Indaver Ireland Limited

Site Sustainability Project

Request for Further Information - Response Document

271242-02

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RFI 7 - Explosion Protection Document

Introduction

This report has been prepared by Arup on behalf of Indaver Ireland Limited in response to the Request for Further Information (RFI) received from An Bord Pleanála (ABP) on 22 April 2021. The RFI is in relation to the application for permission for the Site Sustainability Project submitted to ABP on 25th June 2020 and referred to by ABP as Case Number: ABP-307433-20:

"Increase in annual total waste for treatment from currently permitted 235,000 tonnes to 250,000 tonnes, increase in annual amount of hazardous waste from currently permitted 10,000 tonnes to 25,000 tonnes, development of a aqueous waste tank farm, hydrogen generation unit, bottom ash storage building, development of a single storage warehouse, new concrete yard, weather canopy, demolition and rebuilding of an existing single storey modular office and ancillary site works. Carranstown, Duleek, County Meath".

This document is referred to as the RFI Response hereafter, and any new figures prepared specifically for this RFI Response to add further clarity are referred to as Additional Figures.

In its letter to Indaver on 22 April 2021, ABP, in accordance with section 37(F)(1) of the Planning and Development Act, 2000, as amended, requires Indaver Ireland Limited to furnish further information on ten separate items in relation to the effects on the environment of the proposed development. Sections 1 to 10 of this document provide a response to each of the ten items requested (numbered RFI 1 to RFI 10).

1 RFI No. 1

1.1 Request

Item 1 of the RFI states:

"*1. The observations of local residents and prescribed bodies have been forwarded to you. You are invited to provide a detailed line by line response to all matters raised in the submissions and where necessary, to supplement the application documentation.*"

Nine observations to the Board as listed below. A detailed line by line response to all matters raised in the submissions is provided in the Sections 1.2.1 to 1.2.9 of this report.

1. Darren O'Rourke, Sinn Féin TD for Duleek, refer to Section 1.2.1
2. John A. Woods, Local Resident, Bellewstown, refer to Section 1.2.2
3. Paddy Meade, Fine Gael Councillor, refer to Section 1.2.3
4. Patrick Sheils, Local Resident, Garballagh, Duleek, refer Section 1.2.4
5. Environmental Protection Agency (EPA), Section 1.2.5
6. Geological Survey of Ireland (GSI), a division of the Department of Communications, Climate Action and Environment, refer to Section 1.2.6
7. Health Service Executive (HSE), refer to Section 1.2.7
8. Meath County Council, refer to Section 1.2.8
9. Transport Infrastructure Ireland (TII), Section 1.2.9

1.2 Response

1.2.1 Darren O'Rourke

Darren O'Rourke, a Sinn Féin TD for Duleek, made a submission to the Board in a letter dated 12 August 2020. Mr O'Rourke's submission contained 15 no. items, all of which are addressed below in Table 1.1 in the order they were presented in the letter. Each item response corresponds to the respective bullet point in the submission.

Table 1.1: Response to submissions made by Darren O'Rourke.

Item No.	Response
1	See **Chapter 2** *Policy and Planning Framework and Need for the Scheme* of the EIAR which sets out the manner in which the proposed development may be regarded as being in alignment with the overarching National and European policy frameworks. The proposed development is consistent with the latest national and EU policy, in particular the EU Green Deal.
2 and 3	There will be an increase in hazardous waste accepted as part of the proposed development, however, the facility will still be obligated to comply within its licensed limit values (EPA IE Licence No. W0167-03). Therefore, the increase in waste tonnage

Item No.	Response
	proposed will not cause significant impact to the environment. See **Section 16.5** of **Chapter 16** *Material Assets* of the EIAR which determines that any negative impacts to waste resources during construction will be slight, with the recovery and/or re-use of material on other sites proposed where feasible. See **Section 8.3** of **Chapter 8** *Air Quality* of the EIAR which outlines the relevant pollutants for the air quality assessment of the proposed development, for which odour is not a concern. See **Section 10.5** of **Chapter 10** *Noise and Vibration* of the EIAR which determines that noise from the construction and operation of the proposed development remains within the required limit values. See **Section 6.6** of **Chapter 6** *Population and Human Health* of the EIAR which determines there are no significant effects on population and human health as a result of the proposed development. As noted in **Chapter 2** *Policy and Planning Framework and Need for Scheme* of the EIAR, the Government has prepared the draft Climate Action and Low Carbon Development (Amendment) Bill (not yet enacted) which provides that the State must "*pursue and achieve climate neutrality by no later than 2050*" and will introduce binding carbon budgets – refer to Section 10 RFI No 10 of this report. Its predecessor the Climate Action and Low Carbon Development Act 2015 is referred to in Section 2.3.2.2 of **Chapter 2** *Policy and Planning Framework and Need for Scheme* of the EIAR. See **Section 9.4** of **Chapter 9** *Climate* of the EIAR which determines that the proposed development will not have a significant impact on climate. See **Section 17.2** of **Chapter 17** *Major Accidents and Disasters* of the EIAR for HAZID methodology which is in line with COMAH Regulations. See **Section 17.5.3** which assesses fire risk associated with the proposed development including fire at the aqueous waste tank farm and fire/explosion at the hydrogen generation unit. The results of the assessment conclude that for the worst-case fire event there would be no significant impacts off site. See **Section 2.4.3** (regarding Local Planning Policy) of **Chapter 2** *Policy and Planning Framework and Need for the Scheme* of the EIAR which details the planning history of the site at which the proposed development will be carried out. In particular, refer to **Section 2.4.3.2** in relation to zoning. Whilst the Carranstown site is located outside of any designated zoned lands in the Meath County Development Plan (CDP), it is however located in an area that has been subject to a number of decisions to permit the clustering of large-scale industrial activities including the existing cement works in the area. The Carranstown site is located in a heavily industrialised area which may be characterised as a 'cluster' of heavy industry. In this regard, this designation, namely that the site is located in an unzoned area which has been developed as a de facto land use is characterised by existing heavy industrial activities. This designation may be justified when reference is had to the planning history of the site as detailed in **Section 2.4.3** of the EIAR and to An Bord Pleanála's findings regarding this now accepted designation as laid out in previous planning documentation pertaining to the site.
4	See **Section 2.4** of **Chapter 2** *Policy and Planning Framework and Need for the Scheme* of the EIAR for planning policy with regards to industrialised land-use (see above in relation to item number 2 and the relevant characterisation of the area). Any decision to establish a regional EPA office in Duleek is a matter for the EPA. See **Section 8.5** of **Chapter 8** *Air Quality* of the EIAR which determines that air quality remains within required limit values and **Section 8.7** which determines no significant cumulative impact with other developments.

Item No.	Response
	As outlined in **Section 8.2.3**, the existing facility is already in compliance with the requirements of the EPA IE Licence No. W0167-03 and the site will continue to operate within its licence requirements. See **Section 6.6** of **Chapter 6** *Population and Human Health* of the EIAR which determines there are no significant effects on population and human health from air quality as a result of the proposed development.
5	The designation of the proposed development as Strategic Infrastructure Development (SID) within the meaning of section 37A of the Planning and Development Act, 2000 as amended is a matter for An Bord Pleanála. On the 4 June 2020, the Board determined that the proposed development is SID, as per ABP Case Ref. PC17.305252.
6	It is considered in **Section 15.3.1.3** of **Chapter 15** *Water* of the EIAR, that the existing water quality in the River Nanny around the discharge point of the site is poor to moderate. As discussed in **Section 4.6.1** of **Chapter 4** *Description of the Proposed Development* of the EIAR, the storm water runoff from the new areas will discharge into the existing storm water system on site. Where required, new drainage infrastructure will be provided in order to collect runoff from new hard standing areas. The proposed development will not increase flood risk during operation. In the event of a fire on site as is currently the case, fire water will be retained in the existing fire water retention tank and stored for removal for disposal or treatment. Therefore, the proposed development is predicted to have an overall neutral long-term impact on water quality and hydrology within the study area (see **Section 15.5** of **Chapter 15** *Water* of the EIAR). The development will result in additional small demands on the public water network which are not considered to be significant. See **Section 16.5** of **Chapter 16** *Material Assets* of the EIAR which determines there will be no significant effects to water supply during the construction or operation of the proposed development.
7	See **Section 11** of the Natura Impact Statement, which concludes that following the implementation of the proposed mitigation measures there will be no adverse direct, indirect or cumulative impacts to the integrity of the River Boyne and River Blackwater SAC, River Boyne and River Blackwater SPA and River Nanny Estuary and Shores SPA (or any other Nature 2000 sites).
8	See **Section 8.5** of **Chapter 8** *Air Quality* of the EIAR which determines that air quality will remain within the required limit values. During the construction phase, with the implementation of mitigation measures, the potential for dust emissions and traffic emissions will not be significant. The waste to energy process would be expected to be the dominant source of air emissions associated with the facility, as outlined in **Section 8.5.3.1**. There will be an increase in hazardous waste accepted as part of the proposed development, however, the facility will still be obligated to comply within its licensed emission limit values and maximum flue gas flowrate (EPA IE Licence No. W0167-03). Therefore, the increase in waste tonnage proposed will not cause significant impact to the ambient air quality. There was an air dispersion modelling assessment carried out for the site operating under maximum conditions. The results of the assessment indicated that the facility would continue to be in compliance with its licence requirements and no significant impacts to ambient air quality are predicted. There was a cumulative assessment carried out for the proposed development, as included in **Section 8.7** which determines no significant cumulative impact to air quality in combination with other developments. The impact to air quality from traffic emissions during the operational stage is not considered significant. See **Section 6.6** of **Chapter 6** *Population and Human Health* of the EIAR which determines there are no significant affects to population and human health from air quality as result of the proposed development and **Section 6.7** which determines no significant cumulative impact to population and human health in combination with other developments.

Item No.	Response
	See **Section 18.2** of **Chapter 18** *Cumulative Effects, Other Effects and Interactions* of the EIAR for the cumulative effects assessment methodology as required by Annex IV (5)(e) of the EIA Directive as amended by Directive 2014/52/EU.
9	As outlined in **Section 7.4.2.1** of **Chapter 7** *Traffic and Transportation* of the EIAR, the proposed development will result in an estimated daily traffic increase of approximately 35 heavy goods vehicles (HGV) and an additional 20 personnel employed on site, once fully operational. It should be noted that the assumption of 20 additional staff is a worst-case approach as some of these staff are already based on site – refer to Section 2 RFI 2 of this report. In the 2022 Opening Year scenario (see **Section 7.6.2.2** of **Chapter 7** *Traffic and Transportation* of the EIAR), it can be seen that with Phase 1 operational traffic on site and Phase 2 construction ongoing (the worst-case scenario from a traffic perspective), the development will result in a maximum increase of 1.3% of traffic on the local road network during peak times. In the 2027 Opening Year +5 scenario (**Section 7.6.3** of **Chapter 7** *Traffic and Transportation* of the EIAR), the development will be fully operational, there will be no construction traffic present on site and the above increased vehicle movements represent an increase of approximately 1% of traffic on the local road network during peak times. The traffic assessment carried out within **Chapter 7** *Traffic and Transportation* of the EIAR adopted a conservative approach to future traffic growth and included a number of cumulative developments within the overall assessment as well as adopting a 'Central' (i.e. medium) growth of traffic into the future assessment years. In the horizon assessment year of 2037, it is noted that there are capacity issues on the local road network at the R152/R150 junction at New Lanes Cross; however, the proposed development is seen to have a negligible impact on the junction performance. No allowance has been made for any traffic reduction or improvement schemes in the site locality (e.g. a potential bypass of Duleek, or a lower projected traffic growth in the area in the medium-term). Therefore, it is considered that whilst there are localised capacity issues on the local road network in the medium-to-long term, the proposed development itself is seen to have a negligible impact.
10	See **Section 8.3** of **Chapter 8** *Air Quality* of the EIAR which outlines the relevant pollutants for the air quality assessment of the proposed development, for which odour is not a concern. See **Section 10.5** of **Chapter 10** *Noise and Vibration* of the EIAR which determines that noise from the construction and operation of the proposed development remains within the required limit values. See **Section 16.5** of **Chapter 16** *Material Assets* of the EIAR which determines that any negative impacts to waste resources during construction will be slight, with the recovery and/or re-use of material on other sites proposed where feasible. See **Section 4.5.2** and **4.5.3** of the **Chapter 4**, *Description of the Proposed Development* of the EIAR, which describes how the additional waste proposed to be accepted at the facility will be managed on site and treated on-site. The additional waste accepted will not have significant effects on the overall environment – refer to the point 8 response above for EPA licencing information. As outlined in **Chapter 2** *Policy & Planning Framework and Need for the* Scheme of the EIAR, the additional waste accepted increases Ireland's self-sufficiency for the treatment of waste on the island. The proposed development also supports the proximity principle and is also more sustainable as it reduces the distance travelled by these waste streams dramatically.
11	See **Section 12.5** of **Chapter 12** *Archaeology, Architectural and Cultural Heritage* of the EIAR which determines that there are no significant effects to archaeological sites predicted as result of the proposed development.

Item No.	Response
12	See **Section 9.3** of the Natura Impact Statement (NIS) which addresses the in-combination effects (cumulative effects) of the proposed development with other developments relevant to the proposed development. **Table 15** of the NIS lists the plans and projects, key policies/issues/objectives directly related to the conservation of the European Network. **Table 15** lists the Irish Cement facility and the relevant plans and projects associated with this facility. Only plans and projects that are considered relevant to the proposed development are listed in **Table 15** of the NIS.
13	See **Section 11.7** of **Chapter 11** *Biodiversity* of the EIAR which determines that there are no significant effects to biodiversity predicted as a result of the proposed development. See Natura Impact Statement **Section 11** which concludes that following the implementation of the proposed mitigation measures there will be no adverse direct, indirect or cumulative impacts to the integrity of any Natura 2000 site.
14	The 2017 National Mitigation Plan was quashed by the Supreme Court in August 2020. In response the Government has prepared the draft Climate Action and Low Carbon Development (Amendment) Bill (not yet enacted) which provides that the State must "*pursue and achieve climate neutrality by no later than 2050*" and will introduce binding carbon budgets – refer to Section 10 RFI No. 10, of this report. An updated Climate Action Plan will detail actions for each sector and will be updated annually.
15	The holding of an oral hearing is a matter for An Bord Pleanála.

1.2.2 John A. Woods

John A. Woods, a local resident, made a submission to the Board in a letter dated 10 August 2020. Mr Woods' submission contained 5 no. paragraphs, all of which are addressed below as items 1 to 5 in Table 1.2.

Table 1.2: Responses to submissions made by John A. Woods.

Paragraph No.	Response
1	As described in **Section 4.2.2** of the EIAR **Chapter 4** *Description of the Proposed Scheme*, the facility is currently permitted to treat up to 10,000 tonnes per annum of suitable hazardous waste. The existing R1 classification will not be affected by the treatment of additional hazardous waste as the facility will remain primarily dedicated to treatment of municipal solid waste (MSW). See **Section 2.2.1.2** of **Chapter 2** *Policy and Planning Framework and Need for the Scheme* of the EIAR. The suitability of a grate furnace for the treatment of certain types of hazardous waste was addressed in the planning application of 2012 to An Bord Pleanála (and subsequent permission 17.PA0026) and also in the licence review application to the EPA in 2012 (and subsequent issue of IED licence reference no. W0167-03). Not all types of hazardous waste can be treated in a grate furnace and the identification of an appropriate List of Waste (LOW) codes in conjunction with limits on the concentrations of specific parameters in the incoming hazardous waste streams is central to this. Schedule A.2 of the EPA IED Licence (Ref. W0167-03) for the site sets this out very clearly. The ongoing management of the acceptance of hazardous waste at the site is specified by condition (refer to IED Licence Condition 8.4.4) and more generally by the waste acceptance and characterisation conditions of the IED Licence in Condition 8.4.

Paragraph No.	Response
2	The granting of approvals to industrial installations in the vicinity of the Carranstown site is a matter for An Bord Pleanála and Meath County Council as appropriate. See **Section 8.5** of **Chapter 8** *Air Quality* of the EIAR which determines that air quality remains within the required limit values and **Section 8.7** which determines no significant cumulative impact to air quality in combination with the Irish Cement Platin developments and other developments in the vicinity of the proposed development.
3	As outlined in **Section 7.6.3** of **Chapter 7** *Traffic and Transportation*, of the EIAR in the 2027 Opening Year +5 years scenario, the development will be fully operational, there will be no construction traffic present on site and the above increased vehicle movements represent an increase of approximately 1% of traffic on the local road network during peak times. Although the impact of the proposed development on the surrounding local road network is seen to be negligible, it is noted that there remains an objective in the Draft Meath County Development Plan to examine the feasibility and progress the provision of the R150 bypass for Duleek to the south of the town. Furthermore, it is Indaver policy to instruct companies that utilise the existing and proposed facility to ensure that HGV traffic does not route through Duleek village (although there are localised routing instances that make this necessary for specific cases). See **Section 7.7** of **Chapter 7** *Traffic and Transportation* of the EIAR which outlines a number of mitigation measures to be implemented to further minimise the impact of the proposed development on the local road network. This is reinforced in the submission and outline conditions suggested by Meath County Council in their submission, which includes a specific condition regarding routing of HGV traffic through Duleek village, which is consistent with Indaver company policy.
4	See **Section 8.5** of **Chapter 8** *Air Quality* of the EIAR which determines that air quality remains within the required limit values for protection of human health. The waste to energy process would be expected to be the dominant source of air emissions associated with the facility, as outlined in **Section 8.5.3.1**. There will be an increase in hazardous waste accepted as part of the proposed development, however, the facility will still be obligated to comply within its licensed emission limit values and maximum flue gas flowrate (EPA IE Licence No. W0167-03). Therefore, the increase in waste tonnage proposed will not cause significant impact to the ambient air quality (Zone D) including heavy metals and benzene. There was an air dispersion modelling assessment carried out for the site operating under maximum conditions. The results of the assessment indicated that the facility would continue to be in compliance with its licence requirements and no significant impacts to ambient air quality are predicted. See **Section 6.6** of **Chapter 6** *Population and Human Health* of the EIAR which determines there are no significant affects to population and human health from air quality as result of the proposed development. **Section 6.5**. of the EIAR presents a literature review that was carried out to address the wate to energy aspects of the proposed development regarding human health. **Section 6.5.4** of **Chapter 6** *Population and Human Health* of the EIAR addressed dioxins and furans in the literature regarding waste to energy facilities. Among other studies addressed in **Section 6.5.4,** it notes a report published by the Food Safety Authority of Ireland in 2003 which looked at the potential effect on food if incineration of municipal waste was introduced in Ireland. The report stated: "*In relation to the introduction of waste incineration in Ireland, as part of a national waste management strategy, the FSAI considers that such incineration facilities, if properly managed, will not contribute to dioxin levels in the food supply to any significant extent and will not affect food quality or safety*".

Paragraph No.	Response
	Any decision to hold an oral hearing is a matter for An Bord Pleanála.
5	Any decision to establish an EPA office in the area is a matter for the EPA.

1.2.3 Paddy Meade

Paddy Meade, a Fine Gael Councillor for Duleek, made a submission to the Board in a letter dated 12 August 2020. Mr Meade's submission presented in 31 no. paragraphs, of which 22 no. items are raised and all of which are addressed below in Table 1.3.

Table 1.3 presents each item and references the paragraph as numbered in Mr Meade's letter dated 12 August 2020.

Table 1.3: Response to submissions made by Paddy Meade.

Paragraph No.	Response
1 to 3	There is now a developing policy landscape on decarbonising the transport sector in the State. In this regard the EU Hydrogen Strategy has been adopted and specific national targets will likely be adopted once the policy framework at European level is further developed and implemented. See RFI no. 10 below in **Section 10** of this report, for further detail on this EU Strategy.
4	See **Section 4.5.4** of **Chapter 4** *Description of the Proposed Development* of the EIAR for detail on the hydrogen generation unit including volumetric flow and mass quantities of hydrogen production and hydrogen storage. Up to 2 tonnes of hydrogen can be stored at a pressure of 350bar at ambient temperature. See **Section 17.2** of **Chapter 17** *Major Accidents and Disasters* of the EIAR for HAZID methodology which is in line with COMAH Regulations. See **Section 17.4** which includes details of hydrogen storage and **Section 17.5.3** which assesses risk associated with hydrogen. The existing site and the proposed development are not classified as a SEVESO site under the COMAH Regulations.
5	The use of "10MW_e" to define the scale of the hydrogen generation unit in the public notice is appropriate. See **Section 4.5.4** of **Chapter 4** *Description of the Proposed Development* of the EIAR for detail on the hydrogen generation unit including rate and mass quantities of hydrogen production per annum.
6 and 7	See **Section 4.5.4** of **Chapter 4** *Description of the Proposed Development* of the EIAR detail on the hydrogen generation unit and efficiency of the process. The thermal (waste input) to electrical output of the existing waste to energy plant is 27%. The electrical output of the plant is then used to generate hydrogen.
8	See **Section 4.5.4** of **Chapter 4** *Description of the Proposed Development* of the EIAR for detail on the hydrogen generation unit and efficiency of the process. The conversion rate of 60% is specifically mentioned in **Section 4.5.4.1**. It is not envisaged that the hydrogen produced would be used in power plants to generate electricity but for domestic use (when blended into the distribution network) and in transportation.
9 and 10	See **Section 2.5.5** of **Chapter 2** *Policy and Planning Framework and Need for the Scheme* of the EIAR which details the need for a hydrogen generation unit to improve the energy efficiency and sustainability of the facility in broad terms.

Paragraph No.	Response
11	The Recast Renewable Energy Directive (RED) (currently subject to review by the European Commission) determines what fuels may be regarded as renewable.
12	See **Section 4.2.3** of **Chapter 4** Description of the Proposed Development, which described the neighbouring land use. A district heating network is not suitable for the Indaver site as there are not enough local heat demand or users for such technology to be feasible. Hydrogen generation is the most suitable technology, as described in **Section 3.4.4** of **Chapter 3** *Alternatives* of the EIAR.
13	The existing Carranstown facility accords with the overarching waste, climate and renewable energy policy framework. See EIAR **Chapter 2** *Policy and Planning Framework and Need for the Scheme*.
14	See **Section 7.6** of **Chapter 7** *Traffic and Transportation* of the EIAR which determines that there will be no significant effects to traffic and transport as result of the proposed development. See **Section 9.4** of **Chapter 9** *Climate* of the EIAR, which determines that road traffic at both the construction and operational phase will not have a significant impact on climate. See **Section 4.5.4** of **Chapter 4** *Description of the Proposed Development* of the EIAR for detail on mobile hydrogen storage and transfer for refuelling of buses or HGVs.
15	The granting of planning permission and the specified time frame of the same is a matter for An Bord Pleanála.
16	See **Chapter 1** *Introduction* **Section 1.3** of the EIAR which details the electricity generated. See **Chapter 4** *Description of the Proposed Development* of the EIAR for detail on the electrical efficiency of the process.
17	See **Section 1.7** of **Chapter 1** *Introduction* of the EIAR which details the consultation undertaken. There is no obligation to carry out public consultation prior to submission of the SID application under the Planning and Development Act 2000, as amended. Prior to submission of the application, a public notice was erected and published in national newspapers on 22nd June 2020. The application once submitted was available for inspection by the public for a period until the 13th of August 2020. The relevant notices were compiled in accordance with the requirements of Section 37E of the Planning and Development Act 2000, as amended. All information in relation to the proposed development application is available online at https://www.carranstownssp.ie/.
18	See **Section 2.5.5** of **Chapter 2** *Policy and Planning Framework and Need for the Scheme* of the EIAR which details the need for a hydrogen generation unit to improve the energy efficiency and sustainability of the facility in broad terms.
19	See **Section 2.4.2** of **Chapter 2** *Policy and Planning Framework and Need for the Scheme* of the EIAR Regional Planning Policy details how the proposed development may be regarded as being in alignment with the Regional Spatial and Economic Strategy (RSES) for the Eastern and Midlands Region 2019 – 2031 and the existing Meath Development Plan (the new draft Development Plan has not yet been adopted).
20 and 21	See **Chapter 2** *Policy and Planning Framework and Need for the Scheme* **Section 2.5.5** of the EIAR which details the need for a hydrogen generation unit to improve the energy efficiency and sustainability of the facility in broad terms. See **Chapter 4** *Description of the Proposed Development* **Section 4.5.4** of the EIAR for detail on the hydrogen generation unit including process efficiency. See **Chapter 3** *Alternatives* **Section 3.3** of the EIAR which addresses alternative sites.
22	See **Section 3.4** of **Chapter 3** *Alternatives* of the EIAR which addresses alternative processes considered.
23	See EIAR **Chapters 1 to 19**, and associated Appendices and Figures which provide the detailed information on the proposed development which has been summarised in the Non-Technical Summary.

