ARUP

Amazon Data Services Ireland Limited

DUB159 IE Licence Application

Attachment 8-2-1 Waste Hierarchy

Issue | 26 March 2025

Job number 305131

Ove Arup & Partners Ireland Limited
50 Ringsend Road
Dublin 4
D04 T6X0
Ireland
arup.com

Contents

Tables

Figures

1. Introduction

Amazon Data Services Ireland Limited (ADSIL) (‘*the Applicant’*) is applying to the Environmental Protection Agency (‘*the Agency’*) for an Industrial Emissions (IE) Licence for its data storage facility (hereafter referred to as the ‘*Installation’*) located at Data Centre Building B1, Kildare Innovation Campus (KIC), Barnhall Road, Leixlip, County Kildare, Ireland.

The Installation site covers an area of c. 3.645 hectares (ha) in total and is situated within the wider KIC Masterplan site, which was granted planning permission in January 2024 by Kildare County Council (KCC) (KCC Planning Ref. 23/60047). An Environmental Impact Assessment Report (EIAR) and Appropriate Assessment (AA) Screening Report were prepared as part of this planning application and have been submitted with this IE Licence application, refer to Attachment 6-3-6 and Attachment 6-2-1 respectively.

ADSIL holds a long-term lease that concerns lands within the Installation site, which sits in the northwest corner of the KIC Masterplan site. The proposed IE licence application relates only to the area concerning the Installation. The remaining areas within the KIC Masterplan site are controlled by the KIC Masterplan site owner, hereafter referred to as *“the Landowner”*.

2. Waste Streams

The operation of the Installation will give rise to a small number of waste streams with minimal amounts of solid and liquid wastes produced. Attachment-8-1 Waste Generated outlines the expected waste types by LoW Code and includes further detail on the period or periods of generation of the waste.

The main site process (data storage) will not give rise to large volumes of waste. Wastes are typically generated from auxiliary activities and from the staff present onsite. These wastes can be allocated into the following types:

- **Domestic type wastes** including recyclable waste and organic/food waste from staff areas.
- **Wastes from site maintenance** including filters, wastes from minor spills, used oil and oily water from the hydrocarbon interceptors.
- **E-waste** including batteries, miscellaneous parts and equipment (including fans, hard drives, PCBAs, servers switches, cables) and central processing units (CPUs).

The quantities presented in Attachment-8-1 Waste Generated are estimates of waste generation (based on waste generation at the data storage facilities on the campus as well as other ADSIL facilities). The actual future quantities generated will be advised to the Environmental Protection Agency (EPA) each year as part of the Annual Environmental Report (AER) for the installation.

2.1 Domestic Type Wastes

Non-hazardous waste from domestic type waste streams form the largest waste quantity from the Installation.

Organic waste and dry mixed recyclables will be generated daily from the employee activities, primarily in the kitchen and offices.

The majority of wastes will be generated from staff that will be present on a shift basis, so numbers will vary throughout the day and night. Operational hours of the Installation site will be 24 hours a day, 7 days a week.

In addition to the typical waste materials that will be generated on a daily basis, there will be some additional waste types generated less regularly that need to be managed separately including:

- Glass;

- Wooden pallets;
- Printer Cartridges/toners; and
- Other office wastes (e.g. domestic batteries).

Glass may also be generated from staff activities from time to time. When generated, this will be segregated on site and collected by a nominated waste contractor.

Wooden pallets will arise from time to time from deliveries from suppliers. When generated, these will be segregated on site and collected by a nominated licensed waste contractor.

Other office wastes including used printer cartridges and other office items (e.g. household batteries) may also be generated in the administration areas. These will be segregated locally at the Installation for collection by a nominated waste contractor for recovery/disposal offsite.

2.2 Waste from Maintenance Activities

The following wastes will be generated on occasion from site maintenance activities. These wastes will be predominantly managed by external vendors in charge of maintenance activities.

- Waste mineral and lubricating oil,
- Waste sludge from hydrocarbon interceptors,
- Waste arising from minor spill clean-ups (both hazardous and non-hazardous) (e.g. waste oil, absorbent mats, and booms etc.) if arising;
- Waste filters (air filters, evaporative media and containment curtains) from filter change outs; and,
- Other liquid and solid wastes from general and maintenance activities (e.g. pesticides, adhesives, other chemical residues in empty containers, aerosol cans, etc).

