



# Baseline Report

Novartis Ringaskiddy Limited  
HSE Projects  
IE0311525-22-RP-0002, Issue: B

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## Baseline Report

Novartis Ringaskiddy Limited  
HSE Projects  
IE0311525-22-RP-0002, Issue B

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# 1 Introduction

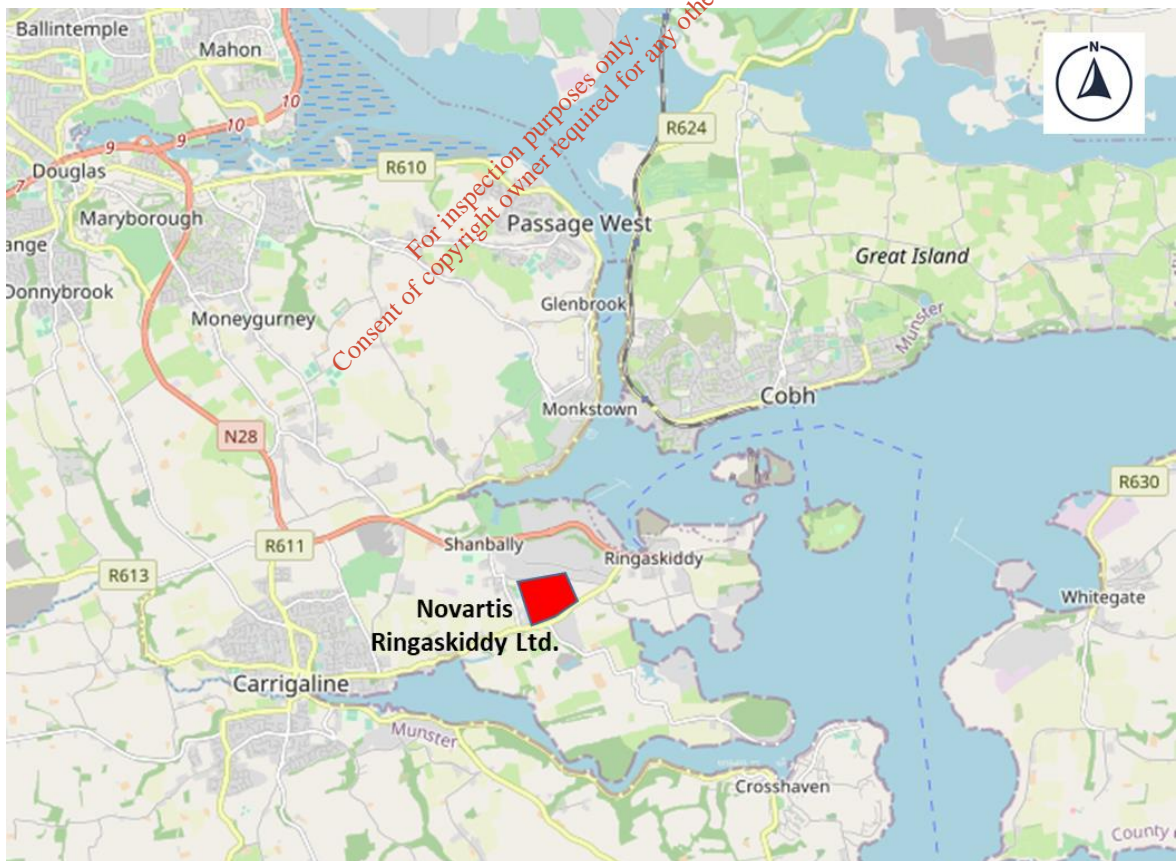
This Baseline Report has been prepared on behalf of Novartis Ringaskiddy Limited (NRL) as part of the application for a review of its current Industrial Emissions Licence (IEL) (Environmental Protection Agency (EPA) Licence Reg. No. P0006-03). It has been prepared in accordance with Regulation 9 of the EPA (Industrial Emissions) (Licensing) Regulations, 2013, (SI No. 137 of 2013). The purpose of the baseline report is to contain the information necessary to determine the state of soil and groundwater contamination if any, as to make a quantified comparison with the state upon definitive cessation of activities.

Please refer to the overall site layout plan that accompanies this review application when reading this report.

Following a request for further information from the EPA this report has been revised to include information relating to the list of hazardous substances used on site, a further review of historical activities and previous site inventories and information on land use prior to site development.

## 1.1 Site & Operational Description

NRL is located on the western side of a large industrially zoned area in Ringaskiddy, Co. Cork. Areas of mixed agriculture and a number of small villages including Ringaskiddy itself border the industrial zone. See Figure 1.1.



**Figure 1.1** Site Location (source: annotated from <https://gis.epa.ie/EPAMaps/>)

NRL is a member of the Novartis Group of companies. Established in 1994 and in operation since 1995, the Novartis Ringaskiddy campus is home to two Novartis organisations and approximately 550 employees at the end of 2019. The site was first developed in 1989 by Sandoz (now Novartis). The two facilities are NRL, a Chemical Operations manufacturing facility and Novartis International Pharmaceutical Ltd, Branch Ireland (NIPBI) a supply organisation for Technical Operations. NRL is

engaged in the manufacture of active substances for speciality drugs used in the treatment of immunologic, dermatologic, cardiovascular, oncological and central nervous system diseases.

Up to the end of 2018 NRL's Environmental Management System and its environmental performance was reported on to the public in accordance with the Community Eco-Management and Audit Scheme (EMAS) (Registration Number IE - 002) as required under Regulation 1221/2009. NRL completed twenty two years of continuous participation in EMAS.

In 2018, NRL took the decision to migrate away from EMAS accreditation to having the site's EMS accredited to ISO14001 and from 2019 all future certification of the EMS will be to ISO14001.

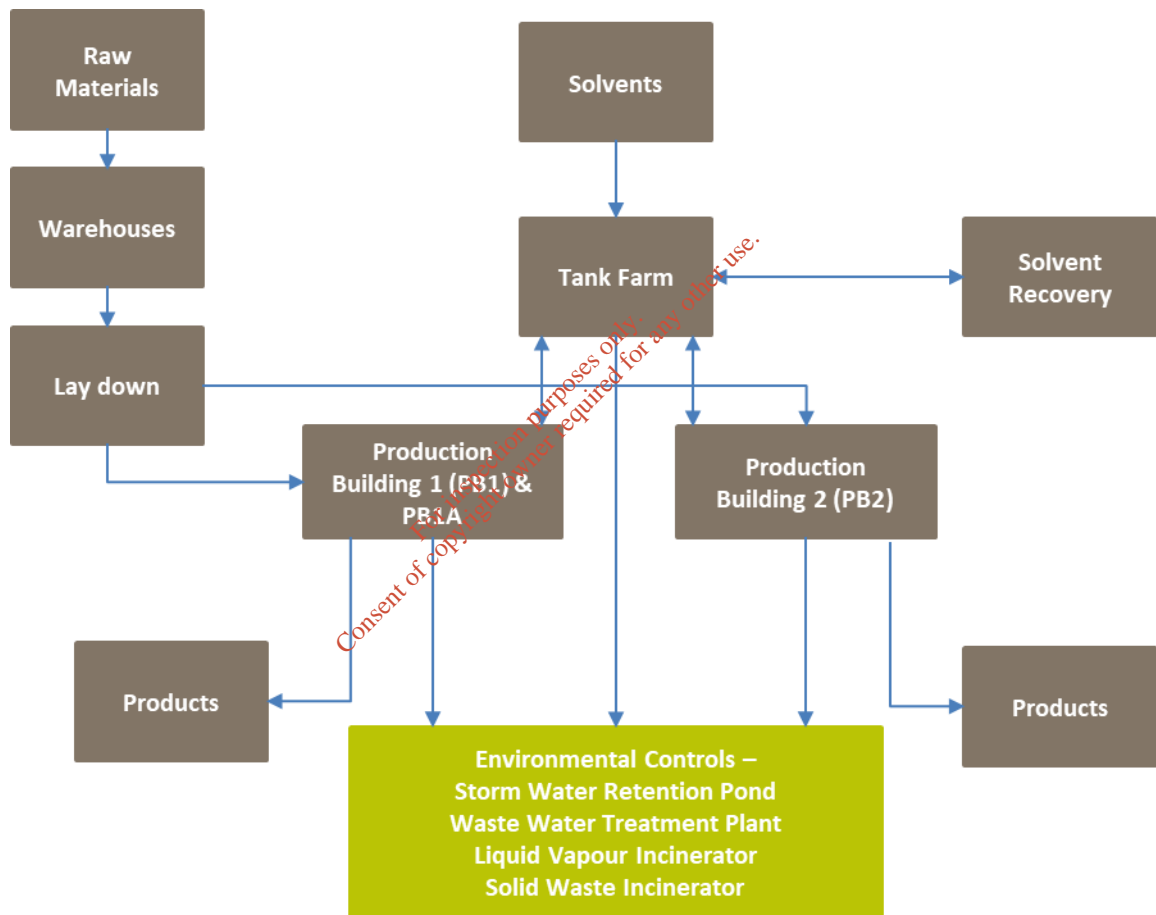
A list of site buildings and plant on site is provided in Table 1.1.

**Table 1.1** List of site buildings and plant on NRL facility.

Building/Plant Area	Function
PB1	Synthesis of bulk chemicals (Multi-synthesis)
PB1A	Annex building to PB1 for sensitive reactions
PB2	Synthesis and Purification of bulk chemicals (Predominately Cyclosporine)
Main Warehouse	Storage of raw materials (solids/powders/liquids) – Category 5, 7, 8 10 Warehouses
Category 2 Warehouse	Storage of substances liable to undergo auto-reaction or spontaneously flammable substances
Category 3 & 4 Warehouse	Storage of substances igniting or producing flammable gases when in contact with water
Category 6 Warehouse	Storage of Flammable liquids with a flashpoint of less than 56°C
Category 9 Warehouse	Storage of compressed and liquefied gases
Tank Farm	Storage of bulk liquids and solvents as raw materials
Solvent Recovery Unit	Recovery of solvents through distillation of solvents used in production
Solid Waste Incinerator (SWI)	Incineration of authorised packaging and other combustible wastes
Liquid Vapour Incinerator (LVI)	Incineration of non-recoverable solvents, process wastes and process vapours and recovery of heat from steam generation and energy conservation
Redundant Vapour Treatment Module (RVTM)	Back up abatement option for the LVI during shut downs and scheduled maintenance
Wet Electrostatic Precipitator (WESP)	Treatment of off gases from the LVI for particulates/metals
Waste Water Treatment Plant (WWTP)	Treatment of all process and effluent water prior to discharge from the site
Utility Building	Housing of gas and oil heating air compressors, water softening plant and chillers
Storage area	Housing of Fuel oil and Glycol storage tanks in addition to cooling tower and chillers
Storm water retention pond	Holding pond for any contaminated fire water or storm water discharge prior to discharge
Administration Building	Main office and admin area, including canteen, staff toilets etc.
NIPBI building	Supply chain management and QC/Reference Standards activities
Fire water tank	Storage of water for fire emergency use
Portable water tank	Storage of water
Bunded areas	Containment of spillages

Building/Plant Area	Function
Catchment Basins	Containment of spillages
Spill Basins 1 and 2	Containment of spillages
SSF	As with all process buildings
Overhead solvent lines	Transport of liquid raw materials and liquid waste materials to and from production buildings
Laboratories	Quality Control, In-Process Control, Process Development and Microbiology

Figure 1.2 gives an overview of the flow of materials, processes on site and the relationship between each working area.



**Figure 1.2** Overview of materials flow on site

A brief description of each of the areas and a summary of their processes are included in the following sections.

**Production Buildings**

There are three main production buildings on the NRL site, which perform a variety of operations required for the manufacture of active pharmaceutical ingredients, a summary of the processes undertaken within the production buildings are outlined as follows:

- Production Building 1 (PB1): This is a seven story process building which contains a variety of multi-purpose equipment ranging from reactors, crystallisers and separators, solid/liquid separators, driers, evaporators and a range of auxiliary equipment which flow from top floor down. The production lines can be configured for different production trains as required and the plant is capable of coping with all standard processes required to produce fine chemicals.

- Production Building 2 (PB2): This is a seven story process building which contains a variety of equipment such as separators, reactors, crystallisers, dissolvers or various sizes, solid/liquid separators, driers, evaporators and a range of auxiliary equipment from top floor down. Equipment within this building is used predominately for the same family of products, predominately Cyclosporine. The equipment is capable of being configured for different production trains however, this occurs on a less frequent basis.
- Production Building 1A (PB1A): This is a four story building used for process steps where a higher degree of safety and environmental protection is required. The use of water reactive chemical substances, hydrogenation, and low temperature reactions are all undertaken in this building. Much of the equipment housed in this building is similar to that contained in PB1 and PB2.

The three buildings have been designed in order to contain any releases of substances within the manufacturing process, in addition procedures are set down in order to minimise the potential for environmental risks, and these include:

- Process floor drains throughout the buildings flow directly into process drains. These drains flow into the site's WWTP lift station, but can alternatively be diverted into Spill Basin 1 in the event of a large spillage or release of liquids with high solvent concentrations.
- All production trains in the production buildings are linked to the Liquid Vapour Incinerator (LVI) for the purpose of vapour and off-gas treatment.
- HVAC system in production buildings circulate air exchange, filters are replaced on regular basis by dedicated team.
- Containment suites are used for highly potent substances.
- Raw materials are brought in on a strict requirement basis to avoid stockpiling within production buildings.

The Small Scale facility (SSF) plant is located north of Production Building 1A. The SSF was commissioned during 2008/09 and is now used for the manufacture of certain 'low volume high value' product. It is a relatively small two-storey building of modular design that will allow incorporation of additional modules as required.

### Tank Farm

This area is located to the north of the site and is used for the bulk storage of liquids, principally solvents, which are directed into production buildings via overhead pipelines. Un-reusable and un-recyclable waste solvent and process liquids awaiting incineration are stored in this area also. The Tank Farm consists of circa 100 tank compartments with capacities ranging between 25 to 100m<sup>3</sup> with a total storage capacity of 3,200m<sup>3</sup>.

The Tank Farm is remotely bunded to contain any spillages and incompatible liquids are bunded separately. The majority of materials stored in the Tank Farm are compatible. The notable exceptions are acetic acid and sodium hydroxide (caustic) which are deliberately stored in tanks located in separate catchment areas.

The primary bunds on site are operated on the basis of catchment areas, in so far as if a spill from a tank occurs then the liquid is drained away from the tank area and directed to a remote storage bund in either in Spill Basin 1 or Spill Basin 2. This procedure is in place in order to direct any flammable liquid that may have leaked from a tank away from the remaining liquid being stored within the catchment area.

Spill Basin 1 has an actual volume of 299m<sup>3</sup> and is located adjacent to the Wastewater Treatment Plant and caters for the following bund/catchment areas:

- Tank Farm Catchment Basins No.1, 2, 3, 4 and 5
- Truck Unloading Area.
- Solvent Recovery Area (East)
- Liquid Vapour Incinerator

- Bulk Storage Trailer Park
- Pumped Discharge from Spill Basin 2
- Warehouse No. 6

If any release of liquid is discharged to Spill Basin 1 then it is collected within the basin where it is assessed and then pumped to the Wastewater Treatment Plant where possible. The Bulk Storage Trailer Park has an overall capacity for fifteen Road Tankers, however it would be very unusual for all the spaces to be occupied at the same time. Of the 15 spaces, there are 3 that are permanently occupied by three 26m<sup>3</sup> tankers (at the slow fill arms) while the remaining 12 other spaces cater for trailers with a capacity of 20m<sup>3</sup>. The average number of road tankers stored in these spaces would be 6 to 7 but for the purpose of the bund capacity assessment all spaces are conservatively assumed as occupied.

Spill Basin 2 has an available volume of 162m<sup>3</sup> and is located adjacent to Catchment Basin No. 7 and caters for the following catchment basins:

- Tank Farm Catchment Basin No. 6, 7, 8, 9 and 10.

The water level within Spill Basin 2 is kept to a minimum as a result of the installed low level outlet to the surface water drain. In the event that the outlet valve is closed then the collected liquid is automatically pumped to Spill Basin 1, which ensures that the water level in Spill Basin 2 is kept to the minimum level which ensures that the maximum storage volume is maintained within Spill Basin 2. Spill Basin 2 has been designed to pump any collected liquid directly into Spill Basin No. 1. The combined capacity of the two spill basin amounts to 461m<sup>3</sup>. In the highly unlikely event that all tanks failed in the above catchment basins, the liquid would discharge to the Storm Water Retention Pond via the overflows in each spill basin.

Both Spill Basin No.1 and 2 can cater for liquid from either a single tank or multiple tank failure within an individual catchment for both the 100% and 25% rule.

In the unlikely catastrophic event of multiple tanks failing in multiple catchments basins then liquids will discharge to both Spill Basins and any excess volumes will discharge to the Storm Water Retention Pond which has a capacity of circa 10,000m<sup>3</sup> storage. This scenario has been the subject of a separate risk assessment that has been submitted to the EPA.

In 2014, NRL installed a series of three gullies along the Tank Farm road to the south of the Tank Farm. The purpose of the gullies is to provide a safe route to tertiary containment in the event of a tank failure and subsequent bund overtopping. The natural gradient in the area is a southerly flow towards the production buildings and the gullies contain any overtopping at the Tank Farm road and prevent the possibility of a flow of material to production causing a domino effect.

### **Solvent Recovery Unit**

This area is located to the north east of the site and is involved in the recovery by distillation of solvents from the processes. The unit consists of 15 distillation columns with still pots of varying capacity. Solvents awaiting recovery and recovered solvents are stored in the main Tank Farm. The recovery unit is remotely bunded to contain any spillages.

### **Warehouses**

A variety of storage warehouses are located within the NRL grounds, mostly towards the east of the site. These are used for separate storage of raw materials, products and intermediates. Each warehouse contains substances classified by their 'storage category' using the Novartis Corporate HSE warehouse guidelines. These segregate goods on their physical, ecological and toxicological properties and their combustion properties. The design of each warehouse inclusive of the layout, density of stock, fire control and other specific contingency arrangements are related to the nature of the stored goods. A series of spill trays are installed within the warehouses under the storage racks to capture any spillages and ensure that adequate bunding volume is provided for the stored materials.

## Drainage Network

The process drainage network is made up of process floor drains throughout the production buildings, which flow directly into process flow chambers external to the buildings. These chambers flow into the WWTP lift station and ultimately to the WWTP for treatment. All process drains are contained uPVC pipes (a pipe within a pipe) and are tested and inspected every three years as per the conditions of the licence. The surface water network diverts all storm flows across the site to the Storm Water Retention Pond (SWRP).

## Storm Water Retention Pond (SWRP)

The storm water retention pond is located to the south west of the site, within the lowest gradient area of the site. This consists of two separated lined holding lagoons with a combined storage capacity of 10,000m<sup>3</sup>. The pond is used to avoid the possible discharge of contaminated surface water arising from a spill and/or fire incident or other accident involving contaminated water flowing into the storm water drain system. All water flowing into this system is continuously monitored with a system in place for retaining any contaminated water in the event of exceedance of storm sewer water quality limits which can be pumped directly back to the WWTP for treatment prior to discharge.

The system delivers a warning alarm and an automatic shut off mechanism of the valve between the storm ponds and the discharge outlet when levels of pH and/or Total Organic Carbon (TOC) are at the 'warning emission levels', set by NRL. The alarm alerts the environmental control division that there is a drift in the storm water quality. A second alarm is activated when storm water levels are at 'action emission levels'. This system ensures that no contaminated water in breach of the sites IEL Emission Limit Values (ELV's) is discharged inadvertently from the facility.

## Waste Water Treatment Plant (WWTP)

This area is located to the east of the site and is used to treat all process water and sewer water prior to discharge from the site. The containment system for the chemical dosing area at the WWTP was upgraded in 2012 and included the construction of a designated bunded area for the dosing chemicals (phosphoric acid, urea and anti-foam polymers).

The three Aeration Tanks in the WWTP used a 'Jet Aeration/Mixing System' to meet the Biological Oxygen Demand (BOD). This method of aerating and mixing used a relatively large amount of energy. The one Digester tank in uses an alternative 'Diffused Aeration system'. In 2014, Novartis Ringaskiddy Limited removed the jet aeration/mixing pumps and associated pipework from the three aeration tanks and installed a high efficiency Fine Bubble Diffused Aeration System that supplies the required amount of air on demand.

During 2013, the tiled bunded area for the storage of sulphuric acid to the south of the neutralisation tank in the WWTP area was noted to be in significant disrepair. A potential spillage of acid may have lifted the tiles and compromised the integrity of the bund. NRL immediately undertook bund repair works followed by a full integrity test to ensure that integrity of the bund was reinstated. A detailed investigation indicated that no soil contamination arose as a result of the damage to the bund.

As part of the recapitalisation programme in 2016, a detailed routine maintenance regime was undertaken on the WWTP and where required all pumps, valves and other plant were replaced or upgraded as necessary.

## Liquid Vapour Incinerator (LVI)

The LVI is located in the eastern section of the site. This system is used for the destruction of non-recoverable solvents, process wastes and process vapours in addition to the recovery of heat for steam generation and energy conservation. The system consists of the following elements:

- A series of 5 liquid feed tanks
- A vapour intake system
- A combustion chamber
- A heat recovery unit to provide district heating to the production buildings.

- Cooling and washing of the flue gases in a water quench section.
- Further washing of the flue gases in a packed Chlorine scrubber.

Air emissions are monitored on a continual basis using the Continuous Emissions Monitoring System (CEMS), which compares emissions against the requirements of the European Waste Incineration Directive. The unit has an automatic shut-down system in place in the event of temperature drop, and/or emission limit value exceedance.

As a back up to the LVI, there is a Redundant Vapour Treatment Module (RVTM) located adjacent to the LVI. The RVTM operates for a total of approximately two weeks per year during periods when the LVI is undergoing maintenance. Both sources discharge through the same emission point and are subject to the same emission limit values.

### **Solid Waste Incinerator (SWI)**

The SWI is located in the eastern section of the site. This incinerator is a much smaller system than that of the LVI. It is used for the destruction of contaminated packaging and other combustible wastes. The system consists of multiple chambers fired with natural gas and a flue gas cleaning system. Air emissions are monitored on a continual basis using the CEMS which compares emissions against the requirements of the European Waste Incineration Directive. Environmental controls include automatic lock out of additional waste allowed into chambers if any of the control parameters are outside optimal operating ranges, predominately temperature ranges or exceedances in ELV's which are continually monitored.

It is noted that the SWI was not operational in 2019 and while not decommissioned, it is not envisaged that the SWI will be operational again in the short term.

## **1.2 Requirement for Baseline Report**

### **1.2.1 European Legislation**

The Industrial Emissions Directive (2010/75/EU) or 'IED' entered into force within the European Union on 6th January 2011. The IED brings together the Integrated Pollution Prevention and Control Directive (2008/1/EC), the Waste Incineration Directive (2000/76/EC) and five other directives in a single Directive on industrial emissions.

For industrial activities regulated by the IED, such as the Novartis Ringaskiddy Limited site, Article 22(2) of Chapter II of the IED states that:

*"Where the activity involves the use, production or release of relevant hazardous substances and having regard to the possibility of soil and groundwater contamination at the site of the installation, the operator shall prepare and submit to the competent authority a baseline report before starting operation of an installation or before a permit for an installation is updated for the first time after 7 January 2013.*

*The baseline report shall contain the information necessary to determine the state of soil and groundwater contamination so as to make a quantified comparison with the state upon definitive cessation of activities.*

*The baseline report shall contain at least the following information:*

- (a) Information on the present use and, where available on past uses of the site;*
- (b) Where available, existing information on soil and groundwater measurements that reflect the state at the time the report is drawn up or, alternatively, new soil and groundwater measurements having regard to the possibility of soil and groundwater contamination by those hazardous substances to be used, produced or released by the installation concerned.*

*Where information produced pursuant to other national or Union law fulfils the requirements of this paragraph that information may be included in, or attached to, the submitted baseline report. The Commission shall establish guidance on the content of the baseline report."*

## 1.2.2 Irish Legislation

Article 22(2), as part of Chapter II of the IED, was transposed into Irish national law on 23 April 2013 by the European Union (Industrial Emissions) Regulations 2013 (S.I. No. 138 of 2013) and resulting amendments to the Environmental Protection Agency Act 1992.

Section 86B of the Environmental Protection Agency Act 1992, as amended, states that:

*“(1) Where an industrial emissions directive activity involves the use, production or release of relevant hazardous substances, and having regard to the possibility of soil and groundwater contamination at the site of an installation concerned, the Agency shall require an applicant under this Part for a licence or review of a licence or revised licence relating to the activity, including such a review by the Agency of its own volition, to furnish to the Agency a baseline report in accordance with regulations under section 89.”*

*“(2) In relation to an installation, a baseline report shall contain the information necessary to determine the state of contamination of soil and groundwater at the time the report is drawn up in order that a quantified comparison may be made to the state of the site upon the permanent cessation (including cessation by abandonment) of the industrial emissions directive activity concerned and the applicant in preparing the baseline report shall include any information prescribed in regulations under section 89.”*

*“(3) Notwithstanding the generality of subsection (2), a baseline report shall include at least the following information-*

- (a) The current use and, where available, the past use of the site,*
- (b) Any available information.*

*On soil or groundwater measurements that reflect the state of the site at the time that the baseline report is drawn up, or*

*ii. On new soil and groundwater measurements, having regard to the possibility of soil and groundwater contamination by the hazardous substances proposed to be used, produced or released by the installation concerned.*

*(4) Any information furnished to the Agency or to any other body under any enactment or rule of law or a law of the European Union, which complies with the requirements of subsection (2) or (3), may be furnished to the Agency in or with the baseline report.*

*(5) For the purposes of determining the information to be contained in a baseline report under this section the Agency shall have regard to, and shall for the purposes of subsection (2), make publicly available any guidance documents published by the Commission of the European Union in accordance with Article 22(2) of the Industrial Emissions Directive.”*

## 1.3 Scope of the Report

The European Commission (EC) established guidance on 6<sup>th</sup> May 2014 on the content of the baseline report as required by Article 22(2) of the IED<sup>1</sup> and this guidance has been used in the preparation of this report.