Paragraph No.	Response
	An Bord Pleanála will make the ultimate determination whether the requirements of the EIA Directive have been fulfilled.
24	See **Chapter 4** Description of the Proposed Development **Section 4.5.4** for of the EIAR detail on the hydrogen generation unit including process efficiency. The make and model of the HGU will be determined at post-planning consent stage of the project. See **Section 3.3** of **Chapter 3** *Alternatives* of the EIAR which addresses alternative sites.
25	See **Section 4.5.2** of **Chapter 4** *Description of the Proposed Development* of the EIAR which details the additional hazardous waste to be treated as part of the proposed development.
26	As outlined in **Section 7.4.2.1** of **Chapter 7** *Traffic and Transportation* of the EIAR the proposed development will result in an estimated daily traffic increase of approximately 35 HGV vehicles and an additional 20 personnel employed on site, once fully operational. It should be noted that the assumption of 20 additional staff is a worst-case approach as some staff are already based on site – refer to Section 2 RFI 2 of this report. During the AM and PM peak hours, this is expected to result in an additional 34 two-way vehicle movements (staff and HGV vehicles). In the 2027 Opening Year +5 years scenario (see **Section 7.6.3** of **Chapter 7** *Traffic and Transportation* of the EIAR), the development will be fully operational, there will be no construction traffic present on site and the above increased vehicle movements represent an increase of approximately 1% of traffic on the local road network during peak times. Furthermore, it is Indaver policy to instruct companies that utilise the existing and proposed facility to ensure that HGV traffic does not route through Duleek village (although there are localised routing instances that make this necessary for specific cases). **Section 7.7** of **Chapter 7** *Traffic and Transportation* of the EIAR outlines a number of mitigation measures to be implemented to further minimise the impact of the proposed development on the local road network. See **Section 8.3** of the **Chapter 8** *Air Quality* of the EIAR which outlines the relevant pollutants for the air quality assessment of the proposed development (for which odour is not a concern) and **Section 8.5** which determines that air quality remains within the required limit values. See **Section 10.5** of **Chapter 10** *Noise and Vibration* of the EIAR which determines that noise from the construction and operation of the proposed development remains within the required limit values. Therefore, it is considered that the proposed development will not generate substantial nuisance to the Duleek area from a traffic, noise, dust or odour perspective.
27	See **Section 3.3** of **Chapter 3** *Alternatives* of the EIAR which addresses alternative sites. See **Section 4.2.3** of **Chapter 4** *Description of the Proposed Development* of the EIAR which described the neighbouring land use. A district heating network is not suitable for the Indaver site as there are not enough local heat demand or users for such technology to be feasible. Hydrogen generation is the most suitable technology, as described in **Section 3.4.4** of **Chapter 3** *Alternatives* of the EIAR.
28	See **Section 8.5** of **Chapter 8** *Air Quality* of the EIAR which determines that air quality remains within the required limit values for protection of human health.

Paragraph No.	Response
	See **Section 6.6** of **Chapter 6** *Population and Human Health* of the EIAR, which determines there are no significant effects to population and human health from air quality as result of the proposed development.
29	Any concerns held by the Community in relation to the Community Benefit Fund are at the discretion of the Board. See EIAR **Chapter 1** *Introduction*, which provides detail on the public consultation process undertaken by Indaver in relation to the proposed development at the Carranstown site. In terms of the local community, this was carried out through the Indaver Community Liaison Committee (ICLC) during various stages of the development of the project and was presented at an ICLC meeting on the 6 February 2020.
30	See EIAR **Chapter 6** *Population and Human Health* which evaluates the impacts, if any, that the proposed development will have on population and human health.
31	The holding of an oral hearing is a matter for An Bord Pleanála.

1.2.4 Patrick Sheils

Patrick Sheils made a submission to the Board in a letter dated 13 August 2020. Mr Sheils' submission contained 31 no. items, all of which are addressed below in Table 1.4. Each item response corresponds to the respective bullet point in the submission.

Table 1.4: Response to submissions made by Patrick Sheils

Item No.	Response
1	The National Hazardous Waste Management Plan and the Progress Report on its implementation underline the need for hazardous waste treatment capacity and for enhanced self-sufficiency in the State. See **Sections 2.2.2.2**, **2.2.2.3** and **2.5** of **Chapter 2** *Policy and Planning Framework and Need for the Scheme* of the EIAR for the need for the Proposed Development. Although the Munster Region is a large producer of hazardous waste, the facility currently accepts hazardous waste from all over Ireland. The requirement of the Eastern Midlands Regional Waste Plan, Objective E16 includes 50,000 tonnes capacity for hazardous waste. There is currently a lack of hazardous waste treatment capacity in the State with a large quantity being exported to continental Europe. This is not a sustainable option in the long term as it infringes the proximity principle and does not meet the objective of moving towards self-sufficiency as underlined in numerous policy positions. See **Section 2.2.3.1** of **Chapter 2** *Policy and Planning Framework and Need for the Scheme* of the EIAR for details on the Eastern Midlands Region Waste Management Plan 2015-2021. See **Section 2.5.2.1** of **Chapter 2** *Policy and Planning Framework and Need for the Scheme* of the EIAR for the EPA hazardous waste figures for 2018 which demonstrate that Ireland currently does not have the facilities required to treat the full range of hazardous wastes it produces thereby highlighting the need for greater self-sufficiency nationally in the management of Ireland's hazardous waste.
2	The existing Carranstown waste to energy facility is classified as an R1 recovery facility (thermal treatment coupled with energy recovery) as per the Waste Framework Directive. See EIAR **Chapter 2** *Policy and Planning Framework and Need for the Scheme*, **Section 2.2.1.2**. The proposed development will not change the R1 status.

<table>
<tr><th>Item No.</th><th>Response</th></tr>
<tr><td>3</td><td>The designation of the proposed development as strategic infrastructure within the meaning of section 37A of the Planning and Development Act, 2000 as amended is a matter for an Bord Pleanála.</td></tr>
<tr><td>4</td><td>EirGrid the Transmission System Operator (TSO) publishes Annual Renewable Energy Constraint and Curtailment Reports, available at www.eirgridgroup.com. There is live information on the grid, including renewable generators that are being curtailed, which can be accessed at all times, available at http://smartgriddashboard.com.
The Indaver site has a record of curtailment hours which have been steadily increasing on a yearly basis, summarised in the table below:

<table>
<tr><th colspan="2">Sum of EirGrid Curtailment hours Indaver Meath</th></tr>
<tr><th>Year</th><th>Hours</th></tr>
<tr><td>2013</td><td>91.26</td></tr>
<tr><td>2014</td><td>31.7</td></tr>
<tr><td>2015</td><td>101.6</td></tr>
<tr><td>2016</td><td>103.45</td></tr>
<tr><td>2017</td><td>486.25</td></tr>
<tr><td>2018</td><td>746.412</td></tr>
<tr><td>2019</td><td>802.42</td></tr>
<tr><td>2020</td><td>1156.6</td></tr>
<tr><td>Grand Total</td><td>3519.692</td></tr>
</table>
</td></tr>
<tr><td>5</td><td>It can be seen from the Annual Renewable Energy Constraint and Curtailment Reports published by EirGrid (the Transmission System Operator) (available at www.eirgridgroup.com) that curtailment hours occur on a yearly basis for Waste to Energy facilities. See above Item 4 response for information on the recorded curtailment hours for the Indaver site.</td></tr>
<tr><td>6</td><td>The Energy Efficiency Directive (Directive 2012/27/EU), promotes the use of cogeneration, district heating and cooling, and waste industrial heat recovery.

The Directive also provides that all EU countries are required to use energy more efficiently at all stages of the energy chain, including energy generation, transmission, distribution and end-use consumption. See Section 2.3.1.1 Clean Energy Package of EIAR Chapter 2 Policy and Planning Framework and Need for the Scheme.</td></tr>
<tr><td>7</td><td>The European Commission has proposed a European Climate Law which aims for Europe’s economy and society to become climate-neutral by 2050 and a 2030 climate target of at least 55% reduction in net emissions of greenhouse gases compared to 1990 levels. Provisional agreement has been reached and is now being prepared for formal adoption. As outlined in Section 4.5 of Chapter 4 Description of the Proposed Development of the EIAR one of the main drivers for the proposed development is “to improve the energy efficiency and sustainability of the facility in a new and evolving energy market” which is in compliance with the objectives of the EC objectives. See Section 2.3 of Chapter 2 Policy and Planning Framework and Need for the Scheme of the EIAR for the Energy and Climate Change Policies relevant to the proposed development.</td></tr>
<tr><td>8</td><td>An updated draft National Hazardous Waste Management Plan is due to be published by the Environmental Protection Agency (EPA).
The 2018 Progress Report on the implementation of Ireland’s National Hazardous Waste Management Plan 2014-2020 underlines the key objective of increasing Ireland’s level of self-sufficiency regarding hazardous waste management.
It also underlines that the often more favourable cost option of treatment and disposal abroad has meant that export continues to be a significant treatment route for Ireland’s hazardous wastes and further warns that the overreliance on any one export market for the treatment of hazardous waste is not advisable (as referred to in Section 2.2.2.3 of EIAR Chapter 2 Policy and Planning Framework and Need for the Scheme).</td></tr>
</table>

Item No.	Response
9	Hydrogen generation is an integral part of the scheme, see **Section 4.5.4** of EIAR **Chapter 4** *Description of the Proposed Development* for detail on the hydrogen generation unit. See EIAR **Chapter 5** *Construction Activities* for construction duration and phasing.
10	See Item 2 above. The existing facility is classified as a R1 recovery facility as per the Waste Framework Directive which generates renewable electricity from the biomass contained in residual waste, thereby contributing toward achieving the EU's renewable energy targets. See **Section 2.3** *Energy & Climate Change Policies* of EIAR **Chapter 2** *Policy and Planning Framework and Need for the Scheme*.
11	See responses to Item 2 and Item 10 in response to this item.
12	See **Section 2.4.3** *Local Planning Policy* of EIAR **Chapter 2** *Policy and Planning Framework and Need for the Scheme* and **Chapter 3** *Alternatives* which addresses this point.
13	As outlined in **Section 7.4.2.1** of **Chapter 7** *Traffic and Transportation* of the EIAR, the proposed development will result in an estimated daily traffic increase of approximately 35 HGV vehicles and an additional 20 personnel employed on site, once fully operational. It should be noted that the assumption of 20 additional staff is a worst-case approach as some staff are already based on site – refer to Section 2 RFI 2 of this report. During the AM and PM peak hours, this is expected to result in an additional 34 two-way vehicle movements (staff and HGV vehicles). In the 2027 Opening Year +5 years scenario (**Section 7.6.**3 of **Chapter 7** *Traffic and Transportation* of the EIAR), the development will be fully operational, there will be no construction traffic present on site and the above increased vehicle movements represent an increase of approximately 1% of traffic on the local road network during peak times. Furthermore, it is Indaver policy to instruct companies that utilise the existing and proposed facility to ensure that HGV traffic does not route through Duleek village (although there are localised routing instances that make this necessary for specific cases). **Chapter 7** *Traffic and Transportation* **Section 7.7** of the EIAR outlines a number of mitigation measures to be implemented to further minimise the impact of the proposed development on the local road network. See **Section 8.3** of **Chapter 8** *Air Quality* of the EIAR which outlines the relevant pollutants for the air quality assessment of the proposed development (for which odour is not a concern) and **Section 8.5** which determines that air quality remains within the required limit values. See **Section 9.4** of **Chapter 9** *Climate* of the EIAR which determines that road traffic at both the construction and operational phase will not have a significant impact on climate. See **Section 10.5** of **Chapter 10** *Noise and Vibration* of the EIAR which determines that noise from the construction and operation of the proposed development remains within the required limit values.
14	See **Section 4.5.4.1** of **Chapter 4** *Description of the Proposed Development* of the EIAR for detail on the process including the, electrical consumption and production and relevant calorific values. The site meets the criteria of the R1 recovery operations under Annex II of the Waste Framework Directive 2008/98/EC. Data on energy from transport of waste to the site is not available.
15	See **Section 4.2.3** of **Chapter 4** *Description of the Proposed Development*, of the EIAR which described the neighbouring land use. A district heating network is not suitable for the Indaver site as there are not enough local heat demand or users for such technology to be feasible. Hydrogen generation is the most suitable technology, as described in **Section 3.4.4** of **Chapter 3** Alternatives, of the EIAR. See **Section 2.5.5** of **Chapter 2** *Policy and Planning Framework and Need for the Scheme* of the EIAR which details the need for a hydrogen generation unit to improve the energy efficiency and sustainability of the facility in broad terms.

Item No.	Response
	The incineration process is self-sustaining and hence has no need for further energy input as is suggested. It is intended nor is it possible for power plants to utilise the hydrogen injected to the local GNI distribution network as these plants would be connected to the main transmission network. It would be for domestic use only.
16	See **Section 4.5.4** of **Chapter 4** *Description of the Proposed Development* of the EIAR for detail on the hydrogen generation unit including hydrogen production and mobile hydrogen storage and transfer. It is planned to store a maximum of 2 tonnes of hydrogen on site in this tank at 350 bar in **Section 4.5.4.7** of **Chapter 4** *Description of the Proposed Development* of the EIAR.
17	See **Section 4.5.4** of **Chapter 4** *Description of the Proposed Development* of the EIAR for detail on the hydrogen generation unit including mass quantities of hydrogen production and hydrogen storage. See **Section 17.2** of **Chapter 17** *Major Accidents and Disasters* of the EIAR for HAZID methodology which is in line with COMAH Regulations. See **Section 17.4** which includes details of hydrogen storage and **Section 17.5.3** which assesses risk associated with hydrogen. The existing site and the proposed development are not classified as a SEVESO site under the COMAH Regulations.
18	This is a matter for An Bord Pleanála to determine.
19	See **Section 2.4.1.2** of **Chapter 2** *Policy and Planning Framework and Need for the Scheme* of the EIAR. The National Development Plan (NDP) in the context of waste management and resource efficiency, National Strategic Outcome 9 as laid out in both the National Planning Framework and NDP underlines that Investment in waste management infrastructure is critical to Ireland's environmental and economic well-being for a growing population and to achieving circular economy and climate objectives.
20	See **Section 4.5.4.1** of **Chapter 4** *Description of the Proposed Development* of the EIAR for detail on the process including the, electrical consumption and production and relevant calorific values. The site meets the criteria of the R1 recovery operations under Annex II of the Waste Framework Directive 2008/98/EC.
21	See **Section 3.3** of **Chapter 3** *Alternatives* of the EIAR which details alternative sites.
22	See **Section 4.2.3** of **Chapter 4** *Description of the Proposed Development,* of the EIAR which described the neighbouring land use. A district heating network is not suitable for the Indaver site as there are not enough local heat demand or users for such technology to be feasible. Hydrogen generation is the most suitable technology, as described in **Section 3.4.4** of **Chapter 3** *Alternatives*.
23	See **Section 4.5.2** of **Chapter 4** *Description of the Proposed Development*, of the EIAR; this infrastructure will ensure that up to 20,000 tonnes of hazardous aqueous wastes can be diverted from the current export to Europe route and instead be directed to Indaver's WtE plant in Ireland. Hazardous waste treated at the facility is generated from all three provinces in Ireland. The only current alternative is to export the waste for treatment.
24	Any increase in the Community Gain Fund is for An Bord Pleanála to determine.
25	This observation has been duly noted. Rotation of the locally elected politicians as members of the ICLC is practised on a 2-3-year basis.
26	It is not feasible or practically possible to relocate the existing Carranstown facility. The existing planning and licence approvals relate specifically to the existing site.
27	See **Section 4.2.3** of **Chapter 4** *Description of the Proposed Development* of the EIAR which described the neighbouring land use. District heating is not suitable for the Indaver site in Duleek as there are not enough local heat demand or users for such technology to be feasible. Hydrogen generation is the most suitable technology, as described in **Section 3.4.4** of **Chapter 3** *Alternatives*, of the EIAR.
28	A detailed EIAR and NIS in respect of the proposed development in line with the legislative framework has been completed. An Bord Pleanála is statutorily tasked with determining the adequacy of same.

Item No.	Response
29	See **Section 1.5** of **Chapter 1** *Introduction* for EIA Legislation, Guidance and Structure that is followed in carrying out the EIAR, including the EIA Directive 2011/92/EU as amended by Directive 2014/52/EU. See **Section 2.2** of **Chapter 2** *Policy and Planning Framework and Need for the Scheme* of the EIAR for Waste Policy, **Section 2.3** for Energy and Climate Change policies and **Section 2.4** on Planning Policy. See **Section 11.2.2** of **Chapter 10** *Biodiversity* of the EIAR for legislation and designated sites as adhered to in the assessment methodology. See Natura Impact Statement **Section 2** for the regulatory context. The Appropriate Assessment is carried out in accordance with the Habitats Directive (Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora). Under the Directive a network of sites of nature conservation importance have been identified consisting of SACs and SPAs, and also candidate sites, which form the Natura 2000 network.
30	The holding of an oral hearing is a matter for An Bord Pleanála.
31	See EIAR **Chapter 6** *Population and Human Health* which evaluates the impacts, if any, which the proposed development will have on population and human health.

1.2.5 Environmental Protection Agency

The Environmental Protection Agency (EPA) made a submission to the Board in an email dated 13 August 2020. The EPA's submission contained 4 no. items, all of which are addressed below in Table 1.5.

Table 1.5: Response to submissions made by EPA.

Item No.	Response
1	This observation raised by the EPA has been duly noted.
2	This observation raised by the EPA has been duly noted.
3	This observation raised by the EPA has been duly noted.
4	This observation raised by the EPA has been duly noted.

1.2.6 Geological Survey of Ireland

The Geological Survey of Ireland (GSI), from GSI, a division of the Department of Communications, Climate Action and the Environment, made an email submission to the Board on 14 July 2020. The GSI'S submission contained 1 no. item, which is addressed below in Table 1.6.

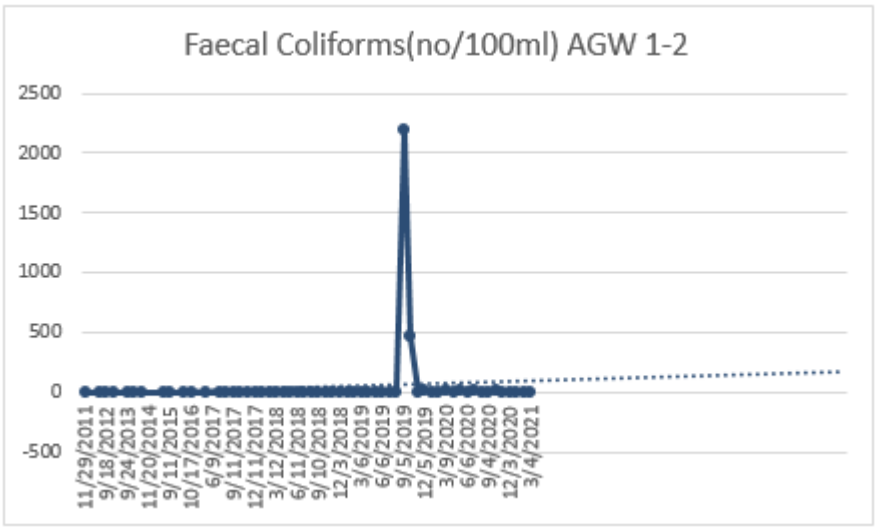
Table 1.6 Response to submissions made by the GSI.

Item No.	Response
1	The observation raised by the GSI has been duly noted.

1.2.7 Health Service Executive

The Health Service Executive (HSE) made a submission to the Board in a letter dated 5 August 2020 and attached the HSE EIS Submission Report (EHIS ID No. 1249) dated 16 July 2020. The HSE's submission contained 7 no. items in the 'Conclusion' section, all of which are addressed below in Table 1.7.

Table 1.7: Response to submissions made by the HSE.

Item No.	Response
1	See **Section 1.7** of **Chapter 1** *Introduction* of the EIAR which details the consultation undertaken. There is no obligation to carry out public consultation prior to submission of the SID application under the Planning and Development Act 2000, as amended. Prior to submission of the application, a public notice was erected and published in national newspapers on 22nd June 2020. The application once submitted was available for inspection by the public for a period until the 13th of August 2020. All information in relation to the proposed development application is available online at https://www.carranstownssp.ie/.
2	See **Section 4.3.4** of **Chapter 4** Description of the Proposed Development, of the EIAR regarding the description on the existing sanitary effluent collection and treatment systems. AWN Consulting carried out a groundwater investigation for the Indaver Meath site in 2019. AWN Consulting have reported that faecal coliforms had been consistently low at the onsite, downgradient wells (AGW 1-2 and AGW 1-3) until the sampling for the investigation was conducted, when a high level of coliforms was recorded. The trend graph below for the faecal coliform levels in AGW 1-2, which is the closest groundwater monitoring well to the Admin block puraflo percolation area. The trend graph demonstrates the peak during the investigation and the return to normal conditions after the investigation. AWN Consulting have reported that the well purging during the investigation may have mobilised fresh groundwater into the wells, which may have affected the coliform levels at that time.  Figure 1: Faecal coliform levels in groundwater well AGW 1-2 from September 2011 to March 2021.
3	See **Section 15.3.2.3** of **Chapter 15** Water, of the EIAR: the percolation area was designed and constructed in accordance with EPA's Wastewater Treatment Manual – Treatment Systems for Small Communities, Business, Leisure Centres and Hotels, (1999).

<table>
<tr><th>Item No.</th><th>Response</th></tr>
<tr><td></td><td>On approval of the application, all tests to determine the suitability of the proposed percolation area will be carried out by a specialist contractor.</td></tr>
<tr><td>4</td><td>See Section 15.3.2.3 of Chapter 15 Water, of the EIAR: the percolation area was designed and constructed in accordance with EPA's Wastewater Treatment Manual – Treatment Systems for Small Communities, Business, Leisure Centres and Hotels, (1999).

The EPA Waste-water Treatment Manual – treatment systems for small communities, business, leisure centres and hotels (1999) notes the following:
The below table (Table 4 from the EPA manual) sets out recommended minimum distances which should be used as a guide to avoid odour and noise nuisance from a wastewater treatment system. This guidance is directed at residential developments.

In the context of the Indaver site it is noted that due to the confined nature of the site, the Bottom Ash Storage Building was located in close proximity to the percolation area. The eastern end of the ash storage building is within the minimum distance identified in the above publication. However, the building is used for bulk storage of bottom ash and is only occasionally occupied (even then by personnel using loaders and delivery vehicles) and therefore and potential odour and noise from the percolation area will not cause a nuisance.
In relation to buildings which are to be occupied i.e. the offices and workshops, they have been located to the south of the percolation area which is approximately 30.0m distance and therefore outside of the buffer zone in accordance with Table 4 (from the EPA manual).

