

Attachment 8.1.2 Waste Management and Waste Hierarchy

1.0 WASTE STREAMS

The proposed development will give rise to a variety of waste streams including hazardous and non-hazardous solid and liquid wastes. Attachment 8.1 outlines the different anticipated waste types by List of Waste (LoW) Code and includes further detail on the period or periods of generation of the waste.

1.1 Solid Waste Streams

1.1.1 Hazardous Solid Wastes

Hazardous wastes anticipated from both the new and the existing facility include:

- Paint/varnish;
- Printer Ink cartridges;
- Ink waste liquid;
- Waste mineral and lubricating oil;
- Packaging containing hazardous substances;
- Isopropyl Alcohol (IPA) impregnated wipes;
- Single-use components;
- Discarded equipment containing hazardous substances;
- Hazardous laboratory smalls;
- Uncontaminated Sharps;
- Injection Pens (may contain very small quantities of pharmaceutical product);
- Health Care Centre Clinical Biohazardous waste
- Fluorescent tubes and
- Waste Electrical and Electronic Equipment (WEEE).

1.1.2 Non-Hazardous Solid Wastes

Non-hazardous waste anticipated from both the new and the existing facility include:

- Faulty injection pens (plastics);
- Paper and cardboard;
- Mixed dry recyclables;
- Mixed municipal waste;
- Empty non-hazardous WEEE cylinders;
- Sub-assembly product pens;
- Construction & Demolition waste;
- Plastic;
- Metal;
- Compostable food waste;
- Empty toner cartridges; and
- Waste batteries (non-hazardous).

1.2 Liquid Wastes

1.2.1 High High Strength Wastewater

High High Strength wastewater is waste from high containment areas or waste which has been identified as potentially containing some toxin or other harmful substances. This waste is considered hazardous and is not suitable for treatment by conventional WWT (Waste Water Treatment) technology. High High Strength wastewater will therefore be tankered offsite for disposal by incineration.

1.2.2 Low Strength Wastewater

Low Strength wastewater is all other process specific waste including flashpot condensate drains, and waste from non-toxin / product contacting equipment e.g. autoclave & buffer prep equipment etc. There is no toxin in this waste.

1.2.3 Other Liquid Wastes

In addition, the following liquid wastes will also be generated at the AbbVie facility:

- Paint/varnish;
- Ink waste liquid;
- Waste mineral and lubricating oil, and
- Hazardous laboratory smalls.

2.0 WASTE HANDLING

Wastes arising from the facility will, in the first instance, be collected locally at each building. Segregation at source will ensure hazardous waste generation is minimised and recycling and recovery opportunities are maximized.

The Environmental Health and Safety (EHS) Department will be responsible for overseeing the implementation of the Waste Management Procedure. The EHS department will also ensure that all waste contractors used by the facility and all recovery/disposal outlets are suitable for use, appropriately authorised and audited as required.

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.

Proper waste management will follow the priorities of the waste hierarchy and avoid significant volumes of waste being sent unnecessarily to landfill. Reuse, recycling or recovery where possible will be used for waste collected from the development, with the exception of those waste streams where appropriate facilities are currently not available.

Site personnel will undertake inspections and preventative maintenance periodically on all treatment and control devices, monitoring equipment, and systems or devices used to prevent the release of waste to the environment (such as tanks, sumps, bunds, other secondary containment, oil/water separators, etc.). Documentation on all maintenance and calibration will be kept and these records will be routinely reviewed to ensure that all information is up to date.

Transport of all waste leaving the site will be by appropriately permitted hauliers only and all waste to be taken to suitably registered, permitted or licensed facilities. Records and copies of relevant documentation of all waste leaving the site will be maintained on file.

2.1 Hazardous Waste

Solid waste from single use equipment will be double bagged and transported to the waste storage area in the Warehouse where it will be placed into a combi-drum for transfer offsite by a specialist waste contractor.

Waste mineral and lubricating oil will be stored in labelled, sealed drums and when full, moved on a banded pallet using a forklift to the site oil store.

Fluorescent tubes will be stored in secure areas protected from physical damage during the accumulation period. Unbroken spent lamps will be stored in the original packaging (if available). Spent tubes will be placed in the designated box in the waste yard.

