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Ingevity UK Ltd

EP Variation – Supporting Information

ENGINEERING CONSULTING

Document approval

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Non-technical summary

Ingevity UK Ltd (Ingevity) operates a Caprolactone Monomer and Polymer manufacturing facility (the Facility) at Warrington in Cheshire, England. An Environmental Permit (EP) for the operation of the Facility was originally granted to Solvay Interox Ltd by the Environment Agency (EA) on 30 June 2006 (Ref: EPR/-BS3824IJ). The EP was subsequently partially transferred to Perstorp UK Ltd in 2008 (Ref: EPR/PP3139XA) as new owner of the Caprolactone business. In 2019 the company name listed on the EP was changed from Perstorp UK Ltd to Ingevity UK Ltd. In total, 4 variations to the EP have been granted to date.

Within this application, Ingevity is applying for a variation to the EP to allow for the operation of up to four new natural-gas fired steam boilers, to replace the existing boilers, which are operated by Solvay, and currently supply steam for the manufacturing process. To facilitate the operation of the boilers into the EP a small area of additional land needs to be incorporated into the installation boundary. This area of land is adjacent to the existing installation boundary and within the curtilage of the existing site.

The new boilers will have lower emissions and a higher efficiency than the existing boilers. In addition, in the event that it was to become available, the boilers are designed to also combust hydrogen as a fuel. However, as this stage, Ingevity is not applying to combust hydrogen as a fuel within the boilers.

As the boilers will have an aggregated thermal capacity of more than 50MWth, Ingevity understands that this application should be determined as a substantial variation.

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1 Introduction

1.1 Background

Ingevity UK Ltd (Ingevity) operates a Caprolactone Monomer and Polymer manufacturing facility (the Facility) at Warrington in Cheshire, England. An Environmental Permit (EP) for the operation of the Facility was originally granted to Solvay Interox Ltd by the Environment Agency (EA) on 30 June 2006 (Ref: EPR/BS3824IJ). The EP was subsequently partially transferred to Perstorp UK Ltd in 2008 (Ref: EPR/PP3139XA) as new owner of the Caprolactone business. In 2019 the company name listed on the EP was changed from Perstorp UK Ltd to Ingevity UK Ltd. In total, 4 variations to the EP have been granted to date.

Ingevity is applying for a further variation to the EP to allow for the operation of up to four new natural-gas fired steam boilers, to replace the existing boilers, which are operated by Solvay, and currently supply steam for the manufacturing process.

Ingevity is applying for a further variation to the EP to allow for the operation of up to four new natural-gas fired steam boilers, with an aggregated thermal capacity of 58.60 MWth, to replace the existing boilers, which are operated by Solvay, and currently supply steam for the manufacturing process.

Section 1 of this document provides an overview of the applicant/application including the proposed changes and type of variation, whilst sections 2 and 3 describe the proposed changes in further detail. Section 4 considers the environmental impact associated with the proposed changes, including the air quality and noise impacts.

1.2 Proposed changes

Within this application, Ingevity is proposing the following changes to the EP:

- Incorporate an additional activity to allow for the combustion of natural gas in up to four gas-fired boilers with an aggregated thermal input of 58.60 MWth;
- Revise the Installation Boundary and baseline site condition report to incorporate the additional land required by the boilers; and
- Incorporate additional emissions points within the EP to allow for the operation of the boilers.

1.3 Type of variation

EA's '*Environmental Permitting Charging Scheme Guide 2021 – 2022*' identify the following types of EP variation:

- Administrative
- Minor technical
- Normal
- Substantial

The guidance states that a substantial variation would be needed to make changes to an activity carried out that:

- would make that activity a part A(1) activity in its own right – for example by increasing the volume of tonnes per hour (or per day) being processed so it reaches the threshold for a part A(1) activity

- increases the treatment or storage capacity on an existing part A(1) by more than the threshold specified in the Schedule 1 activity description
- may have significant negative effects on human health or the environment

As the operation of the boilers is a part A(1) activity, the change would be to make that activity a part A(1) activity in its own right. Therefore, it is understood that this application will be a 'substantial variation' to the EP.

2 The Boilers

2.1 Legislative context

The rated thermal input of each of the new boilers is 14.65 MWth and the aggregated thermal input is 58.60 MWth. The Environmental Permitting Regulations (EPR) (Schedule 1, Part 2, Section 1.1 – Combustion, Part A(1) (a)), lists the following activity:

Burning any fuel in an appliance with a rated thermal input of 50 or more megawatts.