Section 3.9 of EPA's guidance "Table 4 above sets out recommended minimum distances which should be used as a guide to avoiding odour and noise nuisance from a wastewater treatment system.[…] Residential developments should not occur within the buffer zone except in exceptional circumstances and in no case should residential development be undertaken within the distance outlined in Table 4."

TABLE 4: RECOMMENDED MINIMUM DISTANCES FROM TREATMENT SYSTEMS

<table>
<tr><th>System size p.e.</th><th>Approximate number of houses served</th><th>Distance from existing development (m)</th></tr>
<tr><td>10 - 40</td><td>2 - 10</td><td>28</td></tr>
<tr><td>41 - 60</td><td>11 - 15</td><td>31</td></tr>
<tr><td>61 - 80</td><td>16 - 20</td><td>34</td></tr>
<tr><td>81 - 100</td><td>21 - 25</td><td>37</td></tr>
<tr><td>101 - 120</td><td>26 - 30</td><td>40</td></tr>
<tr><td>121 - 140</td><td>31 - 35</td><td>43</td></tr>
<tr><td>141 - 160</td><td>36 - 40</td><td>46</td></tr>
<tr><td>>161</td><td>>41</td><td>50</td></tr>
</table></td></tr>
<tr><td>5</td><td>See Section 4.3.2.2 and Section 4.6.1.1 of Chapter 4 Description of the Proposed Development of the EIAR, the proposed development will have the capacity to attenuate the additional volumes of surface water generated on site.
The existing site levels required a pumped solution for surface water run-off from the proposed east area concrete slab. surface water run-off for this area enters a proposed attenuation tank under the slab where it is then pumped to the existing surface water system in a controlled manor so as not to overwhelm the existing system, from here it enters the existing attenuation pond. The existing attenuation pond has the capacity for the run-off from the additional impermeable areas.</td></tr>
<tr><td>6</td><td>See Section 8.7.1 of Chapter 8 Air Quality, of the EIAR, the cumulative assessment of the proposed development in combination with the Irish Cement Platin development was carried out in accordance with the EIA Directive 2011/92/EU as amended by Directive 2014/52/EU.</td></tr>
</table>

Item No.	Response
	The methodology for this EIAR section, was deemed appropriate for the proposed deveopment by the competent expert for **Chapter 8** *Air Quality*, refer to EIAR **Appendix 1.2** *List of Competent Experts for the EIAR*, for a list of competent experts, their qualifications and relevant expertise.
7	The site location and the nature of the works and working hours would not necessitate a travel plan for the facility. However, dedicated and secure cycle parking is provided on site and Indaver are continuously monitoring cycle parking demand on site with a view to increasing parking if necessary. In relation to low emission vehicles delivering to the site, this is primarily a matter for Indaver's customers (Municipal Waste Collectors) directly and their respective business models. There is little scope for Indaver to influence in this regard. See **Section 8.5** of **Chapter 8** *Air Quality* of the EIAR, which determines that road traffic from the proposed development at both the construction and operational phase will not have a significant impact to air quality. See **Section 9.4** of **Chapter 9** *Climate* of the EIAR which determines that road traffic from the proposed development at both the construction and operational phase will not have a significant impact to climate.

1.2.8 Transport Infrastructure Ireland

Transport Infrastructure Ireland (TII) made a submission to the Board in a letter dated 24 July 2020. TII's submission contained 2 no. items, all of which are addressed below in Table 1.8. Each item response corresponds to the respective point in the submission.

Table 1.8: Response to submissions made by TII.

Item No.	Response
(a)	**Development Traffic:** As outlined in **Section 7.4.2.1** of **Chapter 7** *Traffic and Transportation* of the EIAR, the proposed development will result in an estimated daily traffic increase of approximately 35 HGV vehicles and an additional 20 personnel employed on site, once fully operational, across a full working day. It should be noted that the 20 additional staff is a worst-case approach as some staff are already based on site – refer to Section 2 RFI 2 of this report. The additional personnel will all commence working on site before 08:00 and will finish work at 16:30. HGV arrivals and departures will be more evenly distributed over a typical day, with 20% of the daily total assumed to arrive and depart in the morning peak period and 20% in the evening peak period. The proposed development is therefore expected to generate an additional 70 two-way HGV movements and an additional 40 two-way staff movements per day, which equates to a daily increase of 110 two-way vehicle movements to and from the site – as outlined above this represents a worst-case scenario as the 20 additional staff (and corresponding 40 two-way staff movements) may not ultimately be 'new' staff at the facility. During the AM and PM peak hours, this is expected to result in an additional 14 two-way HGV movements and a total of 20 two-way personnel movements, which sums to a total of 34 two-way vehicle movements (staff and HGV vehicles) to and from the development.

Item No.	Response
	Based on existing traffic surveys at the site and the profile of arriving and departing vehicles, it is assumed that the split of traffic will be equal between northbound and southbound origins and destinations for both staff and HGV vehicles. **Impact on Local Road Network:** In the 2022 Assessment Scenario (**Section 7.6.2.2** of **Chapter 7** *Traffic and Transportation*) Phase 1 of the development is completed and operational, and Phase 2 is under construction. This scenario represents the most significant impact from a traffic perspective due to the overlap of construction and operational traffic. In this scenario, construction personnel are assumed to arrive on site prior to commencement of works at 07:00 and will depart the site after construction works cease at 19:00. During these time periods the additional traffic on the local road network equates to an increase of approximately 7%, which is primarily due to the lower background traffic flows between the hours of 06:00-07:00 and 19:00-20:00. During the local road network AM and PM periods (07:00-08:00 and 16:00-17:00, respectively) the combined construction and operation traffic flow will result in an increase of 0.6% on the R152 to the north of the Indaver site, and of 0.9% on the R152 to the south of the Indaver entrance. The increase of 0.6% of traffic during peak times travelling northbound on the R152 towards the M1 interchange at Junction 8 is considered to have a negligible impact on the R152 north of the development site. In the 2027 Opening Year +5 years scenario (**Section 7.6.**3 of **Chapter 7** *Traffic and Transportation*), the development will be fully operational, there will be no construction traffic present on site and the above increased vehicle movements represent an increase of approximately 1% of traffic on the local road network during peak times. As with the 2022 scenario, this increase is deemed to have a negligible impact on the R152 north of the development site and on the M1 interchange at Junction 8; therefore, it is considered that no further analysis of the interchange is warranted. **Impact on the M1:** Traffic to and from the facility from the north is expected to include some traffic which travels from the M1 and other approaches including Drogheda, Slane, etc. Therefore the 50% of arriving and departing traffic at the site will not all route to and from the M1 mainline at Junction 8. However, as a conservative assessment, the impact of daily traffic flow to and from the facility on the M1 mainline has been carried out. Traffic data for the M1 mainline, between Junction 8 (Drogheda South) and Junction 9 (Julianstown) is available from the Transport Infrastructure Ireland Traffic Count Data website. The Traffic Counter in question (Ref. TMU M01 0.5.0 N) provides two-way link flow on the M1 for the years 2017-2021. It is noted from a review of this traffic counter that the Annual Average Daily Traffic (AADT) flows for the M1 at this location in 2020 and 2021 (year to date) are significantly reduced from the flows recorded in 2019, due to the significant disruption to traffic flow and overall mobility during the Covid restrictions. Therefore, the 2019 data is the most robust and representative data set and is used as part of this response (note that traffic surveys for the proposed development were also undertaken in October of 2019 at a number of junctions in the site vicinity, which ensures a good correlation with available M1 mainline traffic flow for 2019). Two-way traffic flow on the M1 mainline for an average day in 2019 was 36,595 vehicles. Even in a scenario where all 110 daily two-way traffic movements to and from the site were assumed to come from the M1, this would equate to a daily traffic flow increase of 0.3%, which is negligible.

Item No.	Response
	Furthermore, during the AM and PM peak periods, the proposed development would result in an additional 34 two-way vehicle movements to and from the site. Again, assuming a scenario where all of this traffic were to route via the M1, this would equate to an increase of 1.2% in the AM peak (07:00-08:00) and 1.0% during the PM peak (16:00-17:00). Both of these increases are considered to have a negligible impact on the M1. In reality, personnel arriving to and from the site are likely to come from a number of potential origins aside from the M1, and HGV traffic to and from the site is also likely to utilise numerous approach routes separate to the M1; however, the assessment above which has assumed that all traffic would route on the M1 mainline has demonstrated a negligible impact on the M1 itself. Furthermore, construction working hours are to be scheduled in a manner that avoids the traffic peak periods on the local road network, which further reduces the potential impact of the development on the local road network and the M1 during the construction period.
(b)	As outlined in **Section 3.3.3** of **Chapter 3** *Alternatives* of the EIAR, having considered the planning history of the existent site, the applicable planning law and policy framework, the comprehensive waste, energy and climate change policy framework, the existent waste management processes carried out at the facility, the characteristics of the proposed development to be carried out and a do-nothing alternative, there are no other reasonable alternatives to the existent Carrastown site. The extension of activities at the existent site may also be regarded as the most practical and reasonable option for the proposed development from an economic perspective. The technology required for the proposed development is already present at the existent site. Crucially, the existing plant and equipment at the Carranstown site has the capacity to treat increased quantities of hazardous waste and residues. It is considered that the proposed development will not undermine the long-term delivery of the Leinster Orbital Route.

1.2.9 Meath County Council

Meath County Council (MCC) made a submission to the Board in the form of a Planning Report, signed by members of the Planning Department and Jackie Maguire, Chief Executive for Meath County Council. MCC's submission contained 10 no. planning conditions.

Indaver notes the planning conditions referred to by Meath County Council and has no objections to the same.

Table 1.9: Response to the submission made by MCC.

Item No.	Response
1	No objection.
2	No objection.
3	No objection.
4	No objection.
5	No objection.
5b	No objection.
5c	No objection.
6a	No objection.
6b	No objection.

Item No.	Response
6c	No objection.
7a	No objection.
7b	No objection.
7c	No objection.
7d	No objection.
7e	No objection.
7f	No objection.
7g	No objection.
7h	No objection.
8a	No objection.
8b	No objection.
8c	No objection.
8d	No objection.
9	No objection.
10	No objection.

2 RFI No. 2

2.1 Request

Item 2 of the RFI states:

"2. *You are requested to provide more information relating to the use of the warehouse, workshop and emergency response team / office building, which is stated to support existing maintenance activities and the existing office building, which is to be rebuilt. In particular, the Board requests that you provide a clearer and strengthened justification for these buildings in terms of the number of staff, the nature of their employment and the need for them to be on site. The planning history of these buildings shall form part of this response and reference shall be made to the wider group offices*."

2.2 Response

2.2.1 Introduction

The waste to energy facility has been in operation since 2011 and has experienced significant growth in activity over that 10 year period, the most significant of which is the addition of the pre-treatment plant and the acceptance of hazardous waste at the site. This has brought the added benefit of additional employment of staff on site to support these activities.

The staff accommodation facilities included in the proposed development are provided primarily to house the existing staff on site (see Tables 2.1, 2.2 & 2.3 below) who are either directly involved in the production, maintenance and management of the facility (totalling 22 staff and permanent contractors based on site) and visiting Indaver staff and maintenance contractors that are periodically on site (total of nine) to directly support the activities on site.

There are two new roles that will be created as a direct result of the proposed development that will also require accommodation (see Table 2.2 below) in the office area of the proposed warehouse and workshop building. This office area will have the space for the provision of four future additional roles directly involved in plant operations. Based on the experience of the past ten years, Indaver believes that it is prudent to allow for this, as other operational activities arise over time.

The proposed re-building of the existing modular office on site will provide minor growth capacity for up to seven additional staff. This will provide for any modest future growth in management or support staff required for the facility.

To reflect a worst case impact in the traffic impact assessment prepared as part of the EIAR supporting the application, it was assumed that 20 additional staff would be added (as outlined in **Section 7.4.2.1** of **Chapter 7** *Traffic and Transportation*) but the actual increase is up to 13 (two new roles, growth for four in operational roles and seven in the office re-build) additional staff.

2.2.2 Warehouse, Workshop and Office/ERT building

As outlined in **Section 4.5.7** of **Chapter 4** *Description of the Proposed Development* of the EIAR, the main reason for constructing a new warehouse, workshop and office area is the re-purposing of the existing structure which currently comprises a warehouse for spare parts storage, a mechanical workshop and an office area for the mechanical maintenance team. This is outlined in **Section 4.3.1** of **Chapter 4** *Description of the Proposed Development* of the EIAR. The existing building was originally erected as a temporary spare parts and workshop during construction of the facility and its status was changed to a permanent structure in 2013 by the parent SID planning permission ref: PL17.PA0026. See further **Section 2.4.3.1** *Planning History, Zoning and Existing Land Use* of **Chapter 2** *Policy and Planning Framework and Need for the Scheme* of the EIAR, in this regard.

The re-purposing need is driven by the logistical requirements of the flexible intermediate bulk container (FIBC) bags produced by the existing pre-treatment plant on site and the need for interim storage on site prior to the arrival of empty trailers for shipment of the material off-site. Currently, if there are any logistical or timing issues with weekends or bank holidays, production of the FIBC bags may have to be stopped. The provision of this building for this purpose will avoid any interruptions to the production of pre-treated residues.

The Emergency Response Team (ERT) equipment storage and changing area was, until recently, located outside the control room area in the main administration building within the waste-to-energy plant. A recent review of ERT activities on site recommended that the ERT equipment and changing area be re-located from the main administration building. The rationale was that if there was a major emergency on site, the ERT equipment should be more readily accessible and not on the fifth floor of the administration building and that the ERT members could be potentially heading towards an incident in order to gain access to the PPE required. Hence, this is a practical re-location of the current area to a new one within the new building and no additional staff are associated with this activity. The ERT equipment has been moved to a temporary portacabin near the northern site boundary as an interim measure.

A consequence of moving the ERT equipment and storage/changing area is the need to provide shower/locker facilities for when ERT equipment is doffed.

As per **Section 4.5.7** of EIAR **Chapter 4** *Description of the Proposed Development*, the use of the proposed warehouse and workshop areas mimics that which is currently housed in the existing building. The six existing maintenance staff housed in the existing building will move to the warehouse (see planning drawing **29043 -CD-401)** and the mezzanine area above the proposed workshop as outlined in planning drawing **29043 -CD-402**. Again, there are no additional staff required as this is purely a relocation of existing activities from one building to another. Please refer to Table 2.1 below which outlines the staff functions and their proposed re-location.

Table 2.1: Maintenance Staff Relocation

Function	No. Staff	Existing/ Proposed	Current Location	Proposed Location
Mechanical Team Leader	1	Existing	Existing Workshop Office area	New mezzanine above proposed workshop
Mechanical Technicians	4	Existing	Existing Workshop Office area	New mezzanine above proposed workshop
Warehouse Manager	1	Existing	Existing Warehouse office area	New office in proposed warehouse

The office area within the proposed building is intended for the following functions, some of which are existing and some of which are new. This is explained in Table 2.2 below.

Table 2.2: Proposed Staffing Levels

Function	No. Staff	Existing/ Proposed	Current Location	Proposed Location
Pre-treatment Plant Manager	1	Existing	Temp Office	New Office in Proposed building
Deputy Pre-treatment Plant Manager	1	Existing	Temp Office	New Office in Proposed building
Pre-treatment shift operatives	2	Existing	Temp Office	New Office in Proposed building
Bottom Ash Building Operative	1	Proposed	N/A	New Office in Proposed building
Tanker/trailer/bottom ash shunter driver	1	Proposed	N/A	New Office in Proposed building

The general growth in plant activities over the past 10 years has placed pressure on office space in the main administration building for staff directly involved in operations activities. Although there are only two additional roles associated with accommodation requirements in this area, there is a need to properly accommodate the four existing staff who are currently housed in temporary accommodation near the northern site boundary. The proposed office area can potentially house up to 10 people which allows for the growth of 4 additional staff over time. A meeting room has also been proposed for team meetings. This will serve both the pre-treatment team members located in this area and also the maintenance team members located in the mezzanine level above the workshop and the warehouse operator.

As detailed in **Section 2.4.3.3** of **Chapter 2** *Policy and Planning Framework and Need for the Scheme* of the EIAR**,** the Meath County Development Plan 2013-2019, POL 20 outlines that any proposals for energy production enterprises must not lead to unacceptable traffic impacts. The proposed office area is not predicted to have any significant effects to traffic and transportation and is therefore of acceptable standard for the existing access roads. See **Section 7.7** of **Chapter 7** *Traffic and Transportation* of the EIAR which outlines a number of mitigation measures to be implemented to further minimise the impact of the proposed development on the local road network.

2.2.3 Existing Modular Office Re-construction

As outlined in **Section 4.5.9** of EIAR **Chapter 4** *Description of the Proposed Development*, the existing modular office building on site can accommodate up to 22 office staff. Planning permission for this building was granted as part of PL17.PA0026 in 2013. The building was originally constructed in 2008 as a temporary facility for staff involved in the construction of the plant but its status was changed to that of a permanent building as per PL17.PA0026.

Before the imposition of restrictions for Indaver staff due to Covid-19 in March 2020, the staffing levels for this building were split over the following functions as outlined in Table 2.3 below.

Table 2.3: Pre-Covid-19 Modular Office Staffing Levels

Function	No. Staff	On Site/Visitor
Indaver Site tour co-ordinator	1	Based on site
Indaver Credit Control Officer	1	Based on site
Indaver EHS Manager	1	Based on site
Indaver Site Safety Manager	1	Based on site
Indaver Process Engineer	1	Based on site
Indaver Finance Director	1	Based on site
Permanent Contractor Site Manager	1	Based on site
Permanent Contractors	5	Based on site – canteen, shower/ locker use
Indaver Managing Director	1	Visitor
Indaver Accountant	1	Visitor
Indaver Project Engineers	2	Visitors
Equipment Suppliers/Contractors for maintenance activities	5	Visitors
Total	22	

There are six Indaver staff based on site that work in the building. There are six permanent contractors (including site manager) based on site that also use the building for welfare facilities. One office is also allocated to the permanent contractor site manager. The other five do not require computer access to carry out their roles.

The remainder of the office areas are currently used by Indaver staff (4) that are frequently on site (at least twice per week) and specialised equipment suppliers and contractors (5) that visit the site for dedicated maintenance activities (twice or three times per year including the annual maintenance shutdown).

As the building is thirteen years old and in need of on-going maintenance, it is proposed to re-build it with a more permanent structure.

All of the existing Indaver site-based staff and visitors (totalling 21 people, 16 of which require office/desk space) will be accommodated in the proposed building and it is proposed to re-arrange the layout and re-assign or re-design the use of some of the existing areas for staff welfare. See Table 2.4 below.

Table 2.4: Existing and Proposed Room Functions

Existing Room Function	**Proposed**	**Justification**
Offices x 5	Office x 5	Like for like. Five Indaver staff currently based on site
Office (First Aid Room)	First Aid Room	Like for like.
Office x 2	Staff Wellness Centre	Gym and shower area for use by all staff members on site.
Visitor display Room	Open plan office area	To accommodate permanent contractor site manager, visiting Indaver staff & specialised maintenance contractors visiting the site. This area was originally used for site tours during construction but this function is now carried out in the main administration building.
Meeting Room	Meeting Room	Like for like
Canteen	Canteen	Like for like
Shower/locker facilities	Shower/locker facilities	Like for like. Upgrade of existing for permanent contractors on site.
Toilets	Toilets	Like for like
Disabled Access toilet	Disabled Access toilet	Like for like
Storage Room	Storage Room	Like for like
Comms Room	Comms Room	Like for like
	Archive/Filing Room	New
	Mothering Room	New

3 RFI No. 3

3.1 Request

Item 3 of the RFI states:

"*3. The Board considers that in the interest of future development management it might be appropriate, if permission is granted, to regulate the use of the hydrogen generated on the site. It is considered that the applicant's proposals involving a range of options lacks clarity and would not facilitate the attachment of clear conditions relating to the nature of the development. Please address this matter*."

3.2 Response

As outlined in **Sections 4.5.4.7** and **4.7.3** of **Chapter 4** *Description of the Proposed Development* of the EIAR, the hydrogen generated by the hydrogen generation unit (HGU) will have three main routes to market:

- Injection into the natural gas grid
- Fuelling of tanker trailers for mobile hydrogen operations
- Re-fuelling of hydrogen-fuelled busses.

3.2.1 Injection into the gas grid

As per **Section 4.7.3** of **Chapter 4** *Description of the Proposed Development* of the EIAR, a connection offer to the local natural gas distribution network will be required from Gas Networks Ireland (GNI). Physical infrastructure to facilitate the connection to the gas grid will be required to enable injection into the grid. An above ground installation (AGI) will be provided by GNI as part of the connection offer.

The rate of injection into the gas grid will be regulated on a daily or hourly basis by GNI. This rate of injection will depend on the maximum concentration of hydrogen in natural gas that is permitted by GNI and will also depend on the demand and usage in the line from day to day. It is envisaged that Indaver will receive dispatch instructions from GNI to either increase or decrease the rate of injection.

There are no traffic movements associated with this operation except for maintenance visits by GNI staff for the AGI installation.

3.2.2 Fuelling of tanker trailers for mobile hydrogen operations

The second application of hydrogen generated on site will be for mobile hydrogen operations.

As explained in Section 4.5.4.7 of **Chapter 4** *Description of the Proposed Developmen*t of the EIAR, this will involve filling tanker trailers on site from the 100m^3 hydrogen storage tank located on site which will be capable of storing up to a maximum of 2 tonnes of hydrogen.

Typically, the hydrogen tanker trailers can hold between 500 to 750kg of hydrogen (see Figure 2 below of example of the type of hydrogen tanker trailers). These tanker trailers are specifically designed for carrying hydrogen and will also have to meet the requirements of the Transport of Dangerous Goods by Road Regulations (ADR). This will be a contracted haulage service provided to Indaver and the driver of the tanker trailer will execute the filling operation on site having completed the security check at the weighbridge and site entrance.

Once filled, the tanker will deliver to the following types of installations;

- Bus depots or garages where hydrogen is stored for fleet use
- Public fuel-filling stations.

Figure 2: Example hydrogen tanker trailer

It is also a possibility that hydrogen could be delivered to injection nodes in the GNI transmission network, if demand allows and if authorised by GNI. This would be subject to additional consents and agreements with GNI.

It is projected that there would be a maximum of 3 such vehicles in any one day with a theoretical maximum of 15 movements per week. **Chapter 7** *Traffic and Transportation* of the EIAR has accounted for these movements in the operation of Phase 2 of the proposed development.

3.2.3 Refuelling of buses & HGV's on site

As outlined in **Section 4.5.4.7** of **Chapter 4** *Description of the Proposed Development* of the EIAR, the third application of hydrogen generated on site will be for mobile hydrogen re-fuelling operations. This relates to the refuelling on site of vehicles that run on hydrogen fuel cells (such as buses) or HGV's (waste collection vehicles specifically) that are converted to run on hydrogen.

It is proposed that such a refuelling facility will not be open to the general public and any such vehicles will either be existing customers of the facility or public/private bus companies that would have a commercial contract with Indaver for such activities.

Due to the proximity of the facility to the M1, it is envisaged that there could be a need for re-fuelling of hydrogen-fuelled buses that are using the M1 as a transport route. The typical size of hydrogen tank on board these buses is between 30kg and 40kg of hydrogen. Based on the estimated traffic movements outlined below, this amounts to a daily demand of 480 kg of hydrogen which can be easily served by the hydrogen storage vessel on site.

