MER INEOS "PROJECT ONE" IN LILLO

NON-TECHNICAL SUMMARY

INEOS Olefins Belgium NV

26 AUGUST 2024

SIGNATURE OF INITIATOR

Name	Position	Signature
Jos Vanduffel	Director, IOB	

Team of EIA experts

Consultancy firm: ARCADIS Belgium in collaboration with AIB Vinçotte

Discipline	Certified 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

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

TABLE OF CONTENTS

1 INTRODUCTION

This is the non-technical summary of an environmental impact report, i.e. a concise summary of the actual environmental impact report intended for the public and stakeholders.

An environmental impact report is a public document that examines the environmental impact of a planning process or project and any alternatives to that planning process or project. The environmental impact report does not decide whether the project or planning process will be granted a permit or approved; this is decided by the permit issuer, who takes the environmental impact report into account.

The purpose of the non-technical summary is to communicate the relevant information from the environmental impact report of the project or plan to the public and stakeholders, thereby promoting public participation in the permit process. For detailed technical information, please consult the actual environmental impact report.

2 PURPOSE AND JUSTIFICATION OF PROJECT ONE

2.1 General

INEOS Olefins Belgium (IOB) is building a state-of-the-art ethane cracker (hereinafter referred to as ECR) with associated supporting infrastructure in the port of Antwerp. The construction and realisation of this project has been given the name 'Project One'.

The ECR will convert ethane into ethylene, a basic raw material in the global chemical industry for the production of high-quality products. Project One differs from existing crackers in Europe in that it uses advanced, innovative and sustainable technology and works with ethane as a raw material instead of naphtha (derived from the petroleum industry). As a result, Project One will emit relatively half as much CO_2 as the best-performing European crackers.

Ethylene is an essential building block for many high-quality end products, such as:

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

The construction of 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. During the busiest months of the construction phase, this number will rise to approximately 2,500 workers per day.

The investment is the largest in the European chemical industry in more than 20 years. This will lead to technological innovation, thereby strengthening Flanders' position as a leading chemical region and confirming and reinforcing the Port of Antwerp's role as the largest chemical cluster in Europe. Project One will ensure that ethylene currently imported into Europe will in future be produced locally using the most technologically advanced methods available.

2.2 The carbon footprint of Project One

Project One will be the most carbon-efficient and sustainable cracker in Europe. The project will be leading the way through its design, use of state-of-the-art technology and the resulting efficiency.

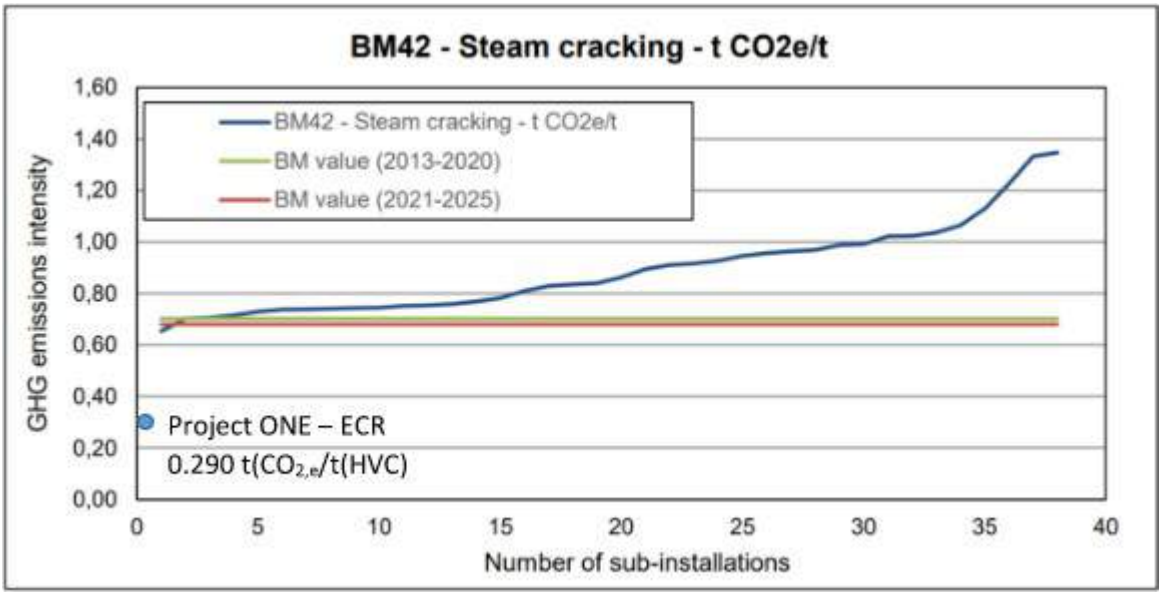
A key advantage of this project is the lower carbon footprint and higher energy efficiency of the technology used. This lower carbon footprint is a direct result of the chosen technology and the use of ethane as a raw material instead of naphtha, which is used in most other cracking plants. Project One 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. For example, Project One produces ethylene with a carbon footprint of only 0.290 tonnes CO2-eq per tonne of HVC (High Value Chemical), which is significantly lower than the current EU reference value of 0.681 tonnes CO2-eq per tonne of HVC (see Figure 2-1). This will significantly lower the EU ETS (European CO2 emissions trading system) standard for crackers.
This shift will put pressure on the worst-performing installations to reduce their emissions or spend more money in the emissions trading system used to finance CO2 reduction projects in Europe. It has been calculated 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 or avoided for existing European steam crackers. Such a quantity of emission allowances corresponds to approximately 267 million euros/year, taking into account the current price (mid-February 2024) of 54 euros/tonne CO2 under the EU ETS system.

Although Project One already has significantly lower CO2 emissions than existing steam crackers in Europe, it is not yet zero.

The INEOS Group is committed to achieving the EU's 2050 climate and energy targets and reducing net CO2 emissions to zero. Project One aims to become the first CO2-neutral cracker in Europe, which will play a role in Antwerp's sustainable industrial future. Project One is currently convinced that it is feasible to achieve this within 10 years of the cracker's start-up. In order to achieve the objectives
With regard to CO2 emission reduction, Project One was designed with a further reduction to zero emissions in mind. Once the technology is feasible, Project One has three possible routes for reducing CO2 emissions:

- Electrification of the kilns using green electricity.
- Use of green hydrogen as fuel.
- Carbon Capture and Storage (CCS).

Once the Project One installations are up and running, IOB will be well positioned to achieve zero CO_2 emissions in the future.



.
Figure 2-1: Specific greenhouse gas emissions (in tonnes CO2-eq/tonne HVC) for existing steam crackers under phase 4 of the EU ETS system (Source: European Commission, dated 15/06/2021[1])

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 waterway vessels for the supply of ethane and other raw materials. Use will also be made of the existing large pipeline networks in north-western Europe for ethylene and propylene (see Figure 2-2). Transport by pipeline is the safest, most ecological and most efficient mode of transport for 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.

[1] European Commission Directorate-General Climate Action. Update of benchmark values for the years 2021 – 2025 of phase 4 of the EU ETS. Benchmark curves and key parameters. 15/06/2021.

