noise management techniques	None required	Yes

Table 5.2 – Waste Treatment BREF:

BATC	Short description	Applicability to proposed change	BAT?
1	Environmental management system required	ISO14001 certificated system in place	Yes
2	Information on inventory & waste acceptance	Waste materials have are subject to pre-acceptance, acceptance and are tracked.	Yes
3	Inventory	Waste streams inventory is maintained.	Yes
4	Storage	Bulk storage meets BATc. HSG176 and COMAH 2015	Yes
5	Implement handling and transfer procedures	Procedures already in place on site.	Yes
6	Inventory of waste water streams	No change – existing site measures in place.	Yes
7	Monitor emissions to water	Existing systems in place.	Yes
8	Monitor channelled emissions to air	Existing systems in place.	Yes
9	Monitor diffuse emissions of organic compounds to air	Existing systems in place.	Yes
10	Periodically monitor odour emissions	Existing systems in place. Odour is not an issue for site.	Yes
11	Monitor the annual consumption of water,	Existing systems in place.	Yes

BATC	Short description	Applicability to proposed change	BAT?
	energy and raw materials		
12	Odour management plan,	No odours	Not applicable
13	Reduce odour emissions	No odours	Not applicable
14	Reduce diffuse emissions to air	Existing systems in place.	Yes
15	Flaring	N/A	N/A
16	Flaring	N/A	N/A
17	Reduce noise and vibration emissions	No significant noise sources or receptors.	Yes
18	Techniques to reduce noise and vibration emissions,	Location suitable – considerable distance from receptors. Inspection of equipment.	Yes
19	Optimise water consumption	Existing systems in place. ISO 14001.	Yes
20	Reduce emissions to water	Existing systems in place.	Yes
21	Accident management plan	Site is UT COMAH	Yes
22	Substitute materials with waste	Waste recycling.	Yes
23	Use energy efficiently	ISO14001 plan. Energy balance in place.	Yes
24	Maximise the reuse of packaging	Limited packaging used on site – bulk solvent.	Yes
25	Reduce emissions to air of dust	N/A	N/A
26	Shredder BAT	No shredder in use on site.	N/A
27	Shredder BAT	N/A	N/A
28	Shredder BAT	N/A	N/A
29	WEE BAT	No WEE handled on site.	N/A
30	WEE BAT	N/A	N/A
31	WEE BAT	N/A	N/A
32	WEE BAT	N/A	N/A
33	Biological Treatment of Waste	N/A	N/A
34	Biological Treatment of Waste	N/A	N/A
35	Biological Treatment of Waste	N/A	N/A
36	Biological Treatment of Waste	N/A	N/A
37	Biological Treatment of Waste	N/A	N/A
38	Anaerobic Waste Treatment	N/A	N/A
39	MBT	N/A	N/A

BATC	Short description	Applicability to proposed change	BAT?
40	Physico-chemical treatment of solid and/or pasty waste	N/A	N/A
41	Physico-chemical treatment of solid and/or pasty waste	N/A	N/A
42	Re-refining of waste oil	N/A	N/A
43	Re-refining of waste oil	N/A	N/A
44	Re-refining of waste oil	N/A	N/A
45	Physico-chemical treatment of waste with calorific value	N/A	N/A
46	Regeneration of spent solvents	Solvents are recovered from the distillation residues by evaporation The residues from distillation are used to recover energy.	Yes
47	Reduce Emissions	Techniques in place include: Recirculation of process off-gases in a steam boiler. Condensation. Wet Scrubbing.	Yes
48	Thermal treatment of spent activated carbon etc	N/A	N/A
49	Thermal treatment of spent activated carbon etc	N/A	N/A
50	Water washing of excavated contaminated soil	N/A	N/A
51	Decontamination of PCBs	N/A	N/A
52	Aqueous Waste Treatment	N/A	N/A
53	Aqueous Waste Treatment	N/A	N/A