MOTT MACDONALD

Report infrastructure

New Nuclear Power Plants NL

April 2026

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Contents

Executive summary

The Ministry for Climate Policy and Green Growth (KGG) has identified seven potential sites (with two alternatives) in four areas (Eemshaven, Maasvlakte, Sloegebied, Terneuzen) for the development of a new twin-unit gigawatt-scale nuclear power plant in the Netherlands.

To support the site selection process, Mott MacDonald has undertaken an infrastructure study on behalf of Antea Group. The purpose of this report is to provide input to the site selection process by indicating infrastructure requirements and options to construct a new nuclear power plant. Specifically, this report:

- Provides a general description of the most important infrastructure in the Netherlands for a large new nuclear power plant (LNPP) e.g., rail, road and marine.
- Describes the available infrastructure in the Eemshaven, Maasvlakte, Sloegebied, and Terneuzen areas.
- Gives an overview of the starting points for required infrastructure at the construction of a LNNP.
- Identifies potential infrastructure solutions to import Abnormal Indivisible Loads (AILs) and bulk materials at each location.[1]
- Estimates the costs to construct such infrastructure.

Assumptions for the infrastructure study have been defined[2], based upon a combination of the existing Dutch infrastructure network, information identified on other LNNP projects[3] and consideration of the worst-case scenario as a starting point. These assumptions are:

- Trains will not be used as transportation mode for either material and/or workforce to site (however, a brief overview of rail infrastructure has been included to provide a complete oversight of options available).
- Trucks are used to transport some conventional goods, including some bulk materials and cement to site. A total of 130 truck trips per day are assumed based on commonly accepted reference values.
- Ships are used to transport bulk materials (e.g. aggregates and sand) to the site. This would either require direct port access by a quay structure or a bulk import facility (e.g., a jetty).
- Ships are preferably used to transport AILs directly to the construction site, which would require a quay structure. Alternatively, if a quay wall is not available or cannot be constructed, an offsite facility could be used to import AILs whereafter they will be transported over road to the construction site.
- For workforce numbers, Sizewell C (SZC) in the UK is used as reference case. Peak workforce at SZC is forecast to be approximately 8,000.
- Workforce is assumed to be split into shifts on a 60% - 25% - 15% basis (day, evening, night).
- Accommodation campuses are not considered at the site selection stage. All workers will instead commute to the construction site on daily basis.
- As worst-case scenario all workers will commute to the construction site by car.

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[1] The locations and type of additional infrastructure are indicative and based upon the information available to date.

[2] These assumptions were defined with Antea Group and KGG.

[3] Refer to the Factsheets: *'Factsheet v4 25082025'*

- At the construction site a parking facility for 1,200 vehicles will be developed.
- Park and Ride facilities will be created at locations yet to be designated, based on the outcomes of the traffic modelling study (currently pending outcome and thus on hold). The cost for such facilities will be the same across all sites and therefore is not considered further.

Required infrastructure per location including costs

The potential required infrastructure per site depends on the availability of existing infrastructure and the transportation strategy at each individual location. Options involving the use of jetties may be constrained by the presence of Natura 2000 areas, which could impede or prevent construction.

Table 1 summarises the outcomes of the study and availability of infrastructure per location.

Table 1: Summary table of the infrastructure required at each location

Site	Port – bulk	Port – AILs	Road	Assumed cost[4]	Main remarks
Eemshaven 1A	Via existing port. Quay structure upgrades necessary.	Via existing port, Quay structure upgrades necessary.	Via N33 and N46. Several road upgrades necessary.	€210M	• AILs and bulk will be transported through the same quay, causing a possible issue on availability. • Quay considered is only just long enough to moor two ships simultaneously.
Eemshaven 1B	Via new built Jetty in Waddensea.	Via existing external facility (Wagenborg).	Via N33 and N46. Several road upgrades necessary.	€561M	• Availability of the external quay facility is to be confirmed. • Optional jetty construction in the Waddensea could be difficult due to Nature 2000 restrictions. • Optional jetty structure may interfere with cooling water options.
Eemshaven 2	Via existing quay at RWE coal fired power plant.	Via existing quay at RWE coal fired power plant.	Via N33 and N46. Several road upgrades necessary.	€90M	• Strength of the quay structure of the RWE coal fired powerplant requires further examination. • Length of the existing quay is only just long enough to moor two ships simultaneously. • AILs and bulk will be transported on the same quay, causing a possible issue on availability.
Eemshaven 3	Via new built Jetty in Eems-Dollard area.	Via existing external facility (Wagenborg).	Via N33 and N46. Several road upgrades necessary.	€465M	• Working area and main area are distanced from each other. Causing possible issues with bulk transport (entry point on main area). • Road system in Eemshaven is assumed to be capable of carrying loads for AILs, this requires further technical assessment. • Availability of the external quay facility is to be confirmed. • Feasibility on optional jetty construction in the Eemshaven area requires further examination and could be challenging due to Nature 2000 restrictions.
Maasvlakte II	Via new build quay directly at the site.	Via new build quay directly at the site.	Via maasvlakte-weg and N15 / A15.	€105M	• Efficiency for ship transport could be improved by creating two separate facilities.

[4] Note that these figures are related to investment costs and no other cost factors as preparation, engineering, land acquisition, permitting, financing etc are taken into account.

Site	Port – bulk	Port – AILs	Road	Assumed cost[4]	Main remarks
					• Rail network in the harbor of Rotterdam is well established and could potentially be a proper transportation method.
Sloegebied 1	Via existing quay structure.	Via existing quay structure.	Via A58 – N62 – N254 corridor	€90M	• Current quay is not long enough. This could be mitigated by creating additional infrastructure as a pier. • Several infrastructures (railway line, road and cable + Pipeline corridor) cross the site. This would require relocation of these facilities.
Sloegebied 2	Via existing quay.	Via existing quay.	Via A58 – N62 – N254 corridor	€60M	• Quay is currently being used to transport a variety of materials including possible toxic materials. Soil could potentially be contaminated.
Terneuzen 1A / 1B	Via new built jetty in the Westerschelde.	Via upgraded existing quay at Zeeland Container Terminal (ZCT).	Via the A58 or E34 corridors.	€525M	• Transport of AILs from ZCT to site requires further examination, since part of private road (operated by DOW) is used. • Construction of an optional jetty structure in the Westernschelde would potentially be difficult due to Nature 2000 restrictions. • Offloading point at the optional jetty will be close to an existing shipping corridor.

This study identified the approximate CAPEX figures of the infrastructure considered likely to be needed to enable the construction of a nuclear power plant. The CAPEX figures have been multiplied by three to accommodate the total worst case investment costs. Further assessment on the feasibility of the sites (e.g., technical, economical, and environmental etc.) has not be conducted in this study and is recommended at a future stage of the project.

1 Introduction

This report presents the infrastructure study executed by Mott MacDonald on behalf of Antea Group, providing information to the site selection for the construction of a new twin-unit gigawatt nuclear power plant in the Netherlands. The Large Nuclear Power Plant (LNPP) Programme is currently in the site selection stage; this study will contribute to the process of identifying a site for development. Specifically, the purpose of this study is to:

- Provide a general description of the generic characteristics of the most important infrastructure in the Netherlands for a LNNP (e.g., rail, road, and marine).
- Describe the available infrastructure in the Eemshaven, Maasvlakte, Sloegebied, and Terneuzen areas.
- Identify indicative new infrastructure options required for the construction and operation of a LNNP, and the estimated costs for such infrastructure.[5]

[5] The locations and type of additional infrastructure are indicative and based upon the information available to date.

2 Description of locations

For this site selection study, four search areas have been defined, within which there are a total of seven locations. For two of the selected locations, two alternative sites are defined, giving a total of nine potential sites provided by the Ministry of Climate Policy and Green Growth (KGG). These are further detailed in the introduction document. The introduction document outlines the project purpose and scope, identifying key stakeholders, implementing boundary conditions, including law and budget, detailing expectations and ambitions for the intended facility. It defines the project and potential risk as well as providing an overview of relevant frameworks and requirements.

Table 2 lists the potential sites; the alternatives are outlined in Appendix A.

Table 2: Potential site locations and adjacent infrastructure

Location	Province	Type	Current land use	Adjacent infrastructure
Eemshaven 1a (A.1)	Groningen	Brownfield	Oil terminal, solar field, electrical substation, wind turbines, defence offloading harbour.	Rail: Yes (single track, not electrified). Passenger line runs north-east along western boundary to the ferry terminal; branch line bisects the site serving the Julianahaven and Emmahaven. Road: N46 (close proximity). Harbour: Yes (Julianahaven, Beatrixhaven and Emmahaven all <1km away).
Eemshaven 1b (A.2)	Groningen	Greenfield	Agriculture, wind turbines.	Rail: Yes (single track, not electrified). Passenger line runs north-east along eastern boundary to the ferry terminal; branch line bisects the site serving the Julianahaven and Emmahaven. Road: N46 (c. 1km away). Harbour: No direct access (c. 1km away).
Eemshaven 2 (A.3)	Groningen	Brownfield	Coal fired powerplant (RWE Eemshaven plant).	Rail: No. Road: N33 (close proximity). Harbour: Yes. (Wilhelminahaven).
Eemshaven 3 (A.4)	Groningen	Brownfield	Gas fired powerplant (Engie Eemscentrale), solar field, wind turbines.	Rail: No. Road: N33 (close proximity). Harbour: No direct access.
Maasvlakte 2 (A.5)	Zuid-Holland	Greenfield	Reclaimed land, not taken up by industry.	Rail: Yes (double track, not electrified) running through wider port for container transport - heavy use, and then towards the site. Road: N15 (via Maasvlakteweg). Harbour: To be constructed [6].

[6] The site has direct access to the deep-sea harbour of the Arianehaven area although, no quay structure is constructed yet.

Location	Province	Type	Current land use	Adjacent infrastructure
Sloegebied 1 (A.6)	Zeeland	Brownfield	Electrical substation (Ijmuiden Ver Alpha), solar field, wind turbines, cable and pipeline corridors, Europaweg Zuid.	Rail: Yes (single track, not electrified) along southeast boundary, a branch also bisecting the site towards the COVRA facility. Road: N62 (via Europaweg Zuid). Harbour: Yes (Kaloothaven).
Sloegebied 2 (A.7)	Zeeland	Brownfield	Coal harbour, electrical substation, wind turbines.	Rail: Yes (single track not electrified). Road: N62 (via Europaweg Zuid). Harbour: Yes (Cittershaven / Kaloothaven).
Terneuzen 1a (A.8)	Zeeland	Brownfield	Solar Park, agricultural, housing, farming.	Rail: Yes (Single track, not electrified) originating from the south of the site in connection to the port of Teneuzen which crosses a bridge. Would need to run in reverse. Road: N61 / N62[7] (both c.4km away). Harbour: No direct access.
Terneuzen 2a (A.9)	Zeeland	Greenfield	Agricultural, housing, farming.	Rai: No (extension of c.2km required of existing railway line). Road: N61 / N62[7] (both c.4km away). Harbour: No direct access.

[7] Connection to the N62 likely to cross perimeter of DOW chemical plant.

3 General description Dutch infrastructure

3.1 Road

The Dutch road-traffic network is one of the densest networks in the worlds. The World Economic Forum declared the Dutch Road Traffic Network to be the best quality in Europe and the second-best quality in the world (2019). Quality in this case refers to the accessibility of various areas in the country and the maintenance of the network. The network consists of the following road categories:

- **Highways:** Referred to as the ‘Autosnelwegen’ in the Netherlands. Highways are labelled by the letter ‘A’, followed by a number. Nominal maximum speed is 100 km/h (06:00-19:00) and 130 km/h (19:00-06:00) however, near larger cities the maximum speed is often 80km/h. Figure 1 shoes the Highways network, the most important highways including:
  - A1: Connecting Amsterdam through the middle of the Netherlands with Germany.
  - A2: Connecting Amsterdam with Belgium through Utrecht 's Hertogenbosch, Eindhoven, and Maastricht.
  - A4: Connecting Amsterdam with the Rotterdam and The Hague area.
  - A7: Connecting Amsterdam via the Afsluitdijk with Northern Germany.
  - A16: Connecting Rotterdam with Belgium (Antwerp).
  - A28: Connecting Utrecht with Groningen.
- **Expressways:** Referred to as 'Autowegen' in the Netherlands, expressways are labelled with the letter 'N', followed by a number. Nominal maximum speed is 100 km/h, 80km/h or 60km/h depending on the road, environment, and surrounding conditions.
- **Local access roads**: Roads within cities or villages. Nominal maximum speed is often 50km/h or 30km/h.

Figure 1: Figure of all highways in the Netherlands

3.1.1 Regulations regarding truck traffic

In the Netherlands, conventional trucks with trailers or semi-trailers may have a total weight of 50t Heavier loads or AILs require special exemptions, regulations are determined national vehicle and traffic laws with permits issued subject to safety, vehicle characteristics, load description, infrastructure capacity, and detailed route planning. There is no ban limiting truck movements during weekends or national holidays.

3.1.1.1 Tolls

In the Netherlands there is a vignette obligation for trucks above 12t. The toll value is dependent on the quantity of axis, the emission category of the truck, and the validity period of the vignette. There is one toll tunnel (Westerschelde-Tunnel) located in the province of Zeeland.

The government is planning to set a more extensive toll regulation for trucks from the 1st of July 2026.[8] The current vignette will be replaced by a kilometre-based truck toll system which applies to trucks over 3.5t. The toll rates will depend on:

- Distance driven
- CO2 emission class
- Euro emission class
- Maximum technical mass

[8] https://www.vrachtwagenheffing.nl/en

3.1.1.2 Sizing

Sizing of trucks depends on the type of truck that is used.

Single truck:

- Length: 12m
- Width: 2.55m
- Height: 4m

Driving machine:

- Length: 20m
- Width: 3m
- Height: 4m

Truck and trailer:

- Length: 16.5m, or 18.75m (up to 22m with indivisible load)
- Width: 2.55m
- Height: 4m

Exemptions

Exemptions on the aforementioned sizing can be requested through the Dutch Vehicle Authority (RDW). Exemptions which are generally accepted are as follows:

- Length: Increase up to 27m (trailer must be equipped with a steering axis)
- Width: Increase up to 3.5m
- Height[9]: Increase up to 4.15m

Furthermore, a truck driver can apply for a LZV (Lange Zware Vrachtvoertuigen; Long Heavy Trucks). The maximum sizing for these vehicles is:

- Length: 25.25m
- Width: 2.55m
- Height: 4m

3.1.1.3 Maximum Load

The general maximum load of trucks (with or without trailer) is 50t. The limit is driven by infrastructure and safety considerations. Some bridges on expressways or local access roads might have weight restrictions lower than 50t, however, this is an exemption. General exemptions are LZV trucks – the maximum load of these trucks is 60t. Further exemptions up to 100t can be applied for through the RDW. Permits can be issued by the Rijkswaterstaat for loads exceeding 100t dependent on route-specific analysis, infrastructure condition, technical vehicle suitability, safety measures, and occasionally traffic escorts or temporary traffic management. Each case will be reviewed by the Rijkswaterstaat following an engineering review.

3.2 Rail

The Netherlands has one of the world's densest railway networks, with a total network length of 3,434km, of which 75% is electrified. The network is operated by the Dutch governmental organisation ProRail. The main operator for passenger traffic is Nationale Spoorwegen (NS),

[9] It should be noted that any viaducts on the Dutch highways are typically built with a 5.6m clearance.

although several smaller operators are also active, including Arriva, Connexxion, Keolis, and Qbuzz. The Netherlands has international railway connections to several major European cities, such as London (St Pancras), Paris Nord, Brussels South, Berlin, Düsseldorf, Vienna, Innsbruck, Frankfurt, Basel, and Dortmund. Figure 2 shows the extend of the Dutch rail network. It is notable that the area of Zeeland within which Terneuzen is located is not served by the Dutch rail network.