Health Care Centre Clinical hazardous waste will be placed in yellow puncture-resistant sealable UN approved plastic containers. When the containers are ($\frac{3}{4}$) full and/or ready for disposal, the lids will be secured in place and the containers will be transferred to the designated waste disposal area. All other clinical wastes will be placed in approved plastic hazardous bags and transferred to the designated waste disposal area awaiting shipment.

The plastic containers, hazardous bags and injection pens containing Humira product will be stored in the designated UN approved 200L drum.

Uncontaminated sharps will be placed in yellow puncture-resistant sealable UN approved plastic containers labelled uncontaminated sharps. When the containers are ($\frac{3}{4}$) full and/or ready for disposal, the lids will be secured in place and the containers will be transferred to the designated waste disposal area awaiting shipment. The plastic containers will then be stored in the designated UN approved 200L drum.

Office printer cartridges are removed to the designated storage location in the hazardous waste solvent store and stored in UN approved hermetically sealed 200L drums.

All obsolete or broken WEEE will be removed to the designated storage location in the external waste disposal area.

All Batteries (alkaline, nickel cadmium) are collected in the designated storage location at the end of the corridor outside lift area.

Waste paints (solvent and oil-based paints) and thinners are collected in the designated storage location in the external flammable stores area and placed in a UN approved hermitically sealed 200L drum. (UN1263)

IPA/Oil contaminated wipes will be collected in a lined labelled hazardous waste bin in the Production area. Bags of waste are removed to the solvent store in waste area and placed in the correctly labelled UN approved hermitically sealed 200L drum (UN3175) cloths, e.g. IPA wipes, contaminated protective clothing.

Empty containers (Ink Videojet production cartridge's, IPA bottles, Pad Printer ink containers) are collected in a lined labelled hazardous waste bin in the Production area. Cartridges are removed to the designated storage location in the external waste disposal area and stored in steel combi drums.

Printer Ink Cartridges are placed in their original packaging and left in the designated storage location. The waste is packed in a UN approved hermitically sealed 200L drum (UN3175) .

Injection Pens containing Pharmaceutical Product will be stored in the designated UN approved 200L steel combi drums and will be treated as hazardous waste for disposal traceability purposes. The waste is packed in a UN approved hermitically sealed 200L drum (UN N/A).

Test material used on Injection Pens is placed into steel combi drums. Collection is then organised as soon as possible by the Logistics Manager/Designee.

2.2 Non Hazardous Waste

Cardboard is broken down at the location where generated and placed in a designated cardboard bin for collection. Larger amounts of cardboard are broken down at the location where generated and placed in the designated cardboard point. The material is baled and removed to the designated storage location in the external waste area for collection.

Dry Mixed Recyclable (DMR) Material as detailed on the signage of DMR bins is collected each day and stored in the designated storage location in the waste storage area. The nominated waste company collects the DMR weekly.

General waste, as detailed on the signage of the general waste bins, is collected each day and stored in the designated storage location in the waste area. The nominated waste company collects the general waste weekly.

Wooden pallets are segregated along with other wooden waste generated onsite and collected by the approved site waste vendor for recycling when contacted by company.

Plastic from moulding and subassembly waste plastic (e.g. polypropylene/acetal) segregated at source in the moulding department is taken to the waste storage

area on each shift and placed in the appropriate bin or bag according to the material.

Food waste is disposed of in the designated compost waste bins in the canteen. The compost waste bin is serviced on a regular basis by an approved waste vendor.

Metal springs are segregated in the production area and, along with other metal waste, placed in the metal skip for collection and recovery when skip is full.

All liquid dye is collected in the marked 5L containers and transferred to the 200L drums. In addition, all solid waste contaminated with blue dye is double bagged and transferred to flexible bulk container bags, which are labelled. Empty glass bottles are placed in a labelled plastic drum located in an allocated waste area.

All other liquid potential waste generated from test methods is collected in a marked 60L container.

When a consignment of waste has accumulated, the relevant personnel responsible for waste management organize for collection and disposal/recovery through the approved waste management company.

Any solid waste that has been decontaminated in the autoclave as part of lab activities will be non-hazardous and can be disposed of with general waste streams.