The EC Guidance identifies key stages to be undertaken to both determine whether a baseline report needs to be produced and the order in which the baseline report is produced. The key stages are as follows:

- Stage 1: Identifying the hazardous substances that are currently used, produced or released at the installation
- Stage 2: Identifying the ‘relevant hazardous substances’<sup>2</sup>

<sup>1</sup> European Commission Guidance concerning baseline reports under Article 22 (2) of Directive 2010/75/EU on industrial emissions (2014/C 136/03)

<sup>2</sup> ‘Relevant hazardous substances’ - *“(Article 3(18) and Article 22(2), first subparagraph) are those substances or mixtures defined within Article 3 of Regulation (EC) No 1272/2008 on the classification, labelling and pack aging of substances and mixtures (CLP*

- Stage 3: Assessment of the site-specific pollution possibility
- Stage 4: Site History
- Stage 5: Environmental Setting
- Stage 6: Site Characterisation
- Stage 7: Site Investigation
- Stage 8: Production of the Baseline Report

The EC Guidance states that *'The possibility of soil and groundwater contamination at the site of the installation' (Article 22(2), first subparagraph) covers a number of important elements. Firstly, due consideration should be given in a baseline report to the quantities of hazardous substances concerned – where very small quantities are used, produced or released on the site of the installation then the possibility of contamination is likely to be insignificant for the purpose of producing a baseline report. Secondly, baseline reports must consider the soil and groundwater characteristics of the site and the impact of those characteristics on the possibility of soil and groundwater contamination taking place. Thirdly, for existing installations, their characteristics may be considered where they are such that it is impossible in practice that contamination can take place.*

This report follows the stage approach as recommended in the EC Guidance. Key references and related documents used in the compilation of this Baseline Report included the following documents:

- NRL, Annual Environmental Reports, as submitted to the EPA, 2008-2018.
- RPS Consulting Engineers, Groundwater Monitoring Update Reports, 2019, 2018, 2017, 2016.
- Groundwater Monitoring Results (Novartis, ELS) for years 2019, 2015, 2014, 2013, 2012, 2011, 2010, 2009, 2008.
- RPS Consulting Engineers, Environmental Liability Risk Assessments, 2016-2019.
- RPS Consulting Engineers, Closure, Restoration and Aftercare Management Plans, 2016-2019.
- Historical site investigation report: Novartis Ringaskiddy Limited WWTP Neutralisation Chemical Storage Area 470.762.001 Analysis of Environmental Sampling at Bund 470.762.001 (November 2013).
- Bund and pipeline integrity testing reports, as supplied by NRL, 2012 - 2019.
- Onsite chemical, solvent, waste and laboratory inventories, as supplied by NRL.
- Historical review of incidents 1993 to 2010, as supplied by NRL
- Eolas, 1989, Environmental Impact Study, Proposed Cork Facility Sandoz Ltd.
- Forbairt & Ove Arup & Partners, 1996, Sandoz Ringaskiddy Limited Environmental Impact Statement November 1996
- Arup, 2011, Novartis Ringaskiddy Limited Wind Energy Project Environmental Impact Statement - April 2011

## 1.4 Limitations

The findings herein are based on the latest guidance available and information obtained at the time of writing (June 2020). If additional information and/or guidance become available, which might alter PM Groups conclusions, we reserve the right to review such information, reassess potential risks and modify our findings, if warranted. Please note that where we refer to information in reports from others, it must be recognised that PM Group has no responsibility for the accuracy of the information contained therein.

*Regulation) which, as a result of their hazardousness, mobility, persistence and biodegradability (as well as other characteristics), are capable of contaminating soil or groundwater and are used, produced and/or released by the installation."*

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## 2 Identification of Hazardous Substances (Stage 1)

The EC Guidance states that Stage 1 should include a list of all hazardous substances used, produced or released inside the installation boundary (either as raw materials, products, intermediates, by-products, emissions, wastes or auxiliaries). Substances (both hazardous and non-hazardous) used in the manufacture of product on-site include:

- Raw materials, intermediates and reagents (organic and inorganic compounds)
- Solvents
- Filter aids.

Other chemicals used on site include:

- Cleaning solutions
- Bench top quantities of laboratory reagents
- Lubricants for utility equipment
- Wastewater treatment plant dosing chemicals
- Water treatment chemicals
- Fuels; and Refrigerants

Materials generated by the activity include:

- Active pharmaceutical ingredients and their intermediates
- Process-related hazardous and non-hazardous wastes
- Effluent and Sludge.

Hazardous wastes generated on site include:

- Bottom Ash from incinerator operations
- Solvents.
- WWTP Effluent
- Laboratory Wastes
- Off-specification Raw Materials
- Aqueous liquid washings.
- Contaminated solid wastes e.g. IPA/ethanol wipes, organic contaminated sharps
- Miscellaneous (minor sources), including waste oils, batteries, unused paints, etc.

The Hazard Statements for each material/substance of NRL was obtained from NRL inventory records and from the European Chemicals Agency (ECA) Classification & Labelling Inventory database <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>. Storage and volumes of substances was detailed in the NRL site documentation.

Appendix C includes a list of all hazardous substances that are used, produced or released inside the installation boundary.

### 3 Identification of 'Relevant Hazardous Substances' (Stage 2)

'Relevant hazardous substances' (Article 3(18) and Article 22(2), first subparagraph) are those substances or mixtures defined within Article 3 of Regulation (EC) No 1272/2008 on the classification, labelling and pack aging of substances and mixtures (CLP Regulation) which, as a result of their hazardousness, mobility, persistence and biodegradability (as well as other characteristics), are capable of contaminating soil or groundwater and are used, produced and/or released by the installation.

Article 3 of Regulation (EC) No. 1272/2008 defines a hazardous substance as *a substance or a mixture fulfilling the criteria relating to physical hazards, health hazards or environmental hazards, laid down in Parts 2 to 5 of Annex I is hazardous and shall be classified in relation to the respective hazard classes provided for in that Annex.*

Part 2 sets out the list of physical hazards (oxidising, flammable, etc.)

Part 3 sets out the health hazards (toxicity, irritants, etc.)

Part 4 sets out the environmental hazards (hazards to the aquatic environment)

Part 5 sets out additional EU hazard classes.

Hazardous substances, as defined by the EPA Document *Classification of Hazardous and Non-Hazardous Substances in Groundwater (2010)*, are substances or groups of substances that are toxic and persistent and liable to bio-accumulate, and other substances or groups of substances which give rise to an equivalent level of concern.

A review of the substances listed in inventories supplied by NRL was undertaken to identify any substances employed at NRL facility that are defined as "relevant hazardous substances". This includes all raw materials, fuels, intermediates and products used and stored at the site. Cleaning, laboratory chemicals and waste streams inventories were also reviewed as part of this baseline report. Any substances stored in a solid or gas state was removed from the list.

The first screening of the substances identified in Stage 1 as 'Relevant hazardous substances' is based on the EPA Classification of Hazardous and Non-Hazardous Substances in Groundwater (EPA, 2010) or if the substances contain any of the H400 series of Hazard phrases as defined under the CLP Regulations.

The second screening is based upon both quantities and the form of the substances, i.e. **the physical state of substances that are used and stored on site, e.g. solids and gases can be removed from the list as part of the screening process as their physical state means that are unlikely to result in contamination.** It is noted the EC Guidance states that *"where very small quantities are used, produced or released on the site of the installation then the possibility of contamination is likely to be insignificant for the purpose of producing a baseline report"*. A number of substances listed in site inventories are stored in relatively small quantities (e.g. laboratory chemicals) and are therefore excluded for the purposes of this Baseline Report.

Several products and intermediates that might be considered hazardous to the environment are produced on site. These substances are processed and handled using highly controlled procedures and processes due to the value of the substances. These substances are not stored in bulk and are produced in the production buildings. In the event of a spill within the production buildings, liquids would discharge to process drain and on to a remote bund (Spill Basin 1), which is located at the WWTP. From here a decision can be made whether to treat the material in the WWTP or whether it needs to be safely removed for off-site treatment.

Due to highly controlled processes and procedures and the storage methods used on site, the likelihood of products and intermediaries entering soil and/or groundwater is considered very low and products and intermediary substances have been screened out as a 'Relevant hazardous substances'.

Following the above review a number of substances were identified as **potential** "relevant hazardous substances" requiring further assessment in Stage 3. Details are included in Appendix A.

## 4 Assessment of the Site-Specific Pollution Possibility (Stage 3)

For each hazardous substance brought forward from Stage 2, the possibility of “*whether the circumstances exist which may result in the release of the substance in sufficient quantities to represent a pollution risk, either as a single emission or as a result of accumulation from multiple emissions*” requires assessment.

The EC Guidance states that each substance should be considered in the context of the site to determine whether circumstances exist which may result in the release of the substance in sufficient quantities to represent a pollution risk either as a result of a single emission or as a result of accumulation from multiple emissions.

This section provides an assessment of the following specific issues:

- The quantity of each hazardous substance handled, produced or emitted each year relative to its toxicity
- The location of each hazardous substance on the site e.g. where it is delivered, stored, used, moved around the site, emitted
- At each of the above locations, identify the method of storage, handling and use of raw materials, products, emissions, wastes etc. and whether there are any containment mechanisms to prevent emissions occurring e.g. bunds, hard standing, handling procedures.
- Undertake physical inspection of the site to determine the integrity of containment mechanisms, nature and condition of site surfacing, location of drains, services or other potential conduits for migration.

The following relevant factors regarding both the likelihood and consequences of a release of relevant hazardous substances was also reviewed in this section:

- Review of historical environmental incidents.
- Integrity of bunds, process and foul process and storm water drainage onsite.
- Site characterisation and environmental setting

### 4.1 Quantity/location of potential ‘Relevant Hazardous Substances’

The details regarding the potential ‘relevant hazardous substances’, raw materials and process inputs are listed in Table A.1 are stored across site in warehouses and banded areas in Integrated Bulk Containers (IBCs), drums, vessels or tanks.

Materials in Table A.2 are solvents and solvent wastes in the tank farm onsite.

Materials in Table A.3 are waste stored in different locations across site.

### 4.2 Methods of Storage, Handling or Use

In accordance with Section 5.1.2.2 of the BREF Document for the Manufacture of Organic Fine Chemicals, August 2006 the following gives the status of measures at NRL to prevent a potential risk of contamination to ground and groundwater.

1. **BAT is to design, build, operate and maintain facilities, where substances (usually liquids) which represent a potential risk of contamination of ground and groundwater / surface waters, are handled in such a way that no spills occur. Facilities have to be sealed, stable and sufficiently resistant against possible mechanical, thermal or chemical stress. (BREF Document Section 5.1.2.2)**
  - The primary bunds on site are operated on the basis of catchment areas and directed to a remote storage bund in either Spill Basin 1 or Spill Basin 2
  - Spill Basins 1 and 2 are fitted with high level alarms. Sumps in the Catchment Basins that feed the spill basins are fitted with level detection. Sumps on the process aqueous wastewater network are fitted with high and low level alarms. All high and low level alarms feed back to the Distributed Control System (DCS)

- Site storage tanks and pipelines are on planned routine inspection programme (Risk Based Inspection programme) in accordance with IE Licence Requirements.
- A preventive maintenance (PM) system is in place through which routine maintenance checks are carried out and results recorded e.g. pipelines are visually inspected weekly for leaks
- The storm water drains flow into the storm water retention/fire water retention pond, which consists of two compartments, and out to Cork County Council storm water sewer. Water flowing into the retention ponds is monitored continuously for pH and TOC. In the event of the pH and TOC readings at or above the action trigger limits, the storm water is retained.

**2. BAT is to enable leakages to be quickly and reliably recognised (BREF Document Section 5.1.2.2)**

- Site storage tanks and pipelines are on planned routine inspection programme (Risk Based Inspection programme) in accordance with IE Licence Requirements. A preventive maintenance (PM) system is in place through which routine maintenance checks are carried out and results recorded for e.g. pipelines are visually inspected weekly for leaks

**3. BAT is to provide sufficient retention volumes to safely retain spills and leaking substances in order to enable treatment or disposal (BREF Document Section 5.1.2.2).**

- The primary bunds on site are operated on the basis of catchment areas and directed to a remote storage bund in either Spill Basin 1 or Spill Basin 2.
- The storm water drains flow into the storm water retention/fire water retention pond, which consists of two compartments, and out to Cork County Council storm water sewer. Water flowing into the retention ponds is monitored continuously for pH and TOC. In the event of the pH and TOC readings at or above the action trigger limits, the storm water is retained.

**4. BAT is to provide sufficient retention volume to safely retain firefighting water and contaminated surface water (BREF Document Section 5.1.2.2).**

The site has two surface water and fire water retention ponds. A 2009 Arup report "*Surface Water Drainage & Fire Water Retention Pond Assessment*", indicated that a total pond retention volume of 9000 m<sup>3</sup> was needed to provide sufficient retention volume for both surface water and fire water containment. An update of this report in 2010 confirmed that following civil works on the ponds, the total retention volume was increased to 9975 m<sup>3</sup>.

The capacity Firewater Retention Pond was increased onsite from 5,000m<sup>3</sup> to 10,000 m<sup>3</sup> installed on the site as a safeguard measure, and to mitigate even the lowest risk of potentially polluted run-off being released to the environment.

**5. BAT is to apply the following techniques (BREF Document Section 5.1.2.2)**

- a) **carrying out loading and unloading only in designated areas protected against leakage run-off**
  - b) **storing and collecting materials awaiting disposal in designated areas protected against leakage run-off**
  - c) **fitting all pump sumps or other treatment plant chambers from which spillage might occur with high liquid level alarms or regularly supervising pump sumps by personnel instead**
  - d) **establishing programmes for testing and inspecting tanks and pipelines including flanges and valves**
  - e) **providing spill control equipment, such as containment booms and suitable absorbent material**
  - f) **testing and demonstrating the integrity of bunds**
  - g) **Equipping tanks with overflow prevention.**
- There are two remote bunds on site, Spill Basin 1 and Spill Basin 2. Spill Basin 1 serves open catchment basins 1-5 in the Tank Farm; the truck unloading area in the Tank farm; the Solvent

Recovery and Liquid Vapour Incinerator areas; the bulk liquid storage trailer park; Warehouse Number 6; and any pumped discharge from Spill Basin 2. Spill Basin 2, serves the open catchment basins 6- 10 in the Tank Farm

- Spill Basins 1 and 2 are fitted with high level alarms
- Sumps in the Catchment Basins that feed Spill Basins 1 and 2 are fitted with LEL detection. Sumps on the process aqueous wastewater network are fitted with high and low level alarms. All high and low level alarms feed back to the Distributed Control System (DCS)
- Site storage tanks and pipelines are on planned routine inspection programme (Risk Based Inspection programme) in accordance with IE Licence Requirements. A preventive maintenance (PM) system is in place through which routine maintenance checks are carried out and results recorded
- Spill kits are available as required on site. They are serviced on a regular basis by a third-party company; and are kept tagged to ensure that the contents are only accessed if needed
- All bulk storage vessels are fitted with high and low level alarms that feed back to the DCS and a secondary instrument for high-high level

#### 4.3 Historical Environmental Incidents

Refer to Site History (Stage 4) in Section 5.

#### 4.4 Integrity of Bunds, Foul Drains and Process Drains

Under Condition 3.6.5 of the site's IE Licence, NRL is required to test the integrity and water tightness of all underground pipes, tanks, bunding structures and containers at least once every three years.

The testing groups, areas for bunds onsite include:

1. Remote bunded sewer system (which drains onsite 'catchment basins' (for the tank farm) and warehouse 6) which drain to spills basins 1, 2.
2. Process sewer system (drains production areas/buildings, laboratories and warehouses 5, 8 in the main warehouse, draining to the WWTP).
3. Sanitary sewer system (drains site toilets, sinks and showers to the site WWTP).
4. Storm water (drains yard area and potential overflows on road areas onsite to the storm water pond onsite).
5. Mobile and outdoor Bunds (in warehouses, cooling tower dosing tank, road tanker storage area, engineering stores, utility service yard)
6. Permanent Bunds (Catchment Basin, Warehouse sumps and channels, outside bunds around site (e.g. warehouses, chemstores, glycol, fuel oil bunds), Solvent Recovery Bund, Liquid Vapour Incinerator, Truck Unloading Area, Area 655 (Tanker offloading area)).

Any defects that are observed from any pipeline/bund testing rounds are repaired in an ongoing program onsite, to remediate any defective bunds or pipework.

Integrity test reports from years 2012, 2015 and 2018 were reviewed as part of this assessment. The following was noted from the review of the 2018 reports:

1. The remote bunded sewer system pipework was found to be in good condition.
2. Process sewer system was overall found to be in good condition on inspection, with some minor repairs needed at four manholes (P45, P47, P76, and P77).
3. Sanitary sewer system: According to the report, air testing was complete and "The network at present is operationally functioning, but in relation to the requirements as set out in the EPA Guidelines, the sanitary network falls short due to the defects in the lines". All the relevant repairs to the sanitary sewer system and subsequent retesting were complete by May 2020.

4. Storm water drain system: 120 grade 5 structural issues were identified. Grade 5 structural issues are identified as “*Best practice suggests that the pipe is at high risk of backing up or causing flooding.*” All Grade 4 and 5 repairs to the storm water drain system and subsequent retesting were complete by May 2020.
5. Mobile Bunds (warehouses, utilities, WWTP): All bunds passed the 2018 tests.
6. Permanent Bunds: Some minor repair works for cracks were identified for the fuel bund and glycol bund. Catchment basins 1-10 passed with minor issues with shrinkage and pitting on basin walls requiring repair. All other permanent bunds (Warehouse sumps and channels, outside bunds around site) were found to be in good working order. Spill Basins 1 and 2 were found to be in good order. The tanker unloading area, solid waste incinerator bund and the liquid vapour incinerator (ground floor and liquid waste tank bunds) all passed their integrity tests, with minor repair recommendations. All the relevant repairs to the permanent bunds and subsequent retesting were complete by May 2020

#### 4.5 Existing Environment

Refer to Environmental Setting (Stage 5) in Section 6.0.

#### 4.6 Conclusion on ‘Relevant Hazardous Substances’

The relevant hazardous substances identified in Stage 2 were assessed based on their:

- Storage and usage location;
- Usage quantity;
- Storage and transport methods; and,
- Review of secondary containment systems and procedures.

Based on the information provided by NRE, it is expected that, as a result of current storage, containment and handling practices, the likelihood of possible significant impact to soils and groundwater from the on-site hazardous substances is low.

After completion of the screening process in Stage 3, the following relevant hazardous substances were identified:

- Orthophosphate
- Manganese
- Methyl Tert-Butyl Ether (MTBE)
- Zinc
- Aluminium,
- Total Cyanide
- Dichloromethane
- Naphthalene
- Chrysene
- Chloride
- Ammonia
- Cyclohexane
- n-Heptane
- Tetrahydrofuran (THF)
- Diesel

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However, it is noted that orthophosphate and manganese is not used or stored on site. Monitoring should continue in two subsequent biannual groundwater monitoring rounds. If they are not reported as detected, then their removal from further sampling events should be agreed with the EPA.

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## 5 Site History (Stage 4)

The facility was first established by Sandoz in 1989. Previous to 1989 the site was agricultural.

### 5.1 Previous Site Use

Figure 5.1 shows the site prior to development. This photo was taken in 1989 and included in the EIS that accompanied the original Sandoz planning application in 1989.



Figure 5.1 Aerial Photo of the Greenfield site prior to development. X marks location.

The site itself was composed principally of a number of large fields in pasture. There are a few hedgerows on the site and electrical fencing has been used for animal containment.

The main categories of land use on the Ringaskiddy Peninsula at that time were agriculture, manufacturing industry, housing and public utilities. Other land uses can also be identified and that are significant in the include amenity land, extractive land, commercial use and public buildings.

Agriculture is clearly the predominant land use accounting for approximately 70-80% of the total land area and reflecting the essentially rural character of the area. The extent of agricultural activity in the area is not surprising given the gently undulating nature of the local topography and the good quality of the land.

At the more local level the site itself was bounded to the north by a mix of agricultural, industrial and public utility uses. To the east was bounded by agricultural use. To the south there is also a mix of agricultural, industrial and public utility uses. To the west of the site there is a mix of agricultural and residential uses.

In summary, the Ringaskiddy Peninsula at the time prior to construction of the existing facility (1989) was an area that while still predominantly rural in character, as reflected in the main land use, which is still agriculture, was increasingly a mixed use area as a result, in particular, of the development of manufacturing industry, housing and port facilities. At that time most of the land area on the Ringaskiddy Peninsula was zoned and fully serviced for industrial development.

### 5.2 Compliance History

A review of environmental incidents, as reported in the Annual Environmental Reports (AERs) submitted to the EPA since commencement of operations was undertaken for the period 2008 to present. There have been no major environmental incidents onsite in the period 2008 to present. All Environmental incidents reported from 2008 to present were judged to be minor deviations and

did not present the potential for having an adverse effect on the local environment. There have been no significant spillages in the period at the facility associated with an adverse environmental impact (air, water, soil, flora and fauna).

### Compliance History

The following is a summary of the compliance status of the NRL facility in relation to aqueous emissions.

2018 - all parameters were 100% compliance with the exceptions of Total Suspended Solids (99% compliance), COD (>99% compliance) and pH (>99% compliance).

2017 – discharges from the WWTP showed >99% compliance with the limits specified in the licence. Only TSS (99% compliance) shows periodic breaches (3 breaches out of 365 readings in 2017) with all other parameters within the ELVs. It is also noted that during 2017 there were breaches of the IE Licence with regards to the annual toxicity analysis of the effluent discharge.

2016 - discharges from the WWTP (emission point 100) showed >98% compliance with the limits specified in the licence. Only Suspended Solids (99% compliance) and COD (98% compliance) show periodic breaches with all other parameters within the ELVs.

2015 - there was one exceedance for Suspended Solids and one exceedance for COD on this discharge and all other discharges were in compliance.

2014 - 100% compliance with the ELVs of the Industrial Emissions licence.

2013 - emissions from the waste water treatment plan demonstrated 100% compliance with the ELVs, with the exception of Total Suspended Solids and Chemical Oxygen Demand, which demonstrated 97% compliance (Non-compliance – 10 out of 365 readings) and 89% compliance (Noncompliance – 41 out of 365 readings) respectively. A rapid Root Cause Investigation was carried out by Novartis Ringaskiddy Limited management over a number of weeks and identified the root cause as the use of a new sanitising agent in some of the production clean rooms, which was introduced at a time when the WWTP was operating on one aeration basin. A number of continuing corrective actions were implemented.

The quality of the groundwater beneath the facility has remained the same as that established prior to the commencement of the development at Novartis Ringaskiddy Limited.

All surface water leaving the site was monitored, found to be of an acceptable quality for discharge and conformed to the requirements of the IEL Register Number P0006-03.

NRL has maintained a hard copy Register of Communication with the EPA since 1993. The contents of these files between 1993 and 2010 were reviewed and no significant events involving spillages to soil or groundwater were noted. No notifiable events took place on-site, which would have resulted in such contamination.

NRL has maintained a hard copy Register of Communication with its Planning Authority Cork County Council since 1993. Again, the contents of these files between 1993 and 2010 were reviewed and no significant events involving spillages to soil or groundwater were noted. No notifiable events took place on-site, which would have resulted in such contamination.

The company's own Environmental Log (part of its Register of Environmental Effects) was also reviewed for the years 1994 to 2010 and no significant events were noted.

All Annual Environmental Reports between 2000 and 2010 were reviewed with no significant events being noted. Environmental monitoring data submitted to the EPA between 1994 and 2000 was reviewed and any deviations were of a minor and technical nature.

NRL has maintained a hard copy Register of Communication covering Environmental Complaints since 1993. The contents of these files were reviewed between 1993 and 2010 and no items of major concern were noted. All events were of a short and transient nature and a significant number not related to site activities at all.

Some events of note from the years 1993 to 2010 –

- Issue with toxicity in the treated effluent in early 1998. The source was identified as being related to one particular production process and subsequent discharges from the process were routed for incineration.
- Spillage of Ethyl Acetate from Production Building 2 in August of 1998. This spill was retained in both Spill Basin 1 and also the Storm Water Retention Pond. There was no loss to grade or externally off-site via the surface water discharge. The material was collected for incineration with some smaller amounts being treated in the Wastewater Treatment Plant.
- Upgrading of the Process Lift Station in the Wastewater Treatment Plant as a precautionary measure identified in the facility's first iteration of the company's Environmental Liability Risk Assessment. An additional groundwater monitoring well was also installed at this time and indicated no legacy issues.
- Fire on conveyor system of the Solid Waste Incinerator in June of 2009. The event occurred when a small amount of solvent wet solid waste flashed back from the primary combustion chamber. It was dealt with automatically and by local intervention with no run-off of firewater to soil.
- Installation of a Wet Electrostatic Precipitator on the Liquid Vapour Incinerator in 2011 to cater for elevated levels of inorganic salts in the solvent waste being incinerated. Some minor compliance issues were noted prior to this project although all of a short term and transient nature.
- Installation of a scrubbing system on the Redundant Vapour Treatment Module of the Liquid Vapour Incinerator in 2013/2014 to cater for vapour streams containing HCl vapours. Some minor compliance issues were noted prior to this project although all of a short term and transient nature.

### Groundwater

As part of the site's licence, emissions to groundwater are monitored on a bi-annual basis at four groundwater monitoring wells (MW-1, MW-2, MW-3, MW-6 and AW-6) all located within the grounds of the facility. The locations of the wells have been chosen to represent the most vulnerable areas down gradient of groundwater flowing throughout the site. The use of an additional borehole (Reference MW5) was introduced in 2017 following on from a recommendation in the RPS Groundwater Monitoring Report (Report Reference EWD72726.001/002b). This is an additional sampling location downstream of the main production buildings.

Monitoring parameters are as per Schedule C6 of the existing licence. The quality of groundwater is assessed annually in terms of changes between baseline sampling year (1995) and each year. The solvents monitored for this program is listed in Table 5.1.

