ABP Waterford Proteins IED Licence Review

Environmental Assessment Report

IED Licence Reg. No. 0040-03

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1. Introduction

ABP Food Group has applied to the EPA for a review of IED Licence Reg. No. 0040-03 in respect of its operating Waterford Proteins plant at Ferrybank, Co. Waterford. As part of the licence review process the EPA has requested a Baseline Report to assess any impact from relevant hazardous substances used, produced or released onsite on the underlying soils and groundwater.

This environmental assessment report has been prepared following a desk study of publicly available Geological Survey of Ireland (GSI), Environmental Protection Agency (EPA), and Teagasc data and site investigations comprising trial pit excavations and soil sampling. The baseline geological and hydrogeological environment at the site and surrounding area is described in this report including details on surface water catchments, soils, bedrock geology, aquifer classifications, groundwater vulnerability, and recharge. Analytical data for soil samples collected at the site is also assessed and interpreted. There are no groundwater production or monitoring boreholes at the subject site.

1.1 Regional Setting (Topography and Surface Water Catchment)

The subject site is located in a predominantly industrial area on the perimeter of Waterford City immediately adjacent to the River Suir. There are a small number of residential dwellings in relatively close proximity to the facility. The site is located in the Kilkenny Local Authority functional area but the postal address is Waterford. The main centre of Waterford City extends beyond the River Suir on the opposite side of the river to the facility.

The subject site is located on the bank of the River Suir which has a catchment area of c.3,610km^2, a length of 185km, and a long-term average flow rate of 76.9m^3/s.

The site is at an elevation of approximately 15-19mOD. The topography generally rises moving away from the river to the east and northeast. The regional topography is controlled by the underlying geological structure with anticlines forming east-west trending upland areas and synclines occupied by valleys.

2. Geology and Hydrogeology

2.1 Soils & Subsoils

According to Teagasc soils and subsoils mapping the subject site is underlain by 'Made Ground' which is obviously consistent with the existence of an industrial facility at the site. The natural topsoil has been largely removed to facilitate the development. The main topsoil that occurs in the area around the site is an Acid Brown Earth/Brown Podzolic which is a deep well drained mineral.

The main subsoil underlying the subject site and surrounding area to the north, east and south is a till derived chiefly from Devonian sandstones. A till is a glacial deposit that is unsorted with a varying grain size and the subsoils in this area are described by the GSI as having moderate permeability. An extensive area of made ground underlies Waterford City to the west of the site. Figure 1 shows the regional subsoil distribution.

2.2 Bedrock Geology

The regional geology is dominated by Ordovician aged volcanic rocks (c.510 to 438 million years old). The regional geology is shown on Figure 2. According to the Geological Survey of Ireland (GSI) the subject site is underlain by Felsic volcanics belonging to the Campile Formation (CA) which is the most extensive rock unit of Ordovician age in eastern County Waterford. The rocks in this formation are characterised by pale rhyolitic volcanic flows and grey and brown slates. The rhyolite/volcaniclastic contacts are sharp, and clast components are dominated by tuff and rhyolite.

The lithological contact with the Ross Member of the Campile Formation occurs immediately to the north of the subject site. These rocks are described as dark grey slate with thin interbedded siltstones.

The geology of the region was deformed during the Caledonian (Silurian to Devonian) and Variscan (end of the Carboniferous) mountain building episodes. The Caledonian deformation affected the Ordovician volcanic rocks of eastern Waterford resulting in

complex folding, faulting and low-grade metamorphism. The crystalline volcanic rocks will have ruptured and broken rather than bent and folded under the mountain building forces that affected the whole area. The Variscan Orogeny was a north-south compression event which created a pronounced east west structural trend in the region and as a result the structure of County Waterford is dominated by several east-west trending synclines. Most of the major folds in the region are cut by east-west trending faults as well as smaller faults perpendicular to the synclines (north-south trending structures). An approximately northwest-southeast trending fault structure is mapped to the southwest of the subject site. Areas of bedrock outcrop are mapped immediately to the south and near the north of the site.

2.3 Groundwater Body and Aquifer Classification

The subject site falls within the Waterford Groundwater Body which covers an area of c.207km^2. The groundwater body, shown in Figure 3, is bounded to the north by the River Suir, by Waterford Estuary to the east and raised elevations to the south, west and northwest.