Main characterisations of the Dutch railway network:

- Track width: Standard-gauge railway (1,435mm).
- Electrification: 1,500V DC.
  - Exception Betuweroute and HSL-South: 25,000V AC.
- Maximum length: 740m for freight trains, 400m for passenger trains.
- Communication system: GSM-R and digital radio communication.

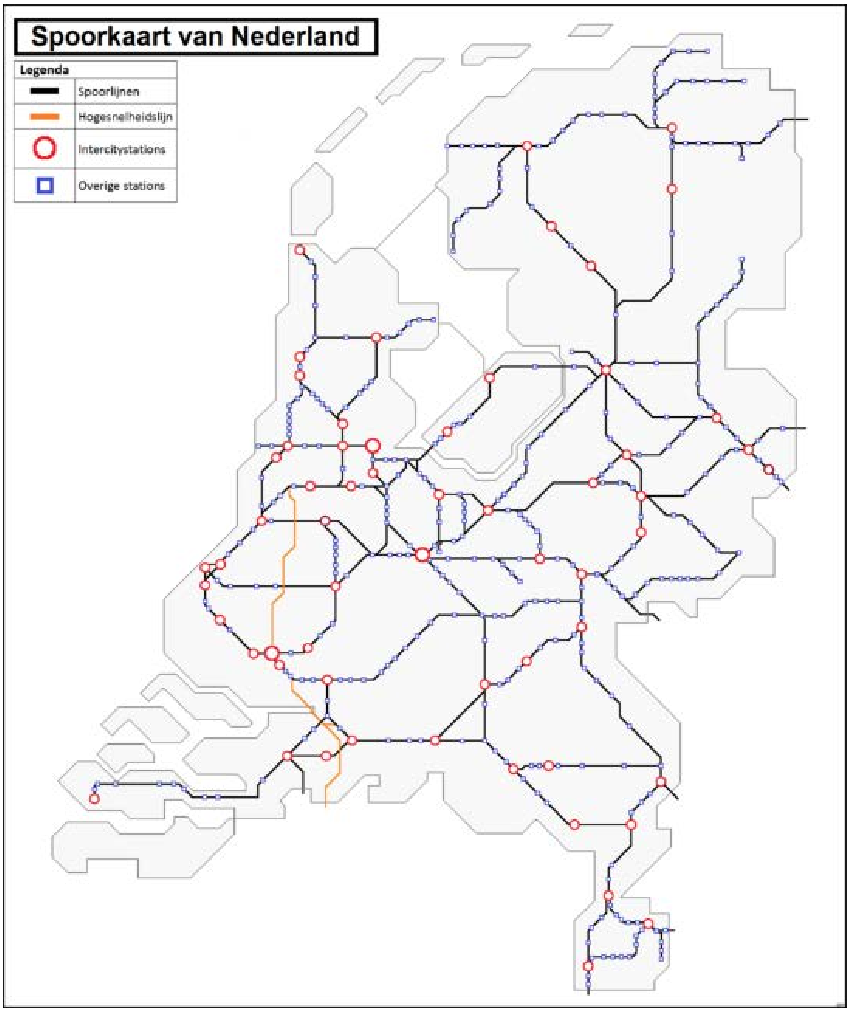

Figure 2: Railway network Netherlands

3.2.1 Freight transport

The Dutch railway network is open to any company who is willing to transport goods over the network and has completed a safety test from the Dutch Government. Main freight transport operators are:

- DB Cargo
- Lineas
- Captrain
- Rotterdam Rail Feeding

Within the Netherlands there are regulations regarding the transportation of hazardous materials and products. Exact restrictions depend on the type of product and exact routing.

The total freight volume in the Netherlands was 39.3 million tonnes in 2023. This freight is mostly transported on designated routes, such as the Betuweroute, a high-capacity, freight-only rail line connecting the Port of Rotterdam to the German border. This ensures minimal interference with passenger services and efficient international transit.

Other corridors that are actively used for freight transport are the Amsterdam- Arnhem-Germany corridor which connect the Port of Amsterdam to the German border, which is part of the Rhine-Alpine corridor, used for container and bulk transport. In the north of the Netherlands, the main corridor is the Groningen – Nieuweschans – Germany corridor, which is used for freight from Eemshaven. It is a less frequently utilised route, however it is strategically important for energy and offshore logistics.

3.2.1.1 Types of freight and sizing

Different types of freight account for rail cargo, and these are transported by various wagons, each with specific limitations in size and weight. The maximum width of all wagons is typically 2.8m. The following wagon types are commonly used.

Open Wagon

These wagons are used to transport bulk cargo that can be exposed to weather conditions, such as coal, scrap wood, and scrap iron (Figure 3). They have the following characteristics: -

- Number of axles: 2/4/6
- Loading capacity: c.82.5m³
- Maximum loading weight: c.66t

Figure 3: Open wagon[10]

Dump wagon (closed/open)

Open dump wagons allow goods to be unloaded by gravity and are suitable for weather-exposed materials like coal and ore. Closed dump wagons are used for weather-sensitive goods

[10] Touax orders 95 freight wagons for Mendip Rail | RailFreight.com

such as cement, steel plates, or chalk (

Figure **4**). They have the following characteristics:

- Number of axles: 2/4/6
- Loading capacity: c.85m³
- Maximum loading weight: c.65t

Figure 4: Closed dump wagon[11]

Closed wagon with sliding doors

Used for palletized goods that must be protected from weather, such as large paper rolls, refrigerators, or manufacturing parts. These wagons have four large sliding doors on both sides (

Figure 5). They have the following characteristics:

- Loading space: c.62.5m²
- Loading volume: c.165.6m³
- Maximum loading length: c.21m
- Maximum loading weight: c.58t

[11] "Side Dump Car" Freight Car Set | Trix Websites

Figure 5: Closed wagon with sliding doors[12]

Flat wagon

These closed wagons are used for goods that must be protected from weather. The sides can be removed to accommodate large items like machinery, metal products, and paper rolls (

Figure 6). They have the following characteristics:

- Loading space: c.34.6m²
- Loading volume: c.15.3m³
- Maximum loading length: c.21m
- Maximum loading weight: c.27t

[12] Closed Sliding Door Wagon RFFSA 2105 FRATESCHI Miniature Collection Figure | eBay

Figure 6: Flat wagon[13]

Container wagon

Designed to transport containers, these wagons can carry up to 3 TEU per wagon (
Figure 7). They have the following characteristics:

- Number of axles: 2/4
- Maximum loading weight: c.70t

Figure 7: Container wagon[14]

Kettle wagon

[13] Flat Wagons | Container Wagons | Flat Rail Cars for Sale | AGICO Group

[14] MFTrain MF33373: Freight wagon set container wagons Lgnss SNCB/IFB Ep.V 2-piece 1:160

Used for transporting liquids or gases, these wagons can be pressurized or non-pressurized. Typical cargo includes oil, chlorides, and LPG (Figure 8). They have the following characteristics:

- Loading capacity: c.116m³
- Maximum loading weight: c.59t

Figure 8: Kettle wagon[15]

3.2.1.2 Possible transport of AILs using rail

The maximum weight of transported cargo is dependent on the wagon specification, and the maximum allowed weight per meter on the railway track. On the route between Amsterdam/Rotterdam and Eemshaven, the final segment of the track limits the weight of wagons. The maximum allowable weight is up to 6.4t per meter of wagon (using the largest railway wagons available this is approximately 160t per wagon). Furthermore, the trains have a maximum width of 3.15m, which is generally insufficient for the transport of AILs.

A new railyard 'Maasvlakte Zuid' is under development and expected to be operational by 2027.The site will include multiple long track suitable for 740-meter-long freight trains and expects to stimulate 6,750 extra freight trains of heavy loads. This will be located in the southern region of Maasvlakte, Rotterdam's port area, and is situated near key industrial zones and container terminals. This is to support growing rail freight needs, improve connections to the European hinterland, and enhance logistics efficiency.

3.3 Sea

The Netherlands consists of several main ports. The general description of the ports of Rotterdam, Amsterdam, Eemshaven, Terneuzen, and Sloegebied are listed below.

3.3.1 Port of Rotterdam

The Port of Rotterdam is one of the largest marine ports in the world. In 2021, total transhipments were as follows:

- Dry bulk: 78.7 million tonnes
- Wet bulk: 204.6 million tonnes
- Containers: 154.5 million tonnes
- Break bulk: 30.9 million tonnes

[15] Tank Wagons | Rail Tank Cars for Sale | AGICO Group

The Port consists of several harbour basins and associated business parks. The total area of the Port of Rotterdam is approximately 12,500ha, with a total length of approximately 40km. The Port is accessible for import and export via waterways (North Sea, Rhine River, Meuse River), railway, and road. Various cargo is handled at the port, ranging from bulk goods to oil, gas, and containers.

Access to the port is possible via the North Sea or major rivers such as the Meuse and Rhine. The port accommodates vessels with a maximum draught of 22.50m, for incoming ships, and 21.50m for outgoing ships. The Port of Rotterdam is operated by the Port of Rotterdam Authority, which is owned by the Municipality of Rotterdam (70%) and the Dutch Government (30%).The 2024 annual report noted revenues of €882 million.[16]

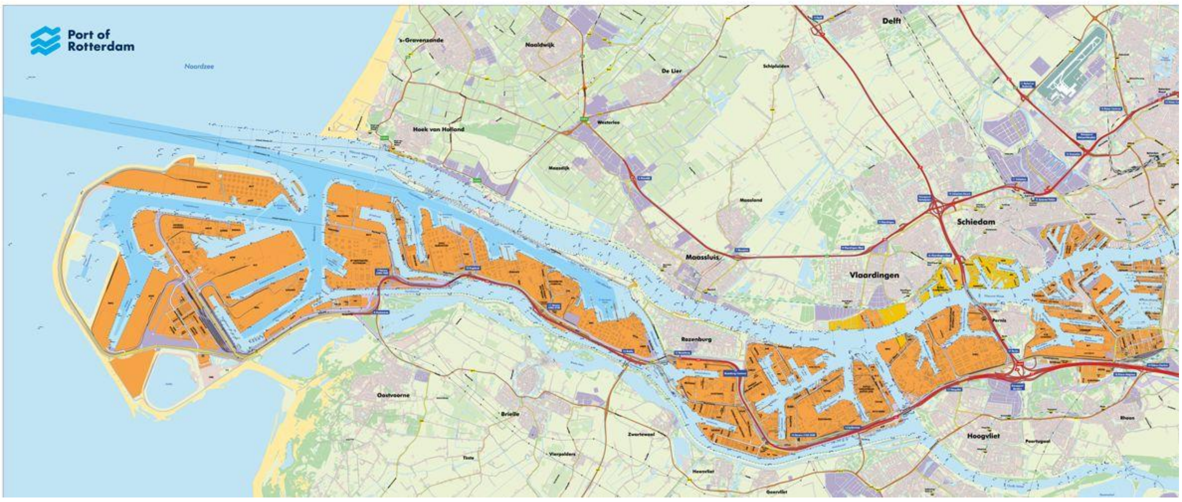

Figure 9: Overview Port of Rotterdam

The harbour is divided into five main zones:

- Eemhaven/Waalhaven
- Botlek
- Europoort
- Maasvlakte
- Eemshaven

3.3.1.1 Eemhaven/Waalhaven

Eemhaven and Waalhaven are prime port locations in the Port of Rotterdam. Together with the Waalhaven, it is one of the oldest ports within the Rotterdam Port area and closest to the city of Rotterdam. Eemhaven is an artificial port created by digging basins and building quays into the reclaimed and developed land, development began in the 1960s. Waalhaven is an artificial port developed in the 1920s through extensive excavation of previously agricultural land and wetlands. The Port has excellent connection to railway, highways (A4 and A15) and the inland rivers. The containers will be transferred from ports to a ‘short sea container terminal’ mainly dedicated to handle containers which stay within Europe. Maximum draught is 5-12m.

3.3.1.2 Botlek

The Botlek is an artificial port, reclaimed from former wetlands in the 1950s and 1960s, and industry area largely dedicated to the petro-chemical industry, tank storage, and bulk storage.

[16] Annual reports | Port of Rotterdam

Within the industrial area, there are several refineries owned by companies such as Shell and BP. From the port there are several pipeline connections to important destinations, both national and international (Belgium, Germany). The Botlek can be accessed through road transport by the highway (A1)5. There is also a railway connection.

3.3.1.3 Europoort

The Europoort is a 3,600ha artificial port within the Port of Rotterdam developed in the 1950s-1960s by reclaiming land from the shallow waters and marshes near Rotterdam. The port primarily consists of oil/gas terminals, bulk carrier goods (iron ore, coal), car transportation, steel, and wood. Together with the Botlek, the Europoort is world’s largest petrochemical industrial area of the world. The Europoort is connected to the North Sea by the Eurogeul, enabling world’s largest vessels to enter the port with a draft of up to 23m. The Port is connected to the railway network and highway network A15.

3.3.1.4 Maasvlakte

The Maasvlakte is an artificial part of the Port of Rotterdam reclaimed from the sea. It comprises two parts:

- De Eerste Maasvlakte (The First Maasvlakte), became operational in the 1970s. Total surface: 3,960ha.
- De Tweede Maasvlakte (The Second Maasvlakte), became operational in 2013. Total surface: 2,000ha.

The main activities on the Maasvlakte are bulk handling, container terminals and distribution centres. The Port can handle the world’s largest containerships, with a draught of up to 23m. Accessibility is achieved through an internal railway network, connected to the national railway network of the Netherlands and the A15 National Highway.

3.3.2 Eemshaven

The Port of Eemshaven is located in the North of the Netherlands in the Province of Groningen, connected to the Waddenzee. The Port is operated by Groningen Seaports NV, fully owned by ‘Gemeenschappelijke Regeling’ which comprises the province of Groningen (50%) and the municipalities of Eemsdelta (33.33%) and Het Hogeland (16.66%). Total transhipments are roughly 7 million tonnes (2021), main transhipments are oil, coal, biomass, containers, and construction materials. Further characteristics of the Port of Eemshaven are as follows (see also):

- Total transhipment (2021): 7,272,407t
- Total surface area: 1324ha
- Available surface area: 207ha
- Total quay length: 5,120m
- Compulsory pilotage: Starting from 90m ship length
- Maximum draught: 14m
- Distance to airport: Heliport Eemshaven (0km); Groningen Eelde Airport (50km)
- Access:
  - Road: Connections to N46 to National highway A7; N33 to National highway A28.
  - Railway connection: Yes, connected to the national rail network by the Eemshaven-Groningen line, supporting both passenger and limited freight transport (especially energy sector logistics) to regional and international destinations. The branch is a single track and primarily non-electrified.

– Water: Eemshaven only accessible through the Eems, a tidal waterway. The Eems connects the Eems canal (near Delfzijl) with the Dutch Inland water system.

Figure 10 - Port of Eemshaven

3.3.3 Terneuzen

The Port of Terneuzen is part of North Sea Port, a cross-border port area that includes Ghent (Belgium) and Vlissingen (Netherlands). It is strategically located along the Western Scheldt estuary and the Ghent–Terneuzen Canal, offering direct access to the North Sea and inland waterways.