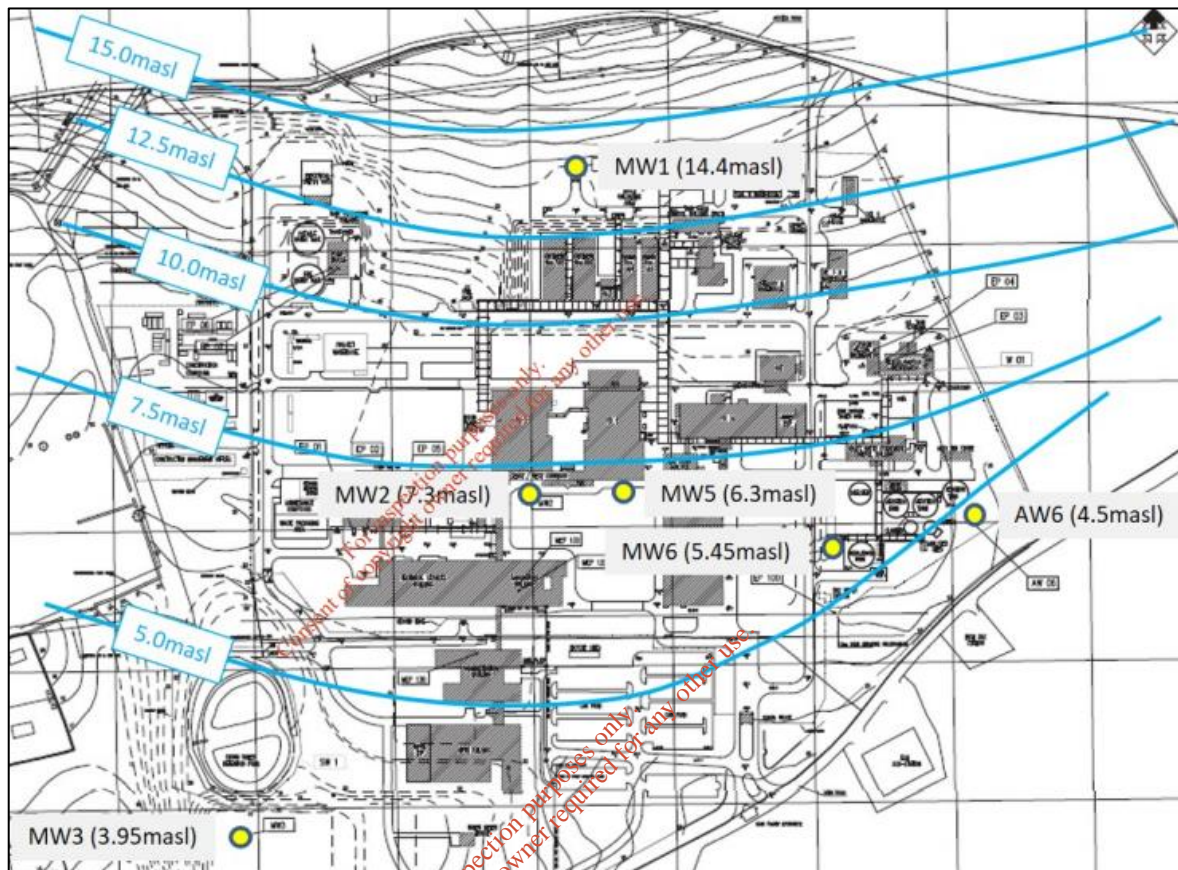
**Table 5.1 Solvents onsite monitored in biannual groundwater sampling program**

Solvent Monitored in Year	2015	2016	2017	2018	2019	Groundwater Threshold Specified
3-methyl-1-butanol	No	No	No	No	No	No
Acetic Acid	Yes	No	No	No	No	No
Acetone	Yes	Yes	Yes	Yes	Yes	No
Acetonitrile	Yes	No	Yes	Yes	Yes	No
Butanol	Yes	No	Yes	Yes	Yes	No
Butyl Acetate	No	No	No	No	No	No
Caustic	No	No	No	No	No	No
Cyclohexane	Yes	No	Yes	Yes	Yes	No
Dimethyl formamide	Yes	No	No	Yes	Yes	No
Ethanol	Yes	No	Yes	Yes	Yes	No

Solvent Monitored in Year	2015	2016	2017	2018	2019	Groundwater Threshold Specified
Ethyl Acetate	Yes	No	Yes	Yes	Yes	No
Heptane	Yes	No	Yes	Yes	Yes	No
Isopropyl Acetate	Yes	No	Yes	Yes	Yes	No
Isopropyl Alcohol	No	No	No	No	No	No
Methanol	Yes	No	Yes	Yes	Yes	No
Methyl Ethyl Ketone	No	No	No	No	No	No
n-Methylpiperazine	No	No	No	No	No	No
t amyl-alcohol	No	No	No	No	No	No
Tert. Butyl Methyl Ether (MTBE)	Yes	Yes	Yes	Yes	Yes	Yes
Tetrahydrofuran	Yes	No	Yes	Yes	Yes	Yes
Toluene	Yes	Yes	Yes	Yes	Yes	Yes

(Source RPS 2019)

MW1 is up gradient of site and is intended to monitor groundwater quality entering the site from the north. Wells MW2 and MW5 (which was installed in 2017) are both located down gradient of production buildings onsite. Wells AW6 and MW6 (which was installed in 2010) are located down gradient of the site WWTP. MW3 is located down gradient of all buildings, in the southwest corner of site. Groundwater is inferred to flow from MW1 to MW2 to MW3 along a south-westerly flow path, with MW3 acting as a guide, receptor of up-gradient site groundwater quality (see figure 7.1 Conceptual Site Model). The NRL site is located in an area of sandstone and limestone (karst) geology. Subsoil thickness across site ranges from 3-20 metres in depth, the depth of the water-table in the bedrock aquifer within the footprint of the site is generally between 10m and 20m below ground level. This is discussed in more detail in Section 6, Environmental Setting.



**Figure 5.1** Groundwater monitoring well locations and elevation contours (RPS, 2019)

The biannual 2018 groundwater monitoring report which assessed all monitoring results and trends from 1995, 2013 to 2018. The 2019 results were assessed from groundwater sample laboratory results and a draft groundwater report summary provided by NRL Ltd. The key points are as follows:

- There has consistently elevated results for orthophosphate and ammonia in the period 2013-2018. In 2018, this has occurred at AW6, located adjacent to the waste water treatment facility and at MW6, down-gradient of the waste water treatment facility. However, orthophosphate and ammonia has also been and periodically exceeded the relevant threshold values at other wells both up- and down-gradient locations across the site. On-going monitoring and trend analysis has continued onsite. The 2018 report concluded that the likely source of these pollutants in the groundwater onsite is from agricultural practices in the area. In 2019, ammonia results at all wells were below the GTV. Orthophosphates was above the GTV in well MW1 in May 2019 (0.072 mg/l) and well AW6 (0.305 mg/l). All results were below GTV in November 2019 at all wells.
- Manganese exceeded its IGV at wells MW1 (up gradient) and wells MW2, AW6, MW5, and MW6 (down gradient) 2013-2018 monitoring rounds. On 11 occasions, the IGV was exceeded in down gradient wells during 2013-2018. Manganese concentrations exceeded the IGV at MW2 in May and November 2019 and exceeded the IGV at MW6 in November 2019. However, as mentioned in section 4.6 of this report, manganese is not used or stored on site.
- For groundwater monitoring results from 1995 to 2018 the RPS report did not find any significant issues associated with solvents. Methyl Tert-Butyl Ether (MTBE) has been detected periodically onsite. In February 2016 and August 2017, (MTBE) was detected at AW6 at concentrations of 0.6 and 4.8µg/l, respectively, below both the GTV (10 µg/l) or the IGV (30 µg/l). At MW5, a MTBE concentration of 1.8µg/l was detected in August 2017, again below the relevant thresholds. In November 2019, it was detected at wells MW2, (3.2 µg/l), MW3 (0.8 µg/l), MW5, (0.7 µg/l), and MW6 (3.9 µg/l). All results in 2019 were below the GTV (10 µg/l).

- From 2013 to 2018, aluminium, arsenic, chromium, copper, iron, lead, mercury, nickel and zinc were detected in groundwater within the monitoring period. However, in all cases the concentrations detected were below the relevant GTV and IGV threshold values, with the exception of dissolved zinc above the GTV at AW6 (120µg/l) in October 2018. AW6 is located adjacent to the Waste Water Treatment Plant (WWTP) which was identified in the 2018 report as a potential source of metal contamination. However previous zinc concentrations at AW6 have not been above the GTV. The second monitoring location, MW6, down-gradient of the WWTP, has not recorded dissolved zinc concentrations above 5µg/l between 2013 and 2018. In 2019, results for zinc were below the GTV at both wells. Aluminium was elevated at 570 µg/l in May 2019 at well MW6, but this had returned to levels below GTV in November 2019.
- Total Cyanide concentrations exceeded the IGV at MW6 in May 2019.
- Calcium, magnesium, nitrate, nitrite and sodium concentrations detected in groundwater did not exceed the respective GTV and IGV thresholds from 2013 to 2018.
- Exceedances of groundwater threshold values were detected for certain hydrocarbons in 2017. This was not found in 1995, 2013-2016 period. Dichloromethane was above the IGV threshold at MW1 (up gradient of site) and MW2 in May 2017. Dichloromethane concentrations increased from 13.5µg/l to 35.6µg/l between MW1 and MW2, before subsequently decreasing to 9µg/l at MW3 (May 2017) (below the GTV). The presence of dichloromethane up-gradient of site works suggests that any potential source of the dichloromethane may be off-site. This would indicate it was unlikely that there was any potential off-site migration of dichloromethane impacted groundwater. An alternative explanation mentioned in the 2018 report may have been sample contamination or laboratory error as indicated in results (as discussed above). Dichloromethane was below detection at all the monitoring wells in the following sampling rounds in August 2017, March 2018 and October 2018. Indeno (123-cd) Pyrene was found in November 2019 round at wells MW2 (0.012 µg/l) and AW6 (0.007 µg/l). Results were below the GTV of 0.075 µg/l for sum of total Poly Aromatic Hydrocarbons (PAH).
- Naphthalene was detected at a number of wells onsite 2017 and 2018. Naphthalene is not used directly as a chemical onsite at Novartis. The inconsistent results for both are believed to be potentially linked to sample contamination and/or laboratory analysis error. Naphthalene was not detected on monitoring of wells in 2019.
- Chrysene was detected above the IGV and GTV at MW2 in May 2017 but was below the laboratory detection limit in August 2017. It was detected again (but below threshold values) at MW2 in both 2018 monitoring rounds. Chrysene was detected below IGV GTV threshold values in May 2017 at MW5, in both 2017 monitoring rounds at AW6 and in both 2018 monitoring rounds at MW6. In 2019, it was also detected in Nov 2019 at well MW5 (0.007 µg/l). Chrysene is not used as a chemical onsite.

The 2018 groundwater report concludes overall for the 2013-2018 data that “*The CSM does not highlight any clear Source-Pathway-Receptor linkage which would lead to a worse than low risk classification for the site. While there are potential sources of contamination on the site there are adequate mitigation measures in place to act as a barrier to groundwater pollution, breaking the pathway link.*” Ongoing monitoring was recommended for elevated parameters. The 2019 groundwater laboratory cert results when assessed overall would support these findings.

### Soils

As outlined in section 4.4, issues were identified with the WWTP bund (no.470.762.001), the Neutralisation Chemical Storage Area in September 2013. The foundation on the southern side of the bund failed a NRL visual inspection, which has noted that the foundation on the southern side of the bund was damaged (possibly due to a potential sulphuric acid leak). The area was excavated and the testing of soils and there found no adverse impact on soils.

### Surface Water

Discharge from the surface water system from site monitored in the period 2008-2019 met the requirements for parameters measured and conformed to requirements of the conformed to the requirements of the IE Licence Register Number P0006-03.

## 6 Environmental Setting (Stage 5)

Details of the site's physical setting are outlined in Table 6.1. The conceptual site model is presented in Figure 7.1.

**Table 6.1 Environmental Setting**

Feature	Details & Comments
Soils & Subsoils	<p>The EPA and Teagasc Soil maps indicates that the soils directly underlying the site is made ground. The soils in land surrounding site are composed of Sandstone Till (Devonian). The site soils is composed of the made ground overlying this glacial till.</p> <p>Subsoil thickness varies across site. This is due to the variable rock head elevation of the underlying bedrock. In the northern half of the site, subsoil thickness varies between 5-10m, with a small area of rock outcrop to the western area of site (karstified limestone at the surface). For the southern half of the site, subsoil thickness varies between 10-20m. (RPS Groundwater Monitoring Update Report 2019).</p>
Geology	<p>According to the EPA, Geological Survey of Ireland (GSI) and Teagasc Land &amp; Soil maps, the regional geology of the Ringaskiddy area comprises of folded and faulted Lower Carboniferous (Dinantian) limestones, sandstones and mudstones, which are divided into:</p> <ul style="list-style-type: none"> <li>- Waulsortian Limestones formation: Consists of pale grey massive limestones, from the Palaeozoic, Carboniferous, Mississippian ages.</li> <li>- Cuskinny Member (Kinsale Formation) Consists of interbedded sandstones and mudstones &amp; thin limestone from the Palaeozoic, Carboniferous, Mississippian ages.</li> </ul> <p>The NRL Ltd site lies to the South and within an anticlinal fold, which strikes east-west through the Ringaskiddy area. The majority of site is underlain by rocks of the Waulsortian Limestones. Some areas in the site (the northern half of the tank farm buildings and some of the utility service area tanks) are underlain by Cuskinny Member sandstone, mudstones. The boundary between sandstone and limestone dissects the Novartis site with an associated east-west faulting and north-south jointing.</p>
Hydrogeology	<p>The NRL site falls with the Ringaskiddy Groundwater Body (GWB). The GWB is approximately 16.7km<sup>2</sup> in extent, occupying an east-west trending valley on the west of Cork Harbour. The GWB is composed primarily of diffusely karstified, highly permeable Waulsortian limestone which is bounded to the north and south by ridges of low permeability sandstones. The limestone is characterised as Locally Important (L) with Bedrock that is karstified to a limited degree of limited area (Lk). The sandstone is classified as Moderately Productive only in Local Zones (LI).</p> <p>Enhanced groundwater flow is likely through these fracture zones with fractures and conduits enlarged via karstification in the limestone. Water level data recorded on site indicates the water-table is located just above the bedrock surface. This suggests that groundwater flow is likely to concentrate in the upper few metres of the limestone bedrock which according to the GSI is highly karstified, weathered limestone. Below the weathered zone, flows to maximum depths of approximately 40m are likely through enlarged conduit and cave systems and through smaller fractures and joints outside the larger conduits.</p> <p>The site is composed primarily of made ground overlying a superficial layer of glacial till. Given the variable rockhead elevation of the underlying bedrock, subsoil thickness varies substantially over short distances. In the northern half of the site, subsoil thickness is generally 5-10m, with a small area of outcrop. Over the southern half of the site, subsoil thickness increases to 10-20m. The majority of the area within the site is characterised as High Vulnerability with areas of Extreme Vulnerability along the north and south of the site.</p> <p>Well Search:</p> <p>The interpreted groundwater flow direction is a general North East to South West &amp; South East direction (RPS Groundwater Monitoring Update Report 2019). The closest GSI mapped groundwater well (with an abstraction zone and abstraction yield) in the direction of ground water flow is approximately 0.11 km west of the site boundary (GSI</p>

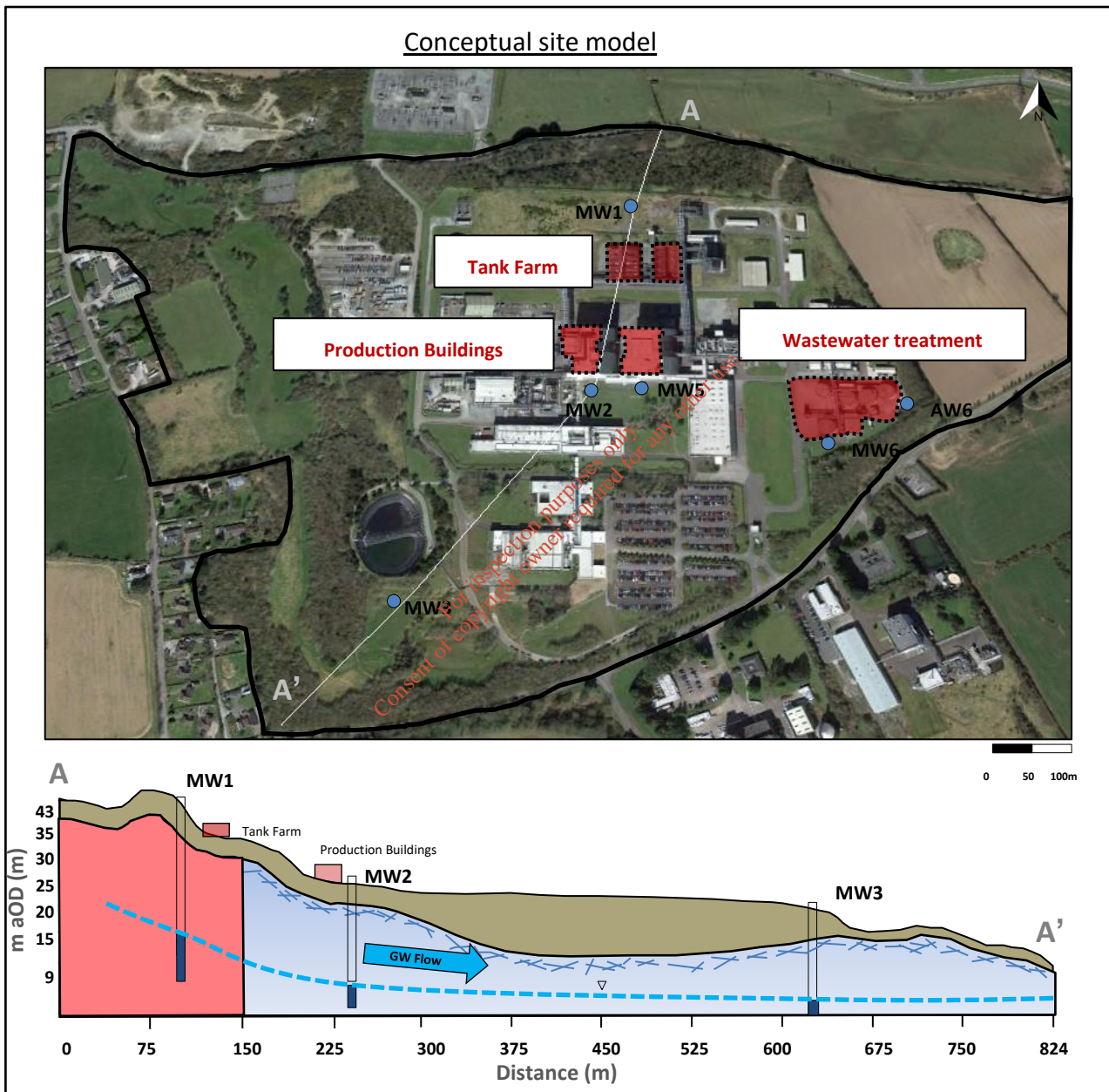
Feature	Details & Comments
	<p>Record No. 1705NWW020). The use class of this well is recorded is unknown.</p> <p>There are 6 wells onsite for groundwater monitoring purposes to comply with IE Licence conditions. These are;</p> <ul style="list-style-type: none"> <li>- MW1: Up gradient of all buildings.</li> <li>- MW2: Down gradient of production building 1</li> <li>- MW5: Sampled only periodically as a well down gradient of production building 2).</li> <li>- MW3: Down gradient of site buildings, acting as a “receptor” of up-gradient groundwater quality from wells surrounding MW1,MW2.</li> <li>- MW6: Down gradient of WWTP, provide insight into groundwater quality leaving the south-eastern area of the site.</li> <li>- AW6: Down gradient of WWTP, provide insight into groundwater quality leaving the south-eastern area of the site.</li> </ul> <p>Locations are shown in Figure 5.1.</p>
Hydrology	<p>There are no watercourses within the site and any water discharges from the site are already controlled and monitored as part of the existing drainage network and IE licence; storm water discharges to an existing storm water sewer whilst treated process water is discharged an existing foul sewer. The storm water sewer discharges into Cork Harbour at Loughbeg. The foul sewer ultimately discharges into Cork Harbour. Therefore, there is an indirect hydrological pathway (via the drainage network into Cork Harbour) from the NRL site to the Cork Harbour Special Protection Area (SPA) (004030) and Great Island Channel Special Area of Conservation (SAC) (001058).</p> <p>The site is located within the Lee, Cork Harbour and Youghal Bay catchment, Lee, Cork Harbour and Youghal Bay Hydrometric area, and in the Southwestern River Basin District. The nearest watercourses are the Glounatouig Stream and Owenboy river. The Owenboy River is approximately 1.1km south of site flows into Owenboy Estuary, to the south of the site, which is adjacent to Cork Harbour. The Glounatouig stream is approx. 1.6km northwest of site, and flows to Cork Harbour to the north of the site. The NRL site is separated from Cork and Owenaboy Harbours by a combination of; other industrial sites, public roads, residential properties and agricultural fields. Results from the WFD monitoring programme carried out during the period 2010-2015 show that there has been a significant decrease in the dissolved inorganic nitrogen concentrations in Cork Harbour. The Ecological status for Cork Harbour is Moderate. As per the EPA MapViewer the coastal water body risk assigned to Cork Harbour is currently in “Review” and the Water Quality for Cork Harbour is “Unpolluted”.</p>
Flora & Fauna	<p>The site is not located within or directly adjacent to any designated conservation site. The closest proposed Natural Heritage Areas (pNHAs) are Monkstown Creek (900m north of site), Loughbeg (approx. 500m southeast from site boundary), Owenboy River (1.1km south of site). The two nearest Natura 2000 sites are Cork Harbour SPA (incorporating the above pNHA’s) and the Great Island Channel SAC (5.98 km from site).</p> <p>The habitats within NRL (according to Fossitt 2000) are considered to be of low ecological value and include, including Buildings and Artificial Surfaces (BL3), Improved Grassland (GA2), Lakes and Ponds (FL8) and Scrub/ Transition (WS1). The area comprises of hardcore and grass. These habitats are common in the surrounding landscape, no habitats of significant ecological value will be affected.</p> <p>The most recent biodiversity survey, which was carried out in 2019, identified one red-listed species (Meadow Pipit) and nine amber-listed species (Sparrowhawk, Goldcrest, Swallow, House Martin, Starling, Mistle Thrush, Robin, House Sparrow and Greenfinch) in the area around the site. None of the species identified on the site are included in the list of Special Conservation Interest (SCI) species for Cork Harbour SPA. None of the habitats to be removed within the construction footprint are of significant importance for SCI species nor birds in general.</p> <p>According to the National Biodiversity Data Centre there are records for Brown Long-</p>

Feature	Details & Comments
	<p>eared Bat (<i>Plecotus auritus</i>), Daubenton's Bat (<i>Myotis daubentonii</i>), Eurasian Badger (<i>Meles meles</i>), Eurasian Pygmy Shrew (<i>Sorex minutus</i>), Eurasian Red Squirrel (<i>Sciurus vulgaris</i>), European Otter (<i>Lutra lutra</i>), Lesser Noctule (<i>Nyctalus leisleri</i>), Natterer's Bat (<i>Myotis nattereri</i>), Pipistrelle (<i>Pipistrellus sensu lato</i>), Red Deer (<i>Cervus elaphus</i>), Soprano Pipistrelle (<i>Pipistrellus pygmaeus</i>) and West European Hedgehog (<i>Erinaceus europaeus</i>) from the 10km Grid Square</p>
Surrounding Land Use	<p>Land use in the immediate environs is a mixture of private residences, industrial activity and farming. The land to the immediate north and east of the facility within the site is currently used for agricultural purposes. Land use to the west of the site boundary is for residential properties and agriculture, with Carbon Chemicals Group Limited and Recordati Ireland Limited located to the South of site, with agricultural activity on southern side of site. Janssen Sciences site is located ca. 230m north of the NRL Ltd site.</p> <p>There is a number of roads around the site boundary. The site is bounded to the North by the Barnahely Road and to the south by the regional R613 road (Ringaskiddy to Carrigaline). The local route Coolmore Road bounds the site to the west. There is a proposal to develop an upgraded N28 to facilitate access to the port. The alignment of the new route passes to the south of the existing Janssen Sciences site through the intervening space between the NRL site and the Janssen Sciences site</p> <p>The nearest local largest settlements are the western boundary of site (on the Coolmore Road) and a residence northwest of site on the Shanbally Road. The nearest village area is the Ringaskiddy settlement which consists of two small villages, Ringaskiddy and Shanbally village, within which there are a number of residential and amenity uses. The village of Shanbally is located ca. 750m from the site to the northwest. The main site entrance is located on the R613 road, with an additional entrance located on the Shanbally Road.</p>

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## 7 Site Characterisation (Stage 6)

The conceptual site model (CSM) for the site presented in Figure 7.1, produced by RPS Group Limited, shows a schematic cross section of the site. It summarises the soil, bedrock and hydrogeology characteristics of the site as discussed in Stage 3 and referenced in Stage 5. The interpreted groundwater flow direction is a general south, to south westerly direction.



**Figure 7.1: Conceptual Site Model (CSM) for Novartis Ringaskiddy Ltd Site (Source RPS Group 2019 Groundwater Monitoring Update Report)**

## 8 Site Investigation (Stage 7)

As stated in the EC Guidance – “*If there is sufficient information from Stages 1-6 to characterise the site both laterally and vertically in terms of quantified levels of pollution of soil and groundwater by relevant hazardous substances to be defined, then go directly to Stage 8.*” Based upon the following supporting points, this condition is satisfied:

- The storage of chemicals and relevant hazardous substances onsite is managed with operating procedures, tank storage, bunding and piping systems. The bunds onsite are regularly tested and verified as required. There is maintenance programs in place for pipe networks and bunds where required onsite.
- A number of investigations site investigations have been performed to date indicating the absence of any site-originating contamination.
- There has been no environmental accidents or direct discharges to soil/groundwater since the commencement of operations on the site.
- Biannual ground water monitoring has been performed since the commencement of operations, per Schedule C.6 of the site’s IE Licence and no site contamination issues have been clearly identified.

Therefore no further site investigations for the establishment of the baseline environmental is considered to be required.

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## 9 Production of the Baseline Report (Stage 8)

The purpose of this stage is to summarise all of the evaluated information collected in Stages 1-7.

This baseline report has been prepared in accordance with Regulation 9 of the EPA (Industrial Emissions) (Licensing) Regulations, 2013. The EC guidance on the content of the baseline report has been used in the preparation of this report. The EC Guidance identifies key stages to be undertaken to both determine whether a baseline report needs to be produced and in order in which the baseline report is produced. This staged approach was used in the production of the Baseline Report.

*Stage 1: Identifying the hazardous substances that are currently used, produced or released at the installation*

In Stage 1 an inventory of raw and ancillary materials, substances, preparations and fuels which was provided by NRL was screened to identify hazardous substances used on site, as described in Section 2 of this report.

*Stage 2: Identifying the relevant hazardous substances*

Hazardous substances identified during Stage 1 were screened to identify potential 'Relevant hazardous substances'. Substances that were identified as part of the screening process was brought forward to the Stage 3 assessment.

*Stage 3: Assessment of the site-specific pollution possibility*

The quantity and locations of the relevant hazardous substances identified in Stage 2 will be detailed. Assessment of the risk of site-specific pollution from the relevant hazardous substances identified in Stage 2 by considering:

- (1) Storage and usage quantities;
- (2) Storage and usage locations;
- (3) Controls and measures in place as recommended by the BREF Document for the Manufacture of Organic Fine Chemicals, to prevent a potential risk of contamination to ground and groundwater;
- (4) Review of historical environmental records;
- (5) Review of integrity testing of bunds, process and foul drainage;
- (6) Site inspection results; and
- (7) Environmental setting of the site.

After completion of the screening process in Stage 3, the following relevant hazardous substances were identified:

- Orthophosphate
- Manganese
- Methyl Tert-Butyl Ether (MTBE)
- Zinc,
- Aluminium,
- Total cyanide,
- Dichloromethane,
- Naphthalene
- Chrysene
- Chloride
- Ammonia

- Cyclohexane
- n-Heptane
- Tetrahydrofuran (THF)
- Diesel

However, it is noted that orthophosphate and manganese is not used or stored on site. They should be included in two subsequent biannual groundwater monitoring rounds. If they are not reported as detected, then their removal from further sampling events should be agreed with the EPA.

#### *Stage 4: Site History*

Groundwater monitoring is ongoing onsite and has not indicated a history of contamination of groundwater onsite from site sources.

#### *Stage 5: Environmental Setting*

The existing environment of the site is analysed using data collected from a desk study. The information has been derived from a number of different sources and provided information on the surrounding topography, geology, hydrogeology, hydrology, flora & fauna and land use.

#### *Stage 6: Site Characterisation*

Based on previous groundwater site monitoring reports, the CSM for the site is shown in Figure 7.1.

#### *Stage 7 – Site Investigation*

It was concluded that no further investigation is required.

