Celtic Renewables Grangemouth Plc
Caledon Green Exemplar Plant

Permit Application

PPC/A/1193001

CONTENTS

1 NON TECHNICAL SUMMARY OF DETERMINATION

PPC requires that where the draft determination of an application or a SEPA initiated variation is to be subject to public consultation (this is usually referred to as PPD consultation) the decision document will contain a non-technical summary of the determination. There is no need to have a non-technical summary if the application is not subject to PPD

Will the draft determination be subject to public consultation? Yes

Celtic Renewables Grangemouth plc (CRG) is applying for a PPC permit to operate a Biorefinery at Caledon Green Grangemouth under Schedule 1, Section 4.1 Part A (b) of the Pollution Prevention and Control (Scotland) Regulations 2012. This site is to be known as the Caledon Green Exemplar Plant.

The CRG application follows the current SEPA application process and consists of the correct application forms, a non-technical summary, and a raft of supporting documentation covering the issues required to be addressed in the 2012 Regulations and the Retained EU legislation.

In their original supporting documentation CRG provided a more detailed description of the following:

1 The activity they propose to carry out
2 The equipment to be used in the production process (The Stationary Technical Unit)
3 The measures and techniques to be put in place at the site to prevent pollution Including, but not restricted to; an outline of the Management Techniques; details of how materials and products on site will be handled; measures to reduce waste; and energy efficiency measures; and measures to minimise the risk of accidents
4 The results of modelling assessments carried out on noise, odour, and air emissions.
5 Details of the site prior to the commencement of production
6 An assessment of the Use of Best Available Techniques on the proposed site

Following acceptance as Duly Made, the application was advertised in both the Edinburgh Gazette and the Falkirk Herald and sent to a number of Statutory consultees for comment. No responses were received from members of the public and only one response from the consultees with the concerns raised addressed through conditions in the draft permit.

An initial assessment and review of the documents provided by CRG was carried out by SEPA, and whilst the application satisfied a number of the key requirements for PPC and BAT there were a number of issues that were not fully covered and required to be addressed further. As a result, SEPA issued a Further Information Notice (FIN) requiring CRG to provide further clarification/justification on 17 points pertaining to the following:

1 Measures to control noise and odour impact
2 Justification and use of BAT (generally and with reference to the choice of odour abatement)
3 Stack design
4 Effluent discharge and treatment

The applicant provided the further information (including additional modelling and monitoring data) in response to the FIN within the required timescale and this was appended to the application by SEPA and discussed in this document

Owing to unforeseen circumstances the determination of the application was delayed until mid 2021 whereupon a detailed and thorough review of all of the information provided by CRG to SEPA up to that point was carried out, with the proposed techniques being assessed for compliance with EU retained legislation on Best Available Techniques for the Sector. The proposal met the benchmarks for BAT contained in The Production of Large Volume Organic Chemicals BAT Conclusions (LVOC

BATC), and The Common Wastewater and Waste Gas Treatment / Management Systems in the Chemical Sector, (CWW BATC) with the pre agreed monitoring for noise and odour indicating a negligible impact from the permitted activities

Following the review SEPA has drawn up a Draft PPC Part A permit for the regulation of the site and has included a number of non-standard conditions (those that differ from SEPA's standard Part A permit template) to cover those operations carried out which are specific to the site. This bespoke draft permit has been issued to the operator for comment and published for open consultation under the Public Participation Directive accompanied by a non-technical summary and this Decision Document

Glossary of terms

CRG - Celtic Renewables Grangemouth Plc
CRL - Celtic Renewables Limited
ALARP - As Low as Reasonably Practicable
AQIA - Air Quality Impact Assessment
BAT - Best Available Techniques
BATC - BAT Conclusions
BREF - BAT Reference Documents
BSI - British Standards Institute
CO - Coordinating Officer
COTC - Certificate of Technical Competence
ELV - Emission Limit Value
VOCs - Volatile Organic Compounds

2 EXTERNAL CONSULTATION AND SEPA'S RESPONSE

***Is Public Consultation Required* – Yes**

Advertisements Check:	***Date***	***Compliance with advertising requirements***
Edinburgh Gazette	28/07/2020	yes
Falkirk Herald	30/07/2020	yes

No. of responses received: None as far as can be determined.
Summary of responses and how they were taken into account during the determination: N/A
Summary of responses withheld from the public register on request and how they were taken into account during the determination: ***N/A***
***Is PPC Statutory Consultation* Required – Yes**
Food Standards Agency: Consulted 15/07/2020 SEPA has no documented response from the FSA on the proposal.
NHS Forth Valley: Consulted 15/07/2020 SEPA has no documented response from NHS Forth Valley on the proposal.
Falkirk Council: Consulted 15/07/2020 Initial covid response (16/07/2020) advised that the consultation would be passed to the Environmental Health department for any comment... SEPA has no further documented response from the Falkirk Council on the proposal
Scottish Water: N/A
Health and Safety Executive: Not consulted (although it is worth recording that there was some discussion as to whether the site would exceed the threshold for inclusion as a Control of Major Accident Hazards (COMAH) site. (See Section 7 below))
Scottish Natural Heritage (PPC Regs consultation): Consulted 15/07/2020. Proposed site is within the relevant screening distance for the specific activity (2km) of environmentally designated sites on the Firth of Forth The e-mail response from SNH was received on 13 August 20202 stating that: "As detailed in Table 4, there are several materials which are potentially harmful to this protected area. However, *[SNH] note* that the design of the process and the mitigation measures to be incorporated will ensure that these materials are not released into the environment, ...based on the information provided in the application... the proposal will not adversely affect the integrity of the SPA/SSSI/Ramsar site. The response was taken forward and looked at in depth under the Nature Conservation procedure (box 6 below)
Harbour Authority: N/A
Discretionary Consultation - No
Enhanced SEPA public consultation - No
'Off-site' Consultation - No

Transboundary Consultation	**- No**
Public Participation Consultation	**- Yes**

STATEMENT ON THE PUBLIC PARTICIPATION PROCESS
The Pollution Prevention and Control (Scotland) Regulations 2012 (schedule 4, para 22) requires that SEPA's draft determination of this application be placed on SEPA's website and public register and be subject to 28 days' public consultation. The dates between which this consultation took place, the number of representations received and SEPA's response to these are outlined below.

Date SEPA notified applicant of draft determination	20 January 2022
Date draft determination placed on SEPA's Website	24 January 2022
Details of any other 'appropriate means' used to advertise the draft	
Date public consultation on draft permit opened	
Date public consultation on draft permit consultation closed	
Number of representations received to the consultation	
Date final determination placed on the SEPA's Website	

Summary of responses and how they were taken into account during the determination:

3 ADMINISTRATIVE DETERMINATIONS

Determination of the Schedule 1 activity

The activity applied for falls under Section 4.1 Part A (b) of the Pollution Prevention and Control (Scotland) Regulations 2012 namely Producing organic compounds containing oxygen by fermentation (including Ethanol Acetone and n-Butanol)

Determination of the stationary technical unit to be permitted:

As detailed in the information supporting the application and the Environmental Impact Assessment (EIA) scoping report)

Determination of directly associated activities:

As detailed in the application and the supporting information

Determination of 'site boundary'

As detailed in the plans contained within the information supporting the application

4 INTRODUCTION AND BACKGROUND

4.1 Historical Background to the activity and application

Celtic Renewables Grangemouth plc (CRG) was founded in 2017, is currently applying for a PPC permit to operate a Biorefinery at Caledon Green Grangemouth under Schedule 1, Section 4.1 Part A (b) of the Pollution Prevention and Control (Scotland) Regulations 2012. This site is to be known as the Caledon Green Exemplar Plant

CRG Operate within the UK sustainable renewable sector, and according to the application the company is looking to build on the Acetone-Butanol -Ethanol (ABE) process in which virgin crops (such as sugar cane) are fermented to produce biofuel. CRG has developed a novel process that uses sub-food grade crops, by-products, and residues as feedstock, these are fermented to produce acetone, butanol and ethanol, and a wet cake, which can be processed into a high protein animal feed.

In Nov 2013, CRL submitted a planning application, supported by an Environmental Impact Statement, to Falkirk County Council for the development of The Caledon Green Site NGR NS 91711 81133 at Earls Gate Park, Grangemouth, approximately 1.4km to the west of Grangemouth town centre. Located to the south of Earls Road, east of Beancross Road and the M9 (Edinburgh to Stirling motorway). Industrial developments are adjacent to the north, east and west of the site with a freight section of the East Coast mainline to the south. Across which is the Jupiter Urban Wildlife Centre owned and managed by the Scottish Wildlife Trust.

CRG state that they are looking to the Caledon Green Exemplar Plant to establish the process on a commercial scale in, preparation for its replication at larger scale future plants located in Scotland and in other key strategic locations worldwide.

4.2 Description of activity

The Caledon Green Exemplar Plant is a biorefinery which utilises by-products from the Scotch Whisky Industry (draff and pot ale) and grade B potatoes. (Unsuitable for the consumer market). During the fermentation process bacteria convert the sugars: xylose, arabinose, and glucose into Acetone Butanol and Ethanol which can be used as biofuels.

The activity as described will involve the following:
• Acceptance of raw materials and chemicals; with raw materials delivered to site when required,

• Processing (including (occasional) washing, and/or maceration of) draff, pot ale and potatoes. See process diagrams below (EIA B5.1 Appendix 1 scoping)

The ABE Fermentation Process utilised at the Caledon Green exemplar plant consists of a 5-stage process summarised as follows:

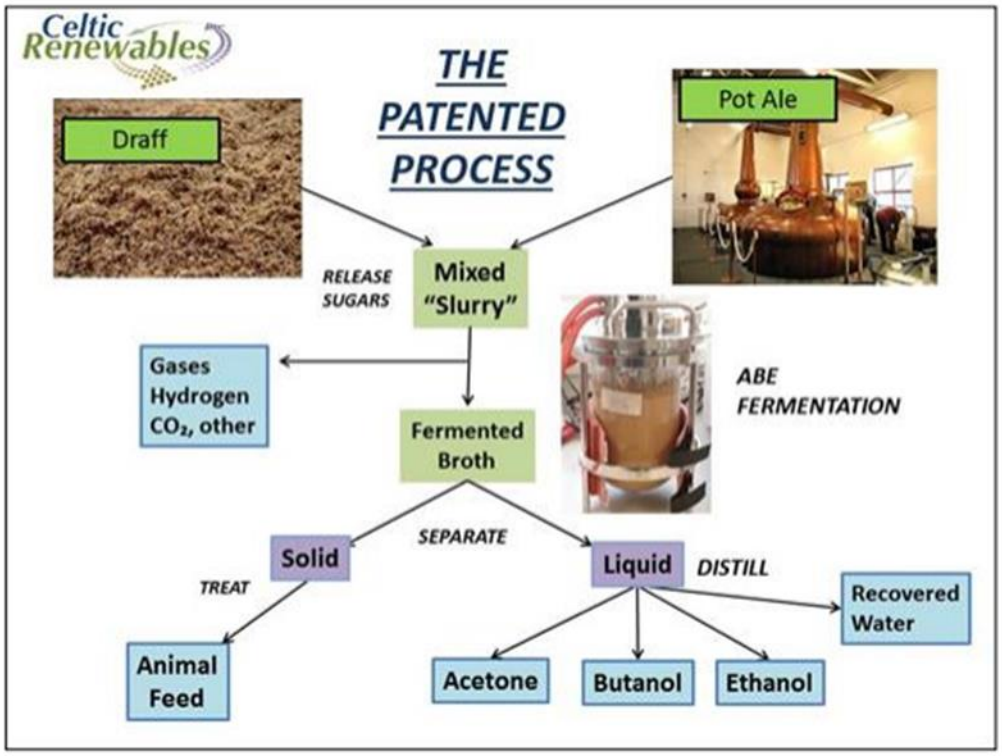
Step 1: Preparation of Fermenter feed

Step 2: Fermentation

Step 3: Distillation

Step 4: Cake Production

Step 5: Storage of products



Flowchart showing the process of chemical production.

• The plant is expected to run 24 /7 for 48-50.5 weeks per year,

• At present there is no energy production on site, but a package boiler is currently being considered

4.3 Guidance/directions issued to SEPA by the Scottish Ministers under Reg.60 or 61.

NONE

4.4 Identification of important and sensitive receptors

Designated Sites

There are different screening distances for Air and water in the case of a CRG discharge to water the screening distance would be 3km the same as for a Complex CAR licence. The assessment under the Nature Conservation Protocol was undertaken prior to the cyber-attack and it is assumed that the water discharge was also assessed at that time; however, as there are no direct discharges to water from the CRG installation and the discharge to sewer forms part of the overall loading passing through the Calachem treatment plant then there would be no need to further assess the effect on the water

environment as that assessment has already been made for the permitted discharge from the Calachem Plant.

SNH were consulted for any concerns they may have regarding the impact of the proposed activity on the designated sites during the formal consultation stage of the application and the comments during the EIA advised that if SEPA were to require detailed modelling for the stack assessment then SNH would recommend that that pollutant concentrations and depositions for sites within a 15km screening distance were assessed and compared with each site's relevant critical level and critical load value

The following sites were identified

- Firth of Forth (Site of Special Scientific Interest, SSSI)
- Firth of Forth (Special Protection Area, SPA)
- Avon Gorge (SSSI)
- Carron Dams (SSSI)
- Howierig Muir (SSSI)
- Darnrig Moss (SSSI)
- Bo Mains Meadow (SSSI)
- Carriber Glen (SSSI)
- Linlithgow Loch (SSSI)
- Slamannan Plateau (SSSI)
- Slamannan Plateau (SPA)
- Lochcote Marsh (SSSI)

Residential
The closest residential properties have been identified as being situated to the South and Southeast (approx. 260m), to the East (approx. 500m) and to the North (approx. 900m)

Other Receptors
The Jupiter Wildlife Park and the Grange Manor Hotel.

5 KEY ENVIRONMENTAL ISSUES

5.1 Summary of significant environmental impacts

Those linked to Biofuel and solvent production at this plant are identified, as follows.

Emissions to Air Acetone, Butanol, Ethanol, Trace VOCs (0-2%) by volume) [Dimethylamine 1, 3-Butanediol, Isopropyl Alcohol, Ethane, 2-Butanol, 3-Methyl-2-pentanol, 3-Methyl-2-butanol, Acetic Acid, Butyric Acid] CO2, Hydrogen, Particulates, odour

Emissions to Land* Acetone, Butanol, Ethanol, Trace VOC's, TOC, Oils and lubricants, fuel, pH Detergents, Organic acids, Alkalis

Emissions to Water Acetone, Butanol, Ethanol, Trace VOC's, BOD, COD, pH, Copper, Oils, and lubricants, fuel, Enzymes, Detergents, Anti foaming agent, Organic acids, Alkalis

Other Emissions Noise, Heat

*Emissions to Land covers all aspects of the discharge of potential pollutants to ground; whether direct or indirect, and includes but is not restricted to spills, escapes of waste and disposal of waste on site.

It is specifically those that would impact on soil and groundwater monitoring, and site surrender.

SEPA aims to control these impacts through both the conditions contained in the Permit and by the requirement on the Operator to use BAT as indicated in the relevant guidance for the activities being undertaken. (See BAT section 5.21 below)

5.2 Point Sources to Air

Background Air Quality
The air quality effects associated with the operation of the proposed biofuels facility at Caledon Green in Grangemouth, were assessed as part of the EIA. Background reports for the environs of the new site show good air quality, with predicted concentrations of all pollutants below the relevant air quality objectives. The proposed site lies within an Air Quality Management Area which includes the Grangemouth petrochemical complex, which was designated in 2005 following breaches of the sulphur dioxide (SO2) objective, since 2013 these levels have been below the objective.

Plant Design

CRG has designed the plant such that all emissions from the main process are passed to a 2-stage abatement system consisting of a wet gas scrubber* and a carbon filtration unit before being discharged to atmosphere via a single 16.9 m stack designed to give maximum dispersion at a single discharge point.

Stack Design

Consultants for CRG undertook a H1 Impact Assessment to investigate the potential impact of air emissions from the proposed process stack. The main bullet points from the information provided are as follows:

The stack position is shown on the site plan, it is 16.9m high was described has having a target exit velocity around 15 m/s under normal operations (in line with the BAT guidance) with a Temperature of approx. 30^{o}C. The applicant stated that according to BAT guidance *"where wet arrestment was being used, unacceptable emissions of droplets could occur where the linear velocity in the stack exceeds 9m/s",* they then went on to conclude that "*as no wet arrestment technologies are being proposed, it is assumed that the good practice target exit velocity of 15 m/s will be achieved".*

*****The wet gas scrubber is primarily included to treat any odours which may be generated under abnormal operation, for example during infrequent upset conditions during fermentation **(See section 5.7 below).**

SEPA had concerns that the information supporting the application (detailed above) was confusing and did not describe how the efflux velocity was arrived at; one of the main points being that it did not seem to account for the use of a wet scrubber odour abatement system. As a result, SEPA requested the applicant, provide further justification for the proposed efflux velocity through a Further information Notice (FIN) issued under Schedule 4 of the Regulations (FIN Query 10).

S4 FIN Query 10. In Appendix A – Assessment of Impacts, page 3 of the impact assessment report states that calculations are based on a stack velocity of 15 m/s and that the recommended lower 9 m/s velocity for situations where wet arrestment plant is in place to prevent unacceptable emission of droplets is not applicable (Ref. CRG014_B4.1a Appendix A – Assessment of Impacts, page 3). Provide further justification for this decision considering the planned wet scrubber. Recalculate impacts as necessary.

CRG Response: Although *a wet arrestment technology is being proposed, it is followed by a mist eliminator and carbon filtration. Therefore, it is assumed that the good practice target exit velocity of 15m/s will be achieved.*

SEPA Discussion: Their own assessment states that "*According to BAT guidance where wet arrestment was being used, unacceptable emissions of droplets could occur where the linear velocity in the stack exceeds 9m/s". Whilst there* are no direct references to efflux velocities in any of the BREF documents, this technical detail is repeatedly stated in the Process Guidance Notes which constitute BAT for PPC Part B air emission activities. The PG Notes define themselves thus "*This is one of a series of statutory notes giving guidance on the Best Available Techniques (BAT)."* In the absence of a direct reference to what constitutes BAT and as the PG Notes constitutes BAT guidance specifically applicable to air emissions from PPC Part B sites its use as guidance for Part A sites relating to air emissions is seen to be a justifiable position. The concerns SEPA raised in the S4 FIN have been addressed by CRG using a mist eliminator and Carbon filter which are valid technologies listed in the BREF documents however they do require extra process monitoring

SEPA Decision: The presence of the carbon filter requires the moisture content of the treated off-gas from the scrubber to be reduced prior to entering that stage of the abatement process. The permit will therefore contain conditions that will require the carbon filters to be monitored tor any impairment due to the presence of water vapour, which should indicate whether further water removal system is required

S4 FIN Query 17: A stack height of 16.9m is proposed, but a stack height assessment has not been included with the application. Please submit a stack height assessment calculated in accordance with 'Guidelines on Discharge Stack Heights for Polluting Emission. Technical Guidance Note D1 (Dispersion)'.

CRG Response: T*he stack height proposed was calculated based on the outcome of Appendix A – Assessment of Impacts, which indicated that insignificant impact from a stack with an effective height of 0m. Therefore, it was elected that a good practice height of 3m above the ground or buildings within 5L would be incorporated into the design.*

Therefore, with the presence of a local structure at a height of 13.9m, the height of 16.9m was elected. Using the formula for calculation of effective emission point release height, this results in an effective height of 4.98m, which further reduces the potential impact of releases from the site. This approach has been clarified with additional detail within Appendix A.

As a conservative assessment methodology, it is considered appropriate that the H1 assessment tool was utilised. An appropriately sized stack allows for adequate dispersion and the reduction of impact. With the impact of emissions being screened out, the resultant stack height is considered to be a minimum good practice stack height which further assessment would not reduce. IED-PPC-TG4: The practical guide for Part A activities published by SEPA refers to the UK PPC horizontal guidance notes. This includes H1 for which the assessment methodology remains active.

SEPA Discussion: The primary objective is, as always, to ensure that the measure proposed, in this case stack height, is sufficient (under normal conditions) to ensure adequate dispersion of pollutants. In the case of stack height determination, SEPA takes a precautionary approach. This requires the applicant to submit a Stack Height Sensitivity Analysis, undertaken using "data modelling from a worst-case scenario (proposed minimum stack height and using IED emission limit value). SEPA does not however stipulate which assessment methodology is to be used for stack height determination.

The response from the applicant suggests that they believe the assessment which was submitted with the application (CRG014_B4.1a Appendix A) is robust and uses an equally valid assessment method to that requested by SEPA in the S4 FIN Query 17.

SEPA acknowledges (as the guidance states), that where an assessment is requested; other methodology can be used with the approval of the regulator... In the "Process Guidance Notes" (covering assessment of BAT for PPC Part B installations), it states "*The calculation procedure D1 is usually used to calculate the required stack height, but alternative dispersion models may be used in agreement with the regulator"*
The applicant refers to the UK PPC horizontal guidance notes (which includes H1) and is listed in the SEPA document IED-PPC-TG4 (SEPA's practical guide for Part A activities). As a result, they state that the "*assessment methodology remains active".*
The IPPC H1 (2003) "H1" guidance was endorsed by SEPA in 2003 and was used in the stack height screening assessment carried out for the Earls Gate Energy Centre PPC application in 2017-18, a few hundred metres away from the proposed site. The decision document describes that the H1 assessment was used to *"screen out 'insignificant' process contributions*" and records, that those assessment criteria, were subsequently applied as part of the site stack height analysis. It also records that a sensitivity screening analysis was carried out using a range of stack heights and concludes with "*SEPA accepts this assessment of the data*." SEPA's Odour Guidance 2010 also advises that the H1 model can be used "*for screening out insignificant impacts such as those contained in Part 1 of the H1 methodology*". Cautioning that where there is a high potential for release of odorous substances, a detailed assessment of the impact may be required which may need to include the use of predictive impact models such as ADMS or AERMOD

Finally, Regarding the height assessment, itself, the Odour Guidance advises that "as a rule of thumb" the stack should be at least 2.5 times the height of adjacent buildings within a radius of 5 stack heights and the importance of the "exit velocity" in determining the effective stack height. It is however worth mentioning that the current Environment Agency guidance includes a more detailed indicative assessment procedure

SEPA Decision: As the H1 assessment provided by the applicant is accompanied by a stack height sensitivity assessment, the predicted emissions concentrations of pollutants are low (calculated as unabated emissions) and an additional two stage abatement system has been fitted, the requirement to provide a D1 assessment is deemed not necessary.

Given the information above and the use of the H1 methodology for a larger site "next door" the H1 assessment and the calculated stack height of 16.9m is accepted by SEPA

Process Emissions
The process is expected to generate approx.1,780 m3 of offgas per day from the fermentation system and process train,

The offgas is assessed as comprising the following gases: -

Component Gas	Concentration
Carbon dioxide	**43%v/v**
Hydrogen	**38% v/v**
Nitrogen	**14% v/v**
Oxygen	**4% v/v**
Acetone	**930 ppmv**
Butanol	**185 ppmv**
Ethyl Alcohol	**35 ppmv**
Miscellaneous compounds e.g. Water/ Other VOC's (inc. dimethlyamine) and Alcohols	**0.79% v/v**

Air Modelling of Emissions

CRG used a worst-case scenario and assumed the remaining VOC (Volatile Organic Compound) contribution to be Benzene* (the most hazardous VOC). The assumption being that if the facility complied with the objective for benzene, it would comply for all VOCs. CRG has provided the methodology used in the modelling and reported that the ambient concentrations of the VOC offgas, as benzene, are well under the air quality objective for Benzene at all sensitive receptors. The CRG modelling exercise identified that under the worst-case scenario there would be moderate adverse impact at three of the receptor sites. As a result, further modelling was carried out specifically for the residual VOC's present in the offgas, this showed that there would be No impact at those receptor sites.

The overall conclusion arrived at by CRG was that the impacts of the actual VOC's present in the offgas stream, are predicted to be negligible (Tables 8 and 9 in the initial air modelling report).