The port consists of two parts (

Figure 611):

- Ghent-Temeuzen channel (Kanaalzone):
  – Noorderkanaalhaven: North Quay: 170m; South quay: 192m
  – Zuiderkanaalhaven: North Quay: 225m; South quay: 230m
  – Massagoedhaven: 978m
  – Zevenaarhaven: North Quay: 421m and 555m; South quay: 259m
  – Axelse Vlaktehaven: 290m
  – Autrichohavere: 950m

- Braakmanhaven:
  - Braakmanhaven is part of North Sea Port, located directly on Westem Scheldt with no locks. Braakmanhaven comprises four berths for seagoing vessels and three berths for inland vessels.
    - Dow's Scheldt Jetty: One berth for vessels up to 22,500 dwt or 200 metres LOA
    - Dow's Oceandock: North and south berths
    - Zeeland Container Terminal: 185m
    - EVOS Tomouzen
    - Dow's Braakman: Docks A, B and C

The Port plays a vital role in both the regional and international logistics chain, handling a wide variety of cargo types including dry bulk, liquid bulk, containers, RoRo’s, and project cargo. It is also a key location for the chemical and process industries located to the east of the harbour. Further characteristics of the Port of Terneuzen are as follows:

- Total transhipment: Not individually published, but part of North Sea Port’s total of over 70 million tonnes annually.
- Main cargo types: Fertilizers, minerals, paper, consumer goods, RoRo, project cargo, and industrial chemicals.
- Total surface area: Integrated within the North Sea Port’s 9,100ha.
- Total quay length: c.1,900m.
- Maximum draught: 12.1m to 12.5m, depending on the terminal.
- Access:
  - Water: Via the Western Scheldt and the Ghent–Terneuzen Canal.
  - Locks: The new Lock of Terneuzen, operational from 2024, allows access for Post-Panamax vessels up to 366m in length, 49m in width, and 14.5m draught.
  - Road: Connected to the Dutch and Belgian highway networks via the N62 and Westerscheldetunnel.
  - Railway connection: The Port of Terneuzen is connected to the National and European rail networks via the Terneuzen–Ghent railway, with rail infrastructure available at all major terminals, including Verbrugge, Ovet, NSG, Dow, BAM Infra Rail, and Vopak Terminals. The primary rail infrastructure is the Zeeuws Vlaanderen railway line (Spoorlijn Zeeuws-Vlaanderen), which runs from Terneuzen northwards towards Sluiskil and further connects to Belgium via the Ghent–Terneuzen Canal corridor. This rail line facilitates freight transport, predominantly accommodating the transport of bulk goods, chemicals, and other industrial cargo. The line is primarily single track and non-electrified, suitable for heavy freight operations.

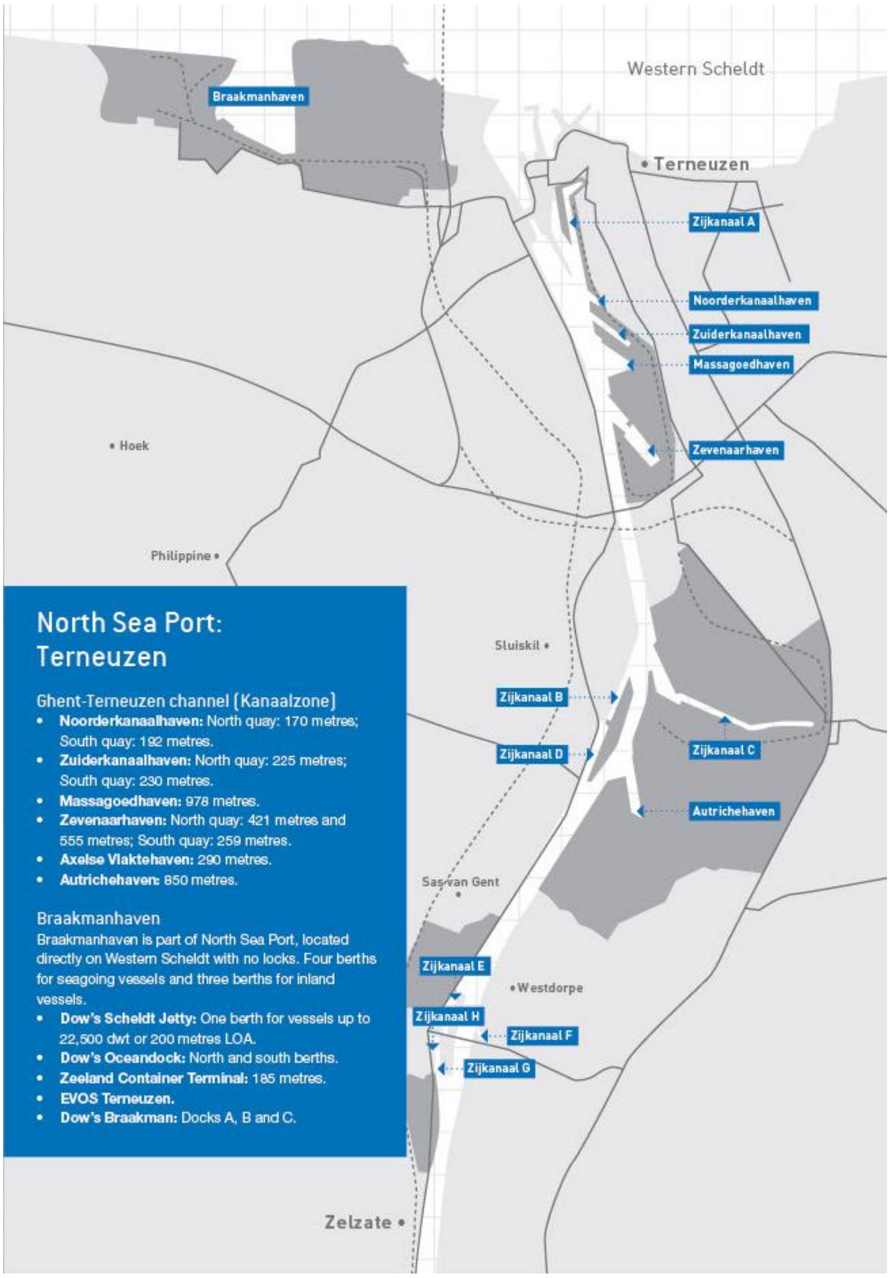

Figure 11: Port of Terneuzen[17]

3.3.4 Sloegebied

The Port of Vlissingen is a smaller but strategically important port located on the Western Scheldt, near the Borssele nuclear power plant and close to major offshore wind energy zones in the North Sea. It is part of the North Sea Port cluster and plays a key role in supporting the energy transition and offshore logistics.

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[17] Source: Terneuzen - Promotion Council North Sea Port

The port is primarily used for general cargo, tankers, and offshore-related activities, including the assembly and transport of wind turbine components. Further characteristics of the Port of Vlissingen are as follows:

- Total transhipment: Not publicly specified; focused on energy-related and general cargo.
- Main cargo types: General cargo, tankers, offshore wind components.
- Total surface area: Integrated within the North Sea Port's infrastructure.
- Total quay length: Not explicitly stated; accommodates vessels up to 190m in length.
- Maximum draught: 13.32m.
- Access:
    - Water: Direct access to the Western Scheldt.
    - Road: Connected to regional road infrastructure and the N62 highway.
    - Special use: The port is a key hub for offshore wind logistics, including the nearby Borssele Wind Farm Zone.
    - Railway connection: Connected to the national and European rail networks via Sloelijn freight railway, with rail infrastructure available at all major terminals in the area—such as Verbrugge Zeeland Terminal, Ovet Terminal, and other port facilities. The Sloelijn is a single-track, non-electrified line, designed to handle a high volume of industrial freight.

3.3.5 Port of Amsterdam

The Port of Amsterdam (Figure 12) is Netherlands second largest port. The port is not within close proximity of the proposed locations. However, the Port of Amsterdam is considered one of the main ports in the Netherlands and is therefore further explained in this report. The Port is operated by the Port of Amsterdam authority, fully owned by the municipality of Amsterdam. Total transhipments are as follows (2018):

- Dry bulk: 31.7 million tonnes
- Wet bulk: 47.4 million tonnes
- Containers: 1.1 million tonnes
- Break bulk: 2.1 million tonnes

The port consists of several harbour parks and associated business parks. The total area of the port of Amsterdam is approximately 1,900ha – port surface, and 600ha – water surface. The port is located near the North Sea along the North Sea Channel. The port can only be accessed by the IJmuiden Sealocks, limiting the size of vessels, in 2022 the new Sealock of IJmuiden increased the maximum size or vessels entering the Port of Rotterdam to:

- Maximum draught: 14m
- Maximum length: 475m
- Maximum width: 65m

The Port complex of Amsterdam consists of several different ports:

- Afrikahaven: Became operational in 2001 and predominantly comprises oil terminals and dry bulk terminals (coal).
- Amerikahaven: Became operational in the 1960s and predominantly comprises oil terminals and dry bulk terminals (construction materials and coal).
- Westhaven: Became operational in the 1940s and predominantly comprises oil terminals, dry bulk terminals (coal, metal), container terminals and a terminal dedicated for roll-on, roll-off.

- Jan van Riebeeckhaven: Predominantly comprises oil terminals and dry bulk terminals (construction materials).
- Petroleumhaven: Became operational in the 1890s and predominantly comprises oil terminals.
- Coenhaven: Predominantly comprises terminals for break bulk materials (construction materials, steel).
- Mercuriushaven: Became operational in the 1890s and predominantly comprises terminals for dry bulk materials (wood, Cacao, fertilizer, food).
- Houthaven: A former port area, now used for residential purposes.
- IJhaven: A former port area, now used for residential purposes and remains a cruise terminal.

The Port of Amsterdam via the following:

- Road: Connected National Highway A5 via the highway network of the Netherlands, with international connections to Belgium and Germany.
- Railway connection: An internal railway network connects to the national railway network of the Netherlands. The Havenspoorlijn consists of double-track, electrified railway lines, supporting both high-frequency freight operations and efficient logistical flows. Rail infrastructure is available at all major terminals in the port area, including Amerikahaven, Westhaven, Jan van Riebeeckhaven, Petroleumhaven, Coenhaven, and Mercuriushaven. Rail infrastructure is modernized to accommodate long trains and heavy loads, with loading and unloading facilities situated adjacent to warehousing and storage zones.
- Water: The Port of Amsterdam is connected to the IJsselmeer via the Oranje locks and to the Rhine River via the Amsterdam-Rhine canal.

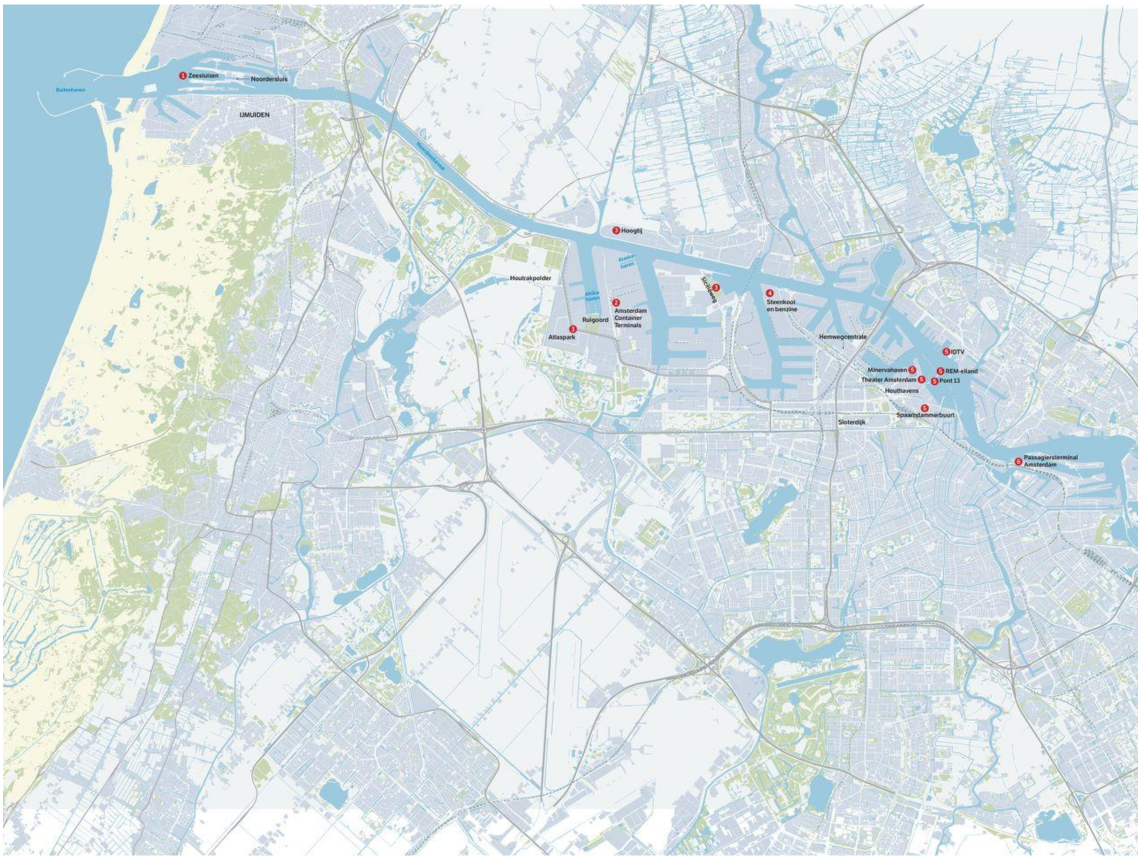

Figure 12: Port of Amsterdam[18]

[18] Source: Doe de haven - NRC

4 Infrastructure availability per location

This chapter reviews the existing infrastructure per location (Eemshaven, Maasvlakte, Sloegebied and Terneuzen) from road and sea perspective.

4.1 Eemshaven

4.1.1 Road

The Eemshaven is accessible via two corridors:

- A7/A28 – N46 – Eemshaven
- A7 – N33 – Eemshaven

Both corridors do not have any restrictions above the general restrictions applicable on the Dutch road system (as described in Section 3.1).

Within the Eemshaven area there is known to be a road system available for transporting heavy loads (>100t) with large dimensions.

4.1.2 Rail

The Eemshaven rail line runs from Eemshaven to Sauwerd, then onwards to Groningen, providing direct access to national and international rail routes. The branch is a single track and primarily non-electrified. The rail terminals and their associated uses are as follows:

- Vopak Terminal Eemshaven: Specialises in tank storage, chemicals, and bulk liquids, with dedicated rail sidings for incoming and outgoing freight.
- Eemshaven Power Plant Terminal (RWE/ENGIE): Provides rail links for the transport of fuel, biomass, and other bulk cargo for local energy producers.
- NorNed Terminal: Supports rail-connected logistics for energy infrastructure and wind farm components, especially for offshore developments.
- DFDS Terminal Eemshaven: Facilitates multimodal transport for Ro-Ro and ferry cargo, with rail access for onward shipment.
- Emmahaven Terminal: Handles general cargo, bulk goods, and project cargo such as wind turbine components and other oversized freight. Rail access enables efficient delivery and dispatch of materials for local construction and offshore energy projects.
- BOW Terminal (Eemshaven): Specialises in offshore wind, heavy-lift, and project cargo. The terminal is equipped for handling large components (turbines, foundations, logistical supplies) with direct rail infrastructure for onward transport to regional and continental destinations.
- Multipurpose Quays: Several quays at Eemshaven are configured for multipurpose use, allowing flexible handling of general cargo, break bulk, and project cargo. Dedicated rail sidings at these locations support tailored logistics for diverse cargo types.

4.1.3 Sea

The Eemshaven area has several locations available which could be used as temporary facility to unload bulk materials and AILs in case there is no space available directly next to the plot. In such cases this would require onward transport over roads to transport the loads from the unloading location to the construction site. These locations are illustrated in Table 3 and Figure 13.