The groundwater body is comprised almost entirely of Ordovician volcanic rocks which are dominated by a fracture flow regime. Groundwater is most likely recharged in the west and south of the body where there is elevated topography with higher rainfall and thinner subsoil cover. Groundwater generally flows northwards through an interconnecting network of fractures discharging to surface water bodies, and in particular the River Suir.

The quantitative status of the Waterford Groundwater Body is classified as Good and this groundwater body is not at risk from abstraction. This groundwater body is also classified as having Good quality status.

Aquifer Classifications

The Ordovician volcanic rocks which are widespread in the east Waterford region are classified by the GSI as a 'Regionally Important Aquifer – Fissured Bedrock (Rf)' (see Figure 4). Groundwater flow in the Ordovician volcanic sequence is considered to be entirely through fractures in the rocks, although due to the complexity of faulting and

interbedding which can vary over short distances (vertically and horizontally), permeabilities are likely to be variable and unpredictable. Areas which are quite folded and faulted will have high permeability zones, but there are also likely to be zones where permeabilities are relatively low and therefore where the rocks will act more like a Locally Important Aquifer. The fissured volcanic rocks underlying the surrounding region are considered to be productive for groundwater supply.

2.4 Groundwater Vulnerability

A 'Moderate' vulnerability rating has been assigned to the northern half of the subject site with the southern part designated as having 'High' vulnerability according to the GSI National Vulnerability Mapping Programme. A 'Moderate' vulnerability rating indicates that the subsoil thickness beneath the subject site is likely to be greater than 10m deep based on the subsoil having moderate permeability. Subsoil thickness in the area which is classified as having 'High' vulnerability will be between 3m and 10m thick. The regional vulnerability designations are shown on Figure 5.

2.5 Groundwater Recharge

Most recharge to the underlying aquifers in the region is diffuse through the overlying topsoil and subsoil deposits. According to the GSI the annual effective rainfall at the subject site is 568mm/year. However, the actual recharge amount at the subject site is 114mm/year based on a recharge coefficient of 20% as the site is developed and underlain by made ground with impermeable surfaces covering much of the site. Similar levels of recharge are mapped across the developed area of Waterford City north and west of the site.

In contrast to this much of the surrounding area immediately to the south and east of the site that comprises agricultural land has a higher recharge coefficient of 60% giving an annual recharge range of 340mm/year.

3. Ground Investigations and Soil Sampling

3.1 Trial Pitting

Site investigations comprising trial pit excavations were undertaken on the 22nd January 2022. A total of 4(no.) pits, labelled TP1 to TP4, were excavated using a tracked excavator machine. Pit locations are presented on the site plan included in Appendix A.

The pits were strategically positioned to monitor for the presence of relevant hazardous substances that were used, produced or released on-site, namely Heavy Fuel Oil (HFO), Kerosene, and a Chemicals Store. Accessibility and the possible occurrence of underground services were also considered in the final positioning of the trial pit locations. TP1 was located adjacent to the HFO and Fuel bund at the northern end of the site. TP2 was excavated adjacent to the kerosene tank located at the rear of the administration building. TP4 was excavated adjacent to the Chemstore in the south-eastern area of the site and TP3 was positioned to cover the southern part of the site (see Appendix A).

Depths excavated varied between 1.0 and 2.2 meters below ground level with refusal met in all pits on possible boulders or bedrock. Ground material excavated from the trial pits was backfilled immediately upon completion of an assessment and soil sampling. There was no groundwater ingress encountered in any of the trial pits. There was little smearing of the sidewalls during excavation and only minor collapsing of formation occurred.

All unconsolidated deposits encountered were described in accordance with the British Standards Institution Code of Practice for Site Investigations (BS 5930). Logs of the pits are presented in Appendix B. Photographs were taken of each excavated pit and these are presented in Appendix C.

Description of ground encountered

Broadly similar ground conditions were encountered in all 4no. pits. A formation of very silty coarse sandy gravelly cobble rich till was revealed in all pits beneath made ground

and topsoil or compacted top cover. This material comprised abundant angular clasts and was generally dense and compact and difficult to excavate given the high angular cobble content. The gravel and cobble content was higher in this material encountered in TP1 in the north of the site. It is likely this formation is reworked ground.