There is no aggregation threshold for defining installation under the IED or EPR. As the aggregated thermal rating of the boilers is 58.60 MWth, the new boilers constitute an 'installation activity' in accordance with the Environmental Permitting Regulations.

Chapter III of the Industrial Emissions Directive (IED) applies to combustion plants with an aggregated thermal capacity of more than 50MWth. However, Article 29(2) of the IED states that combustion plants with a rated thermal input of less than 15 MWth are not considered for aggregation purposes for determining whether the plants falls under the requirements Chapter III (Special Provision for Combustion Plants). As the individual boilers have a thermal capacity of 14.65 MWth, the requirements of Chapter III of the IED are not applicable to the boilers.

The Medium Combustion Plant Directive (MCPD) applies to combustion plants with a rated thermal input equal to or greater than 1 MWth and less than 50 MWth. As the aggregation rule within the IED does not apply to the boilers, they will be required to comply with the requirements of the MCPD. As such, the boilers will be regulated by the EA as an installation activity but will be subject to the regulatory requirements of the MCPD.

2.2 Legislative requirements

In addition to the proposed emission limits and monitoring set out within Table 2 and Table 3, the following requirements will be adhered to in accordance with UK Government guidance on MCPs:

- The plant will be operated in such a way as to promote energy efficiency (refer to section 4.5).
- Periods of start-up and shutdown will be kept as short as possible.
- Records of operation of the new boilers will be retained for at least 6 years.
- The plant will not persistently emit dark smoke.

Although the new boilers will be subject to the requirements of the MCPD, as the aggregated thermal input exceeds 50 MWth the new boilers will be regulated as an 'installation' as defined in Environmental Permitting Regulations. Therefore, they are required to comply with the energy efficiency requirements of the Environmental Permitting Regulations (Schedule 24). Schedule 24 requires consideration for:

- electricity generating installations;
- Heating and cooling networks; and
- installations generating waste heat.

The new boilers will not generate electricity and generate steam for a process rather than provide energy for a heating or cooling network. Therefore, the first two categories are not relevant to the boilers. Regarding the third category, the only significant heat losses from the boilers will be via the stack, which includes an economiser, to maintain high efficiency. As such, it is considered that the boilers will be operated to eliminate waste heat and maximise efficiency. Therefore, the Schedule 24 requirements do not apply to this application.

2.3 Activity

The new boilers will provide steam to the Facility via a connection to new and some of the existing steam pipe network covering the Ingevity installation and the Solvay installation. This application is for a maximum of four natural gas-fired steam boilers. It is intended that three boilers will be installed initially, with the option to install a fourth boiler when the steam demand for the site requires it.

Each boiler will have a rated thermal input of approximately 14.65 MWth, for a total aggregated thermal input of 58.60 MWth. Three boilers operating at approximately 60% load would be sufficient to supply the average steam demand over a calendar year.

The proposed activity to be incorporated into Table S1.1 of the EP is listed within Table 1.

Table 1: Proposed activity

Activity listed in the EP Regulations	Description of specified activity	Fuel	Limits of specified activity
Part 2, Schedule 1, Section 1.1 Part A(1)	Burning any fuel in an appliance with a rated thermal input of 50 or more megawatts (4 x 14.65 MWth steam boilers)	Natural gas	No limits to operating hours.

2.4 Fuel choice

Potential fuels for use in a boiler are listed as follows:

- natural gas;
- diesel;
- liquefied petroleum gas (LPG); or
- hydrogen.

The Facility already benefits from a natural gas supply sufficient to fuel the new boilers, whereas LPG or diesel would have to be imported and stored on-site. Diesel can have lower safety risks than natural gas or LPG; however, the combustion of diesel can lead to higher emissions of NOx, SO_2 and CO_2 compared to using natural gas or LPG.

Hydrogen is an energy-dense fuel that is zero- or low-carbon, depending on the source. The new boilers are capable of being adapted for firing on hydrogen and are therefore 'hydrogen-ready'. Hydrogen would potentially result in higher NOx emissions that natural gas, but this can be minimised through optimisation of the combustion control process.

