# PROJECT MER
# INEOS "PROJECT ONE" IN LILLO

INEOS Olefins Belgium NV

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# SIGNATURES OF RECOGNISED MER- EXPERTS

| Name | Type of Recognition | Responsibilities | Signature |
|---|---|---|---|
| Frank Van Daele | EIA COORDINATOR<br><br>AIR,<br>Air pollution subdomain<br><br>GOP/ERK/MERCO/2019/00044<br>MB/MER/EDA/481-V1 | Coordination<br>Discipline Air | |
| Bert Van Den Branden | NOISE AND VIBRATIONS<br>subdomain sound<br><br>ERK/MER/105881 | Discipline Sound | |
| Inge Leroy | SOIL<br>Subdomain geology and pedology<br><br>ERK/MER/105227 | Discipline Soil | |
| Guy Van den Broeke | WATER,<br>Subdomain surface water and waste water<br><br>MER/EDA-513/V3 | Discipline Water - surface water | |
| Daan Storms | PEOPLE,<br>subdomain mobility<br><br>ERK/MER/102942 | Discipline Mobility | |
| Wouter Rommens | BIODIVERSITY<br><br>GOP/ERK/MER/2014/00016/V | Discipline Biodiversity | |
| Hanne Carlens | LANDSCAPE, ARCHITECTURAL HERITAGE AND ARCHAEOLOGY<br>Subdomain Landscape<br><br>AMV/LNE/ERK/MER/EDA-817 | Discipline Landscape | |
| An Tombeur | PEOPLE,<br>subdomain health<br><br>AMV/LNE/ERK/MER/2016/00001 | Discipline Human - Health | |
| Nele Dhaese | CLIMATE<br><br>WATER<br>subdomain geohydrology subdomain surface water and waste water<br><br>GOP/ERK/MER/2019/00007 | Discipline Climate<br>Discipline Water - groundwater | |

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| | |
|---|---|
| AAQS | Ambient Air Quality Standard – Air quality objectives |
| ABT | Antwerp Bulk Terminal NV |
| ASA | Advario Stolthaven Antwerp |
| ALARA | As Low as Reasonably Achievable |
| AMPA | Aminomethylphosphonic acid |
| ANB | Agency for Nature and Forests |
| ANSES | Agence Nationale de sécurité sanitaire de l'alimentation – French government agency for health |
| AOX | Adsorbed Organic Halogen Compounds |
| AQG | Air Quality Guideline |
| AWV | Agency for Roads and Traffic |
| AZG | Agency for Care and Health |
| BBI | Belgian Biotic Index |
| BBT | Best Available Techniques |
| BBO | Descriptive Soil Investigation |
| BECCS | Bioenergy combined with CCS |
| BEF | Biomass expansion factor |
| BFF | Supra-local Functional Cycle Route Network |
| BOD | Biological Oxygen Demand |
| BOG | Boil Off Gas – Gases that arise in a cryogenic tank |
| BKG | Greenhouse gas |
| BPA | Special Development Plan |
| BREF | BAT Reference documents – European BAT studies |
| BRV | Flanders Spatial Policy Plan |
| BSP | Soil remediation project |
| BT | Benzothiazole |
| BTEX | Benzene, Toluene, Ethylbenzene and Xylene |
| BTOH | Benzothiazolol |
| BVO | Gross floor area |
| BWK | Biological valuation card |
| BOD | Biological oxygen demand |
| CAI | Central Archaeological Inventory |
| CCL | Container cluster on the left bank of the Scheldt |
| CCS | Carbon Capture and Storage |
| CCUS | Carbon Capture Utilisation and Storage |
| CEMT | Conférence Européenne des Ministres de Transport – European Conference of Transport Ministers |
| COD | Chemical Oxygen Demand |
| COP25 | 25th United Nations Climate Change Conference |

| | |
|---|---|
| COPD | Chronic Obstructive Pulmonary Disease |
| CPI | Corrugated Plate Interceptor – Oil separator |
| CPT | Cone penetration test |
| CTO | Coal to olefins – Process for extracting olefins from coal |
| CWW | Treatment and management of waste water and waste gas in the chemical sector |
| CZV | Chemical oxygen demand |
| DABM | Decree containing general provisions on environmental policy |
| dB | Decibel |
| DCC | Continuous oil-containing drainage system |
| DeNOx | Flue gas purification to reduce NOx |
| DGF | Dissolved Gas Flotation – Flotation system for dissolved gas |
| DHM | Digital Elevation Model Flanders |
| DTM | Digital Terrain Model Flanders |
| DIAL | Differential Adsorption Light – Measurement technique for diffuse air emissions |
| DMDS | Dimethyl disulphide |
| DOC | Potentially (oil) contaminated wastewater drainage system |
| DDC | Continuous oil-containing wastewater drainage system |
| DOV | Flanders Subsurface Database |
| EC | Electrical conductivity |
| ECA | Additional container handling capacity in the Antwerp port area |
| ECR | Ethane cracker |
| EEO | Final evaluation study |
| EEA | European Economic Area |
| EC | European Community |
| EIA | Environmental Impact Assessment |
| EIN | Ecological Infrastructure Nature |
| EMEP/EEA | European Monitoring and Evaluation Programme/European Environment Agency |
| ENOVER | Energy consultation between the federal state and the regions |
| EVA | European Free Trade Association |
| EoL | End of Life |
| ETS | Emissions Trading System |
| ESR | Effort Sharing Regulation – Directive on the EU Emissions Trading Scheme |
| FEV | Forced Expiratory Volume – Volume of air that a person can exhale in a given period of time (e.g. 1 second) |
| FPS | Federal Public Service |
| FVC | Forced Vital Capacity – Maximum volume of air that can be exhaled after a full inhalation |
| GAW | Health advisory value |
| GEN | Large Units of Nature |

| | |
|---|---|
| GENO | Large Units of Nature in Development |
| GIS | Geographic Information System |
| GM | General Motors (former Opel site) |
| GOVC | Regional Environmental Permitting Committee |
| GPBV | Integrated Pollution Prevention and Control |
| GRS | Municipal Spatial Structure Plan |
| GTW | Health assessment values |
| GRUP | Regional Spatial Implementation Plan |
| GW | Limit value |
| GWP | Global Warming Potential |
| HCOV | Hydrogeological coding of the subsurface in Flanders |
| HVC | High Value Chemicals – Chemicals with high value, such as hydrogen, acetylene, ethylene, propylene, benzene and toluene |
| Hz | Hertz |
| IC | Classification criterion |
| ICU method | Methodology for determining intersection load (Intersection Capacity Utilisation) |
| IE | Population equivalent |
| IED | Industrial Emissions Directive |
| IHD | Conservation objective |
| ILVO | Institute for Agricultural, Fisheries and Food Research |
| IMB | INEOS Manufacturing Belgium NV |
| IMJV | Integrated Environmental Annual Report |
| IMPACT | IMmission Prognosis Air Concentration Tool, air dispersion model |
| INBO | Institute for Nature and Forest Research |
| IOB | INEOS Olefins Belgium NV |
| IPPC | Integrated Pollution Prevention and Control |
| IVON | Integrated Interweaving and Support Network |
| KB | Royal Decree |
| KDW | Critical deposition value |
| KLE | Small landscape element |
| KMI | Royal Meteorological Institute |
| WFD | Water Framework Directive |
| KWS | Hydrocarbons |
| LCON | Long CONductivity – Long-range electrical conductivity (groundwater) |
| LDAR | Leak Detection and Repair |
| LTRU | Low Temperature Recovery Unit |
| LULUCF | Land Use, Land Use Change and Forestry |
| LV | Light Traffic |

| | |
|---|---|
| MBP | Environmental Policy Plan |
| MBT | Mercaptobenzothiazole |
| MEA | Monoethanolamine |
| EIA | Environmental impact assessment (the |
| procedure) EIA | Environmental impact report (the report) |
| MKN | Environmental quality standard |
| m-mv | Meter below ground level |
| MODFLOW | Computer code containing the algorithm for solving groundwater flow equations in a 3D grid |
| MT3DMS | Transport model (3D) linked to the MODFLOW algorithm for simulating convective transport of various dissolved components in groundwater |
| MTBE | Methyl tert-butyl ether |
| MTE | Environmental technical unit |
| MTO | Methanol-to-olefins – Process for producing olefins from methanol MTR Maximum permissible |
| risk | |
| N | Nitrogen |
| NAAQS | National Ambient Air Quality Standard – Air quality standards in the US NEC National |
| Emission Ceilings | |
| NGL | Natural Gas Liquids – Components of natural gas that can be separated as a liquid |
| NMVOS | Non-Methane Volatile Organic Compounds |
| NOAEL | No Observed Adverse Effect Level NOx Nitrogen oxides – sum of nitrogen monoxide (NO) and nitrogen dioxide |
| ($NO_2$) | |
| NTP | National Toxicology Programme (US) |
| OBO | Preliminary Soil Investigation |
| OEHHA | California Office of Environmental Health Hazard Assessment – Californian government agency for the assessment of environmental health risks |
| Off spec | Water flow that does not meet specifications |
| OGI | Optical Gas Imaging – Technique for detecting diffuse air emissions OO Public |
| Investigation | |
| OPA | Oriented polyamide |
| OPET | Oriented polyethylene terephthalate |
| OSHA | Occupational Safety and Health Administration – European Agency for Safety and Health at Work |
| OVAM | Public Waste Agency of Flanders OVR Environmental |
| safety report | |
| OWV | Oosterweel link |
| P | Phosphorus |
| PAE | Passenger car equivalent |
| PAH | Polycyclic aromatic hydrocarbon compound |

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|---|---|
| PAS | Nitrogen Action Programme |
| PCB | Polychlorinated biphenyl |
| PCR | Post-consumer Recycled Plastic – Recycled plastic made from consumer plastic waste |
| PE | Polyethylene |
| PET | Polyethylene terephthalate |
| PGP | Polymer Grade Propylene – High purity propylene (suitable for polymer production) |
| PGS | Priority hazardous substances |
| PM | Particulate Matter – Fine dust |
| PNEC | Predicted No-effect concentration – Predicted concentration at which no effect is expected |
| PP | Polypropylene |
| PUR | Polyurethane |
| PRUP | Provincial Spatial Implementation Plan |
| PS | Polystyrene |
| PSA | Pressure Swing Adsorption – Technique for purifying hydrogen gas |
| PTT | Point Transect Method – Method for counting organisms |
| PVC | Polyvinyl chloride |
| PvM | Programme of Measures |
| RIVM | National Institute for Public Health and the Environment |
| REVIHAAP | Review of Evidence on Health Aspects of Air Pollution |
| RO | Reverse Osmosis |
| RUP | Spatial Implementation Plan |
| RSB | Roundtable on Sustainable Biomaterials – Roundtable working group on sustainable biomaterials |
| RSPA | Spatial Structure Plan for the Province of Antwerp |
| RSV | Spatial Structure Plan for Flanders |
| RW | Guideline value |
| WWTP | Sewage treatment plant |
| SBP | Species protection programme |
| SBZ | Special Protection Area (-V: Bird Directive area; -H: Habitat Directive area) |
| SCON | Short CONductivity – Electrical conductivity at short distance (groundwater) |
| SCR | Selective Catalytic Reduction |
| SEAWAT | Transport model (3D) analogous to MT3DMS based on density-dependent flow |
| SEC | Specific energy consumption |
| SES | Socio-economic status |
| SGBP | River basin management plan |
| SLO | Written Living Environment Survey |
| SOF | Solar Occultation Flux – Method for measuring volatile organic compounds |
| SHE | Safety Health Environment – Safety, health and environment |

| | | |
|---|---|---|
| SPMT | Self Propelled Modular Transporter – Self-propelled modular transport vehicle m TAW | Second General Levelling (reference height) |
| TCP | 1,2,3-Trichloropropane | |
| TDS | Salt content | |
| TEA | Triethylamine | |
| TECQ | Texas Commission on Environmental Quality – Texas Environmental Agency TOC | Total Organic Compounds – Total organic carbon |
| TOP | Temporary storage site for excavated soil (earthworks) TSP | Total Suspended Particulates – Total dust concentration |
| TW | Assessment value | |
| VAP | Flemish Adaptation Plan | |
| VEN | Flemish Ecological Network | |
| VCRO | Flemish Spatial Planning Codex VHA | Flemish Hydrographic Atlas |
| VIP | Safety Information Plan | |
| VITO | The Flemish Institute for Technological Research VLAREBO | |
| | Flemish Regulations on Soil Remediation VLAREM | |
| | Flemish Regulations on Environmental Permits | |
| VLAREMA | Flemish Regulations on the sustainable management of material cycles and waste VLEC | Very Large Ethane Carriers – Very large ethane tankers |
| VLOPS model | Flemish Operational Priority Substances model VMM | Flemish Environment Agency |
| VMP | Flemish Mitigation Plan | |
| VOCI | Chlorinated solvents | |
| VOPAK | Neighbouring company on the site north of Ineos Project One, formerly used by Gunvor; VOPAK is making plans to implement the VEPA project (VOPAK Energy Park Antwerp – see https://www.vopak.com/terminals/vopak-energy-park-antwerp) in phases at this site. | |
| VOC | Volatile Organic Compounds | |
| VR | Safety Report | |
| VRI | Traffic control system | |
| WHO | World Health Organisation CHP | Combined heat and power |
| WOW | Western Access Waasland Port WZI | Water treatment plant |
| WWTP | Wastewater treatment plant | |

# 1 Introduction

## 1.1 Brief project description

INEOS Olefins Belgium (IOB) is building a state-of-the-art ethane cracker (hereinafter referred to as ECR) with associated support infrastructure in the port of Antwerp. The construction and realisation of this project has been named **'Project** One'. Once built, the ECR will convert ethane into ethylene, a basic raw material used in the global chemical industry for the production of high-quality products.

The location chosen for Project One was an infill area between existing SEVESO companies in the Port of Antwerp. This location was chosen primarily because of its direct access for seagoing vessels supplying the raw material (ethane) and because of its immediate connection to an existing international pipeline network for the distribution of the end product (ethylene). Figure 1-1 shows the project area.

Project One utilises the available area located between Vopak[1]in the north and Bayer and ASA in the south. The project area includes all facilities for the construction and operational phases, including production installations, utilities and supporting infrastructure, yard facilities and infrastructure for periodic maintenance.


*Figure 1-1: Location of the project area*

[1] Vopak is the neighbouring company on the site north of Ineos Project One, which was previously used by Gunvor. Vopak is making plans to implement the VEPA project (VOPAK Energy Park Antwerp – see https://www.vopak.com/terminals/vopak-energy-park-antwerp) in phases at this site.

The project area is located in the port of Antwerp between Scheldelaan and Kanaaldok and, from a planning perspective, falls within the boundaries of the regional spatial implementation plan (GRUP) for the Antwerp Seaport Area and, more specifically, within the area for seaport and water-related businesses in the 'Industry' zoning category.

The total area of the site will be approximately 90.3 hectares during the construction phase and approximately 85 hectares during the operational phase, as indicated on Map 2 in Appendix 1.

Project One is located in an area that has been heavily influenced by human activity, in this case by industrial and port activities. The port area was reclaimed in the past and was subsequently systematically taken over by mainly chemical industry, buildings and constructions. The areas to be occupied by Project One were not previously in use. By choosing this project area, Project One is contributing to **the infill development** of the port area and no new areas need to be opened up or developed.

The planned developments will proceed chronologically as follows:

- Construction phase (already partially completed): vegetation removal, general site works (levelling, construction of site facilities) and construction of all installations, buildings and facilities on the site;
- Operational phase: operation of the ECR and supporting infrastructure and periodic maintenance work.

This project EIA concerns the integrated project planned for these areas, evaluating the effects of the above phases as well as the cumulative effects with other existing and/or approved projects.

## 1.2 Purpose and accountability of the project

Project One is a technologically innovative and large-scale investment which, once operational, will create approximately 450 direct, full-time jobs and five times as many indirect jobs. During the construction phase of the industrial installations, a varying number of workers will be employed. It is expected that during the busiest months of the construction phase, this could rise to approximately 2,500 workers per day.

The investment is the largest in the European chemical industry in more than 20 years. Such investments are unique within the Belgian market and can hardly be considered commonplace, even at European level. With this large-scale investment project, Flanders is reinforcing its position as a leading chemical region and the Port of Antwerp is confirming and strengthening its role as the largest chemical cluster in Europe.

The ECR will convert ethane into ethylene, a basic raw material in the global chemical industry for the production of high-quality products. In addition, propylene, C4 and C5+ hydrocarbons and pyrolysis oil are also obtained as by-products. These hydrocarbons are sold to chemical companies as raw materials for their production processes. Ethylene and propylene are essential building blocks for many high-quality products such as:

- Building materials: water and gas pipes with a minimum lifespan of 50 years, sewers, wires and cables, insulation, insulation foam;
- Household applications: vacuum cleaners, washing machines and other household appliances;
- Healthcare: medicines, syringes, gloves, oxygen masks, disinfectant hand gel, etc.;
- Automotive sector: including lightweight parts, interior trim, battery holders, insulation;
- Renewable energy: including lubricants and blades for wind turbines, solar panels;
- Packaging industry: including beverage crates, storage boxes, film for medical products, film for food applications that guarantees hygiene and extends shelf life.

Sustainability Project One

Project One aims to be one of the most innovative, efficient and sustainable cracking plants in the world. The project will be leading the way in terms of design, use of state-of-the-art technology and the resulting efficiency. A key advantage of this project is the lower carbon footprint and higher energy efficiency of the technology used compared to other existing cracking plants. This lower carbon footprint is a direct result of the use of ethane as a raw material. Project One will therefore be able to bring products to market that are produced with significantly lower emissions per tonne of end product compared to current crackers in Europe:

- Project One produces ethylene with a carbon footprint of only 0.290 tonnes of CO2 per tonne of HVC (High Value Chemical).
- The average CO2 emissions of 38 existing European crackers is 0.891 tonnes of CO2 per tonne of HVC. In comparison, Project One emits three times less CO2 per tonne of HVC.
- The current EU ETS reference value for the top 10% of crackers in Europe is 0.681 tonnes of CO2 per tonne of HVC2. Project One therefore emits half as much CO2 per tonne of HVC as the best European crackers.

This outstanding performance will significantly lower the EU ETS (European CO2 emissions trading system) standard for crackers. This shift will put pressure on the worst-performing European installations to reduce their emissions or spend more money in the emissions trading system used to finance $CO_2$ reduction projects in Europe. It has been calculated (see Chapter 14: Climate) that Project One implies a tightening of the EU ETS benchmark value for HVC production from 0.681 to approximately 0.577 tonnes CO2-eq/tonne HVC. This is a decrease of approximately 15% compared to the current benchmark value for HVC production. This will mean that approximately 4.4 Mtonnes of additional emission allowances will have to be paid for or avoided for existing European steam crackers. Such a quantity of emission allowances corresponds to approximately €267 million/year, taking into account the current price (mid-February 2024) of €54/tonne CO2 under the EU ETS system. The INEOS group is committed to achieving the EU climate and energy targets for 2050 and reducing net CO2 emissions to zero[3]. Project One has been designed with net zero $CO_2$ emissions in mind and aims to be the first CO2-neutral cracker in Europe that will be able to play a role in Antwerp's sustainable industrial future. Project One is currently confident that it is feasible to achieve this goal within 10 years of the cracker's start-up. Once the technology is feasible, Project One has three possible routes for reducing $CO_2$ emissions:

- Electrification of furnaces using green electricity.
- Use of green and/or blue hydrogen as fuel.
- Carbon Capture and Storage (CCS).

IOB is a partner in the Antwerp@C project, which is investigating the possibilities for Carbon Capture, Utilisation and Storage (CCUS) in the Port of Antwerp. The companies collaborating in this project are investigating the technical and economic feasibility of an open access infrastructure in the port that enables carbon capture and storage (more information is available at https://www.portofantwerpbruges.com/onze-haven/klimaat-en-energietransitie/antwerpc). In this way, IOB is further contributing to the sustainability of the port.

INEOS is also investigating how $CO_2$ can be stored in depleted oil fields in the North Sea in the long term. The project within INEOS that is investigating the possibilities for transporting and injecting $CO_2$ has been named 'Greensand'. INEOS has a concession for depleted oil fields (Siri Area) off the Danish coast for this purpose. CO2 captured from process and flue gases is purified, liquefied and transported by ship to Denmark, where it is injected into the depleted oil fields.

[2] Annex to the Commission Implementing Regulation establishing revised benchmark values for the free allocation of emission allowances for the period from 2021 to 2025 in accordance with Article 10a(2) of Directive 2003/87/EC of the European Parliament and of the Council.
[3] Sustainability Report Ineos Group, https://www.ineos.com/sustainability/sustainability-reports/

In 2023, the pilot project successfully demonstrated the feasibility of the technology at the site in question, using Belgian CO2 from the INEOS Oxide site in Zwijndrecht. More information is available at https://projectgreensand.com.

Project One also opts for sustainable solutions in the field of mobility. The Project One site will be accessible to large seagoing vessels and inland vessels for the supply of ethane and other raw materials. The existing large pipeline networks in North-West Europe for ethylene and propylene can also be used. Pipeline transport is the safest, most ecological and most efficient method of transporting chemicals. The transport of the main raw materials and end products will therefore have no impact on road traffic and will reduce the project's carbon footprint.

Cooperation, safety and health

IOB has drawn up a Sustainability Protocol with the Port of Antwerp. The protocol covers the shared sustainability objectives and the cooperation between IOB and the Port of Antwerp with regard to Project One. In addition, the protocol sets out the safety approach, which is based on three key areas: process safety, human behaviour and product safety.

As part of the health and safety policy, all IOB employees are expected to behave in accordance with the INEOS Group Safety Rules. These consist of 20 safety principles that result in a low number of safety incidents. IOB strives for 'zero injuries' by continuously reducing safety risks.

The Port Authority is actively involved in engaging and mobilising various industrial sectors and companies in concrete projects and cooperation relating to sustainability. IOB will participate in relevant initiatives related to its knowledge and activities.

