Application for Variation (3)

Maelor Poultry Processing Plant
EPR/ AB3591ZQ

Maelor Foods Limited
Pickhill Lane
Cross Lanes
Wrexham
LL13 0UE

13th September 2022

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1 Non-Technical Summary

Maelor Foods Limited operate an installation for slaughtering poultry and processing poultry portions in accordance with our environmental permit, reference EPR/AB3591ZQ, as varied.

Our current Phase 1 operations commenced in 2017 and are limited to a processing capacity of 1 million birds per week in our environmental permit.

We are applying to vary our permit to cover Phase 2 operations which will double our processing capacity to 2 million birds per week. Operating hours will be unchanged, with the same shift patterns as for processing 1 million birds per week.

Phase 2 will include the following primary changes to our installation:

- An increase in processing capacity from 1 million birds per week to 2 million birds per week by installation of a second processing line, new module handling system and an additional chiller plant inside the existing buildings.
- Low noise specification chiller condenser plant with energy recovery capability.
- The application of flavorings and marinades to some whole bird products.
- An extension to the wastewater treatment plant (WWTP) to increase on site wastewater treatment capacity and an increase in the volume of cleaned water to be discharged to the River Dee.
- Upgrading and replacing the chemical scrubber serving the WWTP and enclosure of odorous sources at the WWTP.
- A new sludge dewatering plant to reduce sludge volumes and associated vehicle movements for transfer offsite for reuse of the sludge.
- Diversion of treated water from package sewage treatment plant into WWTP for additional phosphate and nitrogen treatment.
- Addition of a second chemical scrubber to serve the most odorous process areas.
- Addition of a second groundwater abstraction borehole to supply potable water, subject to water abstraction licence approval.
- An additional small boiler (512kWth) to serve the aeroscalder on line 2.
- Hot water will be provided by the existing boilers, supplemented by energy recovery from compressors and condensers.

Our environmental impact assessments for noise, odour and emissions to air and water have been reviewed for the Phase 2 changes and show that there will be minimal impact on our neighbours and local environmental receptors.

There will be 2 new emission points to air serving the exhausts from the second chemical scrubber and the second aeroscalder boiler.

Waste arisings rates will reduce and energy and water consumption rates will continue to be in line with industry leading sites.

Process description

The Maelor Poultry Processing Plant installation undertakes poultry slaughtering with a current processing capacity (Phase 1) of 1 million birds per week. The installation includes a wastewater treatment plant (WWTP) serving the processing plant, permitted to discharge up to 1,500m^3 of treated wastewater per day to the River Dee. The permit also includes a treating and processing activity for a cutting plant for processing of poultry portions (yet to be installed) up to 158T of product/day. Under phase 2 we will be adding flavorings / marinades to some whole bird products which comes under this prescribed activity.

Phase 2 will see the processing capacity double to 2 million birds per week with a second processing line to be installed inside the existing buildings. This will essentially be the same as Line 1 and the same techniques will be used.

The existing bird reception and lairage are large enough to handle the additional live bird deliveries and the live bird holding building can accommodate the temporary holding of live bird delivery vehicles, pending unloading in the lairage during processing delays. A separate live bird holding building contingency, permitted under an earlier permit Variation is available to implement if needed. A new module handling system will be installed inside the existing buildings.

Phase 2 will utilise the existing second gas stunning pit and the stunned birds will then go into Line 2 which will undertake bleed and defeather and subsequent steps as per Line 1. The defeather stage will be served by a second aeroscalder.

An additional 110% chilling capacity for whole birds is provided by a new fridge plant in the basement plus extra compressors and condenser added to the current plant.

The animal by-products (ABP) from Line 2 will be held in the existing ABP storage building which can accommodate sufficient trailers to ensure ABP are always stored inside and collected in a timely manner. The existing blood tank is large enough to hold the additional blood volume from Phase 2.

The wastewater arisings from the installation will increase by around 100%. To ensure that the river quality meets the relevant water quality standards and objectives, further capacity is incorporated at the WWTP to achieve the necessary discharge quality. Grey water volume for reuse will double and will be used within the module handling system. Overall, the grey water usage will remain at around 25% of the overall water consumption. A sludge dewatering facility will be added at the WWTP to reduce the amount of sludge sent for offsite reuse.

Water consumption will increase proportionally to the birds/day rate and a second groundwater abstraction borehole will be utilised to supply potable water, subject to water abstraction licence approval.

The most odorous process areas are scalding / defeather and the ABP storage building. An additional chemical scrubber is to be added to treat the air to be extracted from these areas under Phase 2. The current scrubber serving the WWTP does not have capacity to handle the air treatment duty associated with the WWTP under Phase 2 and will be replaced with a larger unit with enhanced controls.

Hot water supply capacity will be increased by utilising heat recovery from various sources such as condensers and air compressors to supplement the existing boilers which have spare capacity. An additional boiler (512kWth) will serve the new aeroscalder on line 2. This is outside the scope of the Medium Combustion Plant Directive and the existing boilers are not in MCPD scope until 2030 we understand.

Our noise management plan has been updated and a noise impact assessment undertaken to devise and verify the noise control measures to be incorporated into the new plant design.

Our odour management plan has been revised and air dispersion modelling has been undertaken using our latest olfactometry data to verify that we will continue to have a low offsite odour impact potential under Phase 2 operations.

Emission points to air will include 2 new emission points serving the exhausts from the 2nd chemical scrubber and the 2nd aeroscalder boiler. A new taller stack will be installed to disperse treated air from the replacement WWTP area scrubber.

Our primary waste arisings rates per bird are estimated to reduce by around 60% with WWTP sludge dewatering. Consumption rates in terms of energy, water and chemical use per bird will be similar but will continue to be monitored to quantify any efficiency gains associated with Phase 2.

The site drainage is unchanged apart from some additional internal drains in the basement and the rerouting of the outlet from the sewage treatment plant serving the installation. These will all be linked to the wastewater drainage leading into the WWTP for treatment.

Environmental setting

There are no changes to the environmental setting of the installation which remains as described in the original permit application and subsequent applications for variation.

The installation lies within The River Dee catchment, which from Snowdonia to the weir in Chester is designated under the Water Resources Act 1991 as a Water Protection Zone.

This means that a consent is required under the Dee Order where certain substances are used or stored at specific sites anywhere within this part of northeast Wales. This helps prevent water pollution arising from activities that cannot be controlled using other permits. The Maelor Foods Installation already holds an environmental permit however so is exempt from this requirement.

The River Dee is still designated as a Special Area of Conservation (SAC) and currently exceeds the recently introduced SAC management plan phosphorous standard for the river in some stretches. However, the river stretch downstream of the installation (Chester Weir to Ceiriog) meets the phosphorous standard.

We have undertaken a Water Quality Impact Assessment to verify that the impact on the river will be acceptable – See Appendix 8. However, this report was commissioned before the new SAC Management Plan for Phosphorous was prepared so does not assess this. We have therefore undertaken a separate assessment of the phosphorus impact of the installation on the SAC in addition to our other impact assessments. See Appendix 20.

2 The Permit Installation

Plans and drawings

The following plans and drawings are included in the Appendices:

- Appendix 1 - Phase 2 Installation Plan
- Appendix 2 - Installation Plan showing noise sources
- Appendix 3 - Site Drainage Plan
- Appendix 4 - Line 2 Schematic Drawing
- Appendix 5 - Slaughter Line Flowchart
- Appendix 6 - Utilities Building Drawing showing new boiler and scrubber
- Appendix 7 - Wastewater Treatment Plant Phase 2 Layout Plan

Licensing history

The Maelor Poultry Processing Plant installation was permitted under the EPR Regulations on 29th August 2017 under permit reference EPR/AB3591ZQ, issued to Maelor Foods Limited.

The first variation to the permit (EPR/AB3591ZQ/V002) was issued on 1st March 2019 and covered a change to monitoring locations W2 & W3, addition of a point source emission to air from the wastewater treatment plant after covering the primary wastewater tank and addition of a DERV fuelling facility for vehicles.

The second variation to the permit (EPR/AB3591ZQ/V003) was issued on 22nd April 2020 and included a change to the permitted installation boundary to include the use of a new live bird vehicle holding building for the temporary holding of vehicles pending the offload of live birds into the lairage when there are delays on the processing line. Additional land was included for vehicle movements and a general storage area. A second gas stunning pit was added to minimise the downtime of the processing line and bottlenecks during peaks in live bird deliveries.

Proposed changes to the permit

The prescribed activities undertaken at the installation are essentially unchanged except for the following:

Addition of a second processing line to increase our processing capacity from 1 million birds per week to 2 million birds per week.

We have consulted NRW's Regulatory Guidance Series, *No RGN 8 Substantial changes in operation at installations……* and understand that these changes will constitute a substantial change due to the 100% increase to our processing capacity for our S6.8 A1(b) activity and the increase in our treated wastewater discharge volume to the River Dee, a SAC site.

The cutting plant covered under the S6.8 A1 (d)(i) prescribed activity "*Treating and processing of animal raw materials intended for the production of food with a finished product production capacity of more than 75 tonnes per day"* has not yet been installed and the installation only supplies whole birds at present. This prescribed activity is to be retained for potential future cutting activities as the business develops.

This activity also covers the application of rubs and marinades and under Phase 2 we will be injecting flavourings to some of the whole birds. Production rates for flavoured birds will be up to 30,000 birds per week in Phase 2 (approx. 50T/week). This is well below the 75T/day threshold for the prescribed activity for "treating and processing……." so would not equate to a prescribed activity in its own right.

The changes we would like to make to our permit are:

a) Table S1.1 activities in Schedule 1 – Operations to be amended as indicated by yellow highlighted text - see Table 1 – Proposed Changes to Table S1.1 below:

- To include the increase in processing capacity
- To include the flavouring of whole bird products
- To increase the wastewater treatment capacity for the specified activities.
- To include the additional chemical scrubber and aeroscalder boiler in the associated activities.
- To correct the descriptions of the site boilers in the original permit.

b) Table S1.2, Operating techniques in Schedule 1 to include references to our application for Variation 3 and any further information.

c) Table S1.3, Improvement programme in Schedule 1 to be amended to show IC1–3 as completed.

d) Table S1.4A, pre-operational measures in Schedule 1 to be amended to show PO1-2 as completed.

e) Table S3.1, Emissions and Monitoring in Schedule 3 to be amended as indicated by yellow highlighted text – see Table 2 - Proposed Changes to Table S3.1 below.

- To include new emission points to air (A6 and A7) for the exhausts from scrubber No.2 and aeroscalder No.2 boiler.
- To correct errors in the descriptions of the boiler emission points A1 – A4 which refer to existing boilers that were specified with the initial permit application. However, these were decommissioned before the permit was issued and were replaced by new package boilers as per information provided to NRW dated 14th July 2017, as recorded in the permit status log and shown in Table S1.1 in Schedule 1. The boiler details in Table 1 below are now correct.
- To amend the description of the roof mounted extract points serving the Linco area, (not lairage), include the 2nd Linco extract point and the roof mounted fans for the extraction from the live bird hang on area.
- To update the WWTP areas that are to be connected into the replacement WWTP area chemical scrubber and to give this an emission point reference A8.

f) Table S3.2, Emissions and Monitoring in Schedule 3 to be amended as indicated by yellow highlighted text – see Table 3 - Proposed Changes to Table S3.2 below.
   - To include revised daily flow / volume discharge limits for emission point W1 to deal with the increase in wastewater associated with Line 2.

g) The installation plan has been updated to show the new emission points and site layout for Phase 2. This is provided in Appendix 1 and should replace the site plan shown in Schedule 7 of the permit.

h) Reporting Form Water 1 needs amending to list the revised W1 emission parameters.

Table 1 – Proposed Changes to Table S1.1

Table S1.1 activities		
Activity listed in Schedule 1 of the EP Regulations	**Description of specified activity**	**Limits of specified activity**
S6.8 A1 (b)	Slaughtering of animals at a plant with a carcass production capacity of more than 50 tonnes per day	From receipt of live chickens to delivery of carcasses for meat processing. Limited to 2 million birds per week.
S6.8 A1 (d)(i)	Treating and processing of animal raw materials intended for the production of food with a finished product production capacity of more than 75 tonnes per day.	From receipt of carcasses to dispatch of final products. Limited to 158 Tonnes per day
S5.4 A1 (a)(i)	Disposal of non-hazardous waste in a facility with a capacity of more than 50 tonnes per day by biological treatment.	Biological treatment of wastewater produced within the site through to discharge of treated wastewater to the River Dee. Limited to 3,120m^3 per day
Directly Associated Activities		
Odour abatement plant	Chemical and carbon scrubbers treating air extracted from odorous areas of the prescribed activities.	From extraction of air to release of air to atmosphere via exhaust stacks.
Chemical storage	Storage of chemicals for use on site	Temporary storage of chemicals necessary for operation of the installation.

Refrigeration plants	Chilling of carcasses and processed meats	From receipt of slaughtered birds to despatch of final products
Water heating	Burning fuel in a combustion plant to heat water.	Heating of water in five gas fired boilers, three each with a capacity of 1.05MW and two with capacities of 0.38MW and 0.512MW.
Waste arisings handling and storage	Temporary storage of wastes on site prior to removal.	From production of waste to removal from site.

Table 2 - Proposed Changes to Table S3.1

Table S3.1 Point source emissions to air – emission limits and monitoring requirements						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
A1 as shown on site plan in Schedule 7	Boiler No1 1.05 MWth input	No parameter set	No limit set	N/A	N/A	N/A
A2 as shown on site plan in Schedule 7	Boiler No2 1.05MWth input	No parameter set	No limit set	N/A	N/A	N/A
A3 as shown on site plan in Schedule 7	Boiler No3 1.05MWth input	No parameter set	No limit set	N/A	N/A	N/A
A4 as shown on site plan in Schedule 7	Boiler No 4 (Aeroscalder 1) 380kWth input	No parameter set	No limit set	N/A	N/A	N/A
A5 as shown on site plan in Schedule 7	Chemical scrubber 1	No parameter set	No limit set	N/A	N/A	N/A
A6 as shown on site plan in Schedule 7	Chemical scrubber 2	No parameter set	No limit set	N/A	N/A	N/A
A7 as shown on site plan in Schedule 7	Boiler No 5 (Aeroscalder 2) 512kWth input	No parameter set	No limit set	N/A	N/A	N/A
High velocity roof fans outlets located on the lairage room roof.	Linco & bird hang on areas	No parameter set	No limit set	N/A	N/A	N/A
~~Air outlet from the DAF plant emission vent~~	~~DAF clarifier emission vent (after passing through activated carbon filter)~~	~~No parameter set~~	~~No limit set~~	~~N/A~~	~~N/A~~	~~N/A~~
~~Air outlet from sludge tank~~	~~Sludge tank emission vent (after passing through activated carbon filter)~~	~~No parameter set~~	~~No limit set~~	~~N/A~~	~~N/A~~	~~N/A~~
A8 as shown on site plan in Schedule 7	Wastewater treatment plant area scrubber	No parameter set	No limit set	N/A	N/A	N/A
Exhaust fans outlet from live bird vehicle holding building	Building air	No parameter set	No limit set	N/A	N/A	N/A

Table 3 - Proposed Changes to Table S3.2

Table S3.2 Point Source emissions to water (other than sewer) and land – emission limits and monitoring requirements						
Emission point ref. & location	**Source**	**Parameter**	**Limit (incl. unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
W1 on site plan in schedule 7 emission to River Dee	Wastewater Treatment Plant, treated wastewater	Maximum daily volume	3,120 m^3 per day	Daily	Continuous flow monitoring	MCERTS
		Mean daily volume	2,400 m^3 per day	Per annum	Continuous flow monitoring	MCERTS
		Biological Oxygen Demand	20 mg/l	Flow proportional daily composite	Weekly (unless otherwise agreed in writing with NRW)	BS EN 1899-1
		Total suspended solids	30 mg/l			BS EN 872:2005
		Ammonia as N	5 mg/l			BS EN 11732:2005
		Phosphate as P	2.5 mg/l			BS EN ISO 15681-1:2004
		pH range minimum to maximum	6 to 9	Continuous	Continuous	MCERTS
		Temperature	30^{O}C	Continuous	Continuous	Standard Temperature sensor
		Visible oil and grease	None visible	Instantaneous	Weekly	Visual
W2 on site plan in schedule 7 emission to drainage ditch, leading to River Dee	Uncontaminated surface water run off from clean yards and roofs	Visible oil and grease	None visible	Instantaneous	Weekly	Visual
W3 on site plan in schedule 7 emission to drainage ditch, leading to River Dee	Uncontaminated surface water run off from clean yards and roofs	Visible oil and grease	None visible	Instantaneous	Weekly	Visual

3 Emissions to the Environment

The emissions from the installation associated with the changes proposed by this variation application are discussed below. The proposed monitoring for these discharge points is in Section 0. The environmental impact assessment of these discharges is in Section 13.