Currently there is not a supply of hydrogen to the site. However, when a supply of hydrogen is established via Cadent's proposed HyNet North West Hydrogen Pipeline which will run close to the Facility, Ingevity would proposes to apply for a variation to the EP to allow for firing on hydrogen as an alternative fuel,

Taking the above into consideration, the use of natural gas is considered to represent BAT for the operation of the boilers.

2.5 Technology choice

The proposed combustion technology to supply steam to the processes undertaken at the Facility is steam boilers fired on natural gas. This technology has been concluded to be BAT when compared to the alternative options and considering the optimum balance of efficiency, emissions, and other factors. This section provides details on the alternative technology options that have been considered, and justification why steam boilers, run on natural gas, have been proposed for the Facility. The available options which have been considered within this application are as follows:

- Gas-fired boilers;
- Steam turbines;
- Gas turbines – open cycle;
- Gas turbines – combined cycle; and
- Reciprocating engine.

A review of the options is presented in sections 2.5.1 to 2.5.5.

2.5.1 Gas-fired boilers

Gas fired boilers are a proven and reliable technology for the generation of heat/steam. Gas-fired boilers currently supply steam to the Facility so gas-fired boilers would be a like-for-like replacement.

2.5.2 Steam turbines

Steam turbines can be powered by steam produced from the combustion of coal, oil, biomass or natural gas. Steam turbines are typically used to generate power and are not suitable for the provision of the steam demands required by the Facility. On this basis, they are not considered to represent BAT for the provision of steam.

2.5.3 Gas turbines – open cycle

Open cycle gas turbines (OCGT) are usually small to medium units and operate well in combination with multiple units. OCGTs are typically used to generate power and are not suitable for the provision of the steam demands required by the Facility. On this basis, they are not considered to represent BAT for the provision of steam.

2.5.4 Gas turbines – combined cycle

Combined cycle gas turbines (CCGT) use both a gas and a steam turbine together. This can produce up to 50% more electricity than an OCGT, because waste heat from the gas turbine exhaust is captured and used to create the steam that runs the steam turbine. Whilst an CCGT could provide the steam and electricity demands for the Facility, they are very large and expensive systems, and are not considered to be suitable for the provision of steam to the Facility.

2.5.5 Reciprocating engine

Reciprocating engines are small to medium sized units which can run well in multiple unit groups to generate electricity. They typically run on gas or oil and have a high electrical efficiency. Reciprocating engines are typically used to generate power and are not suitable for the provision

of the steam demands required by the Facility. On this basis, they are not considered to represent BAT for the provision of steam.

2.6 Emissions to air

The new boilers will have a single 35 m stack which will contain all 4 flues. The stack location is subject to detailed design. The preliminary design places the stack at NGR of X: 359513, Y: 385931.

Emissions to air from the boilers will comply with the emissions limits as set out in the MCPD for new natural-gas fired boilers. Monitoring will be required for oxides of nitrogen and carbon monoxide. The emission monitoring requirements for the boilers are detailed in Table 2. The emission limits for the boilers are detailed in section 4.1.

Table 2: Emissions monitoring requirements

Parameter	Reference period	Monitoring frequency	Monitoring standard or method
Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	Average over the sampling period	Within 4 months of completion of commissioning and every 3 years	MCERTS BS EN 14792
Carbon monoxide	Average over the sampling period	Within 4 months of completion of commissioning and every 3 years	MCERTS BS EN 15058

2.7 Emissions to water

Boiler feedwater will be supplied from the existing demineralised water tank within Solvay's installation boundary. Treatment of the boiler feedwater will take place within the new boiler house prior to use in the new boilers. Details of the quantity of boiler feedwater, and measures in place to ensure efficient use of water, are provided in Appendix G.

There will be a small amount of process water discharge primarily associated with boiler blowdown and maintenance boiler draining operations (i.e. only boiler water) which will be discharged via the existing surface water drainage system. The small amount of process water generated will not be substantially different in nature to the existing process effluents that are currently generated by the existing boilers and discharge via surface water drainage. Therefore, the operation of the boilers will not introduce a new discharge point to either water or sewer. The impact of the process water from the boilers is considered in section 4.2.

2.8 Management and maintenance

The Facility is already operated in accordance with documented management systems. The existing management systems will be extended to include for the operation of the new boilers.

The new boilers will be monitored and operated 24/7 from an on-site control room,. The new boilers will be operated in accordance with the manufacturer's instructions and records will be made and retained to demonstrate this. Regular preventative maintenance of the new boilers will be undertaken in accordance with documented management systems.