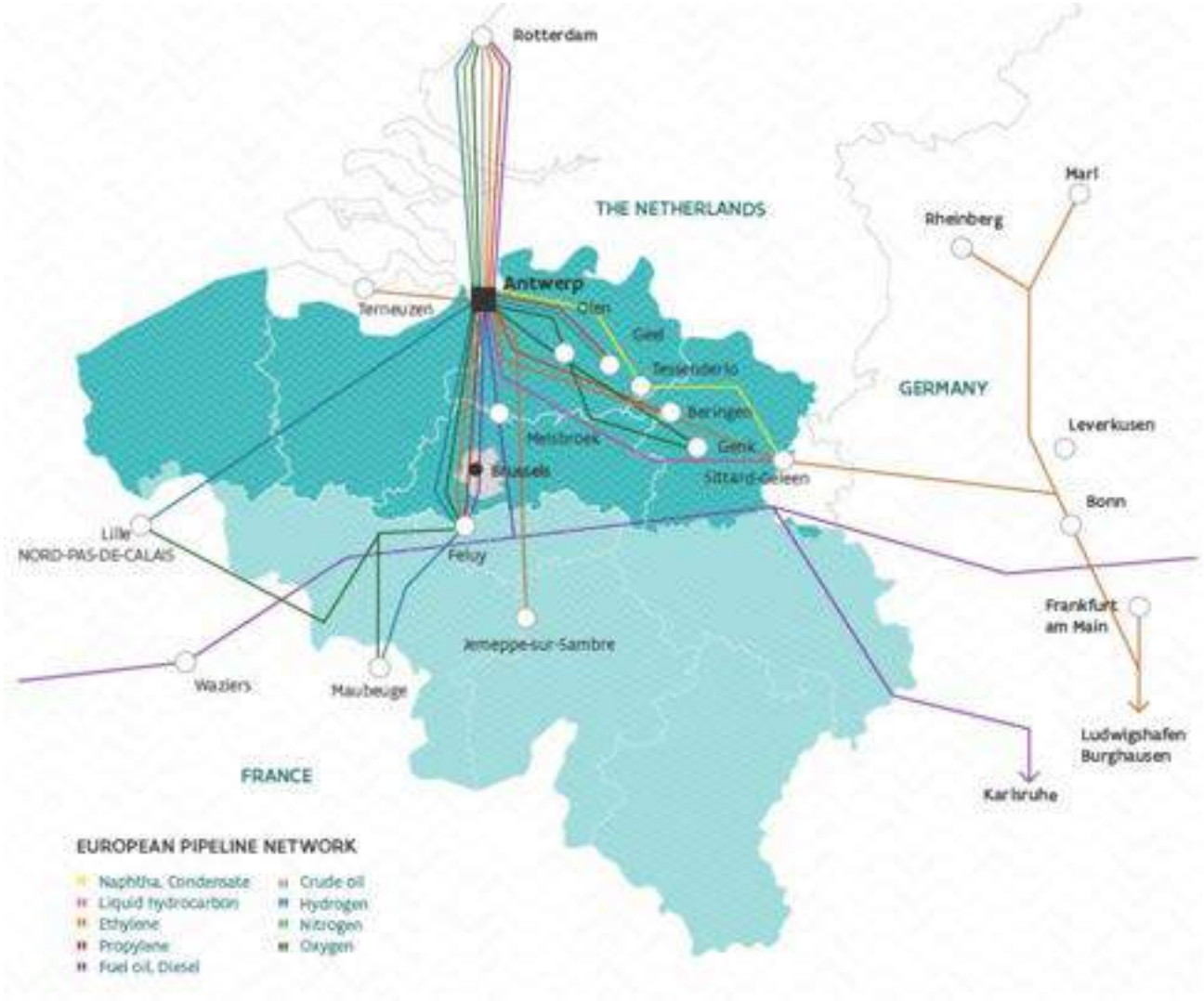


Figure 2-2: Existing pipeline networks (Source: Flanders Investment & Trade / Port of Antwerp)

2.3 Cooperation on sustainability in the Port of Antwerp

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

IOB is a partner in the Antwerp@C project and is therefore involved in the development of the external infrastructure that will be needed to transport CO_2 to storage locations. The Antwerp@C project is studying 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 infrastructure in the port that enables carbon capture and storage. In this way, IOB is further contributing to the sustainability of the port.

3 PROJECT DESCRIPTION

3.1 Project environment

3.1.1 Location of project area

Project One will be located on remaining, unused parts of the industrial sites in the north of the Antwerp port area. The project site is located on Scheldelaan, between the Scheldt and the Kanaaldok (see Figure 3-1) and close to the border with the Netherlands (approximately 4 km as the crow flies). The project area is also shown in Figure 3-2, together with the surrounding industrial sites, which mainly house chemical and petrochemical companies. The importance of accessibility by seagoing vessels and access to the existing international pipeline network, as indicated above, are key factors in the choice of the project area.

Figure 3-1: Location plan for Project One

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. L'Air Liquide Belge NV (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 – Europa Terminal (PSA)
11. Covestro NV (Covestro)
12. Sea-Tank Terminal Antwerp NV (Sea-Tank)
13. Antwerp Bulk Terminal NV (ABT)

Figure 3-2: Surrounding businesses Project One

Over the years, these unused industrial sites have become overgrown with grassland, shrubbery and forest vegetation. The site is designated for industrial port activities (Regional Plan No. 14 Antwerp, map sheet 15/3, see Figure 3-2, and Regional Spatial Implementation Plan 'Demarcation of the Antwerp Seaport Area', approved by the Flemish Government on 30/04/2013). The choice of this site means that so-called port expansion or densification will take place. The site has a total area of approximately 90.3 ha during the construction phase and approximately 85 ha during the operational phase.

3.1.2 Residential areas in the vicinity

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.

3.1.3 Nature reserves in the surrounding area

A number of protected nature reserves are located a short distance from the project area. The closest nature reserves are Galgenschoor and Opstalvallei (see Figure 3-4).