Although it is unlikely that the numbers of buses re-fuelling on site would be large on a daily basis, **Chapter 7** *Traffic and Transportation* of the EIAR considered 12 such movements per day and up to 60 per week in order to assess a worst-case impact. As per Section 3.2.2 above, these traffic numbers were accounted for in Phase 2 of the proposed development

Indaver customers using waste collection vehicles converted to run on hydrogen as a fuel would be permitted to re-fuel those vehicles after delivering waste to the facility and hence there are no additional traffic movements associated with this activity.

4 RFI No. 4

4.1 Request

Item 4 of the RFI states:

"*4. You are requested to confirm that the existing HAZID-RA document will be expanded to ensure that all significant initiating events are identified. This analysis should include all hydrogen plant unit operations and the functional interaction between the unit operations: Electrolysis Unit, Scrubber unit, Gas holder, Compressors and AGIs and future De-oxidizer & Drier if required*."

4.2 Response

The existing HAZID&RA document covers all areas of the operations at the site, both existing operations and planned new operations. It identifies major accident scenarios and the initiating events by which these scenarios could arise and it also identifies the controls that are in place or will be put in place to prevent or mitigate these risks.

Indaver will review and update the HAZID&RA following completion of the detailed design for the proposed development and will also carry out a detailed Hazard and Operability study (HAZOP) for the proposed development in conjunction with the suppliers of the plant. This will be a systematic review of the operations, in which Indaver will divide the new plant into nodes, which will be assessed using a series of guidewords and deviations, in accordance with good practice.

Indaver will use the findings of the HAZOP to update and to expand the HAZID&RA to provide a more detailed breakdown of scenarios to ensure that all significant initiating events are identified and that appropriate controls will be in place to protect against these events. This assessment will cover all unit operations at the hydrogen plant and the functional interaction between the unit operations, including the electrolysis unit, scrubber unit, gas holder, compressors, and AGIs, and future do-oxidiser and drier, as appropriate.

Indaver will also use the findings of the HAZOP to develop a layers of protection analysis (LOPA) for key safety systems at the site. The LOPA is discussed in more detail in response to RFI 5 below in Section 5.

5 RFI No. 5

5.1 Request

Item 5 of the RFI states:

"5. *You are requested to confirm that a Layer of Protection Analysis (LOPA) study will be executed during detailed design, which will define the required Safety Instrumented Systems (SIS). The risk acceptance criteria for the assessment need to be approved in advance of plant procurement so that any SIS offer the required protection in accordance with Functional Safety Standard IS EN 61511-1:2017.*"

5.2 Response

Indaver can confirm that a LOPA for the plant will be carried out which will to ensure that the relevant Safety Instrumented Systems (SIS) are in accordance with IS EN 61511.

The first step in implementing this standard will be the identification of the hazards associated with the Equipment Under Control (EUC) and identifying the associated control systems. The EUC comprises the plant item (e.g. vessel and pipework) and the EUC control system is the basic process control system. Protection systems relying on other technology and External Risk Reduction Facilities (such as blast walls or bunds) are considered to the extent that they contribute to the overall risk reduction in relation to a particular hazard.

Typically, LOPA is used to evaluate scenarios that have been identified in a prior hazard identification exercise. As discussed in the response to Question 4, Indaver will conduct a HAZOP for the development, which will serve as the basis for identifying scenarios for which LOPA would be an appropriate technique. Indaver will screen these scenarios on the basis of consequences, or other appropriate rationale, as identified by the HAZOP team. This will enable Indaver to focus on protection against major accidents to human health or the environment.

In carrying out this assessment, Indaver will also consider the potential for common mode failures to occur, which may not only constitute initiating events but may also serve to disable certain safeguards.

The Indaver team will assess the potential initiating events for these scenarios and will identify the independent protective layers (IPL) to prevent these events from occurring. The team will also assess the effectiveness of these IPL, based on their probability of failure on demand (PFD), in accordance with the standard.

6 RFI No. 6

6.1 Request

Item 6 of the RFI states:

"*6. You are requested to confirm that the Hazardous Area Classification (HAC) of the facility will be completed in accordance to IS EN 60079-1/2."*

6.2 Response

Indaver have included a copy of the Explosion Protection Document (EPD) for the Carranstown site in **Appendix A** of this document in response to RFI 7 as discussed below in Section 7 of this report. **Appendix A** shows the Hazardous Area Classification (HAC) for the various installations where flammable atmospheres can arise and it describes the hazard area zones that apply in each case.

The HAC was carried out in accordance with IS EN 60079-10-1:2015 "*Explosive atmospheres – Part 10-1: Classification of areas – Explosive gas atmospheres*", which relates to the classification of areas where flammable gas or vapour hazards may arise. It may be used as a basis to support the proper design, construction, operation and maintenance of equipment for use in hazardous areas.

Indaver confirms that the HAC will also be updated to include the proposed development in accordance with the standard IS EN 60079-10-1. All equipment installed in zoned areas will be appropriately rated in accordance with the standard.

Note – The Boards's reference to 'IS EN 60079-1/2' in RFI 6 is in incorrect and should state 'IS EN 60079-10-1:2015' as described above.

7 RFI No. 7

7.1 Request

Item 7 of the RFI states:

"*7. You are requested to provide a copy of the current Site Explosion Protection Document (EPD) and confirm the document will be updated in accordance to the Safety, Health and Welfare at Work (General Application) Regulation 2007 Part 8, Regulation 169 and the aforementioned electrical and functional safety standards.*"

7.2 Response

Find attached a copy of the site's current Explosion Protection Document (EPD), in **Appendix A** of this report. Indaver can confirm that this has been prepared in accordance with the requirements of Part 8 of the Safety, Health and Welfare at Work (General Applications) Regulations 2007 (SI No 299 of 2007), as amended. Indaver confirm that the EPD will be updated to reflect the proposed development, also in accordance with Part 8 of the Regulations.

Indaver will ensure that all electrical and functional safety systems installed in hazardous area zones at the site will be rated appropriately, in accordance with IS EN 60079, as discussed in Section 6 above (RFI No 6).

Indaver will use the LOPA to ensure that the electrical and functional safety systems are in accordance with IS EN 61511.

8 RFI No. 8

8.1 Request

Item 8 of the RFI states:

"*Please advise proposed design codes and pressure / vacuum ratings for the aqueous solvent tanks and the equipment and piping systems in the hydrogen generation, storage, and distribution plant*."

8.2 Response

The aqueous waste tanks will be mild steel, atmospheric, single-skinned construction. The tanks will be designed in accordance with API 620 "*Design and construction of large, welded, low-pressure storage tanks*", or equivalent.

The tanks will be designed for a 20 mbar overpressure and 6 mbar under-pressure. Over and under-pressure protection devices will be installed as standard and in accordance with the outcome of the HAZOP and LOPA exercises.

The piping for aqueous waste will be designed and installed in accordance with ASME B31.3 "*Process Piping*", or equivalent.

The design and installation of the hydrogen generation unit will be completed in accordance with the relevant codes, standards and legislation, including the following:

- B31.12-2019, Hydrogen Piping and Pipelines, or equivalent.
- Pressure Equipment Directive (PED) 2014/68/EU
- Merkblätter AD 2000 Code on Pressure Vessels
- Machinery Safety Directive 2006/42/EC
- Electromagnetic Compatibility Directive 2014/30/EU (as amended by Regulation (EU) 2018/1139.

9 RFI No. 9

9.1 Request

Item 9 of the RFI states:

"*9. Recovery of venting vapour from a common aqueous tank farm header and from a direct injection facility to the furnace from trucks is acknowledged to be an environmentally efficient design. However, could the applicant please confirm that associated safety systems will be included in the LOPA study*."

9.2 Response

As discussed in response to RFI 4 in Section 4.2 of this report, Indaver will conduct a HAZOP for the new systems as part of the detailed design for this plant. This assessment will sub-divide the new plant into a series of nodes for analysis, in accordance with the HAZOP methodology. This assessment will include the venting system for the tank farm header to mitigate against breathing losses and the use of nitrogen for safety. The HAZOP will enable Indaver to characterise these systems and to identify the key safety systems, which Indaver will also subject to LOPA study.

10 RFI No. 10

10.1 Request

Item 10 of the RFI states:

"*10. You may take this opportunity to review the documentation presented with the application and incorporate any updates which you consider may be relevant in informing the Board's decision, including in the context of EIA. Topics to be considered should include planning history and policy provisions."*

10.2 Response

The planning history and policy relevant to the proposed development are included in **Chapter 2** *Policy and Planning Framework and Need for the Scheme* of the EIAR.

Since submission of the planning application to ABP on 25th June 2020, a number of public policy updates have occurred including the new national waste policy document[1] ('A Waste Action Plan for a Circular Economy') which was published in September 2020 and the adoption of the European Hydrogen Strategy[2].

Also, since the planning application submission, and in relation to climate change policy, the revised Climate Action and Low Carbon Development (Amendment) Bill 2021[3] has been approved by Government and will amend the Climate Action and Low Carbon Development Act 2015 (as detailed in **Chapter 2** *Policy and Planning Framework and Need for the Scheme* of the EIAR) in order to strengthen the framework for governance of climate action by the State and to realise our national, EU and international climate obligations and once fully enacted.

[1] Government of Ireland) 2020) A Waste Action Plan for a Circular Economy – Ireland's National Waste Policy 2020-2025, September 2020, available at: https://www.gov.ie/en/publication/4221c-waste-action-plan-for-a-circular-economy/
[2] European Commission (2020) A Hydrogen Strategy for a climate-neutral Europe, Brussels, 8.7.2020, COM(2020) 301 final. Available at: https://ec.europa.eu/energy/sites/ener/files/hydrogen_strategy.pdf

[3] Climate Action and Low Carbon Development (Amendment) Bill 2021 (Bill 39 of 2021), Bill Progress: https://www.oireachtas.ie/en/bills/bill/2021/39/

10.2.1 A Waste Action Plan for a Circular Economy': Ireland's National Waste Policy 2020 -2025

The previous national waste policy as set out in 'A Resource Opportunity - Waste Management in Ireland' (2012), as detailed in **Section 2.2.2.1** *National Waste Policy*, **Chapter 2** *Policy and Planning Framework and Need for the Scheme*, of the EIAR, expired in mid-2020 and has been replaced by, 'A Waste Action Plan for a Circular Economy': Ireland's National Waste Policy 2020 -2025[4] (2020), referred to hereto as the 'National Plan'.

This National Plan encompasses many shared principles, aims and objectives of other policy initiatives including:

- Climate Action Plan (currently being updated);
- Project Ireland 2040 (National Planning Framework (NPF));
- UN Sustainable Development Goals (SDG's);
- Circular Economy Package, including the Plastics Strategy;
- Single Use Plastics Directive;
- Bio-economy; and
- DCCAE Statement of Strategy.

The National Plan, 'Waste Action Plan for a Circular Economy' (2020), will sit at the top of the hierarchy of statutory plans and programmes for the waste area which also includes Waste Management Plan(s) (currently subject to review and due to be replaced by a single amalgamated National Waste Plan for a Circular Economy[5]); the National Waste Prevention Programme (currently subject to review by the Environmental Protection Agency (EPA) and due to be reconfigured as Ireland's Circular Economy Programme[6]); and the National Hazardous Waste Management Plan (an updated draft Plan is also due to be published for public consultation by the EPA).

This National Plan (2020) referenced above, will inform future versions of those other statutory plans and provide a coherent framework in which sectoral policies, targets and objectives can be realized and is aimed at providing a roadmap for Ireland to embrace the opportunities in becoming a circular economy in the decades ahead.

The Plan notes that over the past two decades Ireland has made significant progress in driving our performance up the waste hierarchy and moving away from disposal as our primary treatment options.

[4] A Waste Action Plan for a Circular Economy: Ireland's National Waste Policy 2022 – 2025
[5] National Waste Management Plan for a Circular Economy: Pre-draft Consultation Process: National Waste Management Plan for a Circular Economy - mywaste My Waste
[6]Ireland's Circular Economy Programme : Proposal to replace the National Waste Prevention Programme Consultation: Consultation Documents :: Environmental Protection Agency, Ireland (epa.ie)

The overarching objectives of the National Plan, include:

- shift the focus away from waste disposal and treatment to ensure that materials and products remain in productive use for longer thereby preventing waste and supporting
- reuse through a policy framework that discourages the wasting of resources and rewards circularity;
- make producers who manufacture and sell disposable goods for profit environmentally accountable for the products they place on the market;
- ensure that measures support sustainable economic models (for example by supporting the use of recycled over virgin materials);
- harness the reach and influence of all sectors including the voluntary sector, R&D, producers / manufacturers, regulatory bodies, civic society; and
- support clear and robust institutional arrangements for the waste sector, including through a strengthened role for Local Authorities (LAs).

More generally, the National Plan sets out a range of policy measures aimed at improving circularity in respect of specific waste streams including, food waste, municipal (household and commercial) waste, plastic and packaging waste, single use plastics, textiles and construction and demolition waste. Furthermore, specific and dedicated policy measures on improving citizen engagement, green public procurement, waste data and waste flows, research and innovation and the development of End-of-Waste (EoW) and By-Product designations for appropriate waste streams are all outlined in detail in the updated National Plan.

In setting out policy measures to deal with plastic and packaging waste[7], including the introduction of a deposit and return scheme (DRS) for plastic bottles and aluminium cans, the banning of single use items from July 2021 and a commitment that all packaging be reusable or recyclable by 2030, the Plan also notes that in relation to the recovery and recycling of packaging waste, energy recovery avoids the emissions associated with disposal of packaging waste at landfill.

The National Plan notes the value that can be derived from EoW and By-Product decisions and which have a significant role to play as we move to a more circular economy by moving material up the waste hierarchy and extracting value from what would have been discarded previously. This will also help to meet recycling targets and reduce pressure on our waste infrastructure. Reduced carbon emissions arising from the replacement of virgin materials is an important co-benefit of such designations.

The National Plan also confirms that a Waste Recovery Levy of €5 per tonne to apply to recovery operations at Municipal Solid Waste (MSW) Landfills, Waste to Energy Plants and Co-Incineration Plants and the Export of MSW will be introduced in due course.

[7] Section 8 at page 27

With regard to waste data and data flows, the National Plan acknowledges the need for more timely and robust waste data and contains a commitment to systems will be put in place to collect data which is accurate, timely, relevant, and useful for policy makers and regulators. It also provides that more detailed, accurate and timely data will be used to inform the policy options and measures required to transition to a more circular economy and to monitor progress in delivery over time.

In terms of supporting indigenous treatment capacity (Waste Management Infrastructure)[8], the National Plan notes that based on EPA data each person living in Ireland generated an average of 577 kg of municipal waste in 2017. This in turn places pressure on our infrastructure to cope with the amount of waste we are generating, again leaving us exposed to potential environmental damage and/or a potential slow-down in the development of our economy due to a lack of outlets for managing waste. The provision of adequate contingency capacity to enable the State to withstand such shocks is underlined as a key priority in the National Plan.

Furthermore, the National Plan goes on to state that Ireland is reliant on exports of municipal, Construction & Demolition (C&D), packaging and other wastes in order to manage the waste we produce – estimated at 9.5 million tonnes in 2020. This leaves the State potentially exposed if there are external shocks to the export market beyond our control. It also means that we are exporting materials, energy and jobs that could be harnessed here.

As such, the National Plan regards the primary objective is to support the development – for environmental and economic reasons – of the adequate and appropriate treatment capacity at indigenous facilities to ensure that the full circularity and resource potential of materials is captured in Ireland. In this regard, the National Plan contains a commitment to examine the legislation and procedures regulating the development of waste infrastructure and whether processes and timelines can be streamlined.

10.2.2 EU Hydrogen Strategy

Since the submission of the application for the proposed development to ABP on 25th June 2020, the European Commission has adopted a dedicated Hydrogen Strategy as outlined below, hereto referred to as ‘the Strategy’.

The EIAR makes reference to the overarching policy framework relating to the production of hydrogen through **Sections 2.3** *Energy & Climate Policy*, **2.3.3**. *Regional Climate & Energy Policy* and **2.4** *Planning Policy* of EIAR **Chapter 2** *Policy and Planning Framework and Need for the Scheme;* **Section 9.5.3** of EIAR **Chapter 9** *Climate;* and **Section 4.5.4** of EIAR **Chapter 4** *Description of the Proposed Development*, for the relevant technical aspects of the HGU.

[8] Section 13 at page 45

On 8 July 2020, the European Commission presented its Hydrogen Strategy[9] , which takes the form of a roadmap setting out the milestones of green hydrogen development up to 2050. The European Commission proposes to reach 40 GW of clean hydrogen electrolysers in the EU by 2030.

In addition, 50% of current hydrogen produced from fossil sources should be upgraded to produce low-carbon hydrogen. From 2030 onwards and towards 2050, renewable hydrogen technologies should reach maturity and be deployed at large scale to reach all hard-to decarbonise sectors where other alternatives might not be feasible or have higher costs.

In addition, the Commission will work to introduce, based on impact assessments, EU-wide instruments in designing a policy framework. This would include a common low-carbon threshold/standard for the promotion of hydrogen production installations based on their full life-cycle greenhouse gas performance, which could be defined relative to the existing Emissions Trading System (ETS) benchmark for hydrogen production.

In this regard, a comprehensive terminology and European-wide criteria for the certification of renewable and low-carbon hydrogen based on the provisions set out in the Renewable Energy Directive (RED) (a revised Directive is due to be presented by the European Commission in July 2021) will be developed.

The Strategy also acknowledges that support schemes are likely to be required for some time in order to scale-up renewable and low-carbon hydrogen before they are cost-competitive. The Commission will consider various options for incentives at EU level, including the possibility of minimum shares or sector quotas of renewable hydrogen in specific end-use applications (for instance certain industries as the chemical sector, or transport applications).

The Strategy document states that a forthcoming revision of the EU Emissions Trading System (ETS) would look into how the production of clean/renewable and blue hydrogen (gas with CCS) can be incentivised through carbon pricing and states "*support schemes are likely to be required for some time*" in order to scale up clean/renewable and blue hydrogen until they become cost-competitive with grey.

10.2.3 Climate Action and Low Carbon Development (Amendment) Bill 2021

A Revised Climate Bill ('the Climate Action and Low Carbon Development (Amendment) Bill 2020') has been approved by Government (although not yet enacted). The Revised Bill is now progressing through the Houses of the Oireachtas as priority legislation.

[9] European Commission, A hydrogen strategy for a climate-neutral Europe, Communication COM (2020) 301 final of 8 July 2020.

This Revised Bill will amend the Climate Action and Low Carbon Development Act 2015 (referred to in **Sections 2.3.3** *Regional Climate & Energy Policy* of EIAR **Chapter 2** *Policy and Planning Framework and Need for the Scheme*) in order to strengthen the framework for governance of climate action by the State and to realise Ireland's national, EU and international climate obligations.

Article 3 of the Revised Bill has been amended to strengthen the "National Climate Objective", which it defined as:

"The State shall, so as to reduce the extent of further global warming, pursue and achieve, by no later than the end of the year 2050, the transition to a climate resilient, biodiversity rich, environmentally sustainable and climate neutral economy."

The Revised Bill also now includes the following key elements:

- Embeds the process of carbon budgeting into law. Government are required to adopt a series of economy-wide five-year carbon budgets, including sectoral targets for each relevant sector, on a rolling 15-year basis, starting in 2021;
- Actions for each sector will be detailed in the Climate Action Plan, updated annually (and recently subject to public consultation);
- A National Long-Term Climate Action Strategy will be prepared every five years;
- Government Ministers will be responsible for achieving the legally-binding targets for their own sectoral area with each Minister accounting for their performance towards sectoral targets and actions before an Oireachtas Committee each year;
- Strengthens the role of the Climate Change Advisory Council, tasking it with proposing carbon budgets to the Minister;
- Provides that the first two five-year carbon budgets proposed by the Climate Change Advisory Council should equate to a total reduction of 51% emissions over the period to 2030, in line with the Programme for Government (PFG) commitment;
- Expands the Climate Change Advisory Council from eleven to fourteen members, and provides that future appointments to the Council provide for a greater range of relevant expertise and gender balance;
- Introduces a requirement for each local authority to prepare a Climate Action Plan, which will include both mitigation and adaptation measures and be updated every five years. Local authority Development Plans will also align with their Climate Action Plan; and
- Public Bodies will be obliged to perform their functions in a manner consistent with national climate plans and strategies and furthering the achievement of the national climate objective.

In summary, the proposed development may be regarded as being in alignment with the Waste Action Plan for a Circular Economy (2020) through the diversion of waste from landfill to a higher tier of the waste hierarchy and the continued generation of renewable energy.

In addition, the element of the proposed development relating to the development of hydrogen equally accords with EU Hydrogen Strategy which takes the form of a roadmap setting out the milestones of green hydrogen development up to 2050 and which can assist with and support the State's transition to a low carbon economy by 2050.

In this regard, the Climate Action and Low Carbon Development (Amendment) Bill 2021 once enacted will set binding requirements for specific sectors of the economy. Such requirements will be laid out in an updated Climate Action Plan for 2021.

10.2.4 Conclusion

Since submission of the planning application to ABP on 25th June 2020, a number of public policy updates have occurred as described in sections 10.2.1-10.2.3 above. There are no other updates which are considered relevant in informing the Boards decision, including in the context of EIA.

Appendix A

RFI 7 - Explosion Protection Document

Indaver Ireland Limited

Safety Management System

Explosion Protection Document - Carranstown

Rev A | 26 May 2021

Job number 279504-00

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1 Introduction

Indaver Ireland Limited operates a Waste to Energy plant in Carranstown, Duleek, Co Meath.

The site operates under a Waste Licence issued by the EPA (Register No. W0167-03, 2 July 2015). Materials handled include aqueous waste containing flammable solvents and municipal waste, and small quantities of pure flammable solvents.

The physical properties of the materials handled at the facility are such that these and other materials could give rise to potentially explosive atmospheres. Hence the facility is subject to the requirements of Part 8 of the Safety, Health and Welfare at Work (General Applications) Regulations 2007 (SI No 299 of 2007) ("the Regulations").

The Regulations stipulate minimum requirements for protecting and improving the safety and health of employees, contractors, visitors and members of the public potentially at risk from explosive atmospheres.

This Explosion Protection Document has been produced as required by Article 169 of the Regulations.

2 Statutory Requirements

The following requirements apply to employers where potentially explosive atmospheres arise at workplaces, as defined in the Regulations:

- Carry out an explosive atmospheres risk assessment having regard to:
  - The likelihood that explosive atmospheres will occur and their persistence,
  - The likelihood that ignition sources, including electrostatic discharges, will be present and become active and effective,
  - The installations, substances used, work processes and their possible interactions,
  - The scale of the anticipated effects,
  - Any places which are or can be connected via openings to places in which explosive atmospheres may occur, and
  - Such additional safety information as the employer may need in order to complete the assessment.
- Hazardous Area Classification
  - The risk assessment forms the basis of the hazardous area classification for the workplace. Hazardous area classification is the delineation of the workplace into explosive zones (refer to Section 3).
- Preparation of an Explosion Protection Document (EPD)
  - The hazardous area classification is included in the EPD for the facility. In addition, the EPD must demonstrate that the employer has taken technical and operational measures (including the selection of electrical and mechanical equipment in accordance with Schedule 172(g) of the Regulations) to:
  - Prevent the formation of explosive atmospheres or where the nature of the activity does not allow that,
  - Avoid the ignition of explosive atmospheres, and
  - Mitigate the detrimental effects of an explosion so as to ensure the health and safety of workers.

This document is intended to fulfil the requirements set out above. It is intended to be used as a working document and a management system for explosion protection on site.