The transfer of site owned property such as commodities, equipment, assets, articles, by-products or unused raw materials that would otherwise be discarded and including but not limited to, filter bags, scrap metal, drums, refrigerators, etc complies with the following:

- Provision of written proof of sale documentation such as a bill of sale, receipt, bill of lading, or purchase order documentation of the item's description, the name and address of the purchaser and the date of sale;
- Obsolete equipment is disposed on an individual basis subject to the approval of the EHS Manager, on completion of the fixed asset disposal approval form; and
- Sale of equipment or donation of equipment is documented and approved by the Financial Controller and EHS Manager.

2.3 Bulk Liquid Wastes

2.3.1 High High Strength Wastewater

High high strength wastewater will be routed via double-contained pipework to the high high strength sump tank. The High high strength sump tank will be a stainless steel, flat bottomed, vertical cylindrical tank with an approximate operating volume of 7000 L. The sump tank will be within the same sunken, chemical resistant coated concrete bund as the low strength wastewater sump tank.

From the sump tank the high high strength wastewater will be pumped to a high high strength wastewater bulk storage tank as required using two (duty and standby) level switch controlled self-priming pumps. The bulk storage tank will be a flat bottomed, vertical cylindrical stainless steel tank with an approximate operating volume of 60,000 L. This tank will be in the same sunken, chemical resistant coated concrete bund as the low strength wastewater bulk storage tank.

Both the sump tanks bunds and the bulk tanks bunds will be roofed over. They will also be equipped with liquid level detection. In the unlikely event that any liquid enters the bund it can be tested and pumped to the appropriate wastewater tank for further treatment or disposal.

The high high strength storage tank will be emptied routinely into a road tanker to be incinerated / disposed of off-site. Approximately two tankers a week are estimated to be required when working at maximum capacity.

2.3.2 Low Strength Wastewater

Low Strength wastewater is all other process specific waste including flashpot condensate drains, and waste from non-toxin / product contacting equipment e.g. autoclave & buffer prep equipment etc. There is no toxin in this waste.

The low strength wastewater drain lines will be stainless steel with the underground drainage transitioning to double contained, gravity drained polypropylene pipe. Two collection headers will feed the main 6-inch header which will drain into the low strength sump tank.

The low strength wastewater sump tank will be a Glass Reinforced Plastic (GRP) tank with approx. 10,000 L operating volume. It will be bunded in the same sunken bund as the high high strength wastewater sump tank. The waste will be pumped into the low strength wastewater bulk storage tank by two (duty and standby) submersible pumps inside the sump tank.

The low strength wastewater bulk storage tank will be a 30,000 L GRP tank. It will be bunded in the same sunken bund as the high high strength wastewater sump tank.

The low strength wastewater will be sampled and will generally be sent to the foul sewer (municipal waste water treatment). The facility includes for pH and temperature adjustment should there be a need for this before discharge. The waste can also be pumped into the high high strength wastewater tank or to a road tanker if there is ever a risk of contamination of the waste.

3.0 ON AND OFF-SITE ARRANGEMENTS FOR THE RECOVERY OR DISPOSAL OF SOLID AND LIQUID WASTES

AbbVie's EHS Department will regularly inspect the onsite waste storage facilities and infrastructure, provide advice on waste segregation requirements, prepare and control documented procedures for waste management, manage the waste

contractors, audit and maintain a full paper trail of waste documentation for all waste movements from the site.

All recyclable wastes will be collected for recycling by permitted waste contractors. General non-recyclable waste will be stored on site and collected for disposal by a licensed waste disposal contractor.

A Supplier Code of Conduct will be in place at the facility for waste contractor selection and control to ensure all waste contractors conform to the relevant legislations and standards as well as AbbVie's environmental requirements. A copy of all contracts with waste management firms will be maintained onsite.

Potentially hazardous wastes to be sent offsite for recycling, treatment, storage or disposal will only be to locations that have been properly evaluated and approved by AbbVie management. AbbVie will maintain a list of the approved sites and this will be made available to facility personnel as required.

4.0 WASTE HIERARCHY

AbbVie is committed to minimising the quantities of hazardous and non-hazardous waste generated from direct and indirect manufacturing activities. In order to minimise the potential impact to the environment, AbbVie will seek to meet the intent of the waste management hierarchy (Refer to Figure 1 below).

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.

Note: Preparing for reuse refers to checking, cleaning or repairing recovery operations, by which products or components of products that have become waste are prepared so that they can be reused without any further pre-processing.