Emissions to air

The new point source emissions to air associated with this variation application will arise from an additional chemical scrubber and an additional natural gas fired boiler serving the new Line 2 Aeroscalder, A6 and A7 respectively.

The additional Linco area will also be extracted to air via roof mounted fans in the same way as the existing arrangement.

The existing scrubber serving parts of the WWTP (currently without an emission point reference) is to be replaced with a larger unit with automated liquor dosage and will accommodate additional inputs from the Phase 2 WWTP. The new scrubber will treat odorous air from the 2 primary balance tanks, divert tank, pit area and the air from a new building which will enclose the DAF plant and house a sludge dewatering plant. The existing sludge tanks will be retained as a contingency and will be connected to the scrubber. We propose that this new scrubber emission point is referenced as A8.

These emission points, the parameters emitted and estimated amounts are shown in Table 4 with updates in yellow highlighted text. The locations of these emission points are marked on the installation plan in Appendix 1.

Table 4 - Emissions to Air

Emission Point Ref.	Source	Parameter	Estimated emission concentration	Estimated emission rate	Operating Hours per week	Estimated annual emission
A1	Boiler No1	Oxides of nitrogen (as NO_2)	39.77mg/m^3	64.8g/hr	120	404kg
A2	Boiler No2		39.77mg/m^3	64.8g/hr	120	404kg
A3	Boiler No3		39.77mg/m^3	64.8g/hr	120	404kg
A4	Boiler No 4 (Aeroscalder 1)		39.77mg/m^3	21.6g/hr	80	90kg
A5	Chemical scrubber 1	Odour	1,000ouE/m^3	10,0000ouE/sec	Continuous (168hrs)	
A6	Chemical scrubber 2	Odour	1,000ouE/m^3	10,000ouE/sec	Continuous (168hrs)	
A7	Boiler No 5 (Aeroscalder 2)	Oxides of nitrogen (as NO_2)	39.77mg/m^3	43.3 g/hr	80	180kg
A8	Scrubber serving WWTP	Odour	2,500 ouE/m^3	7,500ouE/sec	Continuous (168hrs)	

The estimated boiler emissions we provided with our permit application were based on the manufacturer's data and our operating hours. We have revised the annual mass emissions (kg/year) in Table 4 above, based on the revised operating hours of the boilers under Phase 2. Note however that the module utilisation of the 3 boilers under Phase 2 is expected to be 7 of 9 modules, so the aggregate annual mass emission of oxides of nitrogen from A1-A3 equates to (7/9) x (3 x 404kg) = 943kg. The mass emissions from the boiler serving aeroscalder 2 are estimated to be double those of the smaller boiler serving aeroscalder 1.

Measured odour concentrations from chemical scrubber 1 have been used to estimate the mass emissions from these emission points based on their flow rates.

The impact of emissions to air from the boilers and from the odour sources have been assessed using air dispersion modelling. See Section 0 and Section 0 respectively.

Emissions to water, land & sewer

There are no new point source releases to water, land or sewer from the installation. The wastewater from the additional processing line and associated areas will be treated in our existing wastewater treatment plant (WWTP) with additional capacity to be added.

The maximum daily flow for Phase 2 will be 3,120m^3 which is slightly greater than double that for Phase 1 due to the change in the hours of work. The slaughter lines will have to run slightly more hours on peak days because the installation is not allowed to run on a Sunday. Due to the lack of Sunday working, the average flow is considerably lower than the maximum and will double to 2,400m^3 per day.

Additional treatment capacity will be installed at our WWTP as described in Section 5.10 and the modelling report assessing the impact on the river is in Appendix 9 and Appendix 9b.

Our proposed Phase 2 emissions to the River Dee from emission point W1 are shown in Table 5 with the changes highlighted in yellow.

Table 5 - Water Emissions

Emission Point	Determinand	Discharge Limit	Units	Expressed as
WWTP (W1) on site plan in schedule 7 emission to River Dee	Average daily volume	2,400	m^3/day	mean
	Maximum daily volume	3,120	m^3/day	maximum
	Biochemical oxygen demand (BOD)	20	mg/l	maximum
	Total suspended solids	30	mg/l	maximum
	Ammonia as N	5	mg/l	maximum
	Phosphate as P	2.5	mg/l	maximum
	pH range (min to max)	6 to 9	N/A	Max & min
	Temperature	30	°C	maximum
	Visible oil and grease	None visible	None	Visual test

4 Management Systems

The installation is operated in accordance with our Operating Procedures, Quality Documents and our internal EMS which includes our environmental related procedures, plans and registers.

The management systems that address the changes covered by this variation are listed below and have been updated to address the changes:

- Odour and noise management plans have been revised. See Appendix 10 and Appendix 11
- Environmental impact assessments and the Aspects and Impacts Register have been reviewed but the generic controls already address emissions to air and water, noise and odour emissions from the installation so are essentially unchanged. See our generic environmental impact assessment for Phase 2 Appendix 12.

A documented preventative maintenance system is in place and the new facilities will be included in this. Key plant such as extraction systems, scrubbers, fans and wastewater treatment plant are included.

Copies of these documents and associated records are available on request and will be readily available for viewing by our NRW Regulatory Officer.

5 Operating Techniques & BAT

We have again referred to the following Technical Guidance Notes to assess the operating techniques for the prescribed and associated activities and these are unchanged since our Phase 1 BAT assessment for our original permit.

- NRW's 'How to comply with your environmental permit' V8, October 2014
- Slaughterhouses & Animal By Products (SA) BRef 2005 (under review – Draft 1 June 2021)
- Environment Agency Guidance EPR 6.11 Treating & Processing Poultry – March 2009
- Food Drink & Milk (FDM) Bref and COMMISSION IMPLEMENTING DECISION (EU) 2019/2031 of 12 November 2019 establishing best available techniques (BAT) conclusions for the food, drink and milk industries, under Directive 2010/75/EU of the European Parliament and of the Council

We note that the Environment Agency's "How to comply with your environmental permit" was withdrawn on 1 Feb 2016 so we have also referred to the replacement guidance on Gov.UK for developing a management system and controlling and monitor your emissions for an environmental permit.

We also note that the SA BRef is currently under review and we have consulted Draft 1 (June 2021) for reference only - despite the UK participating in the early stages of the review, the UK has since left the EU and the UK is no longer participating in the review process. This means that the forthcoming SA Bref BAT Conclusions will not be applicable to the UK. We are unclear as to when UK BAT will be implemented and at what stage this will address the SA sector. This means that the existing guidance above remains the most applicable currently.

It should be noted that the Maelor Poultry Processing Installation was visited and nominated by the UK Regulators as a UK leading site / BAT candidate for slaughterhouses and Maelor Foods were asked to complete an SA Bref data collection questionnaire in 2019.

The process stages employed at the Maelor Foods installation were described in our original permit application and we compared them against indicative BAT. The environmental aspects for poultry slaughterhouses and meat processors were assessed and we included BAT summary tables for each section along with the associated aspects.

We have listed the process stages again below and described the Phase 2 arrangements. We have specified whether they are the same as for Line 1 or else what the change is and we have added comments on our experience of operating Phase 1. Where there are changes under Phase 2, we have assessed these against indicative BAT.

We have referred to the FDM Bref BAT Conclusions for comparison of wastewater treatment benchmarks as this is the latest and applicable reference document available.

A schematic showing the processing plant including Line 2 is shown in Appendix 4 and a process flow chart of the slaughter lines is given in Appendix 5 - Slaughter Line Flowchart.

Delivery & Lairage

The existing bird reception and lairage is large enough to handle the additional live bird deliveries for Phase 2.

As for Phase 1, the arrival of live bird vehicles is scheduled and timed to minimise the delay between arrival at site and offloading of the live birds in the lairage.

The level of faecal contamination produced during transportation, and hence the amount requiring cleaning in the lairage is reduced by not feeding the birds or animals before shipping. Delays in processing the birds can mean they are held in the lairage longer than normal and this can increase the amount of faeces. Our deliveries are scheduled to ensure that birds are offloaded and processed as quickly as possible.

The existing live bird holding building is large enough to accommodate the temporary holding of live bird delivery vehicles pending unloading in the lairage if there are processing delays and deliveries of live birds are pushed back until the plant is operational again. As a further contingency, under permit Variation 2 Maelor Foods acquired the former transport depot adjacent to the installation and have scope to convert this into an additional live bird holding area for emergency use. This could allow up to seven live bird vehicles to be parked inside so the live birds can be cooled by air fans in a non-stressful manner. The live bird vehicles would be moved from here into the lairage as soon as the lairage was available to receive them.

Live chickens from broiler production farms will continue to arrive at the plant in modules on HGV trailers. The HGV trailers enter the enclosed lairage via fast acting doors before moving to the intake area where the modules are unloaded by forklift truck.

Slaughterhouses using gas stunning such as ours do not have a traditional lairage. We use an automated module handling system (Linco) in the intake area. Once the modules are unloaded from the HGVs they are loaded onto a live bird handling system, delivering modules directly into the gassing unit to kill the birds.

Our lairage is fully enclosed and is served by an air recirculation system with cooling which provides an air-conditioned environment for the birds.

Our lairage and intake area only produces low level odours associated with faecal contamination and this is generally controlled by good housekeeping and scheduling of deliveries which will be unchanged. The live bird handling systems area is cleaned every night and briefly in between kills but faecal contamination of the area is minimal.

The lairage is cleaned daily with the manure manually scraped into collection bins and floors washed using portable floor scrubbers and trigger operated spray lances. The lairage floor design allows dry scraping and easy cleaning.

Our revised odour management plan and odour impact assessment (Appendix 10 and Appendix 14) conclude that the lairage building will remain a low odour risk area.

The Poultry Meat Hygiene Regulations require poultry processors to provide separate facilities for cleaning and disinfecting the crates, modules and bird delivery vehicles. To prevent odour accumulating, empty modules are automatically transferred to the washing area. Modules are washed in automated washers and water recycled in the system.

A new additional module wash and Linco handling system will be installed for Phase 2. Air is extracted from the current Linco area and this is discharged from the high-level exhaust point on the lairage roof. The extract points from the bird hang on area are connected into these roof mounted fans. Olfactometry measurements taken from this exhaust show odour levels are very low and not in need of abatement. The exhaust from the 2nd Linco system will be discharged in the same manner from roof mounted fans.

"Grey water" from the treated wastewater stream will continue to be used in the module and crate wash process as well as for washing the lairage floor. Cleaning water temperatures are controlled and monitored to prevent energy wastage.

Washed modules are loaded onto washed HGV trailers for return to farms for bird collection. Unloaded HGV trailers are washed at the vehicle washing area using grey water before being reloaded with cleaned modules.

Table 6 below outlines the BAT measures for the lairage:

Table 6 - Lairage BAT

	Indicative BAT	Maelor Foods	Aspect
Management	Time of last feed at farms should be optimised to minimise faeces produced during transit.	Yes	O
	Deliveries managed to minimise processing and wait time in lairage.	Yes	O

	Indicative BAT	Maelor Foods	Aspect
Lairage Design	Fully enclosed but ventilated - effective dispersion if ventilated via a point source, or Covered and enclosed with natural ventilation	Yes – fully enclosed with air conditioning system in place to maintain temperature	O
	Easy clean design	Yes	O, W
	Drainage to wastewater treatment	Yes	Eff
	Ingress of clean surface water and roof drainage should be prevented	Yes – fully enclosed	Eff
Cleaning	Minimise wash down and use dry clean methods where possible.	Yes	W, E, Eff
	Use grey water or rainwater harvesting for wash down of floors.	Yes – recycle from WWTP	W
	Minimise temperature of cleaning water	Yes	E
	Fit hoses with spray nozzles, and optimise water pressure at jets, nozzles and orifices.	Yes – we use 20 Bar pressure lances	W, Eff
	Prompt cleaning of empty poultry modules / crates	Yes	O
	Effective cleaning schedule to include regular removal of manure	Yes	O, W, E, Eff
Unloading of birds	Automated live bird handling systems at gas stun sites eliminates some of the issues associated with lairages.	Yes	O, W, Eff, E
Crate washing	Automated crate washers using re-circulated water.	Yes – module wash	W, Eff
	Use of grey water from wastewater treatment plant.	Yes – recycle from WWTP	W
Slurry / manure storage	Manure and slurry storage skips or tanks should be covered with regular emptying and removal from site, typically 2-3 times per week.	Yes	O

Stunning and bleeding

Phase 2 will utilise the existing second gas stunning pit and the stunned birds will then go into Line 2 which will undertake bleed and defeather as per Line 1.

The birds are stunned using oxygen deficient gas stunning technique which has been very effective in Phase 1. Electric stunning is an alternative method but gas stunning using carbon dioxide / nitrogen or nitrogen / argon blends is now preferred for animal welfare reasons.

Modules of birds are placed by forklift truck onto an automated feed conveyor system into the gassing chambers. This eliminates the handling of the birds as they remain in the modules from the farm until dead and causes them less stress, improves product quality and minimises rejected product.

Dead birds are removed from the modules as they emerge from the gassing chambers and hung-on to the shackles on overhead conveyor lines for transfer for de-heading and bleeding. There is no residual flapping of wings with gas killing so emissions of dust are low and less blood splashes outside of the trough compared to electric stun lines.

The birds are decapitated and bled by gravity as they move around the conveying system. The heads are removed and transported via vacuum system to the ABP collection building. The blood is drained into the bleed troughs which are long enough to capture blood for our specified bleed time of around four minutes. The bleed troughs are narrow, steep sided design and require minimal rinsing and are cleaned down at the end of each shift.

The troughs are gravity fed to prevent the blood coagulating and are pumped to the blood tank in the ABP building. The troughs have double drains feeding to the blood tank during killing and are diverted to the wastewater system before the end of production rinse.

Valve interlocks and / or tight procedures are used to ensure blood is not discharged to the wastewater system in error. Rinse water is further minimised by mechanically scraping the trough clean and by using restricted flow nozzles. Anti-coagulants may be added in the bleed troughs to minimise coagulation but to date we have not found this necessary.

The internal workplace is air conditioned on a recirculated air system with replacement air drawn in as needed. Excess air is extracted from the bird hang on area and discharged via the new roof mounted fans serving the Linco area.