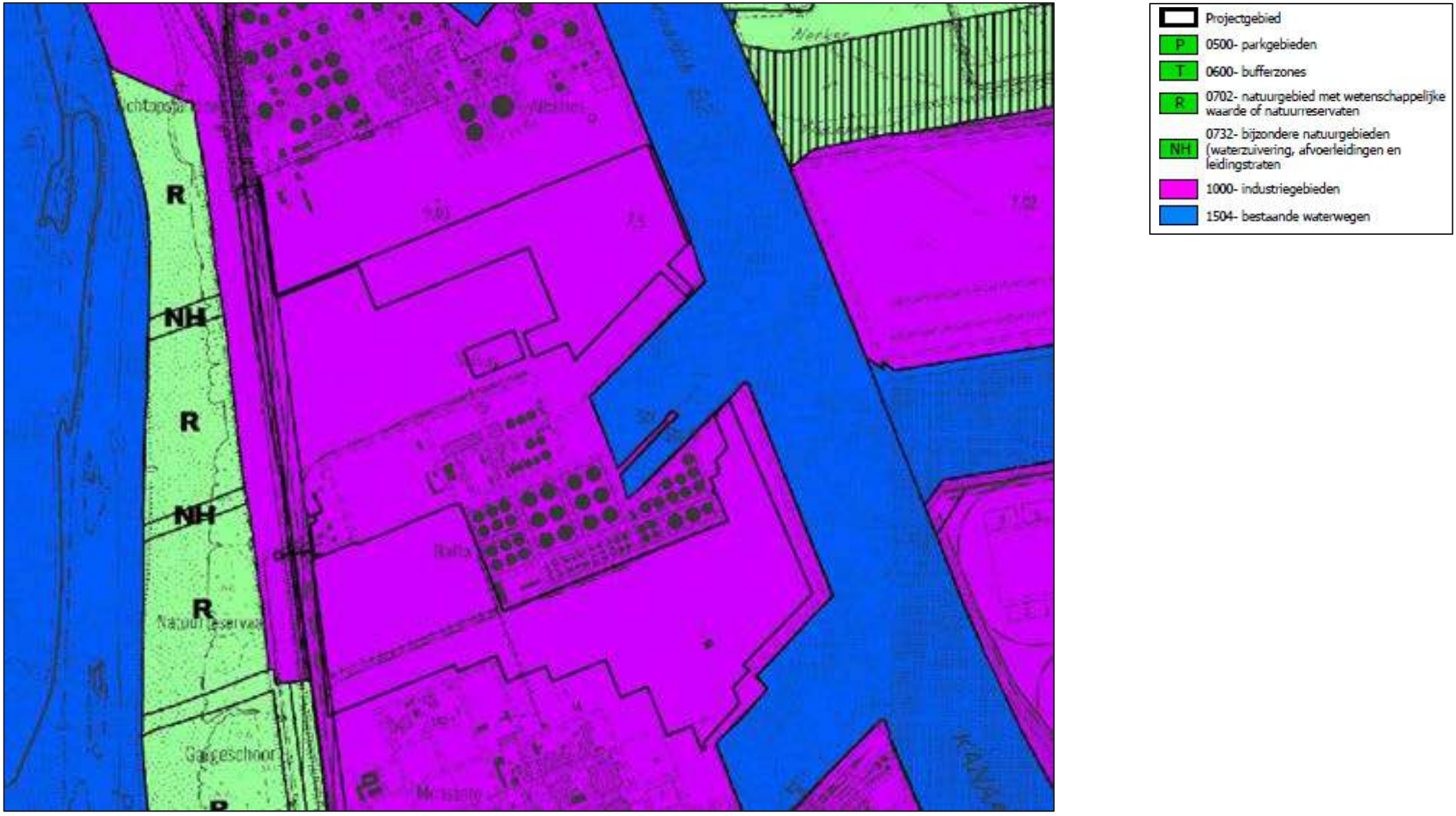


Figure 3-3: Regional plan

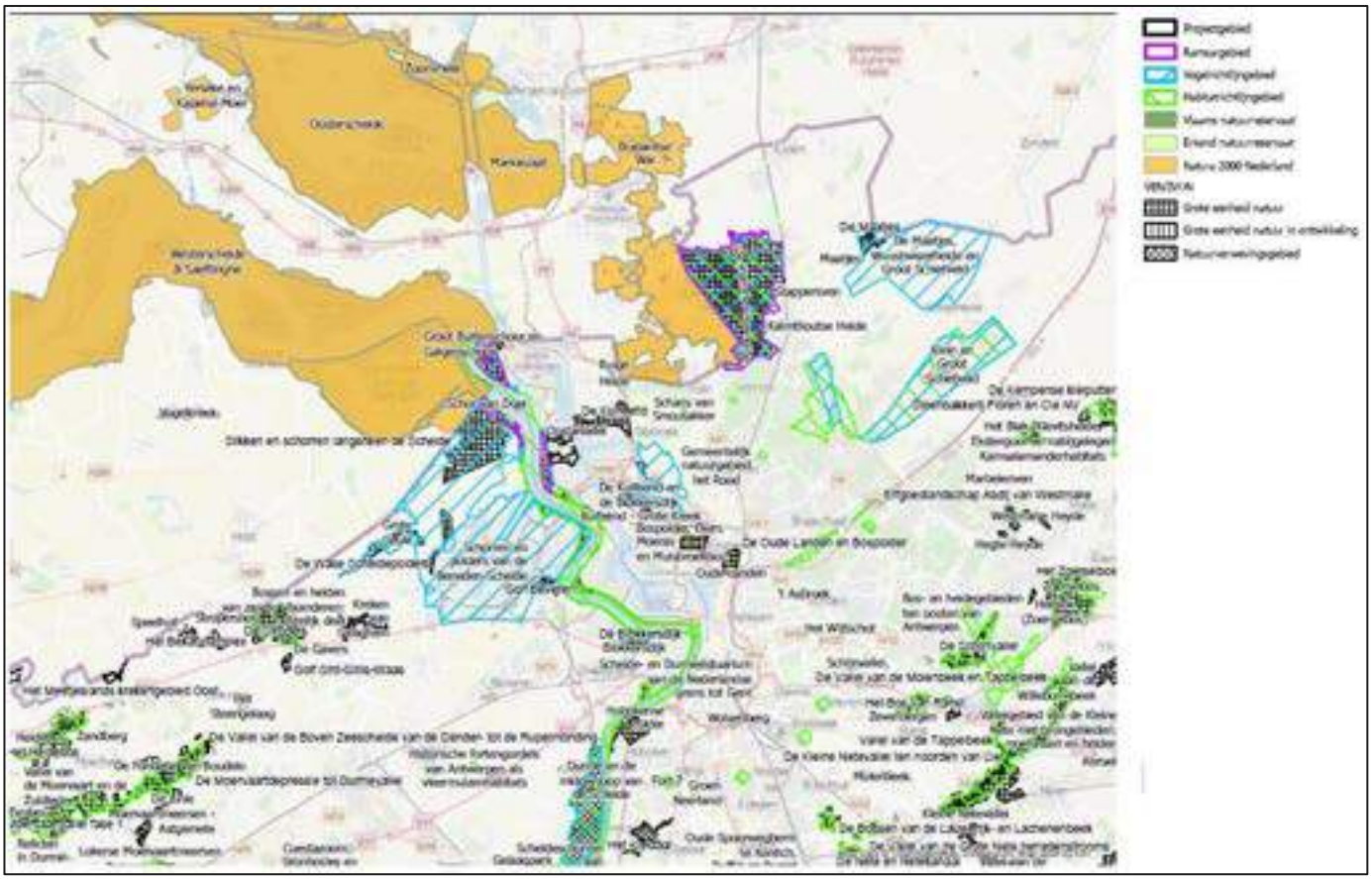


Figure 3-4: Nature reserves, VEN areas and Natura 2000 areas

3.2 Ethane cracker (ECR)

The ethane cracker (ECR) will be one of the most innovative, efficient and sustainable cracking installations in the world. The ethane supplied will be converted into ethylene in the ethane cracker at a production capacity of 1,450,000 tonnes/year.

The cracking process consists of four process steps. In the **furnace section,** the actual conversion of ethane to ethylene takes place by heating the ethane to a high temperature in the presence of steam. This product stream is then cooled with water in the **warm section**. Extra steam is also formed in this step.

This stream is then purified, for which it is first compressed. The compression step provides the pressure required for the **cold section** to function properly, where the first part of the compressed gases is purified. In the final section, the **C3+ processing section**, the heavier components are separated from each other. Finally, there are a number of local utilities that support the process.

In addition to pure ethylene, the separation section also produces pure propylene, C4 and C5+ hydrocarbons, and pyrolysis oil as by-products of the cracking furnaces. In addition, externally supplied propylene can also be fed into and purified in this separation section, so that this product can also be transported via the European pipeline network. Project One plans to produce 230,000 tonnes/year of pure (polymer grade) propylene in this way.

The process steps are described in detail below (see also Figure 3-5).

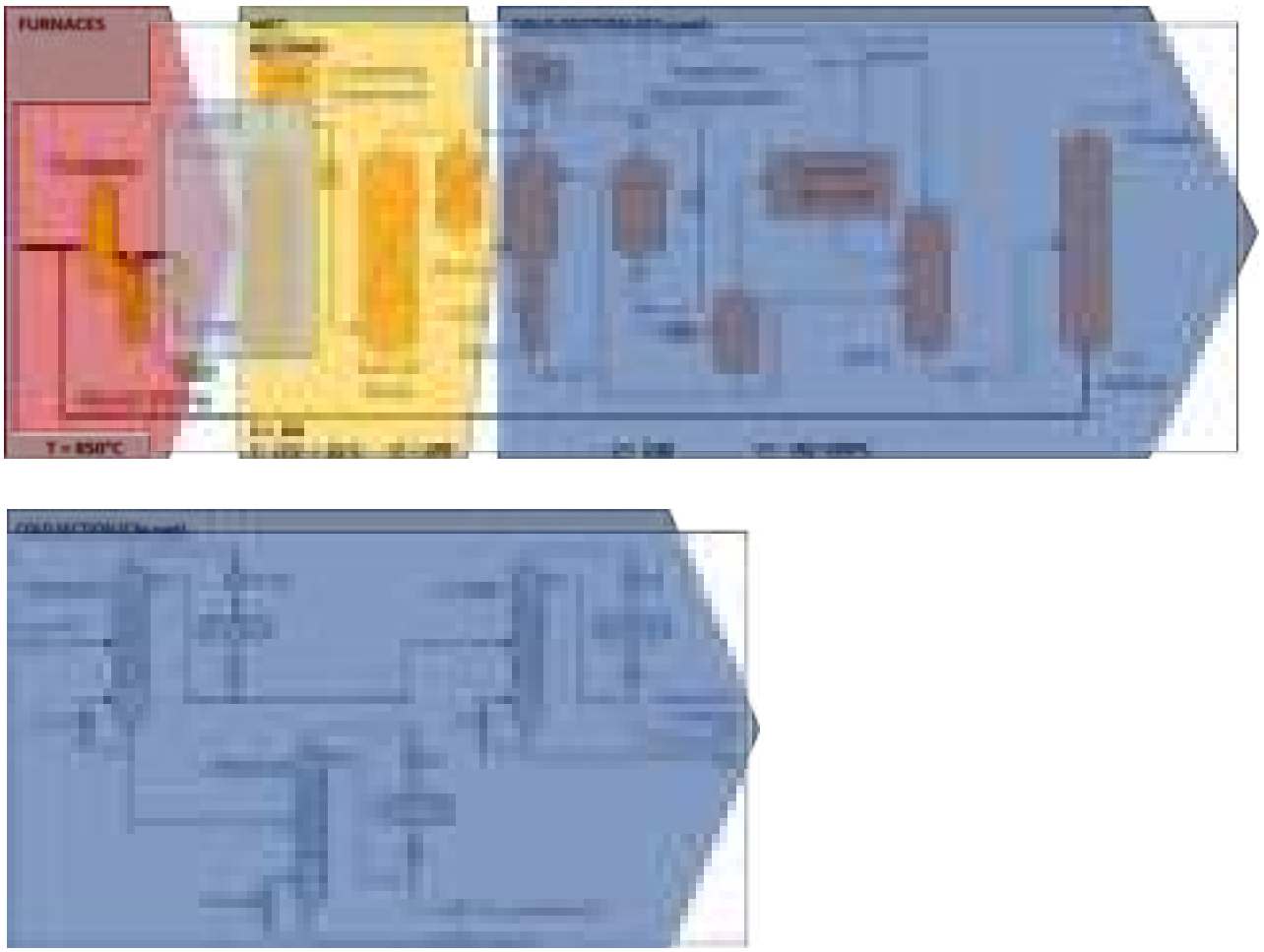


Figure 3-5: ECR process diagram

Oven section

Ethane is supplied in liquid form as a base feed from the ethane tank (see below) via a pipeline to the ECR unit. First, this liquid ethane is vaporised and preheated to the required inlet temperature. This is done by heat exchange with various process streams in order to save energy.

This preheated ethane vapour flows to the cracking furnaces where it is cracked into ethylene and other by-products. The furnace section consists of six identical, parallel furnaces, each of which consists of a convection section and a radiation section. In the convection section, the ethane vapour is first heated with flue gas and then mixed with steam. This mixture is then further heated against flue gas before entering the radiation section. In the radiation section, the conversion of ethane to ethylene, hydrogen and by-products takes place. The reactions occur at high temperatures in tubular reactors ('coils').

In the convection section, the flue gas produced by the combustion of the fuel in the burners is transported to the chimney via a series of heat exchangers. This section is designed to recover as much residual heat from the gas as possible.

Over time, coke deposits form on the inside of the reactor tubes. The formation of this coke is delayed as much as possible by choosing the right material and adding steam and sulphur components to the reaction mixture. Despite these measures, a layer of coke will slowly form on the inside of the reactor tubes, which has an insulating effect. As this insulating layer thickens, the wall temperature of the tubes will rise in order to allow the reaction to proceed at a sufficiently rapid rate. However, the wall temperature of the reactor tubes must be limited in order to guarantee the integrity of the installation. At that point, the coke layer must be removed in a sequence using steam and air (= decoking).

Cracked gas leaving the radiation section is cooled as quickly as possible to prevent further reactions and the formation of unwanted by-products. This takes place in three successive heat exchangers, which use the exchanged heat to produce high-pressure steam at 110 bar. This steam is then used to power or heat other equipment, generate electricity; in short, to use the energy generated as efficiently as possible.

Hot section

In the hot section, the cracked gas is further cooled by direct contact with water in the *quenching tower*. This creates two streams from this tower: a cooled ethylene-rich gas stream that leaves the tower at the top and a mixture of water and heavier hydrocarbons that leaves the tower at the bottom.