## 1.3 Assessment against the EIA (Environmental Impact Assessment) obligation

The EIA Decree of 10 December [20044] divides projects subject to EIA into three groups:

- The first group of projects is always subject to an EIA obligation (Annex I of the aforementioned EIA Decree).
- The second group is in principle subject to project EIA, but may be exempted from the EIA requirement by means of a reasoned request (Annex II of the aforementioned EIA Decree).
- The third group comprises projects that fall below the threshold value of Annex II (Annex III of the aforementioned EIA Decree). For these projects, a project EIA screening must be carried out to determine whether they will have significant environmental effects. Only if this is the case must an EIA be drawn up.

### 1.3.1 EIA categories applicable to the project

The project is subject to an EIA, as the following categories from the above decision apply (the respective thresholds are exceeded):

- Annex I:
  - category 2 a)
    *Thermal power stations and other combustion plants with a thermal capacity of at least 300 megawatts.*
- Annex II:
  - category 1 d)
    *Deforestation with a view to converting to another land use, insofar as the area covers 3 hectares or more and insofar as Article 87 of the Forestry Decree does not apply.*

[4] The Decree of the Flemish Government of 10 December 2004 establishing the categories of projects subject to environmental impact assessment, in short the project EIA decree.

- Category 6 a)
  *Chemical industry for the treatment of intermediate products and the manufacture of chemicals:*
  - *Chemical installations for the production of organic chemicals with a production capacity of 100,000 tonnes per year or more.*
- Category 6(c)
  *Storage facilities for petroleum, petrochemical and chemical products: Installations for the storage of petroleum, petrochemical or chemical products with a storage capacity of 100,000 tonnes to 200,000 tonnes.*
- Category 10(a)
  *Industrial estate development with an area of 50 hectares or more.*
- Category 10 o)
  *Works for the extraction or artificial recharge of groundwater:*
  *Extraction of groundwater, including reinjection of untreated and uncontaminated groundwater into the same aquifer, if the net extraction rate is 2,500 m³ per day or more. Artificial recharge of groundwater if the rate is 2,500 m³ per day or more. Extraction of groundwater if the flow rate is 1,000 m³ per day or more and the activity is located in or may have a significant impact on an area designated in implementation of the Decree on measures to protect the coastal dunes of 14 July 1993, or if the activity may cause significant damage to the natural characteristics of a special protection zone..*

Given that the threshold values for various categories in Annexes I and II are exceeded, a project EIA is being drawn up to comply with the EIA obligation.

### 1.3.2 EIA categories that do not apply

The reasons why the following categories do not apply are explained below.

- *Annex I, category 6*
  *Integrated chemical installations, i.e. installations for the industrial-scale manufacture of substances by chemical conversion, in which several units coexist and are functionally interconnected, intended for the manufacture of: basic organic chemicals; inorganic basic chemicals; phosphate, nitrogen or potassium fertilisers (single or compound fertilisers); basic products for crop protection and biocides; basic pharmaceutical products using a chemical or biological process; explosives.*

  For this, we refer to the interpretation guide of Team MER ("Interpretation guide EIA sections – 6. Chemistry", Team MER, updated 22/04/2022), which is based on the European Guidance (Interpretation of definitions of project categories of annex I and II of the EIA directive, 2015). The explanatory notes to this section list a combination of four conditions that must be cumulatively met in order for an integrated chemical installation to be considered as such, namely:

  1. manufacture of basic chemicals;
  2. on an industrial scale;
  3. by chemical conversion;
  4. between several units that coexist and are functionally connected to each other.

  In order to meet the definition, all four conditions must therefore be met simultaneously.

  Within Project One, there is only one chemical installation (the ECR), so this category does not apply. The fourth condition is interpreted to mean that there are several units and that there is a connection between different parts of a chemical plant. This is not the case with Project One: it is a unit in itself and a single installation that is independent of other installations in the vicinity. The interpretation of the functional link indicates a process path,
  i.e. the various units of the installation must serve a common purpose by producing intermediate products or input materials for other units. The various elements of the installation therefore contribute to the production of a finished product. Again, this interpretation does not apply to Project One, because the ECR is completely self-contained as a single chemical installation and is not dependent on other chemical installations. This EIA is being prepared for this ECR installation as a whole.

Project One (ECR) does not share any common raw materials or end products with the surrounding companies, nor is there any exchange of intermediate chemicals that would indicate a functional link. There are therefore no integrated chemical installations.

Category 6 also does not apply to IMB, as it does not produce basic chemicals, but polymers.

- *Annex II, category 10(b)*
  *Urban development projects, including the construction of shopping centres and car parks,*
  - With regard to the construction of 1,000 or more residential units, or;
  - With a gross floor area of 5,000 m² of commercial space or more, or;
  - With a traffic-generating effect of peaks of 1,000 or more passenger car equivalents per 2-hour time block.

  No residential accommodation will be built and the traffic generated during the operational phase will not peak at 1,000 or more passenger car equivalents per 2 hours. Furthermore, as the office space and car park are entirely linked to the company and will not be used by third parties, according to the current interpretation, EIA category 10 b does not apply ('Interpretation Guide EIA sections – 10. Urban development', Team EIA, update 02/02/2024).

- *Annex II, category 10 e)*
  *Construction of roads with two or more lanes over a length of 10 km or more.*

  Since the roads constructed within the project are located exclusively on the company premises, according to the current interpretation, EIA category 10 e) does not apply ("Interpretation guide for EIA categories – 4. Construction of roads", Team MER, update 26/01/2023).

- *Annex II, category 10 k)*
  *Installation of pipelines in open trenches and installation of ancillary facilities associated with those pipelines that are not located within the building lines of a public road, and where one of the following conditions is met:*

  1. *At least 2,000 m² of the ancillary facility is located in a specially protected area;*
  2. *The pipeline has an uninterrupted length of 1 km or more in a specially protected area;*
  3. *The pipeline has a length of 10 km or more.*

  According to the EIA interpretation guide, this category only applies to underground pipelines outside the company premises. The various pipelines planned for Project One are mainly pipelines that will be laid above ground (pipeline corridors) within the company premises. We would like to provide the following additional explanation:
  - Underground pipelines on the site are provided for utilities such as sewerage and water supply, fire-fighting water, natural gas and nitrogen. The ethylene and propylene pipelines that leave the site and connect to the existing underground pipeline network for these gases near the site boundary are also largely underground on the site.
  - The connection will be made to the existing international transport pipeline networks (for ethylene and propylene) that already pass the company boundaries or the other side of the public road (Scheldelaan) (see Figure 2-3). The management, maintenance and modifications to these pipelines will be carried out by the relevant owner/operator. The connection to the underground ethylene pipeline on the other side of Scheldelaan will be made at the edge of a Birds Directive area and in a Habitats Directive area. The surface area of the work zone in the Special Protection Areas (SPAs) is less than 2,000 m². See Chapter 11 for more information about the relationship to these SPAs.
  - A pipeline will be installed to ASA (C4 product discharge) and Inovyn (NaOH supply) across the industrial sites.
  - No long-distance transport pipelines outside the industrial site to other companies are planned for the project.

  We can conclude that no work on underground pipelines (in open trenches) is planned outside the company premises, to which, according to the current interpretation, EIA section 10 k) applies ("Interpretation guide EIA sections – 13. Pipelines", Team EIA, update 22/04/2022).

## 1.4 EIA procedure

The EIA procedure takes place partly prior to the permit procedure and partly during the permit procedure.

Depending on the characteristics of the project for which the EIA is being prepared, the EIA procedure prior to the permit procedure can be carried out in various ways. The legally required and optional procedural steps are explained in the manual 'Project EIA/environmental permit – guide for initiators and EIA experts of the EIA Team'. Several possible routes are proposed, but variations are still permitted.

In this case, the following procedural steps had already been completed prior to the permit procedure:

1. Notification of the project EIA (PR3642) for Project One without a request for scoping advice, submitted on 28 February 2024.
   The Environmental Impact Team forwarded the notification to the Dutch provinces of North Brabant and Zeeland, as it concerns an EIA with cross-border effects.

2. Decision on the notification by the Environmental Impacts Team.
   The decision on the notification by the Environmental Impact Team was drawn up on 19 April 2024. The Environmental Impact Team added an additional notification to cross-border authorities on 27 June 2024.

3. Preparation of the Project EIA.

The project EIA will be subject to public scrutiny together with the environmental permit application for the project and will be submitted to various authorities for advice. Taking into account all comments and advice received, the Environmental Impact Team will then make a decision on the project EIA for Project One.

## 1.5 Initiator of the project

The initiator of this EIA is:

INEOS Olefins Belgium NV Scheldelaan 475
2040 Antwerp

VAT no. BE 0716.953.031

Company no. 0716.953.031 Contact person:

Jos Vanduffel, Director of IOB

projectone@ineos.com

## 1.6 s team of experts

Under Flemish law, an EIA must be drawn up by accredited EIA experts. In addition to these external experts, the team of experts also includes internal experts who act on behalf of the initiator. The EIA experts are also supported by EIA staff.

### 1.6.1 Internal EIA experts

The following persons act as internal experts for Project One in the preparation of the EIA:

- Anne-Marie Verrelst, HSSE Manager for Project One
- Ralf Gesthuisen, Process Technology Manager for Project One
- Harry Denne, Senior Project Engineer for Project One
- Herwig Teughels, Lead Environmental Engineer for Project One

### 1.6.2 External E s

Table 1-1 provides an overview of the accredited EIA experts acting as external experts in this dossier.

*Table 1-1: Team of accredited EIA experts*

| Discipline | Accredited EIA expert |
|---|---|
| **EIA coordination** | Frank Van Daele |
| **Noise and Vibrations** | Bert Van Den Branden |
| **Air** | Frank Van Daele |
| **Soil** | Inge Leroy |
| **Water – surface water** | Guy Van den Broeke |
| **Water – groundwater** | Nele Dhaese |
| **Mobility** | Daan Storms |
| **Biodiversity** | Wouter Rommens |
| **Landscape, architectural heritage and archaeology** | Hanne Carlens |
| **People - Health** | An Tombeur |
| **Climate** | Nele Dhaese |

The coordination of the project EIA is carried out by Frank Van Daele, assisted by Ilse Laureysens.

Each expert bears final responsibility for the content of the disciplines for which he/she is recognised. The coordinator bears final responsibility for the overall EIA. He/she ensures that the content of all disciplines is coordinated and that the necessary data is transferred from one discipline to another in a timely and correct manner. He/she is also responsible for drawing up the final synthesis and the non-technical summary. He/she is the primary point of contact for the internal experts and those responsible within the EIA Team.

### 1.6.3 EIA support

Table 1-2 provides an overview of the internal EIA staff who support the recognised experts in this dossier.

*Table 1-2: Team of EIA staff*

| Discipline | EIA staff member |
|---|---|
| **Coordination** | Ilse Laureysens |
| **Air** | Sven Pauwels |
| **Soil** | Mona Fierens, Kimber Diels, Nele De Groof |
| **Water – surface water** | Inge Leroy |
| **Water – groundwater** | Inge Leroy, Guillaume Poquette |
| **Mobility** | Daan Demandt |
| **Biodiversity** | Hans Van Gossum, Lauren Schuerewegen |
| **Landscape, architectural heritage and archaeology** | Ottelien Claeys |
| **People - Health** | Sven Pauwels, Frank Van Daele |
| **Climate** | Mona Fierens |

# 2 Spatial, administrative, legal and policy context of the project

## 2.1 Spatial

*Map 1: Topographical map Map 2:*
*Orthophoto*
*Map 3: Regional plan*
*Map 4: GRUP Demarcation of the Antwerp Seaport Area Map 5: Land*
*Registry*
*Map 6: Soil map*
*Map 7: Watercourses*
*Map 8: Pluvial flood map current climate Map 9: Pluvial flood map*
*future climate Map 10: Fluvial flood map current climate*
*Map 11: Fluvial Flood Map for future climate Map 12: Protected heritage*
*Map 13: Established inventories*
*Map 14: Nature conservation: Nature reserves, VEN areas and Natura 2000 areas Map 15: Biological value map*
*Map 16: European Habitats Map 17:*
*Study area*
*Map 18: Flood risk map – coast (current climate) Map 19: Flood risk map –*
*coast (future climate) Map 20: Plot plan*

The map bundle is included in Appendix 1.

The project area is located within the territory of the city of Antwerp in the Port of Antwerp. It has a total surface area of approximately 90.3 ha (see § 1.1, Figure 1-1 and Figure 2-1).

On the eastern side, the project area borders the Harbour Dock (Canal Dock B2). On the other side of Canal Dock B2 are mainly port areas, the Opstalvallei nature reserve and the village of Berendrecht. On the western side, the project area borders Scheldelaan, with a narrow strip of the recognised Galgenschoor nature reserve and the village of Lillo right next to it, and the Scheldt river beyond that. On the other side of the Scheldt, on the left bank, is the village and nuclear power plant of Doel. To the north and south of the project area are the companies mentioned in § 2.2.1.

The project area is located in the northern part of the Port of Antwerp, in a zone designated in the regional plan and the GRUP Afbakening Zeehavengebied Antwerpen (2013) (Antwerp Seaport Area Demarcation Plan) as an area for seaport and water-related businesses within the 'Industry' zoning category.

The following municipalities are located within a radius of 5 km: Antwerp, Stabroek and Beveren.

The nearest residential area is Berendrecht, approximately 890 m northeast of the project area. Other residential areas are located slightly further from the project area, namely Lillo, approximately 1.3 km to the south, Doel, approximately 1.6 km to the south-west, Zandvliet, approximately 2.2 km to the north, and Stabroek, approximately 3.3 km to the east. The border with the Netherlands is approximately 4 km from the project area as the crow flies.

There are several protected monuments, town or village views and landscapes in the wider vicinity of the project area (see Appendix 1 Map 12):

- Protected cultural-historical landscapes:
  - Groot Buitenschoor – Galgenschoor approximately 150 m west of the southern part of the project area and approximately 80 m west of the northern part of the project area;
  - Slikken en schorren van Oude Doel, approximately 1.3 km west of the project area;

- Anti-tank ditch approximately 1.6 km east of the project area;
- Protected town and village views:
  - Lillo Fort with ferry and tidal harbour approximately 1 km south of the project area;
  - Westmolengeest windmill and surroundings approximately 2.2 km northeast of the project area;
- Protected monuments:
  - Lillo Fort:
    - ramparts approximately 1.2 km southwest of the project area;
    - powder magazine approximately 1.4 km southwest of the project area;
    - facades and roofs of officers' residences approximately 1.4 km southwest of the project area;
    - casemates approximately 1.4 km southwest of the project area;
    - log cabin approximately 1.2 km southwest of the project area;
  - De Eenhoorn grain windmill approximately 1.6 km southwest of the project area;
  - Fort Liefkenshoek, approximately 2.4 km southwest of the project area;
  - Doel: Stone windmill approximately 1.6 km west of the project area;
  - Objective: Hooghuis, approximately 1.9 km west of the project area.

There are no heritage landscapes in the wider vicinity of the project area.

There is no designated architectural heritage in the project area itself. However, there are a number of elements in the study area that have been designated as architectural heritage. The Bevrijdingsdok (Liberation Dock) is located approximately 400 m east of the project area. The other elements are located at least 1 km from the application site.

There are a number of Natura 2000 areas, VEN areas and recognised nature reserves in the wider vicinity of the project area (see Appendix 1 Map 14).

The following Flemish special protection areas are located in the wider vicinity of the project area:

- Habitat Directive areas:
  - Kalmthoutse heath (SBZ-H BE2100015)
  - Scheldt and Durme estuary from the Dutch border to Ghent (SBZ-H BE2300006)
  - Klein en Groot Schietveld (SPZ-H BE2100016)
  - Historical fortification belts around Antwerp as bat habitats (SBZ-H BE2100045)
  - Forest and heathland areas east of Antwerp (SBZ-H BE2100017)
  - Forests and heathlands of sandy Flanders – eastern part (BE2300005)
- Birds Directive areas:
  - Kalmthoutse heath (SBZ-V BE2100323)
  - Zeeschelde – Salt marshes and polders of the Lower Scheldt (SBZ-V BE2301336)
  - Tufted Duck (SBZ-V BE2300222) incl Blokkersdijk
  - De Maatjes, Wuustwezelheide and Groot Schietveld (SBZ-V BE2101437)

The following VEN areas are also located within a 20 km radius of the project area:

- Slikken en Schorren along the Scheldt: sub-areas Groot Buitenschoor, Galgenschoor; Schorren van Doel; Hobokense Polder
- De Kuifeend: sub-areas Kuifeend, Grote Kreek, Opstalvallei
- Blokkersdijk
- De Kalmthoutse Heide
- De Maatjes
- The Oude Landen and Bospolder
- De Stropers
- Wase Scheldepolders
- The Kleidaal

The Groot Buitenschoor and Galgenschoor is a recognised nature reserve located approximately 150 metres west of the project area. This reserve area is also covered by the Ramsar Convention. The Kuifeend area is designated as a nature reserve on the regional plan. The Opstalvalleigebied is located on the other side of the Kanaaldok and is partly a recognised nature reserve.

Finally, the following special protection areas on Dutch territory are located in the wider vicinity of the project area:

- Habitat Directive areas:
- Brabantse Wal (SBZ-H NL9801055)
- Westerschelde and Saeftinghe (SPZ-H NL9803061)
- Oosterschelde (SPI-H NL3009016)
- Vogelkreek (SPZ-H NL2003049)
- Yerseke and Kapelse Moer (SBZ-H NL9802068)
- Bird Directive areas:
  - Brabantse Wal (SBZ-V NL3009003)
  - Markiezaat (SBZ-V NL3009015)
  - Zoommeer (SBZ-V NL9902010)
  - Oosterschelde (SBZ-V NL3009016)
  - Westerschelde and Saeftinghe (SBZV NL9802026)
  - Yerseke and Kapelse Moer (SBZ-V NL9802068)

The protected areas mentioned above (nature reserves, VEN areas, Habitats Directive and Birds Directive areas) also include other sub-areas further away from the project area (see Map 14). These are located and described in more detail in Chapter 11 Biodiversity.

The project area itself is not located in a water extraction area or in a protected landscape area.

The Scheldt and the Antwerp harbour docks (Canal Dock B2) are the most important surface waters in the area. This section of the Scheldt belongs to the Lower Scheldt basin (water body code VL17-43) and must comply with the environmental objectives for the 'transitional waters' category, with the type 'brackish macrotidal lowland estuary'. The harbour docks (VL05-187) must comply with the environmental objectives for the 'lakes' category, with the type 'very slightly brackish lake'. The project area is not located in a flood-prone area.


*Figure 2-1: Location plan for Project One*

The project area is located between various companies that are classified as high-threshold Seveso sites, namely Vopak (formerly Gunvor), INEOS Manufacturing Belgium, Inovyn Manufacturing Belgium, Nippon Gases, Vesta Terminal Antwerp, Bayer Agriculture and Advario Stolthaven Antwerp (ASA). In addition, there is a low-threshold Seveso establishment on the Inovyn site, namely Air Liquide.

For the location in relation to flood areas, nature reserves and areas of scenic value, please refer to the corresponding maps in Appendix 1.

## 2.2 Spatial demarcation – Project area

### 2.2.1 Current spatial demarcation situation

Antwerp plays a crucial role at the heart of the European oil and chemical industry: Antwerp – Port of Antwerp-Bruges – is the largest integrated chemical cluster in Europe. The high degree of integration and diversity throughout the value chain of the chemical players present is unique in the world. It brings together the most advanced logistics experts for the safe storage, handling and distribution of oil, chemical products and gases. (Chemistry | Port of Antwerp-Bruges (portofantwerpbruges.com)

Antwerp is the largest cluster in the world after the petrochemical industry in Houston, Texas (USA). The following companies are located in Antwerp: BASF DOW HPPO, BASF, INEOS, Air Liquide, Eurochem, Vopak (formerly Gunvor), BAYER Agriculture, Eastman, Evonik, Covestro, Ashland, Monument Chemical, Lanxess, Lubrizol, Borealis, TotalEnergies, ExxonMobil, TotalEnergies, Nipon Shokubai, Kuraray, Praxair, 3M, Kuwait Petroleum (Q8), Inovyn, VESTA, Advario, ... the list is not exhaustive.

Port of Antwerp-Bruges owns and manages 720 km of pipelines, 90% of which serve the chemical and petrochemical industry and hinterland. Within the port area, there are more than 1,000 km of pipelines, managed by both private companies and Port of Antwerp-Bruges itself.

Project One is located on unused parts of the industrial sites in the north of the Antwerp port area, surrounded by plots that are already in use. The project area is defined as the sites on which Project One is planned to be realised, including the construction zones. Once the project has been completed, the contiguous industrial site between the Berendrechtsluis in the north, the Kanaaldok in the east, the R2 (Tijsmanstunnel, Liefkenshoektunnel) in the south and the Scheldelaan (with the adjacent Galgenschoor nature reserve and the Scheldt) in the west will be almost entirely occupied by industrial companies.

In the current situation, the following existing industrial and port activities are present on the sites in the immediate vicinity of the Project One site:


1. Vopak (formerly Gunvor Petroleum Antwerpen NV)
2. Nippon Gases Belgium NV (Nippon Gases)
3. INEOS Manufacturing Belgium NV (IMB)
4. INOVYN Manufacturing Belgium NV (Inovyn)
5. Air Liquide Industries Belgium (Air Liquide)
6. Vesta Terminal Antwerp NV (Vesta)
7. Bayer Agriculture BVBA (Bayer)
8. Advario (formerly Oiltanking) Stolthaven Antwerp NV (ASA)
9. Evonik Antwerp NV (Evonik)
10. PSA Antwerp NV (PSA)
11. Covestro NV (Covestro)
12. Sea-Tank Terminal Antwerp NV (Sea-Tank)
13. Antwerp Bulk Terminal NV (ABT)

*Figure 2-2: Companies surrounding the Project One site*

As is customary within a port area, there has long been a certain exchange of end products, intermediate products, residual products, raw materials, heat, steam or fuels via pipelines between several of these existing industrial and port activities for reasons of opportunity and efficiency. The Port of Antwerp-Bruges also encourages this exchange itself by promoting the high degree of integration and diversity throughout the value chain of the chemical players present as unique in the world: "*it brings together the most advanced logistics experts for the safe storage, handling and distribution of oil, chemical products and gases*".