This area remains a low intensity odour source because:

- A small number of birds are in the stunning and hang-on areas at any one time
- No significant changes to the state or composition of the birds within this area
- Fresh blood has a low odour

Table 7 below outlines the BAT measures for stunning and bleeding:

Table 7 - Stun & Bleed BAT

	Indicative BAT	Maelor Foods	Aspect
Kill technique	Gassing method and Live bird handling systems Electric stun lines still common practice at older sites however	Yes - Gas stun & automatic module transfer	O, W, Eff
Building odour control	None specified – low odour risk area	Good housekeeping. Temperature controlled input air with minimal air movement, reducing dust generation.	O, A
Blood trough	Long enough to capture over required bleed period. Design to facilitate easy cleaning and minimisation of rinse water. Dry cleaning of coagulated blood using squeegee or vacuum systems with final rinse at end of shift Anti-coagulants added to trough to prevent coagulation. Rinse water minimised by restricted flow nozzles and recirculation of rinse. Double drain to divert to wastewater for rinsing with tight controls to prevent accidental discharge of blood to wastewater drain	Yes, bleed time 4 minutes Yes, narrow steep sided. Yes - squeegees to be used and final rinse at shift end. Not needed yet Yes Yes, operating procedures for this	Eff, O O, W, Eff W W, Eff, O W, E, Eff Eff

Scalding

After bleeding the birds are scalded by a saturated hot air system in the same way as for Line 1. Birds are conveyed through the scalding unit to loosen their feathers to facilitate mechanical plucking in the de-feather area.

Aeroscalding was justified and accepted as BAT for Phase 1. Our operational data and experience from Phase 1 have found that energy usage is reduced from a standard water bath system as well as improved control over the defeathering process. Temperature is adjusted more, meaning that it is reduced more often where the quality allows this, especially during the summer months. The odour from the Aeroscalder has less bacterial loading than expected which means there is less chemical used in the chemical scrubber to treat the odorous air.

Traditional scalders use a mixture of water and air to scald the birds. The disadvantage of this system is the loss of energy through escaping odorous warm air cannot be avoided. Moreover,

the heat exchange in this type of scalder is not optimal. Another disadvantage is the high maintenance requirement of the blowers.

We have therefore chosen a second aeroscalder for Line 2. This non-immersion method is still relatively new but has now been installed in one other plant within the UK sector. It offers advantages over the traditional techniques in that the water and energy use are much less and odour emissions are lower as found by our experience from Phase 1 – refer to our odour impact assessment in Appendix 14.

Table 8 below outlines the BAT measures for scalding:

Table 8 - Scalding BAT

	Indicative BAT	Maelor Foods	Aspect
Scald technique & tank design	Saturated air scalding uses less water and energy than immersion scalding. For immersion systems, ……. Fully enclosed and insulated to conserve heat and prevent build-up of misty odorous air in building	Yes NA Aeroscalder is fully enclosed with insulated panels	W, E, O, Eff NA E, O
Controls	Water level and temperature controls to be fitted and maintained. Monitor and record energy and water consumption regularly	Yes Yes - water consumption per bird is monitored	W, E W, E
Cleaning	End of shift discharge of scald tank contents to wastewater system in controlled manner to prevent shock COD loading of WWTP	Low volume of discharge water prevents shock loading of WWTP	O, Eff
Building odour control	Enclosed scald tanks. Air extracted to odour abatement before discharge to air via a stack to minimise ground level odour concentrations	Yes – Aeroscalder is an enclosed unit. Yes - Odour impact assessment shows acceptable impact	O O

De-feathering

After scalding the birds are conveyed to the de-feather area where mechanical defeathering is undertaken in defeathering machines as for Line 1.

Dry feather collection techniques are rarely used in the UK poultry slaughterhouse sector and wet feather flume systems are standard practice. Dry systems have higher energy demand for compressed air which we wish to avoid.

Feathers are rinsed from the machines with re-circulated water fed via nozzles and transported via a recirculating water flume into the ABP storage building. The feathers are pressed to remove excess water before collection in a vehicle trailer in an ABP collection bay. The feather trailer(s) are collected on daily basis for offsite processing which minimises odour build up.

The feather flume water is drained down at the end of each day in a controlled manner to prevent overloading the wastewater treatment plant.

Wall and ceiling mounted fans introduce cooling air into the building. The headspace air in the de-feather area is potentially odorous so is extracted directly to a chemical scrubber odour abatement system. A second chemical scrubber will serve Line 2.

Table 9 below outlines the BAT measures for de-feathering:

Table 9 - De-feathering BAT

	Indicative BAT	Maelor Foods	Aspect
Feather collection	Dry collection systems will minimise water consumption but require compressed air and vacuum.	Not widely used in UK so opted for standard industry practice.	W, E
	For wet feather flumes, water should be re-circulated within the flume and used to flush out the machines.	Yes	W, Eff
	Use nozzles instead of irrigation pipes	Yes	W, Eff
	Filter and re-circulate flume water and use recycled water to flush feathers from machines	Yes	W, Eff
	Monitor and record water consumption.	Yes - water consumption per bird is monitored	W, Eff
Feather storage / disposal	Pressing of feathers to remove water.	Yes	O
	Transfer to rendering or another reprocessing route	Yes	O
	Feather trailer covered or stored inside and collected daily to minimise odour potential	Yes – inside and daily collection	O
Cleaning	End of shift discharge of flume water to wastewater system in controlled manner to prevent shock COD loading of WWTP	Yes – balance and diversion tanks on WWTP plus operational procedures	O, Eff

	Indicative BAT	Maelor Foods	Aspect
Building odour control	Air extracted to odour abatement before discharge to air via a stack of sufficient height and efflux velocity to minimise ground level odour concentrations	Yes – chemical scrubbers Odour impact assessment shows acceptable impact	O

Evisceration

The birds are automatically eviscerated to remove intestines and other internal organs (heart, lungs livers etc.) Edible offal is separated, dry chilled and packed for retail markets and transferred to the cold store awaiting distribution.

Inedible offal is downgraded to ABPs and transferred by vacuum lines to the ABP trailer in the collection bay awaiting collection for offsite processing.

Carcasses are rinsed during evisceration using round nozzle showers with the rinse flow rate optimised and water consumption monitored. Interlocks ensure there is no wash when no bird is passing.

Spills of meat scraps onto floors are quickly dealt with and collected into bins for transfer to ABP trailer.

Internal drains have meshes to prevent scraps washing into the wastewater system and increasing the organic loading of the wastewater.

An enclosed air system is in place with cooling to moderate the working environment and a small amount of input air is provided to maintain fresh air. Any excess air from this process is drawn through the chemical scrubber serving each Line.

Odours from evisceration are less offensive than the scalding and defeathering areas as the intestines are unbroken and the innards are still fresh. Our experience from Phase 1 is that this area is a low odour source and unlikely to contribute to offsite odour.

Table 10 below outlines the BAT measures for evisceration:

Table 10 - Evisceration BAT

	Indicative BAT	Maelor Foods	Aspect
Carcass Rinse	Warm water rinses operated on a non-continuous basis.	Yes	E, W, Eff
	Optimised flow efficient shower heads for rinsing during EV.	Yes	E, W, Eff
	Automatic rinse control depending on bird size to minimise water consumption.	Yes	E, W, Eff
	Spray nozzle wear incorporated into preventative maintenance system.	Yes	E, W, Eff
	Interlocks to automatically switch showers off when no birds are moving along line, e.g. during outages & breaks.	Yes	E, W, Eff
	Monitor and record water consumption regularly.	Yes, water consumption per bird is monitored	E, W, Eff
Product maximisation	Utilise the maximum saleable product from the carcass by exploiting alternative markets and minimise amounts sent for rendering	Yes	R, Ws
ABP storage / disposal	Vacuum lines direct into covered trailer or stored inside. ABPs collected daily.	Yes	O O
Cleaning	Two stage meshes fitted on internal floor drains	Yes	Eff
	Dry collection of spilt scraps.	Yes – transfer to ABPs store	W, Eff, O
	Procedures to ensure use of meshes and dry cleaning methods	Yes	W, Eff, O
Odour control	Building air extracted through an abatement unit if required before final discharge via a stack of sufficient height and efflux velocity to minimise ground level odour concentrations.	Low odour risk area - building air is recirculated and temperature controlled with any excess to scrubber	O

Chilling

An additional 110% chilling capacity for whole birds will be provided by a new fridge plant in the basement as well as extra compressors and a second condenser to be added to the current plant. To meet noise control requirements the new condenser will be a low noise water cooled unit which will allow heat recovery for hot water heating.

5.1.1 Whole bird chilling

Most UK chicken producers have switched to air chilling to reduce water consumption and improve bacteriological control.

At Maelor Foods we use air chilling for our whole bird chilling and will add to this for Phase 2.

This method was chosen as it is very clean (and thus assures minimal risk of cross contamination) and uses no water. Air chilling can only be applied when processing fresh products. The process works by passing the birds through an air chilling tunnel. The tunnel can be designed to accommodate up to three layers of birds, thus saving space and energy.

Birds hang from the overhead conveyor in special chilling shackles and are conveyed through the tunnel. Air coolers and fan outlets within the tunnel produce a top to bottom line flow of chilled air.

These air chilling systems are efficient with optimum airflow and evaporator design resulting in maximum chilling effect and reducing weight loss to a minimum. The systems are PLC controlled for easy and reliable operation.

We chose an ammonia refrigerant system for phase 1 and have selected an ammonia-based system for the new chilling plant for phase 2. This utilises the existing plant but with added compressors and condenser.

Ammonia does not fall under the F Gas and ODS Regulations and we are familiar with the hazardous properties of ammonia and our management systems ensure safe operation.

CO_2 systems are not widely used in the sector and are much more expensive to install. The additional chiller will have capacity for 15,000 birds per hour which equates to an additional 1million birds per week. The chill time will be sufficient to reduce carcass temperature to <4°C and by products to <2°C.

We use an integrated by-products air chilling tunnel to chill up to 5,000kg of by-product per hour. This is separate from the inline chiller and will not change for Phase 2, however we will potentially increase the capacity by installing a second chiller.

5.1.1 Packing plant chilling

We use several smaller chiller units in the packing plant which are served by air cooled condensers. There is no heat recovery on these units which were existing at the time of

permitting. We will consider heat recovery on any additional units we install as the plant throughput increases to its Phase 2 design capacity.

These chillers all use R407F refrigerant, (also called Performax LT). This is a blend of HFC refrigerants designed to replace R22, R404A and R507 in low temperature refrigeration applications. Major compressor manufacturers have endorsed its use in their equipment.

R407F comprises of HFC-32, HFC-125 and HFC-134a. It is non-toxic and non-flammable meeting the highest A1/A1 classification. It has a zero-ozone depletion potential so does not fall under the Ozone Depleting Substances Regulations.

Systems using R407F can consume up to 15% less energy than systems using R404A and use of R407F can reduce CO_2 emissions by up to 40%.

HFCs have a high Global Warming Potential (GWP) however and they must be used with care. The GWP for R407F is 1824. The constituents of R407F are specified in the Fluorinated Greenhouse Gases Regulations 2015 (SI 2015/310).

Companies that operate or service and maintain equipment containing F gas must meet the requirements of the Regs. These include leak checks on equipment, record keeping, labelling, recovery of F Gases and use of appropriately qualified maintenance personnel.

We use specialist external contractors to perform planned inspection and maintenance work on all our refrigeration systems. Records are kept of such works along with inventories and labelling of equipment. Maintenance intervals are set by our contractors based on the F Gas Regs for our inventories.

Our cold stores temperatures are monitored and displayed on our HACCP systems which report any deviations which may indicate doors being open. We also have CCTV cameras in the stores fed into the control room so if cold store doors are not closed this will be noticed and quickly addressed.

5.1.2 Edible Offal Cold Store

Cooled offal material which is fit for human consumption is transferred to chillers and cold storage areas where it will be stored before transport off-site. The cold storage buildings are refrigerated to prevent decay and are largely “sealed” by means of a cold-store type door. This is a low odour risk area.

Table 11 below outlines the BAT measures for chilling:

Table 11 - Chilling BAT

	Indicative BAT	Maelor Foods	Aspect
Management	Refrigeration management plan, preventative maintenance programme for refrigeration to include mandatory leak tests and record keeping as required by F Gas & ODS Regs.	Yes – refrigeration engineers and records kept accordingly. F Gas Regs apply ODS Regs do not apply.	E, A
	Monitor energy consumption per bird.	Energy per bird is monitored	E, W
	PLC control of refrigeration units to monitor temperatures / load	Yes	E
	Fast closing doors/alarms on chilled storage areas	HACCP monitoring systems	E
	Procedures and controls to close doors to chill rooms and report faulty doors or sensors	Yes – CCTV to warn of doors open. Operational procedures / signage	E
Heat Recovery & Efficiency	Heat recovery for water heating applications. Energy efficient technology.	Low grade heat recovery in place for main chiller with option to add high grade heat recovery. 2nd condenser water cooled – heat recovery for hot water & low noise	E, N
	Reduce loadings during cooler weather and consider utilising cool ambient air.	No ambient air use for hygiene reasons.	
	Optimise chill temperatures to the maximum temperature to minimise loading whilst retaining sufficient chilling of product.	Yes – by design and PLC control	E
Chill techniques	Air chillers use less water than spray or immersion chillers and should be used where carcasses are for sale fresh and where compliance with statutory carcass chill criteria is achievable by this technique.	Yes	W
	For immersion / spin chillers …….	NA	W

Treating, Processing & Packing

Packing criteria is driven by the customer and consumer requirements and expectations. We understand our obligations under the Packaging Regulations and work with our customers and packaging suppliers to identify packaging which meets their needs while minimising materials and maximising recycling. For example, full birds are usually tray and polythene wrapped but some customers now accept wrapped birds without a tray.

Under Phase 2 we will be applying flavouring rubs to some whole bird products but will not undertake cooking of whole birds. Ingredients will be mixed onsite and flavours such as, but not limited to sage and onion, garlic and herb will be injected into the whole birds. Up to 30,000 birds per week will be flavoured (approx. 50T per week) which will utilise around 6-8T of marinade per week. There is no external extraction from the area where flavourings are made up and applied.

The portioning lines covered under the original permit are yet to be implemented but may be added in future.

We use vacuum packing with a gas flush of oxygen and carbon dioxide to extend shelf life, although gas type can potentially change according to customer specification.

Packing units are insulated to conserve heat and have interlocks to switch them off when no product is passing through.

Table 12 below outlines the BAT measures for treating, processing and packing:

Table 12 - Treating, processing & packing BAT

	Indicative BAT	Maelor Foods	Aspect
Management	Record and monitor energy consumption	Yes – consumption per bird is monitored	W, E
	Use interlocks / sensors to automatically switch off machinery or rinse water when process line is stopped.	Yes	W, E
	Solenoids should be maintained in working order via preventative maintenance system	Yes	W, E
Cleaning	Use dolavs, dry cleaning of floors to collect meat scraps.	Yes	W
	Repair machines causing spillages quickly.	Yes	R, Ws,
	Meshes on drains	Yes	Eff

	Indicative BAT	Maelor Foods	Aspect
Packing	Recycle clean cardboard, plastic and metal packing waste. Minimise packaging and consider thinner, lighter materials.	Yes Yes, segregated, re-used or recycled. We work with our customers and packaging suppliers on this.	W E, R, Ws

Cleaning

To comply with the Meat Hygiene Regulations, all process floor areas, equipment, containers etc. are washed down and sanitised at least once a day and in accordance with our "clean as you go" policy. The floor and equipment surface area affect water, energy and chemical consumption associated with cleaning and the plant layout and surfaces have been designed to facilitate easy cleaning.