In TP1, made ground comprising a compacted clay top cover overlying compacted stone hardcore was revealed to a depth of 0.5m below ground level (bgl) to the top of the reworked ground till formation. In TP2 a silty gravelly cobbly sand rich fill material was encountered beneath a topsoil cover. The till material was revealed at c.0.6m bgl beneath the sand rich fill in this pit. The till formation was encountered directly beneath topsoil in TP3 and TP4 at c.0.3m bgl. Some items of waste were identified in this material in TP3 and TP4 including plastic, steel and wood but there was no visual or olfactory evidence of gross contamination observed in any of the pit excavations. This confirms the till formation is likely reworked ground.

3.2 Soil Sampling

Representative composite samples were collected from the unconsolidated materials excavated from each pit on the 22nd January 2022. The sampling schedule included a sample of the reworked silty till formation for each pit and an extra sample was collected to cover the topsoil and sand rich fill material revealed in TP2. Samples were obtained using appropriate sampling techniques and in accordance with the applicable standards. A pair of disposable latex gloves were used for each sample collected. All equipment used was decontaminated between each sample collection. Samples were collected in laboratory supplied containers which were stored in cool boxes and dispatched to an accredited laboratory for analysis.

4. Analytical Assessment

The collected samples were submitted to Eurofins Chemtest, which is a UKAS accredited laboratory, for analysis of a broad suite of parameters. Sufficient parameters were analysed so that the samples could be checked for the presence of gross contamination. The sampling schedule for all samples included metals, hydrocarbons, PAHs, PCBs, phenol, and volatile organic compounds (VOCs).

This is the most comprehensive suite to cover the relevant hazardous substances that were produced, stored or disposed of at the site and to check for evidence of contamination derived from those substances in the ground at the Waterford Proteins plant. The laboratory report is presented in Appendix E.

4.1 Interpretation and Discussion of Analytical Results

There are no set standards or legislation for soil in Ireland. The accepted industry best practice is to apply international standards such as those used by the United Kingdom Environment Agency (DEFRA) or the Dutch Ministry of Housing, Spatial Planning & Environment (VROM). The latter organisation has produced a series of standards which outline certain substances and the permissible values at which they can be permitted in soil, to aid in determining the suitability of brownfield sites for housing. These standards are very much geared towards the scenario of human/soil interactions, such as toddlers consuming soil particles or children playing in soil, in back-gardens or play areas.

These Dutch Standards (2002) outline two values for selected contaminants, the Target Value and the Intervention Value. The Target Value (TV) is the baseline concentration value below which compounds and/or elements are known or assumed not to affect the natural properties of the soil. The Intervention Value (IV) is the maximum tolerable concentration above which further investigation, assessment, or remediation is required. A revised suite of Intervention Values was published in 2009.

DEFRA has calculated and published several Soil Guideline Values (SGVs) which provide an objective basis for decision making based on an assessment of risk to human health. These guidelines are based on human toxicological data and consider

the various potential pathways for human exposure. The SGVs indicate a level below which the site is considered safe. Above the guideline value, further investigation is required.

SGVs have been published in respect of different land use functions including *'Residential', 'Allotments',* and *'Commercial'*. In the interest of being conservative the *'Residential'* land-use setting has been applied to the subject site. The published SGVs are based on a sandy soil type which is the most suitable overburden classification to use when dealing with a site that comprises a layer of made ground i.e., fill material.

Category 4 Screening Levels (C4SLs) have been developed through a DEFRA research programme and these offer a higher simple test for deciding whether land is suitable for use and definitely not contaminated i.e., they are a generic screening value to help show when land is within Category 4 and thus is land where there is no risk or the level of risk posed is low. These are intended to be more pragmatic than the SGVs whilst being strongly precautionary.

As groundwater ingress was not encountered during the ground investigation it was decided to check the leachability of any contaminants present in the underlying soil. Furthermore, where contamination is suspected or evident the soil/waste should be classified as inert, non-hazardous or hazardous in case a requirement arises to dispose of the material at landfill. This requires a Waste Acceptance Criteria (WAC) analysis in accordance with the procedures and standards set out in EC Decision of 19 December 2002 (2003/33/EC). Part of this WAC testing requires assessment of the leachability of contaminants present in the soil.

The laboratory extracted leachate from all of the submitted soil samples to ensure a representative distribution of leachability testing across the subject site. The leachate was analysed for the presence of metals, phenol, hydrocarbons, PAHs, PCBs and VOCs.