The cooled gas leaving the top of this tower is fed to the compression unit. There, it is compressed in several stages to the pressure required to achieve product separation in the subsequent process steps. To neutralise any acids present in the gas, it is washed with a NaOH solution (sodium hydroxide) supplied from outside the ECR. The aqueous stream that is created (NaOH with residual products from acidic gases) is then pre-treated so that it can be sent to the wastewater treatment plant.

Before proceeding to the cold section, the gas must be dried and pre-cooled. Drying is necessary to prevent water from entering the cold section, as ice and hydrate formation will cause blockages and can cause considerable damage to the equipment.

The bottom stream from the *quenching tower* is a mixture of water (water fraction) and heavier hydrocarbon components (oil fraction). In a first step, the oil fraction is separated from the water fraction. In a second step, the oil fraction is further separated into a light oil fraction (Py gas, also known as C5+) and a heavy oil fraction (pyrolysis oil). These by-products are discharged. The water fraction is further purified and converted back into dilution steam.

Cold section

In the cold section, the cracked gas is separated into its various components, which are then purified, mainly by means of distillation. In a first step, all components with two or fewer carbon atoms (or C2 minus) are separated from the components with at least three carbon atoms (or C3 plus).

The C2 minus stream contains a fraction of acetylene, an undesirable impurity that must be removed. This is done by hydrogenating the acetylene into ethylene. This stream is then cooled to a very low temperature to separate the residual gas (a mixture of mainly methane and hydrogen) from the components with two carbon atoms. This is done in several steps to make the separation as efficient as possible. The residual gas produced is mainly used as fuel gas for the cracking furnaces and for the regeneration of the dryers.

A C2 splitter then separates the ethane from the ethylene. The recovered ethane is recycled to the cracking furnaces. The ethylene produced is then compressed and cooled into a product that is exported.

C3+ processing section

In this section, the previously obtained C3 plus stream is further purified. All components with at least four carbon atoms (or C4 plus) are first separated from the components with exactly three carbon atoms (or raw C3). In this raw C3 stream, as above, impurities must be hydrogenated before propylene can be separated from propane. The propane is recycled as feedstock to the cracking furnaces, and the high-purity propylene is exported after final drying.

From the C4 plus stream, all components with at least 5 carbon atoms (raw C5 plus or pyrolysis gas) are first separated from the components with 4 carbon atoms (raw C4 product). After another hydrogenation step, raw C4 is sent to the C4 storage as the end product. Raw C5 plus stream is combined with similar streams from the hot section before it also leaves the ECR unit.

3.3 Supporting infrastructure

3.3.1 Utilities Water

Project One uses municipal water and demineralised water, both of which are supplied to the site by utility companies via pipelines. Rainwater is reused for sanitary purposes and as cooling water. The use of demineralised water results in a significant reduction in water consumption as well as in the amount of water discharged into the Scheldt.

Independent cooling systems are provided for the ECR and the supporting infrastructure. These systems remove residual heat that cannot be reused from the various process sections. Cooled water is pumped to consumers from an open system with forced air flow (cooling towers with fans). After use, the warm cooling water is returned to the cooling towers. Demineralised water is used to limit the amount of fresh water required and the discharge flow from these cooling circuits. This results in significant savings in fresh water consumption due to the lower salt content. The discharge flow is treated in the water treatment plant.

A fire water tank will be provided to ensure that sufficient water is available at short notice. In addition, there will be collection basins for contaminated fire water or large quantities of potentially contaminated rainwater. The contaminated water will be treated in the wastewater treatment plant, after which the purified water will be discharged into the Scheldt via an existing underground pipe.

3.3.2 Steam system

As mentioned in the furnace section, large quantities of superheated steam at high pressure are generated by recovering heat from the process gas. This steam is used internally to supply heat to various heat exchangers, to drive machines, and also to generate electricity.

Two steam boilers are provided to supply additional steam in situations where the plant's own steam production is reduced and/or the steam demand is increased. Furthermore, two steam turbines are provided, which make it possible to generate electricity with the available steam. The condensed steam is cleaned and returned to the steam boilers to be reused in the unit.

3.3.3 Fuel gas

The fuel requirements of the ECR installation are met by using fuel gas. This is residual gas that is produced in the installation as a by-product. Part of the fuel gas produced is also used to regenerate the gas dryers. When the amount of available fuel gas is insufficient, natural gas can also be used temporarily. The fuel gas is rich in hydrogen and low in carbon. The use of this fuel gas is the main reason why the CO2 emissions of Project One are (much) lower than those of other cracking installations.

3.3.4 Storage

The ethane is transported by ship in liquid form at a very low temperature (-88.5˚C). From the ships, this raw material is unloaded into a cryogenic tank and temporarily stored.

In addition, there are also storage facilities for C3 and C4 by-products, C5+ by-products and pyrolysis oil. Various chemicals required for the processes, water purification, water treatment, etc. are also stored. All storage tanks and the storage of solid products are equipped with the soil protection measures prescribed by law.

3.3.5 Transport infrastructure

Loading facilities will be provided for the loading of C3, C4, C5+ products and ethane transported by ship. The quay infrastructure will be equipped with liquid-tight zones and leak collection systems in accordance with regulations.

The products and by-products (ethylene, propylene and C4 hydrocarbons) will be transported almost entirely via existing pipelines. Loading areas for lorries will be provided for the transport of products that occur in relatively limited quantities.

3.3.6 Flares

As in most (petro)chemical processes, flares are necessary to start up the installation, to release it for maintenance or to guarantee its safety in the event of an incident.

To minimise the impact of such incidents, this project has opted for the maximum use of ground flares. These are low flares with an enclosed flame.

The system is designed so that the ground flares are always activated first. One ground flare is provided for the ECR installation. This is used when starting up or shutting down the installation for maintenance. In addition, a second ground flare is provided to protect the storage of gases (with a reserve ground flare for the latter, which is used when the first is out of service for maintenance).

The ECR also has a tower flare that is only activated in the event of a major incident. This concerns situations in which, for safety reasons, a large amount of gas must be evacuated in a short period of time. The tower flare is not used for normal start-up or shutdown procedures.

3.4 Administrative Zone

An administrative building will be provided at the entrance to the site along Scheldelaan (see Figure 3-6). This building consists 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 is provided at the entrance to the site. In addition, workshops and general warehouses. We refer to this group of buildings as the 'administrative zone'.

An open-air car park for staff and visitors and an extensive green area are provided around the administrative building. The car park also provides bicycle parking, charging points for electric cars and charging points for electric bicycles.

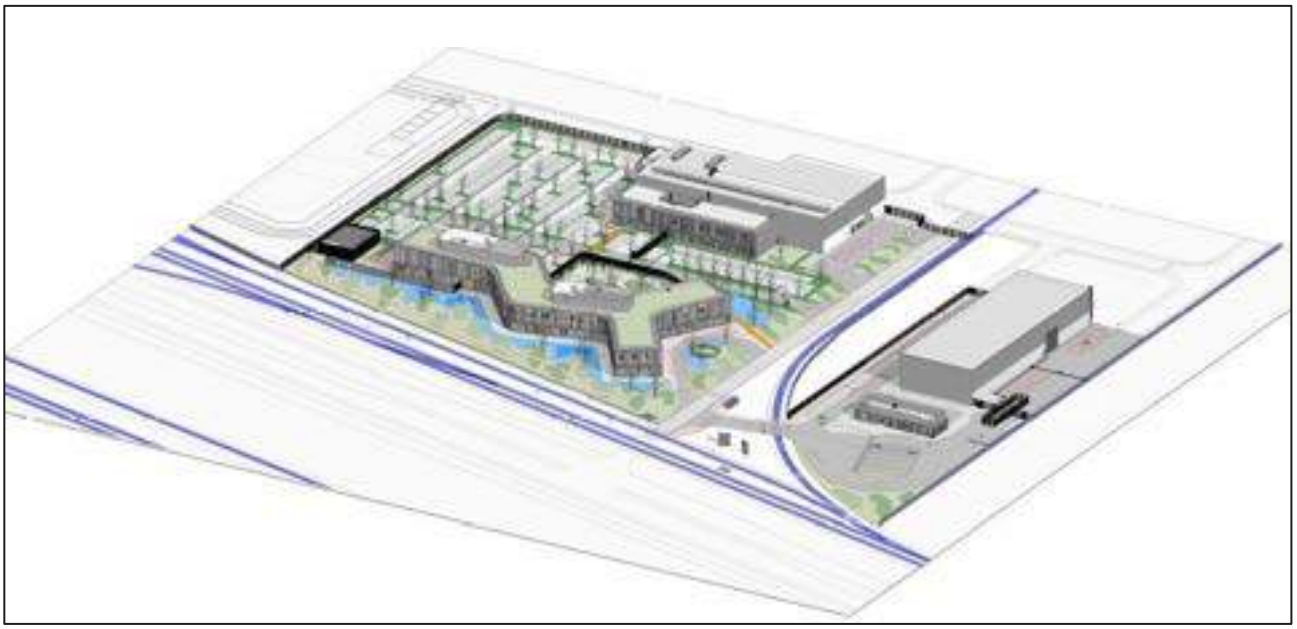


Figure 3-6: Location and visualisation of the administrative building along Scheldelaan

3.5 Planning of the works - construction phase

Site preparation began with the removal of vegetation from the project area, together with the top 30 cm of soil, which is unusable due to the presence of organic residues. The sites were also levelled in preparation for the construction works. When organising and carrying out the works, a number of measures will be taken to limit the impact on the Galgenschoor Bird Directive area to the west and the impact on possible breeding birds and other protected animal species. Finally, a contractor village with parking and a laydown zone will also be built in the northern part of the project area. This contractor village will remain in permanent use after the construction phase for contractors and IOB employees during planned maintenance shutdowns and major modification works (e.g. new technology to achieve CO2 neutrality). Site preparation will take approximately one and a half years (see Figure 3-7).