The cleaning is undertaken by in-house staff who manage the purchase of chemicals. We will continue to use the same chemicals and cleaning procedures for Phase 2.

Water for cleaning circulates via a ring main and chemicals are supplied by a mobile foaming and sanitation units. Automated chemical dosage minimises chemical additions to cleaning water and we monitor chemical and water consumption on a regular basis.

In processing areas, for hygiene reasons medium pressure trigger operated lance sprays are used. The appropriate water temperature is used for each cleaning application to ensure hot water is not wasted unnecessarily.

Operating procedures specify that dry cleaning techniques should be used to shovel, scrape or vacuum spilt meat scraps into bins during production. Spillages are quickly addressed and collected in containers. Operatives are trained on these measures and supervisors make routine checks to ensure the procedures are followed.

Internal drains have mesh covers plus catch traps to prevent solids entering the wastewater system and adding extra organic loading to the wastewater.

Empty live bird modules are washed in the Linco "module wash". Low intensity odours may arise from handling of the empty modules and the building air from the Linco area is extracted by roof mounted extraction fans and discharged to air from the lairage roof extract point and for the new Linco system via new stack A6 which provides dispersion.

Unloaded HGV trailers are moved from the intake area to the internal "truck washing" area where they are completely washed down before moving to the "box return" area for reloading with clean empty modules. Low intensity odour emissions may arise from truck washing operations and air is extracted directly by roof mounted extraction fans.

The module wash, lairage and vehicle wash use grey water generated from the WWTP and the module wash re-circulates water within the washer.

Personal hygiene stations have timers or sensors to switch off taps and boot washers after use and water temperatures are set to the minimum required.

Table 13 below outlines the BAT measures for cleaning:

Table 13 - Cleaning BAT

	Indicative BAT	Maelor Foods	Aspect
Management	Procedures and training of operatives to ensure: Meat wastes and blood are kept out of drains Floor-drain meshes are not bypassed during cleaning trays collect waste to prevent it falling on floor Machinery causing spillage repaired quickly Catch pots and meshes are cleaned into waste bins and replaced afterwards Dry pre-clean of process areas before wet cleaning, e.g. scraping, shovelling and vacuuming	Operating procedures, training, auditing and monitoring address these points. Yes Yes Yes Yes, but not vacuuming	Eff, W, Ws,
Wet cleaning methods	Use meshes on internal drains. Fit spray nozzles to hoses and optimise water pressure. Review and minimise water temperatures. Monitor consumption rates	Yes Yes Yes Yes – consumption per bird monitored	Eff W, E W, E W, E
Chemicals	Use automated chemical dosing to minimise consumption, optimise concentrations, record and monitor consumption and audit cleaners Review whether better chemicals are available with less environmental impact.	Yes Yes - EMS procedure for raw materials review	R R, W

	Indicative BAT	Maelor Foods	Aspect
Lairage & vehicle washing	Fit hoses with spray nozzles, optimise water pressure at jets, nozzles and orifices.	Yes - Trigger operated lances used	W, E
	Use treated wastewater water if risk of cross contamination is acceptable or consider rainwater harvesting	Recycled water from WWTP used	W, E

Animal By-Products and Blood Storage and Handling

The animal by-products (ABP) from Line 2 will be held in the existing ABP storage building which can accommodate sufficient trailers to ensure ABP are always stored inside and collected in a timely manner.

Non-useable innards and other ABP are transferred by vacuum lines into trailers located inside the ABP storage building. Feathers are transferred in a water flume and separated from the flume water and pressed. The pressed feathers are loaded into bulk trailers inside the building awaiting collection for further processing off-site.

The ABP building is fully enclosed and doors are kept closed except to allow immediate access and egress. The building is a medium odour risk area and the building headspace air is extracted directly to the chemical scrubber(s) for odour abatement.

The ABP and feather trailers are collected daily to minimise degradation and odours. Dolavs and other small containers used for collecting ABP around the process are emptied into the ABP trailer and then washed out.

The ABP building is large enough to accommodate the collection vehicles and the trailers are sheeted up inside before being driven out.

The blood tank is located inside the ABP storage building which has internal drains to the wastewater treatment plant and is large enough to serve Lines 1 and 2.

Poultry blood is not sold on for further processing into foodstuffs for human consumption or pharmaceutical applications so the blood tank is not refrigerated.

The blood tank is sealed and fitted with a high-level interlocked alarm to prevent overfill. It has capacity to hold at least 110% of the maximum kill capacity of blood to cover contingencies such as transport delays. Our EMS accident management plan addresses blood spillages.

The blood tank is fully emptied daily and regularly cleaned using the integrated CIP system to prevent build-up of odorous residues. The blood tank has a bottom drain valve to enable the tank to be fully emptied and cleaned out, preventing odorous residues building up.

The blood tank is a high odour risk area so the tank vent is connected directly to extraction ducting and fed into the chemical scrubbing odour treatment systems.

Displaced air from road tankers collecting blood is fed back into the blood tank by back venting the tanker exhaust. Table 14 below outlines the BAT measures for ABPs storage and handling:

Table 14 - ABPs Storage and handling

	Indicative BAT	Maelor Foods	Aspect
ABP storage / disposal	Store in covered skips or trailer and inside if no cross-contamination issues.	Inside ABP building with air extracted to odour abatement unit.	O
	Collect daily to minimise odour potential	Daily collection of ABPs and blood.	O
	Design waste storage buildings to accommodate the collection vehicle and fit automated doors and keep closed	Yes – doors kept closed	O
	Wash down floors in storage area regularly.	Yes, as per our cleaning procedures – internal drains.	O, Eff
	Odour neutralisers may provide an additional degree of odour control but are not a primary measure	Not used routinely	O
Blood Storage	Bunded tanks.	Tank inside building, internal drains to WWTP, spill procedures / divert tank at WWTP	Eff
	Interlocked high level alarms.	Yes	Eff
	Procedures for offloading to road tanker.	Yes – tanker exhausts vented to scrubber	Eff, O
	Tanks internals should be cleansed after each emptying and CIP points should be fitted.	Yes, with bottom drain to fully empty tank	O, W
	Tank capacity should be greater than maximum kill within blood collection contingency.	Yes, including for Phase 2	O, Eff
	Accident management plans should address blood spillages.	Yes	Eff
	Further odour control measures and abatement.	Yes – building air and tank vent abated in chemical scrubber	O

	Indicative BAT	Maelor Foods	Aspect
Animal By-Products segregation	Utilise the maximum saleable product from the carcass by exploiting alternative markets and minimise amounts sent for rendering.	Yes	R
	Segregate ABP categories 2 and 3.	Yes	R

Wastewater emissions and treatment

There is no foul sewer available at the installation so process wastewater is treated in our on-site wastewater treatment plant. We also have a package sewage treatment plant (STP) serving the offices, canteen and factory toilets and personal hygiene stations that has an environmental permit issued by NRW on 15th December 2015, EPR/WB3990HT. The STP has capacity to handle the Phase 2 staff levels of wastewater.

The treated process water is discharged to the River Dee with around 25% recycled for use as grey water in some cleaning activities, based on the Phase 2 usage.

For Phase 2 the wastewater volume will theoretically double so we have undertaken a further assessment of the water quality standards and impact on the river of a larger discharge volume. See our water quality impact assessment for the treated water discharge in Section 13.3 and Appendix 9Appendix **8** and our assessment of the Habitats impact (SAC management target for phosphorous) in Appendix 20.

The wastewater treatment plant design is based on the flow when processing 1million birds per week, the capacity covered by the original permit application. The plant is however designed for easy upgrade to treat the flow from processing 2 million birds per week.

We are taking the opportunity to divert the treated wastewater from the STP into the inlet to the process wastewater treatment plant. This will give added security that this comparatively small volume of treated wastewater (21.25m^3/day) will be further treated to the highest quality and ensure phosphate levels are minimised. Once this is configured, we will apply to revoke the STP environmental permit.

The treatment stages of our wastewater treatment plant were fully described and justified as BAT at the time of permitting and this is still valid. For Phase 2 the primary stages are unchanged but we will be adding an additional balance tank and additional secondary treatment facilities to increase the treatment capacity as explained below. To accommodate these new facilities in the WWTP area we will remove the earth bund around the WWTP area and add further spillage containment infrastructure and a concrete bund. A plan of the Phase 2 WWTP layout is in Appendix 7.

The WWTP began operation under Phase 1 in February 2018 and has performed very well after some initial teething problems in the 1st 3 months while the biological systems and

operating procedures were established. Since June 2018 we have reported seven out of consent discharges from emission point W1 under Schedule 1 of our permit - See Table 15:

Table 15 – W1 Non-Compliance Events June 2018 - 2021

Year	Events	Dates	Details
2018	2	18/7 19/7	SS high – filter split Ammonia high – bacteria loss
2019	4	25/4 18/6 23/9 13/12	SS marginally high – flocculant dosing increased SS marginally high – dirty sample container SS marginally high – sampling error Ammonia high – fresh activated sludge added
2020	0		
2021	1	28/6	SS marginally high – torn filter replaced

Table 16 shows the average results from our in-house monitoring since June 2018:

Table 16 - W1 Average Monitoring Results (In-house)

	Parameter, units and target / limit					
	COD (mg/l) 100	**SS (mg/l) 30**	**Ammonia (mg/l) 5**	**Phosphate (mg/l) 2.5**	**Temp (°C) 30**	**pH 6-9**
Average	40.3	17.3	0.52	0.43	20.2	7.57

Table 17 shows the average results from our external lab permit compliance monitoring for 2021:

Table 17 - W1 Average Monitoring Results (External Lab)

	Parameter, units and target / limit			
	BOD (mg/l) 20	**SS (mg/l) 30**	**Ammonia (mg/l) 5**	**Phosphate (mg/l) 2.5**
Average	2.95	9.88	0.28	0.89

The Phase 2 proposed parameters for the treated wastewater emission point W1 are unchanged from Phase 1, other than daily volume. The Phase 2 parameters are in line with the BAT AEL's set in the BAT Conclusions for the Food, Drink and Milk (FDM) Bref and Draft 1 of the SA Bref as shown in

Table 18:

Table 18 - W1 Discharge Parameters for Phase 2

Phase 2 Discharge		BAT Conclusions AELs		
W1	**Limit**		**FDM Bref**	**Draft SA Bref**
BOD (mg/l)	20	COD (mg/l)	25-100 (a)	25-100
TSS (mg/l)	30	TSS (mg/l)	4-50 (b)	4-40
Ammonia as N (mg/l)	5	Total Nitrogen (mg/l)	2-20 (c & d)	2-25
Phosphate as P (mg/l)	2.5	Total Phosphorous (mg/l	0.2 – 2 (e)	0.25 – 2.5

(a) No BAT-AEL applies for biochemical oxygen demand (BOD). As an indication, the yearly average BOD_5 level in the effluent from a biological wastewater treatment plant will generally be $\leq$ 20 mg/l.

(b) The lower end of the range is typically achieved when using filtration (e.g. sand filtration, microfiltration, membrane bioreactor), while the upper end of the range is typically achieved when using sedimentation only.

(c) The upper end of the range is 30 mg/l as a daily average only if the abatement efficiency is $\geq$ 80 % as a yearly average or as an average over the production period.

(d) The BAT-AEL may not apply when the temperature of the wastewater is low (e.g. below 12 $^{\circ}$ C) for prolonged periods.

(e) The upper end of the range is: — 4 mg/l for dairies and starch installations producing modified and/or hydrolysed starch; — 5 mg/l for fruit and vegetable installations; — 10 mg/l for oilseed processing and vegetable oil refining installations carrying out soap-stock splitting; as daily averages only if the abatement efficiency is $\geq$ 95 % as a yearly average or as an average over the production period.

5.1.3 Wastewater reception and balance tanks

The wastewater from Phase 2 will be connected into the existing trade wastewater drainage leading to the WWTP. Raw wastewater enters the raw wastewater pump sump and is pumped to the balance tank.

For Phase 2 a second balance tank is to be installed to provide the extra capacity required. This will be a fully enclosed tank with breather ventilation to be linked into the odour control scrubber serving the WWTP area. The existing open top balance tank will also be replaced with a fully enclosed tank as the existing tank, fitted with a cover under Variation 1 with headspace extraction to the new WWTP area scrubber, is approaching the end of its lifecycle.

Each balance tank has a maximum capacity of 1,500m^3. If operated on average at 50% volume, the retention time at peak flow (for 2 million birds/week operation) will be 11.5 hours and with average flow, 18 hours. This will continue to allow waste streams of high and low organic loading to be combined and help to reduce consumption of reagents by making the flow rate less variable. This also means that the plant only needs to handle the average flow and not the peak flow, such as the discharge of feather flume contents. These volumes are based on using the balance tank only and still maintaining a divert tank for contingency.

The existing divert tank will be retained and will remain with the cover added under Variation 1 with headspace extraction to the new WWTP area scrubber. This will enable us to maintain the contingency to divert potentially damaging wastewater such as large blood spillages or to hold wastewater in the event of a treatment plant problem. Should the diversion tank be used the contents can be gradually re-introduced into the balance tank or removed for off-site treatment.

The balance and diversion tanks will still be agitated by venturi mixers to mix and aerate the contents to maintain aerobic conditions and prevent them from going septic and becoming odorous.

5.1.4 Primary Treatment - Screening

There are no changes to the screening step under Phase 2. Our WWTP uses an enclosed rotary drum screen on top of the balance tank to screen the wastewater prior to treatment. The primary screenings drop into a skip and full skips are transferred into an ABP's trailer in the offal bays.

5.1.5 Primary Treatment - DAF

There are no changes to the primary treatment stage with the existing DAF plant designed to handle the flows under Phase 2. Note that the chemical dosage on the DAF is now automated. For Phase 2 we are enclosing the DAF plant inside a new building that will also house a new sludge dewatering plant. This will allow even better control of fugitive odours and the DAF plant vent and the building air will be connected into the new WWTP area scrubber.

5.1.6 Secondary Treatment

For Phase 2 we will be increasing secondary treatment capacity by adding a second anoxic tank to take DAF clarified water followed by a second aeration tank and a second clarifier tank to settle solids from the mixed liquor from the aeration tank.

The existing blowers are housed in acoustic enclosures to mitigate any potential offsite noise and the new blowers will also be enclosed.

Treated wastewater is diverted back to the factory for re use in "grey water" applications such as lairage cleaning, feather flume make-up water, module wash and vehicle washing. We expect 20-25% to be reused under Phase 2 and now have grey water metering to monitor this more closely.

5.1.7 Tertiary Treatment

The summary of the WWTP plant performance under Phase 1 in Table 16 and Table 17 above shows that it has performed very well so far. The treated wastewater quality has met the permit emission limits by some margin overall, however, on occasions suspended solids have approached the 30mg/l emission limit.

A second rotary disc ultrafilter will filter out any residual solids in the final wastewater to help guarantee that the quality meets the BOD and suspended solids limits for discharge to river and the standard for recycling.

BAT Conclusion 12 in the Food Drink and Milk Bref says that wastewater treatment plants should achieve suspended solids levels of between 4 – 50mg/l. (The proposed range in Draft 1 of the SA Bref is 4 – 40mg/l). The lower end of the range is typically achieved when using filtration (e.g., sand filtration, microfiltration, membrane bioreactor), while the upper end of the range is typically achieved when using sedimentation only.