Table 3: Possible locations to transport AILs at Eemshaven

#	Location	Current user	Max draft	Current use	Capacity quay
1	Wagenborg Stevedoring[19]	Wagenborg	14m	Cargo, Roll on / Roll off, onshore / offshore wind, bulk cargo.	10t/m^2
2	Mammoet Eemshaven[20]	Mammoet	7.5m	Heavy lift and storage.	20 – 30t/m^2
3	Vopak Oil terminal[21]	Vopak	11.5m	Oil terminal.	N/A only jetty available
4	Handelskade	N/A	7.5m	Storage.	10t/m^2
5	RWE coal fired power plant[22]	RWE	11m	Bulk transport of coal.	4-6t/m^2

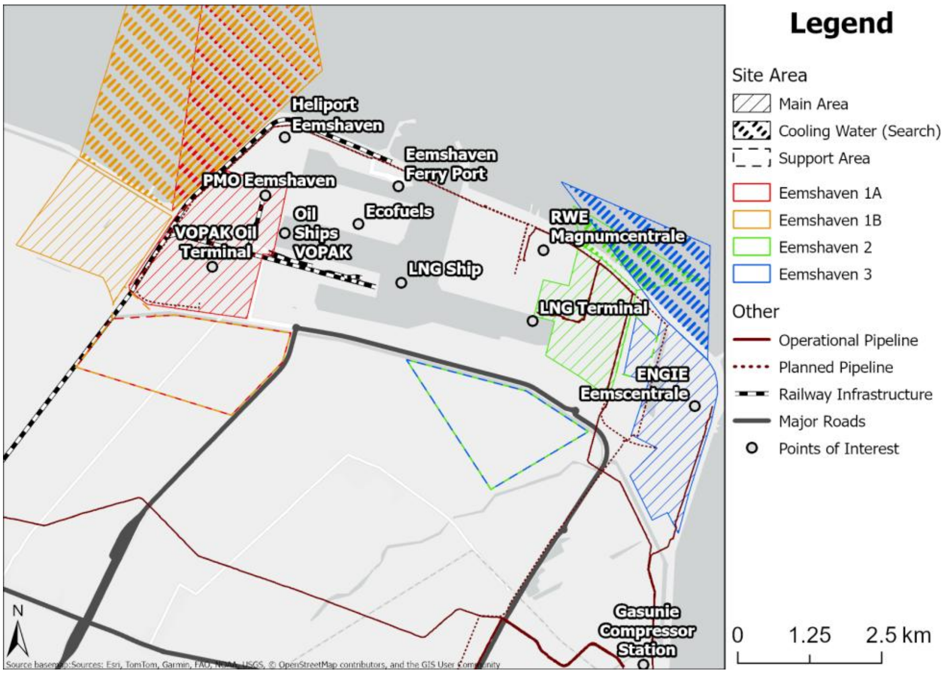

Figure 13: Locations in the Eemshaven area to transport AILs

4.2 Maasvlakte

4.2.1 Road

The Maasvlakte is accessible via one corridor: Maasvlakteweg – N15 – A15. The standard clearances apply as described in Section 3.1.

[19] https://www.wagenborg.com/ports-terminals/warehousing-storage-terminals

[20] https://www.groningen-seaports.com/wp-content/uploads/Offshore-wind-brochure-versie-8-LR.pdf

[21] This location is only considered in relation to alternative Eemshaven 1A, in all other alternatives the VOPAK oil terminal is assumed to remain operational

[22] This location is only considered in relation to alternative Eemshaven 2, in all other alternatives the RWE coal fired power plant is assumed to remain operational.

4.2.2 Rail

The Maaskvlakte rail network forms the western terminus of the Betuweroute freight corridor (a dedicated double-track freight railway built for high-capacity, direct connections from the port to the German border and beyond). The rail terminals and their associated uses are as follows:

- APM Terminals Maasvlakte II: Deep-sea container terminal with direct Betuweroute access; uses automated rail cranes and sidings for intermodal operations.
- RWG – Rotterdam World Gateway: State-of-the-art container terminal handling large volumes; equipped with rail sidings for direct continental container and cargo shipments.
- Euromax Terminal Rotterdam: Major container facility with rail connections to Betuweroute and dedicated intermodal platforms.
- Maasvlakte Distribution Park: Various logistics hubs, warehouses, and rail sidings serving the whole distribution park and adjacent terminals.
- EMO Terminal (Europees Massagoed-Overslagbedrijf): One of Europe’s largest dry bulk (coal, minerals, iron ore) terminals, with specialised rail infrastructure for bulk cargo transfer from ship to rail.
- ECT (Europe Container Terminals) – Maasvlakte: Extensive rail facilities for container transshipment.
- C.RO Ports Rotterdam: Multi-purpose Ro-Ro and container terminal with rail links to Betuweroute, serving automotive, container, and general cargo.

4.2.3 Sea

The Maasvlakte II is 2000ha of a land reclamation and port expansion project which opened in 2013 to increase Rotterdam’s port capacity for deep-sea shipping, container handling, bulk goods, and logistics, while enhancing multimodal transport links (rail, road, inland shipping). The harbour areas are in principle designed and constructed to accommodate ships up to 20m draft. Much of the area is still under development and will accommodate container terminals, bulk storage facilities and energy infrastructure.

The Maasvlakte area has limited existing locations available which could be used to offload AILs off plot (see Table 4 and Figure 14. However, the area of the plot indicates sufficient capacity to offload AILs. Note that this option would require additional transport over roads for the transportation of AILs from the unloading location to the construction site

Table 4: Possible location to transport AILs in the Maasvlakte II area

#	Location	Current user	Max. draft	Current use	Capacity quay
1	Rhenus Deep Sea Terminal	Rhenus logistics	16.4m	Heavy lifting, offshore structures, breakbulk handling.	Not found, likely up to 30t/m^2.

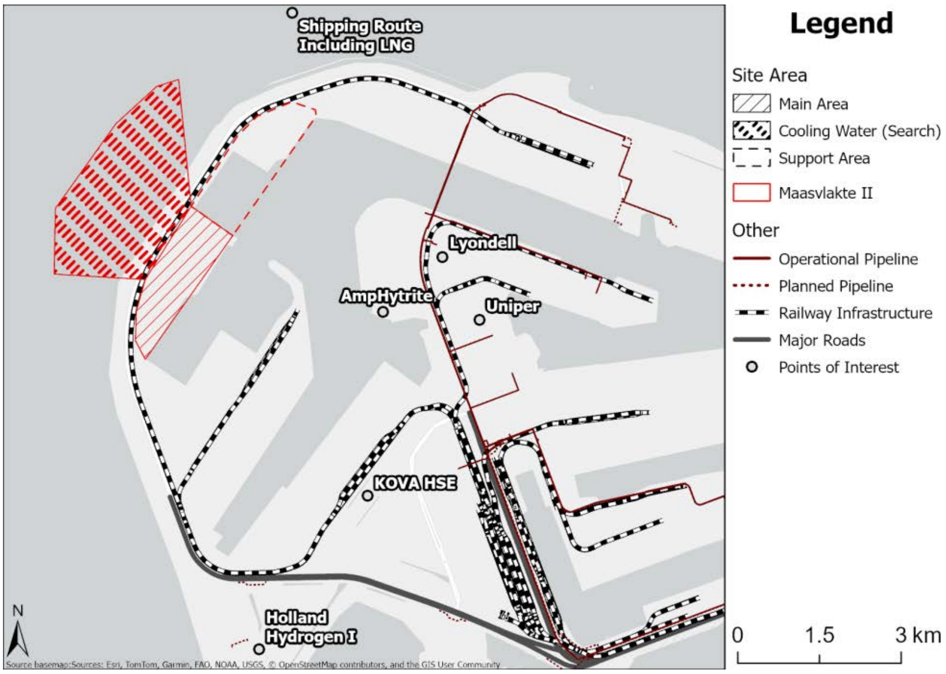

Figure 14: Possible offside location in the Maasvlakte area to transport AILs

4.3 Sloegebied

4.3.1 Road

The Sloegebied area is accessible via one main cargo corridor: N62 – A58.

It should be noted that the N62 via the southern connection to Terneuzen is accessible via a tunnel with an under-bridge clearance of 4.5m. There are no further restrictions than the standard restrictions applicable on the Dutch road system.

4.3.2 Rail

The Sloegebied area is served by the Sloelijn freight railway, a dedicated line connecting Sloegebied directly to the Dutch national rail network via Kruiningen, and onward to Roosendaal and wider European destinations. The Sloelijn is a single-track, non-electrified line, designed to handle a high volume of industrial freight. Sloegebied's rail infrastructure is designed exclusively for freight operations. The rail terminals and their associated uses are as follows:

- Verbrugge Zeeland Terminal: Handles bulk, general, and project cargo; equipped with extensive rail infrastructure for intermodal operations.
- Ovet Terminal: Specialises in dry bulk (coal, minerals, etc.); direct rail siding for efficient ship-to-rail transfer.
- Vopak Terminal Vlissingen: Focuses on tank storage and bulk liquids; rail connections support chemical logistics.
- BOW Terminal Sloe: Heavy lift/project cargo terminal, supporting the offshore wind and energy sectors; rail facilities for large industrial components.
- Other multipurpose quay and bulk terminals: Several smaller terminals and quays are configured for multipurpose use, with rail accommodation for break bulk, general cargo, and industrial supplies.

4.3.3 Sea

The harbour at the Sloegebied is a deep-water tidal harbour servicing the industrial area of the Sloegebied industrial park. The full industrial zone covers approximately 300ha, and the harbour offers berth depths up to 18m. Main activities in the harbour area are containers, dry bulk, liquid bulk, break-bulk, and project cargo (offshore structures). The area also hosts oil refining, energy production, ship repair yards, and offshore production services. Existing locations where AILs could be offloaded are shown in Table 5 and Figure 15.

Table 5: Possible locations to transport AILs in the Sloegebied area

#	Location	Current user	Max. draft	Current use	Capacity quay
1	Unnamed	Unknown	10.4m	Unknown.	Not known
2	Heerema	Heerema	10.4m	Development of offshore structures.	Not known
3	Zeeland refinery	Zeeland refinery	10.4m	Oil terminal.	N/A only jetty development
4	Supermaritime group	Supermaritime group	14.3m	Breakbulk cargo, project cargo.	$10t/m^2$
5	DEME offshore	DEME Offshore	14.3m	Development of offshore structures.	Not known
6	Smulders Netherlands	Smulders Netherlands	7.9m	Development of offshore structures.	$5t/m^2$

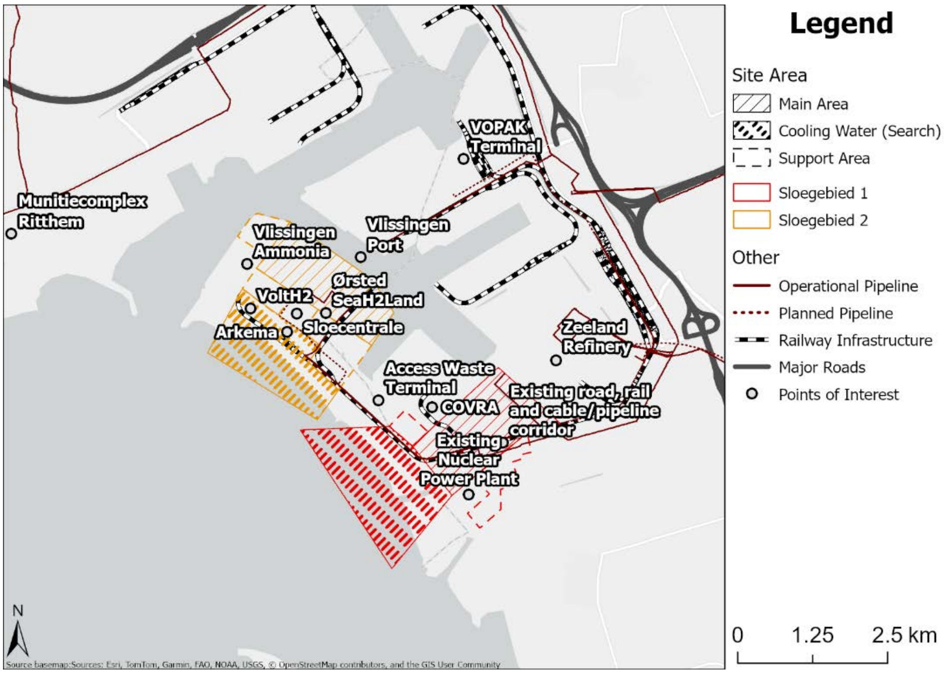

Figure 15: Locations in the Sloegebied area to transport AILs

4.4 Terneuzen

4.4.1 Road

The Terneuzen area is accessible via two main cargo[23] corridors:

- N61 – N62 (north) – A58
- N61 – N62 (south) – Belgium boarder – E34

The northern route crosses the Westerscheldetunnel. Crossing the tunnel has some additional regulations[24] for the transportation of larger dimensions and / or dangerous goods:

- Vehicles cannot be taller than 4.3m.
- Vehicles wider than 3m and longer than 18m or classified as unusually heavy must obtain a special transport permit.
- A special permit is required for any vehicles with a weight above 50t.
- The tunnel is categorised as Category C meaning that vehicles with the possibility to form a risk to large or very large explosions are not allowed.

The restrictions above form limitations for the transportation of certain goods to the site in Terneuzen as requirements specific to the Westerscheldetunnel apply and/or crossing the border with Belgium is required. There is no alternative, and no B-roads, to avoid the routes identified.

[23] There is a road bypassing the DOW facilities which looks like a viable access road to the construction site although it might need to be upgraded. However, this road is not considered viable since part of this road is owned/operated by DOW.

[24] Welke regels zijn er voor transportverkeer en de Westerscheldetunnel?

4.4.2 Rail

The port area is connected to the Dutch and European rail networks via the Terneuzen–Ghent railway, a dedicated freight line facilitating direct cargo movement between Terneuzen, Belgium (Ghent), and onward to inland European destinations. Terneauzen's rail infrastructure is designed exclusively for freight operations. The line is primarily single track and non-electrified, suitable for heavy freight operations. The rail terminals and their associated uses are as follows:

- Verbrugge Terminals: Handles bulk, general, and project cargo; equipped with rail sidings for intermodal transport and efficient transfer to/from ships and trucks.
- Ovet Terminal: Specialises in dry bulk commodities; has direct rail access for swift ship-to-rail transfer of materials like coal, minerals, and aggregates.
- NSG Terminal (N.V. Steenhandel en Grintmaatschappij): Focuses on aggregates and associated bulk goods; supported by rail infrastructure for import/export logistics.
- Dow Terneuzen Complex: Large chemical and industrial site with extensive rail facilities for chemical products, bulk materials, and interplant transport.
- Vopak Terminal Terneuzen: Tank storage and bulk liquids; equipped for rail logistics in chemical supply chains.
- Multipurpose and bulk terminals: Additional facilities support rail-served general cargo, bulk, and project cargo (often linked directly to the Terneuzen–Ghent railway).

4.4.3 Sea

The Port at Terneuzen mainly hosts the port facilities dedicated to the DOW chemical plant This is one of the largest chemical plants in the Netherlands. Primarily producing basic chemicals from polystyrene to polyethylene and polyurethane.

Next to the DOW chemical plant is the Terneuzen sea lock. This lock is directly connected to the North Sea and the Ghent-Therneuzen channel. Main characteristics of the lock are:

- Maximum vessel size: 366m long, 49m wide, 15m draft
- Operational: Since 2025
- Operator: Rijkswaterstaat

Potential locations for AIL delivery are outlined in Table 6 and Figure 16.

Table 6: Locations available to transport AILs in the Terneuzen area

#	Location	Current user	Max. draft	Current use	Capacity quay
1	Katoen Natie ZCT (Zeeland Container Terminal)	Zeeland Container Terminal (ZTC	13.5m	Bulk, chemicals, granulates, containers.	Unknown[25]
2	Goese Kade[26]	Navimar	12.5m	Ship waiting area.	Unknown

There are further locations available in the Terneuzen area, however, these all require passing the Gent-Terneuzen channel and therefore are not considered at this moment.

[25] Not known from public available data however, typical quay structures for the type of use (mainly container transportation) have a typical capacity of 5-10t/m^2

[26] The Goese Kade was constructed by Rijkswaterstaat to support the construction of the new Sea Lock complex at Terneuzen. It requires passing the Sea Lock complex.