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# Appendix A

## Potential 'Relevant Hazardous Substances'

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**Table A.1: Potential ‘Relevant Hazardous Substances’ – Main Site**

Material/ Substance	CAS No.	Hazard Statement	Storage Quantity (tonnes)	Annual Usage* (tonnes)	Nature of Use	Storage Location
AFQ056-C8.001 ( 3-Ethynyltoluene)	766-82-5	H226,H304,H315,H319,H335,H401,H411	0.3		Production	Liquid API in main warehouse, Warehouse 6
Ammonia Hydroxide Solution 20%	1336-21-6	H314,H336,H400,	35.1		Production	IBCs/Drums main warehouse
Ammonia Solution 25%	1336-21-6	H314,H336,H400,	15		Production	1m3 IBC's main warehouse building
Biomate 5702	7681-52-9	H314, H319, H318, H400, H410, EUH031	18		Incoming Water Treatment	1800l steel tank (bundled), adjacent to Cooling tower
Bulic	109-72-8 (n-Butyllithium),110-82-7 (Cyclohexan), 110-54-3 (n-Hexan)	H225,H250,H260,H304,H314,H318,H400,H410, EUH014	15	15	Production	Warehouse 3, 4 onsite in 2.5 ton vessels. Pressure Rated vessel (steel tanks). No External drainage from the tanks
Cyanamid 50	420-04-2	H301,H312,H314,H317,H318,H351,H361d,H373, H412, H314	5	26.8*	Production	Main warehouse in 200l drums.
DEMB (Borinic acid, diethyl-, methyl ester in tetrahydrofuran)	7397-46-8	H225,H301,H302,H312,H314,H317,H332, H335,H336,H351,H373,H402,H413	10	0.49*	Production	Raw material in cylinders warehouse 3&4, 100l per cylinder
DICI (2-Propanamine)	693-13-0	H226; H315; H317 H318 H330; 334	0.36*	0.36*	Production	Warehouse in drums/IBCs
Diesel Fuel	68476-34-6	H220,H304,H315,H319,H336,H350,H411	35	105**	Fuelling Vehicles, emergency generators (utility yard) and firewater pumps onsite.	There is a "Fuel Oil Tank" in the Utility yard 210m <sup>3</sup> . There is also three tanks in firewater pump house (1 x 2,500 litre and 2 x 1,000 litre). All tanks are fully bunded.
Diisopropylcarbodiimide	693-13-0	H226,H315,H317,H318,H330,H334,H335,H400,H410	1		Production	Warehouse 6, 200l drums.
Dowtherm J Heat	25340-17-4	H226,H304,H315,H410	15		Heat	Within buildings and

Material/ Substance	CAS No.	Hazard Statement	Storage Quantity (tonnes)	Annual Usage* (tonnes)	Nature of Use	Storage Location
Transfer Fluid					transfer fluid, medium	six 200 litre drums for topping up piping loops in the buildings (Production Building 1A & Small Scale facility).
EDIPA (Ethyl-diisopropylamine)	7087-68-5	H225,H301,H302,H314,H318,H331,H335,H336,H402,H411,H412	24	10.2*	Production	Warehouse 6, drum store -200l drums.
ENA712-NXA/DS	123441-03-2	H300,H372,H401,H411	4	1.106*	Production	Warehouse 6. 200 litre drums
Envirofloc 2050LV	42751-79-1	H315,H319, H335, H410,H412	2		Wastewater treatment	IBCs, in bunded area to the north of the WWTP Control Building. On a separate bund when in use at the WWTP.
Envirofloc 234	68213-23-0	H304, H315,H336, H226, H411, H319 GHS07	2		Wastewater treatment	
Envirofloc 3040	64742-46-7,106232-83-1,68213-23-0	H302, H350, H318, H400, H412	2		Wastewater treatment	
Foamblock 139	64742-47-8	H304, H315,H336, H226, H411	2		Wastewater treatment	
Gengard gn8163	30915-61-8, 22042-96-2, 1310-73-2	H290,H314, H318, H413	1		corrosion inhibitor	Utility yard, stored in either Mobile Bunds (no. 11 000-765-011 11, or 000-765-011 no. 13).
Heptane	142-82-5	H225,H304,H315,H336,H400,H410	13	34*	Production	200l drums in warehouse 6.
Hexyllithium, 33% in hexane	21369-64-2	H225,H250,H260,H304,H314,H318,H336,H361f,H373,H401,H411. H400, H410	1.2		Production	Pressurised cylinder 500 l per container, warehouse 3,4
HPTF (Heptane, mixture of isomers)	92045-32-4	H225 H304 H315 H336 H400 H410	0.858**	0.858*	Production	In drums
n-hexyllithium 33% in hexane	21369-64-2	H225,H250,H260,H304,H314,H318,H336,H361f,H373,H401,H411	1.2		Production	Pressurised cylinders in warehouse 3,4. (500l cylinders)
O-dichlorobenzene, 98%	95-50-1	H302,H315,H319,H335,H400,H410	1		Production	Warehouse 6, 200l drums
Propargyl Alcohol	107-19-7	H226,H301,H311,H314,H331,H411	3		Production	Warehouse 6, 200l

Material/ Substance	CAS No.	Hazard Statement	Storage Quantity (tonnes)	Annual Usage* (tonnes)	Nature of Use	Storage Location
						drums,
Rivastigmine Base/DS16	123441-03-2	H300 H372 H401 H411	1.106*	1.106*	Production	In drums/IBCs
Sodium Hypochlorite 10-12%	7681-52-9	EUH031,H314,H318,H400,H410	20		Production	1m <sup>3</sup> IBC's main warehouse building
Sodium Hypochlorite LSG 14% CL	7681-52-9	H314, H318, H400, H410, EUH031	20	35*	Incoming Water Treatment	1m <sup>3</sup> IBC's main warehouse building
Toluene	108-88-3	H225,H304,H315,H336,H361d,H373	10		Production	Drum storage in warehouse 6, 200l drums
Trifluoroacetic Acid	76-05-1	H314 H332 H402 H412	0.250*	0.250*	Production	In drums
XG (Benzene)	1330-20-7	226; 312; 315; 332	7.812*	7.812*	7.812	Warehouse 6
Xylene	1330-20-7	H226,H312,H315, H332, H412	1		Production	Warehouse 6, 200l drums

\*: Based on 2020 Raw Material Use Forecast.

\*\* : Estimate Based on bulk refills 3 times a year.

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**Table A.2 Potential 'Relevant Hazardous Substances' – Tank Farm**

Tank no.	Solvent	CAS no.	Hazard Statement	Volume stored onsite (m <sup>3</sup> )	Total Tank Capacity (m <sup>3</sup> )	Catchment Basin Bund (all connected to remote bunding system)	Drains To Spill Basin
652.261	n-Heptane	92045-32-4	H224,H225,H315,H400,H410,H304,H336	25	34.03	2	1
652.298	Aqueous waste	N/A	-	25	31.11	2	1
652.21	Toluene	108-88-3	H224,H225,H332	25	34.03	3	1
652.22	Cyclohexane	110-82-7	H224,H225,H315,H400,H410,H304,H336	25	34.03	3	1
652.242	Toluene	108-88-3	H224,H225,H332	25	34.03	3	1
652.243	Butanol	71-36-3	H224,H225,H226,H302,H315,H335,H318,H336	25	34.03	3	1
652.203	Methylene Chloride	75-09-2	H315, H319, H335, H336, H351, H376	25	34.03	4	1
652.253	Heptane and Isopropylalcohol	92045-32-4	H224,H225,H315,H400,H410,H304,H336	25	62.22	8	2
652.287	Heptane and Acetone	92045-32-4	H224,H225,H315,H400,H410,H304,H336	25	62.22	8	2
652.213	Cyclohexane	110-82-7	H224,H225,H315,H400,H410,H304,H336	25	31.11	9	2
652.271	Cyclohexane/ethylacetate mix	110-82-7	H224,H225,H315,H400,H410,H304,H336	50	62.22	9	2
652.292	Cyclohexane	110-82-7	H224,H225,H315,H400,H410,H304,H336	50	62.22	9	2
652.293	Cyclohexane	110-82-7	H224,H225,H315,H400,H410,H304,H336	25	31.11	9	2
652.875	Tetrahydrofuran (65% Tetrahydrofuran/35% Hexane & Water)	Mixture	H224,H225, EUH019,H373,H361f,H361fd, H411	25	31.11	10	2
652.877	HP Ascristex	104987-12-4	H372c,H413	50	62.22	10	2

Note: Catchment areas drain to spill basin via the site bunded sewer network. Spill Basin 1= 299m<sup>3</sup> Capacity, Spill Basin 2=162m<sup>3</sup> capacity

**Table A.3: Potential ‘Relevant Hazardous Substances’ – Liquid Waste-Onsite (2019)**

EWC Code	Description of Waste	Total Annual tonnage	Storage Area
07 05 01	aqueous washing liquids and mother liquors	129.786	Tank Farm. Transferred to bunded day tanks on the Liquid Vapour Incinerator for subsequent treatment.
07 05 01	aqueous washing liquids and mother liquors	630.544	Tank Farm. The loading to waste tankers takes place in the bunded area to the north of the WWTP Control Building
07 05 01	aqueous washing liquids and mother liquors	632.480	
07 05 04	other organic solvents, washing liquids and mother liquors	115.410	
07 05 01	aqueous washing liquids and mother liquors	21.458	These are aqueous washings from production, which are stored in 1,000 IBCs in the bunded area to the north of the WWTP Control Building.
16 03 05	organic wastes containing dangerous substances	23.195	200 l steel drums on the bunded area to the north of the WWTP Control Building.
16 05 07	discarded inorganic chemicals consisting of or containing dangerous substances	0.401	200 l steel drums on the bunded area to the north of the WWTP Control Building.
20 01 14	acids	2.914	200 l steel drums on the bunded area to the north of the WWTP Control Building.
07 05 01	aqueous washing liquids and mother liquors	505.580	Tank Farm. The loading to waste tankers takes place in the bunded trailer park to the north of the WWTP Control Building.
07 05 01	other organic solvents, washing liquids and mother liquors	720.322	
07 05 01	other organic solvents, washing liquids and mother liquors	144.331	
07 05 01	other organic solvents, washing liquids and mother liquors	1.396	
07 05 01	other organic solvents, washing liquids and mother liquors	13.121	
07 05 03	aqueous washing liquids and mother liquors	27.290	
07 05 04	other organic solvents, washing liquids and mother liquors	21.390	
07 05 04	other organic solvents, washing liquids and mother liquors	70.120	
07 05 04	other organic solvents, washing liquids and mother liquors	946.050	
07 05 04	other organic solvents, washing liquids and mother liquors	1,125.130	

EWG Code	Description of Waste	Total Annual tonnage	Storage Area
07 05 04	other organic solvents, washing liquids and mother liquors	1,581.344	
07 05 04	other organic solvents, washing liquids and mother liquors	1,896.879	
07 05 04	other organic solvents, washing liquids and mother liquors	18.345	
07 05 04	other organic solvents, washing liquids and mother liquors	172.444	
07 05 04	other organic solvents, washing liquids and mother liquors	357.847	Tank Farm. Transferred to bunded day tanks on the Liquid Vapour Incinerator for subsequent treatment.
07 05 04	other organic solvents, washing liquids and mother liquors	1.130	Tank Farm. The loading to waste tankers takes place in the bunded trailer park to the north of the WWTP Control Building.
07 05 04	other organic solvents, washing liquids and mother liquors	1.130	
13 02 08	other engine, gear and lubricating oils	0.958	These are stored in bunded areas in the Utility Services Yard.

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# Appendix B

## Assessment of Site-Specific Pollution Possibility

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Table B.1: Assessment of Pollution Possibility (Main Site)

Material/ Substance	Storage Quantity (tonnes)	Storage Area	Bunding, containment measures	Potential Scenario for Release to groundwater/soils	Source-Pathway-Receptor	Risk of contamination of soils/groundwater
AFQ056-C8.001 ( 3-Ethynyltoluene)	0.3	Liquid API in main warehouse, Warehouse 6	The Warehouse 6 catchment system (sump and channels) in the warehouse and pipeline (manhole B41 to B42) drain to the main banded sewer network and all passed 2018 integrity tests. These drain to spill basin 1 (299m <sup>3</sup> capacity). The main warehouse includes warehouse 5,8 for liquids storage. The floor bund sump Capacity in warehouse 8 is 4.61m <sup>3</sup> , warehouse 5 has bund capacity of 0.270 m <sup>3</sup> . Both are connected the process sewer network. A series of spill trays have been installed within the warehouses under the storage racks to capture any spillages and ensure that adequate bunding volume is provided for the stored materials. All bunds and channels passed the 2017/2018 tests. Storm drains around site will collect leaks outside the warehouse area in the event of a spill outside the building. Drainage is contained to the firewater/stormwater pond as required.	Drums burst on transport, use leading to spill at same time of a failure of sump, channels, and drainage pipe network.	<b>Source:</b> A burst or spilled drum/IBC/vessel in the warehouse or on transport around site. <b>Pathway:</b> with a failure of sumps, channels or banded network leads to leak to soil, groundwater. <b>Receptors:</b> Soil & Groundwater. The site soils are composed primarily of made ground overlying a superficial layer of glacial till. In the northern half of the site, subsoil thickness varies between 5-10m, with a small area of rock outcrop to the western area of site (karstified limestone at the surface). For the southern half of the site, subsoil thickness increases to 10-20m. The Groundwater flow is likely to concentrate in the upper few metres of the limestone (RPS 2019). The Groundwater flow is likely to concentrate in the upper few metres of the limestone (RPS 2019). Groundwater vulnerability is high to extreme across site (GSI 2020).	Risk is relatively low, with no incidents of major spills or incidents onsite. The bund system in warehouses have passed most recent integrity tests, and emergency response procedure is in place to deal appropriately with spills. In less likely event of chemicals spilling outside onto concrete, the underground storm sewer system is integrity checked every 3 years with most recent repairs completed in 2020.
Ammonia Hydroxide Solution 20%	35.1	IBCs/Drums main warehouse		Drums/IBCs burst on transport, use leading to spill at same in warehouse with a failure of sump, channels, and drainage pipe network. Leaks to roads around site enter the storm sewer network system.		
Ammonia Solution 25%	15	1m <sup>3</sup> IBC's main warehouse building				
Biomate 5702	1.8	1800l steel tank (bunded), adjacent to Cooling tower	Stored on mobile bund (reference 765-012) which passed its integrity test (2018).	Tank and/or bunds fails on transport or in the bund, leading to leak to concrete and ground.	<b>Source:</b> Tank or bund fails leading to spill. concrete, ground. <b>Pathway:</b> The IBC/drums leaks through bunds or hardstanding and/or storm water system, to soil. <b>Receptor:</b> The site soils are composed primarily of made ground overlying a superficial layer of glacial till. In the northern half of the site, subsoil thickness varies between 5-10m, with a small area of rock outcrop to the western area of site (karstified limestone at the surface). For the southern half of the site, subsoil thickness increases to 10-20m. The Groundwater flow is likely to concentrate in the upper few metres of the limestone (RPS 2019). Groundwater vulnerability is high to extreme across site (GSI 2020).	Risk is low. Emergency spill response protocols in place. The bund and storm water pipe network systems in place are integrity tested every 3 years.
Bulic	15	Warehouse 3, 4 onsite in 2.5 ton vessels. Pressure Rated vessel (steel tanks). No External drainage from the tanks	Each warehouse 3, 4 each has a sump in place. Both passed 2018 integrity tests and are not linked to external process or banded drainage. A set of spill trays were installed within the warehouses in 2015 under the storage racks to capture any spillages and ensure that adequate bunding volume is provided for the stored materials.	Vessels burst on transport, use leading to spill at same time of a failure of sump, channels, and drainage pipe network.	<b>Source:</b> Tank or bund fails leading to spill in warehouse bunds, sumps or outside to storm sewer system. <b>Pathway:</b> The vessels leak through bunds, channels or hardstanding and/or storm water system, to soil. <b>Receptor:</b> The site soils are composed primarily of made ground overlying a superficial layer of glacial till. In the northern half of the site, subsoil thickness varies between 5-10m, with a small area of rock outcrop to the western area of site (karstified limestone at the surface). For the southern half of the site, subsoil thickness increases to 10-20m. The Groundwater flow is likely to concentrate in the upper few metres of the limestone (RPS 2019). Vulnerability is high to extreme across site (GSI 2020).	Risk is low to none. Vessels are not connected to external drainage. There are adequate spill response procedures, bunds integrity systems checks which are in place.

Material/ Substance	Storage Quantity (tonnes)	Storage Area	Bunding, containment measures	Potential Scenario for Release to groundwater/soils	Source-Pathway-Receptor	Risk of contamination of soils/groundwater
Cyanamid 50	5	Main warehouse in 200l drums.	The main warehouse includes warehouse 5,8 for liquids storage. Bund Sump Capacity in warehouse 8 is 4.61m <sup>3</sup> , warehouse 5 has bund capacity of 0.270 m <sup>3</sup> . A series of spill trays have been installed within the warehouses under the storage racks to capture any spillages and ensure that adequate bunding volume is provided for the stored materials. All bunds and channels passed the 2017/2018 tests.	Drums/IBCs burst on transport, use leading to spill at same in warehouse with a failure of sump, channels, and drainage pipe network. Or leaks to roads around the warehouse would enter the stormwater network system.	<b>Source:</b> A burst or spilled drum/IBC/vessel in the warehouse or on transport around site. <b>Pathway:</b> with a failure of sumps, channels or remote bunded network leads to leak to soil, groundwater.	Risk is relatively low, with no incidents of major spills or incidents onsite. The bund system in warehouses have passed most recent integrity tests, and emergency response procedure is in place to deal appropriately with spills. In less likely event of chemicals spilling outside onto concrete, the underground storm sewer system is integrity checked every 3 years with most recent repairs completed in 2020.
DEMB (Borinic acid, diethyl-, methyl ester in tetrahydrofuran)	10	Raw material in cylinders warehouse 3&4, 100l per cylinder	Each warehouse 3,4 each has a sump in place. Both passed 2018 integrity tests and are not linked to external process or bunded drainage. A set of spill trays were installed within the warehouses in 2015 under the storage racks to capture any spillages and ensure that adequate bunding volume is provided for the stored materials.	Cylinders burst on transport, use leading to spill at same time of a failure of sump, channels, and drainage pipe network.	<b>Receptors:</b> Soil & Groundwater. In the northern half of the site, subsoil thickness varies between 5-10m, with a small area of rock outcrop to the western area of site (karstified limestone at the surface). For the southern half of the site, subsoil thickness increases to 10-20m. The Groundwater flow is likely to concentrate in the upper few metres of the limestone (RPS 2019). Vulnerability is high to extreme across site (GSI 2020).	Risk is low to impossible. Vessels are not connected to external drainage. Warehouse 3,4 There are adequate operating procedures, bunds and pipework integrity systems and checks which are in place.
DICI (2-Propanamine)	0.36*	Warehouse in drums/IBCs	Warehouse materials are stored in mobile bunds and each warehouse has sumps and channels also in event of bund overrun	Drums/IBCs burst on transport, use leading to spill at same time of a failure of sump, channels, and drainage pipe network.		Risk is relatively low, with no incidents of major spills or incidents onsite. The bund system in warehouses have passed most recent integrity tests, and emergency response procedure is in place to deal appropriately with spills. In less likely event of chemicals spilling outside onto concrete, the underground storm sewer system is integrity checked every 3 years with most recent repairs completed in 2020.
Diesel Fuel	35	There is a "Fuel Oil Tank" in the Utility yard 210m <sup>3</sup> (bunded to 231m <sup>3</sup> (110%)). There is also three tanks in firewater pump house (1 x 2,500 litre and 2 x 1,000 litre). Within the pump house there are three fuel oil tanks and 2 x 1,000 litre). Within the pump house there are three fuel oil tanks. All tanks are fully bunded.	Each tank is bunded according to volume. Tests were completed in 2018 on the main fuel oil tank bund (430-767-002 (Fuel Oil Bund)) and passed testing, but showed some minor hairline cracks. The other tanks in the pump house were upgraded with new bunds in 2016.	Spill during refuelling or burst hose leads to diesel spill on concrete plinth. Bund failure occurs leading to fuel leak from tank or pump.	<b>Source:</b> External to the bund, there is potential for fuel oil to seep into ground below, area not subject to testing. This could occur during refuelling. <b>Pathway:</b> Diesel could be lost to soil (made ground over sandstone tills) to karst aquifer, into groundwater. A leak would leak to made ground, before potentially migrating down to sandstone tills. <b>Receptor:</b> Soil & Groundwater. In the northern half of the site, subsoil thickness varies between 5-10m, with a small area of rock outcrop to the western area of site (karstified limestone at the surface). For the southern half of the site, subsoil thickness increases to 10-20m. The Groundwater flow is likely to concentrate in the upper few metres of the limestone (RPS 2019). Groundwater vulnerability is high to extreme across site (GSI 2020).	Risk is low, but cannot be ruled out completely given refuelling is done on concrete plinth in yard. Risk Assessment Methods Statement is in place for filling of fuel tanks.
Diisopropylcarbodiimide	1	Warehouse 6, 200l drums	The Warehouse 6 catchment system (sump and channels) in the warehouse and pipeline (manhole B41 to B42) drain to the main bunded sewer network and all passed 2018 integrity tests. These drain to spill basin 1 (299m <sup>3</sup> capacity).	Drums/IBCs burst on transport, use leading to spill at same in warehouse with a failure of sump, channels, and drainage pipe network. Leaks to roads around site enter the storm sewer network system.	<b>Source:</b> A burst or spilled drum/IBC in the warehouse or on transport around site. <b>Pathway:</b> with a failure of sumps, channels or remote bunded network leads to leak to soil, groundwater.	Risk is relatively low, with no incidents of major spills or incidents onsite. The bund system in warehouses have passed most recent integrity tests, and emergency response procedure is in place to deal appropriately with spills. In less likely event of chemicals spilling outside onto concrete, the underground storm sewer system is integrity checked every 3 years with most
EDIPA (Ethyl-diisopropylamine)	24	Warehouse 6, drum store - 200l drums			<b>Receptors:</b> Soil & Groundwater. The site soils are composed primarily of made ground overlying a superficial layer of glacial till.	

Material/ Substance	Storage Quantity (tonnes)	Storage Area	Bunding, containment measures	Potential Scenario for Release to groundwater/soils	Source-Pathway-Receptor	Risk of contamination of soils/groundwater
					In the northern half of the site, subsoil thickness varies between 5-10m, with a small area of rock outcrop to the western area of site (karstified limestone at the surface). The Groundwater flow is likely to concentrate in the upper few metres of the limestone (RPS 2019). Groundwater vulnerability is high to extreme across site (GSI 2020).	recent repairs completed in 2020.
Envirofloc 2050LV	2	Bunded area (3B) to the north of the WWTP Control Building. On a separate mobile bund when in use at the WWTP.	Bund 3B (general WWTP storage) and bunds 3E, 3F in the WWTP, which drains to process sewer. Bund 3E, 3F for antifoam, polymer and WWTP chemical dosing passed integrity tests in 2018 round.	IBC fails in situ leaking to bund or else to concrete and storm drain, or during transport leaking to storm sewer drain.	<b>Source:</b> A burst or spilled IBC in the bunds or on transport around site. <b>Pathway:</b> with a failure of sumps, channels or banded network leads to leak to soil, groundwater. <b>Receptors:</b> Soil & Groundwater. In the northern half of the site, subsoil thickness varies between 5-10m, with a small area of rock outcrop to the western area of site (karstified limestone at the surface). For the southern half of the site, subsoil thickness increases to 10-20m. The Groundwater flow is likely to concentrate in the upper few metres of the limestone (RPS 2019). Groundwater vulnerability is high to extreme across site (GSI 2020).	Risk is relatively low, with no incidents of major spills or incidents onsite. The bund system have passed most recent integrity tests, and emergency response procedure is in place to deal appropriately with spills. In less likely event of chemicals spilling outside onto concrete, the underground storm sewer system is integrity checked every 3 years with most recent repairs completed in 2020.
Envirofloc 234	2					
Envirofloc 3040	2					
Foamblock 139	2					
Gengard gn8163	1	Stored adjacent to cooling tower in either bund 000-765-011 (Mobile Bund 11) or bund 000-765-011 (Mobile Bund 13)	Stored in either 000-765-011 (Mobile Bund 11) or 000-765-011 (Mobile Bund 13 both bunds greater than 1000l capacity. Both passed integrity tests in 2018.	IBC failure on transport around site leading to leak to concrete yard ( leak to storm sewer system) or leak in situ on a bund.	<b>Source:</b> A burst or spilled IBC in the bunds or on transport around site. <b>Pathway:</b> with a failure of sumps, channels or banded network leads to leak to soil, groundwater. <b>Receptors:</b> Soil & Groundwater. The site soils are composed primarily of made ground overlying a superficial layer of glacial till. In the northern half of the site, subsoil thickness varies between 5-10m, with a small area of rock outcrop to the western area of site (karstified limestone at the surface). The Groundwater flow is likely to concentrate in the upper few metres of the limestone (RPS 2019). Groundwater vulnerability is high to extreme across site (GSI 2020).	Risk is relatively low, with no incidents of major spills in this area onsite. The mobile bunds have passed most recent integrity tests, and emergency response procedure is in place to deal appropriately with spills. In less likely event of chemicals spilling outside onto concrete, the underground storm sewer system is integrity checked every 3 years with most recent repairs completed in 2020.
Heptane	13	200l drums in warehouse 6	The Warehouse 6 catchment system (sump and channels) in the warehouse and pipeline (manhole B41 to B42) drain to the main banded sewer network and all passed 2018 integrity tests. These drain to spill basin 1 (299m3 capacity).	Drums/IBCs burst on transport, use leading to spill at same in warehouse with a failure of sump, channels, and drainage pipe network. Leaks to roads around site enter the storm sewer network system.	<b>Source:</b> A burst or spilled drum/IBC in the warehouse or on transport around site. <b>Pathway:</b> with a failure of sumps, channels or remote banded network leads to leak to soil, groundwater. <b>Receptors:</b> Soil & Groundwater. The site soils are composed primarily of made ground overlying a superficial layer of glacial till. In the northern half of the site, subsoil thickness varies between 5-10m, with a small area of rock outcrop to the western area of site (karstified limestone at the surface). The Groundwater flow is likely to concentrate in the upper few metres of the limestone (RPS 2019). Groundwater vulnerability is high to extreme across site (GSI 2020).	Risk is relatively low, with no incidents of major spills or incidents onsite. The bund system in warehouses have passed most recent integrity tests, and emergency response procedure is in place to deal appropriately with spills. In the less likely event of chemicals spilling outside onto concrete, the underground storm sewer system is integrity checked every 3 years with most recent repairs completed in 2020.
Hexyllithium, 33% in hexane	1.2	Pressurised cylinder 500 l per container, warehouse 3,4	Each warehouse 3,4 each has a sump in place. Both passed 2018 integrity tests and are not linked to external process or banded drainage. A set of spill trays were installed within the warehouses in 2015 under the storage racks to capture any spillages and ensure that adequate bunding volume is provided for the stored materials.	Vessels burst on transport, use leading to spill at same time of a failure of sump, channels, and drainage pipe network.	<b>Source:</b> Tank or bund fails leading to spill in warehouse bunds, sumps or outside to storm sewer system. <b>Pathway:</b> The vessels leak through bunds, channels or hardstanding and/or storm water system, to soil. <b>Receptor:</b> The site soils are composed primarily of made ground overlying a superficial layer of glacial till. In the northern half of the site, subsoil thickness varies between 5-10m, with a small area of rock outcrop to the western area of site	Risk is low to impossible. Vessels are not connected to external drainage. There are adequate operating procedures, bunds and pipework integrity systems and checks which are in place.