Once the site has been prepared, the actual construction work can begin. During the works, groundwater will be pumped out of the construction zone. If this water is contaminated, it will be purified before being discharged into the Canal Dock. Foundation piles will be installed to ensure the stability of the installations. Screw piles (rather than driven piles) have been chosen to minimise noise pollution. The site plan is included in APPENDIX 1.

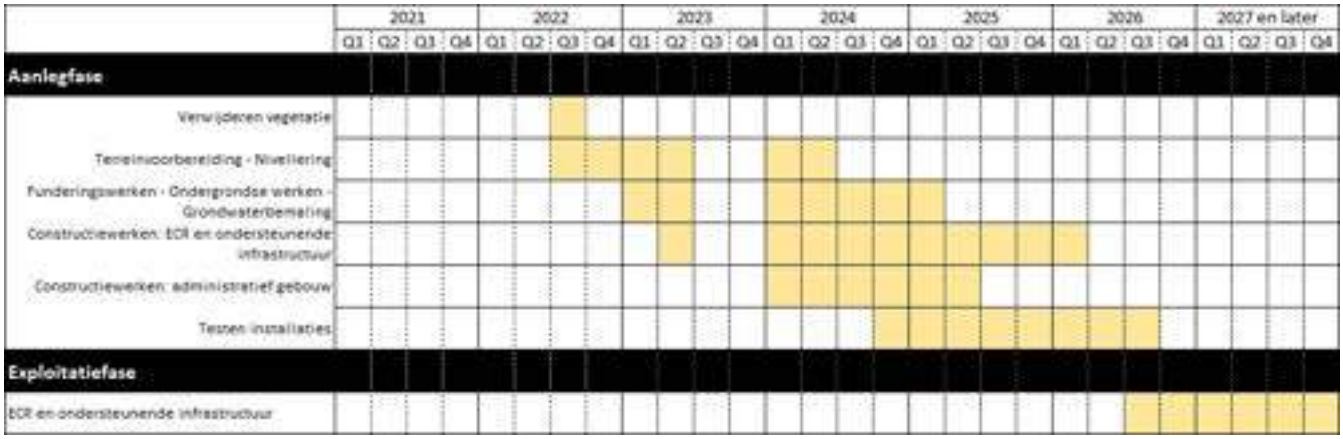


Figure 3-7: Provisional planning for Project One

The larger installations on the site will largely be constructed at sites outside the Port of Antwerp. This will be done in modules that can be transported by ship. The installations will be 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 will be transported by ship to the quay at the Project One site. This will significantly reduce the impact of the project on traffic and the environment.

The total duration of the project is 3 years and 8 months. The ECR will be operational after the summer of 2026.

3.6 Employees

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

During the operational phase of Project One, approximately 380 people will generally be present on site during the day (weekdays). At night and at weekends, 15 to 23 people will be present on site (only employees working shifts).

3.7 Project EIA approach

Given that the threshold values for various categories of Annexes I and II of the EIA Decree of 10 December 2004 are exceeded, a project EIA is being drawn up to comply with the EIA obligation. This project EIA will be submitted for public consultation together with the environmental permit application and presented to various administrations for advice. Taking into account all the comments and advice received, the EIA Team will then take a decision on the project EIA for Project One.

The project EIA assesses the effects of Project One on the environment in relation to the reference situation. The reference situation is the current situation before the start of any work, including existing industrial and port activities around the Project One site and their related environmental impact. The construction of the quay wall is also part of the reference situation, as its construction was already approved in 2020 at the request of the Port of Antwerp (with a separate EIA). Construction of the quay wall has already started and will be completed during the construction phase of Project One. The effects of the construction of the quay wall will be evaluated as 'cumulative effects' in the impact assessment of the construction phase of Project One.

Development scenarios are also assessed, i.e. the expected future developments in the study area. The following development scenarios are evaluated:

- Complex project 'Realisation of Extra Container Handling Capacity' (ECA) in the Antwerp Port Area: a project by the Flemish government to realise extra container capacity, among other things;
- Oosterweel connection.

In this EIA, we distinguish between the following for the impact description and impact assessment:

- 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.

[2] 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.

4 REFERENCE SITUATION

For the reference situation, we assume the current state of the environment based on the most recent data. For most disciplines, publicly available data (e.g. air quality, water quality, etc.) from the government or literature was used. In addition, the following data was specifically collected:

- For the Project One site, the fauna and flora present were mapped during site visits.
- For the surrounding nature reserves, data was requested from the managers of these areas.
- As part of the EIA, noise measurements were carried out at four locations in the surrounding residential and nature areas.
- In preparation for the permit application, soil surveys were carried out on plots where no sufficiently recent surveys were available.

The main points of attention are:

- Noise: Noise measurements at measuring points in Berendrecht, Lillo and in the Galgenschoor nature reserve show that the noise standards for ambient noise at night are already being exceeded almost everywhere. In the residential areas of Berendrecht and Lillo, the noise standards for the daytime period are respected. In Galgenschoor, the noise standards are also exceeded during the day.
- Air: Air quality meets air quality targets everywhere. However, there are elevated concentrations of NO2 in particular in the port area compared to more rural areas. Although the statutory air quality standards are being met, it is known that air pollution does have health effects.
- Surface water: The quality of the Scheldt water meets environmental quality standards for many parameters, but there are still exceedances for a number of pollutants at the measuring points near the project area (mainly chemical oxygen demand (COD), nitrogen, orthophosphate, boron, arsenic, cobalt, vanadium and cadmium).
- Soil and groundwater: Soil investigations have revealed localised, existing soil and groundwater contamination on several plots of land belonging to Project One and surrounding businesses, which will need to be taken into account during excavation work and groundwater drainage.
- Mobility: In general, traffic flows smoothly in the port area. A known point of attention near the Project One site is the intersection of Scheldelaan and the R2, which is saturated/congested during rush hour. The government is working on a solution, but this involves major works (including on the Tijsmanstunnel) and no concrete timing has yet been set.
- Biodiversity: Presence of several protected animal and plant species in the project area.

5 ENVIRONMENTAL IMPACTS

5.1 Noise

5.1.1 Effects

5.1.1.1 Construction phase

During the construction phase, there will be no or negligible noise impact in most of the area surrounding Project One. This applies to the residential areas in Lillo and Berendrecht, both during the day and at night. No impact is expected in the Opstalvallei nature reserve either. The noise impact of traffic in the port area will also increase only slightly or not at all during the construction phase.

In Galgenschoor, localised, rather limited effects are to be expected near the Project One site. These depend on the varying activities and noise emissions during the construction phase. In the northern part of Galgenschoor, only a limited impact is expected on the Scheldt dyke and during site preparation. In the southern part of Galgenschoor, a limited impact is predicted during a larger part of the construction phase. A stronger negative effect will occur more locally and only during the peak of construction. The impact of these noise effects on both breeding and non-breeding birds in Galgenschoor will be further evaluated in the Biodiversity discipline.

5.1.1.2 Operational phase

During the operational phase, under normal operating conditions, the impact of the project on noise levels in the surrounding residential areas (Berendrecht, Zandvliet, Lillo and beyond) and nature reserves (Galgenschoor, Opslavallei and beyond) will be negligible. Only a limited negative impact is expected locally above the Canal Dock.

The effect of the limited change in traffic during the operational phase is also negligible.

The noise impact of the ground flare of the ethane cracker, which is used when starting up (1 to 3 days) or shutting down (several hours) the unit, is also assessed as negligible in the surrounding residential areas and nature reserves. During the start-up of the ECR, there is only a limited negative effect above the Canal Dock.

In the exceptional case of a safety incident in which the tower flare is activated together with the ground flare, a noticeable effect on the noise level at Berendrecht and the Opstalvallei nature reserve is expected.

5.1.2 Mitigating measures

Project One provides a package of measures that limit the noise impact during both the construction phase and the operational phase. For the construction phase, this includes the use of screw pile foundations, modern construction machinery and a modular design that limits site traffic. For the operational phase, low-noise installations are being designed.

During the construction phase, care will be taken to ensure that the machinery used complies with the assumptions in this EIA and that the distance between non-mobile machinery and the most noise-sensitive areas is as great as possible.
In addition, noise-intensive work will be limited to daytime hours and Project One will clearly inform local residents about the duration and type of work.

No additional specific mitigation measures are necessary during the operational phase, as the design of the installation is already low-noise.

5.2 Air

5.2.1 Effects

5.2.1.1 Construction phase

During the construction phase, emissions will be caused by construction machinery, with nitrogen oxides (NOx) as the main pollutant. Emissions from ship and road traffic that will transport equipment, materials and personnel to and from the site have also been calculated, but are much more limited.