The maintenance and commissioning of the emergency generators will involve the consumption of industrial oils and the generation of used oils and oily rags/filters. These are considered hazardous waste and will be managed as such.

Maintenance activities will also include air filter and containment curtain change outs. An external company will be employed to maintain the units and the used filters will be collected and removed from the Installation site by the relevant vendor. These wastes are not typically hazardous.

Landscaping and wider site maintenance will be undertaken by an external company. All wastes generated will be collected and removed from the Installation site by the relevant external contractor. This will include hazardous and non-hazardous wastes.

The hydrocarbon interceptors within the stormwater network will generate oily water wastes from onsite vehicle movements and possibly occasional minor spills/leaks. The interceptors will be inspected and cleaned every 6 months by the maintenance contractor. This waste is classified as hazardous and will be managed as such.

It is anticipated that the operational phase of the Installation will generate a range of mostly non-hazardous wastes with some hazardous wastes.

An Operational Waste Management Plan (OWMP) will be developed prior to commencement. The plan will seek to ensure the Installation contributes to targets outlined in the National Waste Management Plan for a Circular Economy 2024 - 2030[1].

All waste materials will be segregated into appropriate categories and will be stored in appropriate bins or other suitable receptacles in a designated, easily accessible area of the Installation site.

[1] National Waste Management Plan for a Circular Economy 2024 – 2030 National Waste Management Plan for a Circular Economy 2024-2030 - My Waste

The main hazardous and non-hazardous waste expected to be generated form the operational phase of the Installation are summarised below:

- Non-hazardous waste which is expected to be produced at the Installation site includes: Packing waste, canteen/kitchen waste, general non-hazardous waste, landscaping waste, non-hazardous WEEE, and non-hazardous lightbulbs.
- Hazardous waste which is expected to be produced at the Installation site includes: hazardous WEEE and lightbulbs; waste filters, lube oil and other spares, waste batteries and waste sludge from the petrol interceptors which will be pumped out/removed as required by a suitably permitted/licenced contractor.

The above types of hazardous wastes would be expected from any industrial facility. All waste will be managed through the permitted/licenced waste contractors and in accordance with best practice and all EU and Irish waste management legislation.

All waste receptacles stored on site will be collected from within the Installation site boundary by the permitted waste contractor and taken to registered, permitted and/or licensed facilities. No waste collection of operational waste will occur outside of the Installation site's boundary.

2.3 E-Waste

Electrical and electronic waste or E-waste will be generated as equipment is repaired and/or replaced. The main E-Waste types generated will include:

- Batteries (both hazardous and non-hazardous) from the UPS systems;
- Waste electrical and electronic equipment (WEEE) (non-hazardous) some of which requires further refining offsite;
- Plastic waste from equipment; and
- Metal waste (i.e. from equipment maintenance and change outs).

It should be noted that a low rate of waste generation associated with the replacement or repair of materials and equipment is expected, taking into account the lifetime of the equipment used at the data storage facility (e.g. air conditioning and Air Handling Units (AHUs) have been designed for an operating lifetime of 50 years, the life of lithium batteries is estimated at 10 years and that of VLRA batteries between 7 and 8 years).

In the event of breakdown or when electrical and electronic equipment becomes obsolete, the equipment will have to be replaced or repaired during the implementation of both preventive and corrective maintenance tasks.

Taking into account the characteristics of the Installation, the potential E-waste arisings have been estimated. E-waste generated will be non-hazardous and hazardous and will be segregated onsite.

3. Waste Management

Waste procedures are already in place for the operation of the Installation. These will ensure the proper management and recycling of wastes generated at the Installation. The waste procedures will enable the Installation to contribute to the targets and policies outlined in the National Waste Management Plan for a Circular Economy 2024 - 2030[2].

[2] National Waste Management Plan for a Circular Economy 2024 – 2030 National Waste Management Plan for a Circular Economy 2024-2030 - My Waste

Wastes arising from the Installation will be, in the first instance, collected locally at Data Centre Building B1. Mitigation measures to manage potential impacts arising from waste generated during operation of the Installation will be included in detail in the waste procedures.