3 Materials

Materials at Indaver that have the potential to form explosive mixtures with air include:

- Flammable liquids
- Flammable gases/vapours/mists
- Combustible dusts

Table 4 shows relevant materials and their properties.

3.1 Flammable Liquids

Flammable liquids are divided into three categories which are defined in Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006.

Table 1: Criteria for Flammable Liquids

Category	Criteria
1	Flash point < 23 o C and initial boiling point ≤ 35 o C
2	Flash point < 23 o C and initial boiling point > 35 o C
3	Flash point ≥ 23 o C and ≤ 60 o C (1)
(1) For the purpose of this Regulation gas oils, diesel and light heating oils having a flash point between ≥ 55 º C and ≤ 75ºC may be regarded as Category 3.	
Note: Aerosols shall not be classified as flammable liquids; see section 2.3.	

The flash point is the lowest temperature at which a liquid gives off enough vapour to form a flammable air-vapour mixture near its surface. Where liquids have flash points that would be exceeded at normal room temperatures, a spill of such a liquid would generate a potentially explosive atmosphere, i.e. an atmosphere with a concentration in air that is above the lower flammable limit.

3.1.1 Aqueous Waste

Aqueous waste is accepted at the Carranstown facility for disposal by combustion. Aqueous waste contains flammable organic solvents.

On arrival at Indaver, every consignment of aqueous waste is sampled. Any consignment displays an immiscible layer is rejected.

The flash point of each sample is measured using a Setaflash point meter (model 82100-2).

A mixture of water with flammable liquids will generate a vapour that contains the vapour of each of the components, including water vapour.

Where the concentration of water vapour is low, the flammable materials will dominate and the flash point of the mixture will be slightly higher than the flash points of the pure flammable liquids.

Where the water is present at a high concentration, *there are two factors involved:*

- *The concentration of the flammable vapour is depressed by the effect of the water in the solution, and*
- *The water vapour itself reduces the partial pressure of the oxygen in the air within the flash-point apparatus.*

Hence there will be a concentration where despite there being enough flammable vapour present to be above the lower flammable limit, there is insufficient partial pressure of oxygen present.

Thus it can be difficult to determine whether the mixture is above its flash point but has insufficient oxygen to burn, or whether it is simply below its flash point.[10]

Although most of the consignments of aqueous waste have a flash point that is well above ambient temperatures, some consignments have been found to have a relatively low flash point, and at least one consignment was found to have a flash point of 15°C. Hence a leak or spill of any of these liquids could generate a potentially explosive atmosphere, i.e. an atmosphere with a concentration in air that is above the lower flammable or explosive limit.

In order to determine the hazardous areas in those areas of the facility where aqueous waste is handled, credible loss of containment scenarios were identified and modelled using the DNV PHAST Professional modelling package.

The vapours of the organic solvents are significantly heavier than air. However, because water vapour is lighter than air, the vapour from the mixture is lighter than air and therefore would not tend to accumulate at low points, such as drains and sumps.

Two mixtures were modelled with the compositions shown in Table 2. The properties of the mixtures are also shown in the table.

It is clear that the concentration of flammable organic solvents in the vapours from these two mixtures do not approach the relevant LELs.

However, some of the lower flash points measured by Indaver clearly indicate that a potentially explosive atmosphere mixture could arise from a spill of aqueous waste. Therefore it is considered prudent to treat all aqueous waste as a liquid that could generate a potentially explosive atmosphere.

Table 2 Properties of Aqueous Waste

Component	Molecular Weight	Normal Boiling Point (°C)	LEL (ppm)	Flash Point (°C)	% w/w in Liquid	% v/v in Vapour	Partial Pressure (psia)	Concentration in vapours (ppm)	Concentration in dry air (ppm)
Mixture A									
Methanol	32.04	64.7	73,000	10.85	10	23.94%	0.119	8,115	8,289
THF	72.11	65.97	20,000	-14.15	10	14.22%	0.071	4,820	4,923
Water	18.00	100.00	-	-	80	61.84%	0.308	20,965	
Total	20.44	94.64	436,000		100	100.00%	0.498	33,900	
Mixture B									
Isopropanol	60.1	82.26	20,000	11.85	5.7	2.99%	0.012	847	865
Acetonitrile	41.05	81.6	44,000	2	14	22.77%	0.095	6,450	6,589
Water	18.00	100.00	-	-	80.3	74.24%	0.309	21,036	
Total		98.14	397,000		100	100.00%	0.416	28,334	

3.1.2 Aqueous Ammonia

Aqueous ammonia (24.9% w/w), also known as ammonium hydroxide, is used for abatement of emissions of nitrogen oxides. Loss of containment would result in a pool of liquid that would generate ammonia gas and water vapour. Pure ammonia gas forms explosive mixtures in air in concentrations 16-27%. However, air-ammonia-water vapour from a pool of 24.9% ammonium hydroxide is not flammable or explosive at ambient temperature.

3.2 Flammable Gases

Flammable gases are divided into two categories defined in Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006. Refer to Table 3.

Table 3: Criteria for Flammable Gases

Category	Criteria
1	Gases, which at 20 °C and a standard pressure of 101,3 kPa: (a) are ignitable when in a mixture of 13 % or less by volume in air; or (b) have a flammable range with air of at least 12 percentage points regardless of the lower flammable limit.
2	Gases, other than those of Category 1, which, at 20 °C and a standard pressure of 101,3 kPa, have a flammable range while mixed in air.
Note: Aerosols shall not be classified as flammable gases; see section 2.3.	

3.2.1 Propane

Flammable/highly flammable gas (propane) is used as medium to ignite the start-up burners of the furnace. Propane is also used as a fuel for forklift trucks on site. Propane is a highly flammable gas and explosive when mixed with air.

3.2.2 Methane

Methane could be generated due to decomposition of waste in the bunker. The likelihood is extremely low because of the relatively short residence time of waste in the bunker and the regular turnover of waste. An LEL meter is installed in this area.

3.2.3 Hydrogen

In the CEMS room a Hydrogen generator is installed for the gas analysis equipment. This is an intrinsically safe device which is ATEX-rated. Hydrogen detection and oxygen depletion detection is in place. These detectors alarm locally with sounders and beacons and output a signal to the control room on activation.

3.3 Combustible Dusts

Dioxorb is now used in place of pure activated carbon as a ten % mix of carbon in activated clay. This product is not classified as hazardous.

Waste polyisocyanurate (PIR) comprising offcuts and other residues from insulation panel. Each container of waste delivered to site holds 4-6 tonnes of this material. This material in the form of panels is generally regarded as being non-flammable, partly due to the use of fire retardants. However dust generated by cutting, grinding and sawing could form a potentially explosive atmosphere. Also, the compaction of polyisocyanurate foam for disposal can entrap pentane in pockets of the compressed foam. The waste is not considered as capable of forming potentially explosive dust clouds in the waste reception and handling area because of the small quantities and any pentane liberated during compaction would not travel with the compacted waste.

Combustible dusts may be present in other wastes delivered to Indaver, but it is highly unlikely that the tipping of waste into the waste bunker or the retrieval of waste by a grab would generate a potentially explosive dust cloud.

Table 4 Hazardous area classification data sheet – Part I: Flammable substance list and characteristics

1	2	3	4	5	6	7	8	9	10	11	12	13	14		15
	Flammable substance							**Volatility[a]**		**Explosive Limits (% v/v)**		**Ex characteristics**			
	Name	**Composition**	**Molar mass (kg/kmol)**	**Relative density gas/air**	**Polytropic index of adiabatic expansion γ**	**Flash point (°C)**	**Ignition temp. (°C)**	**Boiling point (°C)**	**Vapour pressure at 20°C (kPa)**	**LEL**	**UEL**	**Equipment group**	**Temp. class**	**EU Class**	**Any other relevant information and remarks**
1	Aqueous Waste	Variable				15									
2	Acetone	Component of Aqueous Waste	58	2.0		-19	535	56		2.15	13	IIA	T1	FL-2	
3	Methanol		32	1.11		11	455	65		6.7	36	IIA	T1	FL-2	
4	Toluene		92	3.1		4	480	110		1.2	8	IIA	T1	FL-2	
5	Acetonitrile		41	1.42		5	975	82		4.4	16	IIA	T1	FL-2	
6	Propane	100%	44	1.56		-104	470	-42		2.0	9.5	IIA	T1	FG-1	
7	Methane	Variable	16	0.55		-	595	-161		5	15	IIA	T1	FG-1	
8	Hydrogen		2	0.07		-	560	-253		4	75.6	IIC	T1	FG-1	

[a] Normally, the value of vapour pressure is given, but in the absence of that, boiling point can be used.

ND = No Data. NA = Not Applicable (to non-flammable liquids and powders)

Of these products, only fuel is classified as flammable.

EU Class per Regulation 1202/2008/EU (FL – Flammable Liquid, FG – Flammable Gas)

4 Risk Assessment

A risk assessment was carried out to determine which areas of the facility should be considered as having potentially explosive atmospheres. The following factors were taken into account in the risk assessment:

- The likelihood that an explosive atmosphere will occur and its persistence.
- The likelihood that ignition sources, including electrostatic discharges, will become persistent and become active and effective.
- The installations, substances present, processes and their possible interactions.
- The scale of the anticipated effects

Assessment of the plant and processes was based on the following operational conditions:

- Normal operating conditions, including maintenance
- Malfunctions and foreseeable fault conditions
- Misuse which may reasonably be foreseen

Explosion risk was assessed overall. The following factors were included in this assessment:

- The work equipment used
- The building fabric and configuration
- Materials used
- Work and process conditions
- Their possible interaction with each other and the working environment.

The EU has developed a guide of good practice for the ATEX 137 Directive (Ref. COM (2003) 515 final). The guide was used for the basis of this ATEX risk assessment.

The guide indicates that the following four conditions must be satisfied simultaneously for explosions with hazardous effects to occur:

- A high degree of dispersion of the flammable substances;
- Concentration of the flammable substances in air within the combined explosion limits;
- Hazardous quantities of explosive atmosphere;
- An effective ignition source.

However, in order to check whether these conditions are met, explosion risks can in practice be assessed by means of seven questions or Assessment Criteria, which are as follows:

1. Are flammable substances present?
2. Can sufficient dispersal in air give rise to an explosive atmosphere?
3. Where can explosive atmospheres occur?
4. Is the formation of a hazardous explosive atmosphere possible?
5. Is the formation of hazardous explosive atmospheres reliably prevented?
6. To what zones can the places with hazardous explosive atmospheres be assigned?
7. Is the ignition of hazardous explosive atmospheres reliably prevented?

Items 1 to 5 are discussed in this section, Item 6 is detailed in Section 5 and Appendix A and Item 7 is reviewed in section 7.

4.1 Presence of Flammable Substances

As indicated in Section 3 of this Document dangerous substances present on-site on a continuous basis can include flammable liquids and gases and combustible dusts.

Therefore, the answer to the question is ***Yes***: Flammable substances are present on site.

4.2 Air Dispersion

It is possible to have dispersal of the vapours due to leaks or spills, damaged drums/containers or in the case of repackaging of waste.

Therefore, the answer to this question is ***Possibl***e: there may be dispersion in air to create a potentially explosive atmosphere.

4.3 Locations of Potentially Explosive Atmosphere

Therefore, the answer to this question is ***Yes***, it is possible to have an explosive atmosphere at some location in the Indaver facility.

The following locations were identified for detailed evaluation.

4.3.1 Road tanker unloading area

The unloading area is situated on the south side of the building and has two parking bays for road tankers (ISO tankers).

An air-operated diaphragm pump and chemical hoses are used to transfer aqueous waste from the ISO tankers to the Baker Tank. The transfer rate is approximately 30 m^3 per hour. The Baker Tank and the ISO road tanker are earthed during this process. A vapour balancing line is provided between the Baker Tank and the ISO tanker that is being unloaded.

Figure 1 Road Tanker Unloading Area

4.3.2 Baker Tank

The Baker tank (see Figures 3 and 4) has a capacity of 70 m³. The tank is installed in the existing tanker unloading area and a new concrete has been provided (see green outlined areas in picture below) for two road tankers/ISO tankers to park/unload.

The Baker tank and the road tanker are earthed during the unloading process. A vapour balancing line links the Baker tank and the road tanker.

The Baker tank is not inerted with nitrogen nor is oxygen monitoring carried out in the tank.

Figure 2 Baker Tank location and tanker unloading area

Figure 3 Baker Tank

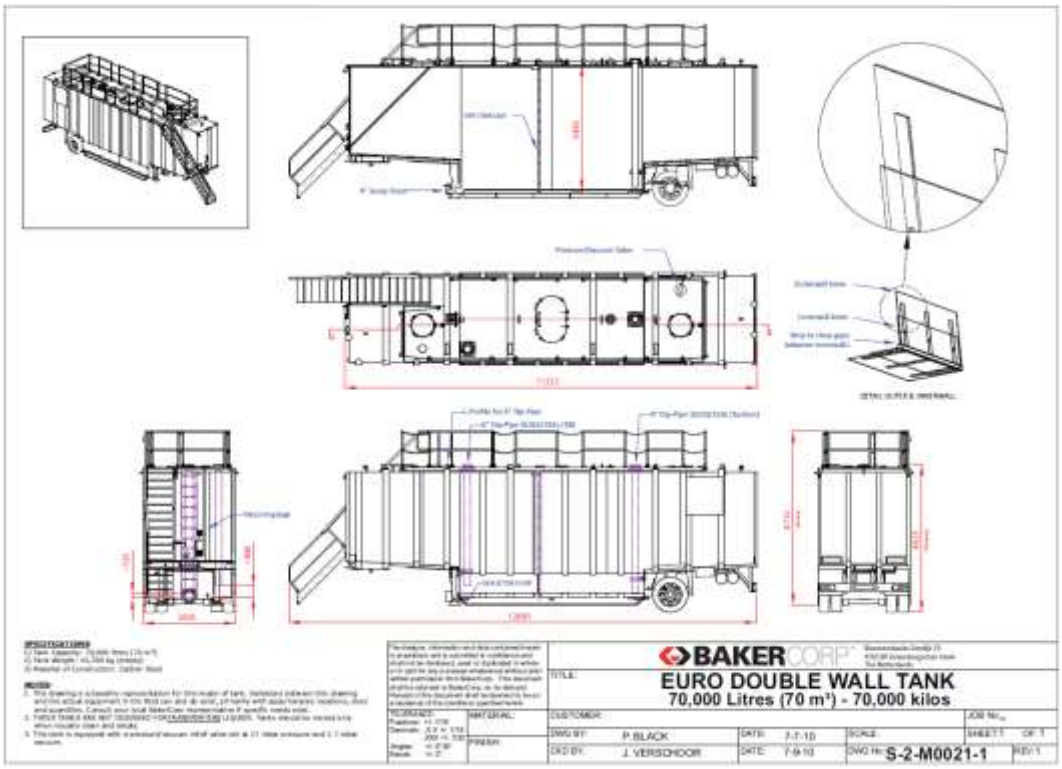


Figure 4 Baker Tank - Plan and Elevation

4.3.3 Feeding Aqueous Waste to Furnace

Aqueous waste is pumped from the Baker tank to the furnace using a peristaltic pump and filter. These are located inside the main process building but adjacent to the location of the Baker Tank.

The feed rate of aqueous waste to the furnace is controlled at Level 5 in the building. See Figure 5.

Figure 5 Aqueous Waste Feed System

4.3.4 Propane Storage

Two to three propane bottles are stored adjacent to the Baker Tank and road tanker discharge area. See Figure 6. These bottles are connected to one single welded feeding line to the burner area. A pressure regulating valve is installed on each of the bottles. A pressure control and warning system is in place.

Figure 6 Propane Bottles

4.3.5 Chemstore Cabinet

A proprietary fireproof storage cabinet (Chemstore Unit) is located outside the warehouse. See Figure 7. It is used mainly for the storage of non-flammable materials, but also for flammable liquids. There are no electric switches or lights connected to the storage unit.

Figure 7 Chemstore Cabinet

4.3.6 CEMS Room

In the CEMS room a hydrogen generator is used to supply hydrogen to emission gas analysis equipment. This is an intrinsically safe device which is ATEX-rated. Hydrogen detection and oxygen depletion detection is installed. These detectors alarm locally with sounders and beacons and output a signal to the control room on activation.

4.3.7 Waste Bunker

Waste is delivered to the facility by road vehicles and discharged into a large bunker. The bunker dimensions are 40.84m long, 28.2m wide and 35.6m high. The waste is retrieved from the bunker by a grab that is operated automatically but can also be operated manually. The waste is transferred to the waste feed system for the furnace. Waste is heterogeneous and varies widely in composition. Much of the waste is municipal and may contain methane-generating materials or quantities of combustible dust.

Primary air for the furnace is drawn from the waste bunker. This ensures a throughflow of air from outside the building. Volatile Organic Compounds (VOCs) or methane (CH_4) may arise in the bunker due to the decomposition of waste or presence of volatile materials e.g. wood preservatives, traces of oil.

To monitor for any potential accumulation of VOC or methane in the waste bunker that could cause a fire risk, a lower explosive limit (LEL) detector has been installed. This has been set to alarm at 20% of LEL.

If the alarm is activated plant operators will increase the air extract rate to from 60,000 Nm^3/hr to 80,000 Nm^3/hr.

The Waste Bunker has a total volume of approximately 40,000 m^3. However, up to 16,000 m^3 of this could be occupied by waste awaiting incineration. Therefore 25,000 m^3 is the minimum volume of "free space". Therefore, the normal air flow rate of 60,000 Nm^3/hr is equivalent to approximately 2.4 air changes per hour (acph). The maximum air flow rate of 75,600 Nm^3/hr is equivalent to approximately 3.2 acph.

It is considered that if methane arises from a consignment of waste the quantity will be small, 20 m^3 out of a total of 16,000 m^3 and that the risk of a potentially explosive atmosphere being developed other than locally within the bunker is extremely low.

5 Hazardous Area Classification

5.1 Methodology

Hazardous area classification was carried out in accordance with IS EN 60079-10-1:2015 Explosive atmospheres – Part 10-1: Classification of areas — Explosive gas atmospheres.

Area classification is a method of analysing and classifying the environment where explosive gas atmospheres may occur so as to facilitate the proper selection and installation of apparatus to be used safely in that environment, taking into account gas groups and temperature classes.

The above standard sets out the methodology to identify the zones and their extent vertically and horizontally. Table 5 shows the zone classification.

Table 5: Classification of Hazardous Areas

	Zone	Description[1]
Gases/ Vapours/ Mists	Zone 0	A place in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapour or mist is present continuously or for long periods or frequently
	Zone 1	A place in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapour or mist is likely to occur in normal operation occasionally.
	Zone 2	A place in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapour or mist is not likely to occur in normal operation but, if it does occur, will persist for a short period only.
Dusts	Zone 20	A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is present continuously, or for long periods or frequently.
	Zone 21	A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is likely to occur in normal operation occasionally.
	Zone 22	A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is not likely to occur in normal operation but, if it does occur will persist for a short period only.

In most practical situations where flammable materials and/or powders are used, it is difficult to ensure that an explosive atmosphere will never occur. It may also be difficult to ensure that apparatus will never give rise to a source of ignition.

[1] Directive 1999/92/EC of the European Parliament and of the Council of 16 December 1999 on minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres (15th individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC)

Therefore, in situations where an explosive atmosphere has a high likelihood of occurring, reliance is placed on using apparatus, which has a low likelihood of creating a source of ignition.

Conversely, where the likelihood of an explosive atmosphere occurring is reduced, apparatus constructed to a less rigorous standard may be used.

It is rarely possible by a simple examination of a plant or plant design to decide which parts of the plant can be equated to the six zonal definitions (zone 0, 1, 2 and zone 20, 21, 22). A more detailed approach is therefore necessary and this involves the analysis of the basic possibility of an explosive gas atmosphere occurring.

The first step is to assess the likelihood of this, in accordance with the definitions of the zones. Once the likely frequency and duration of release (and hence the grade of release), the release rate, concentration, velocity, ventilation and other factors which affect the type and/or extent of the zone have been determined, a firm basis then exists on which to determine the likely presence of an explosive gas atmosphere in the surrounding areas. This approach therefore requires detailed consideration to be given to each item of process equipment which contains a flammable material, and which could therefore be a source of release.

In particular, Zone 0, 1, 20 or 21 areas should be minimised in number and extent by design or suitable operating procedures. In other words, plants and installations should be mainly zone 2/22 or non-hazardous. Where release of flammable material/dust is unavoidable, process equipment items should be limited to those which give secondary grade releases or, failing this (that is where primary or continuous grade releases are unavoidable), the releases should be of very limited quantity and rate. In carrying out area classification, these principles should receive prime consideration. Where necessary, the design, operation and location of process equipment should ensure that, even when it is operating abnormally, the amount of flammable material/dust released into the atmosphere is minimised, so as to reduce the extent of the hazardous area.

Once a plant has been classified and all necessary records made, it is important that no modification to equipment or operating procedures is made without discussion with those responsible for the area classification. Unauthorised action may invalidate the area classification. It is necessary to ensure that all equipment affecting the area classification which has been subjected to maintenance is carefully checked during and after re-assembly to ensure that the integrity of the original design, as it affects safety, has been maintained before it is returned to service.

The Regulations state that where explosive atmospheres are likely a warning sign must be displayed at or near the point of entry. The guidance documentation shows the warning sign as follows:

5.2 Classification of Openings and Grades of Release – Flammable Liquids and Gases

A source of release is a point of location from which a flammable gas, vapour or liquid may be released into the atmosphere such that an explosive gas atmosphere could be formed. Openings are classified as type A, B, C or D with the following characteristics as shown in Table 6.

Table 6: Types of Openings

Type A	openings not conforming to the characteristics specified for types B, C or D.
Type B	openings which are normally closed (e.g. automatic closing) and infrequently opened, and which are close fitting.
Type C	openings normally closed and infrequently opened, conforming to type B, which are also fitted with sealing devices (e.g. a gasket) along the whole perimeter; or two type B openings, having independent automatic closing devices.
Type D	openings normally closed conforming to type C, which can only be opened by special means or in an emergency.

No comparable classification is given in the International Standard for explosive dust atmospheres.

The three basic grades of release are listed in Table 7, in order of decreasing likelihood of the explosive gas atmosphere being present. A source of release may give rise to any one of these grades of release, or to a combination of more than one.

Table 7: Grades of Release

Grade of Release	**Flammable Gases and Vapours - Description of Grade IEC 60079-10 Part 1: 2009**	**Combustible Dusts IEC 60079-10 Part 2: 2009**
Continuous	A release which is continuous or is expected to occur for long periods	Locations in which dust cloud may exist continuously, or may be expected to continue for long periods or for short periods which occur frequently
Primary	A release which can be expected to occur periodically or occasionally during normal operation.	A source which can be expected to release periodically or occasionally during normal operation
Secondary	A release which is not expected to occur in normal operation and if it does occur, is likely to do so only infrequently and for short periods.	A source which is not expected to release during normal operation and if it releases, is likely to do so only infrequently and for short periods

5.3 Classification of Ventilation

Where potentially flammable atmospheres arise, ventilation in the area can affect the type and extent of the hazardous zone. Ventilation may be either natural or artificial. Natural ventilation is the movement of air by wind or temperature gradients. Artificial ventilation is caused by fans, extractors etc. Ventilation is further described in terms of degree and availability, as shown in Tables 8 and 9.

Table 8 Degree of Ventilation

Degree of Ventilation	
High	Can reduce the extent of the hazardous zone to negligible extent.
Medium	Can stabilise the extent of the hazardous zone while the release is in progress.
Low	Cannot control the extent of the hazardous zone while the release is in progress.