The effect of the emissions on air quality in residential areas is negligible. There is a limited negative effect up to 0.5 to 1 km northeast of the site, where a small part of the Opstalvallei nature reserve is located. The area with a negative effect is limited to the Kanaaldok and does not extend to residential or nature areas.

5.2.1.2 Operational phase

During the operational phase, there will be various emission points on the site. The most important ones are the chimneys of the cracking furnaces and the steam boilers. These will all be equipped with specialised gas purification (SCR-DeNOx technology) to significantly reduce emissions of nitrogen oxides (NOx), which is the main pollutant.

The zone with a negative impact on air quality for nitrogen oxides is located only above the Kanaaldok. Based on the expected emissions, the zone with limited negative effects does not extend to the nearest residential area of Berendrecht.

The EIA also determined the effect on other pollutants such as particulate matter, carbon monoxide, sulphur dioxide and the organic substances benzene and butadiene. The effect of these substances on air quality proved to be negligible in all surrounding residential and nature areas. For some substances, there is a limited negative effect near the site.

5.2.2 Mitigating measures

In accordance with BAT, Project One is strongly committed to limiting air emissions.

To limit nitrogen oxide (NOx) emissions, the combination of advanced burners (low-NOx) with specialised gas purification (SCR-DeNOx technology) on the chimneys results in lower emission values than if only one of these two best available techniques were implemented. This results in emission concentrations that are on average 3 to 4 times lower than the VLAREM emission limit values.

The emission concentrations and the proper functioning of the gas purification system will be monitored using continuous measuring equipment on the chimneys.

In addition, the gases released during water treatment and storage and transfer emissions are extracted and treated, partly to prevent possible odour nuisance.

During the decoking of the furnaces, coke deposits are removed from the installation. These are efficiently collected using cyclones, leaving only negligible dust emissions.

Finally, the entire installation is designed in such a way that small leak emissions (fugitive emissions) are minimised.

The use of ships and pipelines for the supply and removal of products limits transport emissions.

5.3 Soil

5.3.1 Effects

5.3.1.1 Construction phase

During the construction phase, the necessary regulations will be strictly applied to prevent accidental soil and groundwater contamination and to ensure that soil removal and temporary soil storage comply with the applicable regulations. The impact of these activities on soil and groundwater quality is therefore assessed as limited negative to negligible.

To guarantee soil stability, preventive measures such as sheet piling will be provided during the drainage works. The risk of unacceptable settlement is assessed as limited negative to negligible and will be monitored during the works.

5.3.1.2 Operational phase

Most of the products present in the installations are gaseous under normal conditions, which limits the risk of soil or groundwater contamination. However, soil or groundwater contamination is possible if leaks occur in the process installations, storage tanks or during loading and unloading operations involving liquid products. Project One follows the necessary and legal measures as laid down in VLAREM to prevent contamination from leaks. The potential impact is assessed as limited negative to negligible.

5.3.1.3 Mitigating measures

Various preventive measures have been integrated into the project, so that, based on the impact assessments, no additional mitigating measures are considered necessary.

5.4 Water

5.4.1 Effects

5.4.1.1 Groundwater – Construction phase

During the construction phase, the groundwater level will be actively lowered to enable construction. The use of sheet piling or equivalent technology will limit the lowering of the groundwater table on neighbouring sites. The groundwater level will recover after the works. The assessment of these effects is limited negative to negligible.

5.4.1.2 Groundwater - Operational phase

During the operational phase, the paving of the site will lead to a reduced supply to the groundwater (limited reduction), which is assessed as having a limited negative impact. No changes in groundwater flows are expected.

5.4.1.3 Surface water – Construction phase

During the construction phase, rainwater from the roofs of the contractor village will be used as sanitary water, and excess rainwater will overflow into the Canal Dock. The drainage water that is pumped up during the construction phase and is partially contaminated will be purified before being discharged. During the works, pumped flows, groundwater levels, contaminants and possible settlement of tanks and buildings around the site will be monitored. Monitoring protocols will be agreed with neighbouring companies for this purpose. The effect of the discharge on the water quality of the Canal Dock is estimated to be negligible.

5.4.1.4 Surface water - Operational phase

The water supply for the operation of Project One is mainly provided by municipal water, demineralised water and reused rainwater. The use of demineralised water in the cooling circuits instead of municipal water reduces water consumption. Rainwater is reused within the technical possibilities. Most of the water consumed evaporates to cool the installation and ends up in the atmosphere.

Project One provides for an extensive water treatment plant, consisting of various pre-treatment steps (including buffering), a biological treatment step, followed by post-treatment to remove the last pollutants. The treated wastewater is discharged into the Scheldt. The quality of the discharged wastewater, based on the maximum concentrations (discharge standards), has a negligible impact on the Scheldt. The hydraulic impact of the discharge on the Scheldt and that of the discharge of excess rainwater into the Canal Dock is also negligible. No pollutants are expected to have a significant effect on the underwater sediment.

5.4.2 Mitigating measures

As described above (for Soil), the necessary regulations will be strictly applied to prevent accidental soil and water contamination, both during the construction and operational phases.

As the process design of the water treatment plant already takes into account a wide range of measures to guarantee efficiency and reliability, no additional mitigation measures are considered necessary.

5.5 Mobility

5.5.1 Effects

5.5.1.1 Construction phase

During the construction phase, there will be additional traffic due to the delivery of various installation parts and building materials, but mainly due to the daily movements of the site personnel. The delivery of installation parts and building materials will be partly organised by ship and maximum use will be made of collective transport for workers.

Most parts of the road network are expected to experience negligible or no impact, except for the Liefkenshoek and Tijsman tunnels and the A12 motorway towards the Netherlands, where a limited negative impact is expected.

Some intersections will also experience heavier traffic, although for most of them only a limited negative impact is expected. The intersection at the entrance to Vopak (also used as access to the contractor village) will experience heavier traffic, but this negative impact can be limited by the installation of traffic lights. The R2 x Scheldelaan Oost intersection already has a high saturation level, and even a small increase could result in a significant negative impact. During the entire construction phase, saturation levels above 100% are expected during rush hours. This will be mitigated by working with contractors to minimise the traffic impact, such as working with adjusted shifts to avoid rush hours.

During the construction phase, there will be a limited negative impact on bicycle safety due to the increase in (freight) traffic at the entrance to the site. Proper design of the intersection and the installation of additional traffic lights will improve this situation.

Sufficient parking spaces will be provided on the construction site, so no or negligible effects on parking pressure are expected.

5.5.1.2 Operational phase

During the operational phase, there will be fewer personnel than during the construction phase. Most raw materials and end products will be transported to and from the site by ship or via pipelines.

During the operational phase, only limited effects on mobility are expected. Only at the R2 x Scheldelaan Oost intersection and at the entrance to Project One is a limited negative effect expected in terms of traffic flow.

This will result in a limited negative impact on road safety for cyclists, both on the access road and at local bicycle crossings. However, measures are being taken in the design to improve the traffic system, such as good signage and separate bicycle lanes.

The parking facilities, both for cars and lorries, are adequate, so no impact is expected in this regard.

5.5.2 Mitigating measures

During the construction phase, the focus will be on using collective transport for site personnel as much as possible. Goods (modules, bulk goods) will largely be transported by water to limit the impact on the roads.

Project One will continue to encourage cycling, collective transport and carpooling in order to promote more sustainable commuting. Various options are already available for this, including lease bicycles and collective transport. Awareness campaigns will also continue to be promoted.

On the company premises, there will be a clear separation between cyclists and pedestrians on the one hand and motorised traffic on the other. Adequate signage will also be provided.

5.6 Biodiversity

5.6.1 Effects

5.6.1.1 Construction phase

As a first step in the construction phase, all vegetation on the vacant land was removed. Despite various restoration measures outside the project area, such as forest compensation, the development of valuable grassland and the relocation of vulnerable species, the local loss of ecotopes and biotopes in this region due to the construction phase of Project One continues to have a significant negative impact. However, the impact on fragmentation and barrier effects is considered to be limited, partly because an ecologically designed corridor will remain between Scheldelaan and Kanaaldok.

The noise impact of the construction and building of Project One is assessed as limited negative during the day in (part of) the nearby Galgenschoor nature reserve. During the night, this effect is assessed as negligible. In the other surrounding nature reserves, such as the Lillo pot polder and the Opstalvallei, the effect is also negligible.

The impact of acidifying and fertilising deposits on vegetation in the surrounding area as a result of exhaust gases from construction machinery and vehicles will remain very limited during the construction phase. The impact score (% additional deposition relative to the critical deposition value) remains below 1%. Taking into account the provisions of the nitrogen decree and the expected decrease in nitrogen deposition by 2030 as a result of PAS measures, this will not lead to any significant impacts. In addition, an ecological analysis shows that these additional deposits during the construction phase will not have any effect on the receiving vegetation, given their limited and temporary nature. No relevant effects are expected as a result of soil disturbance or groundwater lowering.

5.6.1.2 Operational phase

During the operational phase, only limited effects on biodiversity in the vicinity of the project are expected.

The discharged wastewater will have no relevant impact on the salt marsh or mudflat habitat of the Galgenschoor. The increase in ambient noise is limited, so only a limited negative effect is expected on a limited part of the salt marshes in the Galgenschoor. The lighting of the installation, which is necessary for safety reasons, will also only have a limited negative effect on species flying overhead at night.