The companies on the right bank of the port area interact in the following ways, among others:

- IMB, Nippon Gases, Air Liquide and Inovyn share the same fire water network;
- IMB, Nippon Gases, Air Liquide and Inovyn jointly discharge waste water, as specified in Inovyn's environmental permit;
- IMB, Nippon Gases, Air Liquide and Inovyn use the same main electrical substation, operated by Inovyn;
- Nippon Gases supplies nitrogen to IMB;
- Air Liquide distributes hydrogen produced at Inovyn;
- IMB has been using the international pipeline network for decades to supply propylene and ethylene; this allows ethylene to be purchased via the ARG network from BP Refining & Petrochemicals GmbH (Gelsenkirchen, Germany), INEOS Manufacturing Deutschland GmbH (Cologne, Germany) and Basell Polyolefine GmbH

[5]https://argkg.com/connected/

(Wesseling-D), SABIC Petrochemicals B.V. (Geleen-NL), ExxonMobil Petroleum & Chemical N.V. (Meerhout-B), DOW Benelux B.V. (Terneuzen-NL), INEOS N.V. Antwerp C2 Terminal (Antwerp-B), Shell Chemicals Europe
B.V. (Rotterdam, Netherlands), TOTAL Olefins N.V. (Antwerp, Belgium) and BASF Antwerpen N.V. (Antwerp, Belgium).

- Bayer supplies steam to Inovyn.

Each of these existing industrial and port activities has a separate environmental permit or environmental licence, granted on the basis of a prior separate project environmental impact report and a prior separate environmental safety report.

The above existing companies and licensed activities are all part of the *'reference situation'* referred to in Annex IV, point 3 of Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment, which includes a description of the relevant aspects of the current state of the environment (see also DABM, Annex IIbis, 3°). These and other existing companies and/or approved projects are covered by the *'description of the likely significant environmental effects of the project resulting from the cumulative effects with other existing and/or approved projects'* referred to in Annex IV, point 5 of Directive 2011/92/EU (see also DABM, Annex IIbis, 5°).

The project EIA for Project One is being prepared in accordance with the provisions on, among other things, the 'reference situation' and 'cumulative effects' set out in the Guidance on the preparation of the Environmental Impact Assessment Report, drawn up in 2017 by the European Commission.

## 2.2.2 Project One

### 2.2.2.1 Integration of Project One into the Antwerp port area

Project One does not involve the creation of a new industrial area, but is an infill development on vacant land between existing and approved industrial and port activities, meaning that no new area needs to be created or developed. All of Project One's facilities and activities are clearly separated from other facilities and activities.

The location of such a new chemical plant cannot be chosen arbitrarily due to requirements regarding accessibility for seagoing vessels that can transport the raw material (ethane), the required site size, access to an existing international pipeline network for the distribution of ethylene and/or the necessary spatial separation from residential areas due to safety risks.

Within the Flemish context, the Port of Antwerp-Bruges is the only location that meets these preconditions. Evidence of this is the already existing very strong clustering of petrochemical companies in Antwerp. These preconditions (in addition to geographical and planning conditions) mean that the establishment of a new chemical plant will also be located next to or near other chemical companies within this existing cluster. These other companies, some of which have been present in the port for decades, operate entirely autonomously on the basis of their own licences. They have their own existing suppliers of raw materials, their own customers for their products, and function perfectly well without the new plant.

Project One will produce ethylene from ethane in the ECR, with propylene as one of the by-products (alongside pyrolysis oil, C4 and C5+ hydrocarbons). Ethylene and propylene are among the most widely produced basic products in the (petro)chemical industry.

An international network of pipelines that has been in existence for decades is available for both products. This network connects all relevant chemical companies that produce or consume these substances in the wider region with each other and with other countries:

*The ARG pipeline network (Aethylen-Rohrleitungs-Gesellschafft) for ethylene* connects *the Belgian, German and Dutch chemical industries. ARG operates an approximately 495 km long ethylene pipeline in Germany, Belgium and the Netherlands. With its pipeline network stretching from Antwerp via Cologne to the Ruhr area, it forms the backbone of the Central European ethylene chemical industry. The Rotterdam market is also directly connected to the ARG system. The ARG pipeline is a common carrier and is therefore accessible to all ethylene producers and consumers under the same transport conditions.*

*The tariff system for usage, which has been in place for many years, favours long-term partnerships and creates a high degree of security of supply for the companies connected to the pipeline.*

*(https://argkg.com/connected/)* https://euc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-US&rs=en-US&wopisrc=https%3A%2F%2Fineosgroup.sharepoint.com%2Fsites%2FTProjectOneProjectOnelegalpermit%2F_vti_bin%2Fwopi.ashx%2Ffiles%2F7c9dd8ca15f34af898a3c35ebece3980&wdenableroaming=1&mscc=1&hid=538718A1-A06F-8000-64FD-4874A802A4B7.0&uih=sharepointcom&wdlcid=en-US&jsapi=1&jsapiver=v2&corrid=7f02c182-d2e4-b31f-a1aa-2b96594a33e4&usid=7f02c182-d2e4-b31f-a1aa-2b96594a33e4&newsession=1&sftc=1&uihit=docaspx&muv=1&cac=1&sams=1&mtf=1&sfp=1&sdp=1&hch=1&hwfh=1&dchat=1&sc=%7B%22pmo%22%3A%22https%3A%2F%2Fineosgroup.sharepoint.com%22%2C%22pmshare%22%3Atrue%7D&ctp=LeastProtected&rct=Normal&wdorigin=ItemsView&wdhostclicktime=1711381438123&instantedit=1&wopicomplete=1&wdredirectionreason=Unified_SingleFlush -_ftnref1https://chemicalparks.eu/europe/pipeline-networks.

The network:

- connects a number of companies within the Port of Antwerp that produce or consume these products;
- also connects Belgian industrial sites with such companies (companies in the Port of Antwerp, along the Albert Canal and in Feluy and Jemeppe);
- finally, it continues to large industrial sites in the Netherlands (ethylene and propylene) and Germany (ethylene only).

Ethylene and propylene are mainly transported between chemical companies via these pipeline networks. Additional transport is mainly by ship.

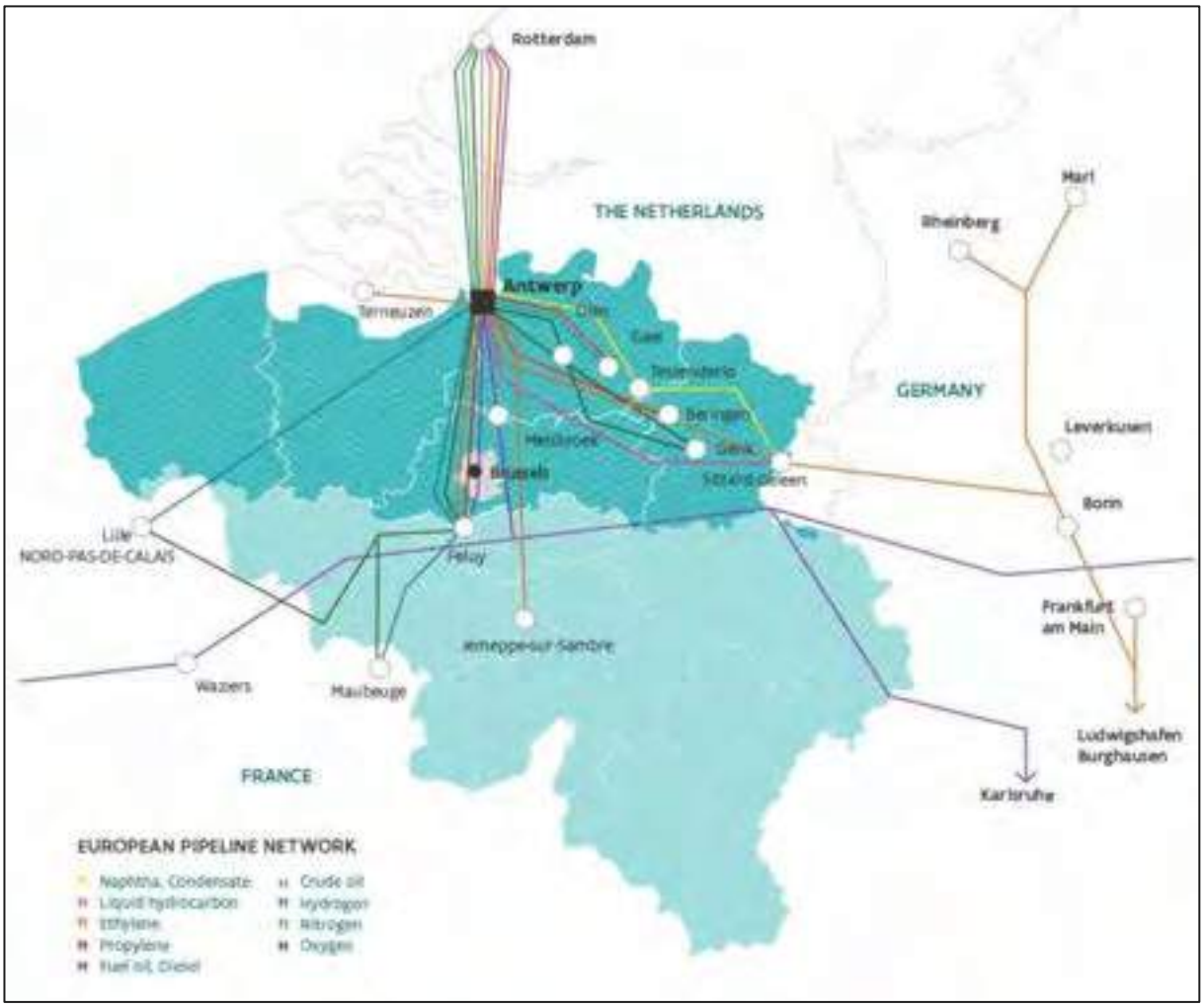


*Figure 2-3: Existing pipeline networks (Source: Flanders Investment & Trade / Port of Antwerp)*

### 2.2.2.2 Environmental unit

Project One is the environmental technical unit (ETU) for which this project EIA was drawn up, with the aim of assessing the combined impact or cumulative effects of the applicable facilities and activities of Project One, so that an overall assessment of the potential nuisance can be made. This is done in accordance with the definition of environmental technical unit as included in Article 1.1.2. VLAREM II and Article 1.1.2, §1, 8° DABM:

*"Various establishments and/or activities, including their operating area and other immovable property associated with them, which must be considered as a whole for the purpose of assessing the harm they may cause to humans or the environment. A factor that may indicate the presence of an environmental unit is the geographical, material or operational interconnection between establishments and activities, accompanied by a relative separation of the whole of these establishments and activities from other establishments and activities.*
*The fact that different establishments have different ownership statuses does not prevent them from forming an environmental unit*
*."*

The legal definition provides various assessment elements, whereby it is clear that no single element is sufficient to constitute an environmental unit. The specific situation and all elements that make up the establishments and activities are taken into account and must be assessed. For example, geographical proximity of establishments and activities is not sufficient if it appears that the business processes are or can be independent of each other. This is certainly the case in an environment such as the port of Antwerp, but it also applies to large industrial sites.

Project One is being realised on an infill plot located in the seaport area of Antwerp and surrounded by port activities that have been in existence for decades, as well as other industrial, chemical and logistics companies. As mentioned above, the fact that various companies are located in close proximity to each other is not decisive in determining an environmental unit.

From a planning perspective, Project One must be located here, i.e. within the boundaries of the regional spatial implementation plan (GRUP) for the Antwerp Seaport Area and, more specifically, within the area for seaport and water-related businesses in the 'Industry' zoning category. After all, the port of Antwerp is home to the largest (petro)chemical cluster in Europe. This cluster comprises a wide variety of production and storage companies. Project One is located among other existing SEVESO companies.

For decades, the Port of Antwerp-Bruges has been promoting the use of pipelines and other efficient integrations within the port area: end products, intermediate products, residual products or raw materials are exchanged, as are heat, steam or fuels. In the future, a joint pipeline network for $CO_2$, hydrogen and similar substances is also expected to be provided, connected not only within the port area, but also with other industrial sites in Flanders, Belgium and/or abroad.

On the other hand, Project One is fully self-sufficient in terms of supply and production. Ethane is supplied by sea-going vessels. Ethylene is produced exclusively on site, in the company's own cracker, which is fully equipped with the following main units

- a furnace section;
- a water quench and dilution steam production;
- a compression and alkaline treatment unit;
- the separation section.

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[6] RvVb 9 January 2018, no. A/1718/0428, *Keteleer.*
RvVb 8 July 2019, no. RvVb-UND-1819-1184, *Van den Brande et al.*
RvVb 10 December 2020, no. RvVb-A-2021-0400, *Superbeton.*
T. MALFAIT, "Environmental unit, coherent technical whole, one classified IIOA... or just the same project?", *STORM* 2021, issue 1, 1-4.
RvVb 4 August 2022, no. RvVb-A-2122-1022, *Van Noten and Franckaert.*

The supporting units also belong exclusively to Project One:

- steam and condensate,
- ECR cooling towers
- slop and waste water system.
- ECR flare system
- Cryogenic tank
- Other storage tanks

Finally, Project One also provides its own administrative building, its own water treatment plant, its own steam production, its own water supply and its own firefighting water supply and storage.

All of Project One's facilities and activities are also separate from other facilities and activities. The plot boundaries are marked by fences, and strict security measures must be observed in order to gain access.

It is therefore very clear that Project One does not depend on any surrounding companies for its proper functioning. Project One is a stand-alone company with completely independent business processes.

Nor is there any expansion of existing activities; the products from Project One are sold to all customers under normal market conditions. No neighbouring companies depend on the yet-to-be-launched production of Project One for their supplies. As mentioned above, supplies have been provided for decades via the existing pipeline network.

It is clear that the impact or effects of the entire environmental engineering unit are correctly assessed in this project EIA.

### 2.2.2.3 Potential future interactions with existing activities

Like many other companies in the chemical cluster of the Port of Antwerp, the future operational phase of Project One will allow for the exchange of products, energy and services with other installations in the port. Examples of these possible exchanges include:

- Purchase and delivery of NaOH from Inovyn via a pipeline. NaOH is used as an auxiliary material in the process and utilities. The pipeline ensures efficient and safe exchange of materials, but NaOH can also be supplied by other suppliers by lorry.
- Sale and transport of C4 product to Advario (ASA) storage facilities. This product can also be transported directly by ship to other buyers, independently of Advario (ASA).
- Ethylene and propylene to buyers in the region, via the existing pipeline network to which various suppliers and customers have been connected for a long time, both domestically and abroad.
  The connection to the ethylene and propylene network is made via the existing infrastructure. The pipeline junction at which the connection is made has been in use for decades for multiple products and is historically located on Inovyn's site. Inovyn is responsible for supervision and security, but is not the owner and is also not responsible for the maintenance of the pipelines. Each of the companies involved has its own maintenance cabin.
- Wastewater is discharged via a separate control facility through an existing pipe in the Scheldt, which is also used by Inovyn, Nippon Gases and Air Liquide. By discharging via an existing wastewater sewer belonging to a neighbouring company, additional drilling through the Galgenschoor is avoided.

[7] Companies connected to the ARG (https://argkg.com/connected/) ethylene pipeline:
BP Refining & Petrochemicals GmbH (Gelsenkirchen, Germany), OXEA Deutschland GmbH (Oberhausen, Germany), INOVYN Deutschland GmbH (Rheinberg, Germany), INEOS Manufacturing Deutschland GmbH (Cologne, Germany), Deutsche Infineum GmbH (Cologne, Germany), BRASKEM Europe GmbH (Wesseling, Germany), Basell Polyolefine GmbH (Wesseling, Germany), SABIC Petrochemicals B.V. (Geleen, Netherlands), Celanese Emulsions B.V. (Geleen, Netherlands), Vynova Belgium N.V. (Tessenderlo-B), INEOS Manufacturing Belgium N.V. (Geel-B), ExxonMobil Petroleum & Chemical N.V. (Meerhout-B), DOW Benelux B.V. (Terneuzen-NL), INEOS N.V. Antwerp C2 Terminal (Antwerp-B), Shell Chemicals Europe B.V. (Rotterdam-NL), Inovyn Manufacturing Belgium N.V. (Antwerp-B), TOTAL Olefins N.V. (Antwerp-B) and BASF Antwerp N.V. (Antwerp-B)

possible disruption to natural values has been avoided. This concerns only the joint use of a section of sewerage system of limited length under Scheldelaan towards the Scheldt. Each of the companies has a separate water treatment plant, with its own discharge conditions and separate control facilities. The discharge conditions of the companies can therefore be monitored and controlled individually. If one of the companies were to cease production or plan a change in the discharge situation, this would have no effect whatsoever on the discharge situation of the other companies. The joint discharge point therefore does not entail any operational or technical cohesion.

The above shows that the potential interaction planned between Project One and companies in the area will not be greater or more intensive than the existing interaction between these other companies. Project One will therefore also be a stand-alone company operating independently of other companies among the existing industrial and port activities.

The project area is defined as the sites on which Project One is planned to be realised, including the construction zones.

## 2.3 Legal and policy-related conditions and preconditions

### 2.3.1 Regional s RUP

In the Antwerp Regional Plan, adopted by Royal Decree on 3 October 1979, the zone in which the project area is located is designated as an industrial area (Regional Plan No. 14 Antwerp, map sheet 15/3). According to the provisions of the Regional Plan, industrial areas are intended for the establishment of industries or craft businesses.

The Tijsman Tunnel, located in the south about 1.2 km behind the Evonik company, is marked as a 250 m wide buffer zone in the Regional Plan. To the southwest lies Lillo Fort, and to the west, next to Scheldelaan, lies the recognised nature reserve Groot Buitenschoor en Galgenschoor. According to the Regional Plan, Lillo Fort is designated as a residential area with cultural, historical and/or aesthetic values, as a park area and as an area for day recreation.

To the east, on the other side of the Harbour Dock (Canal Dock B2), there is an industrial zone. Further to the north is a buffer zone, next to the residential area of Berendrecht. About 3 km southeast of the project area, on the other side of the Harbour Dock (Canal Dock B1), is the recognised nature reserve 'Kuifeend'. To the west, on the other side of the Scheldt, is the Doel nuclear power plant (ENGIE Electrabel) and there are also rural/agricultural areas.

The project area is located in the northern part of the Antwerp port area and is surrounded by other industrial estates with mainly chemical and petrochemical companies.

The Regional Spatial Implementation Plan 'Demarcation of the Antwerp Seaport Area' was approved by the Flemish Government on 30/04/2013. The GRUP set out the following policy vision for the area:

- consolidating the existing port;
- construction of buffers and liveability buffers;
- ensuring sufficient distance between the centres and the seaport;
- construction of a ring of natural elements around the seaport;
- expand the ecological infrastructure.

Furthermore, the project area is not included in any general or specific development plans, nor are there any such development plans in the immediate vicinity.

### 2.3.2 Other legal pre s preconditions

Table 2-1 provides an overview of the legal and policy preconditions that are relevant to the environmental impact assessment of the project. For each precondition, the reason for its relevance is indicated, as well as where in the EIA it will be discussed or assessed in more detail.