Wastes will be reused, recycled, or recovered where possible with the exception of those waste streams where appropriate facilities are currently not available, where waste will be disposed of as a last resort.

3.1 Waste Management Standard Operating Procedures (SOPs)

Specific procedures for waste management have been developed to address the control of waste generation and management, and which include the following aspects:

- **Storage (and segregation) of waste:** includes information on the storage location of each type of waste, in particular giving indications on the storage of hazardous waste. The instructions needed to avoid mixing waste, and to ensure the correct separation of waste, are described while making clear that the presence of waste outside the storage areas is not allowed. All waste materials will be stored in bins or other suitable receptacles in a designated, easily accessible area of the Installation.
- **Waste labelling:** details the correct signage and labelling of waste, with particular emphasis on the labelling of hazardous waste to ensure compliance in all cases. Requires that all wastes will be classified, labelled and stored in accordance with the prevailing requirements of the Waste Management Act 1996-2015 (as amended) and associated regulations.
- **Waste management:** the appropriate management process for each type of waste is included. All waste leaving the Installation site will be transported by suitably permitted contractors and taken to suitably registered, permitted and/or licensed waste facilities.
- **Documentation associated with waste management:** the procedure includes a list of all documents associated with waste management both internally and externally. Internal delivery notes that will allow internal control of waste management as well as external control related to withdrawals (quantities, dates, etc.), and all the certificates of final management issues by the waste managers to ensure traceability of management, and the appropriate destination and final treatment of waste, are included. All waste leaving the Installation site will be recorded and copies of relevant documentation maintained.
- **Other obligations and information to authorities:** other legal or internal obligations that have not been included in previous points of the procedure are included and will be updated to include those issues related to the IE Licence that have to do with the annual reporting.
- **Roles and responsibilities of waste management:** Waste management at the Installation is the responsibility of the DCEO Facilities Manager.

3.2 Environmental Management System

An Environmental Management System (EMS) has been developed for ADSIL and will be amended to include the Installation site in accordance with the requirements of BAT. The EMS will outline the management of the Installation's environmental program and is ISO14001 accredited.

The purpose of the EMS is to present the environmental objectives and targets and action plans for the Installation site. This will contain waste-reduction goals as applicable, and employees who can significantly affect the achievement of these goals will be notified. Such assessments are already being undertaken by ADSIL and will be formalised into the EMS format as part of IE Licence compliance.

4. Waste Handling and Storage

4.1 General Waste Handling Measures

An Operational Waste Management Plan (OWMP) will be developed prior to commencement of operations in accordance with the grant of planning permission. The plan will seek to ensure the Installation contributes to the targets outlined in the National Waste Management Plan for a Circular Economy 2024 - 2030[3].

The following mitigation measures will be implemented during the operational phase of the Installation:

- All waste materials will be segregated into appropriate categories and will be temporarily stored in appropriate bins, skips or other suitable receptacles in a designated, easily accessible area of the Installation site.
- The Operator / Buildings Manager of the Installation site during the operational phase will be responsible for ensuring – allocating personnel and resources, as needed – for the production, updating and implementation of an Operational Waste Management Strategy, ensuring a high level of recycling, reuse and recovery at the Installation site.
- The Operator / Buildings Manager will regularly audit the onsite waste storage facilities and infrastructure, and maintain a full paper trail of waste documentation for all waste movements from the Installation site.
- The Operator will ensure on-site segregation of all waste materials into appropriate categories, including (but not limited to): Packaging Waste; General Non-Hazardous Waste; Mixed Dry Recycling; General Non-Hazardous Waste; Organic; Glass; Non-Haz and Haz WEEE; Landscaping waste; Lightbulbs; Waste Oil; (Wet) Batteries and (Dry) Batteries.
- The Operator will ensure that all waste materials will be stored in colour coded bins or other suitable receptacles in designated, easily accessible locations. Bins will be clearly identified with the approved waste type to ensure there is no cross contamination of waste materials.
- The Operator will ensure that all waste collected from the Installation site will be reused, recycled or recovered, where possible, with the exception of those waste streams where appropriate facilities are currently not available.
- The Operator will ensure that all waste leaving the Installation site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licensed facilities.