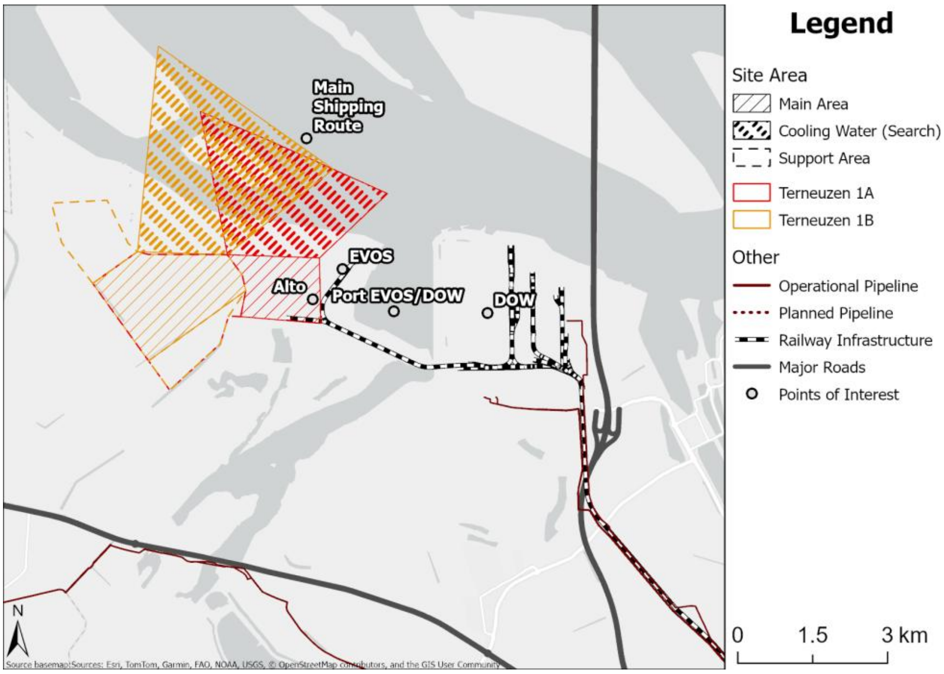

Figure 16: Locations in the Terneuzen area to transport AILs

5 Required infrastructure

This chapter describes the general infrastructure required to support the construction and operation of a LNNP. This required infrastructure has been determined by representatives of KGG, Antea Group and Mott MacDonald. The agreed assumptions are as follows:

- We will not consider a temporary accommodation facility. It is assumed that the workers travel to site every day, this will be spread over the transportation network. This is considered the worst-case scenario regarding traffic.
- The traffic model will show where congestion occurs and at what locations additional P+R locations are foreseen.
- Shifts are foreseen with the following spread of personnel over the day:
  - c.60% early shift (06:00 – 14:00)
  - c.25% evening shift (14:00 – 22:00)
  - c.15% night shift (22:00 – 06:00)
- The following traffic intensities are foreseen, based on the figures provided by the Technology Vendors:
  - 90 buses per shift (70 / day)
  - 1200 movements per shift to site (3600 / day)
  - 100 trucks with construction supplies per day (between 06:00 and 22:00)
  - 30 trucks with general supplies per day
- Trucks will be divided over the system using a worst-case approach.
- Park & Ride locations will be calculated based on the congestion predictions provided by the first run of the traffic model. Foreseen Park & Ride capacity is 2500 – 3000 cars, based on HPC / SZC.
- For early work, no calculations are necessary as these are within the work area of the plots, so there is no impact on local roads.
- For the construction and early work phase we consider that bulk material is transported to site by ship.
- AILs are transported from port to the site. Preferably directly by ship to the site. If this is not possible, they will first be transported to a temporary offload facility (as with HPC’s use of Combwhich Wharf). Impact on traffic will be considered minimal as the total number of trips is limited in terms of total traffic flow.
- During the operational stage the following assumptions are made:
  - 130 movements per shift (390 per day)
  - 10 trucks per day maintenance
  - 2 trucks per day supplies

Chapter 6 describes what infrastructure is needed and the infrastructure to be adapted per location.

5.1 Transportation of material

In principle there are three methods which can be used to transport material to the construction site: road, rail, and ships. The construction of a nuclear power station typically mandates the transportation of three different types of cargo:

- Bulk: Such as sand and gravel (figure 17).
- Conventional material: Everything that can be ‘containerized’ e.g., wood, steelworks, formwork.
- Abnormal Invisible Loads (AILs): Larger pieces of equipment which cannot be fully dismantled into container sized packages e.g., the reactor pressure vessel, steam generator, convertor etc. (figure 18).

Figure 17: Example of bulk cargo[27]

Figure 18: Transportation of the steam turbine at the Hinkley Point C Nuclear Power Plant[28]

[27] Source: https://www.morethanshipping.com/an-overview-of-types-of-cargo-that-cannot-fit-in-shipping-containers/

[28] Source: https://www.heavyliftnews.com/osprey-deliver-rotor-for-the-worlds-most-powerful-steam-turbine-at-hinkley-point-c/

5.1.1 Road

In the Netherlands, trucks are one of the most common transport modes of goods to a construction site. As described in Section 3.1, there is a wide variety of type of trucks to transport different types of material. In the Netherlands truck traffic is divided into three different classes:

- Light truck traffic (Licht Vrachtverkeer): Often refers to smaller construction vans up to 3.5t gross weight.
- Medium heavy truck traffic (middelzwaar vrachtvedkreer): Often refers to smaller trucks with a typical weight between 3.5t and 12t.
- Heavy truck traffic (Zwaar vrachtverkeer): Often refers to larger trucks with a typical weight between 12t and 50t or exceeding this threshold.

The classification of trucks is important for traffic modelling purposes and identification of pollution factors as noise.

Based on the input of information supplied from the Technology Vendors, approximately 130 trucks per day are expected for delivery. Road traffic modelling is not undertaken as part of this report, however, it is suggested that potential new infrastructure will be required for the transport of materials and AILs.

Figure 19: Example of light truck traffic (licht vrachtverkeer)

Figure 20: Example of medium heavy truck traffic (middelzwaar vrachtverkeer)

Figure 21: Example of heavy truck traffic (zwaar vrachtverkeer)

5.1.2 Rail

Trains can be used to transport goods to construction sites. There are example cases whereby trains are used to transport bulk material and/or conventional construction materials to the construction sites of nuclear power plants. At the Sizewell C Nuclear Power Plant, trains are used to transport bulk material, steelwork, and concrete segments to the construction site.

The use of trains compared to trucks for the transport goods helps to reduce congestion from construction traffic. One freight train is equal to approximately 30 and 100 trucks[29]. However, the use of trains as a supply route to construction sites in the Netherlands is uncommon and is limited to linear construction projects such as the Betuwelijn[30]. Further, the Dutch railway network is congested, with passenger trains prevailing over freight trains.[31] This indicates that

[29] Source: Rail freight transport | Freight transport | Government.nl

[30] Source: Expansion of Rail Infrastructure and Transfer Capacity

[31] Source: The scheduling of freight trains on the Dutch railway network | TU Delft Repository

freight trains can only be integrated into the network so long as they do not interfere with the already congested passenger train network.

It is assumed that as the use of trains to supply construction projects in the Netherlands is uncommon and the railway network in the Netherlands is congested, rail transport should not be considered further at stage of the site selection process with regards to the construction stage of the new Nuclear Power Plants. It should be noted that this does not exclude the usage for rail transport being investigated and incorporated as the project progresses.

5.1.3 Ships

In larger construction projects, ships are commonly used to transport larger quantities of materials to the construction site. In the Netherlands transport via ship is primarily used due to the extensive network of sea, canals and rivers. Transport via ship aids in reducing the number of truck deliveries to the site, therefore reducing congestion on road infrastructure.

For the construction of nuclear power plants ships are primarily used to transport, bulk cargo (e.g., sand and gravel). An example is the transport of bulk materials for the construction of the Hinkley Point C Nuclear Power Plant, where ships have been used to transport the majority of the bulk material to the construction site. The typical capacity of the ships used is between 5,000t and 8,000t, saving approximately 125 to 200 truck trips per ship. At HPC a new jetty had to be constructed for ships to be able to unload at the construction site. During peak construction seven ships per week were unloading at HPC. The necessary draft for such ships is approximately 8m. Table 7 outlines the comparison between ship and truck movements for bulk materials.

During the pre-construction stage (assumed duration: 2 years or 24 months), earthworks are being executed on site. It is assumed that approximately 2,000,000m^3 of soil needs to be transported from site.

Table 7: Comparison table ships vs. trucks for bulk material

Transportation mode	Capacity	Total removal	Total movements	Movements per day[32],[33]
Ship	4,800m^3 / ship[34]	2,000,000m^3	417	0.8/day
Truck	20m^3 / trucks	2,000,000m^3	100,000	192/day

Given the large number of truck movements per day, with high loads and the necessity of integration of this number into the local road network, it is not considered feasible to transport the load over the road network. Further, the total costs for transporting large quantities via ships are generally lower when compared to trucks.[35]

Ships are typically used to transport AILs to or near the construction site and it should also be considered that a permanent route for AILs transport during operations needs to be available. Consequently, would this require the necessary infrastructure to moor ships and to unload and off load goods, for instance, proper quay structures will be necessary near the construction site. The required strength of the quay structure is estimated to be between 20-30t/m^2: this figure is based upon reference quay structure strengths where heavy lift activities take place (e.g.,

[32] Assuming 5/day construction in the pre-construction stage

[33] One-way

[34] Assuming a bulk carrier of 8,000T

[35] Source: Studie naar kosten van afvaltransport over de weg, per spoor en over water met betrekking tot vier afvalkategorieën - Rijkswaterstaat Publicatie Platform

Wagenborg Quay at the Eemshaven). Whilst ships are typically the preferred option to transport AILs to the construction site, location will be assessed to determine the most viable option.

5.1.4 Conclusion

Table 8 summarises the key characteristics of the transportation methods selected, and types of materials associated.

Table 8: Types of materials and transportation methods considered

Transportation method	Type of material	Remarks
Train	N/A	Not used[36]
Truck	Conventional goods, AILs when needed.	130/day assumed.
Ship	Bulk, AILs (preferably)[37]	7 ship movements at maximum for bulk transport.

5.2 Transportation of workforce

5.2.1 Peak workforce numbers

Infrastructure required for the associated workforce at the construction site is based on the peak workforce numbers which will be required for the Nuclear Power Plant. The following statistics show the peak workforce numbers at several LNNPs:

- Peak at Vogtle 3 + 4 (two reactors): estimated at 4,400 workers.
- Peak at Flammanville 3 (one reactor): estimated at 2,500 workers.
- Peak at Sizewell C (two reactors): estimated at 8,000 workers.[38]
- Peak at Hinkley Point C (two reactors): Currently estimated to reach around 15,000 workers on site.[39]

The peak workforce numbers for Sizewell C will be used as guideline in the estimation of workforce for the Dutch Nuclear Power Plants. This is because the information available is the most comprehensive and well-documented resource available for similar large cale nuclear developments. By referencing these statistics, a realistic estimate for the Dutch context, as the construction processes, scale, and regulatory environment are provided as they are broadly comparable. While some local adjustments may be necessary to account for specific Dutch conditions or site characteristics, Sizewell C offers the closest practical approximation for workforce needs given the current availability of information. The outlier in workforce numbers for HPC can be based upon several reasons, such as construction process delay, covid-19, and several activities which require high labour inputs being executed at the same time.

5.2.2 Modal split in shifts

It is expected that the construction site will be manned 24 hours a day, six to seven days a week. There is no data available from the powerplants currently under construction regarding

[36] However, it is decided not to use the railway network because of a variety of reasons. It is explicitly noted that specific port railways could be a viable option to transport certain goods. However, availability of such infrastructure needs to be verified on individual basis.

[37] After discussion with experts it is advised to separate the quay structure for the AILs and for Bulk transport. It is assumed either the barges transporting AILs and the ships transporting bulk need a free quay space of approximately 150m each.

[38] Data is derived from the Development Constent Order (DCO)

[39] Source: Peak numbers HPC: https://www.edfenergy.com/media-centre/new-figures-show-hinkley-point-c-driving-growth-across-britain-and-boosting-south-wests

the model split in workforce. However, the model split in workforce figures over the day is estimated[40] to be:

- 60% on a day shift (06:00 - 14:00)
- 25% on an evening shift (14:00 – 22:00)
- 15% on a night shift (22:00 – 06:00)

5.2.3 Transportation modes to Fite

Due to accommodation campuses or temporary accommodation facilities for workers on construction sites being uncommon in the Netherlands, it has been determined that no accommodation campuses are foreseen in the construction of the new nuclear power plant. This decision is further based upon the fact that a worst-case approach is considered. With regard to traffic, the worst-case perspective would be all employees commuting to the construction site on a daily basis.

Given the limited capacity on all locations regarding rail transport using the National Railway network, it is assumed that the majority of employees travel to the construction site by car, bus network or alternative public transport. To avoid large congestion areas on the Dutch road system the following measures are decided: a bus network (e.g., with routes of the Park and Ride facilities to site and vice versa) will likely be operational during the construction stage, however, this network will be fully dependent on the project and not using any public services currently present to date. The following modes of transport are anticipated for the proposed construction of a new nuclear power plant:

- At the construction site a parking area will be created for 1,200 vehicles.[41]
- Several Park and Rides areas will be created.[42]
- The remaining traffic will be distributed over the road network using the ‘normal’ Origin – Destination (O-D) matrices of the area associated.

[40] Source: Smith, J. & Gareis, R. (2022). Continuous-Operation Construction Scheduling, 4th ed. New York: McGraw-Hill, pp 78–80.

[41] This number is based upon the current estimations at the Sizewell C parking area at the construction site.

[42] several Park and Ride facilities will be created. The location and capacity of these areas will be based upon the outcome of the traffic flow model.

6 Required infrastructure per site

This section describes potential options for the import of AILs and bulk materials by sea/ship, and local road infrastructure requirements in the immediate vicinity of the candidate sites.

6.1 Eemshaven 1A

6.1.1 Transportation strategy

Workforce: During the early stages of construction it is anticipated that workers will travel to the site via car and/or from public transport hubs in the area (e.g., Groningen) Once the park and rides are established and operational, it would be anticipated that the majority of workers will arrive to site via bus.

Conventional transport: Transported via road origins and individual trips over road infrastructure. The trips will originate from the N33 and the N46. In total 68 trips are anticipated to originate from the N33, and 62 trips are anticipated to originate from the N46 (Appendix error for the full calculation).