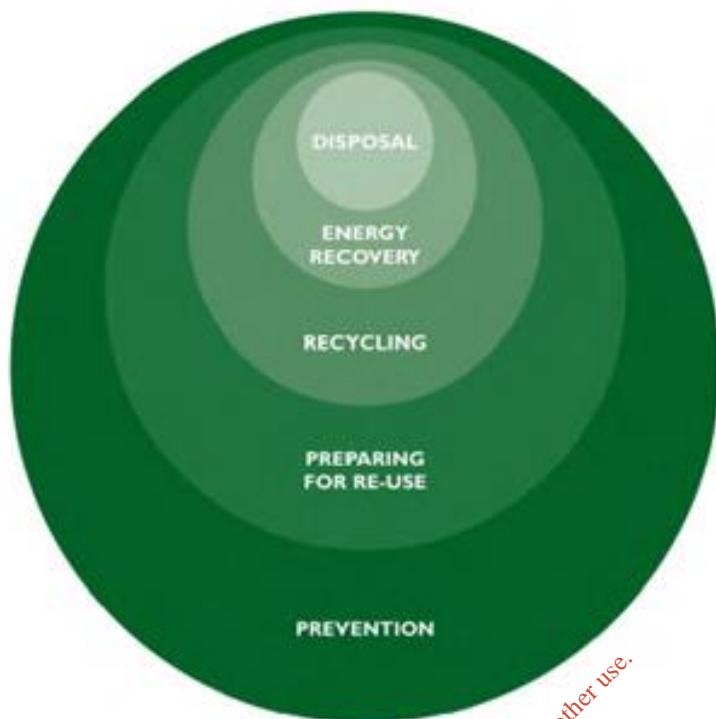


Figure 1 Revised Waste Management Hierarchy

The entire production process has been designed with waste prevention/reduction in mind (although it should be noted that there are certain restrictions in terms of Good Manufacturing Practice (GMP) requirements which may unavoidably result in waste generation).

AbbVie operate an EHS and Energy Sustainability Long Range Plan 2017-2020 which sets out the company's methods for reducing disposal and increasing waste prevention and recycling.

5.0 WASTE PREVENTION / MINIMISATION OF WASTE

AbbVie is committed to minimising the environmental impact of its operations and the proposed waste management process for the facility is considered an essential and integral component in the efficient operation of the facility.

An Environmental Management System (EMS) will be developed for the facility as required under the IE Licence. The purpose of the EMS is to identify the Environmental objectives and targets and action plans which have been created by the Health, Safety and Environmental Manager. It is AbbVie policy that this will contain waste-reduction goals and employees who can significantly affect the achievement of these goals will be notified.

AbbVie's EHS and Energy Sustainability Long Range Plan 2017-2020 sets out waste disposal reduction targets to reduce the total amount of hazardous waste and non-hazardous waste generated, as well as tactics for achieving these

targets matched with a relevant person responsible for that tactic. AbbVie currently operates a Zero Waste to Landfill site and it is committed to maintaining this performance. The facility also tracks waste-reduction progress.

The entire production process has been designed with waste reduction in mind. The raw materials used in the pharmaceutical products to be produced at the site are extremely valuable therefore the minimisation of waste is crucial to the commercial success of the site.

AbbVie will evaluate its chemical and raw materials list (see Attachment 4.6.2) at least annually to determine whether chemicals are unnecessary or unused and efforts will be made to minimize use of such chemicals in the future.

6.0 WASTE RECYCLING AND RECOVERY

The site will set recycling and recovery targets as part of the development of its EMS. In combination with the waste management system described above it is expected that a very high rate of recycling and recovery will be achieved thereby supporting "Ireland Inc." in achieving its national targets for recycling and recovery of paper, metal, plastic and glass.

AbbVie's EHS and Energy Sustainability Long Range Plan 2017-2020 sets out recycling targets to increase and maintain the percentage of waste recycled for hazardous and non-hazardous waste up to 50% (ex. C&D) by 2020.

The proposed facility includes provision of a canteen for up to 280 staff once the plant is fully operational plus additional contractors etc. who will occupy/visit the site. Food waste generated from this activity will be segregated and directed for recovery as per the requirements of the Waste Management (Food Waste) Regulations 2009.