These mitigation measures will ensure the waste arising from the proposed project is dealt with in compliance with the provisions of the Waste Management Act 1996, as amended, associated Regulations, the Litter Pollution Act 1997, the National Waste Management Plan for a Circular Economy 2024 - 2030[4], and KCC waste bye-laws. It will also ensure optimum levels of waste reduction, reuse, recycling and recover are achieved.

4.2 Hazardous Waste Storage and Handling

Hazardous wastes generated onsite will be stored in a covered hardstanding space inside Data Centre Building B1 or in covered bunds in designated areas external to Data Centre Building B1. Mobile retention bunds will be available should liquid waste need to be stored at any given time. The storage areas will house all the hazardous wastes generated at the Installation that are awaiting collection by the nominated hazardous waste contractor for recovery and/or disposal off-site.

[3] National Waste Management Plan for a Circular Economy 2024 – 2030 National Waste Management Plan for a Circular Economy 2024-2030 - My Waste

[4] National Waste Management Plan for a Circular Economy 2024 – 2030 National Waste Management Plan for a Circular Economy 2024-2030 - My Waste

The main source of hazardous wastes onsite will be waste oils from the hydrocarbon interceptors and/or emergency generators. Appropriate management of these liquid wastes (as outlined below) will ensure adequate protection from unauthorised discharges to ground, groundwater and/or surface water.

Oil captured by the hydrocarbon interceptors will be held within the interceptor tanks. The oily water will be removed directly from each interceptor by a specialised contractor by means of vacuum tanker. The contractor will remove the waste at the time of cleaning for offsite recovery and/or disposal. These tanks will be manufactured by specialised companies and made of materials that are resistant to the substances they contain in order to ensure water tightness.

The quantity of waste oil from the generators is expected to be minor. An external contractor will be employed to maintain the generators and replace the oils as required. Waste oils as well as oily rags and used filters will be collected and removed from site by the external contractor.

As indicated above, no waste used oil or filters will be stored as these are removed from the Installation site by the maintenance contractors for recovery and/or disposal at authorised waste facilities. However, ADSIL will require the maintenance contractors to provide all the relevant permits and waste management documentation.

In event of a minor fuel spill onsite, trained staff will apply spill kits. The used materials will be stored in sealed drums in the designated hazardous waste storage area in each building pending collection by the nominated hazardous waste contractor for recovery and/or disposal off-site.

Waste commercial batteries will not be stored onsite. These will be removed offsite for appropriate recovery and/or disposal by the contractor in charge of maintaining the electrical equipment.

Other hazardous site maintenance materials (e.g. pains, aerosols, pesticides) will be removed directly by the relevant external contractor and will not be stored onsite.

4.3 Non-Hazardous Waste Storage and Handling

All non-hazardous waste generated from day-to-day operations at the Installation will be segregated for recycling/recovery at source using dedicated receptables located throughout the Installation. These will then be emptied into skips/larger bins externally. Appropriate segregation of wastes at the source will reduce the risk of cross-contamination and provides the greatest potential for recycling/recovery.

When waste receptacles are full, the DCEO Facility Manager or Engineering Operations Technician (EOT) will organise a collection for offsite reuse, recovery and/or disposal by the nominated (third party) authorised waste management contractor(s).

Dry Mixed Recyclables (DMR) material will be placed in DMR bins for collection. Cardboard will be segregated from other DMR waste where possible and placed in a designated bin collection.

Organic (food) waste from staff facilities will be disposed of in the designated organic waste bins in the canteens. The organic waste bins will be serviced on a regular basis by the nominated authorised waste contractor.

All obsolete or broken E-Waste will be removed to a designated storage location in the designated waste storage area at the Installation. The majority of E-waste generated will be subject to confidential storage and disposal requirements.

As outlined above, site maintenance wastes (including non-hazardous wastes) will be removed directly by the relevant external contractor and will not be stored onsite. Waste filters and non-hazardous containment curtains requiring change out will also be removed directly by the relevant external contractor and will not be stored onsite.