*Table 2-1. Overview of the legal preconditions*

| Condition | Explanation | Relevance: yes or no | Reference |
|---|---|---|---|
| **Environmental hygiene – general** | | | |
| **Decree of 5 April 1995 containing general provisions on environmental policy (DABM)** | The so-called EIA Decree inserted Title IV 'Environmental impact and Safety Reporting'.<br>The environmental impact and safety report aims to give environmental interests and human health and safety equal weight to social, economic and other societal interests in decision-making on actions that may have significant environmental impacts and/or cause a major accident. | Yes | All disciplines |
| **Decree on environmental permits**<br><br>**(25/04/2014)** | The decree of 25 April 2014 on environmental permits and its implementing decrees together form the basis of the Flemish environmental permit policy.<br>The environmental permit covers activities that relate to classified activities based on nuisance, such as certain storage of hazardous products in an existing building, but also construction or renovation projects that previously required an urban development permit. | Yes | The environmental permit that will be applied for Project One falls within the scope of this regulation. |
| **Flemish Environmental Permit Regulations (VLAREM)** | For various categories (related to the nature of activities), the (general and sectoral) conditions that must be met are specified. These include conditions relating to noise pollution, air pollution, water pollution, etc. | Yes | All disciplines |
| **Cooperation agreement of 16 February 2016 between the Federal State, the Flemish Region, the Walloon Region and the Brussels-Capital Region on the control of major accident hazards involving dangerous substances. Entry into force on (10/06/2016)** | The Cooperation Agreement, which transposes the Seveso III Directive into Belgian law, imposes obligations on Seveso establishments with regard to the control of the risks associated with the presence of dangerous substances on the premises of the establishment.<br>Companies with a certain quantity of dangerous substances on their premises are subject to the safety reporting (VR) obligation. They must draw up a draw up a safety report in which they must demonstrate that they are aware of and control the risks associated with the presence of these hazardous substances, and that they are taking or have taken measures deemed sufficient to prevent the undesirable (accidental) release of hazardous substances or to limit the possible consequences of accidental releases for humans and the environment. | Yes | For the operation of the Future installations are subject to the obligation to draw up an environmental safety report (ESR). These aspects will be further investigated in the ESR for Project One.<br><br>A summary of the OVR's conclusions will be included in the EIA. |

| Precondition | Explanation | Relevance: yes or no | Reference |
|---|---|---|---|
| **IED Directive (2010/75/EU dated 17/12/2010, entry into force on 6/01/2011)** | The Industrial Emissions Directive (IED) integrates the IPPC and six other directives (the Large Combustion Plants Directive, the Waste Incineration Directive, the Solvents Directive and three Directives for the titanium dioxide industry). The directive came into force on 6 January 2011 and must be transposed no later than two years later. The IED (and the IPPC Directive) lay down, among other things, the permit conditions for IPPC companies and oblige these companies to use BAT, among other things. | Yes | Discussion in the Air and Water disciplines. |
| **BAT/BREF documents within the framework of the Industrial Emissions Directive (2010/75/EU)** | BREF documents are drawn up at European level. These documents specify the BAT for each industrial sector, as well as the emission levels (to air, water, noise, etc.) associated with these BAT. Vito draws up BAT studies for various industrial sectors. These studies indicate the best available techniques, as well as the emission levels (to air, water, noise, etc.) associated with these best available techniques. | Yes | All disciplines |
| **Spatial planning** | | | |
| **Regional plan** | In the past, the government drew up regional plans. Since 2000, no new regional plan amendments have been made. Spatial implementation plans (RUPs) are gradually replacing the existing regional plans. Only where no spatial implementation plan applies yet is the regional plan is still in force. | Yes | Discussion of the spatial location of the project (§2.1). |
| **Spatial implementation plan (RUP)** | A spatial implementation plan is a plan with which the government determines the land use in a specific area. This means that for all plots of land in a specific area, the entire clearly what is and is not permitted. Based on the urban development regulations that have been luded in the RUP, environmental permits can be issued once the RUP has been approved. | inc | Discussion of the spatial location of the project (§2.1). |
| **Flemish Spatial Planning Code (1/09/2009) and its implementing decrees** | The decree specifies the interventions for which a permit for urban development activities is required. The general objectives of spatial planning policy in the field of structural planning are described in the four basic objectives of the Flanders Spatial Structure Plan:<br>• The selective expansion of urban areas and the targeted integration of functions and facilities within them; s<br>• The preservation and, where possible, strengthening of rural areas and the concentration of housing and work in their centres;<br>• Concentrating economic activities within the existing economic structure;<br>• Optimising the existing traffic and transport infrastructure. | Ye | Significant changes to the relief, such as any addition, raising, excavation or deepening that alters the nature or function of the site, require a permit for urban development activities, as does the construction of new installations. |

| Precondition | Explanation | Relevance: yes or no | Reference |
|---|---|---|---|
| **Regional urban development regulation on rainwater wells, infiltration facilities, buffer facilities and separate discharge of waste water and rainwater (02/10/2023)** | The regional urban development regulations contain minimum requirements for the discharge of uncontaminated rainwater from paved surfaces. The general principle here is that rainwater should initially be reused as much as possible<br>. Secondly, the remaining rainwater must be<br>infiltrated or buffered, so that ultimately only a limited flow rate<br>is discharged slowly. The placement of the overflow from the rainwater tank and the infiltration facility must also comply with this principle. | be | Discussion in the Water discipline. |
| **Soil and Water** | | | |
| **Decree on soil remediation and soil protection (20/10/2006) and implementing decree VLAREBO (14/12/2007)**<br><br>**Groundwater Decree (1984)** | The Soil Decree and its implementing decrees regulate soil legislation in<br>s Flanders.<br><br>~~The protection of groundwater is regulated by this decree. The procedure for~~<br>applying for a permit for the extraction of or infiltration into groundwater Yes is included in the Environmental Permit Decree and the Environmental Permit Decree. | Ye | Discussion in the disciplines Soil and Water.<br><br>~~Discussion in the Water discipline.~~ |
| **Coordinated Decree on Integrated Water Policy (15/06/2018) and its implementing decrees. Decree establishing detailed rules for the application of the water assessment (20/07/2006)** | Regulates integrated water policy and is the Flemish translation of the European Water Framework Directive. Some of the objectives of this decree are:<br>• The protection, improvement or restoration of surface water and groundwater bodies in such a way that good status of the water systems is achieved by 22/12/2015 at the latest. To achieve this status, management plans were drawn up for each river basin.<br>• Organising the management of rainwater and surface water in such a way that excess<br>s rainwater is preferably discharged in a delayed manner via the surface water network and that desiccation is prevented.<br>One of the instruments for achieving these objectives is the 'water test', which is used to assess whether a plan or activity has a harmful effect on water systems. | Ye | Discussion in the Water discipline.<br><br>The elements necessary for the implementation of the water assessment are compiled in a separate chapter entitled 'Water Assessment' in the EIA. |

| Precondition | Explanation | Relevance: yes or no | Reference |
|---|---|---|---|
| | For activities subject to an EIA, the EIA must provide the necessary elements for the implementation of the water assessment. The implementing decree that has come into force provides local, provincial and regional authorities, which are responsible for issuing permits, with guidelines for the application of the water assessment. | | |
| **Quality objectives for watercourses (24/05/1983)**<br><br>**Decision of the Flemish Government amending the decision of the Flemish Government of 6 February 1991 establishing the Flemish regulations on environmental permits and the Decision of the Flemish Government of 1 June 1995 establishing general and sectoral provisions on environmental hygiene, with regard to environmental quality standards for surface waters, water beds and groundwater (21/05/2010)** | The Act of 24 May 1983 was adopted to implement EC directives and provides a legal basis for the quality objectives that surface water intended for specific purposes must meet.<br><br>s. The decision of 21 May 2010 defines the environmental quality objectives for surface waters, waterbeds and groundwater. The environmental quality objectives for surface waters vary according to the category and type of surface water. | Ye | The effluent from the water treatment plant will be discharged into the Scheldt.<br>The section of the Scheldt both upstream and downstream of the discharge point must comply with the objectives for 'Transitional water – brackish macrotidal lowland estuary'.<br><br>Discussion in the Water discipline. |
| **Sigma Plan (Council of Ministers of 18/02/1977) and updated Sigma Plan (22/07/2005, valid until 2030)** | The objective of the Sigma Plan was to protect residents along the Zeeschelde and its tributaries against flooding and storm surges from the North Sea. The<br>updated Sigma Plan provides for numerous measures to preserve the 'naturalness' of the<br><br>heldt estuary. New nature areas are being created or existing areas are being refilled. | Sc | With the updated Sigma Plan, the target values for dyke heights have been adjusted.<br>Work has already been carried out at Fort Lillo. The Lillo polder is located just upstream from Fort Lillo along the Scheldt. An area of ten hectares was depoldered in order to improve safety in the |

| Precondition | Explanation | Relevance: yes or no | Reference |
|---|---|---|---|
| | | | Scheldt area. A high ring dyke of approximately 1.1 kilometres was constructed around the pot polder (height of +11 metres TAW), after which the existing dyke along the Scheldt was breached so that water could flow into the polder. Thanks to the inflowing water, mudflats and salt marshes will develop in the pot polder over time. Discussion in the Climate discipline. |
| | | | There are no water extraction areas in the immediate vicinity. |
| **Protection zonearound water extraction areas (24/01/1984)** | Indicates the zones designated for the protection of water extraction sites. | No | |
| **Air** | | | |
| **NEC Directive 2001/81/EC on national emission ceilings and the Flemish NEC reduction programme** | The aim of the NEC Directive is to limit emissions of $SO_2$, NOx, VOCs and $NH_3$. An emission reduction programme was drawn up for the Flemish Region within the framework of the NEC Directive. | Yes | Discussion in the discipline of Air. |
| **Directive 2008/50/EC of the European Parliament and of the Council of 20 May 2008 on air quality and cleaner air for Europe** | EU Directive 2008/50/EC replaces Framework Directive 96/62/EC and the first three daughter directives (1999/30, 2000/69/EC and 2002/3/EC). The limit values, target values, Information and alert thresholds were retained, except for the 'second phase' for $PM_{10}$ s limit value, which is being phased out. Instead, a limit and target value will be introduced for $PM_{2.5}$ (the even smaller particulate matter fraction). | Ye s | Discussion in the discipline Air. |
| **Special protection zones** | Areas in which the expected increase in pollution as a result of urban and industrial developments must be limited or prevented. The special protection zones are laid down in VLAREM II. | Ye s | Discussion in the Air discipline. |

| Precondition | Explanation | Relevance: yes or no | Reference |
|---|---|---|---|
| **Noise** | | | |
| **Law on the prevention of noise pollution (18/07/1973), Directive 2002/49/EC of the European Parliament and of the Council of 25/6/2002 and VLAREM II Chapter 2.2 Environmental quality standards for noise and related policy tasks** | Chapter 2.2 of VLAREM II contains the environmental quality standards for noise and related policy tasks, in implementation of the Act of 18 July 1973 on noise pollution. VLAREM II was further amended to transpose Directive 2002/49/EC into Flemish legislation. | Yes | Discussion in the Noise discipline. |
| **Nature conservation** | | | |
| **Decree on nature conservation and the natural environment (21/10/1997) and decision of the Flemish Government on measures to implement area-specific nature policy or the 'Measures Decision' (21/11/2003)** | The Nature Conservation Decree sets out the general objectives of nature conservation policy in Flanders. The basic principles are the standstill principle and the precautionary principle. The decree explains the Flemish Ecological Network.<br><br>In implementation of the Nature Decree, a Flemish Ecological Network (VEN) was defined, consisting of Large Nature Units (GEN) and Large Nature Units in Development (GENO). In the VEN areas, nature conservation and development are paramount and at least the existing natural qualities must be preserved. To this end, a number of prohibitions apply within the VEN.<br>The Measures Decree includes general provisions concerning nature development plans and special protection regulations for VEN areas.<br><br>The Habitats Directive and the Birds Directive aim to preserve biological diversity within the EU. The European directives were incorporated into the Flemish Nature Decree. Special protection areas were designated within this framework.<br><br>A number of changes to vegetation are prohibited, subject to authorisation or subject to notification. These provisions are generally applicable. | | Discussion in the Biodiversity discipline. |

| Precondition | Explanation | Relevance: yes or no | Reference |
|---|---|---|---|
| **Decision of the Flemish Government on the assessment of damage to nature in the Flemish Ecological Network (10/01/2024)** | The licensing authority may not grant an environmental permit for an activity that could cause unavoidable and irreparable damage to nature in the Flemish Ecological Network (VEN). Practice therefore shows clear guidelines are needed to define the ine the concept of damage in substantive terms. With this decision, the Flemish Government implements the possibility of determining how an activity cannot cause unavoidable and irreparable damage. def | Discussion in the Biodiversity discipline. | |
| **Decision of the Flemish Government on species protection and species management (15/05/2009) ("the Species Decree")** | The legal provisions on species protection can be found in the Species Decree of 15 May 2009. The Species Decree specifies which species of animals and plants are protected in the Flemish Region and what legal consequences are attached to that protected status. s. The Species Decree of 15 May 2009 also provides the legal basis for taking measures to protect species. The most prominent of these measures is the possibility for the competent minister to establish species protection programmes (SBP). . | Ye | Discussion in the Biodiversity discipline. |
| **Species protection programme for the Antwerp port area** | The second species protection programme for the Port of Antwerp 2022-2027 (MB 26 September 2022) is an area-specific programme that contains a bundle of actions for the development and conservation of umbrella species and their hitchhikers. The In an agreement with the Flemish government, the Port of Antwerp Authority has committed itself guarantee the implementation of the actions. The SBP also provides a framework for obtaining exemptions from the prohibitions of the Species Decree. | to | Discussion in the discipline of Biodiversity. |
| **Decision of the Flemish Government of 23/07/1998 establishing detailed rules for the implementation of the Decree of 21 October 1997 on nature conservation and the natural environment (the "Vegetation Decree")** | The Vegetation Decree regulates the concrete protection of (prohibited to change) vegetation and small landscape elements (SLEs) that are prohibited from being altered, and how or for what purpose a permit for s vegetation changes can or must be applied for. | Ye | Discussion in the discipline of Biodiversity. |

| Precondition | Explanation | Relevance: yes or no | Reference |
|---|---|---|---|
| **Emergency Decree or Decree for certain building permits for which compelling reasons of major public interest apply (14/12/2001) and Decision of the Flemish Government dated 18 March 2002 implementing the compensation plan for major infrastructure works in the Western Scheldt and the Sea Scheldt.** | On the left bank of the Scheldt, a number of areas have been designated as nature compensation areas to compensate for the loss of protected habitats in the European Habitat and Birds Directive area for the construction of the Deurganckdok. | No | / |
| **Flemish and recognised nature and forest reserves** | The Flemish government designates or recognises areas that are important for the conservation and development of the natural environment. | | |
| **Forest Decree (13/06/1990 with amendment 17/07/2002)** | The conservation, protection, creation and management of forests is regulated by the Forestry Decree, as are felling, permit conditions and any compensation.<br>The Forest Decree is a decree that was issued on 13 June 1990 by the Flemish parliament and aims to regulate the conservation, protection, management and restoration of forests and their natural environment and the development of forests. | Yes<br>Yes | Discussion in the discipline of Biodiversity.<br>Discussion in the discipline biodiversity. |
| **Bern Convention (20/04/1989) for the conservation of wild animals and plants and their natural environment** | The Bern Convention deals with the conservation of wild flora and fauna and their natural habitats, in particular those species whose conservation requires cooperation between different countries. | Yes | Discussion in the discipline Biodiversity. |
| **Ramsar Convention on Protection of areas important for water birds (1971)** | The Ramsar Convention concerns the protection of water birds. | Yes | Discussion in the discipline Biodiversity. |
| **Bonn Convention on the Conservation of Migratory Species of Wild Animals** | The Bonn Convention contains provisions on the protection of certain migratory wild animal species. | Yes | Discussion in the discipline of Biodiversity. |
| **Nitrogen Decree (22/02/2024)** | Decree on the programmatic approach to nitrogen (PAS). With the PAS, the Flemish government is taking measures to significantly reduce nitrogen emissions by 2030 and to restore nature. | Discussion in the discipline of Biodiversity | |

| Precondition | Explanation | Relevance: yes or no | Reference |
|---|---|---|---|
| **Landscape conservation** | | | |
| **Malta Convention (La Valetta, 1992)** | Flemish archaeological heritage policy is based on the European positions set out in the La Valletta Convention and is founded on the duty of care, which implies that the owner or user must take responsibility for preserving and protecting the archaeological heritage values located on their land and safeguarding them from damage and destruction.<br>The primary aim is to preserve the sites in situ. Where preservation in situ is not possible, the only alternative is preventive archaeological research of the threatened sites.<br><br>The Immovable Heritage Decree provides for four possible protection statuses: a protected monument, a protected cultural-historical landscape, a protected town or village view, and a protected archaeological site. | No | Discussion in the archaeology memorandum, which is attached to the application for the environmental permit. |
| **Immovable Heritage Decree (12/07/2013)** | The Immovable Heritage Decree provides for six fixed inventories. These include heritage objects that are not protected but are nevertheless valuable. There is an inventory for architectural heritage (entities and relics), a landscape atlas, wooded plantations with heritage value, historic gardens and parks, and archaeological zones. A number of legal consequences have been laid down.<br><br>Finally, there are the heritage landscapes. A heritage landscape is a larger spatial entity comprising heritage elements and values, defined in a RUP (spatial implementation plan). Measures for the preservation of heritage values and characteristics are incorporated into the urban development regulations. | Yes | There are no protected immovable heritage sites, designated architectural heritage sites or elements of the landscape atlas in the project area itself.<br><br>Discussion in the discipline of Landscape, Architectural Heritage and Archaeology. |

| Precondition | Explanation | Relevance: yes or no | Reference |
|---|---|---|---|
| **People** | | | |
| **Legionella Decree (9/2/2007)** | Need to draw up a Legionella management plan and carry out regular sampling and analysis. | Yes | Discussioninthediscipline<br>Human |
| **Indoor Environment Decree** | In the Decree of the Flemish Government on measures to combat health risks caused by indoor environmental pollution of 11 June 2004, amended<br>by the Decree of the Flemish Government of 13 July 2018, referred to as the Indoor Environment Decree,<br>s, guidelines are included that describe a healthy indoor environment, in the form of guideline values and intervention values. | Ye | Discussion in the discipline of Human. |
| **Climate** | | | |
| **United Nations Framework Convention on Climate Change (1994), Kyoto Protocol (1997), Paris Agreement (2015) and national climate policy plan** | Limitation of emissions of $CO_2$ and other greenhouse gases | Yes | Discussion in the Climate discipline. |
| **B. Flemish Regulation of 20 April 2012 on tradable greenhouse gas emission allowances for stationary installations, aviation activities and the use of flexible mechanisms** | Implementation of tradable emission allowances | Yes | Discussion in the Climate discipline. |
| **Flemish Climate Policy Plan 2021-2030** | On 9 December 2019, the Flemish Government definitively approved the Flemish Energy and Climate Plan 2021-2030. The climate policy plan sets out the broad outlines for climate policy in the period 2024-2030. In line with the target imposed on Belgium by the EU, the plan sets the objective of reducing greenhouse gas emissions in Flanders by<br>2030 by 35% compared to 2005. The required effort is mapped out for each sector<br>ort required for each sector, and where necessary, the greenhouse gas target is converted into sub-targets. In addition, the plan also contains the main measures needed<br>to achieve this target and set Flanders on the path to a low-carbon future. | eff | Discussion in the Climate discipline. |

| Precondition | Explanation | Relevance: yes or no | Reference |
|---|---|---|---|
| **Materials Decree (23/12/2011) and Flemish Regulations on the sustainable management of material cycles and waste (VLAREMA) (17/02/2012).** | The Materials Decree and the implementing decree VLAREMA contain all provisions on waste, materials, raw materials, selective collection, transport and processing of waste. | Yes | Discussion in disciplines Climate and Chapter 15. |
| **LULUCF Decision No. 529/2013/EU and LULUCF Regulation (EU) 2018/841** | LULUCF is the abbreviation for Land Use, Land Use Change and Forestry. The LULUCF Decision No. 529/2013/EU came into force in June 2013. This decision sets out accounting rules for emissions and removals by the LULUCF sector. The subsequent LULUCF Regulation (EU) 2018/841 entered into force in July 2018, building on the existing accounting rules and must update and improve them with a view to the period from 2021 to 2030. | Yes | LULUCF primarily leads to an obligation of the government at regional/national level. Discussion in the Climate discipline. |

### 2.3.3 Policy-related preconditions

Table 2-2 provides an overview of the policy preconditions that are relevant to the environmental impact assessment of the project. For each precondition, the reason for its relevance is indicated, as well as where in the EIA it will be discussed or assessed in more detail.

*Table 2-2. Overview of policy preconditions*

| Condition | Explanation | Relevance: yes or no | Discussion of relevance + Reference |
|---|---|---|---|
| **Spatial Structure Plan for Flanders (RSV) (23/09/1997 with amendments 19/03/2004)** | Provides a vision for the spatial development of Flanders and the Province of Antwerp. They set out the main lines of spatial policy for the future and also serve as a reference framework for municipal spatial structure plans. | | No further discussion, located in the port area, in accordance with the GRUP 'Demarcation of the Antwerp Seaport Area'. |
| **Spatial Structure Plan for the Province of Antwerp (RSPA, 10/07/2001) (2001-2007 and extended until 2012) and partial revision of the RSPA (04/05/2011)** | RSPA – vision for the port area:<br>• Spatial boundaries of the port area<br>• Further expansion of the port, mainly on the left bank<br>• Safeguarding accessibility and reachability<br>• Densification, efficient use and reuse of port areas | Yes | Very limited, given that the project is located in an industrial area.<br>Discussion in various disciplines. |
| **Spatial Structure Plan for the City of Antwerp, adopted on 12/09/2006** | Spatial Structure Plan for the City of Antwerp – Guiding section – 'The Port City' – Objectives:<br>• Improve accessibility and logistics<br>• Improving interaction with the city | Yes | Very limited, given that the Spatial Structure Plan focuses primarily on exchange and/or interaction between the port and the surrounding areas (city, logistics infrastructure, etc.) and not on the organisation within the port where Project One is taking place.<br><br>The themes relevant to this EIA are:<br>• Good condition of water systems (Water discipline)<br>• Climate (climate aspects, see Climate discipline) |
| **MINA Plan 4: Flemish Environmental Policy Plan 2011-2015** | The Environmental Policy Plan (MBP) contains eight main objectives that the Flemish government wants to achieve within one generation. These are further translated into concrete objectives for the 2011-2015 planning period, mainly relating to biodiversity, climate, clean air, clean water and waterbeds, soil contamination and protection, sustainable production and consumption, and local quality of life. The EPP sets out the main lines of the environmental policy pursued by the<br>Flemish Region, as well as by the provinces and municipalities in matters of regional importance, should be pursued.<br>are conducted.<br>The primary function of the plan is to promote the effectiveness, efficiency and internal coherence of environmental policy at all levels and in all areas. In 2017, the obligation to draw up a five-year environmental policy plan (MINA plan) was lifted, which is why the objectives of the last MINA plan 4 (2011-2015) are no longer explicitly evaluated. | Yes | |

| Precondition | Explanation | Relevance: yes or no | Discussion of relevance + Reference |
|---|---|---|---|
| | More and more of these MINA Plan 4 objectives are being replaced by more recent policy plans and/or European policy, e.g. the Water Framework Directive, the Habitats Directive, etc. | | • Biodiversity (Biodiversity discipline)<br>• Soil contamination (discipline Soil) |
| **Climate plan for the province of Antwerp – climate plan 2030 'Plan Today'** | The Provincial Climate Plan 2030 is the Province of Antwerp's response to the three objectives set out in the Covenant of Mayors for Climate and Energy:<br>1) reducing emissions by 40% by 2030<br>2) increasing climate resilience<br>3) providing affordable, sustainable and secure energy for all its residents | Yes | Discussion in the Climate discipline. |
| **Strategic plan for the Port of Antwerp (19/05/2000)** | In accordance with the RSV and the port decree, a spatial vision is being developed for the seaport of Antwerp, which has been selected as a gateway, in a strategic plan. | Yes | On the right bank of the Scheldt, the Flemish Government has opted for infill and densification.<br>Applied (see § 1.1). No further discussion<br>No specific actions have been formulated for the area surrounding the project area. |
| **Provincial Nature Development Plan Antwerp (2004-2014)** | Based on its regional identity, the available instruments and guidelines, the province of Antwerp has set itself the following mission for its nature and landscape policy: 'Protection, restoration, development and sustainable use of nature, forests, the natural environment and landscape as a necessity for a sustainable society'. | No | The project area is part of the Lower Scheldt basin.<br>Discussion in the Water discipline. |
| **Becken Management Plan for the Lower Scheldt Basin** | Flanders is divided into 11 river basins, and a committee is established for each basin, consisting of a plenary meeting, a steering group and unspecified working groups responsible for water quality, water quantity and ecology. | Yes | |
| **European climate and energy policy 2030** | In its conclusions of 23 and 24 October 2014, the European Council adopted overarching climate targets for 2030. | Yes | Discussion in the Climate discipline. |
| **European Green Deal** | During the international climate summit at the end of 2019 (COP25 in Madrid), the European Commission launched its ambitious European Green Deal plan. This plan aims to make Europe the first climate-neutral continent by 2050 wit h net greenhouse gas emissions reduced to zero. | | Discussion in the Climate discipline. |