Material/ Substance	Storage Quantity (tonnes)	Storage Area	Bunding, containment measures	Potential Scenario for Release to groundwater/soils	Source-Pathway-Receptor	Risk of contamination of soils/groundwater
					(karstified limestone at the surface). For the southern half of the site, subsoil thickness increases to 10-20m. The Groundwater flow is likely to concentrate in the upper few metres of the limestone (RPS 2019). Groundwater vulnerability is high to extreme across site (GSI 2020).	
HPTF (Heptane, mixture of isomers)	0.858**	Main warehouse	The main warehouse includes warehouse 5,8 for liquids storage. Bund Sump Capacity in warehouse 8 is 4.61m <sup>3</sup> , warehouse 5 has bund capacity of 0.270 m <sup>3</sup> . A series of spill trays have been installed within the warehouses under the storage racks to capture any spillages and ensure that adequate bunding volume is provided for the stored materials. All bunds and channels passed the 2017/2018 tests.	Drums/IBCs burst on transport, use leading to spill at same in warehouse with a failure of sump, channels, and drainage pipe network. Or leaks to roads around site enter the storm water network system.	<b>Source:</b> A burst or spilled drum/IBC/vessel in the warehouse or on transport around site. <b>Pathway:</b> with a failure of sumps, channels or remote banded network leads to leak to soil, groundwater. <b>Receptors:</b> Soil & Groundwater. In the northern half of the site, subsoil thickness varies between 5-10m, with a small area of rock outcrop to the western area of site (karstified limestone at the surface). For the southern half of the site, subsoil thickness increases to 10-20m. The Groundwater flow is likely to concentrate in the upper few metres of the limestone (RPS 2019). Groundwater vulnerability is high to extreme across site (GSI 2020).	Risk is relatively low, with no incidents of major spills or incidents onsite. The bund system in warehouses have passed most recent integrity tests, and emergency response procedure is in place to deal appropriately with spills. In less likely event of chemicals spilling outside onto concrete, the underground storm sewer system is integrity checked every 3 years with most recent repairs completed in 2020.
n-hexyllithium 33% in hexane	1.2	Pressurised cylinders in warehouse 3,4. (500l cylinders)	Each warehouse 3, 4 each has a sump in place. Both passed 2018 integrity tests and are not linked to external process or banded drainage. A set of spill trays were installed within the warehouses in 2015 under the storage racks to capture any spillages and ensure that adequate bunding volume is provided for the stored materials.	Vessels burst on transport, use leading to spill at same time of a failure of sump, channels, and drainage pipe network.	<b>Source:</b> Tank or bund fails leading to spill in warehouse bunds, sumps or outside to storm sewer system. <b>Pathway:</b> The vessels leak through bunds, channels or hardstanding and/or storm water system, to soil. <b>Receptor:</b> The site soils are composed primarily of made ground overlying a superficial layer of glacial till. In the northern half of the site, subsoil thickness varies between 5-10m, with a small area of rock outcrop to the western area of site (karstified limestone at the surface). For the southern half of the site, subsoil thickness increases to 10-20m. The Groundwater flow is likely to concentrate in the upper few metres of the limestone (RPS 2019). Groundwater vulnerability is high to extreme across site (GSI 2020).	Risk is low to impossible. Vessels are not connected to external drainage. There are adequate operating procedures, bunds and pipework integrity systems and checks which are in place.
O-dichlorobenzene, 98%	1	Warehouse 6, 200l drums	The Warehouse 6 catchment system (sump and channels) in the warehouse and pipeline (manhole B41 to B42) drain to the main banded sewer network and all passed 2018 integrity tests. These drain to spill basin 1 (299m <sup>3</sup> capacity).	Drums/IBCs burst on transport, use leading to spill at same in warehouse with a failure of sump, channels, and drainage pipe network. Leaks to roads around site enter the storm sewer network system.	<b>Source:</b> A burst or spilled drum/IBC in the warehouse or on transport around site. <b>Pathway:</b> with a failure of sumps, channels or remote banded network leads to leak to soil, groundwater. <b>Receptors:</b> Soil & Groundwater. The site soils are composed primarily of made ground overlying a superficial layer of glacial till. In the northern half of the site, subsoil thickness varies between 5-10m, with a small area of rock outcrop to the western area of site (karstified limestone at the surface). The Groundwater flow is likely to concentrate in the upper few metres of the limestone (RPS 2019). Groundwater vulnerability is high to extreme across site (GSI 2020).	Risk is relatively low, with no incidents of major spills or incidents onsite. The bund system in warehouses have passed most recent integrity tests, and emergency response procedure is in place to deal appropriately with spills. In the less likely event of chemicals spilling outside onto concrete, the underground storm sewer system is integrity checked every 3 years with most recent repairs completed in 2020.
Propargyl Alcohol	3	Warehouse 6, 200l drums,	The Warehouse 6 catchment system (sump and channels) in the warehouse and pipeline (manhole B41 to B42) drain to the main banded sewer network and all passed 2018 integrity tests. These drain to spill basin 1 (299m <sup>3</sup> capacity).	Drums/IBCs burst on transport, use leading to spill at same in warehouse with a failure of sump, channels, and drainage pipe network. Leaks to roads around site enter the storm sewer network system.	<b>Source:</b> A burst or spilled drum/IBC in the warehouse or on transport around site. <b>Pathway:</b> with a failure of sumps, channels or remote banded network leads to leak to soil, groundwater. <b>Receptors:</b> Soil & Groundwater. The site soils are composed primarily of made ground overlying a superficial layer of glacial till.	Risk is relatively low, with no incidents of major spills or incidents onsite. The bund system in warehouses have passed most recent integrity tests, and emergency response procedure is in place to deal appropriately with spills. In the less likely event of chemicals spilling outside onto concrete, the underground storm sewer system is integrity checked every 3 years with most

Material/ Substance	Storage Quantity (tonnes)	Storage Area	Bunding, containment measures	Potential Scenario for Release to groundwater/soils	Source-Pathway-Receptor	Risk of contamination of soils/groundwater
					In the northern half of the site, subsoil thickness varies between 5-10m, with a small area of rock outcrop to the western area of site (karstified limestone at the surface). The Groundwater flow is likely to concentrate in the upper few metres of the limestone (RPS 2019). Groundwater vulnerability is high to extreme across site (GSI 2020).	recent repairs completed in 2020.
Rivastigmine Base/DS16	1.106*	In main warehouse	The main warehouse includes warehouse 5, 8 for liquids storage. Bund Sump Capacity in warehouse 8 is 4.61m3, warehouse 5 has bund capacity of 0.270 m3. A series of spill trays have been installed within the warehouses under the storage racks to capture any spillages and ensure that adequate bunding volume is provided for the stored materials. All bunds and channels passed the 2017/2018 tests.	Drums/IBCs burst on transport, use leading to spill at same in warehouse with a failure of sump, channels, and drainage pipe network. Or leaks to roads around site enter the storm water network system.	<b>Source:</b> A burst or spilled drum/IBC in the warehouse or on transport around site. <b>Pathway:</b> with a failure of sumps, channels or remote bunded network leads to leak to soil, groundwater. <b>Receptor:</b> Soil & Groundwater. The site soils are composed primarily of made ground overlying a superficial layer of glacial till. In the northern half of the site, subsoil thickness varies between 5-10m, with a small area of rock outcrop to the western area of site (karstified limestone at the surface). For the southern half of the site, subsoil thickness increases to 10-20m. The Groundwater flow is likely to concentrate in the upper few metres of the limestone (RPS 2019). Groundwater vulnerability is high to extreme onsite (GSI 2020).	Risk is relatively low, with no incidents of major spills or incidents onsite. The bund system in warehouses have passed most recent integrity tests, and emergency response procedure is in place to deal appropriately with spills. In less likely event of chemicals spilling outside onto concrete, the underground storm sewer system is integrity checked every 3 years with most recent repairs completed in 2020.
Sodium Hypochlorite 10-12%	20	1m <sup>3</sup> IBC's main warehouse building	The main warehouse includes warehouse 5, 8 for liquids storage. Bund Sump Capacity in warehouse 8 is 4.61m3, warehouse 5 has bund capacity of 0.270 m3. A series of spill trays have been installed within the warehouses under the storage racks to capture any spillages and ensure that adequate bunding volume is provided for the stored materials. All bunds and channels passed the 2017/2018 tests.	Drums/IBCs burst on transport, use leading to spill at same in warehouse with a failure of sump, channels, and drainage pipe network. Or leaks to roads around site enter the storm water network system. Drums/IBCs burst on transport, use leading to spill at same in warehouse with a failure of sump, channels, and drainage pipe network. Or leaks to roads around site enter the storm water network system.	<b>Source:</b> A burst or spilled drum/IBC in the warehouse or on transport around site. <b>Pathway:</b> with a failure of sumps, channels or remote bunded network leads to leak to soil, groundwater. <b>Receptor:</b> Soil & Groundwater. The site soils are composed primarily of made ground overlying a superficial layer of glacial till. In the northern half of the site, subsoil thickness varies between 5-10m, with a small area of rock outcrop to the western area of site (karstified limestone at the surface). For the southern half of the site, subsoil thickness increases to 10-20m. The Groundwater flow is likely to concentrate in the upper few metres of the limestone (RPS 2019). Groundwater vulnerability is high to extreme across site (GSI 2020).	Risk is relatively low, with no incidents of major spills or incidents onsite. The bund system in warehouses have passed most recent integrity tests, and emergency response procedure is in place to deal appropriately with spills. In less likely event of chemicals spilling outside onto concrete, the underground storm sewer system is integrity checked every 3 years with most recent repairs completed in 2020. Risk is relatively low, with no incidents of major spills or incidents onsite. The bund system in warehouses have passed most recent integrity tests, and emergency response procedure is in place to deal appropriately with spills. In less likely event of chemicals spilling outside onto concrete, the underground storm sewer system is integrity checked every 3 years with most recent repairs completed in 2020.
Sodium Hypochlorite LSG 14% CL	20	Main warehouse Building, in 1'000 litre IBCs.				
Toluene	10	Drum storage in warehouse 6, 200l drums	The Warehouse 6 catchment system (sump and channels) in the warehouse and pipeline (manhole B41 to B42) drain to the main bunded sewer network and all passed 2018 integrity tests. These drain to spill basin 1 (299m3 capacity).	Drums/IBC's burst on transport, use leading to spill at same in warehouse with a failure of sump, channels, and drainage pipe network. Leaks to roads around site enter the storm sewer network system.	<b>Source:</b> A burst or spilled drum/IBC in the warehouse or on transport around site. <b>Pathway:</b> with a failure of sumps, channels or remote bunded network leads to leak to soil, groundwater. <b>Receptors:</b> The site soils are composed primarily of made ground overlying a superficial layer of glacial till. In the northern half of the site, subsoil thickness varies between 5-10m, with a small area of rock outcrop to the western area of site (karstified limestone at the surface). For the southern half of the site, subsoil thickness increases to 10-20m. The Groundwater flow is likely to concentrate in the upper few metres of the limestone (RPS 2019). Groundwater vulnerability is high to extreme across site (GSI 2020).	Risk is relatively low, with no incidents of major spills or incidents onsite. The bund system in warehouses have passed most recent integrity tests, and emergency response procedure is in place to deal appropriately with spills. In less likely event of chemicals spilling outside onto concrete, the underground storm sewer system is integrity checked every 3 years with most recent repairs completed in 2020.
Trifluoroacetic Acid	0.250*	In main warehouse	The main warehouse includes warehouse 5, 8 for liquids storage. Bund Sump Capacity in warehouse 8 is 4.61m3, warehouse 5 has bund capacity of 0.270 m3. A series of spill trays have been installed within the warehouses under the storage racks to capture any spillages and ensure that adequate bunding volume is provided for the stored materials. All bunds and channels passed the 2017/2018 tests.	Drums/IBCs burst on transport, use leading to spill at same in warehouse with a failure of sump, channels, and drainage pipe network. Or leaks to roads around site enter the storm water network system.		

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XG (Benzene)	7.812*	Warehouse 6	The Warehouse 6 catchment system (sump and channels) in the warehouse and pipeline (manhole B41 to B42) drain to the main bunded sewer network and all passed 2018 integrity tests. These drain to spill basin 1 (299m3 capacity).	Drums/IBCs burst on transport, use leading to spill at same in warehouse with a failure of sump, channels, and drainage pipe network. Leaks to roads around site enter the storm sewer network system.	<b>Source:</b> A burst or spilled drum/IBC in the warehouse or on transport around site. <b>Pathway:</b> with a failure of sumps, channels or remote bunded network leads to leak to soil, groundwater. <b>Receptors:</b> Soil & Groundwater. The site soils are composed primarily of made ground overlying a superficial layer of glacial till. In the northern half of the site, subsoil thickness varies between 5-10m, with a small area of rock outcrop to the western area of site (karstified limestone at the surface). The Groundwater flow is likely to concentrate in the upper few metres of the limestone (RPS 2019). Groundwater vulnerability is high to extreme across site (GSI 2020).	
Xylene	1	Warehouse 6, 200l drums		Drums burst on transport, use leading to spill at same time of a failure of sump, channels, and drainage pipe network.		

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**Table B.2: Assessment of Pollution Possibility (Tank Farm & Solvent Recovery Unit)**

Tank ID	Tank Material/ Substance	Total Tank Capacity (m <sup>3</sup> )	Potential Scenario for Release to groundwater/soils	Source-Pathway-Receptor	Risk of contamination of soils/groundwater
652.261	n-Heptane	34.03	Sampling of tanks, or operations or pipeline failure leading to single or multiple tank failure causes leakage of large quantity of chemicals.	<p><b>Source:</b> Single or multiple tank failure causes leakage. This would need to occur in conjunction with bund (catchment basin) remote bund pipeline and/ or spill basin 1 failure.</p> <p><b>Pathway:</b> Stored chemicals leak through failed bund or pipe network into soil.</p> <p><b>Receptor: Soils &amp; Groundwater.</b> The site soils are composed primarily of made ground overlying a superficial layer of glacial till. In the northern half of the site, subsoil thickness varies between 5-10m, with a small area of rock outcrop to the western area of site (karstified limestone at the surface). For the southern half of the site, subsoil thickness increases to 10-20m. The Groundwater flow is likely to concentrate in the upper few metres of the limestone (RPS 2019). Groundwater vulnerability is high to extreme across site (GSI 2020).</p>	<p>The risk of such a scenario is low. The tank farm has operation procedures and controls in place for operation and tank filling, sampling. The two main remote bunds on site (Spill Basin 1 and Spill Basin 2) are fitted with high level alarms. Sumps in the Catchment Basins that feed Spill Basins 1 and 2 are fitted with Lower Explosive Limit (LEL) detection. Sumps on the process aqueous wastewater network are fitted with high and low level alarms. All high and low level alarms feed back to the Distributed Control System (DCS).</p>
652.21	Toluene	34.03			
652.22	Cyclohexane	34.03			
652.242	Toluene	34.03			
652.243	Butanol	34.03			
652.203	Methylene Chloride	34.03	<p>Sampling of tanks, or operation failure leading to single or multiple tank failure causes leakage of large quantity of chemicals.</p> <p>Catchment Basins 7 or 9 which in the north of the Tank Farm and are bounded to the North by a kerb (2-3 metres wide) and outside it an earthen berm. This poses a risk of ground contamination in the event of significant spill of bunds overtopping from catchment basins into soils and groundwater (RPS 2019).</p>	<p><b>Source:</b> Single or multiple tank failure causes leakage. This would need to occur in conjunction with bund (catchment basin), remote pipeline and/ or spill basin 2 failure.</p> <p><b>Pathway:</b> Stored chemicals leak through failed bund or pipe network into soil.</p> <p><b>Receptor: Soils &amp; Groundwater.</b> The site soils are composed primarily of made ground overlying a superficial layer of glacial till. In the northern half of the site, subsoil thickness varies between 5-10m, with a small area of rock outcrop to the western area of site (karstified limestone at the surface). For the southern half of the site, subsoil thickness increases to 10-20m. The Groundwater flow is likely to concentrate in the upper few metres of the limestone (RPS 2019). Groundwater vulnerability is high to extreme across site (GSI 2020).</p>	<p>The 2018 integrity tests has shown minor repair issues for the catchment basins, but the process sewer system and spill basin 1 have passed the integrity checks. There is a repair program onsite for integrity and maintenance of tank farm pipe work for transporting solvents. There is no history of significant spillages onsite to date. Biannual monitoring of groundwater to date has not demonstrated any significant change from baseline groundwater conditions in 2013-2019.</p>
652.253	Heptane and Isopropylalcohol	62.22			
652.287	Heptane and Acetone	62.22			
652.213	Cyclohexane	31.11			
652.271	Cyclohexane/ ethylacetate mix	62.22			
652.292	Cyclohexane	62.22			
652.293	Cyclohexane	31.11			
652.875	Tetrahydrofuran (65% Tetrahydrofuran/ 35% Hexane & Water)	31.11			
652.877	HP Ascristex	62.22			

**Table B.3: Conclusions on “Relevant Hazardous Substances” (Waste onsite)**

EWG Code	Description of Waste	CAS No.	Hazard Statement	Total Annual tonnage	Storage Area	Potential Scenario for Release to groundwater/soils	Source-Pathway-Receptor	Risk of contamination of soils/groundwater
07 05 01	aqueous washing liquids and mother liquors	N/A	N/A	129.786	Tank Farm. Transferred to banded day tanks on the Liquid Vapour Incinerator for subsequent treatment.	Sampling of tanks, or operations or pipeline failure leading to single or multiple tank failure causes leakage of large quantity of chemicals.	<p><b>Source:</b> Single or multiple tank failure causes leakage. This would need to occur in conjunction with bunds (catchment basin/liquid vapour day tanks) remote bund pipeline and/ or spill basin 1 failure.</p> <p><b>Pathway:</b> Stored chemicals leak through failed bund or pipe network into soil.</p> <p><b>Receptor:</b> Soils &amp; Groundwater. The site soils are composed primarily of made ground overlying a superficial layer of glacial till. In the northern half of the site, subsoil thickness varies between 5-10m, with a small area of rock outcrop to the western area of site (karstified limestone at the surface). For the southern half of the site, subsoil thickness increases to 10-20m. The Groundwater flow is likely to concentrate in the upper few metres of the limestone (RPS 2019). Groundwater vulnerability is high to extreme across site (GSI 2020).</p>	The risk of such a scenario is low. The tank farm has operation procedures and controls in place for operation and tank filling, sampling. The 2018 integrity tests for catchment basins were passed with minor repairs needed, but the process sewer system and spill basin 1, 2 have passed the integrity checks. The first floor tank bunds in the liquid vapour incinerator (for storing waste) have passed 2018 integrity tests. There is repair program onsite for integrity and maintenance of tank farm pipe work for transporting solvents. There is no history of significant spillages onsite to date. Biannual monitoring of groundwater to date has not demonstrated any significant change from baseline groundwater conditions in 2013-2019.
07 05 01	aqueous washing liquids and mother liquors	N/A	N/A	630.544	Tank Farm. The loading to waste tankers takes place in the banded area to the north of the WWTP Control Building	Sampling of tanks, or operations of tanks (filling, emptying) or pipeline failure leading to single or multiple tank failure causes leakage of large quantity of chemicals.	<p><b>Source:</b> Tank/pipeline failure or accident during tanker tank operation, causing leakage. This would need to occur in conjunction with bund (catchment basin) remote bund pipeline and/ or spill basins 1, 2 failure.</p> <p><b>Pathway:</b> Stored chemicals leak through failed bund or pipe network into soil</p> <p><b>Receptor:</b> Soils &amp; Groundwater. The site soils are composed primarily of made ground overlying a superficial layer of glacial till. In the northern half of the site, subsoil thickness varies between 5-10m, with a small area of rock outcrop to the western area of site (karstified limestone at the surface). For the southern half of the site, subsoil thickness increases to 10-20m. The Groundwater flow is likely to concentrate in the upper few metres of the limestone (RPS 2019). Groundwater vulnerability is high to extreme across site (GSI 2020).</p>	The risk of such a scenario is low. Mobile bunds and the trailer park bund have passed 2018 integrity tests in the trailer park area. The tank farm has operation procedures and controls in place for operation and tank filling, sampling. The 2018 integrity tests for catchment basins were passed with minor repairs needed, but the process sewer system and spill basin 1, 2 have passed the integrity checks. There is repair program onsite for integrity and maintenance of tank farm pipe work for transporting solvents. There is no history of significant spillages onsite to date. Biannual monitoring of groundwater to date has not demonstrated any significant change from baseline groundwater conditions in 2013-2019.
07 05 01	aqueous washing liquids and mother liquors	N/A	632.48					
07 05 04	other organic solvents, washing liquids and mother liquors	N/A	N/A	115.41				
07 05 01	aqueous washing liquids and mother liquors	N/A	N/A	21.458	These are aqueous washings from production, which are stored in 1,000 l IBCs in the banded area to the north of the WWTP Control Building.	Failure of drums, containers and/or bunds they are contained in the trailer park.	<p><b>Source:</b> Tank/pipeline failure or accident during tanker tank operation, causing leakage. This would need to occur in conjunction with bund (catchment basin) remote bund pipeline and/ or spill basins 1, 2 failure.</p> <p><b>Pathway:</b> Stored chemicals leak through failed bund or pipe network into soil.</p> <p><b>Receptor:</b> Soils &amp; Groundwater. The site soils are composed primarily of made ground overlying a superficial layer of glacial till. In the northern half of the site, subsoil thickness varies between 5-10m, with a small area of rock outcrop to the western area of site (karstified limestone at the surface). For the southern half of the site, subsoil thickness increases to 10-20m. The Groundwater flow is likely to concentrate in the upper few metres of the limestone (RPS 2019). Groundwater vulnerability is high to extreme across site (GSI 2020).</p>	The risk of such a scenario is low. Mobile bunds and trailer park bund have passed 2018 integrity tests in the trailer park area. The tank farm has operation procedures and controls in place for operation and tank filling, sampling. The 2018 integrity tests has shown minor repair issues for the catchment basins, but the process sewer system and spill basin 1,2 have passed the integrity checks. There is repair program onsite for integrity and maintenance of tank farm pipe work for transporting solvents. There is no history of significant spillages onsite to date. Biannual monitoring of groundwater to date has not demonstrated any significant change from baseline groundwater conditions in 2013-2019.
16 03 05	organic wastes containing dangerous substances	N/A	N/A	23.195	200 l steel drums on the banded area to the north of the WWTP Control Building.			
16 05 07	discarded inorganic chemicals consisting of or containing dangerous substances	N/A	N/A	0.401	200 l steel drums on the banded area to the north of the WWTP Control Building.			
20 01 14	acids	N/A	N/A	2.914	200 l steel drums on the banded area to the north of the WWTP Control Building.			

EWC Code	Description of Waste	CAS No.	Hazard Statement	Total Annual tonnage	Storage Area	Potential Scenario for Release to groundwater/soils	Source-Pathway-Receptor	Risk of contamination of soils/groundwater
							vulnerability is high to extreme across site (GSI 2020).	
07 05 01	aqueous washing liquids and mother liquors	N/A	N/A	505.58	Tank Farm. The loading to waste tankers takes place in the bunded area to the north of the WWTP Control Building.	Sampling of tanks, or operations of tanks (filling, emptying) or pipeline failure leading to single or multiple tank failure causes leakage of large quantity of chemicals.	<p><b>Source:</b> Single or multiple tank failure causes leakage. This would need to occur in conjunction with bunds (catchment basin/liquid vapour day tanks) remote bund pipeline and/ or spill basin 1 failure.</p> <p><b>Pathway:</b> Stored chemicals leak through failed bund or pipe network into soil.</p> <p><b>Receptor:</b> Soils &amp; Groundwater. The site soils are composed primarily of made ground overlying a superficial layer of glacial till. In the northern half of the site, subsoil thickness varies between 5-10m, with a small area of rock outcrop to the western area of site (karstified limestone at the surface). For the southern half of the site, subsoil thickness increases to 10-20m. The Groundwater flow is likely to concentrate in the upper few metres of the limestone (RPS 2019). Groundwater vulnerability is high to extreme across site (GSI 2020).</p>	The risk of such a scenario is low. Mobile bunds and trailer park bund have passed 2018 integrity tests in the trailer park area. The tank farm has operation procedures and controls in place for operation and tank filling, sampling. The 2018 integrity tests has shown minor repair issues for the catchment basins, but the process sewer system and spill basin 1,2 have passed the integrity checks. There is repair program onsite for integrity and maintenance of tank farm pipe work for transporting solvents. There is no history of significant spillages onsite to date. Biannual monitoring of groundwater to date has not demonstrated any significant change from baseline groundwater conditions in 2013-2019.
07 05 01	other organic solvents, washing liquids and mother liquors	N/A	N/A	120.322				
07 05 01	other organic solvents, washing liquids and mother liquors	N/A	N/A	144.331				
07 05 01	other organic solvents, washing liquids and mother liquors	N/A	N/A	1.396				
07 05 01	other organic solvents, washing liquids and mother liquors	N/A	N/A	13.121				
07 05 03	aqueous washing liquids and mother liquors	N/A	N/A	27.29				
07 05 04	other organic solvents, washing liquids and mother liquors	N/A	N/A	21.39				
07 05 04	other organic solvents, washing liquids and mother liquors	N/A	N/A	70.12				
07 05 04	other organic solvents, washing liquids and mother liquors	N/A	N/A	946.05				
07 05 04	other organic solvents, washing liquids and mother liquors	N/A	N/A	1,125.13				
07 05 04	other organic solvents, washing liquids and mother liquors	N/A	N/A	1,581.34				
07 05 04	other organic solvents, washing liquids and mother liquors	N/A	N/A	1,896.88				
07 05 04	other organic solvents, washing liquids and mother liquors	N/A	N/A	18.345				
07 05 04	other organic solvents, washing liquids and mother liquors	N/A	N/A	172.444				
07 05 04	other organic solvents, washing liquids and mother liquors	N/A	N/A	357.847	Tank Farm. Transferred to bunded day tanks on the Liquid Vapour Incinerator for subsequent treatment.	Sampling of tanks, or operations or pipeline failure leading to single or multiple tank failure causes leakage of large quantity of chemicals.	<p><b>Source:</b> Single or multiple tank failure causes leakage. This would need to occur in conjunction with bund (catchment basin) remote bund pipeline and/ or spill basin 1 failure.</p> <p><b>Pathway:</b> Stored chemicals leak through failed bund or pipe network into soil.</p> <p><b>Receptor:</b> Soils &amp; Groundwater. The site soils are composed primarily of made ground overlying a superficial layer of glacial till. In the northern half of the site, subsoil thickness varies between 5-10m, with a small area of rock outcrop to the western area of site (karstified limestone at the surface). For the southern half of the site, subsoil thickness increases to 10-20m. The Groundwater flow is likely to concentrate in the upper few metres of the limestone (RPS 2019). Groundwater vulnerability is high to extreme across site (GSI 2020).</p>	The risk of such a scenario is low. The tank farm has operation procedures and controls in place for operation and tank filling, sampling. The 2018 integrity tests for catchment basins were passed with minor repairs needed, but the process sewer system and spill basin 1, 2 have passed the integrity checks. The first floor tank bunds in the liquid vapour incinerator (for storing waste) have passed 2018 integrity tests. There is repair program onsite for integrity and maintenance of tank farm pipe work for transporting solvents. There is no history of significant spillages onsite to date. Biannual monitoring of groundwater to date has not demonstrated any significant change from baseline groundwater conditions in 2013-2019.