Other office wastes including used printer cartridges and other office items (e.g. household batteries) generated in the administration areas are segregated locally at the Installation. Designated bins will be provided for printer cartridge wastes within the offices. These will be collected by the manufacturer. Similarly, designated bins will be provided for waste domestic batteries and collected by a nominated waste contractor for recovery off site.

4.4 Summary of Waste Storage

Table 1 below summarises the storage of main waste types generated at the installation.

Table 1: Waste Management Strategy for KIC Masterplan Site (KCC, 2023) | Tom Phillips + Associates (2023) ©[5]

Waste Name	Hazard (Y/N)	On-site Storage/Treatment Method (anticipated)	Method of Treatment or Disposal
Mixed Dry Recyclables (Packaging Waste)	No	Segregated bins/skips	Recycle
Plastic and cardboard (baled)	No	Bailer onsite	Recycle
General Non-Hazardous Waste (Office/Canteen/Kitchen Waste)	No	Segregated bins for contaminated or non-recyclable waste, plastics, cardboard, general waste.	Recycle/Recovery Disposal of other general waste to landfill
Organic Waste	No	Compost recycling bins	On-site compost bins (Off-site composting)
Glass	No	Glass recycling bin	Recycle bins
Polystyrene	No	Segregated receptacle	Off-site recovery
Non-Hazardous WEEE	No	Segregated bins for WEEE	Off-site recovery
Hazardous WEEE	Yes	Segregated bins for WEEE	Off-site recovery
Landscaping Waste	No	Compost waste bins	On-site compost bins (Off-site composting)
Cleaning Products/Solvents	No	Bunded storage	Off-site recovery
Lightbulbs	No	Specialised container in waste storage area	Off-site recovery
Waste Oil, Filters & Spares	Yes	Oil drum in external waste storage area	Off-site recovery
(Wet) Batteries	Yes	Specialised container in waste storage area	Return to supplier
(Dry) Batteries	Yes	Specialised container in waste storage area	Off-site recovery

5. On and Off-site Arrangements for the Recovery or Disposal of Solid and Liquid Waste

The DCEO and Engineering Operations Technicians (EOTs) will regularly inspect the onsite waste storage facilities and infrastructure, manage the waste contractors, audit and maintain a full paper trail of waste documentation for all waste movements from the Installation site. The Regional Environmental Engineer will provide advice on waste segregation requirements, prepare and control documented procedures for waste management, they will also ensure that all waste contractors engaged by the installation and all recovery/disposal outlets are suitable for use, appropriately authorised and audited as required.

Waste management companies authorised by ADSIL will be responsible for the transfer of waste off-site to authorised recycling/recovery/disposal facilities. An approved waste vendor list is in place at the Installation

[5] Tom Phillips + Associates (July 2023). Planning Application to Kildare County Council Environmental Impact Assessment Report, Data Storage Facility Development Kildare Innovation Campus at Barnhall Road, Leixlip, County Kildare.

for waste contractor selection. ADSIL's contracts with Waste Vendors require that all waste contractors conform to the relevant legislations and standards as well as ADSIL's environmental requirements.

A chronological record will also be kept showing the date, the amount, nature, origin, destination, treatment method and, means of transport and frequency of collection of the hazardous and non-hazardous waste generated.

Waste will only be collected by Waste Contractors who have been properly evaluated and are on the ADSIL Approved Waste Vendor List.

Waste will not be stored onsite for more than six months.

6. Waste Hierarchy

Waste management in Ireland is subject to EU, national and regional waste legislation and control, which defines how waste materials must be managed, transported and treated. The overarching EU legislation is the Waste Framework Directive (2008/98/EC) which is transposed into national legislation in Ireland. The cornerstone of Irish waste legislation is the Waste Management Act 1996 (as amended). European and national waste management policy is based on the concept of 'waste hierarchy', which sets out an order of preference for managing waste (prevention > preparing for reuse > recycling > recovery > disposal) as seen in Figure 1 above.

EU and Irish National waste policy also aims to contribute to the circular economy by extracting high-quality resources from waste as much as possible. Circular Economy (EC) is a sustainable alternative to the traditional linear (take-make-dispose) economic model, reducing waste to a minimum by reusing, repairing, refurbishing and recycling existing materials and products. Refer to Figure 1 below.