***The report submitted with the application advises that Benzene is commonly selected as a conservative worst-case VOC when speciation is not possible. This is due to the Environmental Assessment Levels (EALs) associated with benzene being the most conservative of all VOCs.**

VOC Limits

CRG has stated that they do not expect to exceed the mass emission benchmarks for the utilisation of VOC limits. Reporting in the initial air modelling the following results:

The Typical total mass emissions were estimated to be 1.28 g/h and 9.08 kg/year which the company anticipates will be made up of Class B VOCs, this would compare with the class B VOC benchmarks of 2 kg/hour 5 tonnes/year (see PPC permit application Section B2.11 "Monitoring"), The consultants have indicated that "*an evaluation of the applicability of Emission Limit Values (ELVs) as described in relevant guidance was undertaken"*. This was to allow consideration of using the ELV concentrations as opposed to predicted concentrations during the H1 assessment. The following guidance was considered: • Guidance for the Specialty Organic Chemicals Sector – IPPC S4.02 (2002) • Specialty Organic Chemicals Sector – EPR S4.02 (2009) • Guidance for the Large Volume Organic Chemicals Sector – IPPC S4.01 (2001) Each of these guidance notes denote that the following ELVs are likely to be applied to VOCs: In their calculations the consultants stated, "*No air pollution control technologies are to be applied to emissions released via the main process extract"* Again this seemed a little confusing as a two-stage abatement system was indeed fitted. In conclusion, the consultants aver that *"the ELV as described in the guidance documents is not considered likely to apply"* adding that Celtic Renewables intend on undertaking an air emission monitoring programme upon commencement of operation to evidence the emissions denoted in the Emission Inventory.

SEPA Discussion: The data provided in the application is based on the up to date EALs and is suggestive that no ELV's are required for the site but as the note cautions *"the releases below these mass emission rates may not be trivial, and so may still require controls and the setting of appropriate emission limit values"* The potential release of VOCs is the primary environmental concern at the Caledon Green Plant, and whilst CRG has carried out bench trials regarding the potential emissions, they are, just that, they are not the "actual emissions from the process", monitored when the plant is fully commissioned and operating under "Normal Operating Conditions" .

Where a similar case was presented to the Environment Agency, (at an "Energy from Waste" EfW plant), the decision not to set an ELV for VOCs was primarily because the parameters were already monitored through the monitoring of other parameters in the emissions from the stack, and as such negated the need to apply one. In the case of Caledon Green Plant, the VOCs are not produced as a by-product or contaminant of the process (as in an EfW), VOCs are the main product produced on site and consequently the main potential pollutant in emissions (point source or fugitive) indeed the PPC Part A permit is being issued precisely to exert control over the solvent production activities on the site. Under Reg.25(2) of the PPC 2012 Regulations, the permit must include an ELV for TVOC (as listed in

Schedule.5) “where it is emitted in significant quantities, or supplement or replace this with an equivalent parameter or technical measure that ensures an equivalent level of protection for the environment”. The fact CRG meet the ELV (with or without the abatement equipment) does not mean that SEPA should exclude it in the permit, as there is still a need to check site compliance against an ELV. As a result, SEPA has included the ELV, particularly since SEPA does not yet have data of emissions during normal operation.

The second point SEPA would raise, is the mention of “No abatement” in the analysis results, this is confusing as abatement is clearly fitted (wet scrubber and carbon filtration). SEPA cannot determine, from the information provided, whether the monitoring was carried out prior to the inclusion of the abatement or after. However, SEPA is satisfied that this “confused” position does not affect the overall setting of TVOC ELV (as the emissions results presented in the analysis reports are significantly below the proposed ELV in either case)

Finally, it is understood, from what CRG has presented in the application, that they intend on undertaking an air emission monitoring programme (upon commencement of operation), to evidence the emissions denoted in the Emission Inventory.

SEPA Decision: As the process generating the offgas involves the fermentation of draff from Whisky production and grade 2 potatoes (those rejected for human foodstuffs) the production of Carcinogenic, mutagenic, reprotoxic (CMR) substances in this process is therefore not expected.

A review of the Inventory of emissions provided with the application was undertaken, SEPA can report that as far as can be determined none of the substances listed in the Inventory appears in the European Chemicals Agency “Table of harmonised entries” (Annex VI to classification, labelling and packaging of substances and mixtures regulations” (CLP))

SEPA can therefore see no reason the maximum Total VOC ELV of 20mg m3 contained within the draft Common Waste Gas Management and Treatment Systems in the Chemical Sector (CWG) BREF should not be applied to the stack discharge at the site. Whilst SEPA recognises that the emissions from the process may be significantly below this level, SEPA believes a permitted activity which produces a potential pollutant as its primary products requires to have an ELV set to cover those products, should they “escape”. Once the results from the operational monitoring exercises and the waste gas inventory are reported, SEPA will look to reflect any significantly low emissions in the monitoring frequency set for the stack as indicated in the permit.

The initial assessment of the application raised a query regarding the level of detail provided about the constituents of the air emissions this was put to the Applicant in Query 11 of the FIN

Query 11. In Appendix A – Assessment of Impacts, Section 2.1.1.4.1 on page 4, other VOCs which may be present in air emissions are listed and are said to be present at a concentration between 0-2% v/v of Total VOCs: a) Please confirm the concentration in mg/Nm3 and the mass flow rate in g/Hour for each of these VOCs. b) The last component on the list, “3-methyl”, appears incomplete. Please confirm the full name of this VOC

CRG Response*: Both requests above have been addressed in an updated version of Appendix A – Impact of Assessments.*

In the updated Appendix A, CRG has produced a new list of trace VOCs to replace the original, thereby addressing point (b) above)

As well as the main products CRG has “anticipated” that the process may also result in the release of the following trace VOCs:
Dimethylamine; 1,3-butanediol; Isopropyl alcohol; Ethane; 2-butanol; 3-methyl-2-pentanol; 3-methyl-2-butanol; Acetic acid; Butyric acid.

SEPA Discussion: The applicant states in the response that these would account for between 0 and 2% of all VOC emissions by volume. With modelling at the upper estimate of 2% and treating all the trace VOCs as Benzene. The calculated maximum unabated release of these VOCs would be anticipated to be 73.9 mg/m3 or 0.030 kg/h. CRG advises that as these components are present in trace amount, further breakdown is not available.

Having reviewed the LVOC BREF and the LVOC BATC Documents the issue raised falls under BAT Conclusion 2 which includes the following compliance requirement

(iii), information, as comprehensive as is reasonably possible, about the characteristics of the waste gas streams, such as:

(a), average values and variability of flow and temperature;

(b), average concentration and load values of relevant pollutants/parameters and their variability (e.g., VOC, CO, NOX, SOX, chlorine, hydrogen chloride).

It is worth noting that information must be "Comprehensive", and its supply must be "Reasonably possible ".

CRG has advised that it is anticipated that the trace VOCs may be released meaning they do not know for certain, furthermore, the potential to produce other VOCs must be considered due to the nature and variability of the fermentation process. Clearly Acetone, Butanol and Ethanol are produced but what else. SEPA in their Guidance *IED-PPC-TG4 "A practical guide for Part A activities"*. Advises that Permits *"must include emission limit values for individual pollutants or groups of pollutants likely to be emitted in significant quantities...*", (including those listed in the relevant BAT conclusions).

In the JRC Reference Report on *"Monitoring of Emissions to Air and Water from IED Installations*" it outlines that depending on the nature of the waste gas, it might be necessary to measure Total Volatile Organic Carbon (TVOC), or Non-Methane Volatile Organic Carbon (NMVOC).... recording that some BAT-AELs defined in BAT conclusions refer to TVOC

The CWW and proposed CWG BREFs record that a lot of the chemical industries simply report their Volatile Organics as either Total Volatile Organic Carbon (TVOC), or Non-Methane Volatile Organic Carbon (NMVOC) with greater details submitted for the main pollutants i.e., they do not list every single VOC (See Table 4.1 below)
The use of TVOC and NMVOC are determined to be Quantitative surrogate parameters which "*can substitute for direct measurements*". The use of these provides an equally good assessment of the actual emission compared to a direct measurement, TVOC can be used instead of individual organic compounds. This is a view which has been included in SEPA guidance both in TG4 with its reference to emission limits for "*groups of pollutants*" and the Monitoring Quick Guide *"SM-QG7 - Monitoring volatile organic compounds (VOCs)",* which advises "*The permit may specify an ELV for TOC, rather than for individual VOCs"*. There is at least one example in the BREF of a complex gas stream which simply identifies the potential pollutants as VOCs but does not give any figures as to the concentration of each

Table 4.1 from the Draft proposed Common Waste Gas Management and Treatment Systems in the Chemical Sector CWG BREF

Table 4.1: BAT-associated emission levels (BAT-AELs) for channelled emissions to air of organic compounds

Substance/Parameter	BAT-AEL (mg/Nm^3) (Daily average or average over the sampling period)	Mass flow threshold (g/h)
Total volatile organic carbon (TVOC)	< 1-20	200
Total volatile organic carbon (TVOC) containing substances classified as CMR 1A or 1B	< 1-5	2.5
Total volatile organic carbon (TVOC) containing substances classified as CMR 2	< 1-10	100
Benzene	< 0.5-1	2.5
1,3-Butadiene		
Ethylene dichloride		
Ethylene oxide		
Propylene oxide		
Formaldehyde	1-5	
Chloromethane	< 0.5-1	100
Dichloromethane		
Tetrachloromethane		
Toluene		
Trichloromethane		

SEPA Decision: SEPA has included conditions within the permit that CRG must provide an emissions inventory to confirm the major pollutants within the waste Gas stream. The other VOCs listed which are referred to in S4 Query 11 a) are “anticipated” trace VOCs i.e., VOCs which may or may not be produced in a fermentation process, it is highly unlikely that SEPA would be looking to introduce individual ELVs for them...certainly at the levels they are predicted to be produced at. If ELVs are required to be imposed on the site then it would seem reasonable to encapsulate these Trace VOCs in a Total VOC ELV, as seems to be the case at a lot of sites identified in the Chemical Industry related BREFs and, in line with SEPA TG4 “groups of pollutants” approach (The Non-Methane VOC measure is not applicable as Methane is not produced in the process). This would not preclude the operator from having to comply with separate ELVs for the main constituents if required. As a result, SEPA will accept that it is not “reasonably possible” to produce the additional information requested in S4 FIN Query 11 a) on the individual composition of the 0-2% trace gases however they should where possible be identified as being present.
SEPA has set a Total VOC limit on the discharge with a proviso that the frequency of monitoring will be reassessed based on the results of the monitoring exercise proposed by CRG, which shall be undertaken during normal operation. SEPA would also like to see results from pre-abatement discharges to assess the probable impact that any failure of the abatement system would have on the emissions from the stack. This fulfils the precautionary principle and allows CRG to demonstrate the true level of, and identify, the major pollutants present within the waste gas (which is a BAT requirement).

Simple Calculation of Atmospheric Impact Limits (SCAIL) Assessment
CRG were recommended by SNH to undertake a Critical load assessment at designated sites up to 15km from the stack. The results of that assessment showed that for NOx (Nitrogen Oxides), Nitrogen deposition and Acid Deposition the Process Contribution (PC) from the proposed activity at those designated sites is low, equating to well below less than 1% of the EAL on each occasion. CRG has compared the results against the guidance issued by the Institute of Air Quality Management, on the assessment of air quality impacts on designated nature conservation site. This guidance outlines that an increment of 1% or less of the relevant long term critical level or critical load alone (PC as a % of the critical load) is deemed to be “inconsequential”.

Biofuel Plant

Overall, the construction and operational air quality impacts of the Proposed Development are judged to be 'not significant'.

Distillation Plant

The distillation columns have a dedicated scrubber incorporated to collect any trace solvents released in gases as part of the process. These are collected and rerouted back into the process. Following an assessment of the information provided on the distillation process a query was raised in the FIN (Query 9) regarding the lack of detail provided for the abatement on the distillation column

S4 FIN Query 9: Provide a description of the scrubber incorporated into the distillation column including details of the scrubbing medium; packing type, materials of construction, capacity, mode of operation, instrumentation/ alarms and vent height for discharge of abated emissions to air if this is separate to the 16.9m stack on the main scrubber. Confirm whether the emissions from this scrubber were included in the odour modelling presented in CRG014 B4.1b Appendix B – Original Odour Assessment. If not, the contribution from this source should be included in the updated modelling required by question 6 above.

CRG Response: Query 9: The scrubber package on the distillation column treats the liquid ring seal water on the vacuum pumps. It is included as a safety feature in the case of solvent release rather than being used in typical operation – this has been considered within site hazard and operability (HAZOP) studies. In the case of solvent release, the scrubber would avoid these losses to atmosphere. Fresh water is introduced through the control logic and the spent water from the liquid ring water gets recycled back into the distillation process to recover the various fractions.

Scrubbing medium – softened water
Packing Type – Pall Rings
Materials of construction – 304L Stainless Steel
Capacity – 1300 kg/h (liquid flow)
Mode of operation – continuous
Instrumentation – Temperature, pressure, level Scrubber located on first floor (4m base height) + 5.7m (vent height from base)

Emissions are separate from the main scrubber.

Releases from this scrubber are minimal and will comprise of carbon dioxide (CO2) alone.
On average, less than 0.025 m3 of CO2 are released daily.

The impact of this scrubber has not been included in impact assessments to this point as Carbon dioxide is, at the concentrations being emitted, an odourless gas. Therefore, its inclusion within the odour assessment was not considered appropriate

SEPA Discussion: CO_2 is a greenhouse gas and had it been diverted to the stack would have required to be entered onto the inventory of emissions for the process gas. CRG describe this scrubber as a "safety" device as such any emission from it could be deemed a "fugitive emission" rather than a point source discharge given that installed is to prevent, rather than to abate, discharge to atmosphere.

SEPA Decision: As a result, it is deemed no additional modelling of the impact from the scrubber is necessary

Combustion and Energy Emissions (see also Section 5.15 Energy)

The biofuels facility does not have any onsite power generation or heat production; instead, electricity will be taken from mains supply, and heat will be provided by the nearby Calachem facility. As such, there will be no onsite combustion of fuels or direct emissions from power or heat production.

SEPA Decision: CRG has indicated that they may look to install boilers later, dependent on the security of supply. SEPA advises the applicant that any combustion appliance on the site may constitute an activity under PPC (MCP 1mw- below 20MW, PPC Part B 20- below 50mw and Part A above 50MW) in which case a variation to the permit and further modelling may be necessary for emissions of carbon dioxide associated with energy

Ozone formation potential

CRG has identified substances within emissions from the site which have the potential, by indirect photochemical reaction, to create atmospheric (low level) ozone. These substances and their associated photochemical ozone creation potential (POCP) are described below:

Substance	Annual Rate (tonnes/year)	POCP Value/tonne	POCP
Acetone	4.22	9.4	39.67
Butanol	1.08	62.0	66.96
Ethanol	0.13	39.9	5.19
Benzene	0.14	21.8	3.05
		Total	**114.87**

Based on modelling undertaken by the Met. Office, release rates likely to give rise to ground level ozone concentrations equivalent to approx. 20% of the Expert Panel Air Quality Standards (50 ppb ozone as an 8-hour rolling average) have been calculated for representative substances in each category.

SEPA Decision: The results of the modelling show that potential releases for each individual category of POCP value are significantly below the threshold levels and that in total, Celtic Renewables estimate they could potentially release around 0.013 tonnes per hour. It is therefore considered that the site will fall below this release rate limit

Global Warming Potential

CRG has estimated the indicative process global warming potential for the activity as follows: ▪

Process Carbon Dioxide:
700,000 m3 /year
1,285.20 tonnes/yr. annual rate.
1 GWP value/tonne.
1,285.20 annual GWP from Site Processes.

Energy related Carbon Dioxide
3,116.58 tonnes of CO2 equivalent/yr.
1 GWP value/tonne.
3116.58 annual GWP from Energy requirement.

In total this results in an annual GWP of 4,401.78

CRG advise that these values are based on estimations

5.3 Point Source Emissions to Surface Water and Sewer

There are no point source emissions to surface water from the Caledon Green Exemplar Plant
There are no discharges of trade effluent to the public sewerage system

Overview
All process (trade effluent) emissions from the Caledon Green site are to be conveyed to the adjacent industrial waste treatment plant operated by Calachem for treatment prior to discharge by them to the Forth Estuary under their PPC Part A Permit (PPC/A/1008834),

On Site Treatment
CRG has assessed that, given the size of the proposed Caledon Green plant, providing full treatment to the process effluent utilising an integrated, on-site Effluent Treatment Plant is not economically viable, at present.
In the current PPC application CRG are proposing to pre-treat the effluent (reduce temperature to below 45^{o}C and pH 3 –11 prior to discharging it to the nearby Calachem Treatment facility

The operation involves two liquid effluent tanks on a duty fill/pre-treat regime i.e., one tank filling with effluent whilst the other is undergoing pH & temperature adjustment and emptying for transport offsite to either the Calachem strong stream process or another nearby licenced facility
CRG has advised that the high level of sterility required, precludes re-cycling/re-use of effluent at this time.

Wastewater Composition
Under normal operating conditions: three different effluent streams have been identified the wastewater produced during the production process comprises liquid (centrate) from the centrifugation and liquids from process – "Cleaning in Place" (CIP) effluent - approx. 90- 110m3 /day, such as media from failed fermentations, excess material from the inoculation vessels and liquids resulting from the cleaning of vessels and pipework.

Centrate Stream: approx. 110-130m3 /day Centrate having already passed through the distillation step (>73°C) is expected to have reduced microbiological activity and to contain only small traces of solvent, (most VOCs being removed by the distillation step). Laboratory tests have been undertaken to determine the composition however CRG believe the actual concentrations will be lower due to solids recovery at the Caledon Plant

A weak stream: This stream will consist of rainwater which will be under controlled release from the attenuation pond at 5 litres/sec, and domestic sewage... with a concentration below 500mg/L Chemical Oxygen Demand (COD) and pH 3-11. This steam will be diverted directly to Calachem via a sewer connection. The total volume is estimated at 50-80m3/day.

A strong stream: The current proposal involves the removal of the strong stream effluent comprising process effluents including flushes and CIP effluent from the plant by Tanker as a result there is no direct discharge of process effluents from the site.

Discharge of External sumps

CRG Proposal The proposal as outlined by CRG is that External Sumps ("sump water") and Bunds "bund water" will be subject to analysis and will only be discharged to the attenuation pond if it is determined to be "rainwater".
Otherwise, it will be directed to the effluent tank for disposal if contaminated.

This issue was the one point of concern regarding water discharges, identified during the updated review in mid 2021 and the informal consultation in December 2021

SEPA Discussion: SEPA has a problem with describing water from a sump or bund as "rainwater" preferring the term "sump" or "bund" water, the second issue SEPA has is that it is not clear from the report at what level of contamination the operator would classify the "rainwater" as contaminated and divert it away from the attenuation pond and on to treatment as process contaminated water. SEPA would contend that simply testing without reference to a defined standard serves little purpose, as it is inevitable that the sump water will collect surface contamination (e.g., soluble compounds from concrete, bird or animal droppings, leaf litter moss etc.) and as a result, it is likely to be contaminated with pollutants (organic pollutants) not dissimilar to those found in the process effluent. SEPA would agree that it is feasible under BAT to discharge bund/sump water to surface water systems and indeed it has been incorporated into a PPC Part A permit for another site. The Caledon Green plant is however slightly different to the site mentioned; in that at that site, the discharge was to a Surface Water Sewer and thence to the receiving water. The current proposal outlines that the discharge from the attenuation pond passes forward to the Calachem plant in what is termed the "weak stream" and as such there is no direct discharge to the Water Environment from the pond.

SEPA Initial Proposal: The standards set in the draft permit are "Trigger values" to determine whether a bund or sump water is contaminated, they require the operator to use BAT to determine the most appropriate disposal route from those available to them under the permit. The values are based on a 2013 WCA report to DEFRA (See References, Section 12 below) they are the average levels of contaminants found in storm water discharges from a variety of built environments. Tables 6.1 and 6.2 in the report detail the Event Mean Concentration (EMC) values that were derived by Mitchell et al in a 2001 study and which the WCA report of 2013 states "*may be used in the model to estimate concentrations of pollutants in urban run-off*". Although at the time of the report they cautioned that much of the data used for the estimations was "*relatively dated*" they believed it would be useful for a "*screening assessmen*t "
The tables below are based on the limit values listed for surface water run-off from Industrial/ Commercial sites in Table 6.1 of the WCA/DEFRA report; summarised as follows-:

Basis of limit Value	Event Mean Concentration (EMC) mg/l
Biochemical Oxygen Demand	10
Chemical Oxygen Demand	150
Total Suspended Solids	50
Ammoniacal Nitrogen	1
Total Phosphate	1

In the previous PPC Part A permit SEPA added a Total phosphorous determinand as the industrial effluent and liquid feed materials in that permit were biodegradable organic compounds discharging to the Water Environment. In addition to the above determinands the operator was required to comply with a pH and descriptive condition as follows (the pH was set at 5-9 to protect the water environment)

Basis of limit Value	Limit
pH	5 - 9
Fats Oils and Grease	The potential discharge shall not include significant traces of visible oil or grease

It was explained that where samples exceeded the values SEPA would deem the bundwater to be "contaminated" requiring it to be taken to a suitably licensed site for disposal and where samples are below "uncontaminated" and suitable for discharge to the surface water drainage and SUD system.

This approach does not alter what is proposed by CRG nor does it restrict them from disposing of the sump water to whichever effluent disposal route they assess to be appropriate under the permit It simply provides a scientific basis on which a distinction can be made between rainwater, surface water / Urban run-off, and process effluent contamination with respect to sump or bund water.

CRG Response December 2021
During the informal consultation CRG raised concerns regarding the both the difficulty (it would theoretically be possible to undertake sampling, but this would be dependent on the water level), as the discharge of bund and sump water will be intermittent. CRG are not averse to doing this, but it may be something which would need to be looked at once the site is operational as a set sampling frequency could not be achieved and it would need to involve the intermittent sampling.
The design of the plant means this uncontaminated rainwater (as described in the various BREF) would mix with the surface rainwater from non-production areas and passed to an attenuation pond, prior to being discharged to an offsite effluent treatment along with the domestic sewage from the welfare facilities at the plant

SEPA response December 2021
The CO acknowledged that there were a number of factors which would impact on the testing and monitoring of the bund /sump water discharge

The requirements for disposal of what is called "rainwater" under the BREF are different to that for wastewater discharges (even if it is going to further treatment) and it is stated in the BREF the operator can elect to send the rainwater run off for further treatment and thereby minimise the need for monitoring. As CRG has no direct discharge to the water environment, then the testing of bund or sump water, is solely to determine whether there is any contamination from process effluent or leaking product. This requires a procedure to be put in place to differentiate between "uncontaminated rainwater" and "process contaminated rainwater" the latter of which would be effectively process effluent under the BREF Documents. The BREF applies a raft of BAT Conclusions to Process effluents which would require additional standards, monitoring and control; and at CRG, an alternative disposal route. The potential for environmental impact is low (due to the discharge to further treatment as opposed to a direct discharge to the water environment) and, at the CRG site, there is the ability to close the valve at the attenuation pond and isolate all "rainwater" discharges. The attenuation pond is in the system to act as a backstop, in case of spills; such that where a potential problematic discharge into the site drainage is identified the attenuation pond exit valve will be closed and there will be no discharge from the site. The attenuation pond can then be pumped out and the contents disposed of whilst the source is investigated, or the spill cleaned up

The CO considers that a daily monitoring frequency may not be feasible for a system where the discharge is in response to storm events. It has been observed, from experience, that a shower of rain falling onto tanks or in a bund can evaporate prior to collection, and that bunds sumps (process areas) are only able to be emptied when there is sufficient water in the sump to allow the pumps to operate...it must also be noted that surface water drainage from the rest of the site is effectively a relatively "uncontrolled" discharge i.e., normal surface drainage. Rainwater from all sources at CRG is not going to a surface water sewer thereupon, to be discharged direct to the Water Environment; it enters the weak stream discharge pipe, where it mixes with the domestic wastewater prior to being discharged from the site for further treatment. The standard for this weak stream discharge has been set by the disposal site and agreed in a formal overarching trade effluent agreement with Calachem (based on the total discharge from both permitted activities and non-permitted activities).

In response to the climate crisis SEPA should be looking to allow disposal of “uncontaminated” rainwater to surface water, **where suitable,** rather than requiring its transport to a disposal point. The transport off site by tanker is a method which impacts in other areas and on environmental media (it increases traffic, increases air emissions, and impacts on the local community), furthermore an increased volume of low strength effluent can adversely impact the operation of biological and other treatment plant.