Ultra-fine membrane filtration is now used quite widely in the food and drink sector and affords water recycling for many applications. However, the re-use applications at Maelor Foods are already fully served by the high-quality grey water following the secondary treatment stages. Even with membrane filtration, additional UV sterilisation would be required for further re-use in food processing areas. This is not widely used in the food and drink sector so far and is not something we want to lead on at this stage for product hygiene, quality and consumer perception reasons.

Membrane filtration uses additional energy and transfers heat to the wastewater. This can create problems in summer if the receiving waters are sensitive to elevated temperatures. We note that the River Dee is a salmonid river and is sensitive to temperature. It may be necessary to cool the treated wastewater before discharge in these cases which consumes further energy.

5.1.8 Sludge Treatment

The WWTP generates sludge from the solid removal stages. As described in Section 5.8, dry cleaning techniques and drain meshes help to minimise sludge by keeping larger solids out of the wastewater stream.

Under Phase 1 we stored our WWTP sludge in a sludge holding tank before transfer offsite for reuse, such as an organic fertiliser via land spreading or injection. We will retain this system as a backup. The tank is covered and a mixer keeps the sludge mixed. The off gas from the tank headspace was vented through a passive activated carbon filter but will be connected to the new chemical air scrubber to be installed at the WWTP to replace the existing scrubber added under Variation 1. This will also deal with displaced air from the road tanker during sludge transfers. The sludge tank has high level alarms and our EMS procedures cover offloading to road tanker.

For Phase 2 we will implement a new sludge dewatering system to reduce the volume of sludge to be collected for offsite reuse as an organic fertiliser. We estimate this will reduce the number of sludge collections by around 60%. In 2021 there were 6 to 9 tankers per week at 30 m^3/tank to remove wet sludge from the site. With de-watering we can reduce this to approx. 3-5 vehicle movements per week under Phase 2. This will reduce the associated environmental emissions and noise of vehicle movements and at the point of reuse offsite. We estimate we will reduce the number of sludge collections by around 60%.

Details of the new sludge dewatering plant specification and photographs of installed examples is provided in Appendix 8.

The system will be housed inside a new prefabricated building which will accommodate a HGV to pick up the sludge cake collection skip. The building will have at least 3 air changes per hour and will be extracted for treatment of odour in the new WWTP area scrubber.

The dewatering process will comprise of passing wet sludge (mixed DAF sludge and secondary sludge) dosed with a polymer-based flocculant through a hydro screw press mounted on an elevated platform. Pressed cake then falls into a collection skip below.

The screw press system has been selected as BAT for our application as it has many benefits over centrifuge systems, giving better performance in terms of polymer and energy consumption, reduced maintenance and lower odour and noise potential. More details are outlined in Appendix 8.

The dewatered sludge will have a dried cake consistency as opposed to a slurry when not dewatered. This makes it much easier to handle and reduces the risk of direct run off into watercourses when deployed to land.

This is a low to medium odour risk area and although the sludge can generate unpleasant odours, the combination of enclosure, air extraction and odour abatement as well as infrequent collections of sludge cake minimise the risks of off-site odour impacts.

5.1.9 Indicative BAT for Wastewater Treatment

Table 19 below outlines the BAT measures:

Table 19 - Wastewater treatment BAT

	Indicative BAT	Maelor Foods	Aspect
Management & maintenance	Competent and trained personnel responsible for the daily checks.	Yes	Eff, O, W, R
	Plant performance should be monitored and recorded and routine reviews made to ensure optimum performance.	Operating procedures include monitoring, reporting and review of data.	Eff, O, W, E, R
	Plant included in the preventative maintenance system.	Yes	Eff, O, W, E, R
	Alarms should be linked to the PLC and be visible / audible in a manned location so they can be addressed promptly.	Yes – telemetry linked to engineers and site security	Eff, O, W, E, R Eff
	Procedures should include contingency measures in case of treatment plant operational or mechanical failures. Accident management procedures to address dealing with spillages to prevent the overloading or damage to the treatment plant.	The Emergency response plan addresses responding to spillages and actions to take in response to alarms, abnormal process deviations, spillages and breakdowns, including contingencies.	Eff, O, W, R
Primary treatment	Primary screenings should be dewatered and stored in covered skips or in a covered area to keep out rainwater and minimise odour potential. Primary screenings should be disposed of in accordance with the ABP Regs.	Screenings collected in skips and transferred to the ABP building for collection with ABP.	Ws, O

	Indicative BAT	Maelor Foods	Aspect
Reception and balance tanks	Flow balancing tanks with a hydraulic retention time of 6 – 12 hours.	RT will be 11.5 hours at peak flow and 18 hours at average flow.	Eff
	A separate diversion tank should be available for storing potentially damaging wastewater, e.g. blood spillages, typically with a capacity of 2 – 3 hours at peak flow rate.	Diversion tank is same size as balance tank.	Eff
	Monitor wastewater upstream of the treatment plant to allow automatic diversion to this tank.	Consistent influent, pH unlikely to vary much. Procedures to alert of abnormal discharges to trade wastewater drains.	Eff Eff
	Balance or reception tanks should be covered or fitted with a lid to minimise odour if necessary.	Yes, New balance and divert tanks are fully enclosed and existing balance tank has been retrofitted with a lid	O
	Tank internals should be cleaned at regular intervals to prevent the build-up of solids and fat.	Yes	O
	Interlocked level controls should be fitted to prevent the tank being overfilled.	Yes	O, W
	Duty and standby pumps should be in place and interlocked with alarms to warn of failure.	Yes	Eff
	The tank should be agitated to prevent settlement of solids.	Yes	Eff, O
	Low level alarms should shut off pumps to avoid excessive solids being pumped into the treatment plant.	Yes	Eff
	Above ground tanks should be bunded.	Yes, double skinned chemical tanks. WWTP area drains into sump for processing in the WWTP with bunded area enclosing entire WWTP	W

	Indicative BAT	Maelor Foods	Aspect
DAF plant	Locate DAF units inside to contain odours.	Yes – will be housed inside new building for Phase 2 & area extracted to scrubber	O
Secondary treatment	Aerobic activated sludge treatment widely used for wastewater from the sector.	Yes	Eff
	Procedures should include contingency measures in case of bacterial failures requiring re-seeding of plant.	Emergency response plan in place	Eff
	Treated wastewater quality may be sufficient for low grade uses.	Yes – circa 25% recycled as grey water.	W
	Careful management of: • bulking sludge development • the carrying of excessive biomass inventories • biologically stable foam formation • the inhibition of microbial activity by biocidal substances from cleaning/sterilising agents	Anoxic zone sludge conditioning prevents filamentous bacteria growth. Rotary disc filter after clarifier tank. Anti-foam not needed to date. DEFRA approved cleaning chemicals meet biodgrability legislation.	Eff Eff
	Ensure the installation clean surface water drains are not routed to the treatment plant	Surface water segregated & drains to discharge points W2 and W3	Eff

	Indicative BAT	Maelor Foods	Aspect
Tertiary treatment	Suspended solids and BOD can be reduced further to meet tight environmental standards using membrane filtration, sand filters or reed beds. High quality water achieved can be used for many cleaning practices. Water produced using membrane filtration / reverse osmosis is warm and can be used as boiler feed make up water to give energy savings. However, some cooling may be required if discharging direct to sensitive surface waters during warmer weather periods. Potential to sterilise and use in process areas.	Not required under Phase 1 to meet standards to discharge to river and for re-use as grey water. 2nd rotary disc ultra-filter to be added for Phase 2	E, Eff, W
Sludge treatment and storage	De-water sludge to reduce volumes for further treatment and save on disposal costs.	Yes for Phase 2.	R, Ws
	De-watered sludge should be stored in covered skips to minimise odour and keep rainwater out or else a covered storage area should be used.	Dewatering plant to be enclosed in building.	O
	Non de-watered sludge storage tanks should have lids fitted.	Yes – retained as back up	O
	Tank vents and air displaced when offloading into road tanker should be abated.	Yes – displaced air from tank connected to WWTP scrubber and also for offloading	O
	The internal tank should be cleansed regularly, new tanks should have a CIP port fitted and CIP lances should be retro fitted to older tanks.	Mixer in tank prevents solids build-up.	O
	Tanks should have high level alarms and procedures should cover offloading into road tanker.	Yes	O

Raw Materials

Our primary raw materials are live birds and under Phase 2 we will process up to 2 million per week (104million per year).

There are no new chemicals, fuels or raw materials associated with the changes covered by this variation. There are also no changes to the existing facilities for the storage, handling and use of chemicals, fuels and raw materials. More frequent deliveries of chemicals will be required to account for the increase in throughput under Phase 2.

Our site inventories are way below the relevant thresholds set in the COMAH Regulations for the materials we hold onsite.

5.1.10 Packaging

Packaging criteria tends to set by the customer. This is influenced by desired shelf life, quality and aesthetics. We continue to work with our customers and suppliers to minimise the amount of packaging we use and specify recyclable materials wherever possible.

Under Phase 1 the annual amounts of packaging we use is 200T and this will double under Phase 2.

5.1.11 Hot Water Supply

Natural gas is used for the additional aeroscalder boiler as well as the existing boilers.

5.1.12 Chemicals

We will continue to use the same cleaning, wastewater treatment and odour abatement plant chemicals under Phase 2 with no changes from Phase 1. No boiler water treatment chemicals are used and water is softened in a resin-based deionization unit which only uses salt.

Bulk storage tanks of ferric chloride and sodium hydroxide are still located at the WWTP and are large enough to serve the WWTP under Phase 2. These tanks are double skinned and fitted with level controls and alarms.

The scrubbing chemicals are also stored in double skinned tanks protected by collision barriers alongside the utilities area while IBCs of cleaning chemicals are still stored inside in the utilties area. Improvements are being made under Phase 2 to ensure that any potential spills from associated pipework and pumps cannot reach nearby surface water drains.

There is limited data available on chemical usage in poultry slaughterhouses. The Environment Agency's 2010 Sector Best Practice Review found on average 4kg of chemicals are used per tonne of carcass with consumption being split 44% WWTP: 56% cleaning.

Our annual consumption under Phase 1 correlated to a throughput of 1 million birds/week is 1,400T which is in line with the 4 - 5 kg/T carcass figure. For Phase 2 we will continue to monitor chemical consumption and review on an annual basis. We have estimated Phase 2

chemical and other raw materials usage figures (based on current usage correlated to 2 million birds/week) as summarised in Table 20 below.

5.1.13 Vehicle Fuelling

Under permit variation 1 we included a bulk diesel and ad blue storage facility for vehicle fuelling in our installation and permit. There are no changes to this under Phase 2.

5.1.14 Potential pollution risk of raw materials

There are no changes to the raw materials and chemicals used on the installation or the facilities for their storage and handling. The amount of chemicals used per annum will increase relative to the increased throughput but site inventories remain the same, but with more frequent deliveries.

Despite more frequent deliveries, the potential pollution risk is the same as when assessed at permitting and subsequent variations as our facilities and management systems are designed and proven to minimise the pollution risk. See Table 20 below which now gives operational data based on Phase 1 rather than estimates at the time of permitting. Other than the revised annual consumption figures estimated for Phase 2 the information in this table is unchanged.

Table 20 - Raw material pollution risk by application

Application	Purpose	Materials used	Hazardous substance	Risk phrases (CHIP)	Environmental fate	Potential pollution risk	Storage arrangements	Delivery and use details	Maximum Inventory	Estimated annual consumption
Poultry slaughter and processing	Production of poultry portions for sale	Live birds	No	NA	Biodegradable	Yes - odour	NA	Live birds delivered to lairage by HGVs.		104 million birds/year
Packaging	To protect product during distribution	Plastic wrap and trays	No	NA	Essentially inert	No	Inside	By vehicle, used inside		
Fuel	Used for vehicles	DERV	Yes	As provided in MSDSs with permit / variation applications	Immiscible, floats on water. Moderate to high toxic effects and bioaccumulation potential. Not readily degradable in water	Yes	Bunded storage tank, compliant with Oil Storage Regs.	By tanker and offloaded to bulk tank	45,000L	1,100,000L
Fuel additive	Emissions control	AD Blue	Yes		Contains ammonia which is toxic to fish and other aquatic life. Readily degradable in water		Bunded and double skinned tank	By vehicle / unloaded by fork truck	5,000L	
Detergents for cleaning applications	Cleaning of vehicles, crates, process equipment & floor areas	Tribac	Yes		Biodegradable	Yes	Bulk storage in double skinned tanks	By vehicle / unloaded by fork truck	3,000L	480T
		Ultrafoam	Yes						5,000L	
Wastewater treatment & odour abatement	pH control, flocculants, sterilisation	Sodium hydroxide	Yes		May cause long-term adverse effects in the aquatic environment. Readily degradable in water. Iron compounds are mainly resistant to degradation.	Yes	Combination of inside or in bunded areas in plastic containers, drums or IBCs, bulk storage in bunded tanks. WWTP area is bunded. Polymer is stored in 15L tubs	Delivered by vehicle or tanker offloaded to bulk storage tanks	5,000L	1,350T
		Ferric chloride	Yes							740T
		Phosphoric acid	Yes							
		Sodium hypochlorite	Yes						5,000L	19T
		Polymer	No		Readily degradable in water					54T
Water softening plant	Treatment of water for boilers	Salt	No	None	Biodegradable	No	Inside in plastic containers	By vehicle, used inside	10,000L	20T

Table 21 below outlines the BAT measures for raw materials:

Table 21 - Raw material & chemicals BAT

	Indicative BAT	Maelor Foods	Aspect
Management	Record and monitor consumption rates routinely. Undertake planned reviews of raw materials consumption. Consider alternative chemicals, packaging and technologies that become available with lower environmental impact.	Yes Consumption reviewed annually. Yes	R R R
Storage	Polluting liquids (fuel, chemicals) in bunded tanks / area.	Yes	R, W, L, Acc
Cleaning	Audit cleaning contractors. Use automated chemical dosing to minimise consumption.	Yes Yes – for cleaning systems	R R
Wastewater treatment	Wastewater balancing tanks hydraulic retention time of 6 – 12 hours to allow waste streams of different pH and organic strength to be mixed. This can reduce consumption of reagents in subsequent treatment stages	Yes – RT is 7 hours peak flow and 17 hours average flow. DAF plant sized for 2 million birds/week	R, Eff
Odour abatement - Chemical scrubbers	Controls required to monitor and re-circulate the liquor within the column and automatically drain down / top up to ensure the liquor is an effective scrubbing medium	Automated dosing, drain down with continuous monitoring of pH / redox	R, O
Boilers	Natural gas	Yes	A

Waste Management

The types of waste arisings from the installation are unchanged under Phase 2 and our current waste storage and handling arrangements will continue. To cater for the additional waste arisings under Phase 2 we will increase the frequency of collections.

Note that Animal by-products are not classed as waste. The storage and handling of these materials is discussed Section 5.9 above.

Based on our Phase 1 operational data our Phase 2 annual waste arisings will be as shown in Table 22:

Table 22 – Annual Waste Arisings

Landspreading	Dewatered WWTP sludge	11,000 T
Landfill	Contaminated packaging	190 T
Recycle	Clean cardboard, metal, plastic	35 T

5.1.15 Wastewater treatment sludge & lairage waste

Section 5.10.6 above covers details of our WWTP sludge handling and storage arrangements. This sludge is our primary waste arising from the installation and is collected by road tanker for offsite re-use applications such as, but not limited to spreading or injection to land for agricultural benefit. We use approved waste collectors for this and we ensure that reuse sites are appropriately authorised.

Our annual sludge arisings, based on Phase 1 data are expected to double to approx. 28,000 tonnes under Phase 2 but with sludge dewatering this will reduce by around 60% to around 11,000 tonnes per annum.