3 Changes to Installation Boundary

As a result of the introduction of the new boilers, a small parcel of land to the south-west of the site will need to be included within the Installation Boundary (i.e., the Installation Boundary will need to be extended). An updated Installation Boundary drawing is presented within Appendix A alongside a drawing showing the extent of the change in the Installation Boundary.

An updated Site Condition Report to reflect the changes to the Installation Boundary is presented in Appendix B.

In submitting this application, it is requested that the EA updates the Installation Boundary within the EP, to represent the revised Installation Boundary (i.e. the area of land which is within the control of Ingevity) as presented in Appendix A.

4 Environmental Impacts

The following sections consider the environmental impacts of the proposed changes.

4.1 Air quality

As explained in section 2.1, the boilers will be classified as new MCPs and will comply with the relevant emission limits which are set out in Table 3:

Table 3: Emissions limits

Parameter	Reference period	Limit (mg/Nm³)
Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	Average over the sampling period	100
Carbon monoxide	Average over the sampling period	No limit set

Note: Monitoring requirements defined at a temperature of 273.15 K, pressure of 101.3 kPa and, after correction for the water vapour content of the waste gases, at a standardised O_2 content of 3%.

Detailed dispersion modelling of emissions of oxides of nitrogen and carbon monoxide from the boilers has been undertaken, refer to the air quality assessment presented in Appendix E.

The air quality assessment concludes that:

"*the Proposed Development will not result in any significant impacts on human health due to emissions to air.*", and *"the Proposed Development will not result in any significant adverse impacts on the sensitive features at the local ecological sites due to emissions to air."*

The air quality assessment does not take into account that the boilers will be replacing the existing boilers on the adjacent Solvay site. It is proposed that the existing boilers will remain as backup for approximately 12 months after commissioning of the boilers and then be decommissioned. The existing boilers are not regulated under the EP for the Facility (Ref: EPR/PP3139XA) and this application does not include for the decommissioning of the existing boilers. Furthermore, the air quality assessment does not take into account the air quality benefit of replacing the existing boilers (which have a higher emission limit for NOx of 240 mg/Nm³). As such, in reality it is considered likely that the new boilers will provide an overall air quality benefit.

4.2 Discharges to controlled waters

There will be a small amount of process water discharge primarily associated with boiler blowdown and maintenance activities which will be discharged via the existing surface water drainage system, which discharges to the Mersey Estuary. The small amount of process water generated will not be substantially different in nature to the existing process effluents that are currently generated by the existing boilers and discharge via surface water drainage. However, due to differing design in boilers between Solvay's water tube boilers and Ingevity's shell boilers it is anticipated there will be less blowdown volume.

The whole site's surface water discharge is predominantly made up of benign cooling waters from both Solvay and Ingevity's manufacturing processes along with benign effluents from Solvay's demineralised water plant and combustion plant, also including off plot roadway and roof rainwater drainage. The limits for this surface water discharge are within Solvay's EP and are monitored via a outfall monitoring station managed by Solvay.

Although relatively benign in nature, the new boiler blowdown effluent before mixing with other effluents will have a relatively high temperature and include some residual phosphate. Data provided by Solvay from their outfall station for 2021 shows the mean flow, temperature and phosphorous concentrations (see Table 4). Solvay has also provided data on their use of phosphorous containing water treatment chemical for 2021 (i.e. 71.5 kg, as phosphorus).

Table 4: 2021 Solvay & Ingevity Combined Discharge to Controlled Water

Item	Unit	Limit	Reported Value (2021)
Flow rate	m^3/day	17,000	10,721
	m^3/hr	-	446.7
Average temp.	^oC	30	16.8
Phosphorus	mg/l	3	0.52

Table 5 shows the additive temperature and phosphorous impact should both Solvay and Ingevity's combustion plant be running together (e.g. during the commissioning phase), assuming a worst-case of:

- similar use of phosphorus-containing water treatment chemical to Solvay's boilers, resulting in a concentration of 8.4 mg/l in the blowdown effluent; and
- 100^oC blowdown effluent temperature at 1 m^3/hr.

Table 5: Impact of New Boiler Effluent on Controlled Water Discharge

Item	Flow rate (m^3/hr)	Temp (^oC)	Phosphorus (mg/l)
New boiler blowdown	1.0	100	8.4
Mean outfall data 2021	446.7	16.8	0.52
Combined impact	447.7	17.0	0.54
Increase	1.0	0.2	0.02

As shown, the current temperature and phosphorous levels are well below the limits and the new boiler blowdown effluent results in a negligible increase.