In accepting that collected rainwater in bunds and sumps will never be devoid of contaminants or contain zero pollutants (it will pick up a certain level of organics from non-process sources simply by contact in the bund e.g., bird or rodent droppings, dead animals, wind-blown rubbish, mosses lichens etc a methodology is needed to determine what is contaminated and what is uncontaminated However where measures are taken to control process inputs then it should be if of a similar quality to other rainwater run-off and be considered for discharge to the water environment.

A complete BAT review was undertaken on the disposal of rainwater from bunds and storage areas by the CO which included a BAT assessment from a site in England and a proposal was drawn up which was adopted by SEPA and presented to the operator

SEPA Decision

Sampling would only be required if the inspection and rudimentary testing procedure laid out in the Emissions from Storage BREF [113, COM 2006] could not be complied with **AND** the operator still wished to dispose of the bund /sump water to the weak stream; in which case the EMC limits above would apply (or another scientifically based standard agreed with SEPA). Conditions have been added to the permit to allow CRG to discharge bund sump water to the attenuation pond if the conditions of the screening assessment are met. Should those screening conditions not be met then the operator has a choice... (If they wish to exercise it!), they can test a sample of the bund sump water to determine if it is uncontaminated (based on the values provided or any alternative values agreed by SEPA) or alternatively, they may tanker it offsite as strong stream (process effluent). The permit also includes a condition whereby, should the overall weak stream discharge fail to meet the trade effluent agreement with Calachem, then no bund sump water shall be discharged without sampling, until such time that the source of any contamination/exceedance has been identified.

SEPA Determination

Overall, what the applicant provided in the supporting information covering direct water discharges was detailed both in its process description and the techniques for managing effluent at the site. The assessment of the application by SEPA did throw up a number of queries regarding the disposal of bund / sump water, the effect on the Calachem plant, and the mode of conveyance of the effluent streams to the Calachem Plant. These concerns were raised with CRG through the Further Information Notice issued under Schedule 4 of the Regulations. See FIN Queries 12, 13, 15 and 16, (pertaining to the discharge) below and, reciprocally, by CRG in the informal consultation above.

Some of the issues SEPA raised had been requested by CRG to be treated as Commercially Confidential and although reviewed those responses are not documented other than to say they have been addressed either through BAT or the conditions of the Permit

S4 Fin Query 12. Confirm the maximum effluent flow in Kg/day for the following parameters: Acetone, Ethanol, and n-Butanol, Metals, including Copper, and any other substances expected to be present in the strong stream effluent associated with the use of raw materials, chemicals, and products at the proposed facility.

CRG Response: *All strong stream effluent from the plant will be treated at Calachem Effluent Treatment plan and there is no mechanism for release to any water course. The strong stream effluent is composed of CIP flushes and front-end processing line flushes therefore CRG do not anticipate any level of Acetone, butanol, or ethanol in the strong stream effluent. To further characterise the strong stream effluent, the plant will need to be operational, and this will be completed during the commissioning and optimisation phases. In the centrate, (~107m3 /day), there will be extremely low volumes of solvents: 0.005% for ethanol, 0.0003% for butanol and 0.002% for methanol, which equates to: 5.47 kg/day of ethanol 0.36 kg/day of butanol 0.00 kg/day of acetone (all removed in distillation) 2.53 kg/day methanol. Other anticipated components of centrate from laboratory trials (*please note that these are indicative, and the characteristics needs to be further defined during commissioning and optimisation).*

Analyte	Anticipated kg/day*
Boron	0.01
Calcium	3.98
Copper	0.01
Iron	0.11
Magnesium	10.11
Manganese	0.04
Phosphorus	31.50
Potassium	106.00
Sodium	10.64
Sulphur	4.41
Zinc	0.02

SEPA Decision: The information requested in the S4 FIN Query 12 has been provided

S4 FIN Query 13. Provide a water quality impact assessment for effluent emissions based on the guidance note IPPC H1 methodology for all substances identified in response to Question 12 above.

CRG Response: *The aqueous releases from the Caledon Green site will all be directed to Calachem (or another licenced equivalent if required in emergency situations). No direct aqueous discharges will be made to the environment. Discharges will only be made to licenced sites on provision of the licence and written confirmation of acceptance. As the potential impact of the discharges will be a function of the treatment made by the receiving sites, it is not considered that this impact assessment would be required with regards to the site at Caledon Green.*

The section of the H1 annexe D guidance referring to “Discharges to sewers” opens with two paragraphs containing the following

“Discharges from installations to sewer should still be assessed to ensure that the chosen option is appropriate. For example, specialised on-site treatment may be a better option than discharge to sewer, where the effluent is passed through a standard treatment process.”

“...Where a release takes place first to sewer and is then treated at a sewage treatment works”

SEPA Discussion: SEPA can understand the position adopted by CRG on this issue, as there are two points, regarding the requirement for a H1 assessment at the site which need to be addressed

Firstly, there is no discharge to sewer from the installation of the “Strong stream effluent” at present...
To explain...CRG in their application describe that [the strong stream] will “*be removed from the Caledon Green facility via tanker... and transported to Calachem strong stream”*

The release is not first to a sewer (as described, but to a tanker which then transports it to a discharge point to (Calachem plant or unloading point). Each load will require either a waste transfer note or Special Waste Consignment Note (the procedures covering repeat movements may apply) as the waste is no longer an effluent per sae but a “waste in liquid form”. The disposal of such waste is covered by the waste framework directive which imposes different regulatory controls, especially if that waste is deemed to be hazardous waste and not least at the disposal site. Furthermore, following a query on acceptance of leachate at another site, a question was raised regarding the definition of “discharge” in relation to tankered waste... Article 11 1. In the Urban Wastewater Treatment Directive, covers the discharge of industrial wastewater into collecting systems and urban wastewater treatment plants, however, it does not specify whether the discharge to the Urban Wastewater Treatment Plant is via a collecting system (pipe sewer) or by tanker. The SEPA definition is that a “discharge” is from a pipe or conduit.

Secondly, the above paragraph from the H1 D guidance with respect to discharge to sewers adds the description “*where the effluent is passed through a standard treatment process”* and in the second paragraph has the words “*then treated at a sewage treatment works”* finally it proffers that” specialised *on-site treatment may be a better option than discharge to sewer" it* also then mentions “specialist on-site treatment”

Definitions have been sought from a variety of sources as to exactly what the terms mean, and how loosely they can be applied, when looking at the activities at both CRG and Calachem. Using what is commonly understood as a sewage treatment plant and sewer then it must be concluded that the the Calachem plant is not a sewage treatment plant. In a sewage treatment plant, the primary objective would be unequivocal, it would be the treatment of domestic wastewater, following which there would be a secondary obligation to accept Trade effluents (providing the flow and load from the latter can be accommodated and that the quality meets certain regulatory discharge standards). Both the Drainage Scotland Act 1968 and Schedule 4 of the Urban Wastewater Treatment (Scotland) Regulations 1994 covering Industrial Wastewater / Trade effluent, require that, effluents entering collecting systems and treatment plants should not cause a risk to: wastewater staff, collecting systems, plant, or the environment, and should not impede the treatment system, or compromise the disposal of sludge and finally be subject to such pre-treatment as is required

No such conditions or pre-treatment requirements apply to Calachem which operates under a PPC Hazardous Waste permit. This permit allows them to treat a range of Industrial wastes which could not be discharged to the Public Sewerage system (termed “waste in liquid form”), primarily for the reasons described in the water regulations referenced in the preceding paragraph.
The terms of their PPC Hazardous waste permit, allows Calachem to offer “Specialist treatment” to CRG (albeit not on site) and similar companies that otherwise would have difficulty disposing of their effluents by other routes, the only caveat being that they must not breech the conditions of that permit.

At which point, as recognised by their response, CRG in their capacity as the producer of what is waste (albeit in liquid form, has a duty of care to ensure that they *“take all such measures applicable to them, as are reasonable in the circumstance, to prevent a contravention of a condition of a permit granted under the 2012 Regulations”*

Finally, if it is accepted that Calachem is not a Sewage treatment plant then the applicability of the Sewage Treatment Reduction Factor (STRF) would be called into question. The STRF appears to be based on treatment in a standard Activated Sludge plant, as opposed to a waste treatment facility. The presence of Draff could also impact on the assessment as it has under certain conditions, it can remove pollutants from effluent streams (commercial systems for pollutant removal have been developed using it). The last point to note is that Acetone, Ethanol, and n-Butanol, the main chemical products produced by CRG, do not appear in the STRF tables.

The question all this raise is, does the absence of a H1 Assessment risk breeching the EQS values in the receiving water and thereby preclude or restrict treatment at the Calachem plant.?

SEPA Decision: The "waste in liquid form" produced by CRG is being conveyed to an Industrial waste treatment plant rather than a sewage treatment plant. The plant at Calachem holds a PPC Part A Hazardous Waste Permit and, based on the wide range of waste types it was proposing to take, in will have undergone a H1 assessment with respect to the discharge. Calachem has assessed the CRG waste streams based on the analysis provided and have determined that they can accept them. The Calachem discharge standard in their PPC Part A permit will have been set by SEPA to comply with the different EQS in the receiving water.

SEPA has reviewed the guidance and the data provided by CRG and concluded that on this occasion a full H1 D assessment is not required to be carried out for the reasons stated above.

S4 FIN Query 15. Provide a copy of the written evidence from Calachem ETP to confirm that there is sufficient capacity to treat the proposed quantity and quality of each of the three effluent streams arising from the proposed facility (Ref. PPC Application Section B2.3.5.11.1), and that it will not cause any issue either with the ETP or when treated and released.

CRG Response: *The initial letter from Calachem, the receiving Effluent Treatment Plant, is shown below, dated 16th March 2018. And in response to this FIN, an updated version of the approval letter was requested, dated 1st October 2020 as a reconfirmation*

SEPA Decision: For reasons described above there is only one discharge from the Caledon Green Plant i.e., the weak stream discharge from the attenuation pond. Any tankered waste, once it exits the site, is controlled under the relevant Waste Regulations. Although CRG has a duty of care to undertake an assessment as to whether a chosen disposal site has the capacity and means to treat any waste they wish to transfer or consign for treatment, it is the disposal site which has the responsibility for meeting its own environmental licence conditions. Whilst it would be an offence for CRG to knowingly cause a breach of the disposal site Permit (e.g., by knowingly or deliberately misdescribing waste), it would not be a breach of the conditions of the Caledon Green Plant PPC A permit; it would be a separate offence under Sections 33 and 34 of the Environmental Protection Act 1990.
CRG has provided SEPA with copies of correspondence from Calachem in which they confirmed that they have the capacity and treatment capability to treat the weak stream discharge from the CRG Plant without breaching their own licence conditions. SEPA has included conditions within the Caledon Exemplar plant permit with respect to discharge to the Calachem treatment plant and conditions requiring that a suitable monitoring programme be agreed with SEPA for the Caledon Exemplar plant discharge These conditions will mirror the discharge limits agreed with the Calachem plant with conditions requiring any changes which could impact the discharge be notified to SEPA
which confirms that they can accept the weak stream discharge from the site advising that this will be subject to sample and review once the process is operating. Regarding the acceptance of tankered waste from the site at a disposal site this is a separate regulatory matter which cannot be controlled through the conditions of the Caledon Green Part A Permit

S4 FIN Query 16. Confirm why it is not considered possible to route the strong stream effluent to a pipeline as part of the construction of the proposed facility. NB. This should be separate to the weak stream drainage route. The explanation should include a BAT assessment for delivery of the strong stream effluent to the Treatment facility comparing tanker versus fixed pipeline options.

CRG Response: *CRG has requested that the full response be treated as Commercially Confidential as it contains commercially sensitive information*

SEPA Decision: A full explanation has been provided to SEPA as to why a fixed pipeline is not feasible at the site. The main points being that other options were considered at the development stage, CRG do not own the site, any pipe would need to pass through other properties to reach Calachem and further infrastructure would be needed to ensure it operated correctly.

5.4 Point Source Emissions to Groundwater

The applicant has advised that there will be no point source emissions to groundwater from the Caledon Green Exemplar Plant.

5.5 Fugitive Emissions to Air

The CRG plant has been designed to minimise fugitive emissions to air these would come from spills accidents or incidents at the site and are more than likely to give rise to odour complaints rather than a breach of any contaminant ELV

Odour
The generation and control of odour at the site is dealt with under Section 5.7 below

Dust
A number of measures will be taken to minimise the production of dust on the site.

5.6 Fugitive Emissions to Water

The main fugitive emissions to water would come from a spill or accident on site and would consist of the emissions from the following process areas

The applicant advises that there are no watercourses in the immediate vicinity of the site and that they have incorporated a number of measures into the site which are designed to prevent or minimise fugitive releases of pollutants to, groundwater, foul sewer, and surface waters,

Draff and Potato Intake
The draff and potato intake equipment have been installed on an impervious concrete base and have been designed to minimising spillages during delivery. Any spillages which do occur will be cleaned up immediately following the delivery. However, the nature of the materials and the delivery schedules are such that liquid run off is not anticipated to be an issue. The applicant again points out, that all drainage from the external area is conveyed to the Attenuation Pond and final release from there can be controlled if required. Adding that run off from internal areas of the building collects in the Process Area Sump which is then conveyed to the effluent tanks.

The Attenuation Pond
The 580m3 Attenuation Pond has been installed with an impermeable liner to prevent ingress of groundwater and as a result prevents transfer of pollutants. It has been designed to act as a secondary containment unit in the event of a spill on site and is fitted with close off valves for the discharge pipe. As this discharge is direct to the Calachem plant, the risk of a fugitive emission is minimal

Subsurface Structures
The information from the Site investigations shows that the number of subsurface structures, already in place and, which could provide a pathway for pollutants to enter ground and surface waters are negligible. Historically there was no formal drainage over most of the site area and although a 300mm perforated “drainage” pipe, crossed the site, it was abandoned due to the piling required for the new development. This has allowed the applicant to construct a modern appropriately designed and sealed drainage system for the site which is constructed to be impermeable and resistant to the drained contents. The applicant has advised that the plant, where possible, has been designed to avoid the need for underground tanks and pipes.

Sumps
A number of sumps have been incorporated into the drainage system these are split into six main sumps – (serving the CIP system, Process area, Fermenter, Pot ale, solvent, and chemical areas these

are connected to the main effluent tanks the exception is the CIP pre-rinse, which due to high flow is conveyed direct to the effluent tank, all floors/bunds are graded towards the sumps.
The other sumps are external and will be tested routinely and either pumped to the Attenuation Pond (if only “rainwater”) or direct to the effluent tank. In the event of an incident these sumps can also be pumped out directly to external tanker see External sumps under 5.3 above

Surfacing
All process activities are carried out on impervious concreted areas with a surface drainage system which discharges to a treatment plant via an attenuation pond. The site is covered with a covering of crushed aggregates, tarmacadam, and subsoils, from the demolition of previous buildings. It is reported that this provides a surface that is highly variable in porosity and impervious to water, creating observable seasonal standing water. The site further benefits from the underlying geology where it is reported that” the thickness of low permeability soils *[at the site]* will also limit downward migration”.

Spill kits will be present on site in the areas used by process related vehicles to deal with any potential oil or fluid leaks from the vehicles. In effect, this makes the whole building a bunded area

Secondary Containment Bunds
The Site’s storage tanks, will all be located above-ground and sited within an impermeable bunded area. These have been constructed to CiriaC763 standard, the bunds have been sized to the standard parameters.

Bulk Chemical Intake
To minimise the risk of fugitive emissions from the delivery of bulk chemicals (sodium hydroxide, potassium hydroxide and phosphoric acid) Management Techniques have been outlined to ensure that chemicals are sent to the correct tank. Each chemical has its own offloading point and clearly labelled control cabinet. Control is exercised through the site’s chemical offloading procedure which requires all cabinets and valves to be closed and locked when not in use
Following delivery There will be a water flush of the lines, an air blow, or a nitrogen purge (depending on the material being transferred) of the line will ensure that all the chemical is delivered into the tank, minimising waste, and preventing any accidental releases. as a final design measure, the automated control logic will alarm signalling that the operator needs to take remedial action, thereby minimising the risk of a fugitive release

Product loading
Like the procedure for Bulk Chemical intake, to minimise the risk of fugitive emissions Tankers will connect via a dedicated connection points to the individual product tanks and due to the flammable nature of the products, to the earthing point. There will be a water flush of the lines, an air blow, or a nitrogen purge (depending on the material being transferred) after every offloading/loading which ensures that all the product is transferred into the tanker. Following collection There will be an air blow or a nitrogen purge of the lines (depending on the material being transferred)

Tanker Loading Area
The Tanker Loading Area is an impervious concrete bay which is designed with a full containment kerb to contain any potential spillages within the area and can hold the maximum contents of a full tanker. thereby preventing the release of fugitive emissions to the water environment. A trench drain, fitted with an automated loading/unloading routing valve, is situated at the low point of the containment kerb, and leads to the Attenuation Pond. When a tanker is weighed in, the automated valve is automatically closed effectively bunding the tanker, thereby minimising the impact of any spill, and preventing any release into the outlet to Calachem weak stream The applicant has pointed out that the design of the system allows further mitigation measures to be taken should an emergency arise. Such that the risk to the Water environment from a spill incident or accident during loading or unloading is minimised

The applicant has advised that maintenance and inspection of the containment kerb and trench drain will be undertaken and documented forming part of the Strategic Asset Management Procedure

During the initial determination of the application concerns were raised that the applicant had not fully explained the procedure regarding the control of the attenuation tank isolation valve (the query is assumed to refer to the Attenuation system as a whole) this was raised in the Further information Notice issued by SEPA (FIN Query 14).

S4 FIN Query 14. Confirm how the attenuation tank isolation valve will be controlled and maintained to ensure effective operation in an emergency, and whether it will be operated automatically and therefore remotely, or manually?

CRG Response: *There are two key valves in the attenuation system, and it is important to understand how both operate. Both are slam-shut valves fitted in underground manholes and operate completely independently. The valves are in continuous use although operation is formally validated every 12 weeks as part of a routine inspection and maintenance regime. The full CRG Response contains a detailed description of loading unloading operations within 1. The Tanker loading Bay, explaining the safety features incorporated into the system to ensure that any spill during loading unloading operations is contained and the maintenance, management, and oversight of those operations. 2. the Attenuation Pond discharge controls in place...including the management and control features and the emergency procedures which are in place to allow the attenuation pond to be isolated and the discharge prevented if required.*

SEPA Discussion: The S4 FIN Query 14 There appeared to be some confusion in that the Tanker loading bay (as described above) detailed under a section headed “Loading Area Design, Containment and Drainage” in the main application had well documented. The valves which the S4 FIN 14 was seeking information on were those at the Attenuation Pond as described in the main application this was described as an attenuation tank in the FIN and an attenuation discharge in the Response. The original description for the valve operation was as follows

“Release from the attenuation pond can be isolated by closing the gate valve – closing this valve will be part of any on-site process where there is a potential for an emergency spillage e.g., during tanker loading or offloading, or in the event of any other actual accidental spillage on site, outwith a bunded area, therefore containing any spillage within the attenuation pond.”

SEPA Decision: This response clarifies the issues raised in S4 Query 14

SEPA Determination: Following the clarification submitted by the operator in response to the S4 Notice SEPA has determined that there is negligible risk of fugitive emissions to water from what has been proposed in the application There are no watercourses in close proximity to the site and in the event of failure of control and containment facilities these areas discharge to the Attenuation pond, the outlet of which is connected to the Calachem weak stream pipeline ensuring there is no reasonable possibility of any accidental release to any local water course. With minimal existing subsurface structures, the applicant was able to engineer the drainage system to suit the design of the facility rather than relying on connecting to an existing or ageing system. As such the new drainage system benefits from modern design and the existence of accurate plans to complement the new system the applicant has introduced a maintenance and inspection programme the results of which will be documented within the site Strategic Asset Management Procedure.

The 2021 review of the application highlighted only one concern, The applicant submission does not detail how the filling of the tanker is controlled to ensure that the correct compartment on the tanker is utilised and that the tanker pumps are set to draw from the tank and not to fill. The CO has investigated an incident of this nature involving a solvent delivery to a chemical production facility, the result was that the tank overfilled, causing an uncontrolled release of the solvent.

As a result, SEPA will expect that such eventuality is acknowledged, and a procedure documented in any incident/accident management plan to eliminate the risk.

5.7 Odour

Overview
The main sources, risks, and the equipment required to mitigate odour at the Celtic Renewables Biofuel Plant; have been assessed as follows-:

Raw materials
Raw Materials will be delivered to the facility by tanker or truck. Trucks will be covered to prevent odour releases on arrival. Tankers will be unloaded via sealed pipe connections. The applicant has outlined that frequency deliveries is limited (less than 5 per day) and the duration of delivery will be no more than "a few minutes" this would indicate that any odours related to delivery being very short-lived and infrequent. As the raw materials move into the process, they will be entering a sealed system and processed timeously such that the risk of odour release is minimised. CRG has outlined they intend to maintain a high level of housekeeping, advising that the hoppers and conveyors used to offload the draff and potatoes into the system will be regularly cleaned to prevent odour build-up and that any spills will be quickly dealt with

Process Odours
The applicant has identified that the main process which will result in the venting of gas is the Fermentation process.

Fermentation vessels
The off gas from the fermentation vessels will include all process air from the front end and fermentation elements of the process, such as the slurry cooking and hydrolysers Under normal process conditions this fermentation off-gas is described as not having any residual odours and would not ordinarily require odour abatement. The applicant has however taken a proactive approach to odour control and fitted a two-stage wet scrubber with carbon filtration; such that any VOCs released in the process, will automatically be removed from the off gas prior to discharge to atmosphere via the 16.9m high stack

Animal feed dryer.
Although the initial application contained plans to include an animal feed drying process, this was removed following a revision of the design of the plant in June 2020.
As a result of this and other design changes CRG commissioned consultants to undertake additional odour modelling at the site

Product loading
The end products (the solvents and the wet cake) will also be removed by tanker or truck. Trucks removing the cake will be quickly loaded via a gravity transfer system and covered before departure. Tanker filling involves the venting of air from the tanker which is displaced as the tanker is filled with product. The frequency of product uplift is anticipated by the applicant to be 1 load per day across all products with a duration of a few minutes. The applicant expects the products to have a residual odour which will give rise to a small and short-lived release.

Cleaning & Maintenance
The contaminated air from any tank being emptied (e.g., during Inspection maintenance or cleaning etc.) will be passed through the odour control system.

Process Buildings (General)
There is no odour control within the process building as the process is a sealed system

Odour Control System (OCS)

CRG has included an odour abatement system as part of the installation design, the system consists of an upstream fan which is used on an “as needs” basis to provide suction from the off-gas header, an odour wet scrubber, carbon filters and a process stack used to vent the abated off-gas to atmosphere. The OCS is pressure monitored and automatically controlled. Where there is a change in the differential pressure within the system e.g., Fouling of the packing this triggers the fan to operate thereby maintaining air flow across the OCU and efflux velocity

Although currently a “water only” based abatement system it is designed to allow chemical dosing if required. Scrubbing water is periodically removed from the unit and sent for effluent treatment. The applicant has indicated that scrubber water will be replaced once per week, however they advise that this will be reviewed once the plant is operational.
The odour control stack has been designed to be a minimum 16.9m in height and 3.9m above the nearest occupied area.

CRG has advised that the initial impact assessment indicated that no air emission ELV’s would be reached or breached from the Caledon Green installation even with no abatement. The data submitted with the application indicates that the odour control unit (OCU) will reduce each of the solvents in the released vapours to 1ppm each thereby abating any sporadic odour released from the facility
The system has been designed to achieve the target exit velocity of 15m/s

Odour Modelling Summary

Initial Odour assessment for Planning Application P/17/0588/FUL

Condition 7 of the planning decision notice Celtic Renewables Ltd: Biofuels Demonstration Plant P/17/0588/FUL stipulates that odour concentrations at the site boundary should not exceed 1.5 OUE/m3. Celtic Renewables subsequently commissioned an odour assessment, undertaken by Air Quality Consultants, and which include an air dispersion model (ADM) to provide an assessment of odour impacts associated with the main process emissions from the site. The result of the ADM was that, in a perceived worst-case scenario, odour emissions at the site’s boundary would be in the order of 1.05 OUE/m3 (100th percentile).