Lairage floor waste, i.e., manure from the modules and live bird HGVs is segregated by dry scraping and the manure is collected by an approved ABP contractor as it is mixed with our Category 2 ABP material and not itemised separately.

5.1.16 Packaging waste

Our packaging waste is re-used or recycled where feasible as described in our permit application. Our estimated annual arisings for Phase 2, based on our Phase 1 data are shown in Table 22.

- Clean plastic packaging is recycled but packaging contaminated with blood or meat scraps cannot be recycled and is sent for disposal.
- Pallets, dolavs and other containers are re-used unless damaged in which case they will be sent for recovery or recycling.
- Cardboard, metal and paper is segregated and recycled.
- Empty chemical and detergent IBCs and containers are returned to the suppliers for re use or recycling

5.1.17 Other wastes

Arrangements for the storage, handling and collection of our other wastes were specified in our permit application and are unchanged. These include waste oils from engineering, small amounts of hazardous waste such as light bulbs and other engineering waste and electrical equipment.

5.1.18 Indicative BAT for waste management

Table 23 below outlines the BAT measures for waste management:

Table 23 - Waste management BAT

	Indicative BAT	Maelor Foods	Aspect
Management	Waste minimisation Policy to prevent and minimise waste, to recycle, re use or recovery options with landfill the last option.	Yes – in our EMS and environmental policy.	R, Ws
	Apply and demonstrate the waste hierarchy.	Waste hierarchy declaration and justification in our EMS waste matrix	R, Ws
	Effective systems to monitor and record product yield, waste production and use correct waste codes	EMS waste matrix	R, Ws
	Waste management KPI's and regular audits	In EMS waste matrix	R, Ws
	Training & awareness on waste minimisation for all staff and at induction for new starters	Yes – env training & staff induction	R, Ws
Maintenance & process equipment	Consider waste minimisation in any new projects at design stage.	Yes – e.g. sludge dewatering considered for Phase 2	R, Ws
	Address waste minimisation aspects in preventative maintenance system, e.g. ensure lines / machinery causing product spoilage or spillage are reported & repaired quickly	Yes – PM system, staff report faulty equipment causing spillage	R, Ws
Packing	Recycle clean cardboard, plastic and metal.	Yes	R, Ws
	Minimise packaging and consider thinner, lighter materials	Yes	
Wastewater treatment plant sludge	Dewater sludge to minimise amounts requiring subsequent land application	Yes for Phase 2	R, Ws

	Indicative BAT	Maelor Foods	Aspect
Land spreading of waste	For any waste being land spread it must be demonstrated that it represents a genuine agricultural benefit or ecological improvement.	No spreading on land within our installation.	Ws
	All the pollutants likely to be present should be identified and validated by chemical analysis of the waste. Identify the ultimate fate of the substances in soil.	We use authorised waste contractors and ensure that our sludge is only applied to appropriately licensed land.	Ws
	Note: un-processed meat scraps collected from screening equipment are not listed as a waste which can be exempted and therefore cannot be sent for application by land spreading	Meat scraps are put into our ABPs trailer for offsite processing.	
	Screened wastewater may be collected and pumped to neighbouring agricultural land for soil injection as a fertiliser (subject EPR permit for land spreading)	NA – sent to our wastewater treatment plant	Eff

Utilities

A layout plan of our utilities area is shown in Appendix 6.

Hot water for process rinsing and cleaning applications and workplace heating is currently provided by 3 modular boilers comprising 9 modules in total as listed below:

- A1 – Duty boiler (1.05MWth total) – 3 modules
- A2 – Duty boiler (1.05MWth total) – 3 modules
- A3 – Standby boiler (1.05MWth total) – 3 modules

The Phase 2 hot water demand for the new processing capacity of 2 million birds per week can be met by these existing boilers as we will be using heat recovery from other areas of the plant and will utilise 7 of 9 modules instead of 4 of 9 at present.

The other existing boiler serves the aeroscalder on Line 1.

- A4 – Aeroscalder boiler (380kWth)

For Line 2 an additional boiler will be added to serve the second aeroscalder and will be slightly larger (512kWth). This will have a new emission point A7.

In terms of the Medium Combustion Plant (MCP) Regulations all the boilers are existing (operational pre-2018) except for the new 512kWth aeroscalder boiler which is outside MCP scope as <1MWth. Nonetheless, the boilers are designed to achieve very low emissions and have manufacturer's specified emissions for oxides of nitrogen <50mg/m^3 which is well within MCP emission limits. The existing boilers come under MCP scope in 2030.

The amount of oxides of nitrogen gas emitted to air from these units are calculated in Section 3.1. The annual mass emissions are very low and there are no foreseeable local air quality issues based on our latest air impact assessment for Phase 2 in Section 13.

We do not propose to undertake emissions monitoring of these points and emission control is ensured by the routine maintenance of these units in accordance with the manufacturer's guidance and statutory requirements.

Electricity for all processing plant, lighting and equipment will be supplied by the mains. Given the rural location we have a priority arrangement with the electricity supplier to get us back online as soon as possible in the event of a prolonged power outage.

Water is supplied to the installation from a combination of mains and borehole supplies. A NRW water abstraction licence is held for our existing borehole and an additional borehole licence is being applied for to deliver water supplies for Phase 2.

Site Drainage

The only changes to the site drainage are some additional internal basement drains which will be connected to the wastewater drains leading to the WWTP. For Phase 2 we are also diverting the treated wastewater from the package sewage treatment plant serving the toilets and wash facilities in the offices and canteen into the inlet to the process wastewater treatment plant. This will give added security that this comparatively small volume of treated wastewater (21.25m^3/day) will be further treated to the highest quality and ensure phosphate and ammonia levels are minimised. Once this is configured, we will apply to revoke the STP environmental permit. See the Phase 2 Site Drainage Plan in Appendix 3.

6 Odour Control

We undertook a further odour impact assessment for Phase 2 to determine the potential offsite odour impact and to inform and verify the designs of the plant, air extraction, scrubbing equipment and dispersion stacks which control odour emissions – see Appendix 14.

Our Operational Odour Management Plan (OMP) has been revised for Phase 2 to include the odour emission sources from the second processing line and has considered any changes associated with the increased throughput of live birds. See Appendix 10.

We have also updated our risk assessment register accordingly.

Our OMP identifies all potentially significant sources of odour at our installation. It describes the management practices and the infrastructure we have in place to prevent and minimise those sources of odour.

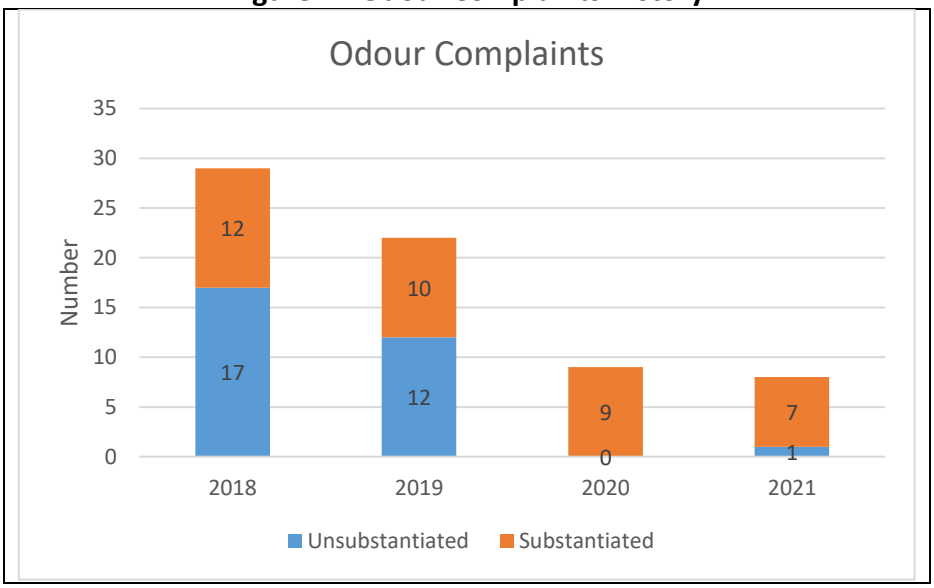
The OMP addresses the potential for odorous emissions over our full range of normal operating conditions. It also covers our contingency measures to minimise odorous emissions during foreseeable abnormal and emergency events that could occur.

Some of the activities undertaken at the installation are inherently odorous by varying intensity. The installation is rural so there will be agricultural type smells generally in the area from time to time. There are several residential receptors nearby in Pickhill Lane and larger residential areas within 1km so there is potential for offsite odour complaints that may be attributed to our installation. The closest housing is in Pickhill Lane and some houses are privately owned and some belong to Maelor Foods.

We recognise that there is potential for odour from our installation to cause offence to our neighbouring receptors and this can lead to complaints. We have proven under Phase 1 that our OMP is very effective at both preventing and minimising odour and in responding to a small number of odour complaints we have received so far.

A summary of the odour complaint history under Phase 1 is shown in Figure 1.

Figure 1 - Odour Complaints History



Where the installation has been found to contribute to an odour episode, we have taken effective measures to prevent them recurring. A good example of this is the addition of covers over the primary and divert tanks on the WWTP and scrubbing of headspace air.

For Phase 2 this scrubber will be replaced with a larger scrubber to deal with the additional odour sources at the WWTP and a taller stack will provide better dispersion of the treated airstream as described below. Table 24 outlines the BAT measures for odour management:

Table 24 - Odour management BAT

	Indicative BAT	Maelor Foods
Management	Implement an effective Odour Management Plan to identify all potential sources of odour and the measures needed to minimise them during normal and abnormal operation.	Yes
	Operating procedures should include odour control measures. Staff training and awareness of odour issues is essential.	Yes
	Housekeeping and maintenance standards need to be high in areas where odour can arise and be released.	SOPs cover housekeeping. PM system includes plant which can affect odour.
	Where there is a history of odour complaints positive community liaison will be beneficial.	We work with our neighbours and have engaged on odour at planning meetings

Odour Control and Abatement BAT Assessment

Our latest odour impact assessment is in Appendix 14 and is discussed further in Section 13.3.

Our operational experience from Phase 1 shows that the low odour risk process areas do not need to be abated and building air is either recirculated or can be emitted directly to air via roof mounted fans.

Only the most odorous process areas need to be extracted to an odour abatement system and these are unchanged under Phase 2:

- Scald and de-feather areas
- ABPs / blood tank building
- Primary tanks, DAF and sludge handling, treatment & storage at WWTP

6.1.1 Selection and Specification of Odour Abatement Techniques

For our permit application we considered a range of odour abatement techniques to treat the odours from these areas and we chose to use chemical scrubbing for the most intense odour treatment. The chemical scrubber abatement technique was justified as BAT and the justification remains valid, given our operational experience and no updates to sector guidance since.

6.1.2 Process Areas

Olfactometry data measurements from the first scrubber during Phase 1 are presented in Table 25 and reinforces our BAT justification with excellent performance. See Appendix 14 for more details of olfactometry measurements and assumptions considered.

Table 25 – Chemical Scrubber Odour Measurements

	March 2022	January 2022	2019	2018
Geometric mean untreated/inlet air odour concentrations ou_E/m^3	4,902	3,820	3,457	1,364
Geometric mean treated/outlet air odour concentrations ou_E/m^3		764	1,202	536
Percentage reduction in odours %		79.99%	65.2%	60.7
Airflow through or to scrubber m^3/s	9.94 (35,784m^3/hr)	9.83 (35,388 m^3/hr)	8.75 (32,500 m^3/hr)	9.612 (34,600 m^3/hr)
Treated air emissions ou_E/s		7520	10,522	5,157

The airflow in January 2022 was 12.5% higher than measured in 2019, but despite that, and the slightly higher inlet odour concentrations, the scrubber achieves a better reduction in odour concentrations and a higher percentage reduction in odour levels. Back in 2018, the airflow through the scrubber was very comparable to that measured in Jan 22, but at that time (2018) the odour loading was lower. This lower odour load in 2018 may have partly been because the plant was operating at a lower throughput level initially.

The data in Table 25 shows that the odour concentrations in untreated air (inlet) remain well below the levels measured in other poultry processing plants where immersion scald tank-based scalding/plucking equipment is used. (Odour concentrations of 20,000 to 50,000 $ou_E/m^3$are not unusual vs 3,500 – 5,000 ou_E/m^3 reported here.) This illustrates the benefits of the Aeroscalder system for defeathering. The outlet measurements prove that the scrubber is very effective, even at relatively low inlet concentrations which can make the efficiency % appear lower than a unit treating a higher inlet odour load.

The scrubber is probably operating at its maximum capacity in terms or airflow because the air speeds through the duct from the scrubber to the stack is at around 15 m/s. Therefore, we needed to consider if a second scrubber is required for Phase 2 operations.

Further olfactometry measurements were taken from the primary processing areas on the inlet to the chemical scrubber in March 2022 to assess the requirement for a second chemical scrubber. These results are presented in Table 26.

Table 26 - Primary Processing Area Odour Analysis Results - March 2022

	Composite flow to scrubber	Aeroscalder Extraction	Offal Extract No. 1	Offal Extract No. 2	Vacuum Pump Outlet
Airflow to Scrubber m^3/s	9.94	6.10	2.94	1.22	0.08
Approximate percentage of total flow to scrubber (%)	100%	63%	29%	12%	1%

Untreated air odour concentrations ou_E/m^3	4,902	5,866	1,911	2,368	10,831
Untreated air emissions (ou_E/s)	48,708	36,847	5,446	2,786	1,011
Approximate percentage of odour load to scrubber (%)		75.6	11.2	5.7	2

The air extraction systems for the Phase 2 areas are designed to minimise air volumes handled i.e., low flow/high concentration and to ensure that local extraction rates are high enough for efficient capture at the place where the odour is generated. We have used our experience from Phase 1 and the process plant provider's guidelines on minimum air changes per hour for the different process stages, for example, buildings have a minimum of 3 air changes per hour specified.

The Aeroscalder, which is to be duplicated as part of Phase 2 is the single most important source of odour emissions in terms of odour concentrations and the airflow rate, but is it remains much less odorous than in conventional scald tanks systems at other plants where extracted odour concentrations can be as high as 20,000 to 60,000 ou_E/m^3. The measured airflow is around 60% of the total airflow to the scrubber. The untreated air odour concentration in air off the Aeroscalder of 5,866 ou_E/m^3 is too high to simply disperse through a stack (without treatment) unless a much higher stack is installed (probably around 25 – 30m). It was concluded that the consequence is that an additional scrubber will be required to abate emissions from the proposed second aeroscalder line.

Odour concentrations in the ABPs offal bay extraction airflow were low, and comparable with those measured in similar buildings elsewhere at other poultry processing plants with good hygiene and frequent offal/feathers removal. Odour concentrations and emission rates may be higher in warmer weather conditions, but these emissions are in any case abated by the existing scrubber

The outlet odour concentrations in vacuum transfer pump exhaust flows were relatively high at 10,831 ou_E/m^3, although the flows are very small, so that the magnitude of emissions is consequently small. All vacuum pump outlet airflows associated with the Phase 2 development should be ducted to scrubber abatement by either the existing scrubber or by the proposed new scrubber.

Based on the effective control provided by the scrubber under Phase 1 we have chosen a precautionary approach to add a second scrubbing unit to deal with the most intense odour sources arising from the second processing line.

It will treat all air extracted air from the new 2nd Aeroscalder. The extraction rate recommended by the suppliers is approximately 4.5 m^3/s, but an extraction rate of 6.1 m^3/s was measured on the existing plant and in the interests of a precautionary design this has been assumed to be used for the proposed new unit.