| Precondition | Explanation | Relevance: yes or no | Discussion of relevance + Reference |
|---|---|---|---|
| **Flemish Climate Strategy 2050** | On 20 December 2019, the Flemish Government approved the Flemish Climate Strategy 2050.<br>The European Regulation on the governance of the Energy Union and climate action requires each Member State to submit a long-term strategy to the Commission by 1 January 2020, and every ten years thereafter, with a perspective of at least thirty years. Working agreements have been made within the National Climate Commission and ENOVER to enable Belgium to meet this obligation. It was agreed that each region would draw up its own strategy, which would then be combined and integrated into a Belgian strategy. The Walloon Region and the Brussels-Capital Region have already approved their long-term strategies. The Flemish Government is now approving the Flemish Climate Strategy 2050, which will later be notified to the European Commission as part of the Belgian Climate Strategy 2050. It will be submitted to the National Climate Commission and ENOVER. | Yes | Discussion in the Climate discipline. |
| **Kyoto Protocol Paris Climate Agreement<br>National Climate Plan<br>Interfederal Energy Pact<br>Flemish Climate Plan 2013-2020 (28/06/2013)** | The Kyoto Protocol and climate plans regulate the reduction of greenhouse gas emissions.<br>In principle, the climate plan at the Flemish level applies to this project, but it is strongly inspired and driven by climate plans, agreements and protocols at the higher national or international level.<br>The new Flemish climate plan consists of an overarching section and two sub-plans:<br>• the Flemish Mitigation Plan (VMP), to reduce greenhouse gas emissions<br>• the Flemish Adaptation Plan (VAP), to mitigate the effects of climate change in Flanders. | Yes | Discussion in the Climate discipline. |
| **Espoo Convention<br>(25/2/1991, transposed in Flanders 30/10/1997)** | Cross-border effects must be considered taking into account the distance to the Dutch border. Yes | | Cross-border effects are evaluated and summarised separately. |
| **Air Policy Plan 2030** | This plan formulates the Flemish air quality objectives, framed within the European policy context, and indicates how these objectives will be achieved. All relevant anthropogenic<br>Measures are proposed for sources of air pollution: the transport sector, combustion and process emissions in industry, domestic and tertiary sector building heating, domestic use of solvent-based products, and agriculture. The plan focuses on emissions and air pollution from SOx, NOx, $NH_3$ NMVOCs, $O_3$ and particulate matter, as well as fertilising and acidifying deposition. | Yes | Discussion in the Air discipline. |

| Precondition | Explanation | Relevance: yes or no | Discussion of relevance + Reference |
|---|---|---|---|
| **Aviation advisory map for Flanders (26/01/2024)** | Information Flanders offers the new version of the Aviation Advisory Map of Flanders, which is valid from 26/01/2024. This dataset contains information from the Directorate-General for Aviation of the FPS Mobility. The aviation advisory map must be used in the procedure for obtaining an environmental permit.<br>The Flanders Aviation Advisory Map indicates when advice must be sought when applying for<br>s an environmental permit for a structure that, due to its height above ground level, may have an impact<br>on aviation. If the height of the planned structure exceeds the height indicated on the map, advice must be sought from the Aviation Directorate of the Federal Public Service Mobility and Transport. | Ye | The map indicates that advice must be sought for structures higher than 60 m in the project area.<br>This will be included in the application for the environmental permit, but is not relevant to this project EIA. |
| **European strategy long-term vision for a thriving, modern, competitive and climate-neutral economy** | The aim of this long-term strategy is to confirm Europe's commitment to taking the lead in global climate action and to present a vision for achieving greenhouse gas neutrality by 2050 through a socially just and cost-effective transition. The strategy highlights the opportunities that this transformation offers for European citizens and the European economy, but also identifies the challenges ahead. The proposed strategy is not intended to introduce new policy measures, nor does the European Commission intend to revise the 2030 targets. The<br>The strategy aims to set out the path for the EU's climate and energy policy and to outline what the EU considers to be its long-term contribution to achieving the temperature goals of the Paris Agreement in line with the UN's sustainable development goals, which in turn will influence a wider range of EU policy areas. The strategy launches a thorough debate with European decision-makers and citizens at large on how Europe can prepare for the 2050 horizon, followed by the submission of the European long-term strategy to the UN Framework Convention on Climate Change by 2020 at the latest. | Yes | Discussion in the Climate discipline. |
| **Climate Plan 2030 City of Antwerp – Input Port Authority** | The Port of Antwerp Authority is a partner of the Flemish, federal and European governments in achieving the Paris climate goals. PoAB pursues a policy that actively supports companies in the Port of Antwerp in<br>reducing their greenhouse gas emissions.<br>However, the climate plan does not directly apply to ETS activities, such as Project One. | Yes | Discussion in the climate discipline |

## 2.4 Administrative history of

Specifically for deforestation and limited preparatory works, a permit procedure was initiated in 2019 as the first phase of Project One. This application included an EIA. On 28 October 2020, an environmental permit was granted. This permit was subsequently suspended by the Council for Permit Disputes. On 25 February 2021, IOB waived this permit as a result of changes in the scope of Project One.

On 20 July 2021, a new permit procedure was initiated, with the site preparation, together with the entire construction and operational phases of Project One, forming the subject of the permit application. This application also included an EIA (EIA PR3263). On 7 June 2022, an environmental permit was granted, after which the construction phase of Project One commenced in July 2022.

This EIA is being prepared for a new permit application for Project One.

This EIA takes into account, among other things, the consultations, advice and public responses to both previous EIAs that took place during the procedural steps between 2019 and 2021. It also takes into account the procedural steps in the permit and appeal procedures that took place between the submission of the permit application on 20 July 2021 and the granting of the permit by the Flemish Region on 7 January 2024 (see below).

| | |
|---|---|
| 16 July 2019: | Submission of application for environmental permit (OMV_2019070612) with project EIA (PR3262). |
| 15 October 2019: | Approval of project EIA (PR3262) by Team EIA as part of the environmental permit procedure. |
| 7 November 2019: | Granting of environmental permit by the Provincial Executive of Antwerp. |
| 6-7 December 2019: | Submission of appeals against the provincial environmental permit. |
| 29 July 2020: | Addition of an amended project EIA (PR3262) to the amended permit file. The additions to the project EIA were intended to provide a comprehensive<br>respond to the arguments put forward during the appeal proceedings. |
| 21 September 2020: | Approval of amended draft EIA (PR3262) by Team EIA. |
| 28 October 2020: | Granting of environmental permit on appeal by the Minister. |
| 6 November 2020: | Appeal lodged by 14 parties (non-governmental organisations) against the environmental permit granted to the Council for Permit Disputes. They also request the suspension of the environmental permit pending a final decision on a possible<br>annulment of the permit. |
| 13 November 2020: | Suspension of the environmental permit granted by the Council for Permit Disputes. |
| 25 February 2021: | Withdrawal by IOB of the implementation of the environmental permit granted. |
| 20 May 2021: | The Council for Permit Disputes takes note of the waiver of the permit and removes the permit from legal circulation by annulling it. |
| 20 July 2021 | Submission of application for environmental permit (OMV_2021104744) with project EIA (PR3263). |
| 3 November 2021 | Approval of project EIA (PR3263) by Team EIA as part of the environmental permit procedure. |
| 16 November 2021 | Positive POVC advice on the permit application |
| 16 December | Granting of environmental permit by the Provincial Executive of Antwerp |
| 14 & 21 January 2022 | Start of an administrative appeal by 14 non-governmental organisations and two Dutch provinces against the environmental permit granted by the Provincial Executive of Antwerp. |
| 20 May | Positive advice from the GOVC on the permit application and advice to declare the administrative appeal unfounded |
| 7 June 2022 | Permit granted by the Flemish Region |
| 19 & 20 July 2022 | Dutch provinces lodge appeal with the Council for Permit Disputes |

| | |
|---|---|
| 21 July | Submission of an appeal by 14 non-governmental organisations against the environmental permit granted to the Council for Permit Disputes |
| 20 July 2023 | The Council for Permit Disputes rules that the appeal lodged by the Province of North Brabant is well-founded and revokes the environmental permit dated 7 June 2022. The Council requests the Minister to take a new decision on the administrative appeal within six months, providing additional detail regarding the effects of nitrogen deposition. |
| 4 October 2023 | Submission of a supplemented version of the EIA to address the grounds for annulment cited by the Council for Permit Disputes. Various parts of the previous document have been deleted to improve the readability of the document. These now refer to the comprehensive appropriate assessment for Flanders and the Netherlands, which can be found in paragraphs 11.9 and 11.10 of the chapter on biodiversity. |
| 7 January 2024 | Environmental permit granted by the Flemish Region. |
| 14 February 2024 | Application/notification for permit amendment for increased drainage flow. |
| 21 February 2024 | Submission of appeals for annulment of the environmental permit of 7 January 2024 by the provinces of Zeeland and North Brabant, as well as by 15 non-governmental organisations. |

Overview updated to 30/04/2024

# 3 Project description

## 3.1 Project description and planning

### 3.1.1 Project One

For the project description, we distinguish between the following phases of the project:

Construction phase: vegetation removal (already completed) and general site works (levelling, construction of site facilities – already partially completed), construction of production installations, buildings and facilities on site.
Operational phase: operation of the ECR and supporting infrastructure, and periodic maintenance work.

For a description of the chronological progress of the project's implementation and the planned permits, please refer to Chapter 1 Introduction.

A rough schedule for the realisation of the project is included in the diagram below: Construction phase from August 2022

to March 2026, according to the indicative schedule below:

- Removal of vegetation: August-September 2022
- Site preparation and construction works (site facilities and contractor village): September 2022 – June 2024
- Site preparation and levelling of ECR zone: November 2022 – May 2024
- Foundation works and underground works: January 2023 – March 2025
- ECR construction works and supporting infrastructure: March 2023 – March 2026
- Construction work on administrative building: January 2024 – June 2025
- Testing of sub-installations and start-up: November 2024 – July 2026 The

operational phase is planned to start in July 2026.

This schedule is shown in Figure 3-1 on a quarterly basis. It gives a good idea of the planned course of the project, but will be monitored during the course of the project and may be subject to change.

### 3.1.2 Quay wall

For your information, the expected schedule for the construction of the quay wall (licensed and built by the Port Authority) is also included. Construction of the quay wall commenced in March 2021. Phases 1 and 2 of the quay wall have been completed, which is necessary for the delivery of installation parts for the ECR installation in the course of 2024-2025. See § 5.4.1 for more information about the quay wall.

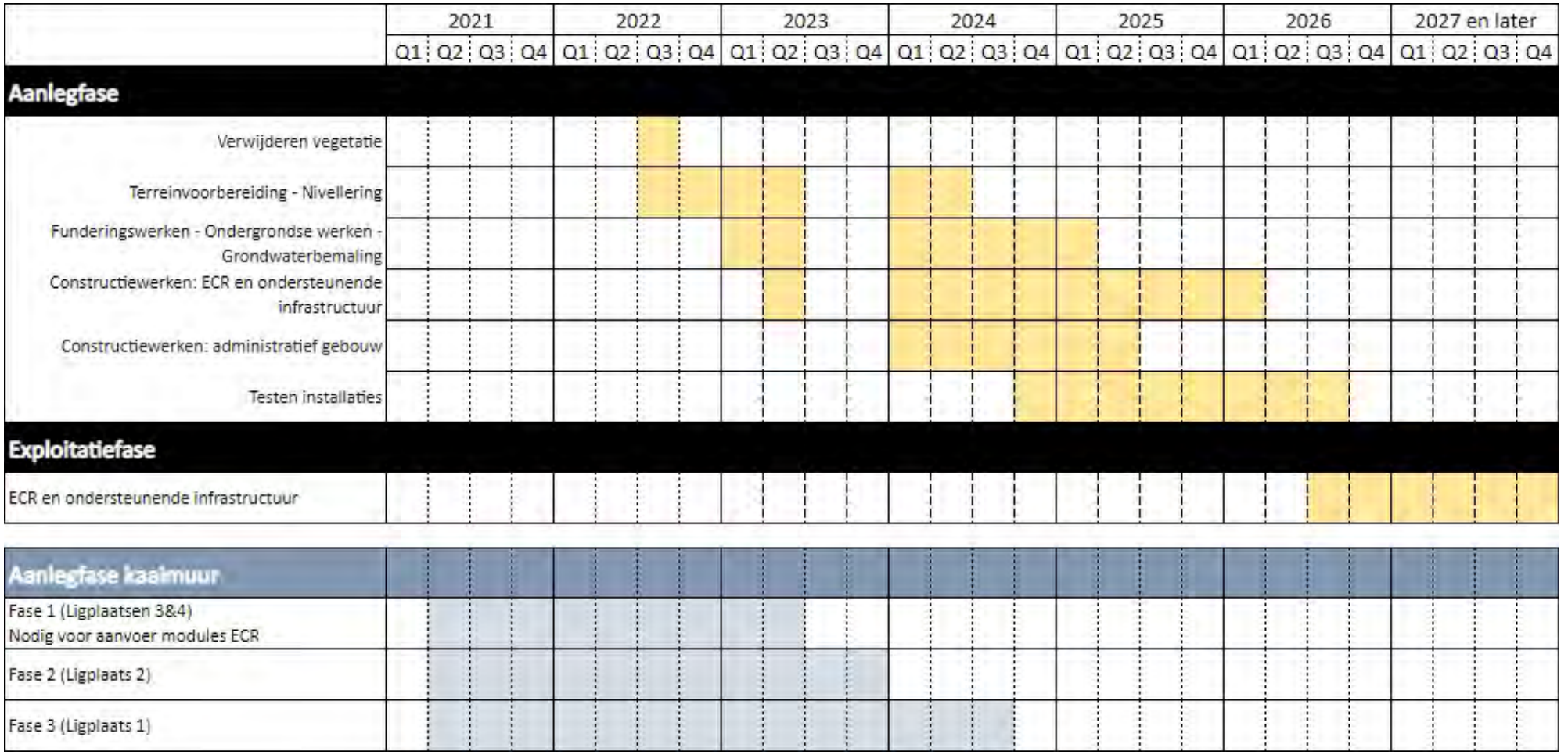


*Figure 3-1: Preliminary schedule for Project One (and construction of quay wall)*

# 3.2 Construction phase

*As the construction phase has already been partially completed (see schedule in section 3.1), we indicate below, where relevant, which items have already been carried out or realised.*

## 3.2.1 Site facilities

A number of facilities are required for the construction phase to enable site activities. For the initial stages of the construction phase (vegetation removal and general site works), these will be relatively limited facilities, while for the subsequent stages of the construction phase, a more extensive contractor village will be required.

### 3.2.1.1 Vegetation removal and general site works *(carried out in 2022-2023)*

Temporary site areas with site huts were provided for vegetation removal and general site works.

These are fairly limited facilities, such as:

- Small site hut for access control (with chemical toilet);
- Site hut for 2 x 25 workers (changing rooms, sanitary facilities, etc.);
- 2 power generators with fuel oil tank (5,000 litres, single-walled with bunding);
- Temporary site roads (crushed stone, 10 m wide) providing access to the site areas for the groundworks.

As soon as possible (after vegetation removal, levelling, etc.), paved roads will be constructed, which will remain in use during the further construction phase and the subsequent operational phase (see below).

### 3.2.1.2 Further construction phase *(partly carried out in 2022-2023, still in use)*

For the further construction phase, a contractor village with parking and laydown zone will be set up in the northern part of the project area (see Figure 3-2). In addition, local site facilities will be installed at a few locations in the southern part (see Figure 3-3). This will be done at locations where no or only limited installations are planned (parking, flare zone, etc.).

Sanitary facilities, storage sheds and diesel storage facilities will be provided at the contractor village and other site facilities. This infrastructure will be constructed and erected in the final months of 2022 and during 2023 and will remain in place throughout the construction phase, i.e. until 2026.

The large contractor village will remain in permanent use for contractors during planned maintenance shutdowns, even after the construction phase.

In total, the following facilities are broadly planned (provisional estimate):

- Office space for approximately 400 people;
- Changing rooms with lockers for approx. 1,000 people;
- Dining area for approx. 1,000 people;
- Storage sheds: 4 sheds of 300 to 600 m² each;
- Diesel storage: 9 x 10 m³ diesel for fuel distribution installations and 10 x 3 $^{m^3}$ for emergency power generators and mobile generators.

The location of the contractor village, the site office and the laydown areas are shown in the figures below. The contractor village and the site office are constructed using container modules (two storeys). Sanitary waste water is collected and transported by lorry for external treatment.

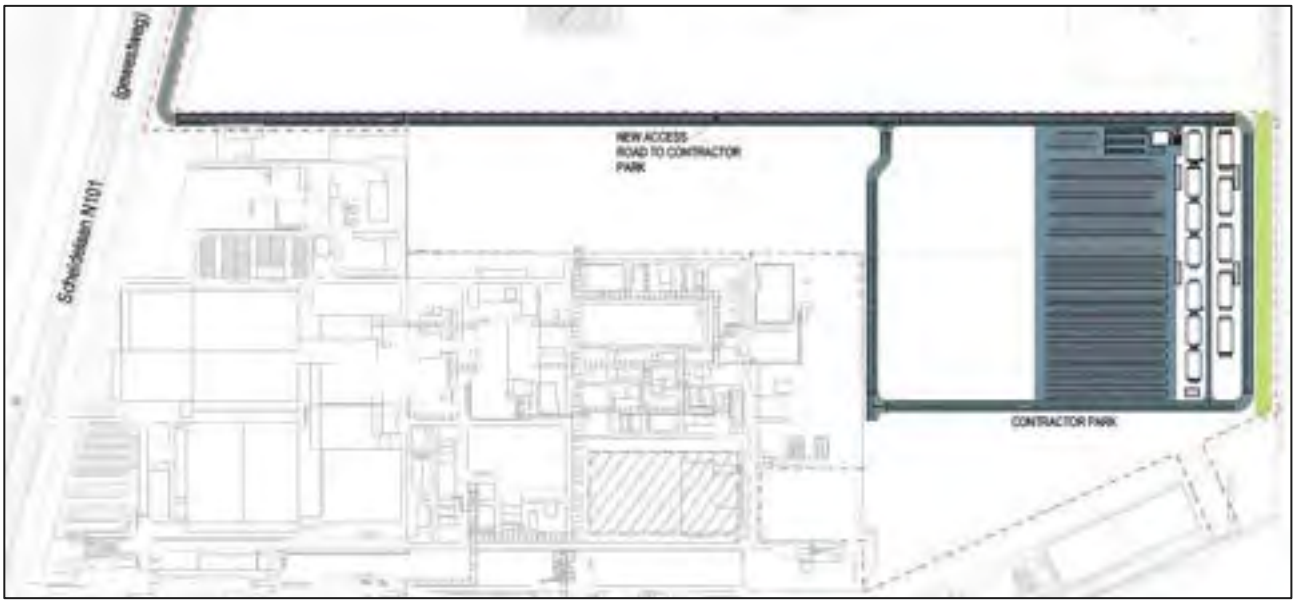


*Figure 3-2: Overview of the contractor village.*

| | Legend |
|---|---|
| | Site facilities Administrative building |
| | Site facilities Ethane cracker (ECR) |
| | Site facilities for utility installations |
| | Site facilities for general project management (IPMT) |
| | Treatment of contaminated water (drainage) |

*Figure 3-3: Overview of temporary facilities and laydown zones in the southern part of the project area.*

When setting up the site with yard facilities, the primary paved roads on the site will already be constructed. These roads will be used for the internal transport of materials during the construction phase, but will also remain in use during the operational phase.

#### 3.2.1.3 Space required for site facilities

In order to carry out construction work efficiently, in addition to the area occupied by the building, installation or structure, space is also required for the facilities described above, for certain preparatory work and for the storage of equipment and materials.

The developments in the planning of the construction works will result in a construction phase in which work will take place more or less simultaneously across the entire site. This means that space is needed for local site facilities (laydown, etc.) in addition to the actual construction zones where the installations will be built. It will not be possible to use certain construction zones for temporary site facilities during the early stages of the construction phase.

The space required depends on the construction strategy used. Modular projects, where part of the construction work is carried out in advance at other locations, require less workspace than projects built on site.

| | Ratio of temporary workspace to construction area |
|---|---|
| **Modular project** | 1 – 1.5 |
| **On-site construction project** | 2 - 3 |

In addition to this space at the shipyard, additional space is required at other locations for the construction of the modules.

Based on the above assumptions, the following estimate can be made of the space required for the temporary construction zones.

| | Construction area (m²) | Factor | Temporary workspace |
|---|---|---|---|
| **Process installations** | 330,000 | 1 – 1.5 | 330,000 – 495,000 |
| **Administrative zone** | 22,000 | 2 | 44,000 – 66,000 |
| **Total required** | 352,000 | | 374,000 – 561,000 |
| **Total available** | | | 245,000 |

The available space of 245,000 m² as stated in the table above is mainly located near the contractor village in the northern part of the project area.

The above findings show that the available space is insufficient to carry out the construction phase of the project in a normal manner. To ensure smooth execution, other sites in the vicinity will also be used, which will need to be taken into account in the site organisation. This is one of the main reasons why parts of the installations are being built as modules off-site. These modules, larger equipment and other installation parts are either stored at manufacturers/suppliers or temporarily stored at other sites in the vicinity. Smaller parts and bulk materials, such as cables, pipe coils, insulation materials and steel construction parts, are also delivered to other sites in the vicinity and then transported to the construction site in smaller quantities on a daily or weekly basis.

### 3.2.2 Vegetation removal *(carried out in 2022)*

As indicated in the introduction, virtually the entire intended site was undeveloped and overgrown with various vegetation at the start of the construction phase.

The footprint of the installations, the contractor village and laydown zone of Project One shows that the entire site will necessarily be occupied. The entire intended site therefore had to be cleared of vegetation.

Developments during the design of Project One have led to a reduction in the area of deforestation and land use.