In summary the Odour Assessment modelling demonstrated that the maximum odour concentration at any location in the study area, was well below 1.5 OUE/m3 and that a sensitivity test showed that concentrations at the site boundary would remain below 1.5 OUE/m3 when the outlet odour concentration was increased to 2,000 OUE/m3; such that the use of an OCU with a 16.9 m stack would meet the planning requirements

Prevailing Wind Direction
The Edinburgh Airport Meteorological station wind rosette for 2015 indicates a Wind direction coming from a bearing between 215º – 270º (most frequently a bearing of 250º)

Odour Modelling - Receptor Location
The assessment of concentrations from main stack emissions against relevant Odour Detection Thresholds (ODTs) focussed upon the 7 nearby sensitive receptor locations identified in the Environmental Impact Assessment (EIA) in Figure 1 of the Air Quality Section of that EIA and submitted in support of this PPC Application
In addition, the model was run to predict concentrations across a rectangular Cartesian Grid of receptors with a resolution of 2m and a height of 1.5m

This approach was described *“as allowing the maximum ground-level process contribution from the main stack to be determined and compared to the ODTs at each receptor location”*. The maximum predicted concentrations of each of the compounds (based on the worst-case scenario) was recorded as being

below the relevant ODT for each compound. The report concluded that the process contributions from the 16.9 m stack" will *not be present at concentrations significant enough to be classified as odorous at ground level"* and as such *"supports the assertion that the stack represents BAT with respect to odour emissions".*

In 2020 CRG reviewed the design of the plant and made some fundamental changes to the operation the Animal feed dryer was removed from the proposed installation and the handling of the "raw" Draff was improved.
As a result, Mabbett were commissioned to undertake additional modelling based on the changes to on site processes. The results of their modelling were summarised in a Table submitted with the application,
***The review in 2021 identified that this table had been subject to revision and replacement under the Further Information Notice See S4 FIN Query 8 a): below**

Odour Management Plan (OMP)
The Common Wastewater and Waste Gas Treatment/Management Systems in the Chemical Sector (CWW) includes one BAT Conclusion regarding odour BAT 20 as follows

BAT 20. In order to prevent or, where that is not practicable, to reduce odour emissions, BAT is to set up, implement and regularly review an odour management plan, as part of the environmental management system

SEPA Discussion: It is recognised that a Biofuel Plant has the potential to generate odour which if left uncontrolled or unabated can cause nuisance, a loss of amenity and in extreme cases harm to human health. The control and management of the plant are seen to be key elements in controlling emissions from the plant. SEPA therefore requires the applicant to show that the measures taken to minimise odour comply with BAT. The OMP sets out the conditions under which the facility will operate to minimise and respond to any odour emissions to air.

SEPA Decision: The Pollution Prevention and Control permit contains a condition requiring the operator to produce, implement and maintain, a detailed Odour Management Plan specific to the site. The applicant has developed an odour management plan for use on the site, drawn up using both SEPA Odour Guidance (2010) and the Environment Agency (EA) H4 Odour Management Guidance.

which they advise will be implemented, maintained and updated as necessary once the plant is operational. From the information provided with the SEPA is satisfied that the OMP outline submitted by the applicant complies with the BAT requirement and covers the key odour management issues for control of odour at the site

Planning/EIA
The SEPA consultation response outlined the applicant should detail the design measures used to limit odour emissions from those areas most likely to have odour causing potential and that these should include, but not be restricted to, the following: -

Raw material	(Offloading and storage)
Air Vents	(Main Process Building)
Off-gas discharges	(Fermentation and solvent recovery)
Pressure Relief Valves	(Solvent storage)
Wet Cake production	(inc. handling and storage)
Liquid Products	(Storage and loading)

stating that *"every effort should be made to design the process to prevent or limit the potential for odour nuisance from this installation".*

SEPA further advised that emissions of potential odorous compounds should be benchmarked against the odour thresholds outlined by Indoor Air Quality UK (IAQUK) namely Acetone 4.58 ppm; Ethanol 0.136 ppm; 1-Butanol 0.03 ppm; 2-Butanol 1ppm; 10ppm (Characterisation of VOCs 1995) LEL 3.3% UEL 19%.

SEPA Discussion: Although the main areas above were addressed in the EIA; SEPA assessed that further information was needed from the applicant on the following issues

"*Further odour modelling including a sensitivity analysis conducted on the stack height to demonstrate the system could meet the 1.5 OUE/m3 Odour limit at the site boundary, a maintenance schedule in respect of the stage 2 wet scrubber odour treatment and a ductwork leakage maintenance and remediation plan with a requirement to use a qualified leak tester to undertake the work"*.

It was felt that the provision of this information at the Planning/EIA stage would aid in the determination of the Part A permit required under the 2012 Regulations. The overall SEPA position at the Planning EIA stage was that what CRG had proposed for odour in the EIA was potentially permittable by SEPA under the 2012 Regulations.

One key area of concern to SEPA was the adoption by the council of a 1.5 OUE Odour standard at the planning stage of the development SEPA had concerns that this could be an issue as they had imposed a 1.0 OEU Odour threshold on an adjacent site. It was suggested that although the two sets of regulations are distinct, and a separate decision could be made to impose a 1.0 OEU limit within the PPC permit, it may be deemed unreasonable to do so, having not requested that limit during the consultation at the earlier planning stage.

According to the Table 2 in SEPAs' Odour Guidance 2010 the norm is for a 1.5 OUE standard to be set for *"more offensive odours"* with a 1.0OUE standard to be set where there is a requirement for a *"Local adjustment for hypersensitive populations" i.e.,* areas where *"odour generated leads to a high level of complaint"* (Reference: EA H4 Guidance Appendix 6). At the Earls Green Plant, it is surmised that an assessment was made that Grangemouth was a population acutely sensitive to odour, and that a 1.0OUE was set accordingly. The setting of the 1.5OUE at the Caledon Green plant was discussed by SEPA at length pre-cyber-attack This the CO believes can be justified due to the removal of the animal feed dryer... The removal of this unit means the CRG no longer falls into the category of "more offensive odours" (no longer classed as an Animal Feed Production unit) leaving the principal cause of odour the fermentation and distillation of alcohols using processes not dissimilar to brewing and distilling activities with the principal emissions being VOC release.

SEPA Decision: Setting a 1.5OUE for the Caledon Green plant seems a proportionate measure, given the sensitivities of the Grangemouth population to industrial odours, the size and scale of the Caledon Plant and the highly specific nature of the production activities carried out there. A review of the indicative criteria in Table 2 of the SEPA Odour Guidance indicates that a 1.5OUE standard, represents a much tighter standard than what would be expected for mid-range "odour offensive" Industrial activities (2.5OUE for sensitive populations). Furthermore, the figures provided in support of the application suggest the plant will meet a 1.05 OEU standard without abatement, once emissions are passed through the OCS the Odour levels are likely to be reduced even further.

PPC

The information provided within the initial Odour report submitted with the PPC application, differed little from that undertaken for the EIA, and although deemed potential consentable was initially assessed to be insufficient in detail, to demonstrate BAT for Odour, under the PPC determination process. As a result, in SEPA served a Schedule 4 Further Information Notice (S4 FIN) on CRG. This Notice required the applicant to provide information to address SEPA concerns on approx. 17 issues of concern

including several relating to Odour emissions, abatement, and control; these are documented along with the response below.

BAT

A review was undertaken of the BAT or odour in the BAT REF documents /BATC for
Production of Large Volume Organic Chemicals (LVOC)
Common Wastewater and Waste Gas Treatment/Management Systems in the Chemical Sector (CWW)
The Draft Common Waste Gas Treatment in the chemicals sector (CWG) was also reviewed to understand current thinking on BAT in the chemical sector

LVOC BATREF Document

The LVOC BREF contains little information on BAT for odour control referring the reader to the CWW BREF which it states, “describes a number of techniques for measuring and treating odorous pollution adding these are “generally not repeated here”, (excepting that some of these techniques are used for pollution abatement). One of the techniques listed is wet gas scrubbing.

The basic advice within the BREF is that process parameters and stack locations can reduce odour and that off-gas can be treated through scrubbing or other means. General advice is that if odorous substances are present, the operators should have an odour management plan as part of the environmental management system (EMS). At which point it outlines a number of bullet points which should be incorporated into an odour management plan (again pointing to the CWW BREF).

At which point The LVOC BREF states “No further elaboration on odour control is included in this document” adding “Further details on odour management plans can be found in the CWW BREF.”

The CWW BREF

The use of a wet scrubber at the Caledon Green Plant is deemed BAT in the CWW BREF where it is described it thus

Scrubbing or absorption is widely used as a raw material and/or product recovery technique for the separation and purification of gaseous streams which contain high concentrations of VOCs, especially compounds soluble in water such as alcohols, acetone, or formaldehyde.

The BREF outlines that there are several designs of scrubber where the choice will depend on the process requirements (performance efficiency, energy needs, reagents, properties of the waste gas stream etc.) and adds that an optimum design of scrubbing systems should achieve low exit concentrations, high reliability, automatic operation and a counter current flow of liquid and gas

An overview of treatment is described thus

Table 3.304: Overview of end-of-pipe odour treatment techniques

Technique	Odour abatement efficiency ([1]) (%)	Section in the BREF	Comments
Adsorption	80–99	Section 3.5.1.2.3	–
Wet scrubbers	60–85	Section 3.5.1.2.4	–
Alkaline oxidative scrubbing	80–90	Section 3.5.5.4.2.2	Variant of the absorption technique
Thermal oxidation	98–99.9	Section 3.5.1.3.5	–
Catalytic oxidation	80–95	Section 3.5.1.3.6	–
Biofiltration ([2])	70–99	Section 3.5.1.3.1	Low shift of pollution to any other media. Few chemical agents added. Low energy consumption
Bioscrubbing ([2])	70–80	Section 3.5.1.3.2	–
Biotrickling	70–90	Section 3.5.1.3.3	–
Moving-bed trickling filter	> 90	Section 3.5.1.3.4	–
Ionisation	80–98	Section 3.5.1.3.7	–
Photo/UV oxidation	80–98	Section 3.5.1.3.8	–

([1]) As reported in the corresponding section of this document where the technique is described.
([2]) Biofiltration and bioscrubbing can be combined into one system to benefit from the advantages of both techniques. The bioscrubber would act as a humidifier and degrade a high portion of the odorous load. It will also display a buffering effect to prevent high concentrations of odorous substances from entering the biofilter, which otherwise might lead to a rise in temperature in the biofilter material due to an increasing degradation process [198, Schlegelmilch *et al.* 2005]. Elevated temperatures would result in a lower efficiency of the biofilter.

S4 FIN Query 7. In Section B2.3 the proposed abatement technique for odour emissions is for a water scrubber with downstream carbon filter. a) Confirm how you will ensure that performance efficiency of the carbon filter will not be adversely effected due to humidity of the inlet gas after it has passed through the water scrubber. b) Confirm design details and materials of construction of wet scrubber and carbon filter, related ductwork, fans, pipework, and pumps etc. Are these suitable for acid or alkali absorbents? c) Provide further justification for the proposal to change the water on a weekly basis. How will this affect abatement efficiency over the week for each of the 3 main solvents and trace VOCs including 2-butanol and DMA, what other options exist?

[The CRG Response broke the query down into parts a, b, and c as follows]

a) Confirm how you will ensure that performance efficiency of the carbon filter will not be adversely effected due to humidity of the inlet gas after it has passed through the water scrubber.

CRG Response: *The H1 assessment carried out showed that an odour scrubber was not required for the site to meet any ELV's. However, as good practice CRG installed the odour scrubber unit as a precautionary measure. CRG engaged with a reputable, experienced third party manufacturer who designed the scrubber. CRG will operate and carry out operational and maintenance checks as per the manufacturer's instruction. There are controls around the operation of the equipment itself in terms of pressure monitoring which indicates when the packing is fouled as there is a change in differential pressure. There are three carbon filters, and the system will it be setup to use two as duty/assist (please note that it is anticipated that only one will be required in normal operation and CRG will be advised by the third-party designer during commissioning) and the third operates as a spare to be brought into duty when one needs changed. We currently envisage changing or recharging the carbon filters on a 6 monthly basis based on in service duty. If evidence of any effects of humidity or moisture become evident (which would manifest itself in the carbon packing needing replaced sooner), the system has been designed to allow the installation of a condenser or heater without significant changes. Neither the experienced design engineer, nor CRG, anticipate this being an issue.*

SEPA Discussion: The Common Wastewater and Waste Gas Treatment/Management Systems in the Chemical Sector (CWW) BAT Reference document outlines that *"wet scrubbers are more effective for*

hazardous VOC control when used in combination with GAC adsorbers" which is suggestive that the use of these two abatement techniques "in series" is common. It is therefore likely that the problem raised in the S4 FIN 7a) has been encountered before and can be overcome either through design of the plant or the incorporation of an intermediate step (as proposed).

SEPA Decision: If regular monitoring and maintenance are carried out SEPA is content to accept the engineer's recommendation as to the design however, SEPA will require the operator to use BAT to identify problems with the abatement and has included a condition within permit to reinforce the undertaking by CRG to monitor the carbon filters.

b) i. Confirm design details and materials of construction of wet scrubber and carbon filter, related ductwork, fans, pipework, and pumps etc.
b) ii. Are these suitable for acid or alkali absorbents?

CRG Response: *The response by CRG contained the required information regarding the design details of the abatement system. Adding that although the materials used in the design build are suitable for both acids and alkalis, at present only water will be used per the system designer's recommendations.*

SEPA Decision: The response answers the queries raised Query 7b)

c) Provide further justification for the proposal to change the water on a weekly basis. How will this affect abatement efficiency over the week for each of the 3 main solvents and trace VOCs including 2-butanol and DMA. What other options exist?

CRG Response: *As part of the operation of the odour scrubber, water is automatically purged as part of the control logic to ensure that the scrubber water remains fresh. This is not a manual operation. There is in-line conductivity monitoring of the scrubber water to ensure the water is within acceptable limits to ensure that the design criteria are met. Fresh water is dosed to maintain the level in the sump. These measures ensure that the water is always suitable to achieve the design parameters and due to this approach, it is anticipated that abatement efficiency will be consistent.*

SEPA Discussion: The guidance proffered in the Common Wastewater and Waste Gas Treatment/Management Systems in the Chemical Sector (CWW) BAT Reference document is that an optimum design for a scrubbing system should include automatic operation and control. The BREF describes that a programmable logic controller (PLC) system or a digital computer system (DCS) is typically used to manage the operation of the plant automatically (e.g., operating at set pH and reduction potential values, optimised for high gas absorption).

SEPA Decision: According to the responses provided by the applicant to the S4 FIN Query 7 a), b), and c), above the abatement system has been specifically designed to cope with the processes undertaken at the Caledon Green Exemplar plant. The materials chosen are resistant to the potential pollutants present, the scrubber system is capable of being chemically dosed to enhance its performance if necessary and the system is automated the use of a carbon filtration system is covered in the BREFs for the Chemical sector which endorses the use of Wet scrubbers in combination with GAC adsorbers for hazardous VOCs

S4 FIN Query 8 a): Confirm how the odour modelling input figure of 100 OUE/m3 and 2000 OUE/m3 were derived and provide associated calculations (Ref. Table 2 in Section 4.5 and Table 4 in Section 6.3 of CRG014 B4.1b Appendix B – Original Odour Assessment.

CRG Response: *The report from AQS (within file CRG014_B4.1b supplied with the application) states that the input figures came from the odour detection threshold for acetone (100 OUE/m3) and a calculated worst-case scenario of release (2,000 OUE/m3). However, it should be noted that, as per Table 7, B4.1a Appendix A, these values are no longer considered appropriate and have been superseded by the values denoted in the table. These values are based on an unlikely worst-case scenario, matching the peak flow rate with the peak odour concentration (without abatement). This worst*

case was selected as assessment subsequently demonstrated that the proposed limit set at site boundary does not meet 1.5 OUE/m3. The inclusion of B4.1b Appendix B – Original Odour Report in the application was with reference to Table 7 in B4.1a Appendix A. It discusses the updates to the original report and evaluates the resultant potential impact.

Table 7: Odour Dispersion Model Alterations

Parameter	Original Value	Alternative Value	Comment
Actual Flow Rate	7,067 m^3/h	400 m^3/h (peak)	The alternative value is based on an evaluation of the procured equipment to be installed at the site. At a maximum, it is calculated that the flow rate from the constituent parts of the process would total 388 m^3/h. This has been conservatively rounded up to 400 m^3/h. In practice, an average flow rate of around 200 m^3/h is anticipated. It is proposed that this flow rate will be controlled by an extract fan which will not have the capacity to exceed 400 m^3/h.
Odour Concentration	2,000 OU_E/m^3	7,930 OU_E/m^3 (without odour abatement)	The original odour concentration was conservatively modelled as 2,000 OU_E/m^3 as part of the ADM's sensitivity assessment, which assumed a poorly functioning abatement plant. For the sake of this assessment, the odour concentration has been revised based on reported worst case emissions of specific compounds (acetone, butanol, ethanol and acetic acid), assuming no abatement is to occur. Individual emission concentrations of compounds anticipated to be generated were estimated via modelling and laboratory analysis undertaken by Celtic Renewables. The peak concentration of each compound was then taken. The odour concentration associated with these emissions was subsequently calculated utilising the odour detection thresholds outlined in SEPA published Odour Guidance 2010. As noted above this revised evaluation conservatively assumes that no odour abatement will be in place.
Odour Emission Rate	3,926 OU_E/s	881 OU_E/s	The odour emission rate is a product of the flow rate and the odour concentration and is a key input variable when evaluating the potential impact of odours released. In practice, the peak flow rate and calculated peak odour concentration are unlikely to occur simultaneously. However, in order to ensure that this evaluation is undertaken conservatively, both peaks are taken.

SEPA Discussion: There was some confusion regarding the values submitted in support of the CRG application. The S4 FIN Query 8 a) reviews the figures supplied in CRG014 B4.1b Appendix B – Original Odour Assessment. i.e., the odour assessment carried out in support of the planning application in 2018. However, in the document numbered CRG014_B4.1a entitled *"Appendix A - Assessment of Impacts"* submitted at the same time CRG state:

"The following original assessment documents should be referred to alongside this memorandum:

1. Celtic Renewables Ltd: Biofuels Demonstration Plant P/17/0588/FUL Condition 7 – Odour Assessment

2. Odour Report Biofuels Demonstration Facility Grangemouth

These documents are available in Appendices B and C, respectively."

In October 2020, an updated version of CRG014_B4.1a was submitted to consider changes to the processes carried out on site, following which revised submission, comprising documents CRG014_B4.1a & CRG014 B4.1b During Peer Review the question was raised as to whether following the S4 FIN the revised data had been looked at by SEPA modelling staff as it could not be verified that the data had been assessed by SEPA, it was submitted to SEPA modellers for assessment.

SEPA Decision: The information provided in the original application and the updated Appendix A provided with the S4 FIN satisfied the requirement in S4 FIN Query 8 a). The result of the assessment of the revised data was that in general, the data provided was satisfactory and that the risk under normal operation appeared to be low. A number of minor issues were raised (recorded below) these have been discussed and are not considered to materially affect the results of the modelling

- Although emissions are likely to vary between maximum and normal, it would be helpful to know what how frequently the maximum emissions are likely to occur.
- The key question relates to odour emissions in ADMS; this is lower than previously used.
- Assumed that most model assumptions (such as terrain, met data, roughness length) are discussed in the previous, pre-cyber-attack, report.
- Suggest that contour plots are provided so that the location of impacts can help to inform the risk but accept that the choice of 500m resolution may restrict this.

S4 FIN Query 8 b): Provide a report on further odour modelling assessment in ADMS for acetone, ethanol, n-butanol, 2-butanol and dimethylamine. Results should be specified in ug/m3. This should include a wider grid area and modelling of impacts at specific sensitive receptors including Jupiter Wildlife Park, Grange Manor Hotel, and all of the receptors shown in the original modelling assessment (Ref. Figure 7.2 in Section 7.5 of Chapter 7 – Air Quality in the EIA) and comparison of results to the odour thresholds for each of these VOCs

CRG Response: *As discussed in B4.1a Appendix A, it is not considered that further modelling would be necessary, either for odour or to evaluate the impact of VOCs. The rationale behind this is summarised as follows:*

Assessment of Odour Impact

As described in Section 4.2 of B4.1a Appendix A, the original modelling undertaken has considered an odour limit at the site's boundary of 1.5 OUE/m3. As the original model utilised input data that was no longer relevant, this was updated using an unlikely worst-case scenario. This worst case considered the plant operating with no odour abatement, which is now proposed, and modelled trace VOCs as the component with the lowest odour threshold (as per the SEPA published Odour Guidance 2010). C This evaluation showed a maximum odour concentration (as a 100th percentile) of 1.05 OUE/m3 at the site boundary – representing compliance with the proposed limit.

Assessment of VOC Significance

To evaluate the potential significance of VOC release from the site, an impact assessment utilising the Environment Agency's H1 software was undertaken. As with the odour impact evaluation, this considered an unlikely worst-case scenario. This included the modelling of trace VOCs as benzene which, although not anticipated to be present, represents the VOC species with the lowest environmental assessment level (EAL). From this H1 assessment, ethyl alcohol, acetone and butanol were screened out at Stage 1 and benzene at Stage 2. This evaluation included quantification of the anticipated process

contribution (in ug/m3) to each of the parameters modelled. As per Section 4.1 Impact Assessment of the Guidance for Specialty Organic Chemicals Sector IPPC S4.02, indicative BAT requirements state that an assessment of potential impact of the total emissions from activities on receptors can be undertaken using the method laid out in IPPC Environmental Assessments for BAT (Horizontal Guidance Note IPPC H1). The methods laid out provide a systematic method by which to "identify where modelling needs to be carried out". Following on from the assessment in line with the prescribed method, further modelling is not considered to be required.

SEPA Discussion: A review of the Earls Gate Energy Centre (Energy from Waste) PPC Part A Permit application was undertaken (the site is less than a few 100m away from the site of the proposed Caledon Plant an underwent Air modelling). Whilst the use of specific data from Earls Gate would not a valid comparison, it is useful to understand the approach taken to the air modelling at the adjacent larger and more complex site. The Decision Document for Earls Gate advised that specific modelling was not directly carried out for the Jupiter Wildlife Centre and that the decision was taken to use a review of the sensitive receptor results for the nearest human health receptors in Primrose Avenue and Wood Street directly behind the Wildlife Park. The three receptors were identified as R1, R2 and R5 in the Earls Gate report and are, according to map comparisons, identical in position to the three receptors designated 1, 2 and 3 in the Caledon Green Exemplar Plant Air modelling report (shown on the map below) and as such it is deemed reasonable to adopt the same modelling decision for the Caledon Green Plant. The Grange Manor was a receptor point identified as R18 in the Earls Gate EIA / PPC Part A Application, this is on a bearing NW of the Caledon Green Site, with the sole receptor, Receptor Point 7, on a bearing NNW of the site (it would if the maps are correct sit between R15 and R14 from the Earls Gate EIA).
The results from the ADMS modelling show that although a slight impact was noted in the model for the Surrogate "VOC as Benzene" at Receptor Point 3 (see Table below) this was for an unabated release in a worst-case scenario is worst case (benzene is not present in the off gas). The calculations of emissions provided from the screening under the H1 assessment indicate that the unabated emissions are deemed insignificant (albeit VOC as Benzene was screened out at stage 2 of the assessment) and therefore were screened out as NOT requiring further modelling as not requiring further modelling.