Material transport: For the transport of AILs and bulk material, three potential strategies are defined (Refer to Figure 22, Figure 23 and Figure 24). Table 9 summarises each strategy along with main advantages and disadvantages,

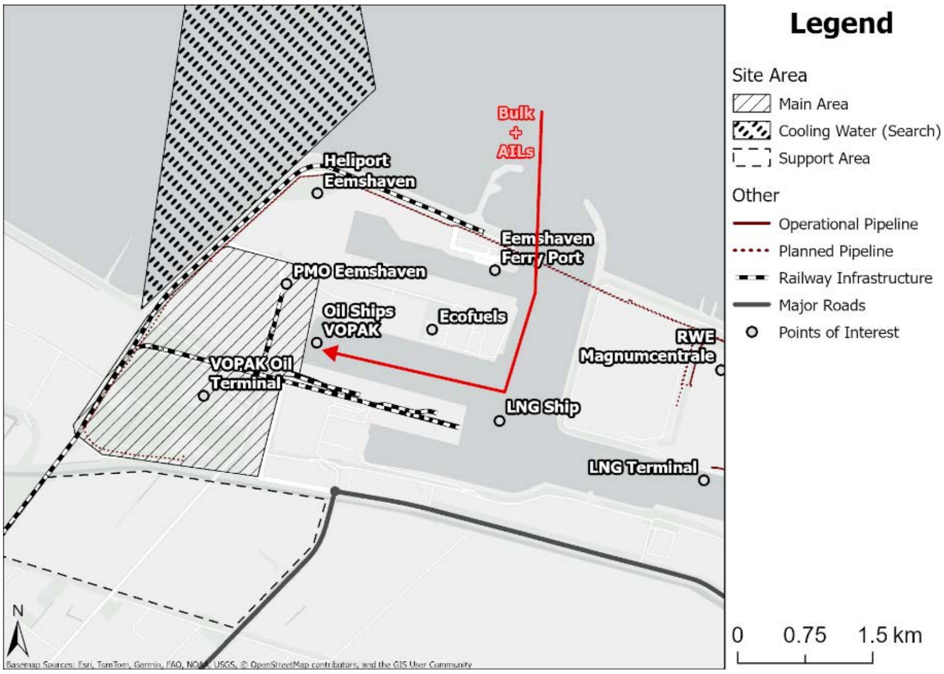

Figure 22: Transportation strategy A, Eemshaven 1A

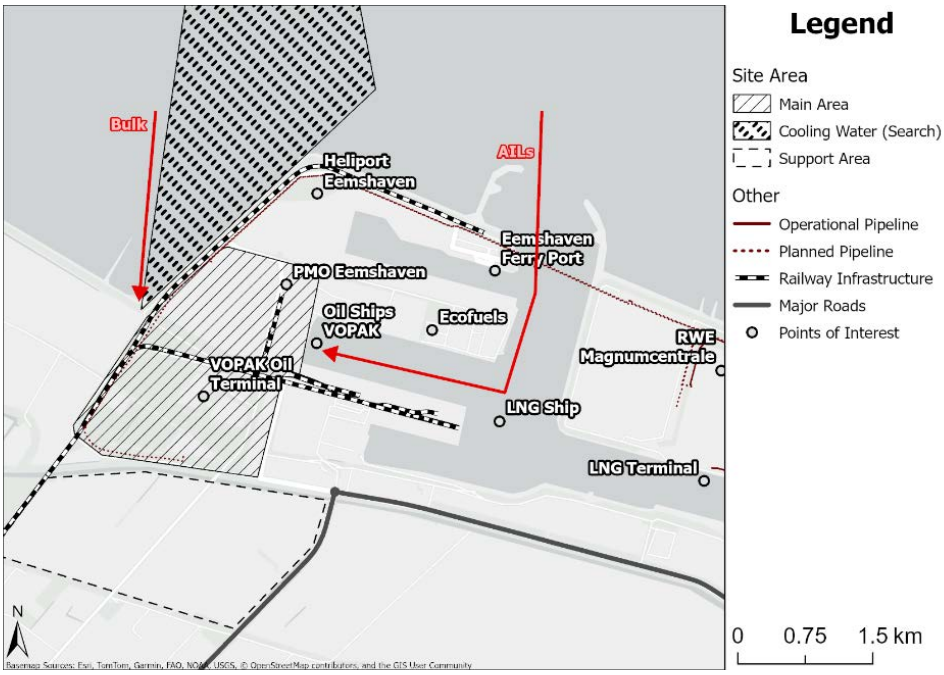

Figure 23:Transportation strategy B, Eemshaven 1A

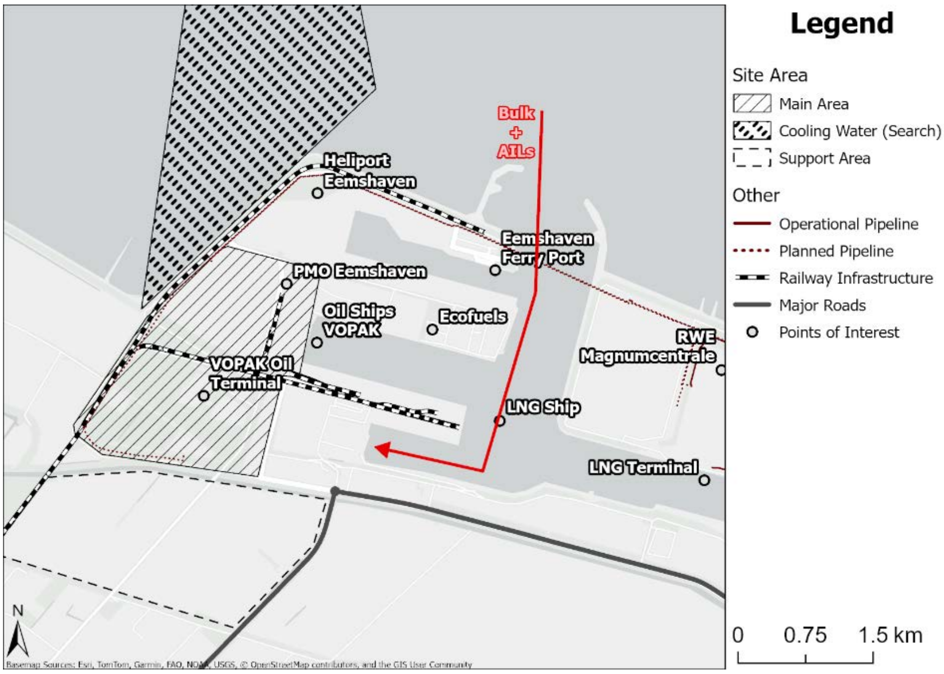

Figure 24:Transportation strategy C, Eemshaven 1C

Table 9: Explanatory notes on three transportation strategies Eemshaven 1A

	Strategy A	Strategy B	Strategy C
Description	• Bulk materials and AILs transported to the quay in the Julianahaven (see Figure 25 for illustration). • Bulk materials and AILs are directly offloaded to the main area with onward transportation to the relevant work areas.	• AILs are transported via a quay in the Julianahaven. • Bulk and AILs are directly offloaded at the main site and may need onward transportation to the work area. • Bulk is transported via an optional built jetty in the Waddensea.	• Bulk and AILs are transported into the Emmahaven. • Both bulk materials and AILs would need to be transported to the main area or the work area.
Advantages	• Harbour is capable of deep draught ships. • Quay length of c.300m is considered sufficient to create two offloading locations (one for AILs and one for Bulk), with further possible space adjacent to this quay if necessary. • Limited demolition of existing infrastructure needed. • Existing use of Julianahaven suggests quay may be more readily adaptable for AILs. • Conveyor could be more readily utilised.	• Bulk and AILs offloading separated to reduce possibility of availability issues. • No transport over open access roads required for bulk materials. • Existing use of Julianahaven suggests quay may be more readily adaptable for AILs.	• Bulk material can be offloaded relatively closer to the work area.
Disadvantages	• Bulk materials cannot be directly offloaded at the work area and would require movement over existing roads. • Requires acquiring quay / port infrastructure (or upgrading quay) which is currently in use. • AILs and bulk materials offloaded in the same area may present availability issues. • Might need additional dredging operation at the Eemshaven. • Potential disruption or cessation to existing activities of the Julianahaven. This will need further investigation.	• Construction of a jetty in the Eemshaven might not be possible because of environmental constraints. • Jetty construction may interfere with the cooling water in-/outlet construction. • Jetty may be subject to weather downtime, impacting availability. • Jetty may present a navigation risk in approach channel that will need to be mitigated. • Materials would need to be transported across the existing rail line to reach the work area. • Construction of jetty resulting in increased road traffic in early years. • Potential disruption to existing users of the Julianahaven (but less than Strategy A). • Jetty would be expensive option.	• Harbour is shallower than the Julianahaven • Requires onward transport including over open access roads to both main area and work area. • Requires acquiring additional quay / port infrastructure (or upgrading quay) which is currently in use. • Might need additional dredging operation at the Eemshaven.

6.1.2 Modifications to infrastructure

Indicative infrastructure modifications are presented for one of the options, Strategy 1A. Strategies 1C would likely require comparable modifications, the key difference for Strategy 1B being the construction or a temporary jetty. The adjacent infrastructure (rail / road) for the Eemshaven laydown areas and nuclear power plants would likely cause restraints regarding transport.

Port infrastructure

- Upgrade quay structure along the east side of the Julianahaven, length c.250m. Modifications necessary:
  - Removal of existing Infrastructure (e.g., Ro-Ro facilities and Jetty Vopak).
  - Construction of a quay wall of c.350m.
  - Upgrade of the existing docking facilities to c.20-30t/m^2 helping to accommodate transportation of materials, for instance, heavy lifting and roll-off possibilities of AILs.
- The necessary amendments are visualised in Figure 25.

Figure 25: Necessary amendments for port facilities at Eemshaven 1A

Road infrastructure:

- Construction of bridges connecting the working area to the main construction area. Total span of the bridges is anticipated to be c.60m (Figure 26).[43]
- Upgrade of the Kwelderweg (c.2km) from the main area to the N46 to accommodate for larger transport (to Figure 26).
- Construction of driveways to the site entrance plaza (Figure 27).
  - For entering the construction site, there is need to construct a bridge over the N46.
  - For exiting the construction site, a driveway to the N46 is required.

[43] These bridges are considered necessary to bridge the Binnenbermsloot, of which it is not considered a possibility to close this water fully down. However the bridges will limit the possibilities in terms of transport capacity from the working area to the main area in terms of total load to be transported (e.g., certain AILs as the Reactor Pressure Vessel are considered to be too heavy to be transported over these bridges).

- Upgrade of any existing infrastructure and the construction of any P+R areas outside the construction are yet to be confirmed.

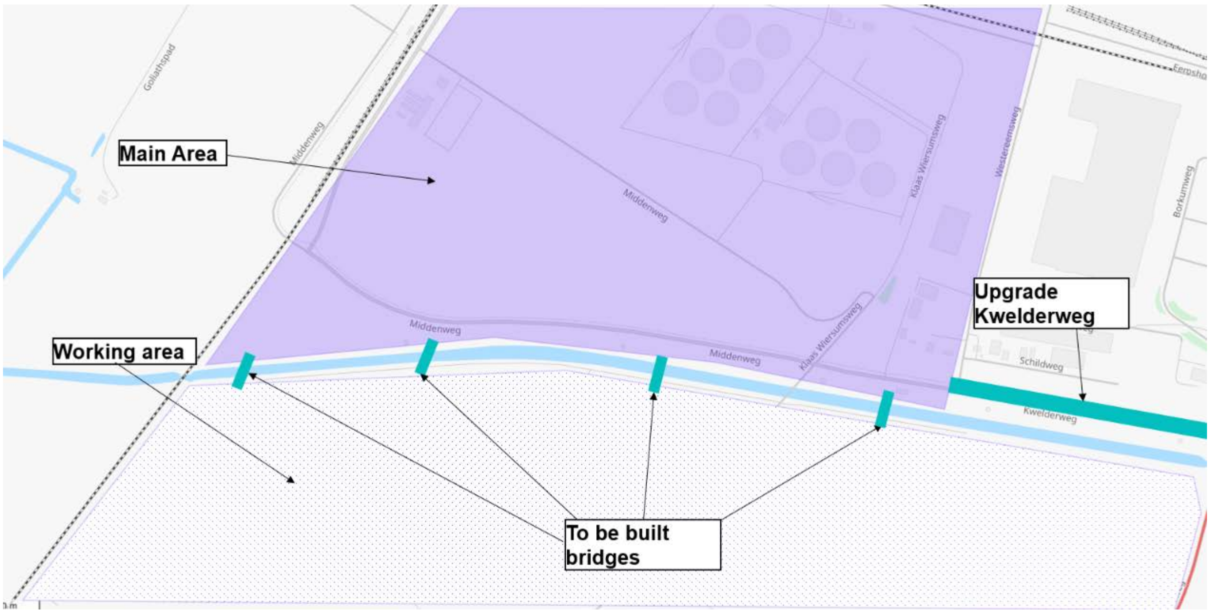

Figure 26: Upgrade to road infrastructure foreseen at the construction location

Figure 27: Construction of driveways to and from the working area

6.2 Eemshaven 1B

6.2.1 Transportation strategy

Workforce: Workforce is transported to the construction site predominantly by car or bus (from P+R locations and/or from public transport hubs in the area (e.g., Groningen)).

Conventional transport: Transported via road origins, and individual trips over road infrastructure. The trips will originate from the N33 and the N46. In total 68 trips are anticipated to originate from the N33, and 62 trips are anticipated to originate from the N46.

Material transport: For the transport of bulk materials and AILs, three strategies are defined (Figure 28, Figure 29 and Figure 30). Table 10 presents a short summary of each strategy.