EW Code	Description of Waste	CAS No.	Hazard Statement	Total Annual tonnage	Storage Area	Potential Scenario for Release to groundwater/soils	Source-Pathway-Receptor	Risk of contamination of soils/groundwater
07 05 04	other organic solvents, washing liquids and mother liquors	N/A	N/A	1.13				
07 05 04	other organic solvents, washing liquids and mother liquors	N/A	N/A	1.13	Tank Farm. The loading to waste tankers takes place in the bunded area to the north of the WWTP Control Building	Mobile bunds and the trailer park bund have passed 2018 integrity tests	<p><b>Source:</b> Tank/pipeline failure or accident during tanker tank operation, causing leakage. This would need to occur in conjunction with bund (catchment basin) remote bund pipeline and/ or spill basins 1, 2 failure.</p> <p><b>Pathway:</b> Stored chemicals leak through failed bund or pipe network into soil.</p> <p><b>Receptor:</b> Soils &amp; Groundwater. The site soils are composed primarily of made ground overlying a superficial layer of glacial till. In the northern half of the site, subsoil thickness varies between 5-10m, with a small area of rock outcrop to the western area of site (karstified limestone at the surface). For the southern half of the site, subsoil thickness increases to 10-20m. The Groundwater flow is likely to concentrate in the upper few metres of the limestone (RPS 2019). Groundwater vulnerability is high to extreme across site (GSI 2020).</p>	The risk of such a scenario is low. The tank farm and trailer park has operation procedures and controls in place for operation and tank filling, sampling. The 2018 integrity tests has shown minor repair issues for the catchment basins, but the process sewer system and spill basin 1,2 have passed the integrity checks. The trailer park passed the 2018 integrity tests. There is repair program onsite for integrity and maintenance of tank farm pipe work for transporting solvents. There is no history of significant spillages onsite to date. Biannual monitoring of groundwater to date has not demonstrated any significant change from baseline groundwater conditions in 2013-2019.
13 02 08	other engine, gear and lubricating oils	N/A	N/A	0.958	These are stored in bunded areas in the Utility Services Yard.	Drums or containers with these materials leak into the bund and overflow or leak from the bund in which they are contained	<p><b>Source:</b> Drums or container cause and overflows bund or bunds leaks through failure of bund integrity.</p> <p><b>Pathway:</b> Stored chemicals leak through failed bund or pipe network into soil.</p> <p><b>Receptor:</b> Soils &amp; Groundwater. The site soils are composed primarily of made ground overlying a superficial layer of glacial till. In the northern half of the site, subsoil thickness varies between 5-10m, with a small area of rock outcrop to the western area of site (karstified limestone at the surface). For the southern half of the site, subsoil thickness increases to 10-20m. The Groundwater flow is likely to concentrate in the upper few metres of the limestone (RPS 2019). Groundwater vulnerability is high to extreme across site (GSI 2020).</p>	The risk of such a scenario is low. The waste oil bund 430-767-011 (Waste Oil Bund) in the utility yard passed integrity tests in 2018. There is no history of significant spillages onsite to date. Biannual monitoring of groundwater to date has not demonstrated any significant change from baseline groundwater conditions in 2013-2019.

## Appendix C

### Hazardous Substances List

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**Table C.1 Hazardous Substances (Main Site)**

Material/ Substance	Physical State	CAS Number	Hazard Statement	Storage Quantity (tonnes)
(CLOZABUG)	Solid	5786-21-0	H301, H400, H410	15
"ALISPORIVIR /IP	Solid	254435-95-5	H302,H361d,H361,H372,H413	17
1-BUTANOL	Liquid	71-36-3	H226,H302,H315,,H318,H335,H336	65
2-AMINO-4-NITROTOLUENE 01	Solid	99-55-8	H301,H311,H331,H351, H412	4.5
2-ETHYLHEXANOIC ACID	Liquid	141-78-6	EUH066,H225,H319,H336	690
ACETANHIDRID TEHN.	Liquid	64-19-7	H226,H302,H314	0.8
ACETIC ACID 100%.002	Liquid	64-19-7	H226,H314	43
ACETIC ACID 100%.002	Liquid	67-64-1	EUH066,H225,H319,H336	140
ACETONITRILE	Liquid	75-05-8	H225,H302,H312,H319,H332	54.4
ACETYL CHLORIDE(DRUMS)	Liquid	75-36-5	H225,H314	0.6
Acetylene	Gas	74-86-2	H220,H230,H280,H336	0.3

Material/ Substance	Physical State	CAS Number	Hazard Statement	Storage Quantity (tonnes)
ADJ5150	Liquid	1310-73-2	H290,H314, H318	Two 50 litre drums (100l)
AFQ056-C8.001	Liquid	766-82-5	H226,H304,H315,H319,H335,H401,H411	0.3
AFQ056-NXA.005	Solid	543906-09-8	H401,H411	0.4
AKF	Liquid	7664-41-7	H221,H280,H314,H331,H400	1.7
AMINO-DIETHYL-INDAN HCL	Solid	312753-53-0	H302,H317,H318,H401,H411	1
AMMONIA SOLUTION 25%	Liquid	1336-21-6	H314,H336,H400,	15
AMN107-AAA.001	Solid	923288-90-8	H410	4
AMN107-B5	Solid	917392-54-2	H401,H411	1.5
AMN107-B6	Solid	641571-11-1	H301,H402,H412	6
AMN107-B7.001	Solid	641571-10-0	H410, H400	12
ANIL	Liquid	100-66-3	EUH066,H226,H315,H319	25

Material/ Substance	Physical State	CAS Number	Hazard Statement	Storage Quantity (tonnes)
AP26	Liquid	1310-73-2	H290,H314	4X50 litre drums (200l)
BENZYLOXY-ACETYL QUINOLINONE 02	Solid	93609-84-8	H303,H400,H410	1.6
BENZYLOXY-ACETYL QUINOLINONE 05	Solid	93609-84-8	H303,H400,H410	0.3
BENZYLTRIMETHYLAMMONIUM DICHLOROIODATE	Solid	114971-52-7	H301,H311,H314,H318,H331,H400,H410	2
Biomate 5702	Liquid	7681-52-9,	H314, H318, H400, H410, EUH031, H319	1.8
Boron Trifluoride	Liquid	02/07/7637	H280,H314,H318,H330,H335,H373	4.4

Material/ Substance	Physical State	CAS Number	Hazard Statement	Storage Quantity (tonnes)
BROMOMETHANE	Gas	74-83-9	H280,H301,H315,H319,H331,H335, H336,H341,H373,H400,H420	0.24
BROM-SUCCINIMID \INACTIVE	Solid	128-08-5	H272,H290,H315,H319,H400	2.5
BULIC	Liquid	109-72-8, 110-82-7 110-54-3	H225,H250,H260,H304,H314 H315,H318, H336,H400,H410, EUH014, H411, H373, H361f,	15
BULIHX	Liquid	109-72-8, 110-54-3	EUH014,H225,H250,H260,H302,H304, H314,H315,H317,H318,H319,H316F, H373,H401,H401,H411,H412	28

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Material/ Substance	Physical State	CAS Number	Hazard Statement	Storage Quantity (tonnes)
BUTYL ACETATE	Liquid	123-86-4	EUH066,H226,H336	43
CAPMATINIB BASE 02 (INC280 C6)	Solid	1029712-80-8	H301,H360d,H373,H411	5
CAPMATINIB HCL/IP 02	Solid	1865733-40-9	H290,H301,H314,H318,H360,H373,H411	10
CBA/NRL2	Solid	50892-62-1	H401,H411	2.5
CBANS/NRL2	Solid	60091-89-3	H228,H312,H332,H360d,H402,H412	5
CHLORO-RUTHENIUM LIGAND	Solid	192139-90-5	H228,H317,H400,H410	0.05

Material/ Substance	Physical State	CAS Number	Hazard Statement	Storage Quantity (tonnes)
CHXA	Liquid	110-82-7	H225,H304,H315,H336,H400,H410	200
CLOZABA 01 FR EX103154	Solid	5786-21-0	H301,H331,H361d+H362,H372, H400,H410,	15
COPPER (I) IODIDE	Solid	7681-65-4	H302,H315,H319,H335,H400,H410	0.2
CORRSHIEL MD4100	Liquid	7632-00-0, 7631-95-0, 1310-73-2	H272,H301,H319,H400, H314	One 1,000 litre IBC

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Material/ Substance	Physical State	CAS Number	Hazard Statement	Storage Quantity (tonnes)
CORTROL IS3070ETrade	liquid	7631-90-5	H302	One 1,000 litre IBC
CYANAMID 50	Liquid	420-04-2	H301,H312,H314,H317,H318,H351, H361d,H373,H412,H314	5
Dabrafenib MonoMesylate IP02, DABRAFENIB MESYLATE SEED	Solid	1198768-06-9	H361f,H373,H400,H411	5
DAEM	Liquid	109-89-7	H225,H302,H312,H314,H332,H335	10
DARIFENACIN BASE 02	Solid	133099-04-4	H301	5
Darifenacin IP	Solid	133099-04-4	H301	5
DEMB	Liquid	7397-46-8	EUH019,H225,H301,H302,H312,H314, H317,H332,H335,H336,H351,H373,H402,H413	10

Material/ Substance	Physical State	CAS Number	Hazard Statement	Storage Quantity (tonnes)
DGLDM	Liquid	111-96-6	EUH019,H226,H360	16
DHBFP-DIPHENYLACETONITR HBR 02	Solid	252317-48-9	H303,H317,H400,H410	6
DICHLORO-2-NITROBENZENE	Solid	89-61-2	H302,H401,H411	5
DICI (2-Propanamine)	Liquid	693-13-0	H226; H315; H317 H318 H330; 334	0.36*
DICYCLOHEXYL-CARBODIIMID	Solid	538-75-0	H302,H311,H317,H318	4
Diesel Fuel	Liquid	68476-34-6	H220,H304,H315,H319,H336,H350,H411	35
Dihydro-benzofuran-5-yl)-ethyl]-pyrrolidin-3-yl)-diphenyl-acetonitrile	Solid	252317-48-9	H317,H400,H410	12

Material/ Substance	Physical State	CAS Number	Hazard Statement	Storage Quantity (tonnes)
DIISOPROPYLCARBODIIMIDE	Liquid	693-13-0	H226,H315,H317,H318,H330, H334,H335,H400,H410	1
DIMETHYL FORMAMIDE	Liquid	68-12-2	H226,H312,H319,H332,H360d	30
Dowtherm J Heat Transfer Fluid	Liquid	25340-17-4	H226,H304,H315,H410	15 tons
EDIPA	Liquid	7087-68-5	H225,H301,H302,H314,H318, H331,H335,H336,H402,H411,H412	24
EMCA	Liquid	42252-34-6	H227,H302,H314,H317, H318,H330,H335,H341,H351	12
ENA712-NXA/DS	Liquid	123441-03-2	H300,H372,H401,H411	4

Material/ Substance	Physical State	CAS Number	Hazard Statement	Storage Quantity (tonnes)
Envirofloc 2050LV	Liquid	42751-79-1	H315,H319, H335, H410,H412	2
Envirofloc 234	Liquid	68213-23-0	H304, H315,H336,H226, H411	2
Envirofloc 3040	Liquid	64742-46-7, 106232-83-1, 68213-23-0	H302, H350, H318, H400, H412	2
Envirofloc FL101	Liquid	10028-22-5	H314,H302,H318,H290,H315,	2
ETHANOL	Liquid	64-17-5	H225	30
ETHANOL	Liquid	64-17-5	H225	80
FENAL	Solid	93957-50-7	H317,H400,H410	34
FLUVAST FRW/PUR	Solid	93957-55-2	H302,H315,H317,H319,H372,H402,H412	6

Material/ Substance	Physical State	CAS Number	Hazard Statement	Storage Quantity (tonnes)
Foamblock 139	Liquid	64742-47-8,	H304, H315,H336, H226, H411 H350	2
Gengard gn8163	Liquid	N/A	H290,H314, H318, H413	1
HEEL EX TETRAZOLYL-VALAMID 11	Solid	137863-20-8	H302,H402,H410	30
Heptane	Liquid	142-82-5	H225,H304,H315,H336,H400,H410	13
HEXYLLITHIUM 33% IN HEXANE 01	Liquid	21369-64-2, 110-54-3, 110-82-7, 64742-49-0	H225,H250,H260,H304,H314, H318,H336,H361f,H373, H401,H410, H400, H411	1.2
Hydrogen	Gas	1333-74-0	H220, H280	0.3
Hydrogen Chloride (liquified gas)	Gas	7647-01-0	H280,H290,H314,H318,H331,H335	1.5

Material/ Substance	Physical State	CAS Number	Hazard Statement	Storage Quantity (tonnes)
Hydrogen Peroxide	Liquid	7722-84-1	H302,H318	16
IMATINIB MES/DS 11 SEED	Solid	220127-57-1	H302,H351,H361d,H373,H401,H411	12
INC424-AZA.001	Solid	1092939-17-7	H301,H402,H412	10
IPA	Liquid	108-21-4	EUH066,H225,H319,H336	250
IPK	Liquid	67-63-0	H225,H319,H336	60
ISOPROPYL MgCl / LiCl 14% IN THF	Liquid	745038-86-2	H225,H260,H302,H318,H335,H351	25
KALIUM TERT?BUTYLAT 20% IN THF	Liquid	865-47-4, 109-99-9	EUH019,H225,H314,H318,H335	16
Ketotifen Hydrogen Fumarate	Solid	34580-14-8	H302,H400,H410	0.5
LCQ908-ABA.001	Solid	956136-98-4	H361F,H373,H400,H410	0.1

Material/ Substance	Physical State	CAS Number	Hazard Statement	Storage Quantity (tonnes)
Liquified extremely flammable gases (including LPG) and natural gas	Gas	74-98-6	H220,H280	2
ME-ISOBUTYL-KETON WGD 147193	Liquid	108-10-1	EUH066,H225,H332,H335	65
Methanol	Liquid	67-56-1	H225,H301,H311,H331,H370	76
Methyl-1-butanol	Liquid	123-51-3	H223,H315,H318,H332,H335	50
METHYLAMIN GAS	Gas	74-89-5	H220,H280,H315,H318,H332,H335	1
Methylpiperazine; 1-Methylpiperazine	Liquid	109-01-3	H226,H303,H312,H314,H317,H318	30
METHYLTETRAHYDROFURAN	Liquid	96-47-9	EUH019,H225,H302,H313,H315, H318,H319,H335	22
N,N-DIMETHYLFORMAMIDE	Liquid	4637-24-5	H225,H315,H317,H318,H332, H360d	15

Material/ Substance	Physical State	CAS Number	Hazard Statement	Storage Quantity (tonnes)
NABH	Solid	16940-66-2	EUH104,H260,H301,H311,H314,H318, H332,H360,H360fd	5
NABH	Solid	16940-66-2	EUH104,H260,H301,H311,H314,H332	5
N-Chlorsuccinimide	Solid	128-09-0	H302,H314,H318,H400	2
NILOTINIB, AMN107-B7.001	Solid	923288-90-8, 641571-10-0	H410,	12
Nitroclear 300	Liquid	-	-	2
Nutrifeed M	Liquid	1302-78-9	-	2
NUTRIFEED N	Liquid	-	-	2

Material/ Substance	Physical State	CAS Number	Hazard Statement	Storage Quantity (tonnes)
Nutrifeed P	Liquid	7664-38-2	H314	1
Nutrifeed T15	Liquid	7664-38-2	H314	1
O-DICHLOROBENZENE, 98%	Liquid	95-50-1	H302,H315,H319,H335,H400,H410	1
O-NITRO-P-AMINO-TOLUENE	Solid	119-32-4	H301,H311,H331,H341,H351,H373,H401,H411	23
O-NITRO-P-AMINO-TOLUENE	Solid	119-32-4	H301,H311,H331,H341,H351,H373,H401,H411	23
OPTISPERSE PO5090Trade	Liquid	1310-73-2	H314	Four 50 litre drums (200L)
Oxygen	Gas	7782-44-7	H270,H280	0.3
Phosphoric Acid	Liquid	7664-38-2	H314	1

Material/ Substance	Physical State	CAS Number	Hazard Statement	Storage Quantity (tonnes)
Phosphoric Acid	Liquid	7664-38-2	H290, H302,H314	One 1,000 litre IBC (1000l)
PIPERAMIDO NITROTOLUENE	Solid	581076-60-0	H317,H400,H410	8
Piperidine	Liquid	110-89-4	H225,H311,H314,H331	0.1
PROP-2-YN-1-OL.001	Liquid	107-19-7	H226,H301,H311,H314,H331,H411	3
QAB149-E10/E12	Solid	753498-41-8	H317	1.2
QAB149-E4	Solid	93609-84-8	H303,H400,H410	1.2
RIVASTIGMIN FR EX117840	Solid	129101-54-8	H300,H372,H401,H441	2
Rivastigmine Base/DS16	Liquid	123441-03-2	H300 H372 H401 H411	1.106*
Ruxolitinib INC424-AZA	Solid	1092939-17-7	EUH 401,H301H302,H312,H319H332,H402,H412	3
Sodium Hypochlorite 10-12%	Liquid	7681-52-9	EUH031,H314,H318,H400,H410	20

Material/ Substance	Physical State	CAS Number	Hazard Statement	Storage Quantity (tonnes)
SODIUM HYPOCHLORITE LSG 14% CL	Liquid	7681-52-9	H314, H318, H400, H410, EUH031	20
SOM CYCLOHEXATIDE ACETATE 02	Liquid	N.A	H226,H361F,H401,H411	0.2
SOM CYCLOHEXATIDE TFA CRUDE	Solid	396091-75-1	H361F,H400,H410	0.5
SOM CYCLOHEXATIDE TFA PURE	Liquid	396091-75-1	H225,H401,H411	0.5
SOM230-BFA/IP 02	Solid	396091-79-5	H361F,H400,H410	0.6
SPECTRUS BD1550	Liquid	93918-10-6	H315,H318	Two 50 litre drums
SPECTRUS DT1402	Liquid	10192-30-0	H319	Two 50 litre drums
SPECTRUS OX1201Trade	Liquid	7647-15-6	-	One 1,000 litre IBC
Sulfadox	Liquid	7631-99-4	H319,GHS07	One 1,000 litre IBC (1000l)

Material/ Substance	Physical State	CAS Number	Hazard Statement	Storage Quantity (tonnes)
Sulphuric Acid	Liquid	7664-93-9	H290,H314, H412	One 1,000 litre IBC (1000l)
SYCOL	Liquid	108-75-8	H226,H302,H312,H315,H319,H335	2.5
T-AMYL ALCOHOL	Liquid	75-85-4	H225,H312,H315,H318,H332,H335	28
T-BUTYLMETHYLEETHER RG EX T-ZOLYVALAMID	Liquid	1634-04-4	H225,H315	190
Terbinafine Base	Solid	91161-71-6	H400, H410	13.5
Terbinafine Hydrochloride	Solid	78628-80-5	H400, H410	11
Terbinafine hydrochloride crude	Solid	78628-80-5	H400, H410	6.5
TETRAHYDROFURAN, TETRAHYDRO-FURAN IN FAESSERN	Liquid	109-99-9	EUH019,H225,H319,H335,H351	220
Toluene	Liquid	108-88-3	H225,H304,H315,H336,H361d,H373	10

Material/ Substance	Physical State	CAS Number	Hazard Statement	Storage Quantity (tonnes)
TRIETHYLAMIN WASSERFREI FASS	Liquid	121-44-8	H225,H302,H311,H314,H331,H336	1
Trifluoroacetic Acid	Liquid	76-05-1	H314 H332 H402 H412	0.250*
TRIMETHOXYETHANE	Liquid	1445-45-0	H225,H315,H317,H319	15
Trimethyl Borate	Liquid	121-43-7	H225,H226,H312,H315,H319,H335	22
XG (Benzene)	Liquid	1330-20-7	226; 312; 315; 332	7.812*
Xylene	Liquid	1330-20-7	H226,H312,H315, H332, H412	1

**Table C.2 Hazardous Substances (API Chemicals)**

Material/ Substance	Physical State	CAS No.	H Statement	Annual Usage* (tonnes)	Nature Of Use	Storage Location
1-METHYL-2-PYRROLIDON	Liquid	872-50-4	315; 319; 336; 360	56.070	Production	Category Warehouses onsite
2,2-DIMETHYLPROPANETHIOAMIDE	Solid	630-22-8	302; 315; 319	0.825	Production	Category Warehouses onsite
2-CHLORO-4-METHYLPYRIMIDINE	Solid	13036-57-2	302; 315; 318	3.000	Production	Category Warehouses onsite
3-ACETYL PYRIDINE 01 (RASCHIG)	Solid	350-03-8	301; 315; 307	9.600	Production	Category Warehouses onsite
4-CHLOROMETHYL-BOCH 01	Solid	876-08-4	227; 290; 302	12.480	Production	Category Warehouses onsite
70% W/W METHANESULFONIC ACID	Liquid	75-75-2	314	1.820	Production	Category Warehouses onsite
AG48 (Argon Gas)	Gas	7440-37-1	280	0.067	Production	Category Warehouses onsite
AKTIVKOHLE ACTICARBONE S PH (Activated Charcoal)	Solid	7440-44-0	N.A.	2.010	Production	Category Warehouses onsite
AMINOMETHYL-PS HARZ_1 (Amino methyl polystyrene resin)	Solid	78578-28-6	N.A.	69.525	Production	Category Warehouses onsite

Material/ Substance	Physical State	CAS No.	H Statement	Annual Usage* (tonnes)	Nature Of Use	Storage Location
ASSC (Formic Acid)	Liquid	64-18-6	226; 314	3.000	Production	Category Warehouse onsite
AUXSP (Aluminium Oxide)	Solid	1344-28-1	N.A.	80.000	Production	Category Warehouse onsite
BENZOTRIAZOLYL-T-METHYLURONIUM HFP	Solid	94790-37-1	317; 319; 402; 411	0.050	Production	Category Warehouse onsite
BULHX n-(Butyllithium in Hexane)	Liquid	64742-49-0, 109-72-8	EUH014; 225; 250; 260; 304; 314; 361f; 373; 401; 411	86.398	Production	Category Warehouse onsite
CAPMATINIB BASE 02	Solid	1029712-80-8	300; 360d; 373; 411	0.140	Production	Category Warehouse onsite
CAPMATINIB BENZOIC ACID HCL_TLCM	Solid	Not Available	314; 318	0.683	Production	Category Warehouse onsite
CAPMATINIB BENZOIC ACID HYDROCHLORIDE 02	Solid?	Not Available	314; 318	0.178	Production	Category Warehouse onsite
CAPMATINIB DS/10	Solid	1865733-40-9	290; 300; 314; 318; 360; 373; 411	0.188	Production	Category Warehouse onsite

Material/ Substance	Physical State	CAS No.	H Statement	Annual Usage* (tonnes)	Nature Of Use	Storage Location
CICLO 11 (Ciclosporin A)	Solid	59865-13-3	302; 351; 373; 402; 412	7.990	Production	Category Warehouse onsite
CICLO 11 ML	Solid	59865-13-3	EUH066; 228; 302; 351; 373; 402; 412	0.331	Production	Category Warehouse onsite
CICLOSPORIN/DS 11 (Ciclosporin A)	Solid	59865-13-3	302; 351; 373; 402; 412	82.798	Production	Category Warehouse onsite
CLC (HCl Gas)	Gas	7647-01-0	314; 331	1.080	Production	Category Warehouse onsite
CSLPA (30% Sodium Hydroxide solution)	Liquid	1310-73-2	314	0.030	Production	Category Warehouse onsite
CSS (Sodium Hydroxide)	Solid	1310-73-2	314	3.600	Production	Category Warehouse onsite
CYREA 11 (Ciclosporin A)	Solid	59865-13-3	302; 351; 373; 402; 412	9.329	Production	Category Warehouse onsite
CYREA 11 NL POSTS (Ciclosporin A)	Solid	59865-13-3	302; 351; 373; 402; 412	0.364	Production	Category Warehouse onsite
CYREA 11 NL SOLID (Ciclosporin A)	Solid	59865-13-3	302; 351; 373; 402; 412	0.332	Production	Category Warehouse onsite

Material/ Substance	Physical State	CAS No.	H Statement	Annual Usage* (tonnes)	Nature Of Use	Storage Location
CYREA 11 ZL INTERS (Ciclosporin A)	Solid	59865-13-3	302; 351; 373; 402; 412	1.300	Production	Category Warehouse onsite
CYREA 11 ZL SOLID (Ciclosporin A)	Solid	59865-13-3	302; 351; 373; 402; 412	1.590	Production	Category Warehouse onsite
CYSPAR (WATER/DEMUL CHANGE) (Cyclosporine A Crude)	Solid	59-865-13-3	302; 351; 373; 402; 412	16.235	Production	Category Warehouse onsite
DABRAFENIB MESYLATE DS 08.008	Solid	1195768-06-9	361fd; 373; 400; 411	2.120	Production	Category Warehouse onsite
DAEM (Diethylamine)	Liquid	109-89-7	225; 302; 312; 314; 332; 335	10.640	Production	Category Warehouse onsite
DEMB (Diethylmethoxyborane in THF 50%)	Liquid	7397-46-8, 109-99-9	EUH019; 225; 250; 302; 312; 314; 317; 332; 373; 413	0.490	Production	Category Warehouse onsite
DIAZABICYCLOUNDECEN.001	Liquid	6674-22-2	301; 314; 318; 402; 412	0.760	Production	Category Warehouse onsite
DIFMAL	Liquid	4637-24-5	225; 315; 317; 318; 332; 360d	14.800	Production	Category Warehouse onsite

Material/ Substance	Physical State	CAS No.	H Statement	Annual Usage* (tonnes)	Nature Of Use	Storage Location
DIMETOL 16	Solid	139306-10-8	302; 317; 319; 402; 412	1.500	Production	Category Warehouses onsite
DIOLAT 12	Solid	129332-29-2	313; 413	12.500	Production	Category Warehouses onsite
EEMA (Glacial Acetic Acid)	Liquid	64-19-7	226; 314	4.060	Production	Category Warehouses onsite
EEMA (W) (Glacial Acetic Acid)	Liquid	64-19-7	226; 314	0.045	Production	Category Warehouses onsite
EMCA (Emacarbamoyl Chloride)	Liquid	42252-34-6	227; 302; 314; 317; 318; 330; 335; 341; 351	3.500	Production	Category Warehouses onsite
FDPHE (D-Phenylalanine)	Solid	86123-10-6	N.A.	0.080	Production	Category Warehouses onsite
FEVIPIPRANT/IP.005	Solid	872365-14-5	317; 402	0.032	Production	Category Warehouses onsite
FLUVASTATIN SODIUM WET 12	Solid	93957-55-2	302; 315; 317; 319; 372; 402; 412	6.176	Production	Category Warehouses onsite