Table 9 Availability of Ventilation

Availability of Ventilation	
Good	Ventilation is present almost continuously.
Fair	Ventilation is expected to be present during normal operation.
Poor	Ventilation does not meet the standard of fair or good.

5.4 Likelihood of Potentially Explosive Atmosphere

It is unlikely that an explosive atmosphere will occur on-site and if it does it will persist only for a short period of time.

Whether an explosive atmosphere can form in the presence of flammable substances depends on the ability to ignite the air-vapour mixture formed. If the necessary degree of dispersion is attained and if the concentration of the flammable substances in air lies within their explosion limits, an explosive atmosphere is present. By their very nature, gases and vapours have a sufficient degree of dispersion.

In order to answer the above question, the following properties need to be considered:

- Flammable gases and gas mixtures:
  - Lower and upper explosion limit
  - Maximum (sometimes also minimum) concentrations of the flammable substances arising or obtained during work with them.

- Flammable liquids:
    - Lower and upper explosion limit of vapours
    - Lower explosion limit of mists
    - Flash point

Note: Explosive mixtures are assumed to be not present inside containers if the temperature within the container is at all times kept far enough below the flash point (by about 50 ºC to 150 ºC).

The answer to this question is ***Yes***: A potentially explosive atmosphere could occur on site.

5.5 Prevention of Hazardous Explosive Atmospheres

If it is possible for a hazardous explosive atmosphere to be formed, explosion protection measures are necessary. An attempt should first be made to avoid the occurrence of explosive atmospheres.

"Explosion protection measures" means all measures that

- Prevent the formation of hazardous explosive atmospheres,
- Avoid the ignition of hazardous explosive atmospheres or
- Mitigate the effects of explosions so as to ensure the health and safety of workers."

Given the controls, both technical and organisational, implemented at the facility, the formation of a hazardous explosive atmosphere is reliably prevented in so far as is reasonably practicable.

5.6 Classification of Indaver Facility

The operations of Indaver were reviewed by site inspections and discussions with Indaver staff, most recently on 18 December 2020. The findings are summarised in Appendix A.

In each area of the facility, the materials handled were assessed to determine whether, under normal operating conditions of temperature and pressure, a flammable atmosphere would be generated. The assessment took into account:

- The flash point of liquids
- The operating temperatures and pressures
- The potential for loss of containment
- The potential for vaporisation of liquids

Based on the assessment hazardous areas in the facility was areas were classified into zones based upon the frequency of the occurrence and duration of an explosive gas atmosphere.

Table 10 lists the sources of release and associated classification and hazardous area extents, using the format in EN 60079-10-1.

The hazardous areas are shown in Figures 1 and 2.

Table 10 Hazardous area classification data sheet – Part II: List of sources of release

	Source of release					Flammable substance			Ventilation			Hazardous area				
	Description	Location	Grade of release[a]	Rate of release)		Reference[b]	Operating temperature and pressure	State[c]	Type[d]	Degree of dilution	Availability	Zone type 0-1-2	Zone extent[g] (m)		Reference[f]	Any other information or remark
				kg/s	m³/s								Vertical	Horizontal		
1	Road Tanker Unloading	External	S	0.008 33	0.00833	1	Ambient	L	N	H	G	2	1[1]	3[2]	67009-10-1 2009 Example 1	
2	Baker Tank	Interior	C	NA	NA	1	Ambient	L	-	-	-	0	Interior of tank		67009-10-1 2009 Example 8	
3	Baker Tank	Exterior	S	NA	NA	1	Ambient		N	H	G	2	3 m from tank wall			
4	Baker Tank vent	Exterior	P	0.01	0.00833	1	Ambient	V	N	H	G	1	3 m in all directions			
5	Aqueous Waste feed to Furnace	Pump and Filter (external)	S			1	Ambient temperature, 5 barG pressure	L	N	H	G	2	1[3]	3[3]	67009-10-1 2009 Example 1	
6	Aqueous Waste feed to Furnace	Feed regul-ating system	S			1	Ambient	L	A	M	F	2	1	1	67009-10-1 2009 Example 1	
7	Propane storage	Exterior	S			6	Ambient	LG	N	H	G	2	1[4]	1[4]	BCGA GN13	
8	Chemstore Unit	Interior	S			2, 3	Ambient	L	N	-	P	2	Interior of cabinet		Inspection	
9	CEMS Room	Top level of Bldg	S			8	Ambient	G	A	M	F	2	NE	NE	See risk assess-ment	
10	Waste Bunker	Main Building	S			7	Ambient	S	A	M	F	0	Interior of bunker		See risk asses-sment	

Notes:

a C – Continuous; S – Secondary; P – Primary b Quote the number of list in Part I c G – Gas; L – Liquid; LG – Liquefied gas; S – Solid d N – Natural; AG – Artificial General; AL – Artificial Local	e See Annex C f Indicate code reference if used, or calculation reference g NE – Negligible Extent	1 2 3 4	Distance above ground distance from pump From flanged joints and seals From joints

6 Equipment Intended for Use in Potentially Explosive Atmospheres

Directive 2014/34/EU applies to equipment and protective systems intended for use in potentially explosive atmospheres. The suitability of mechanical and electrical equipment intended for use in potentially explosive atmospheres is determined according to its group and category.

6.1 Equipment Groups and Categories

Equipment group I applies to equipment intended for use in underground parts of mines, and in those parts of surface installations of such mines, liable to be endangered by firedamp and/or combustible dust.

Equipment group II applies to equipment intended for use in other places liable to be endangered by explosive atmospheres. Group II equipment is divided into three categories as follows:

Category 1	Equipment in this category is intended for use in areas in which explosive atmospheres caused by mixtures of air and gases, vapours or mists or by air/dust mixtures are present continuously, for long periods or frequently i.e. zone 0/20.
Category 2	Equipment in this category is intended for use in areas in which explosive atmospheres caused by gases, vapours, mists or air/dust mixtures are likely to occur i.e. zone 1/21.
Category 3	Equipment in this category is intended for use in areas in which explosive atmospheres caused by gases, vapours, mists, or air/dust mixtures are unlikely to occur or, if they do occur, are likely to do so only infrequently and for a short period only i.e. zone 2/22.

Category 1 equipment can be safely used in all zoned areas. Category 2 equipment can be used in zones 1/21 and 2/22. Category 3 equipment can only be used in zones 2/22.

6.2 Equipment Labels

ATEX certified equipment is labelled as follows:

	**The European Commission mark for ATEX certified products**
II	Equipment group (I for mining equipment, II for all others)
2	Zone in which equipment may be used (0,1,2, 20,21,22)
G	G indicates that marking relates to gas/mist/vapour atmospheres. D indicates dust atmospheres
EEx	Explosion protection marking
d	Method of protection of equipment (d, e, p etc)
IIB	Gas group in whose presence equipment may be used. Group II equipment is subdivided into groups A, B and C according to the level of risk. IIC is the highest rating
T4	Gas temperature class (T1 – T6). T4 equipment may be used in the presence of temperature class 4 gases and below

7 Prevention of ignition

The EU guide outlines thirteen different types of possible ignition sources as detailed in EN 1127-1:

- Hot surfaces
- Flames and hot gases
- Mechanically generated sparks
- Electrical apparatus
- Stray electrical currents
- Static electricity
- Lightning
- Electromagnetic fields in the frequency range from 9 kHz to 300 GHz
- Electromagnetic radiation in the frequency range from 300 GHz to 3 x 106 GHz or
- Wavelength range from 1,000µm to 0.1 µm (optical spectrum)
- Ionising radiation
- Ultrasonics
- Adiabatic compression, shock waves, gas flows
- Chemical reactions.

Not all of these ignition sources are relevant to the Carranstown site.

Those that are relevant are assessed below:

7.1 Hot surfaces/flames/sparks

This is one of the main concerns as hot work such as welding; grinding or flame cutting in or near the areas such as the Bunker area, Baker Tank and Propane Gas bottles, could ignite gas if present.

In line with current legislations smoking is allowed on-site only in designated areas.

7.2 Sparks from Forklift

The use of forklifts in the immediate surroundings of the ISO tanker unloading area is not allowed. The Propane Gas bottles are stored in a safe area away from traffic routes.

7.3 Static Electricity

Safety Shoes and clothing will be antistatic. For the unloading of hazardous waste ISO tankers earthing and bonding will be utilised as part of operations to prevent the formation of static electricity.

7.4 Electrical Equipment

The suitability for electrical equipment to be used in each zoned area is assessed in Appendix C. Mobile phones should not be allowed in zoned areas of the plant.

7.5 Lightning Protection

Protection against lightning involves installation of a surge protection device between each non-earth bonded core of the cable and the local structure. Further guidance can be found in BS 6651:1999 - (Code of practice for protection of structures against lightning).

There is adequate lightning protection fitted to the plant. Lightening conductors are in place.

This is checked on an annual basis.

7.6 Smoke Detectors

Smoke detectors in will be kept out of the defined ATEX zones.

7.7 Warning Sirens

Warning sirens will be kept out of the defined ATEX zones.

8 Explosion Protection Measures

8.1 Technical Measures

8.1.1 Engineering Measures

Earthing and grounding are used to prevent the generation and accumulation of static charge on equipment (Ref. P0557 Unloading into the Baker Tank).

The unloading point is specially designed to offer increased protection against the generation of charge. It operates on a system of ISO tanker verification of both monitoring capacitance and resistance; this makes it impossible to verify earth against another metal object such as the railing. This removes the scope for operator error.

Electrical equipment is appropriate to the area in which it is used.

There is a preventative maintenance system in place at Indaver. Whereby equipment is regularly inspected and maintained by external contractors for any defaults and thus kept in good working order. Staff also carry out regular inspections and surveillance of equipment.

8.1.2 Fire and emergency plans

The facility has been equipped with a fire detection and alarm system, which can be activated automatically or manually. The Turbine oil circuit has been equipped with a foam sprinkler system. Bunker storage area, lay down area in the tipping hall, feeding hopper and turbine have been equipped with sprinkler systems. In the bunker storage area water guns can be operated in case of a fire. Fire and emergency plans for the facility, including the maintenance schedule (Ref. Operations 15.2 Maintenance of Equipment) for firefighting equipment and emergency lighting are contained in the Indaver Safety Statement, which is reviewed periodically, at least annually, by the Health & Safety Officer.

8.1.3 Facility Hazard Identification

A risk assessment of the various departments has been carried out. The results of this risk assessment are contained in the Indaver Ireland Safety Statement, which is reviewed periodically by the Health & Safety Manager. Hazards specific to the different areas of the facility are identified and prevention measures and responsible persons identified.

8.1.4 Zoned Areas

Indaver has taken a cautionary approach in zoning the areas. Areas have been zoned on a worst-case basis and in some parts of the site zoned areas have been extended to ensure that the zone encompasses the entire region.

8.2 Organisational measures

8.2.1 Staff training

Induction training includes information on Indaver's approach to safety and the safety procedures and requirements throughout the premises. Training programmes (Ref. P0328 Training and Staff Competence) are designed so that employees become fully conscious of the need to work safely and have the necessary knowledge and skills to do so. On-the-job training focuses particularly on hazardous aspects of each job with a view to ensuring that employees are fully aware with the dangers arising from any operation. The training is supported by a continuing effort on the part of the Company's Department Managers and Supervisors to provide information and guidance to employees with a view to eliminating any unsafe working practices, which might develop.

8.2.2 Standard Operating Procedures

MOSS (Microsoft Office SharePoint Server) is the current Indaver document management system. It is an electronic system that is used for the storing and control of new, amended or issue of controlled documents such as policies, procedures and manuals. Old versions of these documents are archived as obsolete within the system.

There are a number of standard operating procedures in relation to the operations of the Waste to Energy Plant, some of the main procedures include:

- P0557 Procedure for Unloading into Baker Tank.
- P0362 Waste Acceptance
- Spills are dealt with in a safe and environmentally safe manner.
- P0353 Control of Hot Work Procedure
- Internal Auditing of operating procedures to verify continuing adherence to operating procedures.

8.2.3 Health & Safety Checks

The operators carry out daily, weekly and monthly checks (ref P0442 Checklists). These checks include visual checks of the bunker area, tipping hall, any containers stored on site and an inspection of tanks, etc.

8.2.4 Work Permit System

There is a Permit to Work system in place at Indaver Ireland. The responsibilities, the rules and the procedure for the issue and use of a hot work permit are clearly laid out in P0353 Control of Hot Work Procedure.

Before work commences in a zoned area a risk assessment is carried out, the work is detailed and described and any preparation actions are carried out. The permit is

completed and signed off by all relevant personnel only then may the work in the area start.

8.2.5 Mobile sources of ignition

Smoking is permitted only in designated areas in the site. Mobile phones may not be used in EX areas.

8.2.6 Purchase of New Equipment

The Health & Safety Manager in accordance with P0289 must approve all purchased or hired equipment. This procedure queries the use and location of the equipment and also the requirement for equipment to be ATEX-compliant.

8.2.7 Management of Change

The management of change at the facility is controlled under operation Management of Change Procedure (Ref P0202). This procedure outlines the steps to be taken in the event of significant changes at the facility, such as the introduction of an additional storage tank. As part of this procedure, ATEX and the potential for the generation of additional sources of explosive atmospheres or sources of ignition must be considered.

9 Recommendations

Based on the zonings laid out in this report the following recommendations are suggested:

- Review procedures to ensure that they address ATEX compliance.
- Provide ATEX awareness training and instruction for all employees. Carry out refresher training at an agreed frequency. EPD to be issued to staff and training to take place.
- Update the Site Safety Booklet for visitors and contractors to include information on explosion protection and ATEX requirements.
- Signage should be displayed at suitable points near zones.
- The Safety Statement should be updated to include explosion prevention and protection. This should be brought to the attention of employees and others who may be affected. (The hot work risk assessment will be updated based on the zoning for ATEX).
- Nominate an ATEX coordinator for the site.

  The ATEX Coordinator should satisfy the following requirements:

  - Must have explosion protection expertise.
  - Knowledge of the national regulations transposing Directives 89/391/EEC and 1999/92/EC (Health & Safety and ATEX).
  - Knowledge of the firm's organisational structure.
  - Leadership qualities to ensure that the necessary instructions are put into effect.

The duties of the coordinator comprise site inspections and coordination meetings, as well as planning, supervision and, if necessary, re-planning of work in response to difficulties arising.

- The various staff, the contractor(s) and all others working on the site should provide the coordinator in good time with the following information:
  - Work to be undertaken;
  - Planned start of work;
  - Anticipated end of work;
  - Place of work;
  - Workers assigned;
  - Planned method of work plus measures and procedures for implementing the explosion protection document;
  - Name of the person(s) in charge.
- No modification to equipment or operating procedures should be made without discussion with the ATEX Coordinator.
- Forklift trucks should not be used in the Isotanker area.
- Mobile phones should not be allowed in zoned areas of the plant.

- For information purposes the flash point of each consignment of aqueous waste should be checked before discharge and recorded.

References

[1] Directive 2014/34/EU of the European Parliament and of the council of 26 February 2014 on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres

[2] European Union (Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres) Regulations 2017 (SI No 230 of 2017)

[3] Directive 1999/92/EC of the European Parliament and of the Council of 16 December 1999 on minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres (15th individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC)

[4] European Commission (2003). Non-binding Guide of Good Practice for implementing of the European Parliament and Council Directive 1999/92/EC on minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres. European Commission, DG Employment and Social Affairs, Health, Safety and Hygiene at Work, Final version April 2003

[5] International Standard EN 60079-10-1:2015 Explosive atmospheres Part 10-1: Classification of areas – Explosive gas atmospheres

[6] HSA (2007). Guide to the Safety, Health and Welfare at Work (General Application) Regulations 2007: Part 8: Explosive Atmospheres at Places of Work.

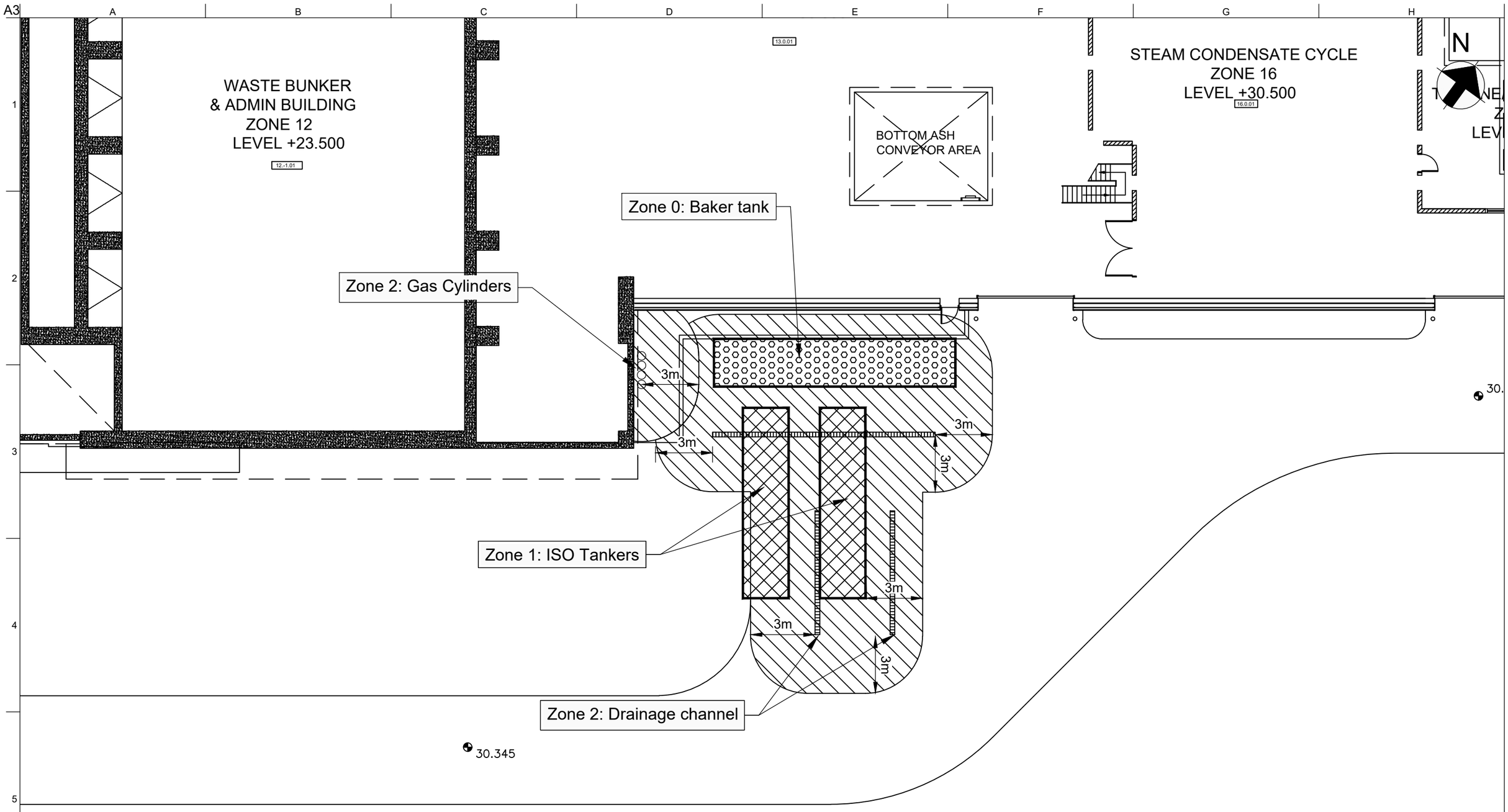
[7] Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006

[8] Energy Institute (2015). (Institute of Petroleum) Model Code of Safe Practice, Part 15, Area classification for installations handling flammable fluids, 4th Edition.

[9] British Compressed Gases Association (2008). DSEAR Risk Assessment. Guidance Note 13

[10] G.R. Astbury et al (2004). Flash Points of Aqueous Solutions of Flammable Solvents. IChemE Symposium Series No. 150

Figures



Legend:

- ZONE 0
- ZONE 1
- ZONE 2

ARUP

Arup, 50 Ringsend Road
Dublin 4
Tel +353(0)1 233 4455
www.arup.ie

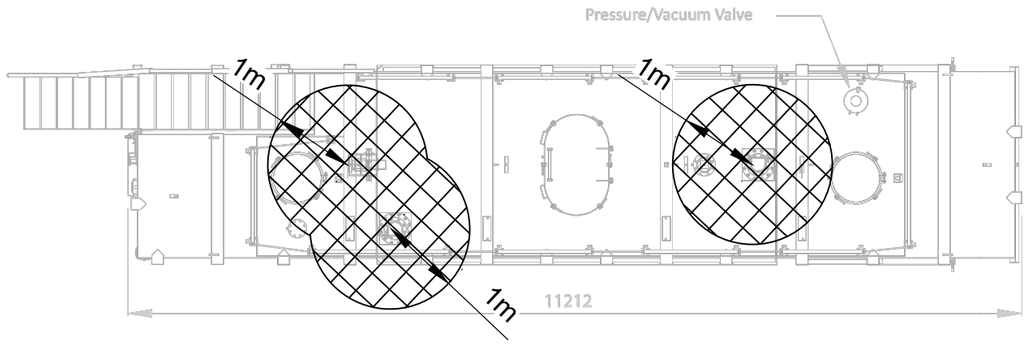
Job Title
Indaver
ATEX

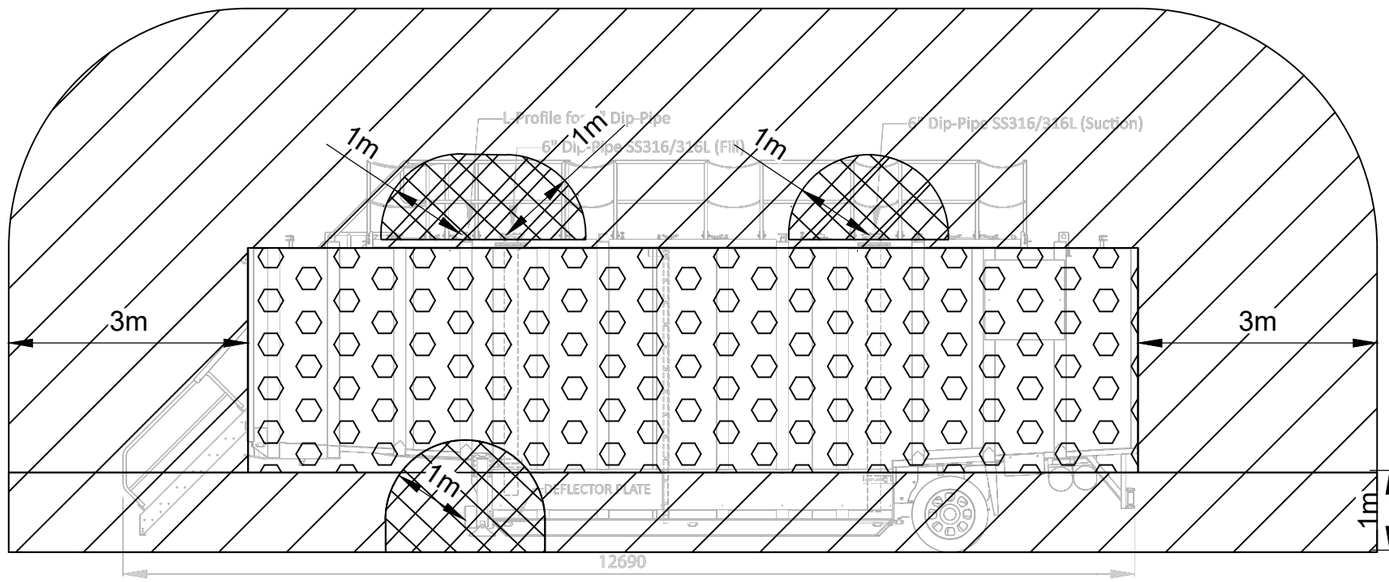
Client
Indaver

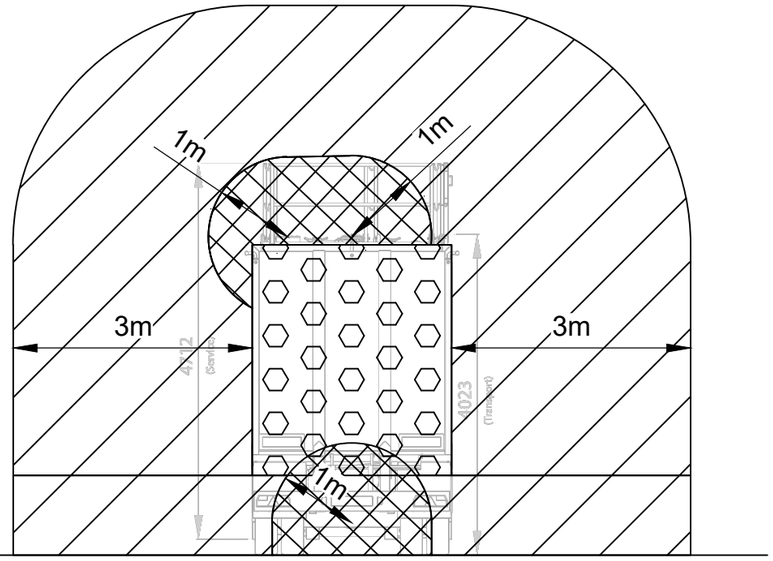
Drawing Title
Hazardous Area Classification
Liquids Intake and Baker Tank Area