This scrubber will also treat all additional ABP transfer vacuum pump exhaust flows that are not treated by the existing scrubber. A total new scrubber treatment capacity of 7.0 m^3/s has therefore been assumed.

It is proposed that emissions from the new scrubber be dispersed to atmosphere through a new 15m stack. The total stack emissions for the proposed second 15m stack (A6) are based on a total stack emission of 10,000 ouE/s and used in the impact modelling in Appendix 14.

Although slightly smaller, the second chemical scrubber will be the same design as the existing unit, designed to destroy the odours and capture any remaining solids from the gas stream. It will operate in five stages, including a single chemical treatment stage as described previously and provided again in Appendix 16.

6.1.3 WWTP Area

At the WWTP we are installing a new sludge dewatering plant in a new building that will also house the DAF plant. This building will be extracted to the WWTP area chemical scrubber. A new primary balance tank and a new divert tank will be installed and these tanks will be enclosed and ventilated into the WWTP area scrubber along with the existing covered balance tank. This will minimise fugitive odour potential in the WWTP area and provide odour abatement from these sources.

We will retain the existing sludge storage tanks and offloading facility for back up and this will be linked to the chemical scrubber at the WWTP.

An assessment of the odour sources at the WWTP and the design criteria for a replacement WWTP area scrubber to handle the increased air volumes are included in Appendix 14.

Odour emission rates for the open tanks sources (anoxic tank, and aeration/activated sludge tanks) have been based on library data for analogous processes in wastewater treatment plants. These values were, in the main, shown to be precautionary when actual emissions were measured in May 2018, as summarised in Appendix 14.

Since odour emission rates were measured in 2018 the balance tank and diversion tanks have been covered and an odour scrubber installed, under permit variation 1. The airflow treatment capacity of the WWTP area scrubber has been calculated as shown in Appendix 14.

The new WWTP area scrubber will be upgraded from the existing manual chemical dosing system to one with automatic controls which will provide automated blowdown and top-up of the scrubber liquor solution as well as automated dosing with caustic soda and sodium hypochlorite. The objectives of these improvements are to alleviate the dip in scrubber abatement performance which may currently occur towards the end of each periodic scrubber liquor flush out and replenishment cycle.

The new chemical scrubber will also be of the same design as the existing process area scrubber which has proven to achieve 1,000 ouE/m^3 or better. However, as a precaution, for

the odour impact assessment we have used 2,500 ouE/m^3 as the basis for assessing the emission from the new WWTP area scrubber.

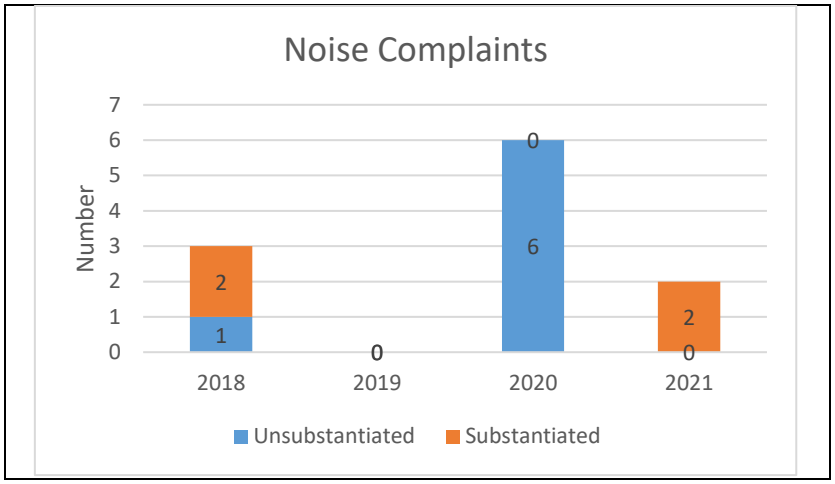
The discharge of treated air will be via a new taller stack of 15m to provide dispersion. This is an improvement on the current stack of 6m high.

For Phase 2 the improved enclosure of odour sources, improved dispersion, extra scrubbing capacity and better scrubber control will give superior odour control in the WWTP area than the current arrangements. This is shown in the odour impact assessment in Appendix 14.

7 Noise & Vibration

The key noise sources at the installation are shown on the installation plan in Appendix 2. A summary of the noise complaint history under Phase 1 is shown in Figure 2:

Figure 2 - Noise Complaints History



During Phase 1 we undertook a noise survey in July 2020 to investigate noise complaints from a residence in Cross Lanes - see report in Appendix 17. This survey proved that under Phase 1, the installation increased the background levels at the closest residential receptors by less than 5dB(A). The survey did not substantiate the complaints but did make one recommendation, which has been completed, to add attenuation to the one remaining ammonia vent on the chiller plant without attenuation.

There have been no cases of vibration causing offsite nuisance under Phase 1 and this remains a low risk.

Phase 2 will introduce additional noise sources such as:

An increase in HGV movements for delivery of live birds, ABP collections, product dispatch. Live bird deliveries will be from 03:30 – 23:30 and fridge trailers will leave between 05:00 – 02:00.

Changes in the external layout include:

- Additional chemical scrubber
- Sprinkler system
- Compressor Room (FLT charging refurb)
- 2nd condenser inside existing enclosure (water cooled)
- Additional fridge plant for basement
- Additional WWTP tanks, pumps, blowers and sludge dewatering unit / building
- New packing store

The new noise sources have been assessed in our Phase 2 noise impact assessment and the report is in Appendix 18. Also see Section 13.6 for more details.

These noise mitigation measures identified in the assessment have been implemented in the Phase 2 design / specification.

Noise Management

Our permit application included a basic noise management plan (NMP) as part of the original noise impact assessment report but we implemented an operational NMP during Phase 1 which we have updated for Phase 2. The latest NMP addresses the potential noise sources and includes the measures devised during Phase 1 to minimise noise disturbance at the nearest residential receptors. See our NMP in Appendix 11.

The potential new noise sources at the installation and changes to existing ones are briefly discussed below and are dealt with in more detail in our NMP.

Under our NMP we undertake qualitative assessments to verify that noise from the various source is not causing noise that is likely to cause off site nuisance.

7.1.1 Vehicle movements

The Phase 2 noise impact assessment of the noise from an increased number of on-site vehicle movements under Phase 2 found that during night-time, the noise levels can be controlled to acceptable levels where HGV movements are limited to 1 per any 15-minute period (i.e., 4 per hour) between 23:00 and 07:00hrs.

During daytime, the forecast 12 HGV movements per hour will result in a negligible increase to the predicted noise and impact at the nearest sensitive receptor.

Vehicles disengage reversing beepers on arrival at site and where reversing is necessary, we use a banksman for guiding reversing HGV's.

Collapsible dock shelters are used by HGVs to contain noise from internal areas. On site vehicles, such as fork trucks mostly operate inside the lairage and external fork trucks are fitted with white noise reversing beepers. Night-time movements of vehicles outside of the buildings are minimal. Our fork trucks are electric and less noisy than diesel powered trucks.

Blood collections are made at the end of the shift around 23:00 and the tanker loading area is shielded from Pickhill Lane by the buildings. Sludge collections at the WWTP are made during operating hours and not overnight and are expected to reduce from twice daily under Phase 1 to around 8 per week when sludge is dewatered under Phase 2 volumes.

As a relatively new installation the on-site roadways are in excellent condition and are inspected and maintained to minimise the potential for clangs and bangs from vehicle

movements. Trained and qualified staff drive the vehicles and drive responsibly, within the site speed limit to ensure site safety and to keep noise levels down.

The existing live bird reception building and lairage can accommodate sufficient HGVs to enable this to be managed. However, we also have scope under Variation 2 to implement the separate holding building if necessary and will ensure that the noise impact of this facility is acceptable.

7.1.2 Operational noise egress

As for Phase 1, the processing plant complies with the Control of Noise at Work Regulations, so that workers are not exposed above the Lower Action Value (LAV). Based on this the noise egress targets are met and we operate a strict closed doors policy.

7.1.3 External plant noise

Noise from the external plant has been designed to meet our planning consent conditions for noise and the Phase 2 noise impact assessment identified the specification for the second condenser plant. This requirement for a low noise condenser led to the decision to install a water-cooled condenser and this also has the benefit of providing recovered heat for hot water heating.

The new building at the WWTP will enclose the DAF unit, sludge dewatering plant and sludge handling operations. This will minimise noise escape from these facilities.

7.1.4 Building air extraction system / air intake fans

The extraction systems and chemical scrubbers will continue to be well maintained to ensure performance is optimal and checks will continue of the extraction ducting and fans so any abnormal noise or vibration is noticed and addressed quickly.

Both chemical scrubbers will be located alongside each other on the eastern side of the installation alongside the lairage building. This screens them from Pickhill Lane so noise from fans and pumps is not detected at the nearest houses.

Air intake and exhaust fans are located to be screened by buildings or pointing away from the nearest housing receptors.

During Phase 1 we received some noise complaints that may have been attributable to the main chemical scrubber so we fitted an enclosure to the scrubber fan and now ramp it down on a timer in non-processing hours. Scrubber 2 will be operated in the same way.

There have been no further noise complaints linked to the efflux air from the scrubber and building extraction system fans under Phase 1 and our Phase 2 noise impact assessment concludes that they should not lead to offsite noise nuisance. Nonetheless, if operational

experience under Phase 2 identifies any noise sources that are contributing to offsite noise nuisance these will be addressed responsibly and in accordance with our NMP.

7.1.5 Refrigeration and chiller plant

Noise from refrigeration plant can potentially create offsite noise complaints. The main chiller refrigeration plant is housed in an acoustic building alongside the offices and all the vents are fitted with acoustic louvres. The condensers are located alongside this building in an enclosure.

Following noise complaints in 2020 a noise investigation survey was undertaken which did not substantiate the complaints. However, the report recommended that we attenuated the only remaining ammonia duct which was not louvred. The already louvred extracts were not audible at the measurement position during the survey.

The specification of the existing ammonia refrigeration plant air cooled condenser is shown in Appendix 19. Note the noise data on Page 2 of the specification sheet at 1.5m & 15.0m, and the reference to noise silencers (which refers to the water fill) & Super Low Sound Fan on Page 1. The water can sometimes cause the most noise, so we specified to have the water fill below the standard level line.

The initial desk top Phase 2 noise impact assessment, based on the condenser technical specification identified that the existing condenser plant could impact the nearest sensitive receptor at night-time. This would be compounded by installing a second air cooled condenser so a low noise condenser was specified.

We undertook a further onsite assessment of the existing condenser and took actual noise measurements. This found that plant noise is sufficiently low and further noise mitigation measures are not necessary. This is consistent with operational experience and there is no history of noise complaints related to the existing condenser.

The second, new chiller plant condenser for Phase 2 is being sourced and will be water cooled to ensure it can achieve the low noise specification recommended, so as not to increase the noise level at the nearest receptor. This also has the benefit of providing recovered heat for hot water heating. The Phase 2 Noise Impact Assessment report is in Appendix 18.

As well as the main refrigeration plant, a new fridge plant will be added in the basement.

Refrigerated trailers parked up are connected to electric hook up points, not diesel engines.

All of our refrigeration plant is maintained on a regular basis by refrigeration engineers.

7.1.6 Boilers & Utility Buildings

Our existing boilers are located inside the utilities building which has acoustic type doors. This is located on the eastern side of the installation alongside scrubbers and the lairage building. It is shielded from the residential receptors in Pickhill Lane by the main buildings and is

insulated to minimise noise egress. For Phase 2 there will be an additional small boiler for Aeroscalder 2. There have been no noise complaints linked to the utilities building under Phase 1.

7.1.7 Wastewater Treatment Plant

Sources of noise at the WWTP include pumps and blowers. The WWTP is located well away from Pickhill Lane housing and shielded by the main factory buildings. Additional treatment capacity is provided under Phase 2 with duplicate equipment added.

Externally mounted blowers are installed in acoustic cabinets rated at 78 dB at 1.0m and these are located amongst the large tanks at the WWTP for additional screening.

The additional blower at the WWTP will be the same as the existing. The Phase 2 noise impact assessment verified that the existing and additional blower at the WWTP will not create an offsite noise nuisance.

The new balance and divert tanks will be fully enclosed which will minimise noise egress from the venturi mixers.

The new sludge dewatering plant will be housed in a new prefabricated building and has a low noise and vibration specification. Road tanker collections of non-dewatered WWTP sludge are only made during our operational hours and will be a backup system only under Phase 2. Sludge volumes will reduce by around 60% pro rata with sludge dewatering implemented, further reducing HGV movements and associated noise.

8 Energy Efficiency

By doubling our production capacity our electricity use will rise but the consumption rate per bird will be the same or better as we add energy efficiency elements to the plant.

There will be a second processing line, additional chilling plant, additional fans to circulate and extract air from the process area operations and an additional chemical scrubber to treat some extracted air from the most odorous areas.

Electricity use will also increase from the additional wastewater treatment capacity and extra treatment required. Gas consumption will increase for the extra hot water demand for cleaning and the second aeroscalder.

Energy efficiency measures include heat recovery from the air compressors and refrigeration plant for hot water heating. This is currently low grade but we are investigating high grade options. The new water-cooled condenser will provide heat for hot water.

Other measures include variable speed drives, LED lighting and sensors on light, wash stations and process lines to switch off equipment when not in use.

Table 27 compares our current energy consumption performance with the sector guidance benchmarks and shows that we are leaders in the sector.

Table 27 - Energy Consumption Comparison

Performance Reference	Energy Consumption
Maelor Foods Phase 1	0.27kWh/bird or approx. 180kWh/T carcass*
SA Bref (2005)	152 – 860kWh/T carcass
EA Sector Review 2010	1.45kWh/bird average
Draft SA Bref Review (2021)	0.25–0.90kWh/bird

*Based on a carcass weight of 1.5kg

Phase 2 will potentially provide some further improvements with the heat recovery measures being incorporated.

We are currently investigating joining the Poultry Sector CCA scheme but it is not currently possible to join for Target Period 5. However, if the new CCA scheme goes ahead, we have opportunity to join as new entrants next year (or the year after if there are delays).

9 Water Consumption

Our water consumption will increase proportionally to the increase in processing capacity. We will continue to minimise our consumption rate by recycling the maximum amount of grey water from the wastewater treatment plant that we can utilise in some applications as described earlier.

We are considering applying for a second water abstraction licence from NRW for a second borehole to meet our increased water demands.

More sub metering will be added to regulate the highest water consuming processes to provide us with information to target further reductions in consumption.

Table 28 compares our current water consumption performance with the sector guidance benchmarks and shows that we are leaders in the sector.

Table 28 - Water Consumption Comparison

Performance Reference	Water Consumption
Maelor Foods Phase 1[Note 1]	6.65L/bird or approx. 4.67m^3/T carcass [Note 2] 5.69L/bird [Note 3]
SA Bref (2005)	5.07 – 67.4 m^3/T carcass
EPR6.11 -Treating and processing poultry	8 – 15L/bird
EA Sector Review 2010	9.8L/bird & 5.85m^3/T carcass average
Draft SA Bref Review (2021)	2–13L/bird & 1.45–6.30m^3/T carcass [Note 3]

Notes
[1] At 1 million birds/week
[2] Based on a carcass weight of 1.5kg
[3] Expressed as wastewater discharge per bird / T carcass

10 Accidents and emergencies

Our main chiller (ammonia) will be upgraded for Phase 2 and a new chiller will be added for the basement (glycol).