The results of the soil analyses and leachability testing are summarised in Appendix D, together with the intervention and target levels quoted in the Dutch Standards, and the published SGVs and C4SLs, as well as the soils and leachate WAC standards for inert,

non-hazardous and hazardous landfills. Typical background concentrations of metals in non-polluted agricultural soils are also presented for context. These were published in an EPA Discussion Document entitled *'Towards Setting Environmental Quality Objectives for Soil: Developing a Soil Protection Strategy for Ireland'*.

4.1.1 Discussion of Analysis

The reported metal concentrations all comply with the corresponding quality standards for remediation or further investigation and are within the typical concentrations that would be expected for these elements in non-polluted agricultural soils.

Low concentrations of PAHs were detected in TP1-S1, TP2-S1 and TP3-S1 but not at levels considered to be of concern. The total PAH concentration in TP1-S1 (55mg/kg) exceeds the corresponding Dutch Intervention Level of 40mg/kg. However, the reported concentration is well below the acceptable limit for disposal in an inert landfill (100mg/kg) indicating it is not a significantly elevated concentration. The total PAH concentrations in TP2-S1 (22mg/kg) and TP3-S1 (27mg/kg) are both well below the Dutch Intervention Level.

There was no VOC, PCB or phenol contamination detected in the soil samples. Similarly, no hydrocarbons were present in the soil samples.

In terms of WAC testing, none of the reported soil sample concentrations exceed the corresponding WAC for inert landfills for Mineral Oil, BTEX, PAHs or PCBs.

Similarly, the measured leachate concentrations are all well within the corresponding WAC for inert landfills. There were no PAHs detected apart from some Naphthalene in all samples with the exception of TP4-S1. However, there may be an analytical error in relation to the reported Naphthalene values given this PAH was not detected in the TP2-S1, TP2-S2 and TP4-S1 soil samples. In general, the reported leachate concentrations are very low and indicate low leaching potential for any contaminants detected in the soil samples.

In summary, there is no significant evidence of gross contamination in the ground from the relevant hazardous substances that were used, stored or disposed at the site. For

instance, any contamination from the Heavy Fuel Oil stored adjacent to the location of TP1 would result in an expected elevated TPH concentration in any contaminated soil but none was detected. Similarly, any contamination from the kerosene stored adjacent to the location of TP2 would result in an expected elevated BTEX concentration but none was detected.

Whilst it is possible the slightly elevated PAH concentrations reported in TP1-S1 could be derived from any HFO spillage in that area of the site it is more likely derived from the original source of made ground/compacted hardcore that forms the surface in this part of the site given the absence of TPH in the ground in this area.

No contamination was detected in TP4-S1 which was collected from the trial pit excavated adjacent to the Chemstore in the southeast of the site.

5. Summary & Conclusions

- Based on a desktop review of published data the ABP plant is underlain by made ground and a sandstone till with moderate permeability. This offers protection to the underlying Ordovician volcanic bedrock that is a regionally important aquifer with moderate to high vulnerability.
- There was no visual or olfactory evidence of any gross contamination noted during the trial pit ground excavations at the site.
- The results of soil and leachate sample analysis do not indicate the presence of gross contamination from the relevant hazardous substances that were used, stored or disposed at the site.
- The soil analytical results generally comply with the applicable quality standards. Low levels of PAH concentrations were detected in some samples but not at levels considered to be of concern. The total PAH concentration in TP1-S1 slightly exceeds the corresponding Dutch Intervention Level of 40mg/kg but is well below the acceptable limit for disposal in an inert landfill (100mg/kg) indicating it is not a significantly elevated concentration. This is most likely derived from the original source of made ground/compacted hardcore that forms the surface in this part of the site.
- None of the reported soil or leachate concentrations exceed the corresponding WAC for inert landfills. The reported leachate concentrations are low and indicate poor leaching potential for any contaminants in the ground. Furthermore, there was no evidence of contamination in the deeper soil sample collected from TP2.
- Therefore, if a future requirement arises for the material that is present at the site to be excavated and removed off-site, it would be suitable for disposal in an appropriately licensed inert landfill facility based on these results.
- On the basis of the site setting, ground conditions encountered, lack of groundwater ingress and analytical results it is not considered necessary to undertake further groundwater quality investigations.

Figures

Appendix A

Trial Pit Locations

Appendix B

Trial Pit Logs

Appendix C

Trial Pit Photographs

Appendix D

Analytical Data

Appendix E

Laboratory Report