SEPA Decision: Given the result of the H1 assessment, the negligible impact from the ADMS modelling the calculation based on unabated releases and the subsequent installation of two stage abatement equipment Further modelling is deemed unnecessary under the Guidance

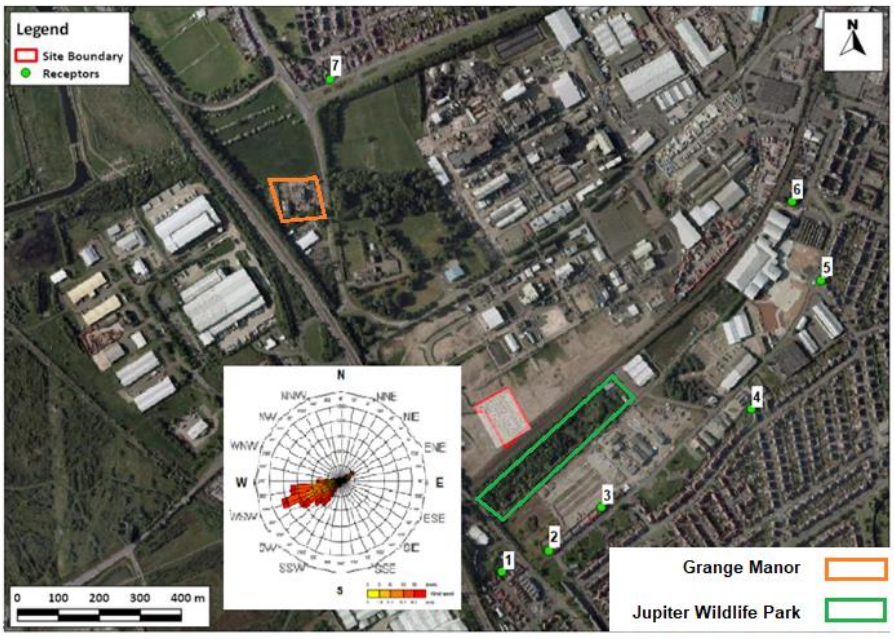


Figure 7.6: Ground Level Contour of the VOCs as Benzene

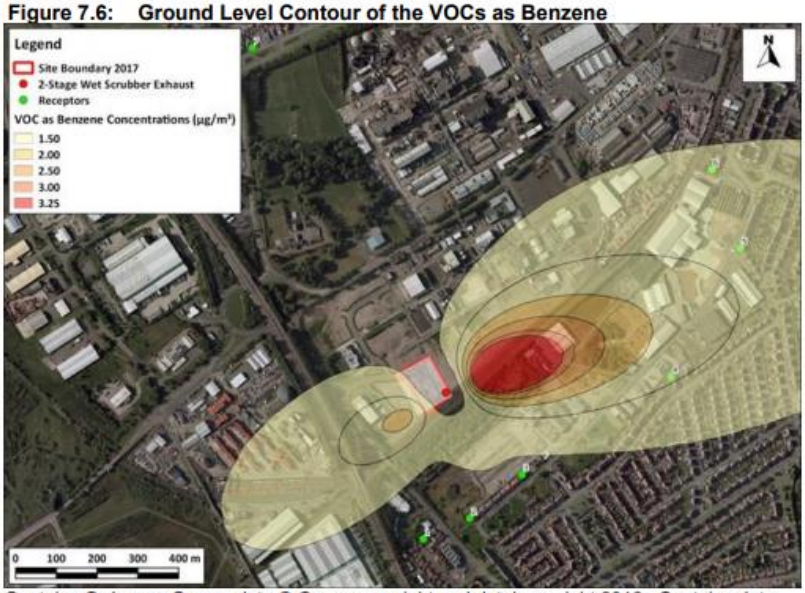


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Table 7.10: Predicted Impacts on Annual Mean Benzene (as VOCs) Concentrations (µg/m³)

Receptor	Without Scheme	With Scheme	% Change [1]	Impact Descriptor as Benzene	Impact Descriptor as Offgas VOCs
1	1.38	1.51	4%	Negligible	Negligible
2	1.38	1.55	5%	Negligible	Negligible
3	1.38	1.62	8%	Slight	Negligible
4	1.38	2.26	27%	Moderate	Negligible
5	1.38	2.04	20%	Moderate	Negligible
6	1.38	1.76	12%	Moderate	Negligible
7	1.38	1.41	1%	Negligible	Negligible
Objective	3.25		-	-	-

Notes on Table 7.10:
1. % changes are relative to the objective and have been rounded to the nearest whole number.

S4 FIN Query 8 c): Provide contour plots of the abated emissions in both OUE/ m3 and ug/m3 for acetone, ethanol, n-butanol, 2- butanol and dimethylamine showing the emission points, proposed installation boundary, the point of maximum impact and the sensitive receptors referred to in 8.b) above.

CRG Response: *As above, it is not considered that this would be required due to the anticipated insignificant impact from the development*

CRG added that based on the evaluation above and the modelling previously undertaken, *"it is anticipated that the maximum odour concentration (as a 100th percentile) from this emission point would be less than 1.05 OUE/m3. This is below the 1.5 OUE/m3 benchmark [*denoted in the planning conditions and adopted in the PPC permit by SEPA]

SEPA Decision: The information to comply with Query 8 c) no longer needs to be provided due to the decision by SEPA in Query 8 b)

5.8 CRG site Management

CRG are the only operators within the site boundary of the installation at Caledon Green, which will be covered by this permit.

The applicant has advised that as the site is new, there are no environmental management systems in place for the Caledon Exemplar Plant , however they have made an undertaking in the application that there will be an Integrated Management System (IMS) implemented prior to start-up which will cover H&S, Quality and Environmental aspects, which will be strictly followed and will be based upon the general structure and requirements of ISO45001:2018, ISO9001:2015 and ISO 14001:2015 respectively. The applicant has undertaken to achieve third party certification in these standards within eighteen months of the site being operational however the document provided in support of the PPC Permit application (supporting document B2.1.) was comprehensive in outlining the Integrated Management system and Environmental Management systems to be put in place at the plant All of which complies with the requirements of BAT

Th applicant has indicated that to support the implementation of the environmental aspect of the IMS, there will be a site-specific Environmental Manual produced.

Communication and Complaint Handling
The applicant has provided SEPA with a framework as to how systems will be set up to handle complaints and internal and external communications under a formal environmental management system (EMS) which is referenced as BAT

5.9 Raw Materials

CRG's ethos as a green energy company is based around sustainability. The process inputs or raw materials are low value, problematic materials produced by other production/agricultural processes, which would be disposed of these are fermented using bacteria to produce valuable products

Initial Feedstocks
The process as described will use approx. 50,000 tonnes of incoming raw materials per annum, this will be made up of the following. Pot Ale, Draff and Potatoes
The actual split of these raw materials will be dependent upon the process and the requirement to blend an optimum feedstock for the fermenter.

Water: (see section 5.12 water use below)

Process Materials:
Phosphoric acid Pros: widely used in the brewing industry for a number of reasons not least in that it forms naturally in the mash tank...Cons: it can corrode metals
Potassium hydroxide Pros: effective degreaser strong alkali only need small stocks Cons: it causes large fluctuation in pH
The company has described that the specification for the storage and handling systems for these chemicals were upgraded to so that stronger strength chemicals could be purchased meaning that a lower volume (and, hence, less deliveries) would be required.

Enzymes: Bacteria: Antifoam: Silicon emulsion
several species of bacteria and numerous commercially available enzyme preparations which are produced to aid industrial fermentation processes the antifoam is necessary as fermentation does produce gases which can be entrained and cause the mash to "boil" over.

Oils and lubricants:
CRG has advised in the supporting documentation that Oils and lubricants on site will be for the maintenance of production and non-production related plant and equipment and will be food grade.

Ancillary Materials

Caustic, acid and detergents/sterilant: These will be used for both production and site related cleaning; • Laboratory chemicals: The laboratory will be used for quality control & assurance, to support the environmental monitoring programme, and for product development.
Laboratory gas cylinders: The compressed gases will include compressed air, anaerobic gas (mostly nitrogen with small volumes of Hydrogen and Carbon Dioxide), nitrogen, helium for use in the analytical equipment
Pest Control Agents: It is envisaged these will be in sealed bait boxes provided by a pest control contractor
Housekeeping and landscaping: small-scale cleaning materials

SEPA Comment: A full table has been provided within the application Table B2.2/1 of the application CRG has stated that they are committed to continually assessing the origin of each of the processing and ancillary materials used on site, and using competitive sustainable alternatives if they are available, and to continually assess the fate of all the materials in the register and the longer-term environmental effects of such.

5.10 Raw Materials Selection

CRG has explained in the application that the basic principle behind the Caledon Green Exemplar plant is to take raw materials produced by other production/agricultural processes which are low value and through the fermentation process produce valuable products, such as: high value biochemicals, biofuels and other commercially valuable commodities
It has been described in the application that it will be the duty of the Commercial Director, supported by the Manufacturing Director, to manage the selection and procurement of incoming raw materials whilst the Plant Manager will, on a day-to-day basis, be responsible for ensuring the receipt, storage, transfer, and use of raw materials in accordance with the procedures held within the IMS. Appropriate records for traceability will be maintained.

SEPA Discussion: CRG has categorised some on the materials used on site as Processing materials are materials that are required to make the process work but are not classed as raw materials, for example the bacteria and the chemicals required for pH adjustment, SEPA would still require the applicant to review those chemicals with a view to eliminating substituting and reducing their use where they are deemed to pose a risk to the environment.

SEPA Decision: SEPA will place conditions within the permit to require reduction of raw material usage throughout the activity including the requirements to assess resource utilisation.

5.11 Waste Minimisation Requirements

CRG has detailed a number of measures that they have taken to reduce waste raw materials are only delivered when required, follow-on handling procedures are designed to reduce waste e.g. The proposed biofuel plant incorporates equipment systems and processing techniques which
produce materials which can be classed as co-products in the form of “wet cake” which CRG will be looking to have certified as animal feed and the congeners (non-product liquids) which subject to specification checks could be potentially used in other manufacturing processes and which otherwise would be disposed of as waste. CRG has described how the design, build and control systems employed at the site are all focussed on minimising waste generation wherever possible and that the proposed operation and management of the site will include waste awareness training for staff and contractors working on the site.

CRG has stated in the application that waste minimisation will be included as part of the specific elements of its Environmental Management System, which is to include procedures to control and manage waste arisings at the site, including the generation, storage, collection, and disposal/recovery of wastes. Throughout the application CRG has been at pains to point out that the whole ethos of their

process is to prevent waste by using low value materials from other processes to produce high value products and co-products

SEPA Decision SEPA will place conditions within the permit to encourage waste minimisation throughout the activity including requirements to assess the management of waste arising at the site.

5.12 Water Use

Process Water
The information supplied indicates that CRG treats minimising water use as a key environmental and commercial objective for the company and as such has installed an automated system to monitor water to improve the efficiency of water use across the site. Water used and re-cycled will be recorded from measurements taken from the mains water and process flow meters. CRG intend to use the results to drive water efficiency, which according to the application has been identified by the company as a Key Performance Indicator (KPI).
The application details the measures taken by CRG to minimise the use of potable water within the process where possible

Cleaning
Where cleaning or decontamination of Tanks fermenters, pipework equipment or vehicles; or the washing down of process floors containment bunds or yard areas, is required.

SEPA Decision: SEPA will require the operator to use Best Available Techniques to minimise the use of water when carrying out these activities

5.13 Waste Handling

(See also...Section 5.11 and Section 5.14)
The applicant has outlined that the responsibility for waste management and control will lie with the Plant Manager and will be in accordance with the site's documented waste management and control procedures. They will oversee the implementation of these practices as well as the training and communication of these practices to all personnel on the site, including visitors. Any contractors working on the installation will likewise follow the company's waste policies and this will be outlined in the permit to work.

A number of dedicated waste collection areas have been identified, from where collections will occur, with all waste storage containers clearly labelled and covered. Hazardous wastes will be stored in separate dedicated areas of the site to avoid damage or accidental release.

SEPA Discussion: SEPA would remind the applicant that where Special Waste is to be disposed of the Regulations in Scotland require that a Special Waste Consignment Note be raised even where the Special Waste is to be disposed of elsewhere in the UK. As the regulations are different under the different jurisdictions of the UK the applicant is advised to contact SEPA for advice prior to Consigning Special Waste especially where the waste is to be sent "cross border".
Furthermore, SEPA would also draw the applicant's attention to the producer's Duty of Care to ensure that waste generated on their site is handled and stored appropriately (Including the provision of bunding or drip trays or storage in a dry and secure area if necessary).

5.14 Recovery or Disposal

(As discussed in Section 5.11)

The aim of the plant is to take in by-products and food crops and use them to produce valuable organic chemicals and co products which have a further use as either animal feed or as a precursor for other production processes. CRG has outlined in the application that wherever possible, waste materials

generated on the site will be sent for recycling and that they would be looking to ensure their waste was not sent to landfill as a result the application details a number of streams from the process which are to be re-used/recycled

SEPA Decision: SEPA has identified two waste streams which require further discussion these are Carbon filters and Waste Oil

Carbon filters
Under waste minimisation BAT, CRG should periodically review the type of carbon filters they are using in the Odour Control Unit and look to replace those requiring disposal with recyclable or rechargeable ones when or if they become available.

Waste Oil
Although SEPA recognises that the applicant, as stated in their application, is looking to use only food grade oils on the site; SEPA would remind the applicant that should the need arise to use specific mineral oils then wherever possible; measures should be taken to ensure that waste oils of different characteristics are not mixed, and that waste oils are not mixed with other kinds of waste or substances, particularly where such mixing would impede their treatment or recovery. SEPA would also advise that non-edible waste oils are always classed as hazardous waste and as such in Scotland they require to be consigned under the Special Waste Regulations 1996 (as amended)

The applicant is reminded that all producers of waste have a duty of care to ensure that any wastes they generate are stored correctly; are only transported by a registered carrier; and are disposed of to a suitably licenced recovery or disposal facility.

5.15 Energy

Overview
At present the Caledon Green Exemplar plant does not have any onsite power generation or heat production; instead, electricity will be taken from mains supply, and heat will be provided by the nearby Calachem facility. The applicant has described in the application how the design, build and operation of the plant contribute to the minimisation of energy use wherever possible. The installation is not part of a Climate Change Agreement.

CRG has included in their application what they describe as the “base techniques & technologies” that they have incorporated into the design of the installation to achieve a high level of energy efficiency energy efficiency. CRG believe that the measures they have taken demonstrate, in both the design of the plant and the processing method used, a commitment to the use of BAT at the site and minimising Energy use.

Regarding the process energy efficiency measures the application details all the measures taken by applicant at every stage of the process to reduce energy use on the site

5.16 Biofuel Production

The Applicant has requested that information relating to the in-depth description and details of the Biofuel production process be treated as Commercially confidential information

5.17 Accidents and their Consequences

CRG has outlined a number of measures they are going to implement to identify, assess and minimise environmental risks and to prevent/minimise the occurrence and consequences of accidents.

These are to be incorporated into the IMS As documented procedures forming part of the Safety and Environmental Management Systems, the applicant is confident these measures proposed and documented will enable a quick response to any emergency, ensuring that the situation is handled in the best practicable way to minimise both the safety and environmental risks. and that communication protocols, reporting mechanisms and investigation structures are clearly defined.

The applicant has undertaken detailed Hazid and Hazop studies and a series of process reviews to identify any potential operating issues which may lead to emergency situations resulting in an incident or have an impact on the environment. The applicant explains in the application how the process reviews included not only a description of the materials used, process conditions, and quantities, but also took account of the equipment used at each stage.

CRG has stated that they will develop a planned preventative maintenance (PPM) schedule for all plant and equipment on site in an attempt minimise the risk from breakdown or failure of critical plant.

5.18 Noise

Environmental Impact Assessment Noise- Notes:
SEPA as a statutory consultee were involved in the discussions regarding Noise generation at the proposed site at an early stage. In their response to the Scoping Opinion request in August 2016 (Ref: PRE/2016/0001/SCOPE). They advised that under PPC Part A Noise is required to be assessed using BS 4142 and that, *"Information on noise and vibration from the operation... should demonstrate that working methods and location of equipment represent the Best Available Techniques (BAT) for control of noise and vibration".* Adding that *"the impact on local sensitive receptors would be a key factor in assessing the BAT justification*," the nearest of these being the residential area on Wood Street and the amenity area comprising the Jupiter Urban Wildlife Centre, with the overall aim of, where possible, preventing noise emissions or, where that was not possible, to minimise and render harmless noise and vibration emissions from the proposed development.
The Scoping response requested that the following details should be provided: - "*Identification of potential noise sources (steam vents, motors, pumps etc.), techniques for minimising noise emissions. including the process design and the layout of the site".*

An Initial baseline noise survey was undertaken to assess the ambient and background noise levels. With operational noise impacts being predicted using CadnaA ® noise modelling software (BS 4142:2014. "Methods of Rating and Assessing Industrial and Commercial Sound").
As concerns were raised regarding the internal noise levels, during the night-time period. the results were supported by an internal noise level assessment under BS 8233:2014 "Guidance on sound insulation and noise reduction for buildings" summarised as follows

Daytime
There was a difference of a difference of between -1.6dB and - 12.1dB at the Domestic properties on Wood Street, which BS 4142:2014 indicates would have a low impact at all Noise sensitive receptors (NSRs) during the daytime monitored at street level.

Night-time
This gave a difference of +4.1dB, which BS4142:2014, indicated was an adverse impact "depending on the context". The level of recorded, of LAr,15mins 31.0dB, was just above the night-time guideline value in the BS 8233:2014 assessed at a height of a 1sr floor (bedroom) window
This indicated that noise mitigation measures needed to be considered, certainly for the cooling towers which were identified as the largest noise source).

After the assessment three mitigation methods were considered which would have a low impact under BS 4142:2014 and meet the Guideline Values for BS 8233:2014

Creating an acoustic enclosure around the cooling towers.
Reducing the noise at source by 10dB.

Moving the cooling towers so as the main process building acts as an acoustic barrier

The applicant advised that once more detailed information became available that a more detailed noise impact assessment could be undertaken to satisfy the requirements of the PPC Part A noise requirements.

May 2020 Noise Survey

This survey included modelling based on a 'worst case scenario*' and was undertaken to supplement the original noise study in 2018. The modelling involved identifying the main sources of noise from the installation and assessing their location and the operating timings as follows.

Source	Location	SPL at 1m (dB(A))*	Operating Strategy	Comment(s)
Air-cooled scroll chiller system	Outside, north eastern corner of plant.	95	Periodically throughout day depending on plant demand	The unit will be in limited operation and when in use, will normally operate below design capacity. 95dB(A) should be considered 'worst case'
Cooling tower	Outside, north eastern corner of plant.	85	Continuous, day and night.	Will modulate depending upon process demands and ambient conditions.
Agitators on Fermenters	Outside, South eastern corner of plant.	85	Continuous, day and night	VSD, will modulate considerably with duty.
Agitators on Storage vessels	Outside, South eastern corner of plant.	85	Continuous, day and night	VSD, will modulate considerably with duty.
Macerator	Inside, north end of warehouse	85	Periodically throughout day and night	
Agitators on cooking vessels	Inside, central location in warehouse	85	Periodically throughout day and night	VSD, will modulate considerably with duty.
Bulk intake system	Inside, north-end of warehouse	80	Daily during raw material delivery. Daytime only.	
Fermenter media recirculation pumps	Outside, South eastern corner of plant.	79	Continuous, day and night/	VSD, will modulate considerably with duty.
Draff intake pump	Inside, north-end of warehouse	78	Daily during draff delivery only. Daytime only.	
Draff discharge pump	Outside north-end of warehouse underneath draff silo.	78	Daily during draff delivery only.	

Table B2.10/1 – Sound Pressure Levels (SPLs) for Key Noise Generating Equipment

**Noise values quoted are the maximum emissions generated from each piece of equipment and does not take into consideration any control measures in place*

The study identified two Residential noise-sensitive receptors (NSRs) locations near to the Caledon Green site... Wood Street (305m SE) and Chisholm Place (355m S), at which to carry out baseline noise monitoring and to assess potential noise impacts from the proposed CRG installation.
These locations were agreed as suitable with Falkirk Environmental Health Department

***The worst-case daytime and night-time scenarios, assume that all noise sources associated with the site, which may need to be operational during those periods, are active simultaneously.**

The results of the modelling based on BS 4142:2014 indicated that the specific noise emissions from the site are likely to result in the following impacts on the NSRs
:

Receptor	Period	Excess of Rating Level	BS 4142 Calculation Indicative Result	Mabbett Conclusion
R1	Day	-11 dB(A)	No/low impact	No adverse impact
	Night	-5 dB(A)	No/low impact	No adverse impact
R2	Day	-28 dB(A)	No/low impact	No adverse impact
	Night	-7 dB(A)	No/low impact	No adverse impact
R3	Day	-26 dB(A)	No/low impact	No adverse impact
	Night	-21 dB(A)	No/low impact	No adverse impact
R4	Day	-29 dB(A)	No/low impact	No adverse impact
	Night	-25 dB(A)	No/low impact	No adverse impact
R5	Day	-10 dB(A)	No/low impact	No adverse impact

Section 11 of BS 4142 provides the following guidance:

Excess of Rating Level over Background Level	Indicative Outcome
≥ 10 dB	Likely to be an indication of a significant adverse impact
≥ 5 dB	Likely to be an indication of an adverse impact
≥ 0 ≤ 5 dB	Some impact, but less likely to be an adverse impact
≤ 0 dB	Indication of no/low impact

In summary, the report concludes that, in practice, it would be rare for all machinery on the site to be operating at once and the installation of variable speed drives and "on demand" systems would limit the operation of equipment to only what is necessary, dramatically reducing operational noise from the maximum (by as much as 40 – 50%) the report also adds that there would be an additional noise reduction benefit, over and above any measures implemented at the site, afforded by trees, foliage, the railway and other buildings located between the site and the NSRs.

The report concludes that *"It is anticipated that the proposed process operations and associated intended site layout are unlikely to result in an adverse impact on the nearest NSRs".*

Control Measures
The applicant has advised that they believe the control measures they have taken during the development of the site will reduce the actual noise emissions to below the levels used in the assessment study, adding that they will undertake a further assessment once the plant is operating normally

A Full Noise Inventory has been provided with the application which includes details of the location, noise specification, and operational details of the plant identified, together with Measured distance between the plant and the two NSRs, and whether the plant is in the open or contained within a building

Summary of Noise Reduction Measures

Variable Speed Drives (VSDs): to be used in the installation (pumps, agitators, conveyors, fans etc.) routine noise, vibration, and temperature monitoring when in operation. Pumps are directly driven (no gearboxes) with installation on rigid plinths to reduce vibrations.

Cooling Tower: (maximum rating at 85 dB(A) at 1 m.) installed at the opposite end of the site from NSRs (Approx. 400m and 500m away from Wood Street and Chisholm Place respectively; Screened by process building (directly between the tower and the NSRs). Will only run at full capacity during high ambient temperature conditions. The 2 cooling tower fans are fitted with silencers and are temperature controlled though VSDs with cooling supported by a heat exchanger,

The Glycol Chiller: CRG has chosen Extra Low Noise (XLN) model, (all components are designed for quieter operation). The oil separators are fitted with acoustic jackets and the compressors are fitted within 'sound boxes. control panel fitted with a 'Night Noise Setback', which can limit the speed of the fans to limit noise, during the night if required.

Bulk Conveyors are all located at the opposite end of the site to the receptors, most of the motors are fitted with VSDs (all directly driven). Identified as a daytime operation (up to 7pm).

Steam Traps: Steam to be delivered at a higher pressure then distributed to the points of use at pressures of between 1.5 bar and 4.0 bar. discharges to be both intermittent and infrequent, Option to install diffusers

Distillation located externally to the process building and therefore, pumping of materials by low power pumps, low pressure steam injection is used (max 2 bar), and the steam injected through a sparger, fully insulated Column will provide noise as well as heat loss, reduction.

Odour abatement scrubber: (Eastern boundary) of the site.
The scrubber consists of a small fan, water sump, recirculation pump and emission stack.
The stack velocity has been designed around 15m/s, to be kept below the 20m/s threshold for onset of 'discharge whistling'.

Other equipment: All other vibrating equipment such as macerator, decanter, and agitators are mounted on securely fastened frames and to dampen and maintain vibration levels at minimum levels. The decanter is fitted with vibration control

Non-equipment Techniques

Building Construction: This incorporates insulated composite panel with an attenuation factor of 20dB.

S**ite Layout:** The cooling tower, glycol chiller and conveyor systems are purposely located as far away as practicable from the specified NSRs, with the site building in between.

On-site Vehicle Movements: Vehicle movements to be strictly controlled using booking system, majority of deliveries within day-shift hours (up to 7pm), strict speed limit of 10mph and installation of consistent concrete base road surfaces to ensure low noise transmission.