The contribution to nitrogen deposition by Project One during the operational phase, mainly as a result of chimney emissions, is limited. The impact score (% additional deposition relative to the critical deposition value) during the operational phase remains limited to 1%. Taking into account the provisions of the nitrogen decree and the anticipated decline in nitrogen deposition by 2030 as a result of PAS measures, this will not lead to any significant impacts. In addition, an ecological analysis shows that these additional deposits during the operational phase will not lead to any effects on the receiving vegetation, given their limited nature, the anticipated reductions and taking into account the overall environmental pressures that influence the condition and extent of vegetation. In VEN areas, the project will not lead to unavoidable or irreparable damage. In Natura 2000 areas, both in Flanders and the Netherlands, the project will not lead to any significant deterioration of the natural characteristics of these Habitat and Birds Directive areas. Project One therefore does not compromise the achievement of the conservation objectives of the notified and targeted habitats and species living in them.

5.6.2 Mitigating measures

During the construction phase, a set of mitigating measures will be taken to minimise the impact on biodiversity. For example, during the construction phase, care will be taken to ensure that no protected species can settle on the site. The first phase of the works was carried out outside the breeding season. For a number of species, a derogation from the species decree was requested and obtained so that these species (such as the bee orchid, the large beetle orchid and the natterjack toad) could be relocated in an appropriate manner.

During the construction phase, principles of good lighting are also being applied. This is with a view to light-shy bat species that have their flight and migration routes along the Kanaaldok. Furthermore, measures to limit NOx and noise emissions have already been integrated into the project.

Forest compensation was carried out by Project One. The sea buckthorn scrub present in the forest was also compensated for by replanting with native scrub in a zone of the Flemish Ecological Network. As part of nature restoration, efforts will be made to preserve the reed vegetation on the site as far as possible. If this is not possible, an area will be kept free on the site for spontaneous reed development or planting. In collaboration with the Antwerp Port Authority, ecologically interesting poor grassland is being developed in the port. The corridor for pipelines, which connects Scheldelaan and Kanaaldok, is also being managed ecologically.

During the operational phase, there are no specific mitigation measures for the discipline of biodiversity, but the mitigation measures for emissions in other disciplines (especially air, noise and water) also limit the effects on biodiversity.

5.7 Landscape

5.7.1 Effects

5.7.1.1 Construction phase

Particularly at the start of the construction phase, the landscape structure was altered and landscape ecological relationships were disrupted by the removal of trees and other vegetation. This results in a negative effect on the landscape. It also increases the visibility of the surrounding industrial landscape. These effects are mainly local and the impact varies from limited negative to negative.

Throughout the construction phase, the landscape will be in a state of constant change and will be dominated by temporary construction sites and various machines. This will cause a temporary disruption to the perceptual characteristics of the landscape and will also change the perceived value of the site. However, within the context of the industrial landscape, these effects can be considered limited negative.

5.7.1.2 Operational phase

Given that Project One is located in an industrial context, the structural changes to the harbour landscape are considered to have only a limited negative impact, as is the impact of the installation on the perceptual characteristics and experiential value of the landscape. In the residential areas, which are largely located behind dykes and often feature various landscape elements that shield the view of the port, the impact is largely negligible.

5.7.2 Mitigating measures

It is not easy to provide mitigating measures given the size of the infrastructure, safety considerations and the limited space available. Moreover, the context of the industrial port landscape means that mitigating measures are less necessary in this case.

5.8 Human health

5.8.1 Effects

The impact of air pollution (NO_2, particulate matter (PM_{10} and $PM_{2.5}$), benzene, butadiene), light, noise and Legionella was assessed as these are potentially relevant stressors during the operational phase. During the construction phase, NO_2, light and noise were assessed.

5.8.1.1 Effects via air

In the vicinity of the Port of Antwerp, background levels of NO_2 are often recorded that exceed the Flemish health advisory values. As a result of these existing background values, Project One's NO2 contribution is assessed more strictly, resulting in a negative impact assessment for Berendrecht, Lillo and Doel during the construction phase and for the residential areas of Berendrecht, Zandvliet, Lillo, Doel and parts of Stabroek during the operational phase, according to the Flemish health advisory value.

The general downward trend in NO2 emissions, supported by the measures provided for in the 2030 Air Policy Plan, is expected to continue and reduce the general background value for NOx in Flanders.

The current background concentrations of benzene and butadiene throughout the study area are associated with an additional cancer risk that is not negligible from a health perspective. For these substances, the contributions of Project One during the operational phase are negligible in themselves. Taking into account the existing background values, the effect can be considered limited negative in Lillo and Berendrecht. To limit this effect, the latest technology and techniques will be used to keep small leak emissions as low as reasonably achievable.

The impact on dust concentrations in the air (PM_{10} and $PM_{2.5}$) is considered negligible for PM_{10}. $PM_{2.5}$ is considered to have a limited negative to negative impact in Berendrecht, partly because the Flemish health advisory value for these parameters has already been exceeded. Outside Berendrecht, the contribution to $PM_{2.5}$ is negligible.

5.8.1.2 Effects via noise

The noise impact of Project One at the nearest homes is negligible, both during the construction phase and during the operational phase.

The installation is equipped with several ground flares and a tower flare. The noise impact of the ground flares near residential areas is negligible.

The tower flare will only be used for safety reasons in the event of major, exceptional process malfunctions. The operation of the tower flare may cause short-term nuisance, especially in Lillo. The tower flare will not be used during planned start-up and shutdown of the installation.

The impact of additional shipping traffic on the noise climate is also negligible.

5.8.1.3 Other effects

The risk of Legionella contamination from cooling systems is considered negligible due to the technical design of the installation and the monitoring laid down in a management plan.

Any increase in light pollution in residential areas will also be negligible.

5.8.2 Mitigating measures

The mitigating measures for the discipline Human – Health are similar to those in the chapters discussing the relevant emissions and relate to the reduction of emissions to air, good lighting and noise reduction.

5.9 Climate

5.9.1 Effects

Project One uses state-of-the-art technology for cracking ethane. The best available techniques (BAT) and energy integrations are consistently applied to achieve the highest possible energy and production efficiencies.

This results in very low process emissions from the Project One ethane cracker, specifically 0.290 tonnes of CO2-eq per tonne of HVC (High Value Chemical), or only 42% of the current EU ETS benchmark value of 0.681 tonnes of CO2-eq per tonne of HVC. It has been calculated that Project One implies a tightening of the EU ETS benchmark value for HVC production to approximately 0.577 tonnes CO2-eq per tonne of HVC. This is a decrease of approximately 15% compared to the current benchmark value for HVC production (0.681 tonnes CO2-eq per tonne of HVC).
Taking into account the current annual HVC production capacity in Europe of 47.6 Mtonnes of HVCs (IEA (2018)), this means that approximately 4.95 Mtonnes of additional emission allowances must be paid or avoided annually by existing steam crackers for HVC production under the EU ETS system. Such a quantity of emission allowances corresponds to approximately 267 million euro/year, taking into account the current price (mid-February 2024) of 54 euro/tonne CO2 under the EU ETS system. Part of this additional revenue for the EU ETS system will be used to support innovation and modernisation projects in energy-intensive industrial sectors and the energy sector. Project One's ECR is likely to have an impact on the benchmark for phase 5 of the EU ETS system (from 2031), as operations will start in 2026. Project One will use green electricity by concluding power purchase agreements with energy suppliers (the contracts already concluded are for offshore wind energy).

Project One has a number of possible future prospects for further reducing the direct CO2 emissions of the ECR, with the aim of becoming CO2 neutral within 10 years of start-up (see § 2.2). The two most concrete are a CO2 capture technology and a CO2 reduction technology with 100% hydrogen in the fuel gas to the ECR. Project One has provided the necessary technological flexibility on the ethane cracking furnaces (ECR) and steam boilers for these scenarios.

Project One has been adapted to a changing climate. The project area is being made more resistant to increased flood risks resulting from climate change. The use of desalinated water to replace municipal water means that Project One's municipal water consumption will be reduced by approximately half, which is a significant decrease. During possible periods of drought, the risk of water scarcity is mitigated by switching to an alternative source via brackish water production.

The administrative building is designed to be energy efficient. Passive techniques such as thorough insulation and passive solar gain, climate and lighting controls, and renewable energy techniques are integrated into the design.

5.9.2 Mitigation measures

Apart from the measures already integrated into the project, no additional mitigation measures are recommended.

5.10 Cross-border effects

Project One is located approximately 4 km from the Dutch border. At this distance, the effects for all disciplines are negligible.

There is a protected nature reserve in the Netherlands (Brabantse Wal, largely designated as a Birds Directive area and a Habitats Directive area). The potential effects of Project One, particularly due to nitrogen deposition, were therefore evaluated in an appropriate assessment, which forms part of the Environmental Impact Report.

This appropriate assessment concludes that, from a scientific point of view, the emissions from Project One will not lead to a significant deterioration of the natural characteristics of the Habitat and Birds Directive areas. Project One therefore does not jeopardise the achievement of the conservation objectives of the notified and targeted habitats and species living therein.