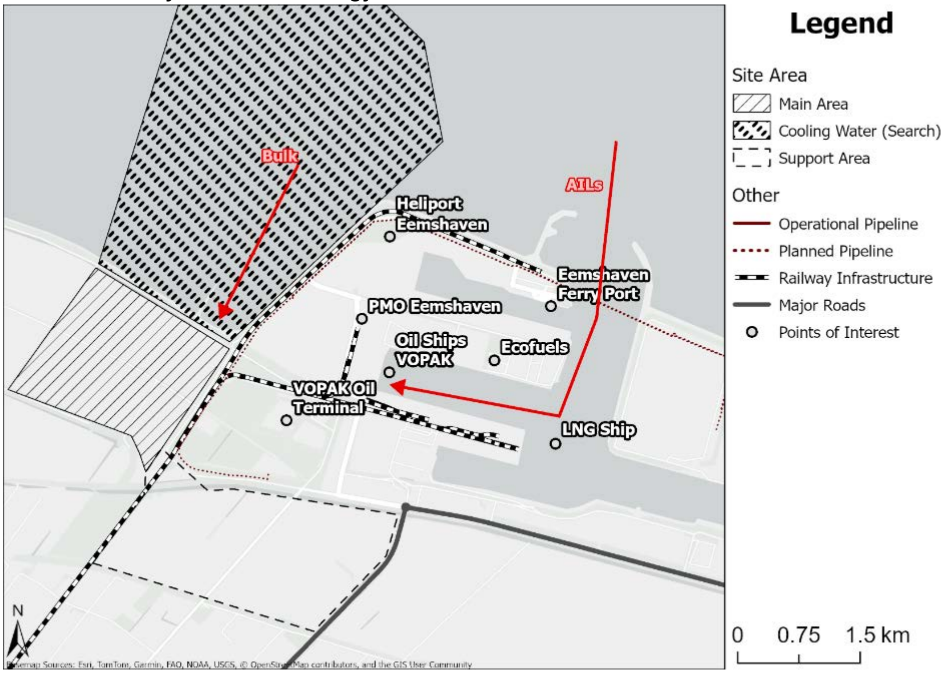

Figure 28: Transportation strategy A, Eemshaven 1B

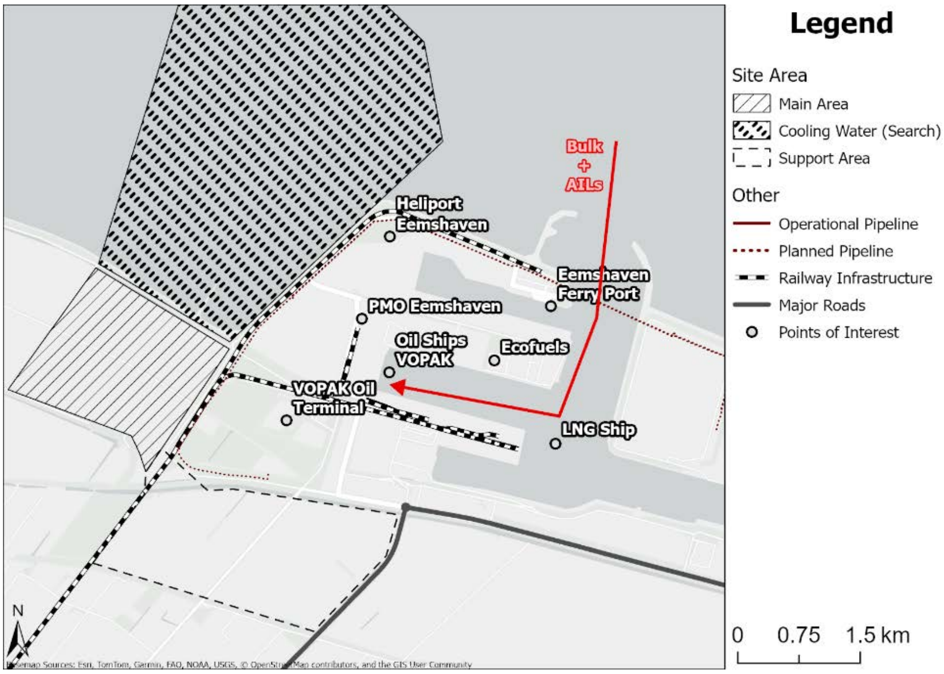

Figure 29:Transportation strategy B, Eemshaven 1B

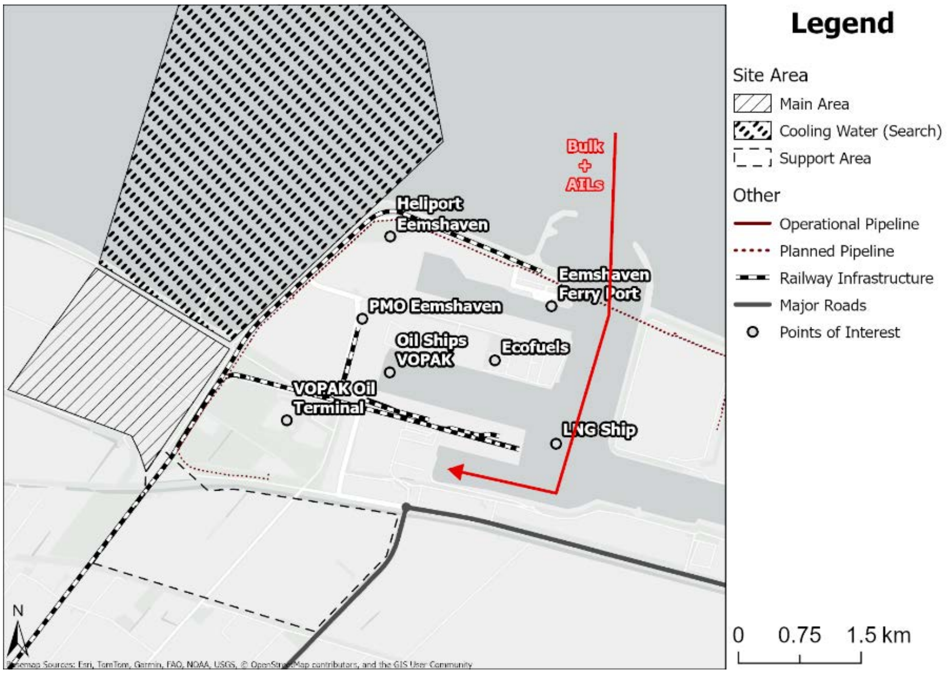

Figure 30:Transportation strategy C, Eemshaven 1B

Table 10: Explanatory notes on the transportation strategies for Eemshaven 1B

	Strategy A	Strategy B	Strategy C
Explainer	• Bulk materials transported via a new jetty extending into the Waddensea. • Bulk materials and AILs transported to the quay in the Julianahaven. • AILs are transported over road, conveyor belt or port rail network to the construction site.	• Bulk and AILs are transported via the quay of Wagenborg Stevodin in the Eemshaven. • Bulk and AILs are transported over road to the main site.	• Bulk and AILs are transported into the Emmahaven. • Both need to be transported via road to the main area or the work area.
Advantages	• Bulk materials and AIL offloading separated to reduce possibility of availability issues. • Bulk materials can be offloaded direct to the Main Area and transported onwards from there. • The use of conveyor belts to move bulk materials onwards to the Support Area is potentially more feasible under this strategy, with less existing infrastructure to plan around. • Quay of Wagenborg Stevodin is already capable of heavy load offloading.	• Quay of Wagenborg Stevodin is already capable of heavy load offloading. • Existing road (or rail) network could be used to move bulk materials and AILs to the Main Area and Support Area (subject to further assessment).	• Possibility of transport via conveyor belt or port rail network.

	Strategy A	Strategy B	Strategy C
	● Existing road network could be used to move AILs to the Main Area (subject to further assessment). ● Limited demolition of existing infrastructure needed.		
Disadvantages	● Requires acquiring additional quay / port infrastructure which is currently in use. ● Construction of a jetty in the Eemshaven might not be possible because of environmental constraints. ● Optional jetty construction may interfere with the cooling water intake / outfall construction. ● Optional jetty may be subject to weather downtime, impacting availability. ● Optional jetty may create navigation risk in approach channel that would need to be mitigated. ● Potential for impacts on existing users of the Julianahaven and may require acquiring infrastructure already in use.	● Bulk materials and AIL offloading within the same quay area increases the possibility of availability issues. ● Quay of Wagenborg is not designed for bulk carriers and might need adaptation or full acquisition of the location. ● Increased impact on current users of the quay and wider port. ● Requires acquiring additional quay / port infrastructure which is currently in use.	● Bulk materials and AIL offloading within the same quay area increases the possibility of availability issues. ● Increased road transport of bulk materials foreseen over public roads (for bulk considered as a red flag).[44] ● Requires acquiring additional quay / port infrastructure which is currently in use. ● Might need additional dredging operation at the Emmahaven (less deep than the Julianahaven). ● Difficulty transporting large quantities of materials by road.

6.2.2 Modifications to infrastructure

For transportation Strategy A, the necessary modifications to infrastructure are detailed within this section. The adjacent infrastructure (rail / road) for the Eemshaven laydown areas and nuclear power plants would likely cause restraints regarding transport. It should be noted that these are indicative based on the information available to date, and as such these should not be considered as final decisions.

Port infrastructure:

- Construction of a jetty into the Waddensea area, because of the limited depth of the Waddensea in this area, the full length of the jetty is estimated to be c.2km.
- For the AILs the existing quay at Wagenborg Stevodin is used. However, availability of this quay for the construction of the nuclear power plant needs to be assessed.

Road infrastructure:

- Construction of a bridge over the existing railway line to connect the main area with the working area. The span of the bridge would be approximately c.150m and the width of the bridge 25m with an assumed 2x2 lane layout.

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[44] Conveyer belts are considered as a possibility to transport bulk over longer distances however, in this case this is not considered as a possibility because of the many intersections and interfaces with other industrial plots.

- Construction of this bridge is considered necessary to avoid a high number of railroad crossings for transportation of the main site to the work area, and to minimise disturbance to the rail line itself which services the wider port and the ferry terminal.

- Upgrade of approximately 4km of the Kwelderweg (c.4km) from the Main Area to the N46 to accommodate for larger transport.
- Construction of driveways to enter and exit the construction site (Figure 27).
  - For entering the construction site, there is need to construct a bridge over the N46.
  - For exiting the construction site, a driveway to the N46 is required.
- Railway crossing to accommodate AILs to be transported from the Eemshaven to the main construction area.
- Upgrade of any existing infrastructure and the construction of any Park & Ride areas outside the construction area are yet to be confirmed.

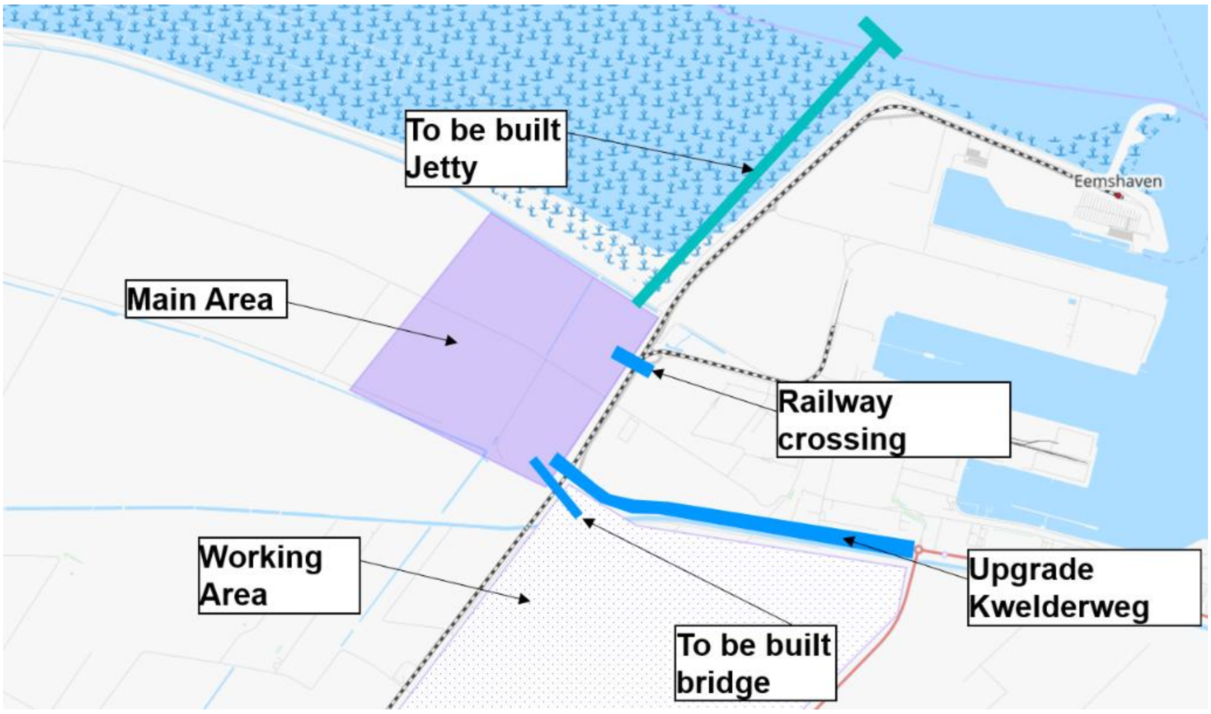


Figure 31: Modifications to existing infrastructure (blue: road infrastructure, green: port infrastructure)

6.3 Eemshaven 2

6.3.1 Transportation strategy

Workforce: Workforce is transported to the construction site predominantly by car or bus (from Park and Ride locations and/or from public transport hubs in the area (e.g., Groningen)).

Conventional transport: Transported via road origins and individual trips over road infrastructure.The trips will originate from the N33 and the N46. In total 68 trips are anticipated to originate from the N33, and 62 trips are anticipated to originate from the N46.

Material transport: For the transport of bulk materials and AILs, two strategies are defined (Figure 32 and Figure 33). Table 11 presents a short summary of each strategy.

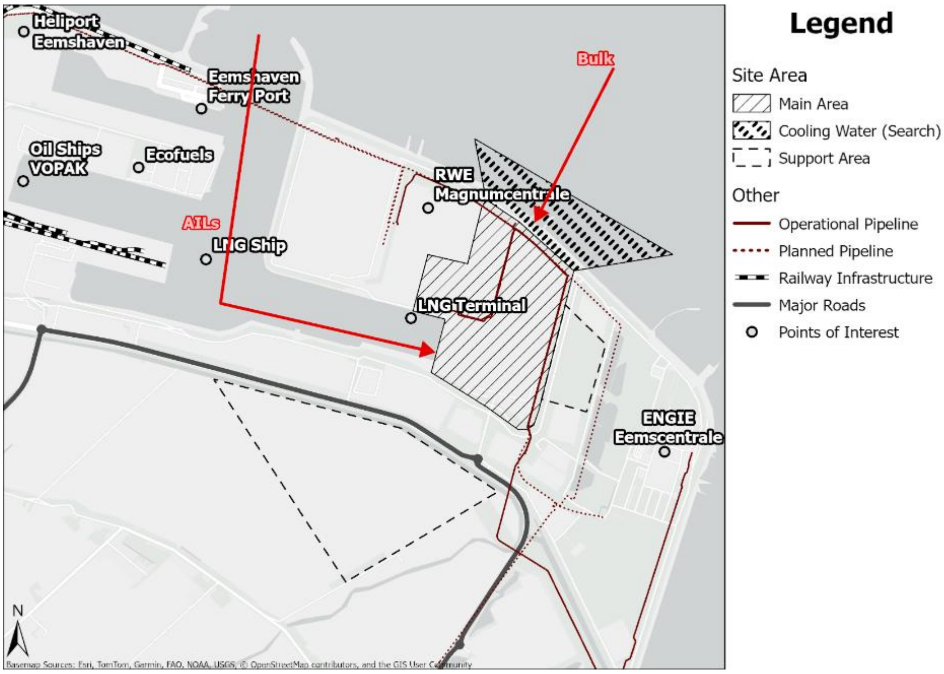


Figure 32: Transportation strategy A, Eemshaven 2

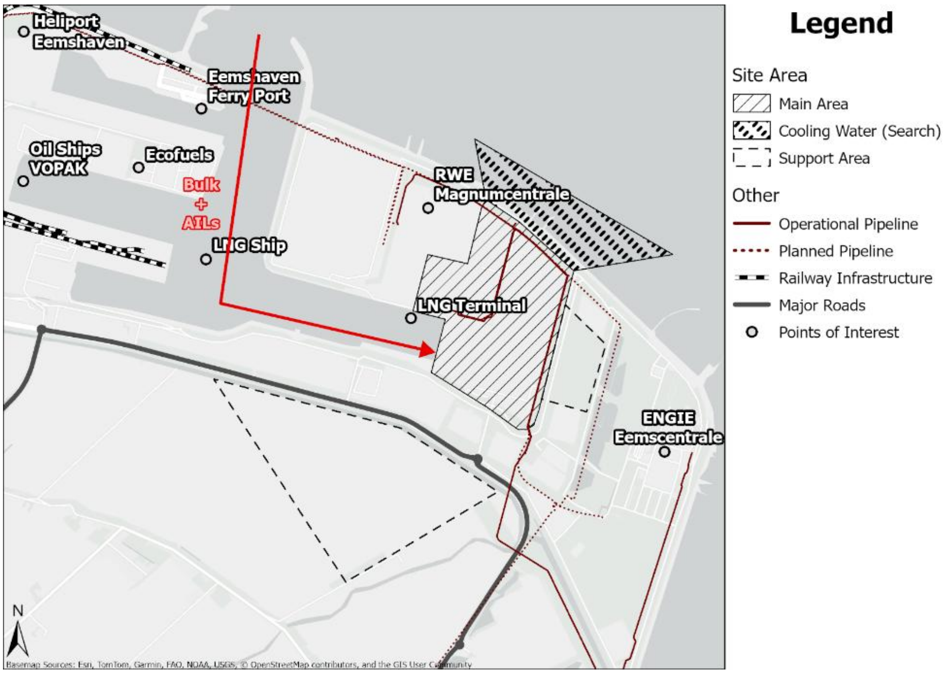


Figure 33:Transportation strategy B, Eemshaven 2

Table 11: Explanatory notes on the transportation strategies for Eemshaven 2

	Strategy A	Strategy B
Explainer	• BULK transported via a new built jetty in the Waddensea. • AILs is transported via the existing quay structure currently being used by the RWE Coal Fired Power Plant. • Bulk transported over the main area to the working area.	• Bulk and AILs are transported via the existing quay structure currently being used by the RWE Coal Fired Power Plant. • Bulk transported over the main area to the working area.
Advantages	• Bulk and AILs clearly separated to avoid any disturbances. • Quay of RWE Coal Fired Power Plant is assumed capable of carrying loads of AILs. • Limited amount of demolishing of existing infrastructure needed.	• Limited amount of demolishing of existing infrastructure needed.
Disadvantages	• Construction of a jetty in the Eemshaven might not be possible because of environmental constraints. • Jetty construction may interfere with the cooling water in-/outlet construction. • Bulk needs to be transported over the full length of the main site to the working area. • Jetty is exposed and subject to weather downtime.	• Quay at RWE Coal Fired Power Plant is only just long enough (c.300m) to moor both AILs and bulk vessels.

6.3.2 Modifications to Infrastructure

For transportation Strategy B, the necessary modifications to infrastructure are detailed within this section. The adjacent infrastructure (rail / road) for the Eemshaven laydown areas and nuclear power plants would likely cause restraints regarding transport. It should be noted that these are indicative based on the information available to date, as such, these should not be considered as final decisions.

Port infrastructure:

- No adjustments necessary to existing port facilities except for the removal of existing infrastructure of the RWE unloading/offloading facilities for the coal fired powerplant.

Road infrastructure:

- Expansion of the Huibertgatweg to a 2x2 road to connect the main area and the working area. The construction of a bridge over the Binnenbermsloot with a width of c.25m will be required.
- Construction of a new exit on the Kwelderweg into the working area.
- Upgrade of any existing infrastructure and the construction of any Park and Ride areas outside the construction are yet to be confirmed.