Figure 1: Circular Economy (Source: Repak)

The Irish Government issues policy documents which outline measures to improve waste management practices in Ireland and help the country to achieve EU targets in respect of recycling and disposal of waste. The most recent policy document, Waste Action Plan for Circular Economy (WAPACE) – Waste Management Policy in Ireland, was updated in 2024 and shifts focus away from waste disposal and moves it back up the production chain.

The Circular Economy and Miscellaneous Provisions Act 2022 was signed into law in July 2022. The Act underpins Ireland's shift from a "take-make-waste" linear model to a more sustainable pattern of production and consumption, that retains the value of resources in our economy for as long as possible and that will significantly reduce our greenhouse gas emissions. The Act defines Circular Economy for the first time in Irish law, incentivises the use of recycled and reusable alternatives to wasteful, single-use disposable

packaging, introduces a mandatory segregation and incentivised charging regime for commercial waste, streamlines the national processes for End-of-Waste and By-Products decisions.

There are currently no Irish national guidelines on the assessment of operational waste generation, and guidance is taken from industry guidelines, plans and reports including the Eastern Midlands Region (EMR) Waste Management Plan 2015 – 2021, Regional Waste Management Planning Offices, Draft National Waste Management Plan for a Circular Economy (2023), BS 5906:2005 Waste Management in Buildings – Code of Practice, the Kildare County Council (KCC) Waste Management (Segregation, Storage and Presentation of Household & Commercial Waste) Bye-Laws (2018), the EPA National Waste Database Reports 1998-2020 and the EPA National Waste Statistics Web Source.

ADSIL is committed to minimising the quantities of hazardous and non-hazardous waste generated from direct and indirect operational activities. In order to minimise the potential impact to the environment, ADSIL have developed site waste management SOPs that seek to meet the intent of the waste management hierarchy (refer to Figure 2) and this will be incorporated into the Installation site EMS as per licence requirements.

The waste hierarchy states that the most preferred option is prevention of waste, followed by preparing for reuse and recycling/recovery, energy recovery (i.e. incineration) and, least favoured of all, disposal.

The entire operations process has been designed with waste prevention/reduction in mind and waste quantities generated will be very small compared to other industrial sites.

Figure 2: Waste Hierarchy (Source: European Commission)

It is ADSIL policy that the Installation site must use the highest-prioritized waste-elimination/disposal method in the following list that is practicable for the particular waste stream:

a) Waste reduction at source of generation (waste elimination and prevention);

b) Reuse or recycling on site;

c) Reuse or recycling off-site at another ADSIL site (assuming the waste-receiving site satisfies all regulator requirements to do this);

d) Reuse or recycling offsite at a properly licensed and properly operated non-ADSIL waste-receiving site;

e) Incineration with energy recovery;

f) Waste treatment, incineration without energy recovery or other destruction method; and

g) Landfilling or other land application.

7. Waste Prevention/Minimisation of Waste

The aspect of the Installation which has the greatest potential impact on waste generation is that of the ongoing maintenance and the replacement of equipment at the end of their useful life.

In order to address waste minimisation, the Installation has been designed, and the equipment has been chosen, taking into account their useful life. A longer useful life will result in reduced waste generation as replacement is minimised.

Specific waste management procedures, as outlined above, will be implemented to keep all employees informed of how to manage waste correctly, relevant employees will receive frequent online training on these procedures. Training records will be retained onsite. The necessary measures will be implemented to enable proper segregation and classification of both hazardous and non-hazardous waste, thereby reducing the amount of waste sent for disposal and facilitating recovery.

A maintenance programme will be in place for the auxiliary equipment contributing to waste generation. This will include primarily the maintenance of the generators, UPS batteries, and hydrocarbon interceptors. ADSIL shall strictly comply with the maintenance procedures specifically in accordance with the 'manufacturers' guidelines so as to not generate more waste than is technically necessary.

8. Waste Recycling and Recovery

Improvements in environmental performance will be encouraged in the EMS, by setting a series of objectives and targets commonly associated with reducing resource material use (e.g. water, energy, paper) and waste production generally. ADSIL will establish targets for improvements in the areas of waste reduction throughout the lifetime of the operation of the Installation.