6 DECISION

Effect (after project-integrated mitigation measures)	Explanation	Score	Additional measure/monitoring	Score
Noise				
Construction phase: Construction site activities and vehicles in project area during the day	Lillo	0	Source-related measures, measures to limit noise transmission and organisational measures.	0
	Berendrecht	0		0
	Galgenschoor north	0/-1		0/-1
	Galgenschoor south	-1/-2		-1/-2
	Opstal Valley	0		0
Construction phase: Construction site activities and vehicles in the project area at night	Lillo	0		0
	Berendrecht	0		0
	Galgenschoor north	0		0
	Galgenschoor South	0		0
	Opstal Valley	0		0
Construction phase: Road traffic noise		0/-1	-	0/-1
Construction phase: Ship noise (sailing)		0	-	0
Operational phase: Installations + ships at the quay	Lillo	0	As the project progresses, we will verify whether all more detailed and specific supplier data is in line with the assumptions in this EIA	0
	Berendrecht	0		0
	Galgenschoor	0		0
	Opstal Valley	0		0
	Canal dock and slipways 1 / 2	0/-1		0/-1
Operational phase: At start-up/shutdown of the ECR (installations + ECR ground flare)	Occurs only sporadically	0/-1	As the project progresses, it is important to check whether all more detailed and specific supplier data is in line with the assumptions in this EIA. Where possible, a low-noise type flare.	0/-1
Operational phase: In the event of emergencies (ground flares and 1 open, high flare)	Emergency	/		/
Operational phase: Road traffic noise		0	-	0
Operational phase: Ship noise (sailing)		0	-	0
Air				
Construction phase: Shipyard activities, vehicles in the project area and ship traffic	Canal dock	-2	-	-

Effect (after project-integrated mitigation measures)	Explanation	Score	Additional measure/monitoring	Score
	Up to 0.5 to 1 km northeast of the site Opstal Valley (limited section) and Galgenschoor (limited part)	-1		-1
	All residential areas and other nature reserves	0		0
Construction phase: Road traffic		0	-	0
Operational phase: NO_2 (annual average)	Canal dock	-	The project already applies BAT, which means that emission levels are lower than those prescribed by BAT. It has been demonstrated that no additional measures with relevant additional reductions are feasible.	-
	Up to approx. 2 km northeast of the site Opstal Valley (partly)	-1		-1
	All residential areas and other nature reserves	0		0
Operational phase: SO_2	Canal dock	0/-1	-	0/-1
	All residential areas and nature reserves	0		0
Operational phase: CO		0	-	0
Operational phase: Fine particulate matter		0	-	0
Operational phase: Volatile organic compounds: benzene	Canal dock	-1	-	-
	All residential areas and other nature reserves	0		0
Operational phase: traffic emissions		0	-	0
Soil				
Construction phase: Erosion		0		0
Construction phase: Change in soil stability		0/-1		0/-1
Construction phase: Earthmoving and temporary storage of soil		0/-1		0/-1
Construction phase: Structural changes and profile changes		0		0
Construction phase: Change in soil quality due to leaks		0/-1		0/-1
Operational phase: Change in soil quality due to leaks (installations, tanks, transhipments)		0/-1		0/-1

Effect (after project-integrated mitigation measures)	Explanation	Score	Additional measure / Monitoring	Score
Water				
Vegetation removal and construction of paved surfaces		-1		-1
Construction phase - Drainage: Soil settlement, impact on existing groundwater extraction, salinisation and groundwater contamination around the project area		-1	Preventive measures already provided for (infiltration and/or sheet piling) with monitoring (drainage note)	-1
Construction phase - Drainage: Change in surface water quality		0		0
Construction phase (including vegetation removal): Change in groundwater quality due to leaks		0/-1		0/-1
Operational phase: worst-case impact of effluent discharge		0	Extensive purification is already planned.	0
Operational phase: impact on underwater sediment		0		0
Operational phase: effect on water quantity		0		0
Operational phase: effect on groundwater quantity due to paving (installations, tanks, transhipments)		-1		-1
Mobility				
Construction phase: Road safety		-1	Attention to road safety at site access and site circulation. Separation of freight traffic/passenger traffic and motorised traffic and vulnerable road users.	-1
Construction phase: Motorised traffic road network	Liefkenshoek Tunnel Thijsman Tunnel A12 towards the Netherlands	-1	-	-
	All other roads	0		0
Construction phase: Resolving motorised traffic intersections	Vopak x Scheldelaan intersection	-2	Well-considered design of the Vopak x Scheldelaan intersection during the construction phase with a view to optimising traffic flow.	-1
	R2 x Scheldelaan intersection	-1/-3	Adjusted working hours	-1/-2
	All other intersections	0	-	0
Construction phase: Passenger car parking		0	-	0
Construction phase: Lorry parking		0	-	0
Operational phase: Road safety	Cycling safety	-	Attention to road safety in further detailed design of Project One access. Separation of freight traffic/passenger traffic and motorised traffic/vulnerable road users.	-1

Effect (after project-integrated mitigating measures)	Explanation	Score	Additional measure / Monitoring	Score
	Vesta intersection	-1		-1
Operational phase: Settlement of road network for motorised traffic		0		0
Operational phase: Motorised traffic intersection management	Intersection Project One (Vesta) x Scheldelaan	-1	-	-
	Intersection R2 x Scheldelaan	-		-
	All other intersections	0		0
Operational phase: Passenger car parking	Ideal occupancy + overflow parking	0		0
Operational phase: Lorry parking		0		0
Biodiversity				
Construction phase: Soil disturbance		0		0
Construction phase: Noise disturbance during the day	Gallows	-1		-1
	Potpolder Lillo	0		0
	Project area	0		0
Construction phase: Noise disturbance at night		0		0
Construction phase: Loss of biotope and ecotope		-	The effect in the project area is negligible. mitigate. Compensation took place outside the project and study area.	-3
Construction phase: Fragmentation and barrier effect		-1	Ecological management of the pipeline corridors has already been planned.	-1
Construction phase: Acidifying and fertilising deposition		0		0
Construction phase: Effect on groundwater management		0		0
Construction phase: Ecotoxicological effects of water and air emissions		0		0
Construction phase: Light pollution		0		0
Operational phase: Noise disturbance	Gallows brace	0		0
	Potpolder Lillo	0		0
	Project area	0		0
Operational phase: Acidifying and eutrophying deposition		0		0
Operational phase: Ecotoxicological effects of water and air emissions		0		0
Operational phase: Light pollution		-1		-1

Effect (after project-integrated mitigation measures)	Explanation	Score	Additional Measure / Monitoring	Score
Landscape				
Vegetation removal/Deforestation: Loss of heritage value		0	-	0
Vegetation removal/deforestation: Structural changes		-2	Local effects are an inherent consequence of deforestation in industrial areas. These cannot be mitigated. However, forest compensation does take place in other locations.	-2
Vegetation removal/deforestation: Relationship changes		-2		-2
Vegetation removal/deforestation: Change in landscape appearance and perception		-1/-2		-1/-2
Construction phase: Loss of heritage value		0/-1	The phased archaeological investigation (with deferred process) indicates a new prehistoric site worthy of preservation. A follow-up investigation with evaluation test pits will not be carried out, as the site has been released. It is recommended that additional targeted mechanical drilling be carried out for the purpose of extensive scientific sampling and study (this is explained in the Programme of Measures for the postponed process).	0/-1
Construction phase: Structural changes		-1	-	-
Construction phase: Relationship changes		-	-	-1
Construction phase: Change in landscape appearance and perception		-1	-	-
Operational phase: Loss of heritage value		0	-	0
Operational phase: Structural changes		-	-	-
Operational phase: Relationship changes		-	-	-
Operational phase: Change in landscape appearance and perception	Varies depending on location	0/-1	These effects are inherent to the presence of conspicuous installations. They cannot be mitigated.	0/-1
People				
Construction phase: NO_2 (peak period of 1.5 years during the construction phase)	EIA-GAW	-1	The project already applies BAT, which means that emission levels are lower than those prescribed by BAT. It has been demonstrated that no additional measures with relevant additional reductions are feasible.	-1
Construction phase: Noise	during the day	0	See above under 'Sound'	0
	At night	0		0
Construction phase: Light pollution		0	Principles of good lighting	0
Operational phase: NO_2	MER-GAW	-	See above under 'Air'	-

Effect (after project-integrated mitigation measures)	Explanation	Score	Additional measure/monitoring	Score
Operational phase: benzene		-1	See above under 'Air'	-1
Operational phase: butadiene		-1	See above under ‘Air’	-1
Operational phase: PM_{10}	EIA-GAW	0	See above under ‘Air’	0
Operational phase: $PM_{2.5}$	EIA-GAW	-1/-2	See above under ‘Air’	-1/-2
Operational phase: Noise – continuous noise sources		0	See above under ‘Noise’	0
Operational phase: Noise – continuous noise sources + flares		-1	See above under ‘Noise’	-1
Operational phase: light pollution		0	Principles of good lighting	0
Operational phase: Legionella		0	-	0

APPENDIX 1: SITE PLAN

COLOPHON

MER INEOS "PROJECT ONE" IN LILLO NON-TECHNICAL SUMMARY

AUTHOR
Frank Van Daele

DATE
26 August 2024

Arcadis Belgium nv

Post X
Borsbeeksebrug 22
2600 Antwerp
Belgium
02 505 75 00

www.arcadis.com