Taking this into consideration, there will not be any changes to the environmental impact of discharges to surface water from the site from the operation of the boilers.

4.3 Raw material consumption

The only changes to raw material consumption will be the import of natural gas via pipeline to fuel the new boilers and the use of water treatment chemicals for the boiler feedwater. The natural gas use will be new to the Facility but will replace the natural gas currently supplied to the existing boilers on the Solvay site. The anticipated annual natural gas use will be approximately 224,000 MWh, equivalent to approximately 23 million m^3.

The water treatment chemicals to be stored and used on site will consist of an oxygen scavenger, a pH corrector and a corrosion inhibitor. Each chemical will be stored in a 420 litre vessel with secondary containment.

The oxygen scavenger reduces corrosion by reducing the amount of oxygen available for oxidation reactions and passivates metal surfaces to reduce corrosion rates. The pH corrector raises the pH

of the feedwater and condensate systems to aid passivation and neutralise acid gases. The phosphate and organic polymer blend will mitigate scale and aid the water pH in the boiler drum.

The consumption of raw materials is summarised in Table 6.

Table 6: Raw material consumption

Raw material	Proposed annual consumption	Storage arrangements
Natural gas	23 million m³	-
Oxygen scavenger (Eliminox)	< 10 tonnes	Storage within boiler house. Each chemical will be stored within containers with a maximum capacity of 420 litres. The containers will be stored within an areas of secondary containment which is equivalent to greater of 110% of the volume of the largest container or 25% of the total volume of chemicals being stored within the containment.
Corrosion inhibitor & pH corrector (Tri-ACT 1800)	< 10 tonnes	
Phosphate and organic polymer additive (NexGuard 22325)	< 10 tonnes	

4.4 Residues generation

The operation of the boilers is not expected to generate any residues besides boiler blowdown, which will be discharged into the site drainage systems, refer to section 4.2.

4.5 Energy efficiency

Ingevity anticipates that current maximum steam demand can be supplied by three boilers operating at maximum load and average steam demand can be met from three boilers operating at 60% load. The calculations and values presented within Table 7 assume these two operating scenarios.

Table 7: Energy parameters

Parameter	Unit	Value
New boilers – design parameters		
Number of boilers	No.	4 (3 to be installed, option to include a fourth)
Rated thermal input – each boiler	MWth	14.65
Aggregated rated thermal input – 4 boilers	MWth	58.60
Anticipated average thermal input	MWth	26.37
Thermal efficiency (at 100% load)	%	94.6%
Heat production (3 boilers at 100% load)	MW	41.58
Heat production (3 boilers at 60% load)	MW	24.95
Assumed operating hours	hours	8,629

Parameter	Unit	Value
Annual thermal input (3 boilers at 60% load)	MWh	224,123
Annual heat production (3 boilers at 60% load)	MWh	215,249
Annual natural gas use (3 boilers at 60% load)	m^3	22,972,237
Heat demand		
Annual heat demand	MWh	215,249
New boilers heat output (3 boilers at 60% load)	% of demand	100%

As presented in Table 7, three new boilers will provide all of the heat currently required by the Ingevity and Solvay plants. The option to install a fourth boiler is included in this application to allow continued operation if heat demand were to increase in the future, and to provide the additional capacity that would be required if the boilers were to be fired on hydrogen.

The boilers will have a significantly improved efficiency (94.6%) compared to the existing boilers (approximately 92%). Furthermore, the boilers are also expected to have a higher availability due to requiring less maintenance.

As detailed in section 2.2 there are no specific requirements for the new boilers under the Energy Efficiency Directive.

4.6 Noise

A noise assessment which assesses the change in noise impacts as a result of the proposed changes to the Facility is presented within Appendix C.

The noise assessment states that, when compared to the existing noise levels measured at the closest noise-sensitive receptors (NSRs), the change in noise impacts boilers will not be perceptible at the closest NSRs. The noise predictions show a potential to give rise to an increase the ambient level by +0.5 dB(A), although this is not deemed to be perceptible in a day-to-day environment.

Taking this into consideration, the noise assessment concludes that boilers are unlikely to give rise to a significant adverse impact.