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Material/ Substance	Physical State	CAS No.	H Statement	Annual Usage* (tonnes)	Nature Of Use	Storage Location
FLUVASTATIN SODIUM/DS 12	Solid	93957-55-2	302; 315; 317; 319; 372; 402; 412	6.297	Production	Category Warehouses onsite
FMOC-D-TRYPTOPHAN-(BOC)-OH	Solid	163619-04-3	N.A.	0.060	Production	Category Warehouses onsite
FMOC-L-HYDROXYPROLIN(BCC)-OH	Solid	187223-75-0	317	0.050	Production	Category Warehouses onsite
FMOC-L-TYROSIN-(BZL)-OH	Solid	71989-40-7	N.A.	0.030	Production	Category Warehouses onsite
FPHE (N- (9-Fluorenylmethoxycarbonyl)phenylalanine)	Solid	35661-40-6	N.A.	0.090	Production	Category Warehouses onsite
FTHR (L-Threonine)	Solid	73731-37-0	N.A.	0.110	Production	Category Warehouses onsite
FUS (Fumaric Acid)	Solid	110-17-8	319	0.175	Production	Category Warehouses onsite
HND 60 (Sodium Hydride, 60% dispersion in oil)	Solid	7646-69-7	228; 260	0.595	Production	Category Warehouses onsite
HOBT (1-Hydroxy-1H-benzotriazole hydrate)	Solid	80029-43-2	EUH044; 228	0.220	Production	Category Warehouses onsite
HYO (Kieselgur, soda ash flux-calcined)	Solid	68855-54-9	373	0.052	Production	Category Warehouses

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Material/ Substance	Physical State	CAS No.	H Statement	Annual Usage* (tonnes)	Nature Of Use	Storage Location
						es onsite
IMATINIB MESYLATE/DS 11	Solid	220127-57-1	302; 351; 361d; 373; 401; 411	8.201	Production	Category Warehouse es onsite
IMATINIB MESYLATE/DS 13	Solid	220127-57-1	302; 351; 361d; 373; 401; 411	2.229	Production	Category Warehouse es onsite
INDACATEROL MALEATE CRUDE 04	Solid	753498-25-8	317	0.373	Production	Category Warehouse es onsite
INDACATEROL ACETATE/DS 03	Solid	1000160-96-2	317	0.004	Production	Category Warehouse es onsite
INDACATEROL ACETATE/IP 03	Solid	1000160-96-2	317	0.064	Production	Category Warehouse es onsite
KTBTfH (2-Propanol, 2-methyl-, potassium salt in 80% THF))	Liquid	865-47-4, 109-99-9	EUH019; 225; 314; 318; 335	66.600	Production	Category Warehouse es onsite
LI-HEXAMETHYLDISILAZIDE SOL (Lithium bis(trimethylsilyl)amide, solution in THF)	Liquid	109-99-9; 999-97-3; 513-35-9	EUH019; H224; H314; H335	47.250	Production	Category Warehouse es onsite
L-PROLINE	Solid	147-85-3	N.A.	1.160	Production	Category Warehouse es onsite

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Material/ Substance	Physical State	CAS No.	H Statement	Annual Usage* (tonnes)	Nature Of Use	Storage Location
METHANSULFOSAEURE 99 % (Methanesulphonic Acid)	Liquid	75-75-2	290; 302; 312; 314; 335	2.400	Production	Category Warehouse onsite
METHIMIDAZOLYL-TFM-BENZAMINE 02	Solid	641571-11-1	301; 402; 412	5.785	Production	Category Warehouse onsite
METHOCA EX ORGAMOL	Solid	59743-88-3	413	1.880	Production	Category Warehouse onsite
METHYLAMIN KOMPR (Anhydroun Methylamine)	Solid	74-89-5	220; 280; 315; 318; 332; 335	0.045	Production	Category Warehouse onsite
METHYL-AMINO-METHYLBENZOATE	Solid	18595-18-1	402; 412	3.200	Production	Category Warehouse onsite
METHYL-PYRIMIDYL-BENZAMIDE 06	Solid	641571-10-0	410	13.014	Production	Category Warehouse onsite
METHYL-PYRIMIDYL-BENZOATE 06	Solid	917392-54-2	401; 411	8.448	Production	Category Warehouse onsite
N,N-DIMETHYL-ACETAMIDE	Liquid	127-19-5	312; 319; 332; 360d	25.936	Production	Category Warehouse onsite
NA HYDROXYQUINOLINE PROPANESULFONATE	Solid	1609934-65-7	302	5.520	Production	Category Warehouse onsite
NA HYDROXYQUINOLINE PROPANESULFONATE LI	Solid	1609934-65-7	302	6.000	Production	Category Warehouse onsite

Material/ Substance	Physical State	CAS No.	H Statement	Annual Usage* (tonnes)	Nature Of Use	Storage Location
NATRIUMHYPOCHLORIT LSG 14% CL (Sodium Hypochlorite 14%)	Liquid	7681-52-9	314; 400	35.000	Production	1 m3 IBCs Main warehouse Building.
N-BROMOSUCCINIMIDE 98.5%	Solid	128-08-5	272; 290; 315; 319; 400	1.150	Production	Category Warehouses onsite
NCLS (N-Chlorsuccinimide)	Solid	128-09-6	302; 314; 318; 400	1.550	Production	Category Warehouses onsite
N-HEPTANE >99.5%	Liquid	142-82-5	225; 304; 315; 336; 400; 410	33.916	Production	200 L drums in warehouse . Warehouse 6, 200l drums
NILOTINIB HYDROCHLORIDE 1AQ/IP 06	Solid	923288-90-8	410	3.842	Production	Category Warehouses onsite
OCTREOTIDE SPPS (GRAM)/DS 02	Solid	79517-01-4	332	0.026	Production	Category Warehouses onsite
OCTR-SPC (Octreotide solution)	Liquid	79517-01-4	332	2.380	Production	Category Warehouses onsite
O-NITRO-P-AMINO-TOLUENE	Solid	119-32-4	301; 311; 331; 341; 351; 373; 401; 411	8.964	Production	Category Warehouses onsite

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Material/ Substance	Physical State	CAS No.	H Statement	Annual Usage* (tonnes)	Nature Of Use	Storage Location
PALLADIUM AKTIVK. 5% E101NW50 (Palladium Catalyst on Charcoal)	Solid	N.A.	N.A.	11.520	Production	Category Warehouse onsite
PIPERAMIDO NITROTOLUENE 04	Solid	581076-60-0	317; 400; 410	2.277	Production	Category Warehouse onsite
PLATINUM 5% ON CARBON (Platinum Catalyst on Charcoal)	Solid	N.A.	N.A.	0.047	Production	Category Warehouse onsite
POPL (Potassium carbonate)	Solid	584-08-7	315; 319; 335	8.000	Production	Category Warehouse onsite
PYRENAMIN 07	Solid	55314-16-4	302; 317; 319; 361fd; 402; 411	15.834	Production	Category Warehouse onsite
RIVASTIGMINE H.TARTRATE/DS 09	Solid	129101-54-8	300; 372; 401; 411	0.003	Production	Category Warehouse onsite
RIVASTIGMINE H.TARTRATE/IP 17	Solid	129101-54-8	300; 372; 401; 411	2.058	Production	Category Warehouse onsite
RUXOLITINIB PHOSPHATE CRUDE	Solid	1092939-17-7	301; 402; 412	0.440	Production	Category Warehouse onsite
RUXOLITINIB PHOSPHATE CRUDE 04	Solid	1092939-17-7	301; 402; 412	0.191	Production	Category Warehouse onsite
RUXOLITINIB PHOSPHATE/IP 03	Solid	1092939-17-7	301; 402; 412	0.108	Production	Category Warehouse

Material/ Substance	Physical State	CAS No.	H Statement	Annual Usage* (tonnes)	Nature Of Use	Storage Location
						es onsite
RUXOLITINIB PHOSPHATE/IP 04	Solid	1092939-17-7	301; 402; 412	0.179	Production	Category Warehouse es onsite
SACR (Hydrochloric acid, 30%)	Liquid	7647-01-0	314; 335	50.020	Production	Category Warehouse es onsite
SASR (Ammonium Chloride)	Solid	12125-02-9	302; 319	2.250	Production	Category Warehouse es onsite
SODIUM THIOSULFATE PENTAHYDRATE	Solid	10102-17-7	N.A.	0.500	Production	Category Warehouse es onsite
SS (Sodium Carbonate)	Solid	497-19-8	319	9.000	Production	Category Warehouse es onsite
SS (FIBC) (Sodium Carbonate)	Solid	497-19-8	319		Production	Category Warehouse es onsite
SULFONAMIDE ESTER	Solid	1195768-19-4	N.A.	6.000	Production	Category Warehouse es onsite
SZV (Sodium Chloride)	Solid	7647-14-5	N.A.	2.450	Production	Category Warehouse es onsite
SZV IN FIBC (Sodium Chloride)	Solid	7647-14-5	N.A.	22.000	Production	Category Warehouse es onsite

Material/ Substance	Physical State	CAS No.	H Statement	Annual Usage* (tonnes)	Nature Of Use	Storage Location
TENACH CRUDE WET 10 (intermediate)	Solid	N.A.	EUH066; 228; 319; 336; 400; 410	16.198	Production	Category Warehouses onsite
TERBINAFINE HYDROCHL./IP 10	Solid	78628-80-5	400; 410	12.663	Production	Category Warehouses onsite
TETRAETHYLAMMONIUM CHLORIDE	Solid	56-34-8	302; 315; 319; 335	0.840	Production	Category Warehouses onsite
TETRAZOLYL-VALAMID 19	Solid	137863-20-8	302; 402; 410	25.032	Production	Category Warehouses onsite
TETRAZOLYL-VALAMID 47	Solid	137863-20-8	302; 402; 410	85.514	Production	Category Warehouses onsite
TETRAZOLYL-VALAMIDE.029	Solid	137863-20-8	302; 402; 410	85.000	Production	Category Warehouses onsite
THFU (DRUMS) (Tetrahydrofuran in drums)	Liquid	109-99-9	EUH019; 225; 319; 335; 351	0.720	Production	Category Warehouses onsite
TOP (Trioctylphosphine)	Liquid	4731-53-7	314; 318; 335	0.150	Production	Category Warehouses onsite
TRIMETHYL BORATE	Liquid	121-43-7	H225; 315; 319; 335	3.500	Production	Category Warehouses onsite

Material/ Substance	Physical State	CAS No.	H Statement	Annual Usage* (tonnes)	Nature Of Use	Storage Location
TRMA (triethylamine)	Liquid	121-44-8	225; 302; 311; 314; 331; 336	0.320	Production	Category Warehouse onsite
VALSARTAN/DS 40	Solid	137862-53-4	361d; 402	77.705	Production	Category Warehouse onsite
VALSARTAN/IP 40	Solid	137862-53-4	361d; 402	59.469	Production	Category Warehouse onsite
VALSARTAN/IP 51	Solid	137862-53-4	361d; 402	9.514	Production	Category Warehouse onsite
WA (Hydrogen)	Solid	1333-74-0	220	3.303	Production	Category Warehouse onsite
WSOY(W) (Hydrogen Peroxide 30%)	Liquid	7722-84-1	302; 318	0.005	Production	Category Warehouse onsite

**Table C.3 Hazardous Substances (Tank Farm)**

Tank no.	Solvent	CAS no.	Hazard Statement	Volume stored onsite (m <sup>3</sup> )	Total Tank Capacity (m <sup>3</sup> )
652.201	Acetic Acid	64-19-7	H224,H225,H226,H314	25	34.03
652.202	Methanol	67-56-1	H224,H225,H331,H330,H311,H301,H370	56	41.48
652.203	Methylene Chloride	75-09-2	H315, H319, H335, H336, H351, H376	25	34.03
652.204	Ethyl Acetate	141-78-6	H224,H225,H319,EUH066, H336	35	41.48
652.205	Methyl Iso Butyl Ketone	108-10-1	H225-H319-H332-H335	25	34.03
652.206	Methanol	67-56-1	H224,H225,H331,H330,H311,H301,H370	66	41.48
652.207	Ethanol	64-17-5	H224,H225	25	34.03
652.208	Butanol	71-36-3	H224,H225,H226,H302,H315,H335,H318,H336	25	34.03
652.209	Isopropyl Alcohol	67-63-0	H224,H225,H335	25	34.03
652.21	Toluene	108-88-3	H224,H225,H332	25	34.03
652.211	Ethanol	64-17-5	H224,H225	25	34.03
652.212	Sodium Hydroxide	215-185-5	H314	25	34.03
652.213	Cyclohexane	110-82-7	H224,H225,H315,H400,H410,H304,H336	25	31.11
652.214	Ethyl Acetate	141-78-6	H224,H225,H319,EUH066,H336	25	31.11
652.215	Ethyl Acetate	141-78-6	H224,H225,H319,EUH066,H336	25	31.11
652.217	Dimethyl Formamide	68-12-2	H332,H312,H319,H360	25	34.03

Tank no.	Solvent	CAS no.	Hazard Statement	Volume stored onsite (m <sup>3</sup> )	Total Tank Capacity (m <sup>3</sup> )
652.218	Water & IPA	67-63-0	H224,H225,H335	65	82.95
652.219	Ethyl Acetate	141-78-6	H224,H225,H315,H400,H410,H304,H336	25	82.95
652.22	Cyclohexane	110-82-7	H224,H225,H315,H400,H410,H304,H336	25	34.03
652.221	Water and Isopropylalcohol	67-63-0	H224,H225,H335	65	82.95
652.222	Ethanol	64-17-5	H224,H225	25	34.03
652.223	Isopropylacetate	67-63-0	H224,H225,H335	25	34.03
652.224	Tert butyl methyl ether	1634-04-4	H224,H225,H315	50	62.22
652.225	Tert butyl methyl ether	1634-04-4	H224,H225,H315	50	62.22
652.226	Acetonitrile	75-05-8	H224,H225,H332,H312,H302,H319	25	34.03
652.227	Anisole	100-66-3	H226, EUH066	25	34.03
652.228	N-Methylpiperazine	109-01-3	H226-H312-H314-H331	25	34.03
652.229	Ethanol	64-17-5	H224,H225	25	34.03
652.23	Tert-Butylmethylether	1634-04-4	H224,H225,H315	25	34.03
652.231	Ethyl Acetate	141-78-6	H224,H225,H319,EUH066,H336	25	34.03
652.232	3 Methyl-1-Butanol	123-51-3	H224,H225,H226, H332	25	34.03
652.233	Butylacetate	123-86-4	H224,H225,H226,EUH066,H336	25	34.03
652.234	Waste solvent	Mixture	H224,H225	25	34.03
652.235	Waste solvent	Mixture	H224,H225	25	34.03
652.236	Tert butyl methyl ether	1634-04-4	H224,H225,H315	25	34.03

Tank no.	Solvent	CAS no.	Hazard Statement	Volume stored onsite (m <sup>3</sup> )	Total Tank Capacity (m <sup>3</sup> )
652.237	Tert butyl methyl ether	1634-04-4	H224,H225,H315	25	34.03
652.238	Not Used – Spare Tank, Waste solvent	Mixture	H224,H225	25	34.03
652.239	Waste solvent	N/A	-	25	34.03
652.24	Ethyl Acetate	141-78-6	H224,H225,H319,EUH066,H336	25	34.03
652.241	Ethyl Acetate	141-78-6	H224,H225,H319,EUH066,H336	25	34.03
652.242	Toluene	108-88-3	H224,H225,H332	25	34.03
652.243	Butanol	71-36-3	H224,H225,H226,H302,H315,H335,H318,H336	25	34.03
652.244	Waste solvent	Mixture	H224,H225	50	82.95
652.245	Not Used – Spare Tank, Waste solvent	Mixture	H224,H225	50	34.03
652.246	Waste solvent	Mixture	H224,H225	50	62.22
652.247	Waste solvent	Mixture	H224,H225	25	34.03
652.248	Acetonitrile	75-05-8	H224,H225,H332,H312,H302,H319	25	34.03
652.25	Acetone	67-64-1	H224,H225,H319,EUH066,H336	50	61.95
652.251	Tetrahydrofuran	109-99-9	H224,H225,EUH019,H319,H335	50	61.95
652.252	Ethyl Acetate	141-78-6	H224,H225,H319,EUH066,H336	25	62.22
652.253	Heptane and Isopropylalcohol	92045-32-4	H224,H225,H315,H400,H410,H304,H336	25	62.22

Tank no.	Solvent	CAS no.	Hazard Statement	Volume stored onsite (m <sup>3</sup> )	Total Tank Capacity (m <sup>3</sup> )
652.254	Ethyl Acetate	141-78-6	H224,H225,H319,EUH066,H336	25	62.22
652.261	n-Heptane	92045-32-4	H224,H225,H315,H400,H410,H304,H336	25	34.03
652.262	Waste solvent	Mixture	H224,H225	25	34.03
652.271	Cyclohexane/ ethylacetate mix	110-82-7	H224,H225,H315,H400,H410,H304,H336	50	62.22
652.272	Ethyl Acetate	141-78-6	H224,H225,H319,EUH066,H336	25	62.22
652.273	Ethyl Acetate	141-78-6	H224,H225,H319,EUH066,H336	25	62.22
652.274	Ethyl Acetate	141-78-6	H224,H225,H319,EUH066,H336	25	62.22
652.28	Isopropyl Acetate	141-78-6	H224,H225,H319,EUH066,H336	25	31.11
652.281	Isopropyl Acetate	108-21-4	H224,H225,H319,EUH066,H336	25	61.95
652.282	Ethyl Acetate	141-78-6	H224,H225,H319,EUH066,H336	50	31.11
652.283	Ethyl Acetate	141-78-6	H224,H225,H319,EUH066,H336	25	31.11
652.284	Ethyl Acetate	141-78-6	H224,H225,H319,EUH066,H336	25	31.11
652.285	Ethyl Acetate	141-78-6	H224,H225,H319,EUH066,H336	25	62.22
652.286	Ethyl Acetate	141-78-6	H224,H225,H319,EUH066,H336	25	62.22
652.287	Heptane and Acetone	92045-32-4	H224,H225,H315,H400,H410,H304,H336	25	62.22

Tank no.	Solvent	CAS no.	Hazard Statement	Volume stored onsite (m <sup>3</sup> )	Total Tank Capacity (m <sup>3</sup> )
652.289	Acetone	67-64-1	H224,H225,H319,EUH066,H336	25	62.22
652.29	Waste solvent	Mixture	H224,H225	50	61.95
652.291.1	Waste solvent	Mixture	H224,H225	25	31.11
652.291.2	Waste solvent	Mixture	H224,H225	25	31.11
652.292	Cyclohexane	110-82-7	H224,H225,H315,H400,H410,H304,H336	50	62.22
652.293	Cyclohexane	110-82-7	H224,H225,H315,H400,H410,H304,H336	25	31.11
652.294	Ethyl Acetate	141-78-6	H224,H225,H319,EUH066,H336	25	31.11
652.295	Ethyl Acetate	141-78-6	H224,H225,H319,EUH066,H336	25	31.11
652.296	Ethyl Acetate	141-78-6	H224,H225,H319,EUH066,H336	25	62.22
652.297	Ethyl Acetate	141-78-6	H224,H225,H319,EUH066,H336	25	62.22
652.298	Aqueous waste	N/A		25	31.11
652.299	Waste solvent	Mixture	H224,H225	25	31.11
652.861	Isopropyl Acetate	108-21-4	H224,H225,H319,EUH066,H336	50	62.22
652.862	Isopropyl Acetate	108-21-4	H224,H225,H319,EUH066,H336	25	31.11
652.863	Isopropyl Acetate	108-21-4	H224,H225,H319,EUH066,H336	25	31.11
652.864	Isopropyl Acetate	67-63-0	H224,H225,H335	50	62.22
652.865	Tetrahydrofuran	Mixture	H224,H225,H319,H335	25	31.11

Tank no.	Solvent	CAS no.	Hazard Statement	Volume stored onsite (m <sup>3</sup> )	Total Tank Capacity (m <sup>3</sup> )
652.868	Tetrahydrofuran	Mixture	H224,H225,H319,H335	25	31.11
652.875	Tetrahydrofuran	Mixture	H224,H225, EUH019,H373,H361f,H361fd, H411	25	31.11
652.876	Tetrahydrofuran	109-99-9	H224,H225,EUH019,H319,H335	25	31.11
652.877	HP Ascristex	104987-12-4	H372c,H413	50	62.22
653.256	Tetrahydrofuran	109-99-9	H224,H225,EUH019,H319,H335	25	5
653.257	Tetrahydrofuran	109-99-9	H224,H225,EUH019,H319,H335	25	5
653256	Tetrahydrofuran-recovered	109-99-9	H224,H225,EUH019,H319,H335	-	5
653257	Tetrahydrofuran-recovered	109-99-9	H224,H225,EUH019,H319,H335	-	5
653266	Tetrahydrofuran-recovered	109-99-9	H224,H225,EUH019,H319,H335	-	5
653267	Tetrahydrofuran-recovered	109-99-9	H224,H225,EUH019,H319,H335	-	5
653269	Isopropylacetate-recovered	67-63-0	H224,H225,H335	-	5
653270	Isopropylacetate-recovered	67-63-0	H224,H225,H335	-	5
653249	BHT additive tank	128-37-0	H400 and H410, H413	0	0.5
653.259	Waste Solvent	-	-	-	1.5
653.288	Decane	124-18-5	EUH066, H226 and H304	0	5

**Table C.4 Hazardous Substances (Labs)**

Material/ Substance	Physical State	CAS No.	Storage Quantity (Litres (L) or millilitres (mls))	Nature Of Use	Storage Location
Conductivity Standard 10us/cm	Liquid	7447-40-7	1 * 500 ml	Laboratories	Micro
Conductivity Standard 84u	Liquid	7447-40-7	1 * 500 ml	Laboratories	Micro
Tween 80	Liquid	9005-65-6	1 * 1 l	Laboratories	Micro
Ammonium hydroxide solution	Liquid	1336-21-6	1 * 100 ml	Laboratories	Reagent Store
Ammonia	Liquid	1336-21-6	1 l	Laboratories	Reagent Store
Bromine		7726-95-6	250 ml	Laboratories	Reagent Store
BUFFER PH10+/-0,01	Liquid	NA	1l	Laboratories	Reagent Store
BUFFER PH4 +/-0,01	Liquid	NA	1l	Laboratories	Reagent Store
BUFFER PH7 +/-0,01	Liquid	NA	1l	Laboratories	Reagent Store
Buffer solution 12.0	Liquid	NA	1 l	Laboratories	Reagent Store
BUFFER SOLUTION PH1.00	Liquid	NA	1l	Laboratories	Reagent Store
Standard buffer PH 1.677	Liquid	NA	500 ml	Laboratories	Reagent Store
Standard buffer ph 9	Liquid	NA	1 l	Laboratories	Reagent Store
Colour ref std PhEur B	Liquid	NA	1 SET	Laboratories	Reagent Store
Colour ref std PhEur BY	Liquid	NA	1 SET	Laboratories	Reagent Store

Material/ Substance	Physical State	CAS No.	Storage Quantity (Litres (L) or millilitres (mls))	Nature Of Use	Storage Location
Colour ref std PhEur GY	Liquid	NA	1 SET	Laboratories	Reagent Store
Colour ref std PhEur Y 10ml	Liquid	NA	1 SET	Laboratories	Reagent Store
Colour ref std PhEur Y 2ml	Liquid	NA	1 SET	Laboratories	Reagent Store
Colour ref stds APHA 70 to 500	Liquid	NA	1 SET	Laboratories	Reagent Store
Dragendorffs reagent	Liquid	39775-75-2	100 ml	Laboratories	Reagent Store
ELECTROLYTE SOLUTION	Liquid	NA	250 ml	Laboratories	Reagent Store
electrolyte solution	Liquid	7447-40-7	250 ml	Laboratories	Reagent Store
Fluoride ISE Solution	Liquid	NA	500 ml	Laboratories	Reagent Store
Formate Standard Soln	Liquid	NA	100 ml	Laboratories	Reagent Store
KNOs Sat		7757-79-1	250 ml	Laboratories	Reagent Store
hydranal water standard	Liquid	NA	40 ml	Laboratories	Reagent Store
Hydrogen Peroxide	Liquid	7722-84-1	1 l	Laboratories	Reagent Store
Ion chromatography standard 1mg/ml oxalate	Liquid	NA	100 ml	Laboratories	Reagent Store
PARAFFIN LIQUID SPECT	Liquid	8012-95-1	500 ml	Laboratories	Reagent Store

Material/ Substance	Physical State	CAS No.	Storage Quantity (Litres (L) or millilitres (mls))	Nature Of Use	Storage Location
PYRIDINE 99.5%, EXTRA DRY OVER MOLECULA		110-86-1	2.5 l	Laboratories	Reagent Store
1LT HYDROGEN PEROXIDE 100V	Liquid	7722-84-1	1 l	Laboratories	Reagent Store
Silver (I) nitrate solution 0.1M (0.1N) ampoule Solustrate	Liquid	7761-88-8	1 * 1 Ampoul	Laboratories	Reagent Store
Silver (I) nitrate solution 0.1M (0.1N) volumetric analysis Standard Volumetric Solution	Liquid	7761-88-8	1 * 1 l	Laboratories	Reagent Store
Sodium hydroxide 50% in aqueous solution	Liquid	1310-73-2	1 * 1 l	Laboratories	Reagent Store
Sodium hydroxide solution	Liquid	1310-73-2	1 * 1 l	Laboratories	Reagent Store
Ammonium standard	Liquid	NA	500 ml	Laboratories	Reagent Store
Bromide standard solution		NA	500 ml	Laboratories	Reagent Store
Chloride Standard Soln	Liquid	NA	500 ml	Laboratories	Reagent Store
Nitrate standard solution	Liquid	NA	500 ml	Laboratories	Reagent Store
Phosphate standard solution	Liquid	NA	500 ml	Laboratories	Reagent Store
Sodium Standard	Liquid	7440-23-5	500 ml	Laboratories	Reagent Store

Material/ Substance	Physical State	CAS No.	Storage Quantity (Litres (L) or millilitres (mls))	Nature Of Use	Storage Location
Tartrate Standard Soln	Liquid	NA	100 ml	Laboratories	Reagent Store
Sodium Hydroxide	Liquid	1310-73-2	1 Ampoul	Laboratories	Reagent Store
Sodium Hydroxide 0.1M, ampoule	Liquid	1310-73-2	1 Ampoul	Laboratories	Reagent Store
Sodium hydroxide solution 1M (1N) ampoule Solutrate	Liquid	1310-73-2	1 * 1 Ampoul	Laboratories	Reagent Store
Sodium thiosulfate, 0.1M, amp	Liquid	NA	1 Ampoul	Laboratories	Reagent Store
Sodium thiosulphate	Liquid	7772-98-7	1 Ampoul	Laboratories	Reagent Store
Span 80		1338-43-8	100 ml	Laboratories	Reagent Store
TRIPROPYLAMINE 98%	Liquid	102-69-2	1 l	Laboratories	Reagent Store
1N Hydrochloric acid	Liquid	7647-01-0	1L	Laboratories	Reagent Store
Acetate Standard Soln	Liquid	NA	100 ml	Laboratories	Reagent Store
Acetic acid Ph. Eur., BP, USP, FCC, 99.8 1 * 1 l	Liquid	64-19-7	1L	Laboratories	Reagent Store
Hydrochloric acid	Liquid	7647-01-0	1 l	Laboratories	Reagent Store
Hydrochloric acid 0.1M amp	Liquid	7647-01-0	1 Ampoul	Laboratories	Reagent Store