The row of trees along the canal dock near the contractor village will be preserved as a green zone.

The vegetation removal and stump grinding took approximately three months. The following project-integrated measures were taken to mitigate the impact on the Galgenschoor Bird Directive area to the west and the impact on potential breeding birds (see Chapter 11 Biodiversity for more information):

- Vegetation removal was started and completed outside the breeding season, which runs from 15 March to 15 July;
- The chipper was not placed on the western side of either project area, so that the disruptive impact of this machine did not extend to Galgenschoor.

Chapter 11 Biodiversity also describes the project-integrated measures that will prevent protected species from settling during the construction phase. These include intensive checks by a security company, avoiding steep sand walls and preventing pools from forming.

### 3.2.3 Geosounding, test drilling and trial trenches *(carried out in 2022-2023)*

During earlier preparatory investigations, geophysical surveys and test drilling were carried out at a number of locations and trial trenches were dug. Geophysical surveys and test drilling are carried out for geotechnical investigations and to investigate the possible presence of explosives. Trial trenches are dug to identify underground pipes.

Building on this, further geophysical surveys and test drilling were carried out in areas where drilling or excavation was not yet possible due to the presence of trees, and test trenches were dug. No drainage was required for this work.

### 3.2.4 Earthworks ( )

The table below provides an overview of the estimated volumes of soil to be excavated and filled. These volumes are explained in the following sections.

*Table 3-1. Estimated earthworks*

| | Soil to be excavated (m³) | | | Soil to be filled (m³) | | |
|---|---|---|---|---|---|---|
| | Total excavation | To be disposed of | Reusable for refilling | Total replenishment | Reuse of excavated material | To be supplied |
| **Topsoil** | 228,500 | 228,500 | | | | |
| **Levelling (“cut and fill”)** | 152000 | 29,500 | 122,500 | 203,000 | 122,500 | 80,500 |
| **After levelling** | 423,500 | 143,000 | 280,500 | 280,500 | 280,500 | |

For conversion to the weight of soil to be removed, a density of 1.8 tonnes/m³ is assumed.

### 3.2.4.1 Topsoil *(to be carried out in 2022-2023)*

After vegetation removal, the top approx. 30 cm of soil will be excavated and removed. This concerns topsoil containing organic residues that cannot be reused for subsequent levelling of the site.

The soil removal (topsoil) will take place over a period of approximately six months, mainly via the B2 canal dock. Specifically contaminated soil may need to be transported by road to a separate processing facility. It is estimated that approximately 90% of the soil will be removed by water and 10% by road:

For transport by ship, the use of 6,400-tonne push convoys is assumed.
The Antwerp harbour docks are CEMT class VIb. This means that push convoys with 2x2 barges can sail side by side. This translates into a load capacity of 6,400 to 12,000 tonnes per convoy. Other types of inland vessels may also be used for soil transport. Since emissions are mainly determined by the amount of soil transported, the type of inland vessel or convoy is of secondary importance here. When evaluating emissions and effects (in the areas of noise, air and climate), worst-case assumptions are used where necessary.
A dumper (truck for soil transport) has a load capacity of 40 tonnes.

With a required soil removal of 228,500 m³ or 411,000 tonnes (1.8 tonnes/m³), the traffic generation for soil removal over a period of 6 months (Q4 2022 – Q1 2023) could be estimated as follows:

- 90% by ship:
- approx. 58 push convoys (calculated with minimum load capacity);
- on average, this amounts to 2 to 3 push convoys per week;
- 10% by road:
  - approx. 1,029 dump trucks;
  - On average, this amounts to 8 to 9 dump trucks per day.

### 3.2.4.2 Levelling *(to be carried out in 2023-2024)*

The actual levelling will start after the topsoil has been removed and will consist of levelling higher areas and filling in lower areas. This work will take approximately 4 months.

The excavation for levelling purposes averages approximately 30 cm. Locally, excavations of up to approximately 3 m are possible, although this is always very localised. The planned work will take place entirely within the embankment package from the 1960s. The northern part of the project area will be levelled entirely to a level of 7.6 m TAW. Figure 3-4 shows the levels at which the various zones of the southern part will be levelled.

The required quantities of earthworks and the associated traffic generation are shown in Table 3-2. In consultation with the Antwerp Port Authority, the soil to be transported will be sourced from other projects that are currently available at the shortest possible distance. It is assumed that 90% of the soil can be transported by water and 10% by road. These soil transports will be spread over approximately 6 months (Q2 2023 – Q1 2024).

*Table 3-2. Required amount of earthworks for levelling work (excluding topsoil excavation)*

| Transport mode | Soil to be removed | Soil to be brought in |
|---|---|---|
| **Total (m³)** | **29,500** | **80,500** |
| **Total transport (tonnes)** | **53,100** | **144,900** |
| per ship (tonnes) | 47,790 | 130,410 |
| number of ship convoys of 6,400 tonnes | 8 | 21 |
| per lorry (tonnes) | 5,310 | 14,490 |

| Mode of transport | Soil to be removed | Soil to be delivered |
|---|---|---|
| Number of 40-tonne lorries | 133 | 363 |

Drainage will be provided in zones K1, K2 and L1 (see § 3.4.4), which will prevent excessive groundwater levels from occurring during rainy periods.

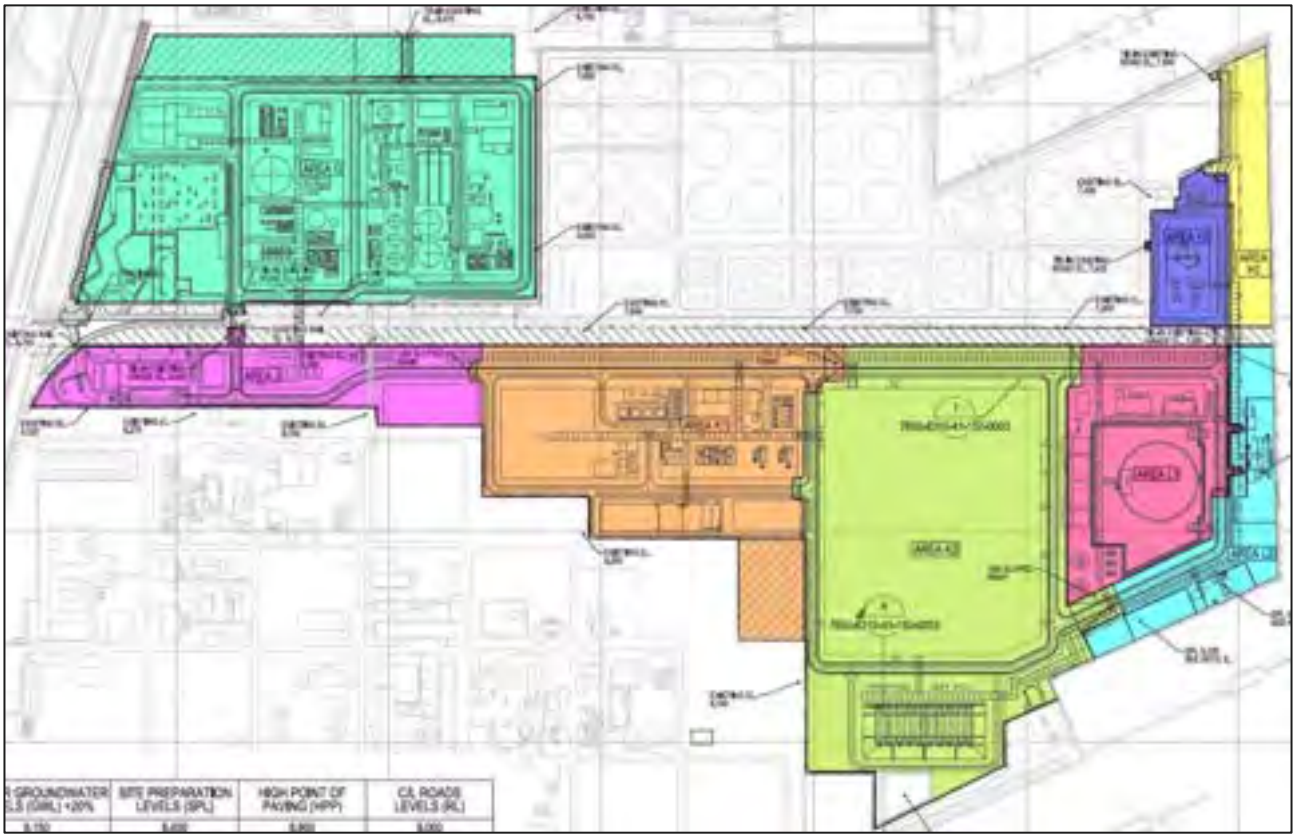

*Figure 3-4: Ground plan for levelling the southern part of the project area (all height levels are indicated in metres above sea level)*

### 3.2.4.3 Earthworks after levelling *(in progress)*

During the further construction phase, earthworks will still be carried out for various groundworks (foundation works, construction of underground facilities, catchment basins, etc.) spread across the site. Some of the excavated soil will be used to fill in the ground after the underground structures have been constructed.

The required quantities of earthworks are shown in Table 3-1. These figures are a worst-case estimate. It may be possible, through 'smart' planning of the various earthworks, to use part of the soil to be removed (143,000 m³) on site, e.g. by bringing in less soil in the previous levelling phase (see above). This is only possible if the levelling of certain parts of the site can be postponed so that it coincides with the later excavation work for the foundations.

The removal will be spread out over the construction phase, mainly between Q2 2023 and Q1 2025.

It is assumed that 90% of both the delivery and removal of soil can be done by water and 10% by road.

### 3.2.4.4 Soil storage – Temporary storage sites (TOP)

Temporary storage sites (TSSs) will be provided for storing soil and rubble. These will be set up in accordance with Best Available Techniques (BAT). Measures will be taken at these TOPs to prevent dust emissions (during dry periods) and any soil contamination. Project-integrated measures will also be taken to prevent the breeding of sand martins (see Chapter 11 Biodiversity).

Temporary storage of excavated soil will take place at various locations within the site, possibly supplemented by a permanent (transhipment) location.

To prevent contamination of rainwater runoff, any heavily contaminated soil is covered, as indicated by the soil expert.

See Chapter 8 Soil for more details on soil storage.

### 3.2.5 Mobility

Materials

The larger installation components on site are largely constructed at sites outside the Port of Antwerp, thereby reducing nuisance to the neighbouring area and limiting the number of transport movements. This is done in modules that can be transported by ship. The installations are divided into modules that can be up to several tens of metres long, wide and high and weigh up to 9,000 tonnes. These modules are transported to Antwerp by ship to the quay at the Project One site. Part of the quay will be equipped to receive these modules. The modules will be moved from the ship to the correct location on the site using heavy cranes and specialised heavy vehicles. The roads on the site that will be constructed for this purpose have been adapted for this heavy transport.

In addition to the modules, a number of larger devices and other installation components will also be transported by ship.

These modules, devices and installation components will be transported by larger and smaller ships, which will often transport several modules at the same time. The number of expected ship transports for this is:

- 5 to 10 seagoing vessels (‘Wide Deck Carriers’),
- 50 to 75 inland vessels.

In addition, smaller installation components and all kinds of materials will be transported by road.

Shipyard personnel

During the busiest months of the construction phase, it is expected that up to approximately 2,500 workers will travel to and from the project area on a daily basis, using collective transport organised by the contractors as much as possible. There will be no overnight accommodation on the construction site. For more detailed information on this, please refer to Chapter 10 Mobility.

### 3.2.6 Drainage

During the construction phase, drainage is required, particularly during the foundation works and when constructing structures below ground level (collection pits, underground cables and pipes, etc.). Prior to drainage, sheet piling is installed at the boundary of the project area to limit the radius of influence of the drainage. Uncontaminated drainage water is discharged to the Kanaaldok. Contaminated drainage water is discharged to (mobile) water treatment plants, after which the effluent is discharged to the Kanaaldok.

For a more detailed description of the planned drainage and sheet piling, please refer to Chapter 9 Water.

### 3.2.7 Pile foundations

To ensure the stability of the installations, they must be placed on pile foundations. See Chapter 8 Soil for more information.

# 3.3 Operational phase

## 3.3.1

### 3.3.1.1 General

The ethane cracker (ECR) is located in the southern part of the project area and is one of the most innovative, efficient and sustainable cracking installations in the world. The ethane cracker will have a production capacity of 1,450,000 tonnes/year of ethylene.

When there is a short-term shortage of ethane as a raw material, propane can be used in part as a backup raw material – the ECR can be fed with a mixture of approximately 20% propane and 80% ethane.

The main components of the ECR are (see Appendix 9):

Main units:

- a furnace section;
- a water quench and dilution steam production;
- a compression and alkaline treatment section;
- the separation section.

Additional support units: steam and condensate, slop and waste water system.

In addition to pure ethylene, other fractions, including pure propylene, are also obtained in the separation section of the ECR (see Table 3-5). It will also be possible to add externally supplied propylene in the separation section. This is so-called 'chemical grade' propylene with a lower degree of purity than the 'polymer grade' propylene obtained at Project One. The chemical grade propylene is further purified in this way to polymer grade propylene, whereby the impurities are removed and end up in other fractions. Project One plans to produce 230,500 tonnes/year of pure (polymer grade) propylene in this way.

### 3.3.1.2 Furnace section

The ethane is mixed with dilution steam and an ethane-rich recycle stream to obtain a suitable reaction mixture. This is fed through the ovens in parallel.

The furnace section consists of six *furnaces* arranged in parallel. They are arranged in three pairs, each pair consisting of two mirrored furnaces placed back-to-back. The operation and capacity of the six furnaces are otherwise identical. Each furnace consists of a radiation section and a convection section. The radiation section is where the conversion of ethane to ethylene and by-products (high-value chemicals) takes place. The reactions occur at high temperatures in *tube reactors (coils)*. The high temperatures are achieved by burning fuel gas in burners. To minimise fuel consumption, the intake air is preheated using residual heat.

Over time, coke deposits form on the inside of these coils. The formation of this coke is delayed as much as possible by, among other things, using suitable coil material, diluting the hydrocarbon reaction mixture with steam and adding sulphur components to the reaction mixture, but it cannot be completely avoided. This coke forms an insulating layer on the inside of the coils. When this insulating layer becomes too thick, the wall temperature of these coils approaches its structural limit and the coke layer must be removed.

When the reaction mixture leaves the coils, it is cooled as quickly as possible to prevent further reaction. This is done in *heat exchangers* that produce high-pressure steam with the exchanged heat.

In the convection section, the flue gas produced by the combustion of fuel in the burners is conducted to the chimney via a series of heat exchangers by an electrically driven fan. This section is designed to recover the maximum amount of residual heat in the gas.

#### 3.3.1.3 Water quench and dilution steam production

In the *water quench section*, the residual heat from the process gas that cannot be converted into steam is removed through direct contact with process water. This causes the dilution steam in the reaction mixture to condense together with the heavier hydrocarbon components (C5+ fraction and pyrolysis oil), after which the oil phase is separated from the water phase in a liquid-liquid separator. Coke and tar are also purified from the reaction mixture in this section. The process water is further used to produce process steam (dilution steam).

#### 3.3.1.4 Compression and alkaline treatment

In the *compression section,* the process gas is compressed to a pressure required for further product separation.

In the alkaline treatment, acidic gases (H2S, $CO_2$, etc.) are neutralised and removed from the process gas using NaOH (sodium hydroxide). This produces a specific waste water stream (known as 'spent caustic') containing the acidic components and excess NaOH. This waste water stream undergoes separate pre-treatment in the water treatment plant.

#### 3.3.1.5 Separation section

In the separation section, the process gas is separated into its various components, which are then purified into products that meet specified requirements, mainly through distillation. First, the process gas is further cooled and dried. Then, all components with two or fewer carbon atoms are separated from the components with at least three carbon atoms. The stream with two or fewer carbon atoms contains the component acetylene, which is reacted to ethylene in the C2 hydrogenation. This stream is then cooled to a very low temperature. At these low temperatures, the fuel gas (a mixture of mainly methane and hydrogen) can be separated from the components with two carbon atoms. The remaining tail gas is sent to the furnaces and steam boilers as fuel gas to be burned. The stream with two carbon atoms is a mixture of ethane and ethylene. These two components are then separated from each other. Ethylene is delivered as the end product at the boundary of the ethane cracker. Ethane is sent back to the furnaces as a recycle stream for use as feedstock.

From the stream containing at least three carbon atoms, the components with exactly three carbon atoms are first extracted. This mixture consists mainly of propane and propylene. A small proportion of diolefins is also present in the mixture. These are hydrogenated in the C3 hydrogenation process. This C3 mixed stream is combined with supplied 'chemical grade' propylene. This is less pure propylene (approx. 95% pure), which still contains other hydrocarbons. The mixed stream is then sent to the C3 splitter for further purification. In the C3 splitter, propylene is separated from propane and other hydrocarbons. Propane can be returned to the furnaces. The propylene is obtained in a very pure form (polymer grade propylene, approx. 99.5% pure) and is transported via pipelines as one of the end products of the cracker.

After separating the components with 3 carbon atoms, a mixture of components with at least 4 carbon atoms remains. As a final step, this mixture is split into a C4 mixture and a C5+ mixture. These streams are stored and transported, also as end products.

### 3.3.2 Local utility

#### 3.3.2.1 Steam and condensate

As mentioned in the furnace section, the steam cracker produces steam when the process gas cools down. This steam is used internally to drive turbines and to supply heat to various heat exchangers. The excess steam produced in the ECR through heat recovery is used to generate electricity (see § 3.4).

#### 3.3.2.2 ECR Cooling towers

An independent cooling system is provided for the ECR. It is an open system with induced draft or forced air flow (ambient air, fans). The cooled water is pumped to the process heat exchangers.

#### 3.3.2.3 Drainage system and waste water system

In the slop system, the contents of a specific process section are emptied in the event of a process malfunction or maintenance work.

The waste water system consists of two parts:

a) the drainage system for continuously contaminated (process) water;
b) the occasional contaminated water, mainly from rainwater falling on certain process zones.

The spent caustic stream (heavily loaded wastewater stream originating from alkaline treatment with NaOH) is diverted separately to a specific pre-treatment process before being further processed in the central water treatment plant.

#### 3.3.2.4 ECR Flare System

For a description of the flares connected to the ECR, please refer to § 3.4.11.

# 3.4 Utilities and supporting infrastructure

## 3.4.1 Storage

### 3.4.1.1 Cryogenic tank

Ethane is gaseous at ambient temperature, which is why it is stored at very low temperatures (-88.5 °C or lower) in a cryogenic tank. This tank has a double container, namely a single-walled metal tank inside a secondary concrete tank (lined with metal). A third layer of protection is provided by an earth embankment with a gravel base layer.

The table below provides an overview of the main characteristics of the cryogenic tank. Given its dimensions, this tank will be one of the most eye-catching elements on the site, alongside the ECR process installations.

*Table 3-3: Characteristics of cryogenic tank*

| Product | Maximum storage volume | Tank diameter | Tank height | Storage temperature |
|---|---|---|---|---|
| **Ethane** | 197,000 m³ | Approx. 90 m | Approx. 31 m | - 88.5 °C |

The cryogenic tank is equipped with a boil-off gas system. This system ensures that the contents of the tank remain liquid and that the pressure in the tank remains under control. Heat loss (from the environment to the tank) and during filling causes a quantity of gas to evaporate. In order to keep the pressure in the tank under control, this evaporated gas must be compressed and recondensed.

When filling the tank from a ship, larger quantities of gas evaporate, which cannot be condensed in the boil-off gas system. This gas flow is diverted to the steam boilers, where the gas is used as fuel.

The cryogenic tank is also connected to ground flares as a safety measure (see § 3.4.11).

### 3.4.1.2 Other storage

The main storage facilities for by-products and other chemicals are:

Storage of C3 and C4 by-products in pressurised tanks; these pressurised tanks are not installed below ground level, but above ground level and are covered with a layer of soil;
Storage of C5+ by-products (atmospheric tank) and pyrolysis oil in two closed, atmospheric tanks (breathing and operating emissions are mitigated by vapour return pipes and gas purification that is common to both tanks);
Storage of chemicals and gas cylinders for processes, water purification, water treatment, etc. This involves various, relatively small tanks and chemical storage facilities, which will be provided at several locations on the site.

The table below provides an overview of the storage tanks with expected storage volumes at the Project One site.

*Table 3-4: Overview of storage tanks*

| Product | | Capacity ($m^3$) |
|---|---|---|
| **Ethane** | Cryogenic | 197,000 |
| **C3-KWS** | Pressure tank - bullet | 3 x 2,000 |
| **Propylene (Polymer Grade) - PGP** | Pressure tank - bullet | 2 x 2,000 |
| **C4 KWS import** | Pressure tank - bullet | 2 x 2,000 |
| **C4 KWS export** | Pressure tank - bullet | 3 x 2,000 |
| **C5** | Atmospheric tank | 6,600 |
| **Pyrolysis oil** | Atmospheric tank | 2 x 137 |
| **DMDS (dimethyl disulphide)** | Pressure tank | 40 |
| **Ammonia (< 25%)** | Atmospheric tank | 55 |
| **Sulphuric acid** | Atmospheric tank | 2 x 5 and 1 x 184 |
| **Methanol** | Atmospheric tank | 56 |
| **Washing oil** | Atmospheric tank | 56 |
| **Diesel** | Atmospheric tank | 4 x 7 and 7 x 3 |
| **Recovered oil** | Atmospheric tank | 2 x 300 |
| **NaOH** | Atmospheric tank | 402 |
| $Na_2PO_4$ / $Na_3PO_4$ | Atmospheric tank | 25 |
| **Nalco purate** | Atmospheric tank | 2 x 5 |

All these storage tanks are equipped with the bottom protection measures prescribed by law (liquid-tight paving, bunding, collection of potentially contaminated rainwater, overfill protection).

## 3.4.2 s and transport

### 3.4.2.1 General

The table below shows the expected quantities of products delivered and removed, as well as the method of delivery, removal and loading.

The supply consists mainly of ethane. Propylene and a fraction of C4 hydrocarbons are also supplied. These are treated and discharged together with similar by-products generated in the ECR.