4.7 Odour & Fugitive emissions

The boilers will not introduce any additional sources of odour. Therefore, an assessment of odour or an updated Odour Management Plan is not provided with this application.

4.8 Other

An updated Environmental Risk Assessment is presented within Appendix D.1 to assess any risks posed to the environment by the introduction of the new boilers. The assessment is supported by a copy of the H1 tool which assesses the impact of emissions to air as a result of the new boilers – refer to Appendix D.2.

The Environmental Risk Assessment has concluded that the addition of the new boilers will not result in a significant risk of fugitive emissions. Therefore, it is understood that an Emissions Management Plan is not required to be submitted in support of this application.

Appendices

A Plans and Drawings

B Site Condition Report

C Noise Assessment

D Environmental Risk Assessment

D.1 Environmental Risk Assessment

The Environmental Risk Assessment will assess the environmental risks associated with the proposed changes to the activities undertaken at the Facility and will demonstrate that the necessary measures will be in place to protect the environment, ensuring that the operation of the Facility will not pose an unacceptable risk to the environment.

The assessment will:

a. identify potential risks that the proposed changes to the activities undertaken at the site may present to the environment;
b. screen out those that are insignificant and don't require detailed assessment;
c. identify potentially significant risks, where appropriate;
d. choose the right control measures, where appropriate; and
e. report the findings of the assessment.

The assessment has been developed to consider the requirements of EA Guidance Notes H1 Annexes A, C, H and F. While it is acknowledged that these guidance documents have been withdrawn, it is understood that the requirements of the guidance are still applicable continue to be followed by the EA.

Plans showing the location of the site have been produced and are included in this Appendix as Figure 1 (Human Receptor Locations) and Figure 2 (Ecological Receptor Locations).

What do you do that can harm and what could be harmed?			Managing the risk	Assessing the risk		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Possibility 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? If it occurs who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that remains? The balance and probability and consequence.**
Noise Impacts						
Noise from the operation of the proposed boilers.	Immediate area. The nearest residential receptors are located approximately 450 m to the south of the new boiler room. Site workers, and adjacent industrial receptors, may also be affected by noise from plant items and machinery.	Sound propagation through air and the ground.	The boilers will be located inside a building which will provide noise attenuation, as will air inlet silencers and stack exhaust silencer. The boilers will be designed to meet specified noise design parameters. Site workers will utilise appropriate PPE to ensure that working noise conditions are within any acceptable limits posed by legislation or similar. Noise level checks may be carried out regularly in operational areas, with early warning of increasing noise levels resulting in additional mitigation	Unlikely (external receptors) Likely (site workers)	Annoyance (external receptors). Hearing damage (site workers).	Insignificant due to the proposed design and mitigation measures, which are confirmed by the noise assessment – refer to Appendix C.

What do you do that can harm and what could be harmed?			Managing the risk	Assessing the risk		
			measures being implemented. Regular preventative maintenance of the new boilers will be undertaken.			
Accidents/incidents						
Explosion/fire risk from natural gas pipework.	Immediate area – air. Site workers.	Air, direct contact.	Natural gas pipework will be installed by accredited professionals and in accordance with any relevant health and safety guidance. Construction and QA checks will ensure the integrity of the pipework. Regular preventative maintenance of equipment associated with the new boilers will be undertaken to ensure integrity is remained throughout its operational lifetime.	Unlikely	Environmental impacts, human health impacts.	Not significant due to control measures in place.
Control failure leading to combustion control upset.	Local environment - air	Air.	Design of control system. Monitoring of combustion conditions. Maintenance of combustion air systems	Unlikely	Pollution of atmosphere (short term), human health	Not significant due to control measures in place.
Making the wrong connections to drainage during construction	Local environment – water	Direct contact, leaching.	Detailed site drainage plan, which will be available to all staff.	Unlikely	Pollution of surface water	Not significant due to management systems in place.