Operator BAT Assessment for Noise
The Applicant records that other realistic sound reduction methods outlined in the BREF were considered but were rejected for various reasons The use of an axial fan system, due to increased energy demand associated with that system Sound walls around the cooling tower were rejected due to the additional footprint required, the construction requirements and on-going access problems The assessment was that other noise reduction methods were simpler and equally effective not least of which was simply altering the site layout to position the Cooling Tower to the other side of the production building which would then act as a sound barrier, other measures include the fitting of silencers to the plant and automated control systems to link fan speed to process demand. Measures which the applicant points out is a demonstration of BAT for noise abatement on cooling towers in accordance with the BREF document on Industrial Cooling Systems and aids in Energy Use reduction. The applicant has advised that the overall impact of the cooling towers will be assessed as part of a physical noise assessment once the plant is fully and normally operating

Noise Management Plan

A draft noise management plan has been completed which will be reviewed and updated prior to start up, then again after start-up. Thereafter it will be regularly reviewed, as a minimum annually in line with Management Review. The noise management plan will specify the required noise monitoring frequency, along with guidelines on responding to any noise complaints as required. A copy was supplied with the supporting information

SEPA Discussion: During the assessment of the initial noise report a number of concerns were raised by SEPA regarding the location of the receptors used in the model, not least was that some of the receptor points appeared to be in the centre of the road. The advice provided was that the Earls Gate PPC Application (for a site located a few 100m from the Caledon Green Site) may be useful in identifying the most appropriate and closest sensitive Receptors; adding that these should include the Jupiter wildlife Park (daytime noise) and the closest residential dwellings. Furthermore, SEPA held the view that there was a need to demonstrate that there would be no tonal or low frequency noise generated by the development., advising that they considered the best way to demonstrate this would be to provide evidence that the NR Curves (Planning Condition 5). would be complied with as they cover the complete spectrum of noise frequencies. It was pointed out that given the more rigorous assessment needed for the PPC Application, the applicant should provide a detailed noise assessment report, that would include: - contour maps, a BAT discussion of key noise sources and how any noise impact could be reduced through improved design, citing that this approach was consistent with that used for the PPC application at the adjacent Earls Gate Site “Energy from Waste site “(EfW).

The assessment undertaken by SEPA in 2020 identified that the reports submitted with the PPC application (as summarised above), provided detailed information on attenuation techniques, but there was little discussion on whether low frequency, tonal or impulsive noise would be an issue. Furthermore, the assessment revealed that it was assessed that although the information provided at the time “indicated a negative impact with little explanation as to why” and it was clear that despite the earlier advice there was “no information on the NR curves (which was part of the planning Permission)”. During the assessment it was also noted that following “significant” layout changes had occurred and that some internal equipment had been moved outside. There was also an indication that CRG were planning to install some steam pressure reducing systems and it was cautioned that at another site employing Steam pressure reduction, albeit a much larger operation, that acoustic insulation had to be fitted as, when in operation, they were audible at the site boundary.

As a result, in mid to late 2020 a Further Information Notice was issued to CRG under Schedule 4 of the 2012 Regulations requesting further information relating to a number of issues connected to the application the first 4 queries of which related to Noise Issues at the site these are detailed as follows

S4 FIN Query 1. A number of changes are Referenced in the application which could materially affect the noise emissions from the site, including changes to structures, fan and emission point locations alongside proposed changes to HGV movements and the construction of a bund. Please provide additional detail and update the noise model with these changes and submit a revised report, including noise maps to illustrate the changes to the noise environment.

CRG Response: *Celtic Renewables Grangemouth plc have commissioned Mabbett & Associates Ltd to address this these queries. A monitoring schedule was proposed to and agreed by SEPA which has now been undertaken. The resultant modelling and analysis are in progress.*
[A copy was requested in July 2021 the response advised]

An updated noise assessment is attached – file name: Celtic Renewables Noise Impact Assessment (1.0 Oct 20), alongside the updated Noise and Vibration section which was submitted previously as part of the PPC application – file name: Section CRG009_B2.10a v2, Noise and Vibration.

SEPA Decision: A review of the report identifies that all the elements of the S4 Fin Query 1 have been complied with and the noise maps and plans and with the emission points identified have been provided

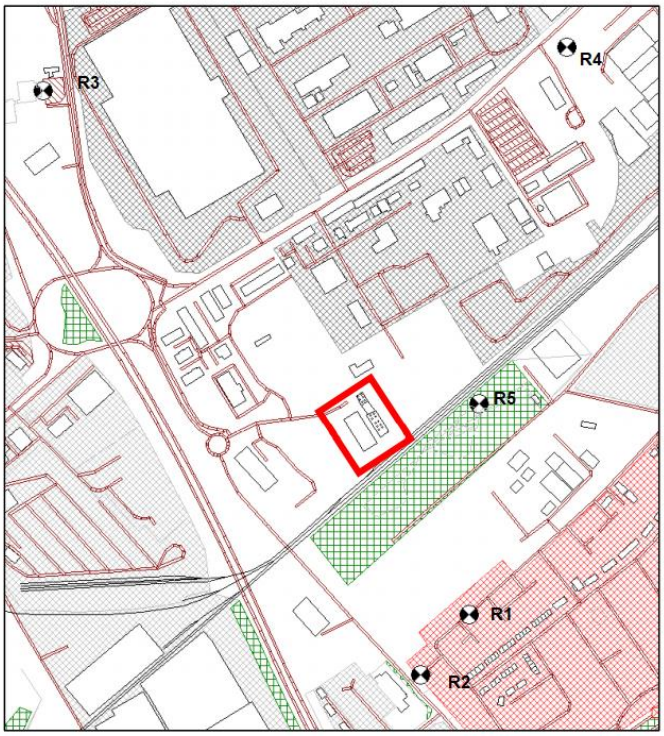
along with the predicted movement of LGVs on the site The ones pertaining to the site layout are included in the appendices to the permit for use in the regulation of the site

S4 FIN Query 2. The noise report submitted alongside the application does not clearly identify appropriate locations of receptors in the model. The report should be revised to include, as a minimum, the Jupiter Urban Wildlife Centre and the closest housing as reference points. (Good examples of noise reports from sites close to the proposed installation maybe useful in identifying the closest sensitive Receptors and can be provided if requested)

CRG Response: *See the response to S4 FIN Query 1*.

SEPA Discussion: A review of the October 2020 Noise Monitoring Report carried out in July 2021 indicated that the number of receptor points within the Noise monitoring assessment had been increased, from the 2 originally monitored for in the 2018 report, to 5 in the 2020 report, identified by R numbers as follows: - (R1) Wood Street, (R2) Chisholm Place (R3), Grange Manor (R4), Earls Road, and (R5) Jupiter Urban Wildlife Centre.
The response from CRG accompanying the resubmitted files in July 2021 advised that the monitoring schedule was proposed to and agreed by SEPA, prior to it being carried out; It is therefore assumed by SEPA permitting that the agreed monitoring schedule included the identification of the Nearest Sensitive Receptor (NSR) points included in the monitoring and shown on the plan below.

Location of Nearest sensitive Receptors (NSR) in relation to the Caledon Green Site



SEPA Decision: A review of the Noise Monitoring report submitted Late 2020 identifies that all the elements of the S4 Fin Query 2 have been satisfied

S4 FIN Query 3. Please demonstrate that there will not be any tonal or low frequency noise generated by the development. The best way to do this would be to evidence that the NR Curves (Planning Condition 5) will be complied with as they cover the complete spectrum of noise frequencies.

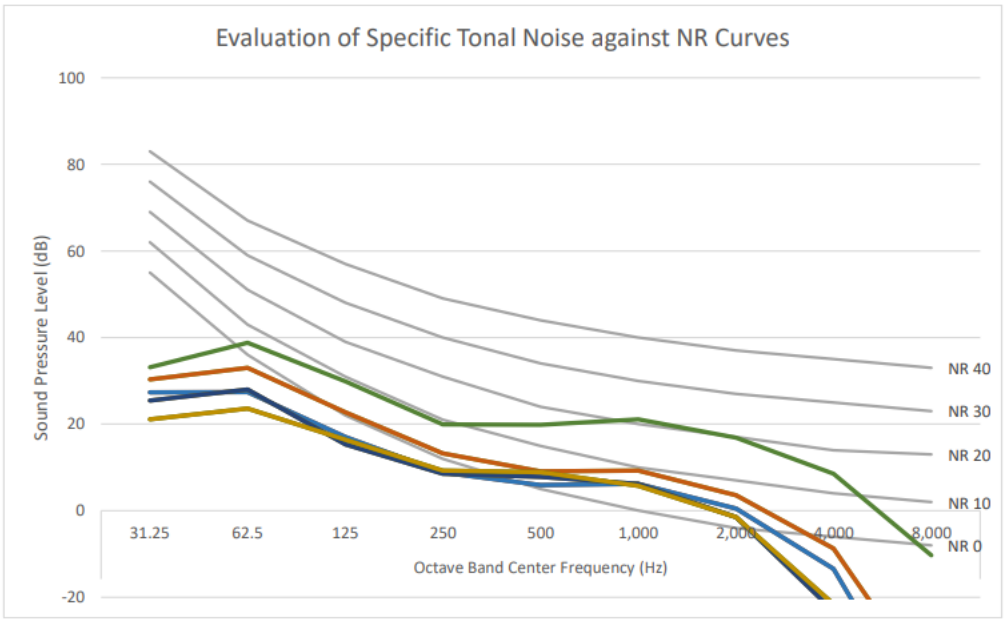
CRG Response: *See the response to S4 FIN Query 1*.

SEPA Discussion: The Noise Impact monitoring undertaken at the Caledon Green site in October 2020 includes an evaluation of the potential Tonal impact from noise generated by the site, this report indicates that this was carried out through analysis of the octave band spectra generated via the modelling and includes a determination of the NR Curves for each receptor

NR curves determined for each receptor.

	Associated NR Curve	
Receptor	Daytime	Night-time
R1	NR 10	NR 9
R2	NR 9	NR 6
R3	NR 8	NR 6
R4	NR 7	NR 6
R5	NR 22	N/A

The report advises that the NR in the table above accounts for where the tonal noise, peaks, relative to the individual NR curves. It then provides the graphical representation of anticipated performance shown below



Based on the modelling result presented in the expanded Noise monitoring, the applicant considers that the noise generated by the site will NOT result in tonal or low frequency noise that will cause a negative impact, as the results show that the maximum anticipated impact associated with the development is NR22 during the day and NR9 at night. To further support this the applicant notes that a worst-case acoustic correction factor of +6 dB(A) has been applied in the BS 4142 assessment above.

SEPA Decision: SEPA is satisfied that the NR noise curves provided within the previously agreed monitoring schedule show there will be no tonal impacts or low frequency noise issues associated with the development

S4 FIN Query 4. The BAT section of the PPC Application discusses a number of possible operating scenarios and options for noise control – please elaborate on the relative impact in noise levels at the closest receptor of each control alongside an estimate of relative costs. (Good examples of this can be provided if that would be helpful)

CRG Response: *See the response to S4 FIN Query 1*.

SEPA Discussion: The measures taken to minimise the noise emissions from the site are recorded in a revised version (v2) of CRG009_B210a submitted as summarised earlier in this section these refer to measures outlined in the BAT reference documents as constituting BAT. The noise monitoring survey and the associated analysis would indicate there is no negative impact on the local NSRs from noise generated at the site. The applicant points out in the report that the modelling indicates that there would be no impact even at a worst-case scenario (one where the plant would be emitting the maximum theoretical noise emissions). The report indicates that the control measures the applicant has put in place should have the effect of reducing the actual noise emissions from the site further and certainly below those used in the noise assessment study. The consultants suggest that this should be confirmed through further monitoring taken, post commissioning, following plant optimisation.

SEPA Decision: The result from the agreed Noise modelling suggest that the site will have a negligible impact on the NSRs monitored, as a result what is proposed by CRG for the Caledon Green Site conforms to the requirements for noise and vibration under PPC.
SEPA will however expect all the mitigation measures described in the supporting documents to be implemented. Furthermore, as a new site, the predicted Noise assessments should be confirmed through further modelling once the site is operating normally (post optimisation), No additional conditions have been added as these measures can be addressed through BAT as an element of the Noise Management Plan for the site

5.19 Monitoring

(See also the relevant sections of this report as indicated next to the headings below)

Process Control
The applicant has advised that Instrumentation has been fitted to the main process units which will allow continual monitoring of the process parameters such as level, temperature, pH, pressure; indicating that as part of the maintenance review, critical instrumentation will be identified with both PPM and calibration requirements documented as part of the IMS.

Process Emissions
The applicant outlines that the site will operate a number of systems to control the emissions and discharges from the site and as such there will also be a number of measuring devices related to environmental control, sampling, and monitoring, both within the plant and in the laboratory. The applicant has detailed the monitoring procedures for all the main emissions from the site, which are listed as
Emissions to atmosphere (all gases produced during the process will be vented via an external odour abatement unit).
Emissions of surface water, described as “only rainwater” and which is directed to an attenuation pond,
Emissions to sewer involving discharge to the Calachem industrial waste treatment plant.
Odour
Noise (third party monitoring).

Monitoring for the following parameters will be carried out.

Air

CRG to undertake MCERTS accredited air monitoring at the main process air emission release point. Monitoring will be undertaken by a monitoring contractor. CRG has stated in the application that they do not consider the Caledon Green Exemplar plant to meet the thresholds required for a defined emission limit value (ELV), to be applied. However, CRG are conscious that as a demonstration facility, the findings from undertaking monitoring of emissions are of benefit and will aid future process development. They have advised they are content to pass the results from this monitoring to SEPA to confirm the assumptions made in this application. CRG advises that they have not yet agreed a monitoring programme however it is anticipated that it will include at least the following total VOCs (as carbon). using the following reference conditions: ▪ Temperature 0^{o}C (273 K) ▪ Pressure 101.3 kPa ▪ Water vapour No correction ▪ Oxygen No correction and be based on the Environment Agency's (EA's) TG Note M21

They have advised they will pass the proposed standards and full details of the monitoring programme, to SEPA in advance of implementation. Should the quantified emissions significantly vary from those predicted, negatively affecting the site's potential impact, a further evaluation of the impact of the emissions will be undertaken and submitted to SEPA.

SEPA Decision: Within the permit SEPA has used the Precautionary principle to include in the permit a conditional ELV for Total VOCs. The figures provided thus far are bench derived not full production figures and the CO is of the opinion that at least one result taken under Normal operation should be provided before an ELV is disapplied (Equivalent Technical measure similar to a" process guarantee"). This places the requirement on the operator to show that they can meet the standard prior to holding a discussion with SEPA on monitoring air emissions and standards going forward SEPA would look to include in that proposed monitoring programme an analysis of emissions from the process prior to abatement. The entry for VOCs in the monitoring tables reflects this position

Raw Materials **see section 5.9 & 5.10 above**

Waste **see section 5.11, 5.13 & 5.14 above**

Infrastructure
Building integrity, Bunds and impermeable surfaces or structures will be routinely assessed

Odour **see section 5.7 above**

Water use **see section 5.12 above**

Energy **see section 5.15 above**

Noise **see section 5.18 above**

Discharge to Sewer

Excess surface water, uncontaminated rainwater from process areas, collecting in bunds /sumps will be assessed for contaminants before being discharged to surface water system / attenuation pond as "rainwater" and conveyed to further treatment in the Weak Stream discharge (see Section 5.3 Discharge of External Sumps)

5.20 Closure

The applicant has provided a detailed proposal outlining the measures they will take to avoid pollution risks and to return the site to a satisfactory state. A Site Closure Plan is to be developed outlining how the site will be decommissioned to avoid any pollution risk and return it site to a satisfactory state, this

plan will be included within the site's Environmental Management System (EMS) and will address issues such as: pollution testing of soil, the need for any remediation, procedures for either the emptying, cleaning (and or where necessary) the removal / of all pipelines and vessels; the provision of plans of all underground pipes and vessels ; clearing the attenuation pond (the pond has been designed with a view to eventual clean-up or surrender and the dismantling demolition and removal of plant.
The applicant has stated that the Site Closure plan will be maintained as a live document within the EMS and will be routinely updated to reflect any changes to the nature of the site's activities. The applicant has advised that any changes to the condition of the site will be recorded and used to inform the decommissioning plan. (SEPA will be informed of any changes to the site condition in a timely manner).

5.21 Site Condition Report (and where relevant the baseline report)

Site Condition Report
The Site Condition report provided with the application contains a review of the available information for the site indicating it has been an industrial site since the late 1800's. A historical review carried out identified a number of industries which have occupied the site which generated potential pollutants (Chemicals of Concern) similar to those produced at the Caledon Green Plant

A detailed assessment of the ground conditions at the site have been provided along with a ground water assessment. Shallow groundwater flow locally within the site area was estimated to be towards the northwest, while more widely it was towards the north and northeast.

Baseline Report

Overview
Where a PPC activity involves the use, production or release of Relevant hazardous materials which could impact on Soil or Groundwater, then the Regulations require that a baseline report be submitted with the application. This report must provide soil and groundwater measurements for the site. This can be based on previously existing information, if that information provides an accurate description of the state of the site at the time of the report; or can be based on current information. As this is a brownfield site, situated in an area of high industrial activity, the applicant has undertaken baseline monitoring It is worth recording that the regulations, regarding the baseline report, only require the applicant to have regard to existing soil and groundwater contamination by any hazardous substance which will be used, produced, or released by the installation.

The baseline report submitted in this application draws on the findings of Environmental Resources Management (ERM) in their Summary of Existing Data Report (2015), the site-specific investigations carried out in 2016 plus additional monitoring (as part of the Environmental Impact Assessment carried out for the associated Planning application) and in 2018 (for the purposes of this permit application).

Hazardous Substance Assessment
In accordance with current guidance the applicant has carried out an assessment on the substances used on site and has indicated that those substances considered to present a potential pollutant risk have been identified as relevant hazardous substances in accordance with The Town and Country Planning (Hazardous Substances) (Scotland) Regulations 2015 The identified relevant hazardous substances denoted as Chemicals of Concern (CoC) are as follows:

Metals	• copper • zinc • lead
Sanitary Parameters	• Biological Oxygen Demand BOD • Chemical Oxygen Demand • ammonia/ammonium • phosphate
Chemicals	• alkalis • acids
Production Chemicals	• acetone • ethanol • n-butanol • butyric acid • lactic acid

The report submitted in support of the PPC Permit application describe that for each chemical used on the site, a 4-stage assessment was undertaken and recorded in a Risk Assessment Table

Previous Investigations (Summary)

The ERM report 2015 summarised the site history and previous environmental investigations at the site (Dames and Moore 1999 and Environ 2005) Dames and Moore investigation, included sampling and analysis of soil and groundwater samples, in the locale. Only one sampling point was located within the site boundary with others located 50 and 100m from the site. The report noted the presence of some VOCs, SVOCs and metals in soils and groundwater and assessed risks to human health and 'controlled waters' using preliminary Risk Based Clean-up Levels (RBCLs), The Environ 2005 Phase I Report noted that VOCs and SVOCs were detected in soils in several trial pits in the site surrounds but in only one of the 10 trial pits within the current site area, Significant concentrations of SVOCs were noted in the surrounds). The detectable SVOCs tended to be in different areas, which would indicate localised spillage/ leaks. There was one groundwater borehole located within the site in 2005 which was reported to have 'no significantly elevated results, however, two of the boreholes located 50m from the site contained VOCs and SVOCs (benzene, chlorobenzene, dichlorobenzene, dichlorophenol, propene and chloropropene). The 2016 Site Investigation Report included an intrusive investigation for layout originally proposed by CRG (double the size of the current site) as a result the sampling points relative to the new site boundary are approximate. It is estimated that approx. half of these samples can be identified as being taken in or close to the new site boundary. The 2016 soil test suite did not include all Chemicals of Concern (CoC) or potential CoC precursors, such as ammonium, phosphate, VOCs, SVOCs, ethanol, acetone, or n-butanol. Copper, zinc, lead, potential CoC precursors related to organic matter content, petroleum hydrocarbons and polycyclic aromatic hydrocarbons, were detected in almost, all the samples. With a hydrocarbon odour and sheen noted in one sample and a sheen noted in another and a high zinc was noted in some of the soil samples. I. CoCs in 2016 With respect to Groundwater monitoring; Of the six 2016 boreholes, only BH3 and CP2 were located within the current site boundary. Additional groundwater sampling from all six 2016 Mason Evans (ME) boreholes was carried out in 2016 to include an extended suite of determinands The results from in BH3 and CP2 (within the site) and BH2 (8m from the site), showed that copper, lead, acetone, n-butanol, and ethanol as well as Potential CoC precursors such as TPH and PAHs were not detectable. Zinc was detectable in all three boreholes and the pH was slightly alkaline. Dissolved organic carbon (DOC) was recorded. Low concentrations of diethylphthalate, pyrene and benzo(ghi)perylene in CP02 and xylene in BH were detected. VOCs/ SVOCs (inc. chlorinates) were noted in groundwater at CP01 (20m NW of the site). The only phosphate detected was off site and was equivalent to good status.

Site Specific Monitoring (2018)

Three boreholes were drilled on the site as identified in table 4.1 the monitoring report as follows

Table 7: 2016 Borehole Details

2016 Borehole	Location relative to site	Response zone	Strata
BH1	~40m outwith to northwest	1m to 5m bgl	sandy clay
BH2	~8m outwith northeast corner	1m to 5m bgl	0.2m made ground, 3.8m sandy clay (shells below 3m)
BH3	on site	1m to 5m bgl	0.1m made ground, 3.9m sandy slightly gravelly clay or sandy clay with shells
CP1	~20m outwith to northwest	1m to 20m	natural soils (base of made ground was 0.7mbgl)
CP2	centre of site	1m to 12m bgl	natural soils (base of made ground was 1mbgl)
CP3	~30m outwith site to west	1m to 20m bgl	natural soils (base of made ground was 0.7mbgl)

Soil Sampling Results

The report records that there were no olfactory or visual signs of contamination within the made ground soils and although faint organic odours were noted within the natural crust deposits, no olfactory or visual signs of contamination were reported. Copper, lead, and zinc detected in soils at depths of 0.25 - 3.0m bgl with one sample recording a level of 1m bgl. Soil pH ranged from 6.3 - 10.1. with organic matter ranging between 1.3% and 12.1%. No acetone, n-butanol, ethanol, or butyrate were detected in the soils. TPH was noted in 9 soils with a maximum concentration 529mg/kg. Total Polycyclic Aromatic Hydrocarbons (PAH) was detected in all but four soils with a maximum concentration of 190mg/kg. VOCs were detected in five trial pit and included benzene, toluene, dichloromethane, 1,1,2-trichloroethylene, 1,1,2- trichloroethane, 1,1,2,2-tetrachloroethane, chlorobenzene and dichlorobenzenes. With a maximum concentration for total VOCs of 0.303mg/kg. SVOCs including PAHs were detected in 12 soils and included dichlorobenzenes, trichlorobenzene, cresol, nitrobenzene, dichlorophenol, methylnaphthalene, dibenzofuran, carbazole, phthalates and dichloroanthraquinone. with a maximum concentration of 0.185mg/kg at TP2 at 0.4m bgl. It is noted that the maximum concentrations of TPH, PAH and SVOCs were recorded from the same sample point and at the same depth (TP2 at a depth of 0.4m bgl) The only 'Tentatively Identified Compound' (TIC) in soil was within the SVOC suite and comprised 1,5-dichloro-anthraquinone (100mg/kg) in TP9-18a at 1.0m bgl. The report advises that the SVOC+TIC screen would have picked up butyric acid or butyrate, but neither were detected in the soils.

Groundwater Sampling Results

Whilst n-butanol, acetone and butyrates were not detected in any of the 20 samples taken, the results from borehole sampling show a mixed set of results; some of the borehole samples indicate the presence of a range of chemicals of Concern and or similar compounds whilst in others they are absent. This is borne out by the results of sampling for a number of parameters Ethanol, pH, BOD, Petroleum Hydrocarbon, as described below

Ethanol was detected in all the samples taken from two of the boreholes but in the third borehole it was only detected in a single sample.

The highest pH (11.8) was recorded in only one sample with the next highest recorded pH in all samples being pH 7.94.

Orthophosphate was only detected above the Limit of Detection in one sample

Total phosphate was detected consistently in one borehole but only detected intermittently in the other boreholes.

The highest BOD concentration was recorded in two boreholes on the same day, but these concentrations were reduced to non-detectable or near non-detectable levels at the same boreholes on subsequent dates.