Scale at A3	NTS
Date	April 2021
Discipline	Environmental
Job No	**279504-00**
Drawing Status	**Report**
Drawing No	**N1001**
Issue	**R1**

Do not scale







Legend:

ZONE 0

ZONE 1

ZONE 2

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Indaver
ATEX

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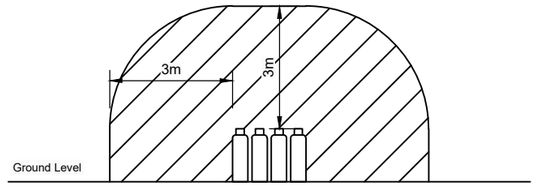
Indaver

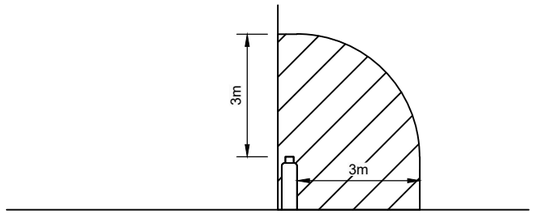
Drawing Title
Hazardous Area Classification
Baker Tank

Scale at A3	NTS
Date	April 2021
Discipline	Environmental
Job No	**279504-00**
Drawing Status	**Report**
Drawing No	**N1002**
Issue	**R1**

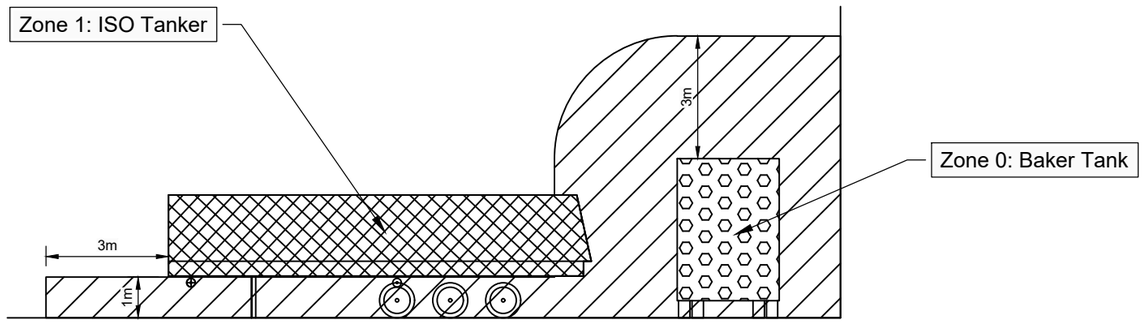
Do not scale



Flammable Gas Storage
Scale: NTS



Flammable Gas Storage
Scale: NTS



Legend:

ZONE 0

ZONE 1

ZONE 2

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Job Title
Indaver
ATEX

Client
Indaver

Drawing Title
Hazardous Area Classification
Baker Tank

Scale at A3 NTS | Date April 2021

Discipline Environmental

Job No **279504-00** | Drawing Status **Report**

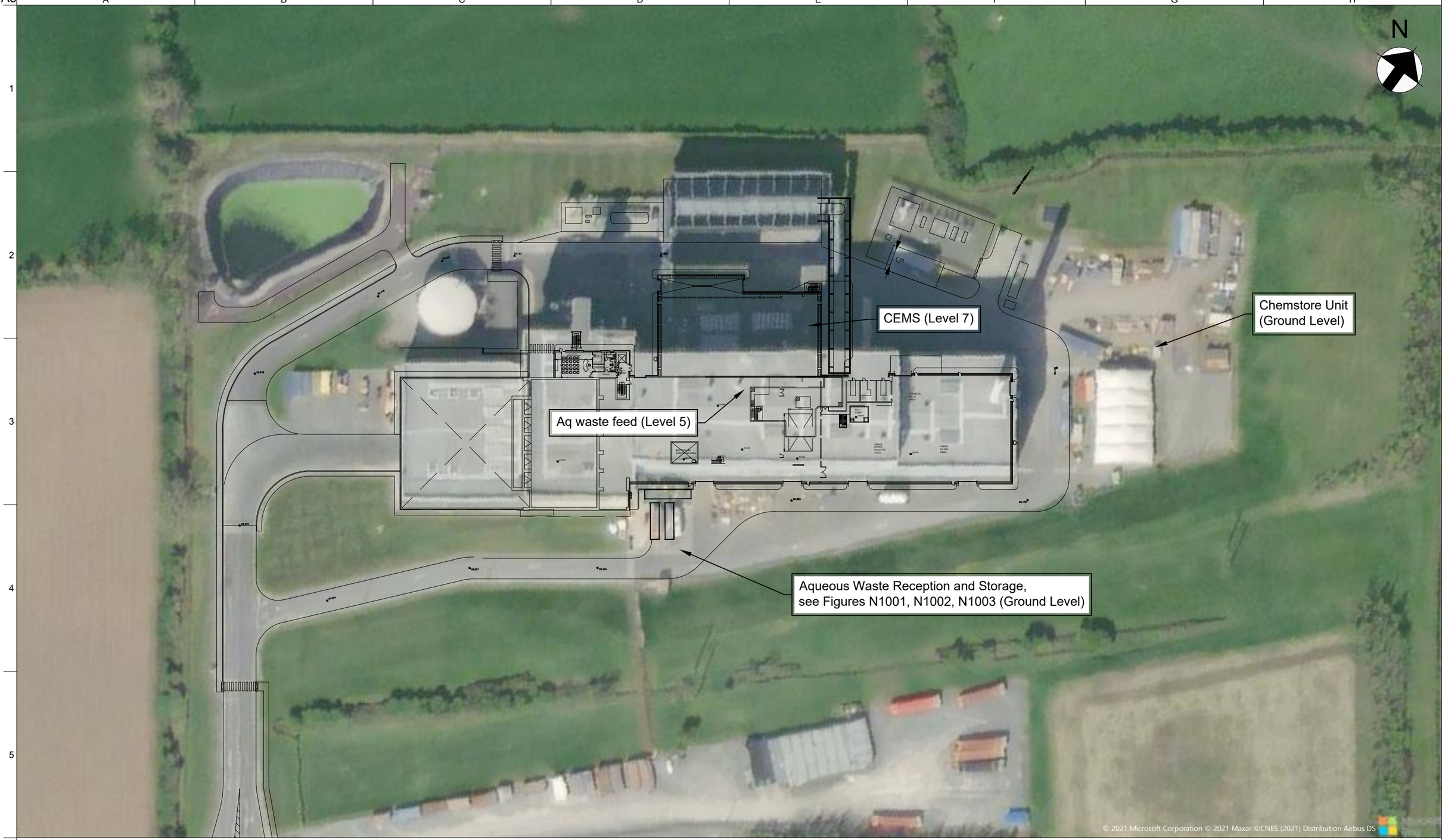
Drawing No **N1003** | Issue **R1**

Do not scale

A3

A B C D E F G H

1 2 3 4 5



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Job Title
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ATEX

Client
Indaver

Drawing Title
ATEX - Hazardous Areas

Scale at A3	NTS
Date	April 2021
Discipline	Environmental
Job No	**279504-00**
Drawing Status	**Report**
Drawing No	**N1004**
Issue	**R1**

Do not scale

Appendix A

Hazardous Area Classification

Areas

Item	Area
1	Aqueous Waste Delivery
2	Baker Tank
3	Aqueous waste pumping
4	Aqueous Waste Feed to Furnace
5	Propane Bottles
6	Emission Monitoring (CEMS) Room
7	Chemstore Unit
8	Waste Bunker
9	Ammonium Hydroxide

A1 Aqueous Waste Delivery

REFERENCE	1
AREA	Aqueous Waste and Baker Tank Area
ACTIVITIES	Unloading of aqueous waste which can contain miscible and immiscible flammable liquids
SOURCES OF RELEASE	Leak from pump or from filter when un-blocking/cleaning.
GRADE OF RELEASE	Secondary
TYPE OF OPENING	Type C
FLAMMABLE MATERIALS	Various solvents most of which are miscible with water.
OPERATING TEMPERATURE	Ambient
OPERATING PRESSURE	Ambient
STATE (gas, liquid, solid)	Liquid
VENTILATION TYPE (Natural, Artificial)	Natural
VENTILATION DEGREE	High
VENTILATION AVAILABILITY	Good
ZONE (0, 1, 2, 20, 21, 22) OR UNZONED (U)	0 in ISO tanker 2 around openings of connections to ISO tanker and the diaphragm pump
ZONE 2 EXTENT VERTICAL (m)	1 m above ground
ZONE 2 EXTENT HORIZONTAL (m)	3 m from pump

COMMENTS

The pump is for unloading road tankers to the Baker Tank. Possibility of leaks during operation or when making & breaking connections. The pump will be located outdoors and is bonded to the general mass of earth and is air operated.

The discharge rate of a road tanker is approximately 30 m^3/hr (0.008033 kg/s) through a 2" (50 mm) diameter pipeline.

In order to determine the hazardous areas in the Isotanker and Baker Tank area and their extents, credible loss of containment scenarios were identified and modelled using the DNV PHAST Professional modelling package.

The scenario modelled was a leak of 20 kg/s for 15 minutes, into the area contained by the trench drain. This limits the pool to an area of 12 m^2, which is approximately that of a circle 4 m diameter.

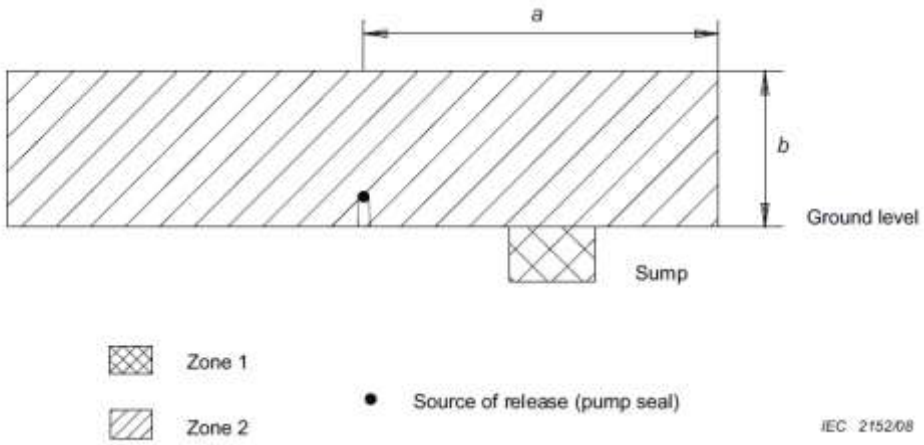
The model predicted that the benchmark of half the LEL would not be reached. This is because the concentration of flammable liquids in the aqueous waste, a total of 20%, would not generate a vapour of sufficient concentration which, with the presence of water vapour, is flammable at the ambient temperature, 20C.

If a flammable solvent, such as toluene, which is immiscible with water, is present, it would be mixed with water in a leak, and the situation could be similar.

Samples of aqueous waste however have been found to have a flash point as low as 15°C and therefore it is considered prudent to classify the area as shown above.

However because of the unlikelihood of a leak of a flammable liquid is considered sufficient to limit the classified area to that within the kerb surrounding it.

Example 1 in IS EN 60079-10-1: 2009 © IEC 2008:



Taking into account relevant parameters, the following are typical values which will be estimated for a pump having a capacity of 50 m^3/h and operating at a low pressure:

a = 3 m horizontally from source of release;

b = 1 m from ground level and up to 1 m above the source of release.

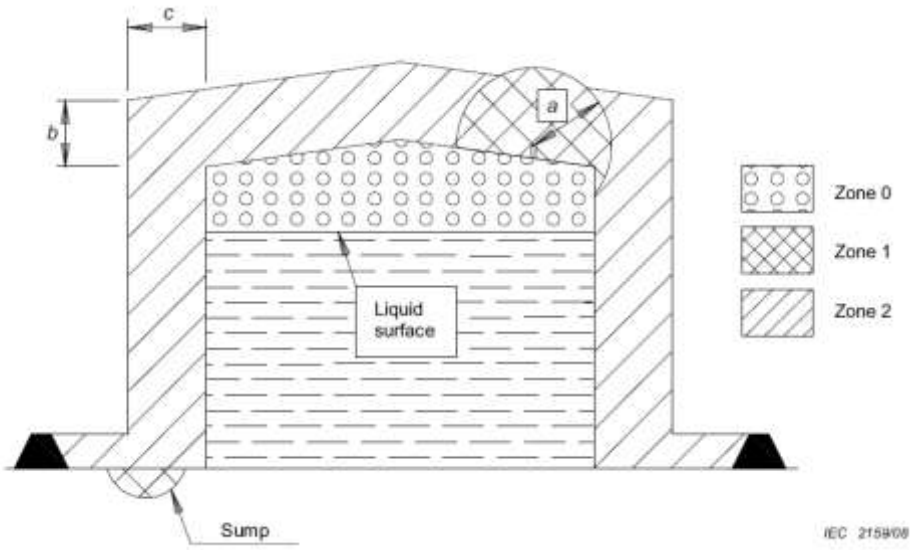
A2 Baker Tank

REFERENCE	2
AREA	Aqueous Waste and Baker Tank Area
ACTIVITIES	Storage of aqueous wastes which can contain miscible and immiscible solvents prior to feeding to furnace
SOURCES OF RELEASE	• Leak from tank • Vapour release from manlid, inspection hatches or overpressure device
GRADE OF RELEASE	Secondary
TYPE OF OPENING	Type B
FLAMMABLE MATERIALS	Various solvents most of which are miscible with water.
OPERATING TEMPERATURE	Ambient
OPERATING PRESSURE	Ambient
STATE (gas, liquid, solid)	Vapour & Liquid
VENTILATION TYPE (Natural, Artificial)	Natural
VENTILATION DEGREE	High
VENTILATION AVAILABILITY	Good
ZONE (0, 1, 2, 20, 21, 22) OR UNZONED (U)	0 within baker tank 1 from tank vent 2 around tank
ZONE EXTENT VERTICAL and HORIZONTAL (m) FROM TANK VENT	3 m

ZONE EXTENT VERTICAL and HORIZONTAL (m) FROM TANK WALL	3 m

COMMENTS

Example 8 in IS EN 60079-10-1: 2009 © IEC 2008:



Taking into account relevant parameters, the following are typical values which will be estimated for this particular example:

a = 3 m from vent openings;

b = 3 m above the roof;

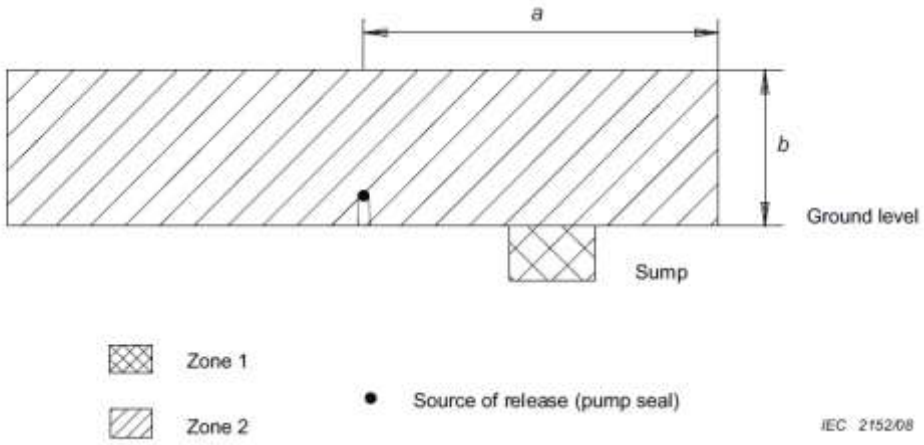
c = 3 m horizontally from the tank.

A3 Pumping of Aqueous Waste from Baker Tank

REFERENCE	3
AREA	Aqueous Waste and Baker Tank Area
ACTIVITIES	Pumping of aqueous waste from Baker Tank.
SOURCES OF RELEASE	Leak from joint or connection to pump
GRADE OF RELEASE	Secondary
TYPE OF OPENING	Type B
FLAMMABLE MATERIALS	Various solvents most of which are miscible with water.
OPERATING TEMPERATURE	Ambient
OPERATING PRESSURE	Low – metering (diaphragm) pump
STATE (gas, liquid, solid)	Liquid
VENTILATION TYPE (Natural, Artificial)	Natural
VENTILATION DEGREE	High
VENTILATION AVAILABILITY	Good
ZONE (0, 1, 2, 20, 21, 22) OR UNZONED (U)	2 around connections to the diaphragm pump
ZONE EXTENT VERTICAL (m)	1m above ground
ZONE EXTENT HORIZONTAL (m)	3m from pump

COMMENTS

Example 1 in IS EN 60079-10-1: 2009 © IEC 2008:



Taking into account relevant parameters, the following are typical values which will be estimated for a pump having a capacity of 50 m^3/h and operating at a low pressure:

a = 3 m horizontally from source of release;

b = 1 m from ground level and up to 1 m above the source of release.

A4 Feeding Aqueous Waste to Furnace

REFERENCE	5
AREA	Furnace Area
ACTIVITIES	Feeding aqueous waste to furnace.
SOURCES OF RELEASE	Leak from joint or connection. Accumulation of leaks in drip tray under skid unit.
GRADE OF RELEASE	Secondary
TYPE OF OPENING	Type B
FLAMMABLE MATERIALS	Various solvents most of which are miscible with water.
OPERATING TEMPERATURE	Ambient
OPERATING PRESSURE	Low – metering (diaphragm) pump
STATE (gas, liquid, solid)	Liquid
VENTILATION TYPE (Natural, Artificial)	General building ventilation
VENTILATION DEGREE	Medium
VENTILATION AVAILABILITY	Good
ZONE (0, 1, 2, 20, 21, 22) OR UNZONED (U)	2 around the skid unit
ZONE EXTENT VERTICAL (m)	1 m from skid unit
ZONE EXTENT HORIZONTAL (m)	1 m from skid unit

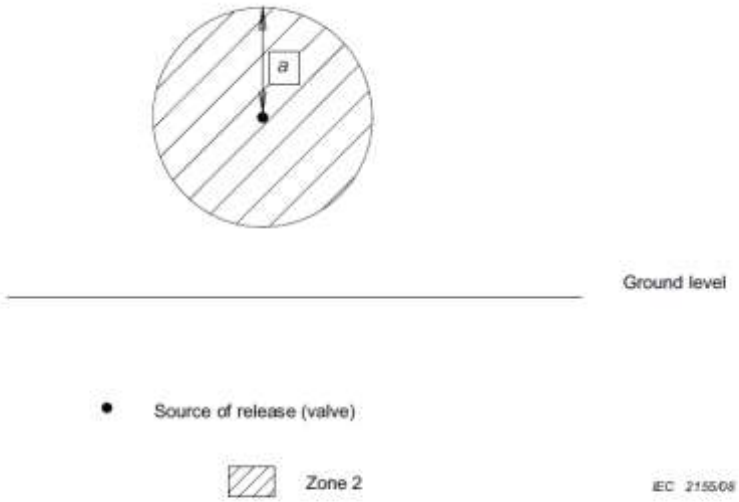
COMMENTS

The pipe from the pump feeds a skid unit in which the flow rate is modulated and the pressure controlled. Potential leak sources include flanged connections and valve seals. In addition to immiscible solvent on surface of liquid, the concentration of miscible solvents may lead to a low flash point (15C).

The maximum pumping rate is 2 m³/hr through a 1" (25mm) diameter pipeline. The delivery pressure is approximately 5 bar. About half of the pressure is required to overcome the static head due to the difference in elevation (25m) of the feed platform and the ground level.

A drip tray is located beneath the skid unit and has a level switch linked to an alarm.

Example 4 in IS EN 60079-10-1: 2009 © IEC 2008:



Taking into account relevant parameters, the following is typical value which will be estimated for this particular example:

a = 1 m in all directions from source of release.

A5 Propane Bottles

REFERENCE	5
AREA	Aqueous Waste and Baker Tank Area
ACTIVITIES	Propane storage
SOURCES OF RELEASE	Piping joints and connections
GRADE OF RELEASE	Secondary
TYPE OF OPENING	Type B
FLAMMABLE MATERIALS	Propane Gas
OPERATING TEMPERATURE	Ambient (20C)
OPERATING PRESSURE	Not Applicable
STATE (gas, liquid, solid)	Gas kept liquid by pressure
VENTILATION TYPE (Natural, Artificial)	Natural
VENTILATION DEGREE	High
VENTILATION AVAILABILITY	Good
ZONE (0, 1, 2, 20, 21, 22) OR UNZONED (U)	2
ZONE EXTENT VERTICAL (m)	Circle of 1 meter around connection point of bottle
ZONE EXTENT HORIZONTAL (m)	Circle of 1 meter around connection point of bottle

COMMENTS

Propane gas (in bottles) is used to start the 2 burners in the combustion chamber.

The bottles are connected to a pipe, monitored by pressure reading.

The pipe is welded and leads to the burner skids.

No electrical equipment is to be installed within this circle of 1 meter.

BCGA GN13 zone distance for relief valve operation is < 1m.

A6 Emissions Monitoring (CEMS) Room

REFERENCE	6
AREA	Emission Monitoring (CEMS) Room
ACTIVITIES	Emission monitoring
SOURCES OF RELEASE	Accidental
GRADE OF RELEASE	Secondary
TYPE OF OPENING	Opening due to a leak
FLAMMABLE MATERIALS	Hydrogen and Oxygen
OPERATING TEMPERATURE	Ambient
OPERATING PRESSURE	Ambient
STATE (gas, liquid, solid)	Gas
VENTILATION TYPE (Natural, Artificial)	Natural /Artificial – extraction by fan
VENTILATION DEGREE	High
VENTILATION AVAILABILITY	Good
ZONE (0, 1, 2, 20, 21, 22) OR UNZONED (U)	U
ZONE EXTENT VERTICAL (m)	50 mm (Negligible Extent)
ZONE EXTENT HORIZONTAL (m)	50 mm (Negligible Extent)

COMMENTS

Near the emission monitoring room a bottle of Hydrogen will be stored as this gas is needed for the correct control of the flue gases going out of the chimney.