What do you do that can harm and what could be harmed?			Managing the risk	Assessing the risk		
Unwanted reactions.	Immediate area	Surface runoff, air, direct contact.	Due care and attention.	Unlikely	Low	Not significant
Loss of boiler water.	None	N/A	Failsafe shutdown.	Unlikely	None	Not significant due to control measures in place
Steam leak to plant building/ atmosphere.	Noise, Visual	Air	Statutory design, fabrication and inspection standards for steam systems. Controls and alarms for pressure. Routine operator checks.	Unlikely	Nuisance from noise and visual impact	Not significant due to control measures in place
Vandalism.	Immediate area	Land, air, water	Security fences, 24-hour controlled entrance to the site.	Unlikely	Release of substances to any environment	Not significant
Flooding of site.	Immediate area – land, water. Site workers.	Surface runoff, infiltration to groundwater, direct contact.	New boilers to be located in a building which will reduce water ingress. Flood Risk Assessment submitted with planning application identified no history of flooding at the site that the site is at low risk of flooding from all sources .	Unlikely	Environmental impacts, human health impacts.	Not significant.
Fugitive emissions						
Spillage/leak when unloading feedwater	Immediate area – air, land, water. Direct contact – site workers.	Air, surface runoff, infiltration to groundwater, direct contact.	Chemicals will be unloaded in a dedicated unloading area with hardstanding. The unloading system will be	Unlikely	Human contact with hazardous substances, environmental	Insignificant due to the proposed management systems and

What do you do that can harm and what could be harmed?			Managing the risk	Assessing the risk		
treatment chemicals			‘hands-free’ to eliminate risk of human contact. Drainage from the unloading area will be contained. The pumps will be mounted over bunds to contain any leaks. The bunds will have a capacity which is equivalent to greater of 110% of the volume of the largest container or 25% of the total volume of chemicals being stored within the containment.		damage through fugitive release of hazardous substances.	design mitigation measures.
Leak of feedwater treatment chemicals from their storage containers.	Immediate area – air, land, water. Direct contact – site workers.	Air, surface runoff, infiltration to groundwater, direct contact.	Feedwater treatment chemicals will be stored in dedicated containers with secondary containment inside the new boiler building. Spill kits will be readily available onsite Dosing lines, if made of plastic, will be double-walled to guide any leaks back to the pump cabinet and bund.	Unlikely	Human contact with hazardous substances, environmental damage through fugitive release of hazardous substances.	Insignificant due to the proposed management systems and design mitigation measures.
Leak of natural gas from pipework.	Immediate area – air. Site workers.	Air, direct contact.	Natural gas pipework will be installed by accredited professionals and in	Unlikely	Environmental impacts, human health impacts.	Not significant due to control measures in place.

What do you do that can harm and what could be harmed?			Managing the risk	Assessing the risk		
			accordance with any relevant health and safety guidance. Construction and QA checks will ensure the integrity of the pipework. Regular preventative maintenance of equipment associated with the new boilers will be undertaken to ensure integrity is remained throughout its operational lifetime.			
Emissions from combustion.	Immediate area – air.	Air.	The new boilers will be designed to comply with emissions standards. The new boilers will be subject to regular preventative maintenance to ensure optimum performance. Monitoring will be undertaken in accordance with the requirements of the EP.	Unlikely	Environmental impacts, human health impacts.	Not significant due to control measures in place.

Legend

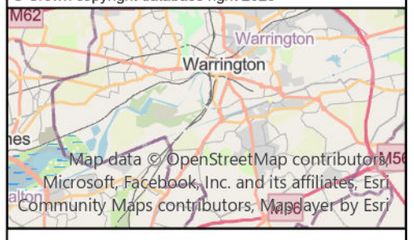
- New Boiler Stack
- Human Receptors

Client:	Ingevity UK Ltd
Site:	Baronet Road
Project:	3656 - EP Variation Application

Title:

Environmental Risk Assessment Human Receptor Plan

Drawn by: SMN	Date: 23/05/2023



0 0.1 0.2 0.4 km

Scale: 1:10,000

N

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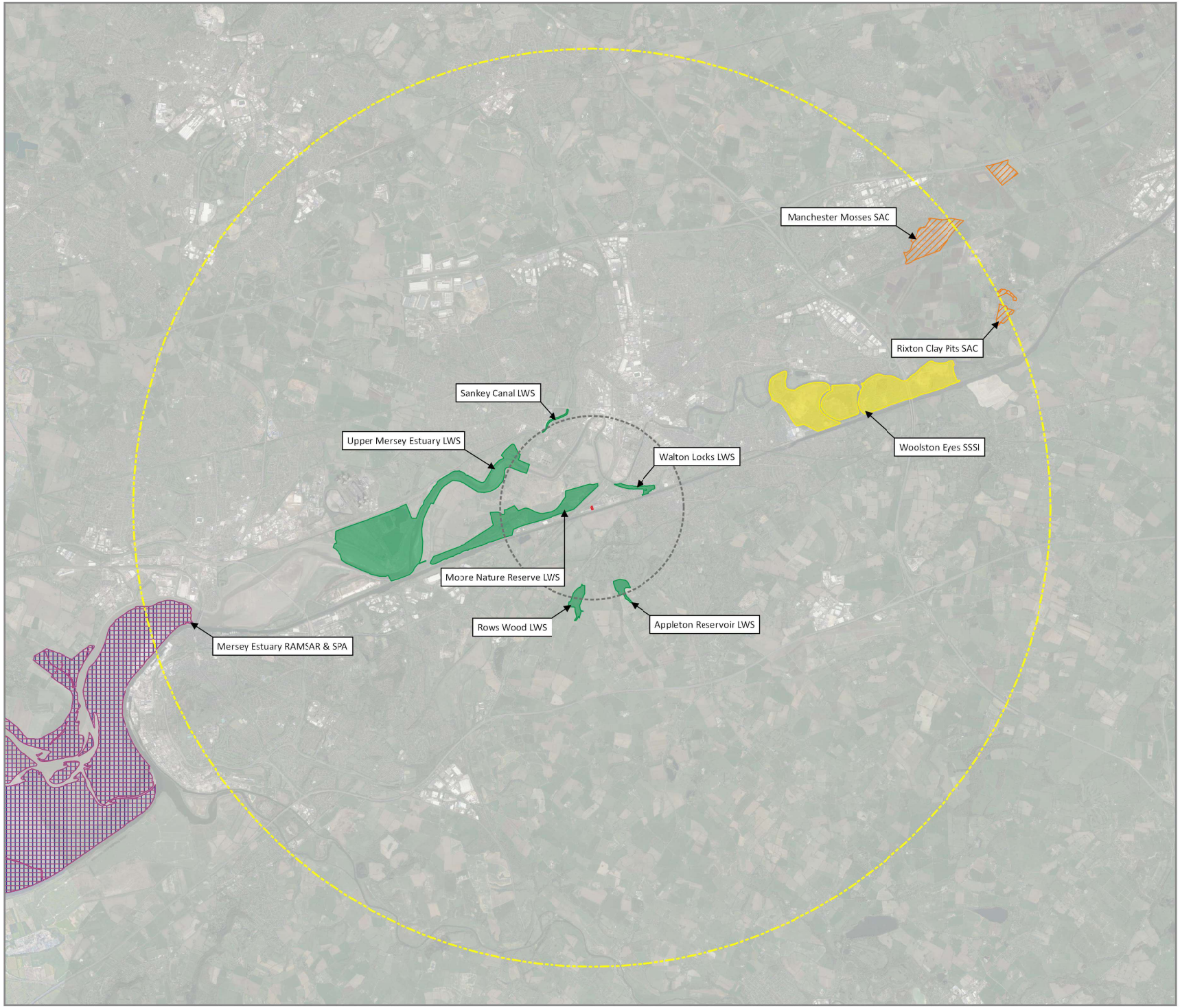
Stockport, Cheshire, SK4 1LW
Tel: 0161 476 0032
Fax: 0161 474 0618



Key:

- Site Location
- RAMSAR
- Special Protection Area (SPA)
- Special Area of Conservation (SAC)
- Site of Special Scientific Interest (SSSI)
- Local Wildlife Site (LWS)
- 2km Buffer Zone
- 10km Buffer Zone

aspect ecology

Aspect Ecology Limited - West Court - Hardwick Business Park
Noral Way - Banbury - Oxfordshire - OX16 2AF
01295 279721 - info@aspect-ecology.com - www.aspect-ecology.com

New Steam Raising Plant, Ingevity, Baronet Works	PROJECT
Ecological Designations	TITLE
6383/ECO2	DRAWING NO.
D/JP	REV
February 2022	DATE

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D.2 H1 tool

E Air Quality Assessments

F Climate Change Levy Agreement

G Water Consumption

H EMS and ISO 14001 Certification

A copy of the current ISO 14001 Certificate is included as Appendix H in the application pack.

It has been agreed in correspondence with the EA that updating the Environmental Management System (EMS) and ISO 14001 Certification for the Installation to include for the operation of the new boilers will be included as a pre-operational condition in the varied EP.

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