Petroleum hydrocarbons were detected in all samples taken on a single day but were only detected in some boreholes on subsequent dates.

Although detected in all borehole samples Significantly higher TPH and PAH concentrations were recorded in one of the boreholes. Borehole BHC had a maximum Total PAH concentration of 5200µg/l decreasing over a 6-week period to 170µg/l); this contrasted with the maximum total PAH concentration recorded in the other boreholes of 1.9µg/l.

The highest concentrations of VOCs were recorded in groundwater in three on-site boreholes, and one off-site borehole (8m NE of the site). The VOCs were detected on more than one occasion and differed between the boreholes. These VOCs included chlorobenzene, 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, 1,2-trichloroethylene, 1,1,2-trichloroethane, cis-1,2- dichloroethylene, 1,1,2,2-tetrachloroethane, 1,1-dichloroethane, 1,1,1-trichloroethane, benzene, 1,2-dichloropropane, toluene, 1,3-dichloropropane and/ or chlorobenzene. I can only be assumed their presence was due to localised leaks or spills

SVOCs were detected in groundwater from three of the boreholes on the same day and from BHC in all samples Results show that Out of the 60 compounds in the SVOC test suite, the only compounds detected in the groundwater were: • di-n-butylphthalate in BH02, CP02 and CP03 • dibenzofuran, carbazole, 4-chloroaniline, 1-methyl-naphthalene, in addition to PAHs (naphthalene, acenaphthene, chrysene, pyrene, benzo(a)anthracene, benzo(b)fluoranthene, fluorene, phenanthrene, anthracene, fluoranthene) in BHC The only compound detected in groundwater in the SVOC+TIC screen was 2-

methylnaphthalene in BHC . The report advises that this screen would have picked up butyric acid or butyrate, but neither were detected in any of the groundwaters

Initial Condition of the Site

SEPA Discussion:
Historical industrial land use associated with the former chemical works and railway and made ground highlights the potential for contamination sources. Previous investigation in 1999 and 2005 noted elevated VOCs/ SVOCs in soils and groundwater within 60m of the site but none within the site boundary. In the 2016 investigation there were no soil on-site exceedances of human health criteria for the commercial scenario and some exceedances in groundwater and leachates in respect of environmental quality standards (EQS) and RPV/ DWS with more exceedances for soils, leachates, and groundwater in the site surrounds. Assessment using the pollutant linkage approach indicated that the predevelopment contamination risks to surface waters and the groundwater were low. Analysis of the monitoring data from both 2016 and 2018 for both soil and groundwater indicate that generally, across the site, the chemicals of concern (those likely to be generated within the proposed activity) were at or, at most, only slightly above background levels, this is not thought to be uncommon for brownfield sites especially those where the site has been used for, and is surrounded by, heavy industry The applicant has stated that it is their view that there is no significant contamination from former land use and that the main products produced on site n-butanol, ethanol, acetone, lactic acid or butyric acid were not detected in soil however ethanol and VOCs were detected in groundwater.

The analysis for the Relevant Hazardous substances that will be produced used and handled on site indicated that there was no significant contamination from these RHS within the soil samples taken; this despite the over century use of the site for chemical production. The Material Safety Data Sheets for each of these substances indicates they all have a short residence time in the environment. The compounds produced at the site are readily biodegradable in the environment, the short chain; alcohols, and ketones, and acids such as Butyric and Lactic are produced in the body and gut of most animals and are rapidly broken down by natural enzyme systems and microorganisms.

The groundwater sampling showed a transient pattern of results in that the background levels of Relevant Hazardous substances fluctuated from day to day and were not uniform across the site (which is likely to make background comparison difficult at the point of site surrender (Site Closure Report).

SEPA Decision: The applicant has stated in the application that they are satisfied that the findings of their Site and baseline reports represent the baseline environmental conditions at the Site of the Caledon Green Exemplar plant at Caledon Green Falkirk prior to commencement of the permitted Activity.

SEPA is satisfied that the reports and analysis required under the Regulations for the baseline Report have been done, and as such SEPA would require the operator to refer to these reports as the initial condition of the site when returning it to a satisfactory state on closure of the site or when they apply to surrender the permit.

5.22 Consideration of BAT

CRG has provided an assessment of BAT for the site in their application, which includes a summary of the Indicative Best Available Technique (BAT) requirements laid out in “Guidance for the Speciality Organic Chemicals Sector, IPPC S4.02, 2003” IPPC S4.02 and confirms the measures the installation has put in place to achieve those indicative BAT requirements.

The applicant describes how the operations proposed at the Caledon Green Exemplar Plant represent a unique and novel manufacturing process. And as such they do not consider that there is specific BAT guidance available that relates to the proposed installation. They assert that the approach and principles laid out in the IPPC S4.02, “Guidance for the Speciality Organic Chemicals Sector” are representative of the potential environmental risks and techniques that should be factored into evaluation of the CRG

process. Following discussions and agreement with SEPA CRG has where appropriate, utilised this guidance in the preparation of the permit application.

SEPA Discussion: It was initially thought that the Large Volume Organic Chemicals BAT Conclusions (LVOC BATC) would apply to the site, as there is no threshold either in the 2012 Regulations or Annex 1 in the Industrial Emissions Directive. However, the LVOC BATC is described as applying to sites that have continuous processes which exceed 20KTPA, well above the level the CRG Plant is operating at. SEPA reassessed the BAT requirements and concluded that the Common Wastewater Treatment BATC (CWW BATC) would apply (and additionally, once issued, the BAT conclusions for Common Waste Gas Treatment in the Chemical Sector (denoted WCG BATC))

The issue as to the level of BAT at the site was raised again in the Schedule 4 Further Information Notice the reason this was done is unclear and confusing as the BAT Tables referred to appear to have been provided by the applicant already. The Cyber-attack means access to detailed information is difficult. All indications from CRG show that they believe this issue to have been resolved during earlier discussions between CRG and SEPA

S4 FIN Query 5: The proposed PPC installation will be regulated as a new plant under the Production of Large Volume Organic Chemicals BAT Conclusions document, commonly referred to as the LVOC BATC, published in the Official Journal of the European Union (EU) on 7 December 2017 (Ref. Commission Implementing Decision (EU) 2017/2117 (primary BREF). The Common Wastewater and Waste Gas Treatment / Management Systems in the Chemical Sector BAT Conclusions, commonly referred to as the CWW BATC, published in the Official Journal of the European Union (EU) on 9 June 2016 (Ref. Commission Implementing Decision (EU) 2016/902 will also apply. For BAT 1 to BAT 23 in the CWW BATC and BAT 1 to BAT 19 in Section 1 of the LVOC BATC, and for any BAT-AEL for new plant associated with that BATC; provide a detailed explanation of how you will ensure that the design and operation of the proposed facility will meet the requirements therein. Your response should be laid out clearly, ideally in tabular format with each individual BATC and BAT-AEL or BAT-APL clearly identified. If you believe any of the BATCs or aspects of the BATCs are not applicable, provide an explanation as to why you believe this to be the case. You may use cross-referencing with other sections of your PPC application and/ or responses to other questions in this notice where any individual aspect of a BATC has already been detailed.

CRG Response: *The Exemplar plant at Caledon Green does not fall under the remit of LVOC BATc as this BREF is applicable to continuous processes where the total capacity of the chemicals exceeds 20 kt/yr. tonnes per year. This plant will produce less than 7% of this volume. The operations proposed by CRL represent a unique and novel manufacturing process. Therefore, it is not considered that there is BAT guidance that relates to the proposed installation. However, the approach and principles laid out in IPPC S4.02, Guidance for the Speciality Organic Chemicals Sector are representative of the potential environmental risks and techniques that should be factored into evaluation of the CRG process. Therefore, CRG have, where appropriate, utilised this guidance in the preparation of the permit application. This proposed approach was discussed and agreed with SEPA, and it has been confirmed again recently that the site does not fall under the remit of LVOC. CRG checked the applicability of the CWW BREF document with SEPA in Aug 2018 as most of the BATc refer to direct emissions to water, and there are no routes from the CRG site where this could happen. The direction given was that the CWW AEL's did not apply to the CRG site however CRG were aware of the requirement for any receiving Effluent Treatment Plant to confirm that that they could treat the effluent from the site. Calachem are a licenced waste facility operating under PPC licence PPC/A/1008834/CP03. The initial letter from Calachem, the receiving Effluent Treatment Plant, is shown below, dated 16th March 2018. And in response to this FIN, an updated version of the approval letter was requested, dated 1st October 2020 as a reconfirmation (CRG politely request that this response remains within SEPA only as permissions have not been obtained for these documents to be shared in the public domain).*
The question I have is what is the status of the following UK Technical Guidance S5.01 Waste incineration and S4.02 Speciality Organic Chemicals – are we OK to continue referring to these for the smaller plant?

SEPA Discussion: From the documentation submitted, SEPA's permitting section are content to accept that what has been already agreed with SEPA, and subsequently provided in the application, demonstrates benchmarking against BAT

Regarding the last point in the response, there is some debate as to the level of BAT to be applied to PPC Part A facilities which fall below the Industrial Emissions Directive (IED) Annex 1 threshold of the relevant BATC. SEPA advises against use of the old UK Technical Guidance as it is liable to be "out of date" having been based on the older BREFs which in many cases have now been superseded.

SEPA's position on this point is that small facilities should benchmark against the current BATC for the activity being undertaken and undertake BAT assessments for any aspects of their process which do not meet the relevant BATC.
This in line with Regulation 25 (10) of the 2012 Regulations stating that with respect to Schedule 1 conditions covering: emission limit values and environmental quality standards that: -

10) Where there are no BAT conclusions for an activity, an emission limit value must be based on the best available techniques in relation to the installation or mobile plant concerned, as determined by giving special consideration to the matters specified in Schedule 3. [Schedule 3 covers BAT and lists the specified matters for Part A installations]

SEPA Decision: Having reviewed the proposal, the relevant reference documents and the response to the Schedule 4 Further Information Notice and taking account the previous discussions between CRG and SEPA Permitting are satisfied that what has been proposed constitutes BAT for this site

It is worth noting that whilst it is the duty of the regulator to determine BAT for any given site (taking into the BREF and BATC Documents and any site-specific issues), it is worth noting that where an applicant is aggrieved by the conditions attached to a permit granted to them (BAT is a condition of a PPC Permit) they may appeal against the decision of SEPA to the Scottish Ministers.

Bund Sump Water disposal
Following concerns raised by CRG the CO undertook a complete BAT Review of the issues surrounding the discharge from Bunds and Sumps.

SEPA Discussion: The Common Wastewater and Waste Gas Treatment/Management Systems in the Chemical Sector (CWW) BREF (BAT Reference) Document seeks to build on this (Water Framework Directive) distinction by describing that an essential point for industrial activities is the prevention of uncontrolled effluents from the site, such as contaminated rainwater. And how for this purpose, the drainage system of an industrial site can be divided into a production surface part, including areas of storage tanks, and a normal traffic surface part, going on to describe how generally rainwater from production areas is collected either in sumps on the spot or in other central facilities (e.g., emergency storage tanks or lagoons) in order to allow inspection and then a decision to be made on whether to discharge it directly to the receiving water or to a wastewater treatment facility. The CWW BREF adds that rainwater collection, monitoring and discharge is a matter of routine at industrial sites, characterised both by the low potential chemical pollution of the water and the low EHS risks associated. Techniques primarily designed for catching spillages and wash waters from cleaning, are also used to catch contaminated rainwater from production or other areas such as: bunded areas and retention ponds. The Common Wastewater and Waste Gas Treatment/Management Systems in the Chemical Sector BREF adds that the drainage system of normal traffic areas is, where appropriate, connected to extra discharge facilities that are, for example, installed to: prevent the unintentional discharge of accidental spillages on roads or parking areas.
On monitoring the CWW BREF Parameters to monitor and pollution prevention techniques to be applied based on the monitoring results will depend on the activities carried out at the site and their significance

to any receiving water as well as on the rainfall intensity and duration, which have major regional variations.

Typical parameters that may be monitored rapidly during periods of rainfall are, for example, pH, turbidity, TOC, colour, and floating material.

The frequency of monitoring (e.g., continuous, or regular) depends on a combination of several factors such as the frequency of rainfall, the size of the installation (SMEs are less likely to use continuous monitoring, as well as the activities carried out at the installation and their significance to any receiving waters.

Continuous monitoring may not be economically viable at small installations with small volumes of rainwater compared to the total volume of wastewater to be treated. These installations may choose to systematically send rainwater to treatment irrespective of whether it is contaminated or not.

The CWW BREF document also advises that “Information on techniques used to prevent the contamination of rainwater from storage areas can be found in the Emissions from Storage BREF [113, COM 2006]. H just advises that rainwater disposal is controlled by regime in place

Good practice at refineries is to segregate this clean tank farm stormwater from potentially contaminated stormwater in order to minimise the amount of wastewater processed

This advises that both Routine and In-service inspections are key in preventing discharges of process effluents and products to the bund through leakage, over or under pressure and of the malfunction of ancillary equipment. The BREF advises that routinely, operations personnel should make frequent visits to the tanks under their control and be alert to any signs of deterioration or change to the tank or its surrounds including any changes in paint condition (where painted). the BREF points out that with proper inspection, of the tank, connecting pipework, pumps, and valves, etc. any leakage can be observed, and its significance evaluated and recorded.

It has been difficult to review other sites in Scotland both due to the cyber-attack and the use of the general default position i.e., that rainwater collecting in bunds be emptied and tankered away.

However, the CO came across a site in England albeit for a BAT assessment undertaken for a radioactive discharge in which uncontaminated rainwater was discharged to the Water Environment following an inspection protocol

The assessment was a Best Available Techniques (BAT) review of the disposal of rainwater ingress into an effluent receipt system and bunds which may become contaminated with radioactive material.

The assessment only applied to rainwater contaminated Rainwater which gathers in the system bunds, and which meets the following criteria:

a. the effluent system tanks are confirmed not to be leaking into the bund,

b. there is no reason to suspect the rainwater has been contaminated due to any

other leak or spill of effluent,

Can be discharged

The assessment went on to add

Effluent with concentrations above the threshold values, or parameters other than those detailed above are outside the scope of the assessment.

SEPA Decision

The methodology in the example above (a. and b.) was enhanced and proposed to SEPA as an initial screening method for bund sump water disposal compliance with which would indicate it was "uncontaminated" and could be discharged. Non-compliance would require the operator to either undertake sampling against a trigger value below which the bund sump water would be deemed "uncontaminated" and suitable for discharge Otherwise the bund sump water would be deemed "contaminated" and would require alternative disposal This proposal was considered BAT and adopted as an alternative to primary sampling with non-standard conditions being included in the draft permit

6 OTHER LEGISLATION CONSIDERED
Nature Conservation (Scotland) Act 2004* & *Conservation (Natural Habitats &c.) Regulations 1994
Is there any possibility that the proposal will have any impact on site designated under the above legislation? No **Justification:** SEPA provides a screening table in its Nature Conservation Procedure for activities under PPC such that where a site falls within the screening radius for the activity to be undertaken further assessment is required by the CO. The table in Annexe A of SEPA's Nature Conservation Procedure was used to specify the screening distance. Following discussion with SNH it was confirmed that there were 12 Designated or protected sites within a 15km radius of the Caledon Green site, however they felt that the proposal would have negligible impact on the designated sites responding thus "*based on the information provided in the application documents, SNH are of the opinion that the proposal will not adversely affect the integrity of the SPA/SSSI/Ramsar sites"*. It was determined that NO further assessment was required
Screening distance(s) used – 2km initially extended to 15km after consultation with SNH
Are there any SSSIs within the area screened? Yes 10 SNH were contacted see above
Are there any SPA or SAC designated areas within the area screened? Yes 2 SNH were contacted see above
Other legislation
N/A

7 ENVIRONMENTAL IMPACT ASSESSMENT AND COMAH
How has any relevant information obtained, or conclusion arrived at pursuant to Articles 5, 6 and 7 of Council Directive 85/337/EEC on the assessment of the effects certain public and private projects on the environment been taken into account? Need for an Environmental Statement 1.4.1 The EIA scoping exercise was undertaken in 2016 and therefore the assessment has been completed under The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011 ('the EIA Regulations') in accordance with the agreed transitional arrangements within The Town and Country Planning (Environmental Impact Assessment)

(Scotland) Regulations 2017. 1.4.2 Within the terms of the Environmental Impact Assessment (Scotland) Regulations 2011 ('the EIA Regulations'), the proposed development falls within Schedule 1, meaning that EIA is mandatory.

Schedule 1, Part 6 Integrated chemical installations, that is to say, installations for the manufacture on an industrial scale of substances using chemical conversion processes, in which several units are juxtaposed and are functionally linked to one another and which are— (a) for the production of basic organic chemicals; (b) for the production of basic inorganic chemicals; (c) for the production of phosphorous-, nitrogen- or potassium-based fertilisers (simple or compound fertilisers); (d) for the production of basic plant health products and of biocides; (e) for the production of basic pharmaceutical products using a chemical or biological process; (f) for the production of explosives

Section 13.0 Indicative BAT Requirements

The indicative BAT requirements for impact assessment, as per S4.03 are provided alongside Celtic Renewables' responses below.

13.1 Indicative BAT Requirements for Impact Assessment

Indicative BAT Requirements	Celtic Renewables Response
Provide a description, including maps as appropriate, of the receiving environment to identify the receptors of pollution. The extent of the area may cover the local, national and international (for example, transboundary effects) environment as appropriate.	See Section 2.0.
Identify important receptors, which may include: areas of human population including noise or odour-sensitive areas, flora and fauna (that is, Habitat Directive sites, special areas of conservation, Sites of Special Scientific Interest (SSSI or in Northern Ireland ASSI) or other sensitive areas), soil, water, that is groundwater (water below the surface of the ground in the saturation zone and in direct contact with the ground and subsoil) and watercourses (for example, ditches, streams, brooks, rivers), air, including the upper atmosphere, landscape, material assets and the cultural heritage.	See Section 2.0.
Identify the pathways by which the receptors will be exposed (where not self-evident).	See Section 2.0.
Carry out an assessment of the potential impact of the total emissions from the activities on these receptors. IPPC Environmental Assessments for BAT provides a systematic method for doing this and will also identify where modelling needs to be carried out, to air or water, to improve the understanding of the dispersion of the emissions. The assessment will include comparison with: ▪ community EQS levels ▪ other statutory obligations ▪ non-statutory obligations ▪ environmental action levels (EALs) and the other environmental and regulatory parameters defined in IPPC Environmental Assessments for BAT.	An assessment of emissions to be air has been undertaken and is shown in Appendix A and PPC permit application Section B3.1 "Emissions Inventory". For emissions to sewer, as discussed above, upon commencement of operation, Celtic Renewables intend on sampling and analysing the discharge to sewer. This data will then be used to assess the impact against relevant environmental standards.
In particular it will be necessary to demonstrate that an appropriate assessment of vent and chimney heights has been made to ensure that there is adequate dispersion of the minimised emission(s) to avoid exceeding local ground-level pollution thresholds and limit national and transboundary pollution impacts, based on the most sensitive receptor, be it human health, soil or terrestrial ecosystems.	Available in Appendix A.

Indicative BAT Requirements	Celtic Renewables Response
Where appropriate, the Operator should also recognise the chimney or vent as an emergency emission point and understand the likely behaviour. Process upsets or equipment failure giving rise to abnormally high emission levels over short periods should be assessed. Even if the Applicant can demonstrate a very low probability of occurrence, the height of the chimney or vent should nevertheless be set to avoid any significant risk to health. The impact of fugitive emissions can also be assessed in many cases.	As discussed in Appendix A, this assessment was undertaken utilising conservative values accounting for a likely worst-case scenario.
Consider whether the responses to Sections 2 and 3 and this assessment adequately demonstrate that the necessary measures have been taken against pollution, in particular by the application of BAT, and that no significant pollution will be caused. Where there is uncertainty about this, the measures in Section 2 should be revisited as appropriate to make further improvements.	Responses to other sections adequately demonstrate where necessary measures have been taken against pollution, in particular by the application of BAT. Please refer to PPC permit application PPC permit application Sections B2.3 "Main Activities", B2.6 and B2.7 "Waste", B2.8 "Emissions Inventory", B2.10 Noise" and B2.9 "Accidents" for further details.
Where the same pollutants are being emitted by more than one permitted activity on the installation, the Operator should assess the impact both with and without the neighbouring emissions.	There is only one permitted activity on the installation.

COMAH

The original assessment team were uncertain as to whether the Caledon Green site was of a sufficient size to fall under the COMAH regulations, correspondence on whether the issue had been raised with the applicant or covered at the planning stage was unclear as a result the applicant was asked to clarify the position and confirm whether the level, they could operate at would exceed the COMAH Threshold. This issued was raised in the Schedule 4 Further Information Notice under Query 6 as follows

S4 FIN Query 6. Confirm whether or not the inventories of chemicals held will meet the storage thresholds for dangerous substances set out in Schedule 1 of the Control of Major Accident Hazards (COMAH) Regulations 2015 (NB The regulations may apply where dangerous substances identified in the regulations are kept or used in quantities above the prescribed thresholds.

CRG Response: *CRG had checked the COMAH regulations and appreciate that this was not referenced in the original application. The total maximum storage for products which are regulated under COMAH regulations, is 49.7 tonnes, falling well under the COMAH lower tier limits of 5000 Tonnes.*

SEPA Discussion: Correspondence at the time of the S4 FIN Query 6, details that SEPA were not sure whether the issues relating to COMAH had been addressed or not, and that, whether CRG would require a hazardous substances consent for the storage of the solvent products (acetone, ethanol, butanol).

The applicant commented that COMAH was dealt with under PPC, this is a misnomer SEPA would advise that although assessed simultaneously with the PPC Permit Application, any COMAH authorisation would be determined by SEPA, separately, under the Control of Major Accident Hazards (COMAH) Regulations 2015

SEPA Decision: As indicated above the levels stored on site are well under the COMAH lower tier threshold

How has any information contained within a safety report within the meaning of Regulation 7 (safety report) of the Control of Major Accident Hazards Regulations 1999 been taken into account? N/A

8 DETAILS OF PERMIT
Do you propose placing any non-standard conditions in the Permit YES

Condition Number(s)

3.3.4 Notwithstanding the requirements of condition 3.3.3 The Operator shall maintain a register of any pressure relief or reduction valves describing the: - location (site plan), height, the items of plant it serves, note any abatement apparatus incorporated into the system and describe any monitoring or alarm system and its purpose. Each pressure relief and reduction valve shall be clearly marked with a reference corresponding to its entry in the register.

Justification:

The CO could find no reference to PRVs in the reports provided, it was confirmed that the tanks that are prone to pressurising have been fitted with pressure relief or reduction valves. This condition places additional requirements on the operator to keep a register of all, or any, pressure reduction systems on the site, and to identify them within the plant. This would aid in identifying the source of any fugitive emissions.

Condition Number(s)

3.5.1 All operations on the Permitted Installation shall be carried out in such a way to minimise the nuisance and hazards arising from the Permitted Installation in respect of the presence of birds, vermin, and insects. The Permitted Installation shall be inspected, in accordance with a documented risk assessment. The risk assessment should be reviewed as appropriate by a person suitably qualified and experienced in pest control.

Justification:

Following a request from the operator, regarding a potential conflict between the requirements in the original PPC condition and the feed safety requirements under the Feed Materials Assurance Scheme (FEMAS), changes were made to Condition 3.5.1

Condition Number(s)

3.7.8 By 01 March 2023 the operator shall establish and maintain an inventory of waste gas streams being emitted from the Permitted Installation under normal operation

3.7.9 The inventory of waste gas streams required by condition 3.7.8 shall include information about the characteristics of the waste gas streams, such as:

a) average values and variability of flow and temperature;

b) average concentration and load values of relevant substances and their variability ;

c) flammability, lower and higher explosive limits, reactivity;

d) presence of other substances that may affect the waste gas treatment system or plant safety (e.g. oxygen, nitrogen, water vapour, dust).