We have reviewed our emergency response plan to consider the changes under Phase 2 but this has not identified any additional potential hazards for the ammonia plant.

11 Site condition report

We submitted Site Condition Reports with our original permit application and our application for Variation 2. There are no changes to the installation area covered by Phase 2 and the activities undertaken are the same. The additional processing line will be located inside existing buildings and the only new drains will be wastewater drains in the basement area.

The additional wastewater treatment plant facilities will be installed in the WWTP area and will be accommodated by installing a new concrete bund to replace the earth bund.

The existing site condition reports cover these areas and the existing activities, raw materials and waste arisings and therefore no changes have been made to the site condition report.

Closure and Permit Surrender

There are no changes required to our site closure plan due to the increase in production capacity and associated changes to the installation under Phase 2.

A site closure and decommissioning procedure is included in our EMS and reviewed on a regular basis. It covers the general clean-up of the site, removal of all materials, residues, waste and emptying of any drains or sumps, dismantling of equipment and safe removal of any chemicals or oils.

We continue to maintain records of the ground condition, any incidents and remediation work during the lifespan of the installation permit. This will then be used to inform the site closure plan and permit surrender application in due course if we close the installation.

12 Monitoring

There are no changes proposed to our permit monitoring criteria which do not specify any monitoring of point source emissions to air. We do not propose to undertake any monitoring of the additional small boiler for the new aeroscalder which will be maintained in accordance with the manufacturer's guidelines to minimise emissions to air.

The additional process area and replacement WWTP area chemical scrubbers will be included in our odour management plan which specifies intermittent olfactometry monitoring for qualitative purposes and in house control.

The continuous monitoring of our wastewater treatment plant meets MCERTs as specified in our permit. Approximately 2 years ago NRW undertook an OMA audit of our continuous and in house monitoring systems and procedures at our WWTP and we satisfactorily addressed their findings. We will continue with our Phase 1 monitoring arrangements and we propose no changes to the compliance monitoring under the permit.

13 Environmental impact assessment

For our original permit application, we used the H1 tool to calculate the impact of emissions to air from our boilers. H1 screens out from detailed assessment those releases described as 'insignificant' emissions to air or for discharges to water, wastewater streams containing substances which are not 'liable to cause pollution'.

We did not use H1 to assess the odour impact and water discharge and used more rigorous Air Dispersion Modelling and River Quality Planning Modelling instead. The only parameters listed in H1 for discharge to water of relevance to our discharge are ammonia and iron so we would have had to assess the other parameters by a different method anyway.

Planning applications now require what is called an Appropriate Assessment under the Habitat Regulations to assess the impacts of a proposed development on the SAC and then to provide either on-site or off-site mitigation to overcome such effects, so that the development is 'phosphorus neutral'. We have undertaken an assessment to address this for Planning purposes and, as we understand that NRW review these assessments we have included it with for our environmental permit variation application below.

We have also undertaken a qualitative assessment of our aspects and impacts.

For our permit variation application for Phase 2 we have undertaken further impact assessments of odour, noise, air and water emissions as described below.

Qualitative impact assessment

We have undertaken a further qualitative environmental impact assessment for Phase 2 and this is provided in Appendix 12. It follows our procedure for Environmental Impact Assessment which is in line with "guidance on risk assessments for your environmental permit". It is based on qualitative risk assessment methodology, where a judgement of risk of an environmental impact is assigned based on the 'Source-Pathway-Receptor' Model.

We have also reviewed the environmental impact assessments for each aspect in our Environmental Impacts Assessment Register.

Where we consider that the hazards do not pose a significant risk, we have not undertaken any further assessment.

Based on our qualitative assessment we have identified the most significant environmental hazards from the installation and undertaken further assessments to determine the potential impact and to inform the plant design and procedural controls required to minimise impacts to acceptable levels. These are described further below.

Boilers and emissions to air

The H1 assessment undertaken for the original permit application in 2017 for the air emissions from the current boilers (A1 – A4) showed that there is no detrimental effect on the local air quality and local environmental receptors.

For Phase 2 a further boiler (A7) is added to serve the aeroscalder on the second processing line under Phase 2. We have undertaken a new assessment of the emissions to air impact based on the Phase 2 boiler parameters and worst-case operating scenarios. For this assessment we have used air dispersion modelling to get a more accurate evaluation.

The results of the air quality assessment identified that the maximum process contributions from the proposed boiler and the existing boilers would be below the screening criteria of 1% of the relevant long-term Air Quality Standard at all receptors assessed, apart from the process contribution to nitrogen deposition at the River Dee and Bala Lake SSSI and SAC.

However, the exceedance is mainly due to the existing boilers and the process contribution from the proposed new boiler on its own, would be well below the 1% screening criteria.
The maximum process contribution was also assessed to be below the screening criteria of 10% of the relevant short-term AQS.

It is concluded that the overall air emission impact of the site on sensitive human and ecological receptors is not significant and none of the relevant AQS's will be approached or exceeded.

See the assessment report in Appendix 13 and modelling data files Appendix 13b.

Odour nuisance potential

Poultry slaughterhouses have an inherent odour risk due to the nature of the activities undertaken. The installation is approximately 1 km to the southeast is the village of Bangor-on-Dee and approximately 700m to the northwest is the residential area of Cross Lanes. There are five residential properties close by, located off Pickhill Lane, to the west of the proposed main poultry processing building and site entrance.

For our original permit application, we undertook a qualitative and a quantitative odour impact assessment using air dispersion modelling. In the operational phase and to satisfy our Improvement Programme we have also undertaken olfactometry surveys to obtain live data from our operations and have repeated monitoring earlier in 2022 to collect more data.

For Phase 2 we have repeated the air dispersion modelling impact assessment to account for the following changes to the plant:

- An increase in processing capacity from 1 million birds per week to 2 million birds per week by installation of a second processing line.

- Addition of a second chemical scrubber with a 15m dispersion stack to serve the most odorous process areas of the new processing line.
- An extension to the wastewater treatment plant (WWTP) to increase on site wastewater treatment capacity and an increase in the volume of cleaned water to be discharged to the River Dee.
- Upgrading and replacing the chemical scrubber serving the WWTP, with the addition of a 15m dispersion stack, and enclosure and extraction of more odour sources at the WWTP.
- A new sludge dewatering plant to reduce sludge volumes and associated vehicle movements for transfer offsite for reuse of the sludge

See the air dispersion modelling impact assessment report in Appendix 14 and the modelling data files Appendix 14b.

These assessments considered the potential for offsite ground level odour concentrations causing nuisance to human receptors and leading to odour complaints. This has informed our Phase 2 design considerations and we have reviewed our Odour Management Plan accordingly.

Process conditions of the proposed facility were used to quantify potential odour impacts at sensitive receptor locations around the plant using dispersion modelling. The results were subsequently compared with appropriate odour benchmark levels to determine the potential for adverse effects in the vicinity of the site.

The results of dispersion modelling show that predicted odour impacts at all receptors are all well below the suggested impact benchmark range of 3.0 to 5.0 ouE/m^3 and modelled impacts are also all below a more precautionary 1.5 ouE/m^3 benchmark assuming 15m stacks discharging air from two chemical scrubbers serving the processing plant and a 15m scrubber stack serving the upgraded wastewater treatment plant scrubber.

The significance of the predicted odour impact is therefore assessed to be **‘negligible’** at all receptor locations using the IAQM assessment criterion.

Based on the assessment results, it is not anticipated that there is a significant risk of adverse odour impacts occurring at any sensitive location as a result of emissions from the proposed development. As such, the potential for adverse odour impacts at sensitive receptor locations is considered to be low

Our revised Odour Management Plan is in Appendix 10
Our updated Qualitative Impact Assessment is in Appendix 12

Treated wastewater discharge to controlled waters

Treated wastewater from our wastewater treatment plant is discharged into the River Dee via emission point W1. The river at this point is a good / high quality, potable supply water

course and is designated as a Special Area for Conservation, designated for its Atlantic salmon and water plantain populations.

A water quality modelling assessment has been carried out for the proposed increase in discharge by Maelor Foods Ltd to the River Dee in Wrexham. See the assessment report in Appendix 9.

We understand that NRW will re-run the modelling using the same tools and data to verify that it is correct. The WQ monitoring data files are included in Appendix 9b.

The assessment used the Environment Agency's River Quality Planning (RQP) Monte Carlo tool to model the effect of the discharge on the downstream river quality, specifically for determinands: BOD, ammonia, total phosphate and pH. A mass balance spreadsheet tool was used to model the resultant river temperature downstream of the discharge.

The river quality modelling using RQP showed that the predicted impact of the increased discharge on downstream river quality is small, with most quality determinands showing no change. Any predicted change in quality was small, especially in the context of uncertainty in the upstream flow data.

This was also reflected in the monthly temperature modelling, which showed a very small increase in temperature, apparent only at the second decimal place, under both average and Q95 (low) flow conditions in the river.

The results were based on proposed discharge flows of an average 2,400 m^3/day and a maximum 3,120 m^3/day, with quality based on the discharge concentrations currently permitted at the site. The results showed negligible impact at this loading (flow and concentration) from the discharge.

BOD and ammonia concentrations downstream remain at Water Framework Directive High Status and despite the increases in flow, all values excluding phosphate are within the NRW High and Good River Standards. Note that the upstream phosphate concentration has increased since the 2015 analysis and is now non-compliant with WFD Good Status.

Note that this report was commissioned before the new SAC Management Plan for Phosphorous was prepared so does not consider this. We have therefore undertaken a separate assessment of the phosphorus impact of the installation on the SAC in addition to our other impact assessments. See Section 0 and Appendix 20.

Protection of the underlying aquifer / surface waters

The site is located on a groundwater source protection zone aquifer (Zone III, total catchment). The installation is also located within the 'Middle Dee Groundwater Management Unit' of the Dee Catchment Abstraction Management Strategy (CAMS).

The site drainage from the installation feeds into the River Dee, a sensitive watercourse with downstream potable extraction and a Special Area of Conservation (SAC) for its Atlantic salmon and water plantain populations. Therefore, the potential impact of spillages of fuels and chemicals could be high.

Our Site Condition Report, as revised for Variation 2 assessed the risks and estimated that there is a Moderate Risk of harm to sensitive receptors, mainly controlled waters, from the existing contaminative issues on site. It was anticipated there is a Low to Medium Risk of harm to sensitive receptors from the activities undertaken at the installation.

For Phase 2 our processing capacity will increase but there are no changes to our raw materials, chemicals and waste handling and storage, site drainage or emergency preparedness. We will use proportionally more chemicals for a higher throughput and will have more frequent deliveries of our raw materials and collections of waste.

The technical and procedural controls we use to operate and monitor the installation ensure that these risks are well managed and acceptable. Our operational experience from Phase 1 shows these are effective at preventing and in responding to leaks to minimise groundwater contamination. Bunding improvements to the chemical scrubber area and WWTP area will add further protection.

Our updated qualitative risk assessment concludes that the overall risk remains low / medium.

River Dee SAC Habitats Assessment – Phosphorous Neutral

Recent case law relating to the Court of Justice of the European Union (CJEU) decision, known as the “Dutch case”, and the scope for authorising new development that will lead to additional phosphorus loading is likely to be limited where the conservation status of the SAC is unfavourable due to phosphorus standards being exceeded.

We understand that NRW are the statutory consultee for such assessments and undertake their own review of the assessment. Given that this environmental permit variation application is being submitted alongside our planning permission application we have included our SAC Habitats assessment here as well.

Phase 2 will increase our production capacity and this will potentially have three aspects and impacts on the SAC phosphorous target.

1. Double the wastewater volume to be treated and discharged to the SAC designated river.
2. The WWTP sludge which is sent for land deployment could cause diffuse phosphorous pollution within the SAC catchment area, albeit the sludge volumes will reduce with sludge dewatering to be undertaken for Phase 2.
3. The additional shift required for Phase 2 production will increase the volume of domestic sewage for treatment in the onsite sewage treatment plant.

We have undertaken an assessment of all these aspects and impacts alongside a review of the current river quality information to assess if the phosphorus standard for the river stretch downstream of the installation (Chester Weir to Ceiriog) will be met. See Appendix 20.

Noise nuisance potential

Our original Planning Consent required that the rating level of any noise generated due to this installation shall not exceed the pre-existing background level by more than 5dB(A) at any time. Our Phase 1 noise impact assessment supported our original planning application.

During Phase 1 we undertook a noise survey in July 2020 to investigate noise complaints from a residence in Pickhill Lane - See report in Appendix 17. This noise survey proved that under Phase 1, the installation increases the background levels at the closest residential receptors by less than 5dB(A). The survey recommendation to add attenuation to the one remaining ammonia vent on the chiller plant without attenuation has been completed.

The key noise sources for Phase 2 are shown on the installation plan in Appendix 2 . We have undertaken a further noise impact assessment to cover the changes under Phase 2 and the report is included in Appendix 18.

The key report findings are:

- The previous noise survey undertaken in July 2020 determined background noise levels at the nearest residential receptors (LA90 (15min)).
- The initial Phase 2 baseline survey recommended that the second condenser unit should be a 'quieter' model than the existing. The new condenser will be water cooled which is a very low noise technique to meet this requirement.
- An attended noise survey on 8th September 2022 determined the ambient noise level (LAeq,T) of the existing condenser unit.
- The predicted level of plant noise exceeds the night-time target by 8dB at the Pickhill Lane receptor, which depending on the context, is likely to be an indication of an adverse impact. However, BS8233 internal ambient noise level targets are predicted to be met in bedrooms of the nearest noise sensitive receptor (NSR) considering a partially opened window. On this basis, plant noise is sufficiently low and further noise mitigation measures are not necessary.
- The plant noise limit is met at both other NSRs considered during the daytime and night-time periods.
- The limiting noise level targets for delivery noise will not be exceeded at the Pickhill Lane NSR in the night-time period if deliveries are restricted to 1 per any 15-minute period (i.e. 4 per hour) between 23:00 and 07:00hrs.
- Daytime - The recommended night-time limit approximately equates to 16 HGV movements during the 4-hour night-time period of the 20-hour working day.
- On this basis, the number of daytime (16-hour) movements to meet the required average 220 movements is 194. This equates to 12 movements per hour.

Appendices

Appendix 1 – Phase 2 Installation Plan

Appendix 2 - Installation Plan showing noise sources

Appendix 3 - Site Drainage Plan Phase 2

Appendix 4 - Line 2 Schematic Drawing

Appendix 5 - Slaughter Line Flowchart

Appendix 6 - Utilities Building Drawing showing new boiler and scrubber

Appendix 7 - Wastewater Treatment Plant Phase 2 Layout Plan

Appendix 8 - WWTP Sludge Dewatering Plant Specification

Appendix 9 - Water quality modelling of WWTP discharge to River Dee for Phase 2

Appendix 9b - WQ Modelling Data files

Appendix 10 - Odour Management Plan V6

Appendix 11 - Noise Management Plan for Phase 2

Appendix 12 - Revised Qualitative Environmental Risk Assessment

Appendix 13 - Boiler Emissions Impact Assessment Report

Appendix 13b – Air dispersion modelling files – Boiler emissions

Appendix 14 - Odour Impact Assessment Report

Appendix 14b - Air dispersion modelling files – Odour emissions

Appendix 15 - Chemical Scrubber Photographs

Appendix 16 - Chemical Scrubber Design Specification

Appendix 17 - Noise complaint assessment report 2020

Appendix 18 - Noise impact assessment for Phase 2

Appendix 19 - Ammonia Refrigeration Plant Air Cooled Condenser Specification Phase 1

Appendix 20 - Habitats impact assessment - River Dee SAC phosphorous standard