*Table 3-5: Products supplied to and removed from the installations*

| Product | Occurrence | Material flow per year (tonnes/year) | Mode of transport | Number of transports per year |
|---|---|---|---|---|
| **Supply** | | | | |
| **Ethane** | Cryogenic–Liquid | 1,910,000 | Seagoing vessels | 37 |
| **Propylene (chemical grade – approx. 95% pure)** | Gas | 200000 | Inland vessels (1,000 to 2,000 tonnes) | 100à200 |
| **C4 hydrocarbons** | Gas | 105000 | Inland waterway vessels (1,250 to 2,000 tonnes) | 53to84 |
| **Total supply*** | | **2,215,000** | | |
| **Discharges** | | | | |
| **Ethylene** | Gas | 1,450,000 | Pipeline | |
| **Propylene (polymer grade – approx. 99.5% pure)** | Gas | 230,500 | Pipeline | |
| **C4 hydrocarbons** | Gas | 112,000<br>50,000 | Inland vessels (1,250 tonnes)<br>Pipeline | 90 |
| **C5+ hydrocarbons** | Liquid | 66,750 | Inland vessels (2,000 tonnes) | 34 |
| **Pyrolysis oil** | Liquid | 12,000 | Trucks (22 tonnes) | 546 |
| **Total disposal*** | | **1,921,250** | | |

*: 'Total supply' is greater than 'Total discharge' because part of the raw materials supplied is not discharged as an end product or by-product. This mainly concerns the use in the combustion installations of hydrogen-rich combustion gas that is produced in the processes.

Various other chemicals for the processes, water purification, water treatment, etc. are transported in smaller quantities. They are transported by lorry, except for NaOH, which is delivered via a pipeline.

No transport by train is planned.

### 3.4.2.2 Ship loading

The site will be accessible to sea-going and inland vessels via the quay at the Canal Dock (east side of the site). The aforementioned unloading and loading of ships with various hydrocarbon products will take place at this quay. Fixed loading arms, which will be provided on the quay, will be used for the loading processes. For Project One, loading arms for various products will only be provided at berths 2 and 3:

- Berth 2:
  - Cryogenic shipments (ethane).
  - Shipments at ambient temperature (C3, C4 and C5+ hydrocarbons).
- Berth 3:
  - Shipments at ambient temperature (C3, C4 and C5+ hydrocarbons).

The loading installations used are completely closed. Evaporating gases are extracted from the storage tank or on the ship and either condensed (BOG system) or burned (e.g. recovered in the fuel gas network to replace natural gas or in the ship's engines to replace diesel).

C3 and C4 hydrocarbons are transported in the form of compressed gas. The transport installations used are completely closed, with gas transfer pipes for the expelled gases.

C5+ hydrocarbons are loaded in liquid form at normal pressure. The loading installations used are completely closed, with gas transfer pipes for the expelled gases and a vapour treatment system.

For all these shipments, there is a possibility to divert gases to a ground flare in the event of unforeseen overpressure during an emergency.

#### 3.4.2.3 Pipelines

The following products will be transported via (pipe) pipelines:

- Ethylene (discharge):
  - Connection to existing pipeline on the east side of Scheldelaan near Inovyn.
  - Equipped with a new connection under Scheldelaan to the ethylene pipeline on the west side of Scheldelaan.
- Propylene (discharge):
  - Connection to existing pipeline on the east side of Scheldelaan near Inovyn.
    - C4 hydrocarbons (discharge):
      - New pipeline to ASA.
- NaOH (supply):
  - New pipeline from Inovyn.

#### 3.4.2.4 Lorries

The above overview shows that lorries are only used for products that occur in relatively limited quantities. For these products, a loading area is provided at the respective storage tanks.

### 3.4.3 Underground facilities and above-ground pipe racks

Underground pipes and cables, as well as above-ground pipe racks, will be provided to connect the various parts of the installation to each other.

The above-ground pipeline corridors enable the transport of process flows and utilities between process units, storage facilities and loading and unloading installations.

One pipeline crosses the access road (and railway line) to Vesta.

One new pipeline is planned from the Project One site under Scheldelaan:

New connection for an ethylene pipeline from the Project One site to an existing ethylene transport pipeline on the west side of Scheldelaan. The pipeline will be laid under Scheldelaan using horizontal drilling. At the connection point to the existing transport pipeline on the west side of Scheldelaan, a temporary limited construction pit will be required to accommodate the horizontal drilling and enable the connection to be made.

*Figure 3-5: Location of new underground pipe under Scheldelaan*

## 3.4.4 Drainage, water buffering, water re

Rainwater from Project One is largely reused for sanitary purposes and as cooling water. A limited section of the eastern part of the site will drain directly into the Kanaaldok via a hydrocarbon separator because this part of the site is too low in relation to the site's rainwater recovery system. For a more detailed description of rainwater recovery and drainage, please refer to Chapter 9 Water.

Drainage will be provided under certain areas of the site (at zones K1, K2 and L1 in Figure 3-4, § 3.2.4.2) to prevent excessive groundwater levels. This concerns uncontaminated groundwater that will be diverted to the dock. This drainage will only be necessary during the winter period when the highest groundwater levels are expected.

Berths 2 and 3 on the quay will be equipped by Project One with the necessary quay infrastructure (pumps, loading arms, etc.), with leak collection and liquid-tight zones. Potentially contaminated rainwater will be collected and processed separately.

## 3.4.5 water utilities

### 3.4.5.1 Municipal water and demineralised water

Project One uses municipal water, demineralised water and its own rainwater recovery system for its water needs. Municipal water and demineralised water are supplied to the site by utility companies via pipes.

Water is mainly used for:

- cooling water systems (see below), supplied with demineralised water, rainwater and partly with municipal water;
- water use in processes and for steam production, supplied by demineralised water and municipal water;
- sanitary use, supplied by rainwater and municipal water;
- firefighting water (sporadic), supplied by municipal water.

For a discussion of the volumes used, please refer to Chapter 9 Water.

### 3.4.5.2 Cooling water system with cooling towers

Independent cooling systems are provided for the ECR (see § 3.3.2.2) and the supporting infrastructure. Each cooling system is an open system with forced air flow (ambient air, fans). The cooled water is pumped to the process heat exchangers.

To make the process water suitable for use in the cooling tower, it is conditioned with chemicals. The chemicals used serve to protect the system against:

- corrosion;
- precipitation of the substances present;
- microbiological growth.

Every cooling system has a discharge flow. Using demineralised water in the cooling systems limits consumption and discharge flow. The discharge flow is treated in the water treatment plant, see § 3.4.5.4.

### 3.4.5.3 Fire-fighting water system

A fire-fighting water tank is provided to ensure that sufficient fire-fighting water is available.

There is a separate collection basin for contaminated firefighting water. In addition, potentially contaminated rainwater can be collected in two separate basins for treatment and reuse. Once these collection basins are filled during a heavy downpour, the rainwater flows through a third basin (built as a hydrocarbon separator) to the dock.

### 3.4.5.4 Wastewater treatment

Wastewater from the process installations (both ECR and utilities), sanitary facilities and contaminated rainwater is separated at source as much as possible. Certain industrial wastewater streams undergo thorough pre-treatment. All sub-flows are ultimately combined and treated in a central water treatment plant. The water is then discharged into surface water (the Scheldt).

For a description of the various pre-treatment processes, central water treatment, rainwater reuse, and achievable discharge standards, please refer to Chapter 9 Water in this EIA.

### 3.4.5.5 Discharge point Scheldt

The treated wastewater is discharged into the Scheldt via an existing underground pipe already used by Inovyn. This means that no new discharge point needs to be tapped near the salt marshes of the Galgenschoor nature reserve, thus avoiding additional space requirements and disruption in the Galgenschoor. This pipe starts at the industrial estates east of Scheldelaan and ends in the Scheldt at the edge of the salt marsh area (see Figure 3-6).

The discharge of waste water (determination of flow rate and quality, sampling, etc.) is monitored separately by both companies using the discharge pipe on their own premises, before the water is combined.


*Figure 3-6: Location of discharge point*

## 3.4.6 d natural gas

The ECR produces process residual gases consisting mainly of hydrogen and methane. These process residual gases are used as fuel gas in the ECR cookers. Due to its high hydrogen content, this fuel gas is highly combustible and results in significantly lower CO2 emissions than natural gas.

A fuel gas network will be provided to enable the exchange of fuel gas between the ECR and the steam boilers (see below). In this way, any surplus fuel gas in the steam boilers can be used for steam production. This maximises the use of internally available fuel and minimises the amount of natural gas that needs to be imported. Ethane gas produced during the unloading of an ethane tanker will also be fed into the fuel gas network.

The composition of the fuel gas will vary depending on the installations in operation and their operating regime. For example, ethane gas, which is released when unloading an ethane tanker, will only be available for approximately one day per week. The fuel gas from the ECR may also show variations in flow rate and composition, albeit less pronounced.

For information purposes, Table 3-6 shows the average ratio for the origin of the fuel gas, as well as a typical composition.

*Table 3-6: Expected consumption and typical composition of fuel gases*

| | Fuel gas ECR | Fuel gas unloading from ethane ship | Natural gas |
|---|---|---|---|
| **Expected consumption** | 285,100 tonnes/year | 5,000 tonnes/year | 62,300 tonnes/year |
| **Typical composition** | | | |
| $H_2$ | 84 vol% | - | - |
| $CH_4$ | 15 vol% | 54 vol% | 91 vol% |
| Ethane | - | 46 vol% | 5 vol% |
| Other (ethylene, propane, CO, $CO_2$, $N_2$, etc.) | < 1 vol% | < 1 vol% | 4 vol% |

When the amount of available fuel gas is insufficient, it will be supplemented or replaced by natural gas. All fuel gas consumers (ECR cracking furnaces, steam boilers) can operate on fuel gas and/or natural gas.

## 3.4.7 Steam and electricity production

In order to achieve the lowest possible $CO_2$ emissions and the highest possible energy efficiency and reliability of the electricity supply, the electricity requirements of the ECR are met under normal circumstances by electricity production within the Project One installations. In this way, the electricity supply for the ECR is completely independent of the high-voltage grid. However, the high-voltage grid is an alternative source of electricity in the event of problems with local production.

This electricity is generated using two steam turbines. The steam required to drive these turbines is supplied by:

- the ECR itself: under normal circumstances, the ECR is a net exporter of steam (the ECR's internal steam production is much higher than its internal steam consumption).
- 2 steam boilers: the additional steam required to achieve sufficient electricity production is supplied by 2 steam boilers. The surplus fuel gas from the ECR is also burned in these steam boilers.

During normal operation, the two steam boilers only operate at a fraction of their capacity. The design capacity of the steam boilers is determined by the steam requirements of the ECR during start-up (during start-up, there is no heat yet to recover and convert into steam).

A steam distribution network will be installed throughout the site, enabling the exchange of steam between the above-mentioned installations (ECR, steam boilers and steam turbines) and the supply of steam to various smaller steam consumers on the site.

### 3.4.8 Electricity supply

The necessary installations and distribution networks will be provided on site to take electricity from the high-voltage grid, convert it to lower voltage levels and distribute it throughout the site.

### 3.4.9 Nitrogen

Nitrogen gas will enter the Project One site via a nitrogen pipeline. A pressure reduction station will be installed on this pipeline to ensure that nitrogen is distributed at the appropriate pressure on site.

Nitrogen is used in various places in the installations, mainly for the following purposes:

- Inerting installation components during start-up, shutdown and emergencies;
- Compressor seal gas;
- Leak testing;
- Nitrogen blanket in tanks.

### 3.4.10 Compressed air

A compressed air system will be provided to meet the needs of the entire site (average 9,500 $Nm^3/h$ compressed air), consisting of: compressors, compressed air treatment (drying), compressed air buffer tanks and a compressed air network.

### 3.4.11 Flare systems

Project One provides several flares, which are described below. The installations are designed in such a way that parts of the installation can be isolated in the event of an incident. This means that only a limited part of the installation needs to be fed with process gas to the flares. The site also provides its own electricity, which means that in the event of a power failure on the public electricity grid, the installations can remain in service and no emergency shutdown is required.

Three shielded (non-visible flame) ground flares are provided. The ground flares offer a safe outlet for gases that need to be discharged during start-up, shutdown or minor incidents. The emissions that occur during this process are short-lived (usually a few hours or at most a few days). The flame of the ground flares is located within a cylindrical screen and is therefore not visible and much less audible. The ground flares are designed for smoke-free flaring up to their maximum capacity.

In addition, a single open tower flare with a visible flame will be provided for the ECR. The tower flare will only be used in emergency situations where, for safety reasons, a large amount of gas must be evacuated in a short period of time, i.e. only in the case of very exceptional larger gas flows from the ECR (>125 tonnes/hour), which are too large for the ground flare. Such emissions only occur in the event of an unplanned emergency shutdown of the installation. By diverting smaller volumes of residual gases to the ground flare during start-up or shutdown procedures, the use of the tower flare and the associated nuisance (noise and visible flame) is very exceptional.

In summary, the following flares are provided. For planned start-up

and shutdown procedures:

- ECR ground flare (20 m):
  - When starting up the ECR: 24 to 72 hours
  - During planned maintenance and planned shutdowns: several hours
  - During incidents: several hours

For safety reasons only in the event of unplanned incidents:

- ECR tower flare (approx. 208 m)
- Only for residual gas flows that are not absorbed by the ground flare
- Very exceptional use in the event of major unforeseen incidents
- Maximum approx. 2 hours
- Double ground flare (1 in use, 1 as backup), linked to the storage of gases in the cryogenic tank and the bullets (both 20 m):
  - In the event of incidents: the ground flare of the storage tanks is only used to release excess pressure from the tanks in the event of unexpected incidents
  - Maximum approx. 2 hours

### 3.4.12 Administrative building

An administrative building will be constructed at the entrance to the site along Scheldelaan (see Figure 3-7). This building will consist of two floors with a reception area, offices, meeting rooms, a canteen, sanitary facilities, a fitness room with changing rooms and a crisis centre.

A separate building for access control will be provided at the entrance to the site itself. Workshops and general warehouses will be provided in separate buildings near the entrance to the site. We refer to this group of buildings as the 'administrative zone'.

An open-air car park for employees and visitors is provided around the administrative building. For an assessment of the number of parking spaces, please refer to Chapter 10 Mobility. The car park also provides:

- bicycle parking;
- charging points for electric cars: 34 charging points;
- charging points for electric bicycles: 34 charging points.

*Figure 3-7: Location and visualisation of the administrative building along Scheldelaan*

### 3.4.13 Wegenis

A number of roads will be constructed at the start of the construction phase so that they can be used to transport materials and installation components within the site during the construction phase. These roads will be suitable for heavy goods vehicles. Additional internal roads will be constructed later in the construction phase so that all installations are easily accessible during the operational phase.

Most internal roads will be equipped with footpaths and/or cycle paths, so that internal travel by bicycle and on foot can be done safely.

## 3.4.14 Contractor village

The large site village, including the laydown zone, will remain in permanent use as a contractor village after the construction phase. The contractor village is intended for use during regular major shutdowns of the ECR and during major modifications to the installations. The contractor village is in line with similar facilities for periodic maintenance at other comparable installations.

### 3.4.14.1 Major regular shutdowns

During regular major shutdowns, various activities are planned for maintenance, inspection and any repairs that require the installations to be taken out of service. These activities are necessary to guarantee production efficiency, safety and compliance with environmental objectives (in particular, achieving the targeted low emissions). They include:

- Maintenance and replacement of furnace components (valves, coils, etc.).
- Maintenance/overhaul of compressors.
- Replacement of dryer equipment and catalysts (acetylene hydrogenation, SCR-DeNOx).
- Maintenance of heat exchangers.
- Various inspections and repairs (including welding work).

During the shutdown, an average of 1,000 to 1,250 contractors are present for the ECR for 45 to 55 days, with a peak of approximately 2,000 contractors. For inspections and maintenance of utilities (steam boilers, storage tanks, water treatment, etc.), which are often also scheduled during the ECR shutdown, an additional 100 to 200 contractors can be expected.

The preparatory planning and engineering for the shutdown begins approximately two years in advance, carried out by a team of around 30 people. Six months before the shutdown, materials and installation components are delivered so that checks on the materials and preparatory work can already be carried out.

Even after the shutdown, a smaller team of people will continue to complete and follow up on the shutdown activities for several months.

### 3.4.14.2 Major modifications to the installations

Major modifications to the installations are expected in order to fulfil the commitment to evolve towards net carbon-neutral installations as quickly as possible. This includes adding installations for carbon capture and/or to be able to use more green or blue hydrogen, as soon as these technologies become feasible.

For such major modifications, similar to a shutdown, a team will carry out the preparatory planning and engineering over a longer period of time, materials and installation components will be delivered in advance, a large number of contractors will be present during the implementation, and there will be a completion of the project. The duration of all this will vary per modification project.

## 3.4.15 ' staffing during the operational phase

The expected number of employees and contractors who will be employed at the Project One site is shown in the table below.

*Table 3-7: Number of Project One employees*

| | Number of employees | Present during the day | Present at night |
|---|---|---|---|
| **Employees (office hours)** | 210 | Max. 210 | 0 |
| **Shift staff (4 shifts)** | 90 | 15 to 23 | 15 to 23 |
| **Contractors** | Approx. 150 | Approx. 150 | 0 |

As indicated, during the operational phase of Project One, there will generally be approximately 380 people present on site during the day (weekdays).

At night and during weekends, there are 15 to 23 people present on site (shift personnel only).

Taking into account the shift system, Project One will directly employ a total of approximately 300 employees, as well as approximately 150 contractors.

# 4 Alternatives

## 4.1 Zero alternative

The zero alternative describes the development that will occur if neither the project nor any alternative to it is implemented. The zero alternative can be used as a frame of reference for assessing the environmental impact. The zero alternative is therefore the situation and evolution of the study area if the project does not go ahead.

The situation in the absence of the project will be used as a basis for comparison for describing and assessing the impact of the project. This situation (reference situation) will therefore be described in the project EIA.

## 4.2 Location alternatives

A site was sought for Project One where Seveso activities are possible. In addition, the site for Project One had to meet three preconditions:

1. Access for seagoing vessels
2. Sufficient size of the site
3. Connectivity to pipelines

To this end, six sites were identified that could be eligible for Project One. These sites are indicated on the map below:


1 Coal Dock

2 General Motors (GM)

3 Zandvliet (BASF)

4 Covestro

5 Canal Dock B2

6 Bayer/Inovyn

*Figure 4-1: Location of alternative sites investigated*

The assessment of these six sites against the preconditions for Project One yielded the following results:

**1° Primordial: access for seagoing vessels**

Direct deep-sea access for large tankers is necessary for the operational phase, including for the supply of ethane feedstock, which must be able to be unloaded directly into the cryogenic storage tank. Mooring a tanker requires the presence of a tanker quay. For safety reasons in particular, this must be compatible with any other loading and unloading activities in the vicinity.

Only the Covestro, Bayer/Inovyn, Kanaaldok B2 and Zandvliet (BASF) sites have access for seagoing vessels. The GM (former Opel site)

and Coal Dock sites are not eligible for the following reasons:

- GM:
  - The site is not water-bound.
  - The adjacent terminals on the quay are not tank terminals, which means they are not suitable for unloading the raw materials for Project One. The combination of a tanker quay with a conventional quay is not feasible for safety reasons.
  - The relocation of the adjacent concessionaires is also not feasible within the timeframe available for Project One.
  - The Port Authority does not want a mix of gas and container ships at the same terminal for safety reasons.
- Coal Dock:
  - The site is not directly connected to the water; there is no infrastructure for ships.
  - Adjacent sites are not tank terminals, so there are no tanker quays either.

**2° Alone or in combination with other sites: 60 to 100 hectares in size**

The available site for the Project One installations (ECR, supporting infrastructure and laydown) must have a surface area of at least 90 hectares. However, in addition to this surface area for the installations themselves, extra space is required for the construction and laydown activities during the construction phase in order to ensure the feasibility of the project. For a more detailed explanation of the space required for the installations and site facilities, please refer to § 3.2.1.3.

Only the combination of the unused site between Bayer and Inovyn, with the unused site Kanaaldok B2, has a combined surface area of approximately 100 ha. The GM site is approximately 83.9 ha, but does not meet criteria 1 and 3.

The other sites do not meet this area requirement:

- Coal Dock: approximately 47 hectares;
- Zandvliet: no guarantees regarding surface area, sites under concession to another company
- Covestro: approximately 62.5 hectares. In addition, Covestro itself had announced an investment project (aniline plant) for which it needed at least part of these sites.

**3° Presence/proximity of pipelines**

The presence/proximity of pipelines for the transport of ethylene and propylene and the presence of the necessary utilities are also essential characteristics that were taken into consideration.

Only the Bayer/Inovyn, Kanaaldok B2 and Zandvliet sites are located on pipelines.

**Decision**: Only the combination of the proposed project areas meets the preconditions for Project One. The alternative locations that were investigated were rejected because none of them cumulatively met these preconditions. Although this was not a precondition of Project One itself (but rather a preference of the port), the combination of the proposed project areas means that Project One involves **'port expansion'**, which immediately constitutes a **fourth precondition** that distinguishes this location (combination) from the alternative locations that were investigated but not selected.

From a spatial and sustainability perspective, port expansion is preferable to port extension, given the presence of infrastructure, the preservation of open space and the manageability of environmental nuisance.

## 4.3 Implementation alternatives

### 4.3.1 Land removal

For soil removal in the context of this project, following vegetation removal, the initiator has opted to have the majority of the soil removed via Kanaaldok B2 (approx. 90%). The remaining soil (approx. 10%) will be removed by road, e.g. in the case of specifically contaminated soil that needs to be transported to a separate processing facility.

Transporting soil by water is preferable to transporting it by road, as this limits the temporary storage of soil on site, transporting bulk goods by ship produces lower air emissions than by lorry, and it reduces the burden on Antwerp's road network.

### 4.3.2 Electricity production

An energy study was conducted for Project One, which evaluated steam and electricity production, among other things. This study examined whether energy efficiency could be improved. The energy study is attached to the permit application.