Material/ Substance	Physical State	CAS No.	Storage Quantity (Litres (L) or millilitres (mls))	Nature Of Use	Storage Location
Hydrochloric acid 34%, NORMATOM® for trace metal analysis	Liquid	7647-01-0	500ml	Laboratories	Reagent Store
Hydrochloric acid M ampoule	Liquid	7647-01-0	1 Ampoul	Laboratories	Reagent Store
Nitric acid 65%, Suprapur® for trace analysis	Liquid	7697-37-2	250ml	Laboratories	Reagent Store
Nitric acid, 69%, 1L	Liquid	7697-37-2	1 * 1 l	Laboratories	Reagent Store
Nitric acid, SG 1.42, AR, 1L	Liquid	7697-37-2	1 l	Laboratories	Reagent Store
Formic Acid	Liquid	64-18-6	2.5 l	Laboratories	Reagent Store
Orthophosphoric acid	Liquid	7664-38-2	1 * 100 ml	Laboratories	Reagent Store
Orthophosphoric acid	Liquid	7664-38-2	1 * 500 ml	Laboratories	Reagent Store
Orthophosphoric acid	Liquid	7664-38-2	1 * 1 l	Laboratories	Reagent Store
Trifluoroacetic acid	Liquid	76-05-1	25 ml	Laboratories	Reagent Store
Trifluoroacetic acid	Liquid	76-05-1	1 * 10 ml	Laboratories	Reagent Store
Perchloric Acid 60%	Liquid	7601-90-3	500 ml	Laboratories	Reagent Store
Perchloric acid 70%, Suprapur® for trace analysis	Liquid	7601-90-3	250ml	Laboratories	Reagent Store

Material/ Substance	Physical State	CAS No.	Storage Quantity (Litres (L) or millilitres (mls))	Nature Of Use	Storage Location
Perchloric acid,0.1 mol/l in a	Liquid	64-19-7	1 l	Laboratories	Reagent Store
Sulphuric acid 102761C	Liquid	7664-93-9	1 l	Laboratories	Reagent Store
ETHANOL FOR ANALYSIS ABSOLUTE DUTYFREE		64-17-5	2.5 l	Laboratories	Solvent Store
ETHANOL GRADIENT GRADE FOR LIQUID CHR 2.5 L		64-17-5	1*2.5L	Laboratories	Solvent Store
Acetic anhydride gr acs, iso		108-24-7	1l	Laboratories	Solvent Store
Acetone for liquid chromatogra	Liquid	67-64-1	2.5	Laboratories	Solvent Store
Acetone SLR 1L	Liquid	67-64-1	1 l	Laboratories	Solvent Store
Acetonitrile Far UV	Liquid	75-05-8	2.5 l	Laboratories	Solvent Store
Acetonitrile hypergrade for li	Liquid	75-05-8	2.5 l	Laboratories	Solvent Store
Honeywell Acetonitrile Gradient	Liquid	75-05-8	2.5 l	Laboratories	Solvent Store
1-butanol	Liquid	71-36-3	1 l	Laboratories	Solvent Store
Acetone ACS	Liquid	67-64-1	1 l	Laboratories	Solvent Store

Material/ Substance	Physical State	CAS No.	Storage Quantity (Litres (L) or millilitres (mls))	Nature Of Use	Storage Location
BENZYL ALCOHOL EXTRA PURE SLR Benzyl Alcohol, Extra Pure, SLR, meets analytical specification of Ph.Eur., BP, USP, Fisher Chemical	Liquid	100-51-6	500 ml	Laboratories	Solvent Store
1,3 Dimethyl-2-imidazolidinone		80-73-9	1 * 1 l	Laboratories	Solvent Store
Chlorobenzene 99+% (GLC) Specified		108-90-7	1 * 1 l	Laboratories	Solvent Store
DICHLOROMETHANE FOR LIQUID CHROMATOGR...		75-09-2	1 * 1 l	Laboratories	Solvent Store
Dimethyl sulfoxide, baker analyzed gc- hs reagent, for use in gas chromatography (gc), environmental inorganic and organic trace analysis 1 * 1 L		67-68-5	1 l	Laboratories	Solvent Store
Acetonitrile gradient grade fo		75-05-8	2.5 l	Laboratories	Solvent Store
Dichloromethane	Liquid	75-09-2	1 l	Laboratories	Solvent Store
DI-ISO-PROPYL ETHER, EXTRA PURE		108-20-3	1 l	Laboratories	Solvent Store
Dimethyl sulfoxide UV 1L	Liquid	67-68-5	1 l	Laboratories	Solvent Store

Material/ Substance	Physical State	CAS No.	Storage Quantity (Litres (L) or millilitres (mls))	Nature Of Use	Storage Location
ethyl acetate for organic	Liquid	141-78-6	1 l	Laboratories	Solvent Store
Ethyl metyl ketone	Liquid	78-93-3	1 l	Laboratories	Solvent Store
1-butanol	Liquid	71-36-3	2.5 l	Laboratories	Solvent Store
Chloroform	Liquid	67-66-3	2.5 l	Laboratories	Solvent Store
Cyclohexane	Liquid	110-82-7	2.5 l	Laboratories	Solvent Store
Dimethylformamide	Liquid	68-12-2	2.5 l	Laboratories	Solvent Store
Ethyl acetate for liquid chrom	Liquid	141-78-6	2.5 l	Laboratories	Solvent Store
Hydranal composite 2		NA	1 l	Laboratories	Solvent Store
Hydranal composite 5		NA	1 l	Laboratories	Solvent Store
Hydranal Coulomat AG Ove 500mL	Liquid	NA	500 ml	Laboratories	Solvent Store
Hydranal titrant 5	Liquid	NA	1 l	Laboratories	Solvent Store
Hydranal Working Medium K 1L	Liquid	NA	1 l	Laboratories	Solvent Store
Hydranal® Columat AG	Liquid	NA	1 l	Laboratories	Solvent Store
Hydranal composite 1	Liquid	NA	1 l	Laboratories	Solvent Store
Hydranal® Columat AK	Liquid	NA	500ml	Laboratories	Solvent Store

Material/ Substance	Physical State	CAS No.	Storage Quantity (Litres (L) or millilitres (mls))	Nature Of Use	Storage Location
HYDRANAL-COMPOSITE 5 K ONE-COMPONENTREAG		NA	1l	Laboratories	Solvent Store
Hydranal-solvent, solvent-comp	Liquid	NA	1 l	Laboratories	Solvent Store
Hydranal-titran.d 2 nh		NA	1 l	Laboratories	Solvent Store
Iso amyl alcohol	Liquid	123-51-3	2.5l	Laboratories	Solvent Store
Isobutyl methyl Ketone	Liquid	108-10-1	2.5 l	Laboratories	Solvent Store
ISOHEXANE FOR ANALYSIS EMSURE		92112-69-1	1L	Laboratories	Solvent Store
Isopropyl acetate	Liquid	108-21-4	1 l	Laboratories	Solvent Store
1-Methyl-2-pyrrolidone for headspace gas chromatography SupraSolv® 1 * 1 l		872-50-4	1 l	Laboratories	Solvent Store
Xylene m	Liquid	108-38-3	5 ml	Laboratories	Solvent Store
DIMETHYLACETAMIDE	Liquid	127-19-5	1 l	Laboratories	Solvent Store
N,N Dimethylformamide	Liquid	68-12-2	2.5 l	Laboratories	Solvent Store
n-Heptane	Liquid	142-82-5	2.5 l	Laboratories	Solvent Store

Material/ Substance	Physical State	CAS No.	Storage Quantity (Litres (L) or millilitres (mls))	Nature Of Use	Storage Location
n-Hexane	Liquid	110-54-3	2.5 l	Laboratories	Solvent Store
1-Propanol	Liquid	71-23-8	1 l	Laboratories	Solvent Store
2-Propanol	Liquid	67-63-0	2.5 l	Laboratories	Solvent Store
2-propanol	Liquid	67-63-0	1 l	Laboratories	Solvent Store
2-propanol extra pure	Liquid	67-63-0	2.5 l	Laboratories	Solvent Store
Tert butyl methly ether	Liquid	1634-04-4	1 l	Laboratories	Solvent Store
Tetrahydrofuran	Liquid	109-99-9	500 ml	Laboratories	Solvent Store
Tetrahydrofuran	Liquid	109-99-9	1 l	Laboratories	Solvent Store
TRIETHYLAMINE 99.5+% HPLC REAGENT	Liquid	121-44-8	250 ml	Laboratories	Solvent Store
Xylene p	Liquid	106-42-3	5 ml	Laboratories	Solvent Store
Tert-butyl methyl ether	Liquid	1634-04-4	2.5 l	Laboratories	Solvent Store
tetra n butyl ammonium hydroxide	Liquid	2052-49-5	500 ml	Laboratories	Solvent Store
tetrabutylammoniumhydroxide in methanol/2-propanol	Liquid	2052-49-5	1 l	Laboratories	Solvent Store
Tetrahydrofuran	Liquid	109-99-9	2.5 l	Laboratories	Solvent Store

Material/ Substance	Physical State	CAS No.	Storage Quantity (Litres (L) or millilitres (mls))	Nature Of Use	Storage Location
Toluene	Liquid	108-88-3	1 l	Laboratories	Solvent Store
Toluene	Liquid	108-88-3	2.5 l	Laboratories	Solvent Store
Pipette washer detergent	Liquid	NA	5 l	Laboratories	Solvent Store
Tetramethylammonium Hydroxide	Liquid	75-59-2	250 ml	Laboratories	Solvent Store
WATER HPLC	Liquid	7732-18-5	2.5 l	Laboratories	Solvent Store
Solvent Stoddard (ASTM D235 Type 1)	Liquid	64742-48-9	1 * 2.5 l	Laboratories	Solvent Store
Methanol	Liquid	67-56-1	2.5 l	Laboratories	Solvent Store

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**Table C.5 Hazardous Substances (Cleaning Agents)**

Material/ Substance	CAS No.	Hazard Statement	Storage Quantity (tonnes)	Nature Of Use	Storage Location
Actival F4r (Floor cleaner)	Not available	H314	<0.050	Cleaning	Site store rooms for cafeteria and cleaning materials
Bactosol Cabinet Detergent	Not available	H210	<0.050	Cleaning	Site store rooms for cafeteria and cleaning materials
Bactosol Rinse Aid	Not available	H319	<0.050	Cleaning	Site store rooms for cafeteria and cleaning materials
Sika Liquid PVC (Seam Sealent)	Not available	H225; H319; H351; H335; H336	<0.050	Cleaning	Site store rooms for cafeteria and cleaning materials
Sika Trocal Cleaner (contains Ethyl Acetate)	Not available	H225; H319; H336	<0.050	Cleaning	Site store rooms for cafeteria and cleaning materials

Material/ Substance	CAS No.	Hazard Statement	Storage Quantity (tonnes)	Nature Of Use	Storage Location
Soft Care Med H5 (hand cleaner / disinfectant)	Not available	H225; H336; H319	<0.050	Cleaning	Site store rooms for cafeteria and cleaning materials
Soft Care Plus H41	Not available	Not Applicable	<0.050	Cleaning	Site store rooms for cafeteria and cleaning materials
Suma Bac Conc D10 Conc (Surface disinfectant)	Not available	H315; H318; H410	<0.050	Cleaning	Site store rooms for cafeteria and cleaning materials
Suma Break up D3.5 (Kitchen cleaner)	Not available	H315; H318	<0.050	Cleaning	Site store rooms for cafeteria and cleaning materials
Suma Calc D5 (Descaling product)	Not available	H290; H314	<0.050	Cleaning	Site store rooms for cafeteria and cleaning materials

Material/ Substance	CAS No.	Hazard Statement	Storage Quantity (tonnes)	Nature Of Use	Storage Location
Suma Drain GTS Plus (Drain cleaner)	Not available	H208; H210	<0.050	Cleaning	Site store rooms for cafeteria and cleaning materials
Suma Grill D9 (Oven/grill cleaner)	Not available	EUH071; H290; H314; H318	<0.050	Cleaning	Site store rooms for cafeteria and cleaning materials
Suma Inox Classic D7 (Stainless steel cleaner)	Not available	H412	<0.050	Cleaning	Site store rooms for cafeteria and cleaning materials
Suma Max D9.2 (Oven/grill cleaner)	Not available	H210	<0.050	Cleaning	Site store rooms for cafeteria and cleaning materials
Suma Multi Conc D2 Conc (Kitchen Cleaner)	Not available	H302; H314; H335	<0.050	Cleaning	Site store rooms for cafeteria and cleaning materials

Material/ Substance	CAS No.	Hazard Statement	Storage Quantity (tonnes)	Nature Of Use	Storage Location
Suma Nova L6 (Dishwasher product)	Not available	H290; H314	<0.050	Cleaning	Site store rooms for cafeteria and cleaning materials
Suma Rapid D6L (General purpose catering cleaner)	Not available	H270	<0.050	Cleaning	Site store rooms for cafeteria and cleaning materials
Suma Revoflow Clean P5 (Dishwasher product)	Not available	EUH031; H314; H318; H412	<0.050	Cleaning	Site store rooms for cafeteria and cleaning materials
Suma Revoflow Clear A11 (Dishwasher product)	Not available	H315; H319; H412	<0.050	Cleaning	Site store rooms for cafeteria and cleaning materials
Suma Rinse A5 (Dishwasher product)	Not available	H208; H 210	<0.050	Cleaning	Site store rooms for cafeteria and cleaning materials

Material/ Substance	CAS No.	Hazard Statement	Storage Quantity (tonnes)	Nature Of Use	Storage Location
Suma Shine K2 (Dishwasher product)	Not available	H315; H318	<0.050	Cleaning	Site store rooms for cafeteria and cleaning materials
Suma Star D1 (Dishwasher product)	Not available	H319	<0.050	Cleaning	Site store rooms for cafeteria and cleaning materials
Suma Star Plus D1-PLUS (Dishwasher product)	Not available	H302; H315; H318; H412	<0.050	Cleaning	Site store rooms for cafeteria and cleaning materials
TASKI Jontec Tensol F3c (Floor cleaner)	Not available	H319	<0.050	Cleaning	Site store rooms for cafeteria and cleaning materials
TASKI Sani 4 in 1 SD (Sanitary cleaner and disinfectant)	Not available	H314; H290	<0.050	Cleaning	Site store rooms for cafeteria and cleaning materials

Material/ Substance	CAS No.	Hazard Statement	Storage Quantity (tonnes)	Nature Of Use	Storage Location
Taski Sani Acid W3f (Sanitary cleaner)	Not available	H290; H314	<0.050	Cleaning	Site store rooms for cafeteria and cleaning materials
Taski Sani Cid Conc W1d (Sanitary cleaner)	Not available	H373	<0.050	Cleaning	Site store rooms for cafeteria and cleaning materials
Taski Sani Cid Pur-Eco W1e (Sanitary cleaner)	Not available	H210	<0.050	Cleaning	Site store rooms for cafeteria and cleaning materials
Taski Sani MouldOut (General purpose cleaner / disinfectant)	Not available	EUH031; EUH071; H290; H314; H400; H411	<0.050	Cleaning	Site store rooms for cafeteria and cleaning materials
Taski Sprint 200 Pur-Eco SD (General purpose cleaner)	Not available	H208; H210	<0.050	Cleaning	Site store rooms for cafeteria and cleaning materials

Material/ Substance	CAS No.	Hazard Statement	Storage Quantity (tonnes)	Nature Of Use	Storage Location
TASKI Sprint Spitfire Spray E5c (General purpose cleaner)	Not available	H319	<0.050	Cleaning	Site store rooms for cafeteria and cleaning materials
Trump XL Special (Detergent)	Not available	H314	<0.050	Cleaning	Site store rooms for cafeteria and cleaning materials

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**Table C.6 Hazardous Substances (Wastes on site)**

EWC Code	Physical State	Description of Waste	Total Annual tonnage (2019)	Storage Area
07 05 01	Liquid	aqueous washing liquids and mother liquors	129.786	Tank Farm. Transferred to bunded day tanks on the Liquid Vapour Incinerator for subsequent treatment.
07 05 01	Liquid	aqueous washing liquids and mother liquors	630.544	Tank Farm. The loading to waste tankers takes place in the bunded area to the north of the WWTP Control Building
07 05 01	Liquid	aqueous washing liquids and mother liquors	632.48	
07 05 04	Liquid	other organic solvents, washing liquids and mother liquors	115.41	
07 05 01	Liquid	aqueous washing liquids and mother liquors	21.458	
16 03 05	Liquid	organic wastes containing dangerous substances	23.195	200 l steel drums on the bunded area to the north of the WWTP Control Building.
16 05 07	Liquid	discarded inorganic chemicals consisting of or containing dangerous substances	0.401	200 l steel drums on the bunded area to the north of the WWTP Control Building.
20 01 14	Liquid	acids	2.914	200 l steel drums on the bunded area to the north of the WWTP Control Building.
07 05 01	Liquid	aqueous washing liquids and mother liquors	505.58	Tank Farm. The loading to waste tankers takes place in the bunded trailer park to the north of the WWTP Control Building.
07 05 01	Liquid	other organic solvents, washing liquids and mother liquors	120.322	

EWC Code	Physical State	Description of Waste	Total Annual tonnage (2019)	Storage Area
07 05 01	Liquid	other organic solvents, washing liquids and mother liquors	144.331	
07 05 01	Liquid	other organic solvents, washing liquids and mother liquors	1.396	
07 05 01	Liquid	other organic solvents, washing liquids and mother liquors	13.121	
07 05 03	Liquid	aqueous washing liquids and mother liquors	27.29	
07 05 04	Liquid	other organic solvents, washing liquids and mother liquors	21.39	
07 05 04	Liquid	other organic solvents, washing liquids and mother liquors	70.12	
07 05 04	Liquid	other organic solvents, washing liquids and mother liquors	946.05	
07 05 04	Liquid	other organic solvents, washing liquids and mother liquors	1,125.13	
07 05 04	Liquid	other organic solvents, washing liquids and mother liquors	1,581.34	
07 05 04	Liquid	other organic solvents, washing liquids and mother liquors	1,896.88	

EWC Code	Physical State	Description of Waste	Total Annual tonnage (2019)	Storage Area
07 05 04	Liquid	other organic solvents, washing liquids and mother liquors	18.345	
07 05 04	Liquid	other organic solvents, washing liquids and mother liquors	172.444	
07 05 04	Liquid	other organic solvents, washing liquids and mother liquors	367.847	Tank Farm. Transferred to bunded day tanks on the Liquid Vapour Incinerator for subsequent treatment.
07 05 04	Liquid	other organic solvents, washing liquids and mother liquors	1.13	Tank Farm. The loading to waste tankers takes place in the bunded trailer park to the north of the WWTP Control Building.
07 05 04	Liquid	other organic solvents, washing liquids and mother liquors	1.13	
13 02 08	Liquid	other engine, gear and lubricating oils	0.958	These are stored in bunded areas in the Utility Services Yard.
07 05 10	Semi-Solid	other filter cakes and spent absorbents	32.832	These are held in 200 l steel drums on the bunded area to the north of the WWTP Control Building.
07 05 13	Solid	Solid wastes containing dangerous substances	4.946	These are held in 200 l steel drums on the bunded area to the north of the WWTP Control Building.
07 05 13	Solid	Solid wastes containing dangerous substances	2.432	These are held in 200 l steel drums on the bunded area to the north of the WWTP Control Building.

EWC Code	Physical State	Description of Waste	Total Annual tonnage (2019)	Storage Area
08 01 11	Semi-Solid	waste paint and varnish containing organic solvents or other dangerous substances	1.115	These are dry paint residues held in 200 l steel drums on the bunded area to the north of the WWTP Control Building.
15 01 10	Solid	packaging containing residues of or contaminated by dangerous substances	26.189	Double bagged and held in UN approved Fibre Boxes in the SWI Alcove pending off-site shipment.
15 01 10	Solid	packaging containing residues of or contaminated by dangerous substances	0.035	Double bagged and held in UN approved Fibre Boxes in the SWI Alcove pending off-site shipment.
15 01 10	Solid	packaging containing residues of or contaminated by dangerous substances	0.998	Double bagged and held in UN approved Fibre Boxes in the SWI Alcove pending off-site shipment.
15 01 10	Solid	packaging containing residues of or contaminated by dangerous substances	0.422	Double bagged and held in UN approved Fibre Boxes in the SWI Alcove pending off-site shipment.
15 01 10	Solid	packaging containing residues of or contaminated by dangerous substances	49.750	Double bagged and held in UN approved Fibre Boxes in the SWI Alcove pending off-site shipment.
15 02 02	Solid	absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances	33.093	Double bagged and held in UN approved Fibre Boxes in the SWI Alcove pending off-site shipment.
15 02 02	Solid	absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances	19.768	Double bagged and held in UN approved Fibre Boxes in the SWI Alcove pending off-site shipment.

EWC Code	Physical State	Description of Waste	Total Annual tonnage (2019)	Storage Area
15 02 02	Solid	absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances	0.704	Double bagged and held in UN approved Fibre Boxes in the SWI Alcove pending off-site shipment.
16 03 05	Liquid and Solid	organic wastes containing dangerous substances	23.195	These are held in 200 l steel drums on the bunded area to the north of the WWTP Control Building.
16 05 06	Liquid and Solid	laboratory chemicals, consisting of or containing dangerous substances, including mixtures of laboratory chemicals	0.130	These are held in the various laboratories and consolidated on a periodic basis in the labs for consignment off-site.
16 05 07	Liquid and Solid	discarded inorganic chemicals consisting of or containing dangerous substances	0.401	These are held in 200 l steel drums on the bunded area to the north of the WWTP Control Building.
16 05 07	Solid	discarded inorganic chemicals consisting of or containing dangerous substances	0.106	These are held in 200 l steel drums on the bunded area to the north of the WWTP Control Building.
16 05 07	Solid	discarded inorganic chemicals consisting of or containing dangerous substances	0.031	These are held in the various laboratories and consolidated on a periodic basis in the labs for consignment off-site.
16 05 08	Liquid and Solid	discarded organic chemicals consisting of or containing dangerous substances	0.341	These are held in 200 l steel drums on the bunded area to the north of the WWTP Control Building.

EWC Code	Physical State	Description of Waste	Total Annual tonnage (2019)	Storage Area
16 05 08	Liquid and Solid	discarded organic chemicals consisting of or containing dangerous substances	0.020	These are held in the various laboratories and consolidated on a periodic basis in the labs for consignment off-site.
16 05 08	Liquid and Solid	discarded organic chemicals consisting of or containing dangerous substances	0.010	These are held in the various laboratories and consolidated on a periodic basis in the labs for consignment off-site.
16 02 11	Equipment	discarded equipment containing chlorofluorocarbons, HCFC, HFC	0.121	Stored in the bunded shed to the east of the WWTP Control Building pending consignment off-site.
16 02 13	Equipment	discarded equipment containing hazardous components (16) other than those mentioned in 16 02 09 to 16 02 12	0.273	Stored in the bunded shed to the east of the WWTP Control Building pending consignment off-site.
20 01 21	Equipment	fluorescent tubes and other mercury-containing waste	0.394	Stored in the bunded shed to the east of the WWTP Control Building pending consignment off-site.

**Table C.7 Hazardous Substances (used as part of previous production campaigns)**

Name	CAS Number	Solid/Liquid	H Phrase
2,6-Di-Tert-Butyl-P-Cresol	128-37-0	Solid	400; 410
3-Amino-, Methyl Ester	14205-39-1	Solid	Not available but not environmentally hazardous.
Isopropyl Acetoacetate	542-08-5	Liquid	227; 319
Potassium Hydroxide	1310-58-3	Solid	290; 302; 314
2-[2-Hydroxy-3-(Isopropylamino)-Propoxyl]-6-Nitrophenyl-Acetaldehyde	Not Available	Solid	317; 402; 412
Quaternary amine divinylbenzene/styrene copolymer	Not Available	Solid	Not available but not environmentally hazardous.
Ascomycin	104987-12-4	Solid	315; 372; 413
33-EPL-Chloro-33-Desoxyascomycin	Not Available	Solid	225; 319; 335; 373
33-EPL-Chloro-33-Desoxyascomycin (in Acetone)	Not Available	Liquid	225; 319; 335; 373
2,1,3-Benzoxadiazol-4-carbaldehyde	32863-32-4	Solid	302; 317; 335; 402; 412
Boron trifluoride-Tetrahydrofuran	462-34-0	Liquid	227; 302; 314; 318; 332; 372
Hydrobromic Acid 48%	10035-10-6	Liquid	314; 318; 335
Calcitonin (Salmon)	47931-85-7	Solid	315; 317; 319; 332; 334
N, N' – Carbonyldimidazole	530-62-1	Solid	302; 312; 314; 332
2-((4-Chloro-2-Aminophenyl)Amino)-Benzoic Acid, Monopotassium Salt, Solution in Ethanol/Water 1/1	Not Available	Liquid	226; 315; 319
Benzoic Acid, 2-((4-Chloro-2-2-Nitrophenyl)Amino)-, Monopotassium Salt	Not Available	Solid	228; 312; 332; 360d; 402; 412
Citric Acid, Monydrate	5949-29-1	Solid	319
Darifenacin Hydrobromide	133099-07-7	Solid	301; 400; 410
(3S)-1-[2-(2,3-Dihydro-5-benzofuranyl)ethyl]-alpha,alpha-diphenyl-3-pyrrolidineacetonitrile hydrobromide	Not Available	Solid	303; 317; 400; 410
{{(S)-1-[2-(2,3-(3S)-1-[2-(2,3-Dihydro-5-benzofuranyl)ethyl]-alpha,alpha-diphenyl-3-pyrrolidineacetonitrile	252317-48-9	Solid	317; 400; 410
2,3-Dihydrobenzofuran-5-acetic acid	69999-16-2	Solid	317; 318
Diphenyl-(S)-pyrrolidin-3-yl-acetonitrile hydrobromide	194602-27-2	Solid	302; 317; 318; 411
Isradipine, Crude	Not Available	Solid	301; 400; 410
Isradipine	75695-93-1	Solid	301; 400; 410

Name	CAS Number	Solid/Liquid	H Phrase
N-Chlorsuccinimide	128-09-6	Solid	302; 314; 318; 400
Pindolol Base	13523-86-9	Solid	301; 402; 412
Piperazine	110-85-0	Solid	314; 317; 318; 334; 361fd
Phosphorus oxychloride	10025-87-3	Liquid	302; 314; 330; 372
4-(4-Pyridinylmethyl)-2H-phthalazin-1-one	107558-48-5	Solid	300; 372; 402; 412
2,4,6-Trimethyl-pyridine	108-75-8	Liquid	226; 302; 312; 315; 319; 335
2 – Methylbutanol	75-85-4	Liquid	225; 312; 315; 318; 332; 335
Triphenyl Phosphine	603-35-0	Solid	302; 317; 373; 413

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