This gas is lead through a thin pipe to the measuring equipment.

In this area an Oxygen bottle is also installed. Both products must be kept apart. (at least 3 meter distance between the two bottles must be foreseen)

As the room is continuously ventilated at a rate of at least 4 times the content of the room each hour, the accumulation of a potential gas leak in the room is very unlikely.

Gas detection equipment is provided in the room.

Nitrogen is also available in the area. Therefore the oxygen content of the room is continuously monitored with alarm when the content is below 19 % oxygen.

For bubble leaks from mechanical joints, pressure accessories, valves, regulators, filters, gauges, valve packing BCGA GN 13 recommends a zone 50mm from the source. This is considered to be a zone of negligible extent.

A7 Chemstore Unit

REFERENCE	7
AREA	Chemstore Unit
ACTIVITIES	Storage of containers (25 litres each) of flammable liquids
SOURCES OF RELEASE	Damaged drum, spill
GRADE OF RELEASE	Secondary
TYPE OF OPENING	Surface of containment sump
FLAMMABLE MATERIALS	Flammable liquids including acetone, isopropanol and toluene for laboratory use.
OPERATING TEMPERATURE	Ambient
OPERATING PRESSURE	Ambient
STATE (gas, liquid, solid)	Gas
VENTILATION TYPE (Natural, Artificial)	Natural
VENTILATION DEGREE	High
VENTILATION AVAILABILITY	Good
ZONE (0, 1, 2, 20, 21, 22) OR UNZONED (U)	2
ZONE EXTENT VERTICAL (m)	Inside Chemstore Unit
ZONE EXTENT HORIZONTAL (m)	Inside Chemstore Unit

COMMENTS

Most of the materials stored in the Chemstore Unit are not flammable. However, some organic solvents in 25 litre containers are stored and from time to time removed to the laboratory for dispensing into smaller containers.

A spill containment tray is provide in the cabinet. Any spills or leaks of flammable liquid would accumulate in this tray and generate a potentially explosive atmosphere within the cabinet. It is considered prudent to classify the interior of the cabinet as Zone 2.

A8 Waste Bunker

REFERENCE	8
AREA	Waste Bunker
ACTIVITIES	Reception and stockpiling of mixed waste
SOURCES OF RELEASE	From surface of mass of waste in bunker
GRADE OF RELEASE	Secondary
TYPE OF OPENING	Exposed surface of waste
FLAMMABLE MATERIALS	Methane from decomposing waste and combustible dust
OPERATING TEMPERATURE	Ambient
OPERATING PRESSURE	Ambient
STATE (gas, liquid, solid)	Solid
VENTILATION TYPE (Natural, Artificial)	Artificial – extraction of primary combustion air by induced draft fan
VENTILATION DEGREE	Medium
VENTILATION AVAILABILITY	Good
ZONE (0, 1, 2, 20, 21, 22) OR UNZONED (U)	U
ZONE EXTENT VERTICAL (m)	None
ZONE EXTENT HORIZONTAL (m)	None

COMMENTS

Primary air for the furnace is drawn from the waste bunker. This ensures a throughflow of air from outside the building. Volatile Organic Compounds (VOCs) or methane (CH_4) may arise in the bunker due to the decomposition of waste or presence of volatile materials e.g. wood preservatives, traces of oil.

To monitor for any potential accumulation of VOC or methane in the waste bunker that could cause a fire risk, a lower explosive limit (LEL) detector has been installed. This has been set to alarm at 20% of LEL. If the alarm is activated plant operators will increase the air extract rate to from 60,000 Nm^3/hr to 75,600 Nm^3/hr.

The Waste Bunker has a total volume of approximately 40,000 m^3. However, up to 16,000 m^3 of this could be occupied by waste awaiting incineration. Therefore 25,000 m^3 is the minimum volume of "free space". Therefore, the normal air flow rate of 60,000 Nm^3/hr is equivalent to approximately 2.4 air changes per hour (acph). The maximum air flow rate of 75,600 Nm^3/hr is equivalent to approximately 3.2 acph.

It is considered that if methane arises from a consignment of waste the quantity will be small, 20 m^3 out of a total of 16,000 m^3 and that the risk of a potentially explosive atmosphere being developed other than locally within the bunker is extremely low.

Therefore, it is not considered necessary to classify the bunker as a hazardous area.

A9 Ammonium Hydroxide Storage

REFERENCE	9
AREA	Ammonium Hydroxide
ACTIVITIES	Emission abatement
SOURCES OF RELEASE	Accidental
GRADE OF RELEASE	Secondary
TYPE OF OPENING	Opening due to a leak
FLAMMABLE MATERIALS	Ammonia gas
OPERATING TEMPERATURE	Ambient
OPERATING PRESSURE	Ambient
STATE (gas, liquid, solid)	Liquid
VENTILATION TYPE (Natural, Artificial)	Natural
VENTILATION DEGREE	High
VENTILATION AVAILABILITY	Good
ZONE (0, 1, 2, 20, 21, 22) OR UNZONED (U)	U
ZONE EXTENT VERTICAL (m)	None
ZONE EXTENT HORIZONTAL (m)	None

COMMENTS

Aqueous ammonia (24.9% w/w), also known as ammonium hydroxide, is used for abatement of emissions of nitrogen oxides. Loss of containment would result in a pool of liquid that would generate ammonia gas and water vapour. Pure ammonia gas forms explosive mixtures in air in concentrations 16-27%. However, the concentration of ammonia in vapours emitted from a pool of 24.9% ammonium hydroxide is approximately 6% v/v at ambient temperature (15°C). Therefore a potentially explosive atmosphere is not credible.

Appendix B

Risk Assessment

B1 Baker Tank - Interior

Checklist: Explosion Protection Assessment I **Focus: Inside Baker Tank**			**Processed by: Don Menzies** **Date: 4 January 2021**
Apparatus/plant – Baker Tank			
Item	**Yes**	**No**	**Measures taken/ comments**
Is the presence of flammable substances avoided as far as possible?		X	As some consignments of waste may have flash point as low as 15°C a potentially explosive atmosphere cannot be completely excluded.
Is the formation of explosive mixtures from the flammable substances present prevented as far as possible?		X	Wastes are predominately aqueous with a maximum CV of 5MJ/kg. surface layer may accumulate with immiscible flammable solvents over time and this layer will be monitored by sampling and visual inspections
Is the occurrence of hazardous quantities of explosive atmospheres precluded as far as possible?		X	It is limited in the extent that the waste is predominately aqueous. Sampling and analysis of incoming wastes verify this. Atmosphere above the waste to be considered explosive as surface layer may accumulate with immiscible flammable solvents over time and this layer will be monitored by sampling and visual inspections
Can the formation of explosive mixtures inside the apparatus be prevented or limited?		X	It is limited in the extent that the waste is predominately aqueous. Sampling and analysis of incoming wastes verify this. . Atmosphere above the waste to be considered explosive as surface layer may accumulate with immiscible flammable solvents over time and this layer will be monitored by sampling and visual inspections

Checklist: Explosion Protection Assessment I **Focus: Inside Baker Tank**			**Processed by: Don Menzies** **Date: 4 January 2021**
Apparatus/plant – Baker Tank			
Item	**Yes**	**No**	**Measures taken/ comments**
Can process conditions ensure compliance with safe concentrations?	X		Intention is to retain the immiscible flammable layer in the Baker tank by sampling and monitoring combined with periodic cleaning and removal when required (over 4mm of a layer)
Is the concentration reliably and lastingly kept below the lower explosion limit or above the upper explosion limit?		X	
• Is the explosion range avoided during start-up and shutdown of the plant?		X	
• Can mixtures emerging from the apparatus during operation above the upper explosion limit form explosive atmospheres outside it?	X		A nitrogen blanketing system is not installed.
• Is this prevented?		X	
• When plant is operated above the upper explosion limit, is air ingress and hence the formation of explosive mixtures prevented?		X	

Checklist: Explosion Protection Assessment I **Focus: Inside Baker Tank**			**Processed by: Don Menzies** **Date: 4 January 2021**
Apparatus/plant – Baker Tank			
Item	**Yes**	**No**	**Measures taken/ comments**
• Is the explosion hazard or violence reduced by lowered pressure (operation under vacuum)?			N/A
• Is the formation of explosive mixtures reliably prevented in all operating conditions by injection of inert substances (e.g. nitrogen, carbon dioxide, noble gases, water vapour or inert powders)?		X	A nitrogen blanketing system is not installed.
- When inerting is carried out with water vapour, is the effect of condensation taken into account?			N/A
- Has allowance been made for the possibility that an inerted mixture may again become explosive on addition of sufficient oxygen or air (e.g. on discharge to the open air)?			N/A
• Has a safety margin been specified between the experimentally determined limiting oxygen concentration and the maximum permissible oxygen concentration, taking account of spatial and temporal variations resulting from operational factors and malfunctions and of the delay between triggering of protective measures and their becoming effective?		X	N/A

Checklist: Explosion Protection Assessment I **Focus: Inside Baker Tank**			**Processed by: Don Menzies** **Date: 4 January 2021**
Apparatus/plant – Baker Tank			
Item	**Yes**	**No**	**Measures taken/ comments**
• Are undesirable dust deposits or accumulations avoided?		X	N/A
Is the prevention or limitation of explosive mixtures inside apparatus monitored?		X	It is assumed that eventually an explosive mixture may be formed by emissions from the immiscible flammable layer or flammable component in the aqueous layer. This layer will be monitored by sampling and visual inspections
Can hazardous explosive atmospheres occur inside the plant or apparatus despite the above measures?	X		
Are all necessary measures taken to prevent the ignition of a hazardous explosive atmosphere?	X		Tank, tankers, pipework are all earthed. Other ignition sources are excluded from the identified zoned areas.
-Are zones known and classified?	X		
-Are effective ignition sources of the 13 known types to be expected according to the zoning?		X	However, ignition sources may arise during maintenance or cleaning activities. Risk assessments and work permit system applied to all works in these areas.
Can a hazardous explosive atmosphere be ignited inside the plant or apparatus despite all the above measures?	X		This is possible during maintenance or cleaning activities. Risk assessments and work permit system applied to all works in these areas.

Checklist: Explosion Protection Assessment I **Focus: Inside Baker Tank**			**Processed by: Don Menzies** **Date: 4 January 2021**
Apparatus/plant – Baker Tank			
Item	**Yes**	**No**	**Measures taken/ comments**
Are the effects of an explosion limited to an acceptable extent by suitable mitigation measures designed in accordance with the state of the art, without endangering the surrounding area (e.g. by venting)?	X		Measures to contain, suppress or relive an explosion are not practicable.
• Explosion-resistant design?		X	
• Explosion relief?		X	Overpressure and underpressure breathing/working vent only
• Explosion suppression?		X	
• Prevention of flame and explosion propagation to upstream and downstream items of plant?		X	
- Flame arresters for gases, vapours and mists?		X	

Checklist: Explosion Protection Assessment I **Focus: Inside Baker Tank**			**Processed by: Don Menzies** **Date: 4 January 2021**
Apparatus/plant – Baker Tank			
Item	**Yes**	**No**	**Measures taken/ comments**
- Decoupling devices for dusts?			N/A
- Explosion decoupling for hybrid mixtures?			N/A

B2 Liquid Waste Storage and Handling Area

Checklist: Explosion Protection Assessment II			**Processed by: Don Menzies**
Focus: Around Baker Tank			**Date: 4 January 2021**
Apparatus/plant - Road tanker unloading area			
Item	**Yes**	**No**	**Measures taken/ comments**
Is the formation of explosive atmospheres around apparatus prevented?	X		But leakages are possible from making and breaking connections.
Are explosive atmospheres prevented by operational measures, design or spatial configuration?	X		Areas are well ventilated. OK outside
Is the apparatus/plant leak proof?		X	Tank is double walled but leakages are possible from making and breaking connections.
Is ventilation or extraction used?	X		Areas are well ventilated, and outside the building.
Are arrangements in place to monitor the concentration around apparatus?		X	No LEL detection required. Control is via surface layer monitoring by sampling and visual inspections
By means of gas instruments, which trigger an alarm?		X	Not installed
By means of gas instruments, which trigger protective measures?		X	Not installed

Checklist: Explosion Protection Assessment II **Focus: Around Baker Tank**			**Processed by: Don Menzies** **Date: 4 January 2021**
Apparatus/plant - Road tanker unloading area			
Item	**Yes**	**No**	**Measures taken/ comments**
By means of gas instruments, which trigger emergency functions?		X	Not installed
Can a hazardous explosive atmosphere occur around the plant or apparatus despite the above measures?	X		But probably of limited extent
Are all necessary measures taken to prevent the ignition of a hazardous explosive atmosphere?	X		Areas zoned and all fixed ignition sources have been removed from these areas
Are zones known and classified?	X		
Are effective ignition sources of the 13 known types to be expected according to the zoning?		X	However, this is possible during maintenance or cleaning activities. Risk assessments and work permit system applied to all works in these areas.
What civil engineering measures are taken to limit the effects of an explosion to an acceptable extent, e.g. Bricking of high-pressure autoclaves?		X	Tank and unloading area are outdoors.
Are organisational measures taken to ensure the effectiveness of the technical measures?	X		
Are operating instructions in place?	X		
Are competent personnel used?	X		
Are workers given training?	X		

Checklist: Explosion Protection Assessment II **Focus: Around Baker Tank**			**Processed by: Don Menzies** **Date: 4 January 2021**
Apparatus/plant - Road tanker unloading area			
Item	**Yes**	**No**	**Measures taken/ comments**
Is a permit-to-work system in place?	X		
Are hazardous places marked?		X	Areas are marked outside
Are protective measures in place for maintenance work?	X		Risk assessments and work permit system applied to all works in these areas.
Procedure and permit for work needed before work may commence?	X		Risk assessments and work permit system applied to all works in these areas.

B3 Area around Propane Bottles

Checklist: Explosion Protection Assessment II			**Processed by: Don Menzies**
Focus: Around Apparatus			**Date: 5 January 2021**
Apparatus/plant - Propane Bottles			
Item	**Yes**	**No**	**Measures taken/ comments**
Is the formation of explosive atmospheres around apparatus prevented?	X		
• Are explosive atmospheres prevented by operational measures, design or spatial configuration?	X		Area is naturally ventilated
• Is the apparatus/plant leak proof?	X		Propane bottles are sealed by supplier. Joints are made using standard approved techniques.
• Is ventilation or extraction used?		X	Area is naturally ventilated
Are arrangements in place to monitor the concentration around apparatus?		X	
• By means of gas instruments, which trigger an alarm?		X	
• By means of gas instruments, which trigger protective measures?		X	
• By means of gas instruments, which trigger emergency functions?		X	

Checklist: Explosion Protection Assessment II			**Processed by: Don Menzies**
Focus: Around Apparatus			**Date: 5 January 2021**
Apparatus/plant - Propane Bottles			
Item	**Yes**	**No**	**Measures taken/ comments**
Can a hazardous explosive atmosphere occur around the plant or apparatus despite the above measures?	X		Highly unlikely if joints are made according to procedure.
Are all necessary measures taken to prevent the ignition of a hazardous explosive atmosphere?	X		
• Are zones known and classified?	X		
• Are effective ignition sources of the 13 known types to be expected according to the zoning?		X	
What civil engineering measures are taken to limit the effects of an explosion to an acceptable extent, e.g. Bricking of high-pressure autoclaves?	X		Bottles are stored outside, away from the heat of the sun
Are organisational measures taken to ensure the effectiveness of the technical measures?	X		
• Are operating instructions in place?	X		
• Are competent personnel used?	X		
• Are workers given training?	X		
• Is a permit-to-work system in place?	X		
• Are hazardous places marked?	X		

Checklist: Explosion Protection Assessment II **Focus: Around Apparatus**			**Processed by: Don Menzies** **Date: 5 January 2021**
Apparatus/plant - Propane Bottles			
Item	**Yes**	**No**	**Measures taken/ comments**
Are protective measures in place for maintenance work?	X		Procedure and permit for work needed before work may commence

B4 Emissions Monitoring (CEMS) Room

Checklist: Explosion Protection Assessment II **Focus: Around Gas Bottles**			**Processed by: Don Menzies** **Date: 5 January 2021**
Apparatus/plant - Emission Room (gas bottles stored)			
Item	**Yes**	**No**	**Measures taken/ comments**
Is the formation of explosive atmospheres around apparatus prevented?	X		Forced ventilation inside CEMS room
• Are explosive atmospheres prevented by operational measures, design or spatial configuration?	X		Area is ventilated
• Is the apparatus/plant leak proof?	X		
• Is ventilation or extraction used?	X		Area is ventilated
Are arrangements in place to monitor the concentration around apparatus?	X		Hydrogen detector installed with local alarm and beacon. Oxygen depletion detector installed with local alarm and beacon.
• By means of gas instruments, which trigger an alarm?	X		
• By means of gas instruments, which trigger protective measures?	X		
• By means of gas instruments, which trigger emergency functions?	X		

Checklist: Explosion Protection Assessment II			Processed by: Don Menzies
Focus: Around Gas Bottles			**Date: 5 January 2021**
Apparatus/plant - Emission Room (gas bottles stored)			
Item	**Yes**	**No**	**Measures taken/ comments**
Can a hazardous explosive atmosphere occur around the plant or apparatus despite the above measures?	X		
Are all necessary measures taken to prevent the ignition of a hazardous explosive atmosphere?	X		
• Are zones known and classified?	X		
• Are effective ignition sources of the 13 known types to be expected according to the zoning?		X	Only during maintenance activities.
What civil engineering measures are taken to limit the effects of an explosion to an acceptable extent, e.g. Bricking of high-pressure autoclaves?		X	Not practicable
Are organisational measures taken to ensure the effectiveness of the technical measures?	X		
• Are operating instructions in place?	X		
• Are competent personnel used?	X		
• Are workers given training?	X		

Checklist: Explosion Protection Assessment II **Focus: Around Gas Bottles**			**Processed by: Don Menzies** **Date: 5 January 2021**
Apparatus/plant - Emission Room (gas bottles stored)			
Item	**Yes**	**No**	**Measures taken/ comments**
• Is a permit-to-work system in place?	X		
• Are hazardous places marked?	X		
Are protective measures in place for maintenance work?	X		Procedure and permit for work needed before work may commence

B5 Chemstore Unit

Checklist: Explosion Protection Assessment II			Processed by: Don Menzies
Focus: Chemstore Unit			Date: 5 January 2021
Apparatus/plant – Chemstore Unit			
Item	**Yes**	**No**	**Measures taken/ comments**
Is the formation of explosive atmospheres around apparatus prevented?	X		Inspection of containers for damage, training in handling, inspections. Located in open air - natural ventilation
• Are explosive atmospheres prevented by operational measures, design or spatial configuration?	X		
• Is the apparatus/plant leak proof?	X		
• Is ventilation or extraction used?	X		Not inside the storage units. Outside the area is ventilated
Are arrangements in place to monitor the concentration around apparatus?		X	.
• By means of gas instruments, which trigger an alarm?		X	
• By means of gas instruments, which trigger protective measures?		X	
• By means of gas instruments, which trigger emergency functions?		X	

Checklist: Explosion Protection Assessment II			Processed by: Don Menzies
Focus: Chemstore Unit			**Date: 5 January 2021**
Apparatus/plant – Chemstore Unit			
Item	**Yes**	**No**	**Measures taken/ comments**
Can a hazardous explosive atmosphere occur around the plant or apparatus despite the above measures?	X		
Are all necessary measures taken to prevent the ignition of a hazardous explosive atmosphere?	X		
• Are zones known and classified?	X		
• Are effective ignition sources of the 13 known types to be expected according to the zoning?		X	Only during maintenance activities.
What civil engineering measures are taken to limit the effects of an explosion to an acceptable extent, e.g. Bricking of high-pressure autoclaves?		X	Not practicable
Are organisational measures taken to ensure the effectiveness of the technical measures?	X		
• Are operating instructions in place?	X		
• Are competent personnel used?	X		
• Are workers given training?	X		

Checklist: Explosion Protection Assessment II			**Processed by: Don Menzies**
Focus: Chemstore Unit			**Date: 5 January 2021**
Apparatus/plant – Chemstore Unit			
Item	**Yes**	**No**	**Measures taken/ comments**
• Is a permit-to-work system in place?	X		
• Are hazardous places marked?	X		
Are protective measures in place for maintenance work?	X		Procedure and permit for work needed before work may commence

B6 Waste Bunker

Checklist: Explosion Protection Assessment II			Processed by: Don Menzies
Focus: Waste Bunker			Date: 5 January 2021
Apparatus/plant – Waste Bunker			
Item	**Yes**	**No**	**Measures taken/ comments**
Is the formation of explosive atmospheres around apparatus prevented?	X		Active preventive measures are not practicable. Waste accepted generally arises from commercial and domestic sources. Waste from industrial sources is controllable and waste that comprises flammable liquids or contains or could emit gases is not accepted.
• Are explosive atmospheres prevented by operational measures, design or spatial configuration?		X	Not practicable other than by limiting categories of industrial waste.
• Is the apparatus/plant leak proof?	X		
• Is ventilation or extraction used?	X		Not inside the storage units. Outside the area is ventilated
Are arrangements in place to monitor the concentration around apparatus?	X		.
• By means of gas instruments, which trigger an alarm?	X		LEL meter which triggers an alarm
• By means of gas instruments, which trigger protective measures?		X	LEL meter prompts operators to increase fan speed if LEL exceeds set point.
• By means of gas instruments, which trigger emergency functions?		X	

Checklist: Explosion Protection Assessment II			Processed by: Don Menzies
Focus: Waste Bunker			**Date: 5 January 2021**
Apparatus/plant – Waste Bunker			
Item	**Yes**	**No**	**Measures taken/ comments**
Can a hazardous explosive atmosphere occur around the plant or apparatus despite the above measures?		X	Highly unlikely
Are all necessary measures taken to prevent the ignition of a hazardous explosive atmosphere?	X		
• Are zones known and classified?	N/A		
• Are effective ignition sources of the 13 known types to be expected according to the zoning?		X	Only during maintenance activities.
What civil engineering measures are taken to limit the effects of an explosion to an acceptable extent, e.g. Bricking of high-pressure autoclaves?		X	Not practicable
Are organisational measures taken to ensure the effectiveness of the technical measures?	X		
• Are operating instructions in place?	X		
• Are competent personnel used?	X		
• Are workers given training?	X		

Checklist: Explosion Protection Assessment II **Focus: Waste Bunker**			**Processed by: Don Menzies** **Date: 5 January 2021**
Apparatus/plant – Waste Bunker			
Item	**Yes**	**No**	**Measures taken/ comments**
• Is a permit-to-work system in place?	X		
• Are hazardous places marked?	X		
Are protective measures in place for maintenance work?	X		Procedure and permit for work needed before work may commence

Appendix C

Equipment

C1 Electrical Equipment

Electrical and other work equipment used in the Zoned areas must comply with the requirements of ATEX Directive 2014/34/EU concerning Equipment and Protective Systems intended for use in Potentially Explosive Atmospheres.

The directive is transposed into Irish Law by the European Communities (Equipment and protective systems for use in potentially explosive atmospheres) Regulations 2017 (SI No. 230 of 2017).

Electrical equipment	Item Number	Provided	Action
Unloading Diaphragm Pump	GA003AP001	Aqueous Waste Unloading Area	Complies
Earth rite static grounding system	GAD03GV001	Aqueous Waste Unloading Area	Complies
Pressure Transmitter	ERC20 CP201 ERC20CP202	Aqueous Waste Unloading Area	To be confirmed
Control Valve	ERC20AA151	Aqueous Waste Unloading Area	To be confirmed