Project One provides steam boilers for the production of steam and steam turbines in which this steam can then be converted into electricity. This approach has the following advantages:

- It is a flexible system that can also use natural gas when there is a low supply of fuel gas.
- It guarantees that the steam requirements of the processes can always be met, even during start-up and shutdown.
- It offers a useful application for periods when there is a surplus of process fuel gases.
- It guarantees electricity supply for the Project One site in the event of a power failure.
- It increases the energy efficiency of the site.

For a more detailed description, please refer to § 3.4.7.

### 4.3.3 Use of hydrogen in pressure swing adsorption ( )

In the ECR, hydrogen will be separated from the hydrogen-rich gases produced in the processes for use in the installation. The amount of hydrogen produced will be tailored to the hydrogen consumption of the ECR (for some hydrogenation process steps).

Project One has opted to reuse the hydrogen-rich residual gases produced in the processes as fuel gas. This reduces the natural gas consumption of the installations, resulting in lower CO2 emissions.

Project One does not provide for a PSA to produce hydrogen for external applications (sale), partly because this would require Project One to use more natural gas, resulting in higher CO2 emissions, and partly because there is currently no concrete application/market for such quantities of hydrogen near the site.

Chapter 14 Climate discusses energy efficiency, CO2 emissions and possible future applications of hydrogen in more detail.

### 4.3.4 BAT

The technology chosen for the processes, utilities and emission control measures was assessed against the relevant BAT. The following BAT conclusions and BREF reports are considered relevant
(see https://eippcb.jrc.ec.europa.eu/reference/):

- Production of Large Volume Organic Chemicals (BAT conclusions 12.2017);
- Large Combustion Plants (BAT conclusions 07.2017);
- Common Waste Water and Waste Gas Treatment/Management Systems in the Chemical Sector (BAT conclusions 06.2016);
- Common Waste Gas Management and Treatment Systems in the Chemical Sector (BAT conclusions 16.12.2022).

A BAT checklist for these BAT conclusions is included in Annex 8.

In addition, the following BREF report (for which no BAT conclusions are available) is also relevant. The relevant aspects of this report are included in the corresponding disciplines (Air and Water):

- Emissions from Storage (BREF 07.2006).

The dust report accompanying the permit application also evaluates the BAT from the above-mentioned BREF 'Emissions from storage', supplemented by the following study:

Guide to reduction techniques for diffuse dust emissions during the storage and transhipment of dry bulk goods, VITO, December 2012.

An energy study was conducted for Project One, which evaluated the energy efficiency of the processes, as well as steam and electricity production and cooling systems, among other things. The energy study assessed, among other things, whether the measures from the BREF documents for energy efficiency and cooling systems were being applied:

- Energy efficiency (BREF ENE - 2009)
- Industrial cooling systems (BREF ICS - 2001)

The energy study is attached to the permit application.

### 4.3.5 Water consumption

A number of options were investigated to reduce water consumption at the site. As the largest water consumption at the site is for cooling water, the focus was on this. The following options were compared:

- use of municipal water for cooling water + recovery of water from the cooling circuit discharge stream (reverse osmosis);
- intake of surface water (brackish dock water), with production of own process water/demineralised water (reverse osmosis) for use as cooling water;
- intake of externally produced demineralised water (reverse osmosis) for use as cooling water, together with municipal water.

After comparing the above options, it was decided to limit the use of municipal water by using demineralised water as supplementary water for the cooling circuit. This also reduces the amount of discharge from the cooling water circuit. This option results in a 46% reduction in municipal water consumption. The demineralised water is produced on a large scale elsewhere in the port area by external partners.

For more detailed information on water use and the reasons for it, please refer to §9.2.4.1 in the Water section.

### 4.3.6 drainage water purification

**Comparison of activated carbon with resin filters:**

For the purification of drainage water, activated carbon filters in series are chosen and no combination of activated carbon and anion exchanger/resin filter (IEX) is used. The advantage of the setup with only activated carbon is the possibility to move filters when they become saturated in order to achieve maximum loading. This is not possible in the setup with a resin filter. The resin filter remains in second position and is replaced when a certain limit value is exceeded. The first carbon filter still needs to be replaced and the consumption of activated carbon remains relatively high.

In addition, if the discharge standard is reduced to 20 ng/l per individual PFAS component, this resin filter setup will become even less cost-effective. In order to always comply with this 20 ng/l limit, the purification process must be controlled in such a way that the filter is replaced as soon as the concentration after the penultimate (second) filter reaches 20 ng/l or more. This implies that the capacity of the resin filter is limited to reaching this level. The resin filter must then be removed and replaced with a new one.

With the setup that only uses activated carbon, the second filter can be moved to the first position when it reaches 20 ng/l, allowing the total usable capacity of the carbon to be utilised more economically and ecologically compared to the setup with the resin filter.

**Ecological aspect**

The tests showed that the setup with only activated carbon filters consumes less medium than the setup with the resin filter. Based on these results, the resin filter setup is not ecologically (nor economically) superior to the use of activated carbon filters alone.

On the contrary: the ecological impact of activated carbon (expressed as CO2 emissions per processed drainage volume) is lower than that of resin if the activated carbon is reactivated, whereas resin is dumped/incinerated after use.

When the limit is set at 20 ng/l, as mentioned above, the AKs (or resins) should not be replaced based on measured values, but rather on 'predictions'. This will result in more replacements, and therefore more consumption of materials with a very limited effect (i.e. probably removing a few µg of PFAS from the environment). The gain of a few µg of PFAS removed from the environment does not outweigh the ecological impact of additional AK/resins/...

**Operating costs**

The actual operational costs for ion exchange with mobile filters can vary greatly depending on the influent PFAS concentration, the desired effluent PFAS concentrations, the composition of the matrix and the capacity to be processed. Depending on the composition of the matrix, the costs may be higher because additional pre-treatment is necessary. In addition, the necessary regeneration or waste treatment costs may further increase the costs. At the time of writing the BAT (December 2023), no concrete cost estimates for resin regeneration were available. It only becomes economically viable to use regenerable resins when the cost savings that can be achieved by reusing the resins outweigh the costs of regularly replacing single-use resins. This is particularly the case when treating streams with higher PFAS concentrations and where low final concentrations must be achieved.

Furthermore, inquiries have revealed that the availability of resins is currently also problematic (with delivery times of up to several months), which does not benefit the operational reliability of resin use.

# 5 Scoping and delimitation of the ' '

## 5.1 Reference situation

The reference situation is defined as 'the state of the study area referred to in relation to the effect prediction' (see the definition of 'Baseline scenario' on page 32 of the Guidance on the preparation of the Environmental Impact Assessment Report, drawn up in 2017 by the European Commission[8]: *'it provides a description of the status and trends of environmental factors against which environmental effects can be compared and evaluated'*).

It is usually the current existing situation that is used to compare the situation during the implementation and operation of a project in order to arrive at an interpretation of the future environmental effects.

In this case, the reference situation for determining the impact is based on:

the current situation, i.e. before the start of the construction phase; where quantitative data from the reference situation is used (including noise climate, air quality, water quality, soil, mobility, , data from the reference year 2022 is used, sometimes supplemented with more recent data (2023), or, if no data from 2022/2023 is available, the most recent representative data;
the construction of a new quay wall by the Antwerp Port Authority in the southern part of the project area: construction began in 2021 and will be completed in 2024, during the construction phase for Project One; the construction of the quay wall has been assessed in a separate EIA (PRMER-3242 approved on 20/09/2020) and was granted in a separate permit applied for by the Antwerp Port Authority.

Specifically, there are no industrial activities within the project area in the reference situation.

The effects of existing industrial and port activities around the Project One site are part of the reference situation. Their impact, as described in the project EIA prior to the environmental permit/environmental licence for each of these companies, is part of the existing environmental quality (including noise climate, air quality, water quality, soil, mobility).

## 5.2 Planned situation

The planned situation is the state of the study area that will arise as a result of the activities during and after the implementation of the planned project, as set out in the project description. This takes into account the project-integrated mitigation measures, but not any additional mitigation measures proposed in the EIA.

The planned situation is obtained by adding the expected impact of Project One, as described above, to the existing effects in the reference situation.

In this EIA, the planned situation is taken to be the situation after the realisation of Project One, taking into account both the activities and interventions during the construction phase and during the operational phase.

[8] https://ec.europa.eu/environment/eia/pdf/EIA_guidance_EIA_report_final.pdf

## 5.3 Impact assessment

Within each discipline, a 7-point scale is used as a significance framework for the impact assessment. When determining the significance level for each impact group, the following criteria are taken into account: duration of the impact (temporary or permanent), size and scope of the impact, vulnerability and/or rarity (of soils, surface waters, species, habitats, monuments, landscapes, population groups) and the extent to which quality objectives are met.

The **7-point scale** used in each discipline is as follows:

| Assessment | Description | Score |
|---|---|---|
| **significant negative effect** | permanent negative effect that is large in scope | -3 |
| **negativeeffect** | permanent negative effect that is small in scale or a temporary negative effect that is large in scale | -2 |
| **limited negative effect** | temporary negative effect that is small in scope or very small permanent effect | -1 |
| **negligible or no effect** | | 0 |
| **limited positive effect** | temporary positive effect that is small in scope | +1 |
| **positiveeffect** | permanent positive effect that is small in scope or a temporary positive effect that is large in scope | |
| **significant positive effect** | permanent positive effect that is large in scope | +3 |
| | | +2 |

Negative scores are linked to mitigating measures as follows:

| | |
|---|---|
| -1 (limited negative) | Research into mitigating or accompanying measures is less compelling, but if the legal and policy preconditions indicate that a problem may arise, the expert should proceed to propose mitigating measures. If these are not available, this should be justified. In the discipline chapters, the measure is then indicated as 'desirable'. If no measure needs to be taken, this is indicated by 'no specific measures required in addition to existing regulations'. |
| -2 (negative) | It is essential to seek mitigating or accompanying measures, to be linked to the longer term. If these are not available, this must be justified. In the discipline chapters, these measures are indicated as 'desirable'. |
| -3 (significantly negative) | It is necessary to seek mitigating or accompanying measures.<br>link measures to the short term. If this is not done, the reasons must be given. In the discipline chapters, these measures are indicated as "necessary". |

## 5.4 Cumulative effects

### 5.4.1 Cairo wall

A new quay wall will be constructed along Canal Dock B2 on the southern part of the project area. This quay wall will be used in part by Project One ships, and in the long term possibly by other companies and other ships on special request. The environmental permit for this quay wall was obtained by the Port Authority on 28 October 2020, which also included an EIA (PRMER-3242 approved on 20/09/2020).

The Antwerp Port Authority is responsible for the construction of the quay wall. Construction of the quay wall began in 2021 and will be completed in the course of 2024.

As the construction of the quay wall partly runs parallel to the construction phase of Project One (2022-2026), cumulative effects may occur. These cumulative effects are evaluated for all disciplines in this EIA.

Now that the first phase of the quay wall has been completed, large parts of the ECR and certain utility installations can be transported by ship.

### 5.4.2 Utility works by Elia and Waterlink

In 2023 and 2024, Elia and Waterlink will be carrying out work on the utility pipes along Scheldelaan. As a result of this work, traffic on Scheldelaan will temporarily be restricted to 2x1 lanes or may even be restricted to one-way traffic.

The cumulative effect on local traffic flow of the construction traffic for Project One involving these works is being assessed in the 'Mobility' discipline, as it only affects local traffic.

### 5.4.3 Oosterweel link

The Oosterweel connection (OWV) is the project in which the Antwerp Ring Road (R1) will be closed to the north-west of the city. This project is located approximately 10 km south-west of Project One.

Due to the distance, there may be an interaction between traffic management during the construction of the Oosterweel link and the construction phase of Project One, particularly in the vicinity of the Oosterweel site.

Therefore, any cumulative effects are primarily considered and evaluated for the Mobility discipline.

### 5.4.4 Other

The effects of existing industrial and port activities around the Project One site are part of the reference situation. Their impact, as described in the project EIA prior to the environmental permit/environmental licence for each of these companies, is part of the existing environmental quality (including noise climate, air quality, water quality, soil, mobility).

Where relevant, the effects of existing industrial and port activities around the Project One site will also be addressed in the *'description of the likely significant environmental effects of the project resulting from the cumulation of effects with other existing and/or approved projects'* referred to in Annex IV, point 5 of Directive 2011/92/EU (see also DABM, Annex IIbis, point 5°, e). The project EIA for Project One is being prepared in full compliance with the provisions on 'cumulative effects' set out in the Guidance on the preparation of the Environmental Impact Assessment Report, drawn up in 2017 by the European Commission.[9]

Available databases were checked to see whether there were any projects that had been approved but not yet implemented that could have an impact within the study area of this EIA and that could be expected to have relevant cumulative effects in combination with the effects of Project One. This primarily concerns cumulative effects that could lead to the effects of Project One being assessed differently in the EIA for Project One and/or to more or different mitigating measures being proposed in the EIA for Project One.

[9] https://ec.europa.eu/environment/eia/pdf/EIA_guidance_EIA_report_final.pdf

No approved, yet unrealised projects were found for which an investigation into such cumulative effects would be considered useful. This also applies to a number of approved projects near the project area, some of which are connected to or fit within the ECA (see section 5.5.1):

- Expansion of the North Sea terminal of PSA Antwerp NV: EIA exemption October 2021.
- Renovation of the Europe Terminal of PSA Antwerp NV: EIA January 2022.
- New Maxiterminal Antwerp by Lanfer Logistics Belgium (bimodal rail terminal): EIA in preparation.
- New quay wall along canal dock B2 K766-772 of PoAB (as part of Antwerp@C): EIA December 2023.

We would also like to note that, in addition to projects in the study area with an increase in emissions that are often evaluated in EIAs, there are also projects or other changes with a decrease in emissions, such as the cessation of activities, the application of additional mitigation measures, the application of recent BAT, etc. These changes are partly influenced by changes/tightening of environmental regulations, which means that they often do not (have to) be evaluated in an EIA.

In order to obtain a general picture of the evolution of environmental impacts, taking sufficient account of both positive and negative developments in the study area, sufficiently accurate quantitative data are needed on all relevant expected increases or decreases in emissions. The large amount of data required for this is not publicly available. Collecting this large amount of data and carrying out such a broad assessment is therefore beyond the scope of a project EIA. For a number of environmental aspects, the government calculates future scenarios in which the overall picture of the evolution of environmental impacts described above is mapped out. This is done, for example, through traffic modelling, future scenarios for nitrogen deposition, etc. Where appropriate, this data is used in the assessment in this EIA, so that the cumulative effects of all relevant positive and negative developments are taken into account.

In general, it appears that overall emissions from industry and transport (the result of increases and decreases) have been declining in recent years for the main aspects and pollutants, and that this is also expected to continue in the future.

We conclude that no significant cumulative effects of other projects with those of Project One are expected in the study area that could lead to the effects of Project One being assessed differently and/or to more or different mitigating measures being included in the EIA for Project One.

## 5.5 Development scenarios

Development scenarios describe the future evolution of the study area, taking into account both the autonomous evolution of the area and the evolution under the influence of plans and policy options. The autonomous development of a study area refers to changes to that area without any external influence. Controlled developments take into account planned policy, as determined, for example, by the regional plan, spatial implementation plans, structural plans or known, planned developments.

These scenarios must be described to supplement the reference situation if there are reasons to believe that this situation may change significantly in the future. These changes may be driven by both autonomous developments and human-driven developments.

Several development scenarios are included in this EIA. These are explained in the following sections.

### 5.5.1 Complex project 'Realisation of Additional Container Handling Capacity in the Port Area Antwerp'

On 15 July 2016, the Flemish Government took the initial decision for the Complex Project 'Realisation of additional container handling capacity in the Antwerp Port Area' (abbreviated to ECA). The project has three objectives: to create additional container handling capacity, to develop associated industrial/logistical sites on the port platform and to construct a multimodal access route to the main transport network.

On 31/01/2020, after completing the Strategic Environmental Impact Assessment, the Flemish Government took the Preferred Decision regarding the realisation of this additional container handling capacity in the Port of Antwerp.

The research was conducted at a strategic level during the research phase. This means that the effects were identified to the extent necessary to weigh up the various alternatives against each other.

An amended Process Memorandum was published on 13/06/2023 following the completion of the elaboration phase (https://www.cpeca.be/documenten/procesnotas). During the development phase, the preferred decision was further refined into a feasible project. Whereas the research in the previous phase took place at a strategic level, the focus is now on the project level. The result of the development phase will be one or more project decisions, each with a set of permits and authorisations, a zoning plan and an action programme. It is also possible that some of the projects will be further developed and licensed through the environmental permit procedure.

For reasons of phasing, it has been decided to further develop the complex project in various procedures:

- A project decision 'Container Cluster Left Bank of the Scheldt' for all permits and authorisations, rezoning and accompanying measures for a cluster of projects on the left bank of the Scheldt (Second Tidal Dock, Northern Inlet Dock, Three Docks and associated buffer, Bieshoek (Zwijndrecht Plain), Doeldok inland shipping terminal, Waasland Canal west (= zone S11), prior nature compensation, and spoil disposal in these project areas).
  Project decision expected in autumn 2025.
- A project decision on the 'Western Access to Waasland Port' for all permits and authorisations, rezoning and accompanying measures for the Western Access.
  Project decision expected in autumn 2024.
- An environmental permit application for the expansion of the North Sea Terminal (no rezoning required).

The effects of the entire ECA have not yet been calculated in detail, so no definitive statements have been made about the use and effectiveness of mitigating measures and/or other actions.

Since ECA mainly takes place on the left bank of the Scheldt, a few kilometres from Project One, an evaluation is primarily useful for those disciplines for which a cumulative effect is possible at such a distance. To this end, we include a discussion in the disciplines of Mobility, Air, People and Biodiversity.

To date, several separate EIA dossiers have been initiated and/or permits have been applied for to expand or construct container terminals and/or container transhipment infrastructure that connect to or fit within the ECA. These include:

- Expansion of the North Sea Terminal of PSA Antwerp NV: EIA exemption October 2021.
- Renovation of the Europe Terminal of PSA Antwerp NV: EIA January 2022.
- New Maxiterminal Antwerp by Lanfer Logistics Belgium (bimodal rail terminal): EIA in preparation.

It is noteworthy that new container infrastructure or the expansion of existing container infrastructure is being used in various ways to promote electrification (cranes, rolling stock, shore power for ships, etc.), which contributes to limiting the emissions and impact of container terminals.

As explained in section 5.4.4, insofar as data is already available from an ongoing or completed permit procedure, no significant cumulative effects with those of Project One are expected that could lead to the effects of Project One being assessed differently and/or to more or different mitigating measures being included in the EIA for Project One.

## 5.6 Scoping of the effects of the

When determining the expected effects, the possible interventions that could give rise to effects are taken into consideration. For the project under consideration, the interventions or causes can be broadly divided as follows:

Construction phase: vegetation removal, general site works (levelling, construction of site facilities), and construction of all installations, buildings and facilities on the site.
Operational phase: operation of the ECR and supporting infrastructure, and periodic maintenance work.

### 5.6.1 Construction phase

The works (partly already carried out since 2022, and the rest to be carried out until 2026; see section 3.2) involve the removal of vegetation. As a result, the discipline of **Biodiversity** is considered a key discipline. The works also include levelling the site, which involves earthworks, and the discipline **of Soil** is therefore also considered a key discipline.

The removal of vegetation and the construction of the new installations will affect the landscape structure and appearance. For the archaeological aspect, please refer to the archaeological report that was drawn up for the preparatory work.

The effects on **noise** and **air** (mainly due to construction machinery) and **water** (mainly due to groundwater drainage) during the construction phase will also be evaluated, as will the effect on **mobility** during the construction phase.

Finally, the effects of the preceding disciplines on local residents (**People**) and the climate aspects of the construction phase will also be evaluated

### 5.6.2 Operational phase

The **industrial installations** will have various environmental effects. The main effects are briefly explained below.

**Noise**: all parts of the installation will contribute to noise emissions, albeit not all to the same extent. The EIA will determine and evaluate the overall impact of the noise emissions from all installations combined. The starting point here is that the applicable standards for noise pollution will be met in any case.
**Air emissions**: the most significant emissions contributing to air pollution in the study area are NOx, VOCs and particulate matter (for $CO_2$, see 'climate' below). The EIA includes an investigation into the nature of the air emissions, an impact assessment and an investigation into the measures necessary to prevent and mitigate effects on air quality. As part of the environmental permit application, an energy study is also included (legally required for energy-intensive installations with an annual energy consumption of more than 0.1 PJ) in which the energy efficiency of the installation is assessed and tested against the best available techniques. The energy study then evaluates measures to improve the energy efficiency of the installation, if necessary.
**Water consumption and wastewater**: in addition to the impact of wastewater discharge, the EIA also assesses the reduction in drinking water consumption (e.g. through reuse or the use of alternative sources).
**Soil and Groundwater**: The main potential impact on soil and groundwater during operation is soil contamination due to leaks or incidents. The EIA evaluates the measures taken to prevent this impact (leak collection, etc.).
**Mobility**: the EIA assesses the extent to which the project will generate additional road traffic and mobility impact. By primarily using ships and pipelines for the supply and removal of the main chemicals, the impact on road traffic will be limited.
**Impact on the landscape and light pollution**: all installations contribute to these effect groups. However, the contribution of a particular unit to the change in the landscape varies from unit to unit. Visualisations are included in the environmental impact report with regard to the impact on the landscape and visual perception and the landscape.
**Climate**: the planned processes will generate greenhouse gas ($CO_2$) emissions. The EIA quantifies greenhouse gas emissions, expressed in CO2 equivalents, and examines the interaction between the project and climate change. A separate study was conducted on future possibilities for $CO_2$ capture. The results of this study are included in this EIA. These are supplemented by an evaluation of alternative techniques to limit the CO2 emissions of Project One in the future, once the technology for this has been sufficiently developed.

A broader assessment of the climate-related effects and sustainability aspects of the project will also be carried out based on Life Cycle Thinking.
**Biodiversity**: the EIA evaluates the effects of emissions, discussed in the disciplines of Air, Water and Noise, on the surrounding nature reserves.
**Health**: based on the disciplines of Air and Noise, the EIA assesses the effects on health using the methodology described in the guidelines.

## 5.7 Study area

The demarcation of the study area is explained in the following chapters. The study area is indicated on

Map 17 in Appendix 1.