Justification: The permit application only provided an inference as to what the constituents of the offgas would be. This condition requires the operator to identify the component gases or groups of gases present in the discharge when the plant is fully and normally operating. A degree of information is required to satisfy BAT on this issue (see further deliberation on the issue in DD02)

Condition Number(s)

3.8.8 Olfactory monitoring shall be carried out by the Operator in accordance with the Odour Management Plan

Justification:
Condition 3.8.8 already had the words “in accordance with” the Odour Management Plan, and therefore if it did not specify that a daily assessment of odour emissions downwind of the Site, at the Site boundary was required. SEPA will require an odour check to be carried out in accordance with the Odour Management Plan. It was proposed to add the words ‘and Monitoring’ and “as agreed with SEPA” the CO was advised that for consistency with other conditions of the permit these should be removed

Condition Number(s)

3.8.9 The Operator shall record the result of each olfactory assessment referred to in Condition 3.8.8. as follows

3.8.9.1 Where odour is detected the records required under condition 3.8.9 shall include the date, time, location, duration, and result of the assessment as well as the name of the person making the assessment, the wind direction and strength and the general weather conditions at the time. The record shall further include the operational status of the Installation.

3.8.9.2 Where no odour is detected the record shall include as a minimum the date, time, wind direction and general weather conditions. The record shall further include the operational status of the Installation.

Justification:
CRG requested that the original conditions were altered to require a 'by exception' method of recording i.e., One where they would only be required to record where an offensive odour, or any other adverse condition was identified. SEPA holds the view that, where a monitoring exercise has been undertaken in accordance with the Odour Management Plan (OMP) then the results of that monitoring require to be recorded. SEPA in reviewing the standard condition(s) is of the opinion that the level of detail required to be recorded when there is no odour detected could be limited and be described in the OMP. As a result, the condition has been amended to include separate requirements for monitoring where no odour is recorded. Following review, the only question raised was whether there was a requirement to know the operational status of the installation when no odour was detected. As any description of the site not operating normally would need to be documented elsewhere and may even be required to be reported as an incident, this could be a tick box rather than any description

Condition Number(s)

3.13.2 All process “strong stream” effluents, generated within the permitted installation shall be transferred to a suitably licenced treatment plant, for treatment and disposal

3.13.3 The “weak stream” effluents, produced in the permitted installation, discharged from Emission Point E1 on the Emissions plan in Appendix 1 shall not exceed the discharge limits for weak stream effluents from Emission Point E1 as detailed in Table 3.6.

3.13.4 Where there is an exceedance of the weak stream effluent discharge limit under Condition 3.13.3, all bund discharges shall be tested in accordance with condition 3.13.8, prior to release until the source of the exceedance has been identified.

3.13.5 Prior to the discharge to the attenuation pond of surface water from any bunded areas, including road bunds and mobile bunds (“bund water”) or sumps (“sump water”), the operator shall carry out the following screening checks to demonstrate that the bund or sump water is uncontaminated:

3.13.5.1 Notwithstanding Condition 3.10.5, that the tanks within the bund show no signs of deterioration or change to the tank or its surrounds, especially of leakage or indications of over or under pressure or changes to the paint condition (if painted),

3.13.5.2 that the effluent system tanks are not leaking into the bund,

3.13.5.3 that there is no reason to suspect the bund or sump water has been contaminated due to any other leak or spill of effluent,

3.13.5.4 that pH is within the discharge limits identified in Table 3.6 for emission point E1, and

3.13.5.5 that a visual inspection of the bund and sump water shows it is clear of any contamination (visibly free of solids, oils, fats, or greases).

3.13.6 Where all the checks carried out under Condition 3.13.5 are met, the bund or sump water shall be considered “uncontaminated” and can be conveyed to the attenuation pond for discharge as a weak stream effluent provided that the weak stream effluent discharge limits under Condition 3.13.3 are met.

3.13.7 Where any one of the checks carried out under Condition 3.13.5 is not met, the operator may submit a sample of the bund or sump water for further chemical analysis under Condition 3.13.8 or can deem it “contaminated” under Condition 3.13.9.

3.13.8 Bund or sump water shall be sampled and tested in accordance with following conditions:

3.13.8.1 Unless otherwise agreed with SEPA, the operator shall use the EMC values provided in Table 3.6 to determine whether surface water collecting in sumps and bunds is contaminated.

3.13.8.2 If the results of the sampling and testing required under Condition 3.13.8, when compared against the EMC values, show the bund or sump water is below the event mean concentration (EMC) value, or is within the range, as appropriate, for the parameters specified in Table 3.6 it shall be deemed to be “uncontaminated” and the operator may convey it to the attenuation pond for discharge as a weak stream effluent

3.13.9 Bund or sump water which fails the screening tests under Condition 3.13.5 or following sample testing under Condition 3.13.8 exceeds the EMC or is outwith the range for the parameters in Table 3.6, shall be deemed to be “contaminated” and must be transferred to a suitably licensed treatment plant for treatment and disposal.

3.13.10 The Operator shall, taking into account any requirements of the disposal site, implement a measurement and/or sampling programme for the emissions in Table 3.6, subject to the requirements for monitoring specified in Table 3.7, or as otherwise agreed in writing by SEPA.

Justification:
These are conditions relating to the discharge of Sump or Bund water they refer to the procedure, and set a benchmark, for determining whether sump or bud water is contaminated with process effluent and addresses the operator options for the subsequent disposal route. They allow the operator to undertake a visual and olfactory inspection of tanks and infrastructure and collected bund or sump water prior to its discharge at which point ...should the operator have any concerns regarding the bund or sump water then they can if they wish, undertake a screening assessment of the bund sump water to check its suitability for discharge to the attenuation pond (using the EMC provided); conversely, they can treat the bund sump water as contaminated and arrange suitable disposal. The values given in the associated tables were used in a PPC Part A Waste Management permit PPC/A/1188451 to allow discharge to the Surface water collection system direct to the water environment and are underpinned with Event Mean Concentration (EMC) levels derived from sound scientific studies. The additional conditions implement the testing regime in The Emissions from Storage BREF [113, COM 2006] which were used in a permit in England following a BAT assessment for disposal of contaminated rainwater from a bund. These have been to be adapted for use at the Caledon Green Plant owing to the discharge to a waste treatment plant rather than direct to the water environment.

Condition Number(s)

Schedule 4 CONDITIONS APPLYING TO THE PRODUCTION OF BIOFUEL AND SOLVENTS
Under Section 4.1 Operation of the Process

4.1.1 The loading and unloading of tankers shall only take place in the specified areas and shall be subject to correct operation of the automatic barriers and divert valve systems

4.1.2 During the loading and unloading of liquids or chemicals the operator shall ensure that all necessary checks are carried out on couplings hoses and pumps to ensure correct and secure attachment and that all site control procedures are followed.

Justification:
These Conditions cover the specific measures which the operator must take prior to vehicle unloading and loading operations at the Caledon Green Plant They are included to reinforce the need for the operator to control these activities and ensure the measures outlined are implemented

Condition Number(s)

4.1.3 The operator shall ensure that all process offgas is treated through the wet scrubber, and carbon filtration system, prior to being discharged through the stack

4.1.4 The operator shall ensure the water vapour content of the partially treated offgas from the wet scrubber does not impact on the performance or integrity of the carbon filter

Justification:
These Conditions are linked to the use of the wet scrubber and Activated Carbon filters and are added following the concerns raised in the Further Information Notice that moisture from the wet scrubber process impact on the operation of the GAC filters These conditions require that the operator not only uses the abatement, but inspects the filters to ensure there is no impairment of them

Table 3.4

Spot Sampling Frequency Total VOC

The ELV set for VOC is, TVOC as total C 20 mgm-3, this has been included for reasons described in the ELV section (Section 13) above and DD02

This has been given a monitoring frequency of “Within 1 year then as agreed with SEPA” giving SEPA the option of extending the period between monitoring events This will be dependent on the results of the operational monitoring and the Waste Gas Emissions Inventory

Table 3.4 Spot Sampling Frequency

Parameter: Total VOC

Within 1 year then as agreed with SEPA

Justification

The trigger level for the requirement for continuous monitoring of Total VOCs within WCG BREF document is given in the table accompanying BAT Conclusion 8.

BATC 8 states: "BAT is to monitor channelled emissions to air with at least the frequency given below and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality."

Total volatile organic carbon (TVOC)	All emission points with a mass flow of ≥ 2 kg/h	Generic EN standards (5)	Continuous	BAT 11
	All emission points with a mass flow of < 2 kg/h	EN 12619	Once every year (2) (3)	BAT 11

(1) The monitoring only applies when the substance/parameter concerned is identified as relevant in the waste gas stream based on the inventory given in BAT 2.
(2) To the extent possible, the measurements are carried out at the highest expected emission state under normal operating conditions.
(3) The minimum monitoring frequency may be reduced to once every three years if the emission levels are proven to be sufficiently stable.
(4) The minimum monitoring frequency may be reduced to once every year if the emission levels are proven to be sufficiently stable.
(5) Generic EN standards for continuous measurements are EN 14181, EN 15267-1, EN 15267-2 and EN 15267-3.

The CRG reported in the CRG014_B4.1a *Appendix A - Assessment of Impacts"* that the mass emissions from the site of all VOCs had been subject of a H1 assessment and the results predicted No Class A VOCs and a Mass Emission of 0.801kg/h of Class B VOCs well below the level of 2kg/h required to trigger continuous monitoring under the WCG BREF. A further assessment of BAT was undertaken in the document B2.11 entitled "Monitoring" in support of the application. Section 3.1 of that document contained the consultant's assessment of the Indicative BAT Requirements for Emissions Monitoring at the site (documented as follows)

3.1 Indicative BAT Requirements for Emissions Monitoring

Indicative BAT Requirements	Celtic Renewables Response
Monitoring should generally be undertaken during all phases of operation (i.e. commissioning, start-up, normal operation and shutting-down) unless the Regulator agrees that it is inappropriate.	As discussed in Section B3.1 "Emissions Inventory", it is not considered that proposed emissions will be of a level that would require the application of a formal ELV. However, Celtic Renewables intend on undertaking a programme of emission monitoring to both air and water upon finalised construction of the site and commencement of process operation during normal operation. These monitoring programmes have been marked as an **ACTION ITEM**.
Continuous monitoring and recording (or at least sampling in the case of water) are likely to be required under the following circumstances: ▪ where the potential environmental impact is significant or the concentration of substance varies widely; ▪ where a substance is abated continuous monitoring of the substance is required to show the performance of the abatement plant. For example continuous monitoring of dust is needed after a fabric filter to show the effectiveness of the filter and indicate when maintenance is needed, or sampling BOD from an effluent treatment plant; ▪ where other control measures are required to achieve satisfactory levels of emission (e.g. material selection).	Regarding the circumstances noted adjacently: ▪ It is not considered that the potential environmental impact will be significant. An assessment of the potential environmental impact has been carried out in PPC permit application Section B4.1 "Impact Assessment" Appendix A. Substance concentrations are not expected to vary widely due to a relatively stable operation and employment of air pollution control techniques. ▪ As demonstrated in Appendix A of Section B4.1 "Impact Assessment", it is not considered that abatement equipment is required at the site. However, as the site is to be a demonstration plant, Celtic Renewables propose to install abatement. Therefore, it is not considered that continuous monitoring of emissions to air is BAT. The WWTP is to have continuous pH monitoring (which is the key treatment parameter) at a number of points across it, which will be used to control the system and to determine abatement efficiency. ▪ No associated control measures to those already available are deemed necessary.

The results of both assessments did not trigger a requirement for continuous monitoring of Air emissions at the site.

The requirement in the permit Table 3.4 (above) to undertake monitoring *"Within 1 year then as agreed with SEPA",* allows a better understanding of the emissions produced by the plant when it is working under normal operating conditions. The CO believes that when allied to the solvent recovery figures from production monitoring it should provide a good indication as to whether the low emissions from the process recorded by the applicant, during bench trials and modelling, occurs in practice.

This is in line with the WGC BREF footnote 3 which states "the *minimum monitoring frequency may be reduced to once every three years if the emission levels are proven to be sufficiently stable".*

9 EMISSION LIMIT VALUES OR EQUIVALENT TECHNICAL PARAMETERS/ MEASURES

Are you are dealing with either a permit application, or a permit variation which would involve a review of existing ELVs or equivalent technical parameters? ***Yes/NO***

The regulations require that permits include emission limit values (ELV) or equivalent technical parameters/measures (ETPM). Record the substances which are to be released from the activity, the location of the release (assuming point source) the ELV to be set or where appropriate the ETPM to be put in place. A justification for the level/approach should be given. If any section does not apply indicate with N/A and delete the rest of the box

Emission limit values Air

Substance: Odour

Relevant emission benchmarks: EA H4 Guidance Appendix 6.

ELV: A descriptive condition that emissions must be "Free from offensive odour at any location at or beyond the site boundary" included in Table 3.4 as "No offensive Odour at Site Boundary" at a frequency described in the Odour Management Plan

Emission point: Odour emissions from the stack and from all other contained and fugitive sources

***Rationale*:** There is a requirement in the Planning Permission (set through the EIA) that emissions shall not exceed 1.5 OEU/m3 and as a result the site has been designed and modelled to meet that limit. SEPA had discussed setting a lower ELV of 1.0 OEU/m3 in line with other, adjacent, permitted sites, however following those discussions a level of 1.5 OUE/m3 was deemed appropriate due to the scale and nature of the emissions from the plant and the data from the operator, which indicated that emissions from the plant as designed were likely to be 1.05 OUE/m3. This is discussed further in the relevant sections of DD02

Details of any equivalent technical parameters adopted to supplement or replace ELVs: None

Details of any derogations from the ELVs set out in the BAT conclusions; None

Substance: Total Volatile Organic Carbon (TVOC or TOC)

Relevant emission benchmarks: BAT-AEL for TVOC in the draft 2019 WGC BREF

ELV: 20mg/m3 TVOC (TOC)

Emission point: Stack

***Rationale*:** All the values presented to SEPA by the applicant have been based on Laboratory bench studies. The applicant has asserted that the results of the tests and modelling carried preclude the application of ELVs on the stack. The CO had disquiet about not including an ELV for Total VOC as Biofuel and Solvent production is the sole activity carried out on the site and requires to be controlled and the composition of waste gases ("Waste Gas Inventory") presented as a "may contain" being based on what was likely to be in the discharge, SEPA would like to see the actual composition and

concentration of the constituents of the off gas and has included a 20mg/m^3 Total VOC limit as outlined in the draft 2019 WGC BREF
SEPA has restricted the frequency to one annual monitoring cycle in the first instance and will review this following a review of the emission results from the plant under normal operating conditions. SEPA has added the requirement to sample the pre-abated emissions i.e., prior to the abatement system, to assess the effectiveness of the abatement system and whether it is necessary to ensure compliance

Details of any equivalent technical parameters adopted to supplement or replace ELVs: None

Details of any derogations from the ELVs set out in the BAT conclusions; None

Substance: Water Vapour and Droplets

Relevant emission benchmarks: Air emissions guidance as outlined in various Process Guidance Notes

ELV: No Emissions monitored by a weekly visual inspection of the stack It has been determined that this frequency may be reduced depending on the performance of the installed demisters and carbon filters

Emission point: Stack

***Rationale*:** The guidance states that the standard efflux velocity of 15m/s can have the effect of forming water droplets in the final discharge, especially where wet abatement has been used. SEPA would look to the operator to remove water vapour prior to discharge as the carbon filter could also be affected by excess moisture in the semi treated Offgas The applicant has stated they have introduced demisters to counter these issues

Details of any equivalent technical parameters adopted to supplement or replace ELVs: None

Details of any derogations from the ELVs set out in the BAT conclusions; None

Emission limit values Surface Water

No Discharges to Surface Waters

Emission limit values Surface Water Drainage (Closed system) *

Substance: Sump / bund water

Relevant emission benchmarks: EMC values quoted in Table 6.1 of “Assessing the Scale and Impact of Urban Run-Off on Water Quality” A report to from WCA Environment Limited (December 2013) Report to DEFRA which was based on

Mitchell G, Lockyer J and McDonald A. 2001. Pollution hazard from urban non-point sources: a GIS model to support strategic environmental planning in the UK. School of Geography, University of Leeds.

ELV: Indicative EMC Values for common surface water parameters

	Basis of Limit	Event Mean Concentration (EMC) mg/l
Limits for Parameters from Emission Source	Volume	
	Biochemical Oxygen Demand	10
	Chemical Oxygen Demand	150
	Total Suspended Solids	50
	Ammoniacal Nitrogen	1
	Total Phosphate	1
	pH	5 - 9
	Fats Oils and Grease	The potential discharge shall not include significant traces of visible oil or grease
	Emissions	Compliance with Any Disposal Site Requirements

Emission point: Sump or bund holding the waters to be disposed of

***Rationale*:** The applicant describes in the application that they would sample the water in sumps and bunds and determine if it were uncontaminated rainwater. It is the view of the SEPA that to define a sump or bund water as simply “contaminated” and “uncontaminated” is a little too arbitrary. SEPA must be satisfied that the system of determining whether the sump or bund water is “uncontaminated” or “contaminated” is robust enough to distinguish between what would be, without bunding, a “normal surface water run-off" and a sump or bund water which has been contaminated with process effluent. To do this the operator would need to benchmark against a standard, as simply testing the water without reference to a standard would be meaningless, as the sump or bund water will collect surface contamination (e.g., solubles from concrete, bird or animal droppings, leaf litter moss etc.) and as a result, it is unlikely to be uncontaminated or meet a zero standard.

The standards proposed by SEPA above constitute a secondary or alternative screening method for sump or bund water, prior to its disposal. They are to be applied where the operator wishes to dispose of bund sump water where the visual inspection is not met or following a breach of the weak stream effluent agreement. The trigger values presented are based on the EMC values listed for run off from Industrial/ Commercial sites in Table 6.1 of the 2013 WCA/DEFRA report; summarised in the table above. This report details the average levels of contaminants found in storm water discharges from a variety of built environments, Tables 6.1 and 6.2 in the report detail the EMC values that were derived by Mitchell et al in a 2001 study and which the WCA report of 2013 states “*may be used in the model to estimate concentrations of pollutants in urban run-off*”. Although at the time of the report they cautioned that much of the data used for the estimations was “relatively dated” they were of the opinion that it would be useful for a “screening assessment”.

***The system does not discharge to the water environment it egresses the site to a private treatment plant**

Details of any equivalent technical parameters adopted to supplement or replace ELVs:

SEPA has included conditions to permit the operator to undertake an Initial primary assessment of bund or sump water prior to its disposal, by Inspection of Tanks and associated infrastructure within the bund combined with an operator visual and olfactory assessment of the bund water assessment If the bund or sump water complies with the initial assessment conditions within the permit (based on The Emissions from Storage BREF [113, COM 2006]) then no further testing will be required. Should the operator not be satisfied that the conditions of the assessment are met then they may, if they wish, subject a sample of the bund sump water to testing against the parameters described above before deciding on an appropriate disposal route

Details of any derogations from the ELVs set out in the BAT conclusions; None

Emission limit values Surface Water Drainage and SUD System

Substance: Weak Steam Discharge
Relevant emission benchmarks: Discharge limits set by Disposal Site

ELV: None

Emission point: Discharge to Surface Water Sewer/SUD system

***Rationale*:** This discharge relates to a controlled release from the attenuation pond of Surface water (rainwater run-off) to a separately licensed PPC Part A disposal site at a max rate of 5 litres/sec there is no direct discharge to the Water Environment. As rainwater run-off it falls to be regulated through Section 3.3.2.3.6 of the CWW BRE, which states that for a Small to Medium enterprise where the surface water discharge is conveyed for further treatment then continuous monitoring is not necessary

Details of any equivalent technical parameters adopted to supplement or replace ELVs:

Details of any derogations from the ELVs set out in the BAT conclusions.

Has an Annex been inserted to the permit containing reasons, assessment and justifications for setting the value

Emission limit values Process Effluent

Substance: Strong Stream Effluent

Relevant emission benchmarks: Disposal Site Limits
ELV: None

Emission point: Tanker loading point

Rationale: This is tankered away and is subject to the requirements of Waste legislation and the Duty of Care provisions under the EPA 1990
.

Details of any equivalent technical parameters adopted to supplement or replace ELVs: *None*

Details of any derogations from the ELVs set out in the BAT conclusions; None

Has an Annex been inserted to the permit containing reasons, assessment and justifications for setting the value None

Emission limit values Noise and Vibration

Substance: Noise and Vibration

Relevant emission benchmarks: BS4142:2014+A1:2019 (Indicative Noise Level)

ELV:

Emission point: Whole Site

Rationale:
The most up to date revision of the British Standard indicates that an increase in noise levels of +4dB is not likely to have an adverse impact at any of the domestic premises closest to the site. However, increasing this by 1 dB to a noise level difference of around +5dB is likely to be an indication of an adverse impact, the caveat being that it is "dependant on the context" Therefore by maintaining a noise level on site below the +5dB night-time limit the site should comply with the guideline for noise level at any given receptor set out in BS4142:2014+A1:2019

Details of any equivalent technical parameters adopted to supplement or replace ELVs:
SEPA's *"Guidance on the Control of Noise and Vibration at PPC Installations"* States in bold type that *"Numerical limits should be applied only when there is particular need and a demonstrable benefit".* and adds that "It is unlikely that detailed regular monitoring would be required in the absence of any particular noise problem".

As a result, SEPA will only require the operator to undertake noise monitoring at the site if noise becomes a frequent or persistent issue. SEPA will include the standard noise condition requiring the operator to produce, implement and maintain a Noise and Vibration Management Plan (NVMP). This plan outlines where the major noise inputs are, how they are controlled and what actions will be taken both routinely or in an emergency to limit noise from the site and how the operator will record, investigate and if necessary, address any noise complaints originating from the site. Finally, the PPC 2012 regulations require that BAT be employed to always minimise noise from the site but especially so during night-time operations.

Details of any derogations from the ELVs set out in the BAT conclusions. None

10 FINAL DETERMINATION

Issue of a Permit - Based on the information available at the time

Issue a Permit – Based on the information available at the time of the determination SEPA is satisfied that

- The applicant will be the person who will have control over the operation of the installation/mobile plant,
- The applicant will ensure that the installation/mobile plant is operated so as to comply with the conditions of the Permit,
- That the operator is in a position to use all appropriate preventative measures against pollution, in particular through the application of best available techniques.
- That no significant pollution should be caused.

11 REFERENCES AND GUIDANCE

Guidance Notes – Identify key references, guidance (BREF, UK Technical Guidance, etc) used in determination

EU Guidance

Common Wastewater and Waste Gas Treatment/Management Systems in the Chemical Sector BREF and BAT Conclusions (2016)
Production of Large Volume Organic Chemicals BREF and BATC (2017)
Monitoring of Emissions to Air and Water from IED Installations REF (2018)
Common Waste Gas Management and Treatment Systems in the Chemical Sector Draft BREF D1 (2019)
Reference Report on "Monitoring of Emissions to Air and Water from IED Installations" JRC Reference Report (ROM 2018)
The Emissions from Storage BREF [113, COM 2006]

SEPA Guidance

SEPA Technical Guidance Note: SEPA Guidance and Control of Noise at PPC Installations (April 2015)
SEPA Noise: Summary Guidance for PPC Applicants (June 2015)
SEPA Odour Guidance (January 2010)
SEPA Guidance: The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) -A Practical Guide
SEPA Guidance: A practical guide for Part A activities IED-PPC-TG4
SEPA Monitoring Quick Guide: Monitoring volatile organic compounds (VOCs) SM-QG7

Other Guidance

Guidance for the Specialty Organic Chemicals Sector – IPPC S4.02 (2002) •
Specialty Organic Chemicals Sector – EPR S4.02 (2009)
Guidance for the Large Volume Organic Chemicals Sector – IPPC S4.01 (2001)
SEPA Regulatory Method (WAT-RM-08) Sustainable Urban Drainage Systems (SUDS or SUD Systems)
The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) A Practical Guide (The General Binding Rules Version 8.5) July 2021

Technical Report
DEFRA Technical Report: Assessing the Scale and Impact of Urban Run-Off on Water Quality WCA Environment Limited (December 2013) based on

Mitchell G, Lockyer J and McDonald A. 2001. Pollution hazard from urban non-point sources: a GIS model to support strategic environmental planning in the UK. School of Geography, University of Leeds.

BAT Example (Environmental Permitting Regulations, England)
Disposal Of Rainwater with Trace Levels of Radiological Contamination from HMNB (Devonport) Tidal X Berth Effluent System Best Available Techniques Assessment BAT/EPR/LB3730DK/2021-0