Figure 34: New infrastructure foreseen at Eemshaven 2 (blue: road infrastructure)

6.4 Eemshaven 3

6.4.1 Transportation strategy

Workforce: Workforce is transported to the construction site predominantly by car or bus (from Park and Ride locations and/or from public transport hubs in the area (e.g., Groningen)).

Conventional transport: Transported via road origins, and individual trips over road infrastructure. The trips will originate from the N33 and the N46. In total 68 trips are anticipated to originate from the N33, and 62 trips are anticipated to originate from the N46.

Material transport: For the transport of bulk materials and AILs, three strategies are defined (Figure 35 and Figure 36). Table 12 presents a short summary of each strategy.

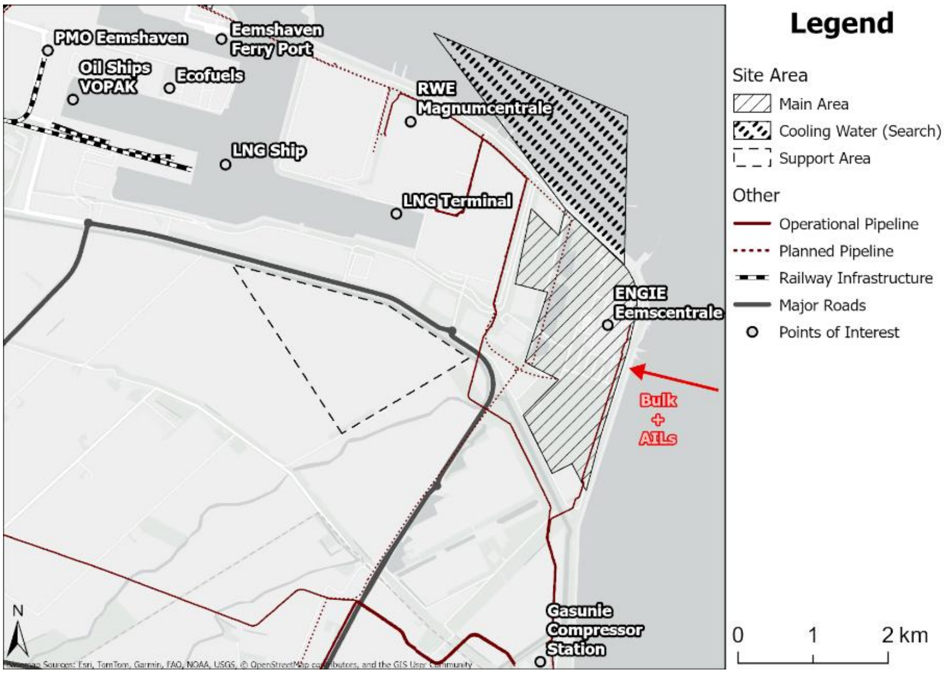


Figure 35: Transportation strategy A, Eemshaven 3

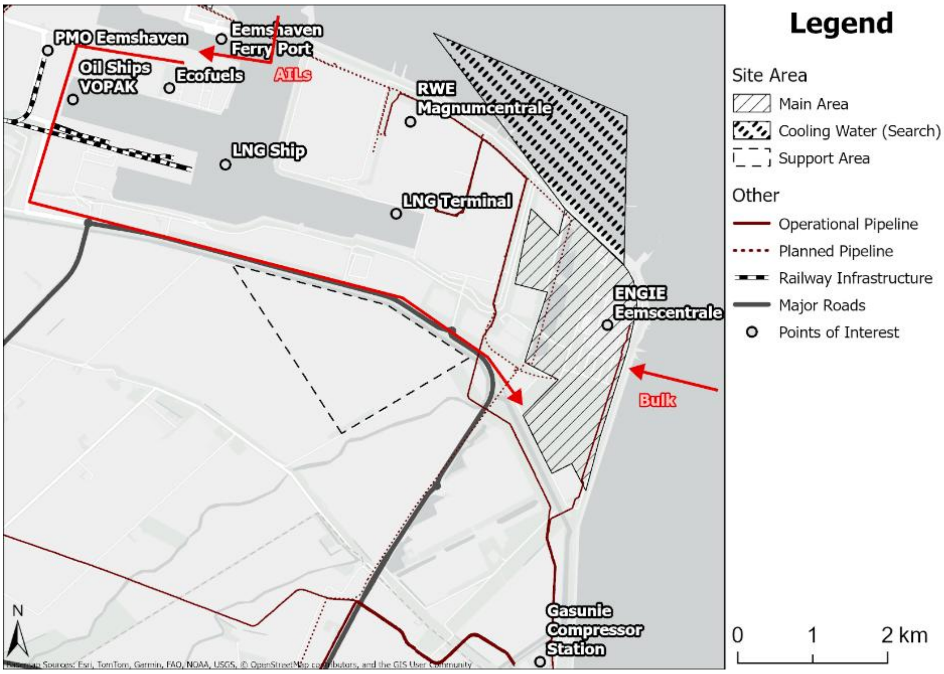


Figure 36: Transportation strategy B, Eemshaven 3

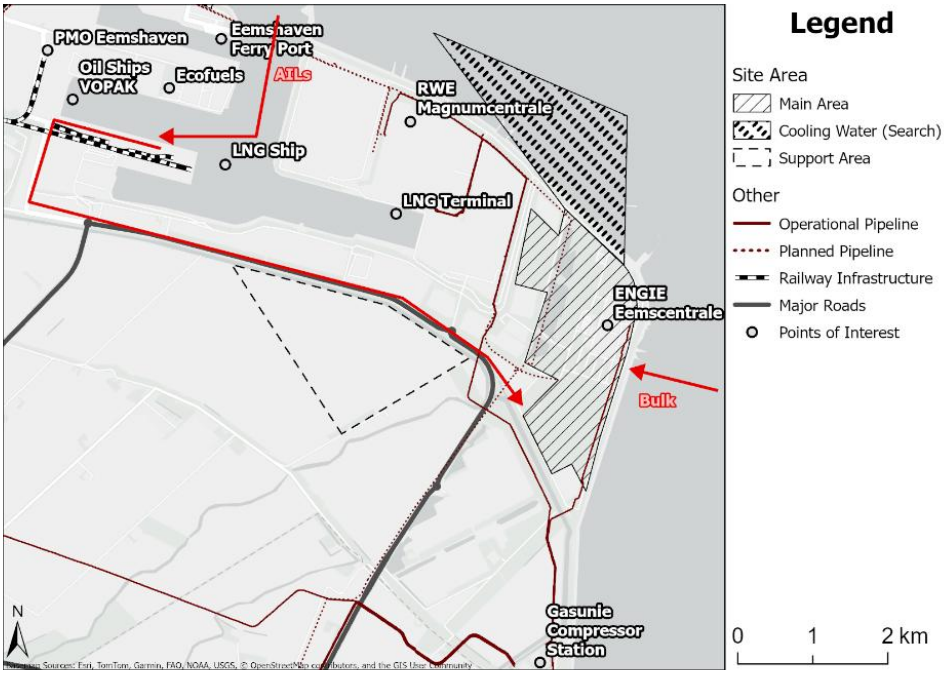


Figure 37:Transportation strategy C, Eemshaven 3

Table 12: Explanatory notes on the transportation strategies for Eemshaven 3

	Strategy A	Strategy B	Strategy C
Explainer	• Bulk and AILs are transported via a new built quay structure[45] in the Eems area. • Bulk is transported over the main area to the working area.	• Bulk is transported via a new to be built jetty in the Eems area. • Bulk is transported over the main area to the working area. • AILs are transported to the site of Wagenborg Stevodin, thereafter transported over the road network to the main site.	• Bulk is transported via a new to be built jetty in the Eems area. • Bulk is transported over the main area to the working area. • AILs are transported to the main site of Mammoet Eemshaven, thereafter transported over the road network to the main site.
Advantages	• No need to transport AILs over the public road network.	• Bulk and AILs clearly separated to avoid any disturbances. • Construction of a temporary jetty in the Eems area is considered more feasible than a permanent quay structure.	• Bulk and AILs clearly separated to avoid any disturbances. • Construction of a temporary jetty in the Eems area is considered more feasible than a permanent quay structure.
Disadvantages	• Construction of a permanent quay structure in the Eems area might not be possible because of environmental constraints. • Jetty construction is likely to interfere with the cooling water in-/outlet construction.	• Need for a temporary jetty construction in the Eems area might not be possible because of environmental constraints. • AILs needs to be transported over the public road. • AILs transport is dependent on availability at Wagenborg Quay.	• Need for a temporary jetty construction in the Eems area might not be possible because of environmental constraints. • AILs needs to be transported over the public road. • AILs transport is dependent on availability at Mammoet Quay. • Increased distance to transport AILs compared to Strategy B.

6.4.2 Modifications to Infrastructure

For transportation Strategy B, the necessary modifications to infrastructure are further detailed within this section. The adjacent infrastructure (rail / road) for the Eemshaven laydown areas and nuclear power plants would likely cause restraints regarding transport. It should be noted that these are indicative based on the information available to date, as such these should not be considered as final decisions.

Port Infrastructure:

- Construction of a Jetty into the Eems area, because of the limited depth of the Eems in this area, the full length of the jetty is estimated to be c.2km.
- For the AILs, the existing quay at Wagenborg Stevodin is used. However, the availability of this quay for the construction of the LNPP needs to be assessed.

Road Infrastructure:

- Expansion of the Huibertgatweg to a 2x2 road to connect the main area and the working area (c.2km). Also, the construction of a 2x2 bridge over the Binnenbermsloot with a width of c.25m width will be required.

[45] Quay structure is considered to be permanent to ensure any transport of AILs during the construction stage

- Construction of a new exit on the Kwelderweg into the working area.
- Upgrade of any existing infrastructure and the construction of any Park and Ride areas outside the construction are yet to be confirmed.

Rail: Should the Port rail network be utilised for the transport of bulk material and AILs, this would reduce the need for major investment regarding the construction or upgrading of a dedicated quay or heavy-lift facility at the port. It is however noted that limitations in railway route capacity, potential bottlenecks, or schedule constraints could make rail alone insufficient for peak demand periods.

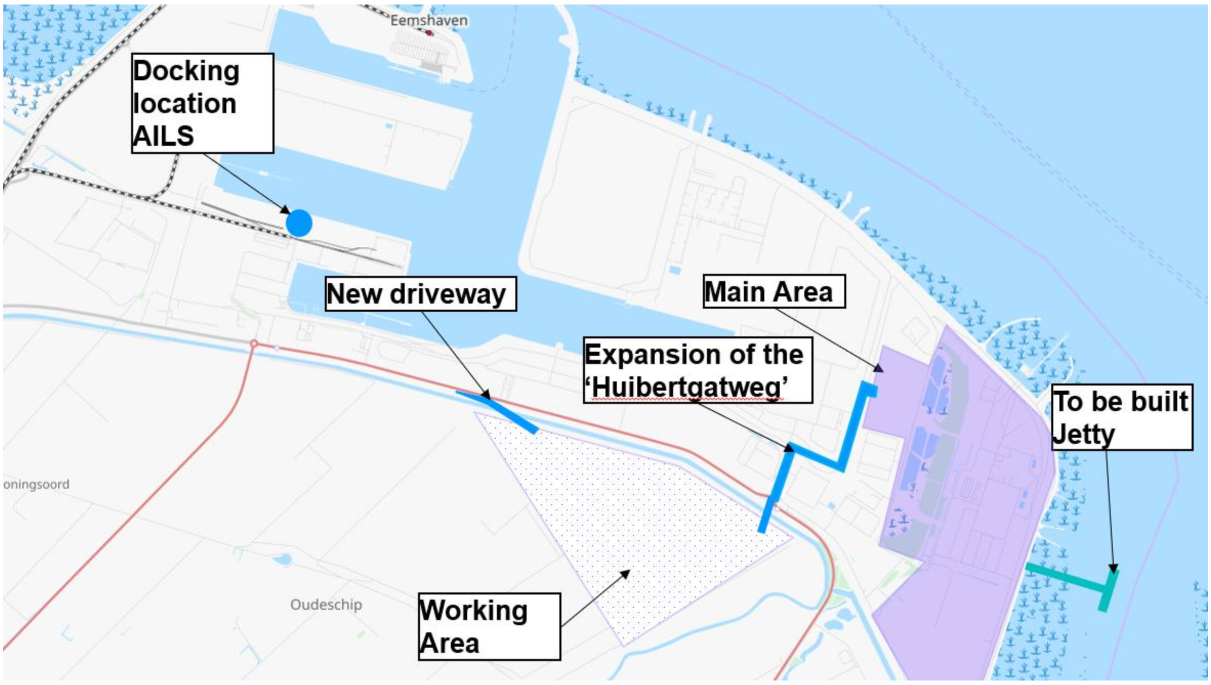


Figure 38: New infrastructure foreseen at Eemshaven 3 (blue: road infrastructure, green: port infrastructure)

6.5 Maasvlakte II 1

6.5.1 Transportation strategy

Workforce: Workforce is transported to the construction site predominantly by car or bus (from P+R locations and/or from public transport hubs in the area (e.g., Rotterdam, Spijkernisse, Vlaaridngen etc.)).

Conventional transport: Transported via road origins, and individual trips over road infrastructure. All daily trips (130) are anticipated to originate from A15-N15 corridor.

Rail transport: Although the usage of rail is excluded in the list of assumptions, it should be noted that an extensive rail network is operational in the Port of Rotterdam. The full rail network in the Port of Rotterdam is c.40km and connects various industrial sites with the Dutch National Railway network. It is suggested that the use of rail is further examined should the Maasvlakte II area be selected for further consideration.

Material transport: For the transport of bulk materials and AILs, two strategies are defined (Figure 39 and Figure 40). Table 13 presents a short summary of each strategy.

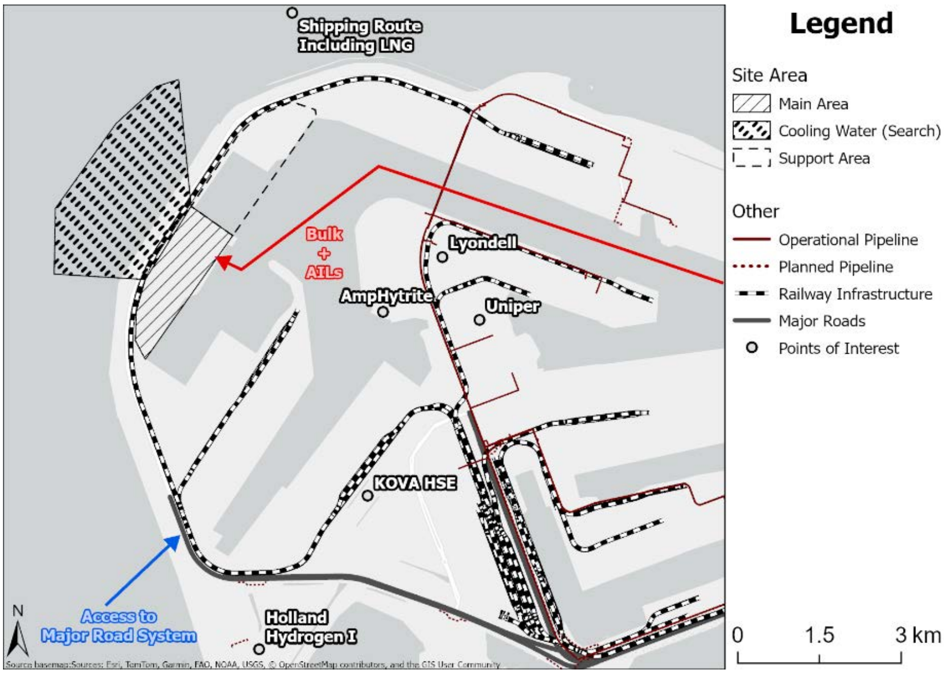


Figure 39: Transportation strategy A, Maasvlakte II, 1

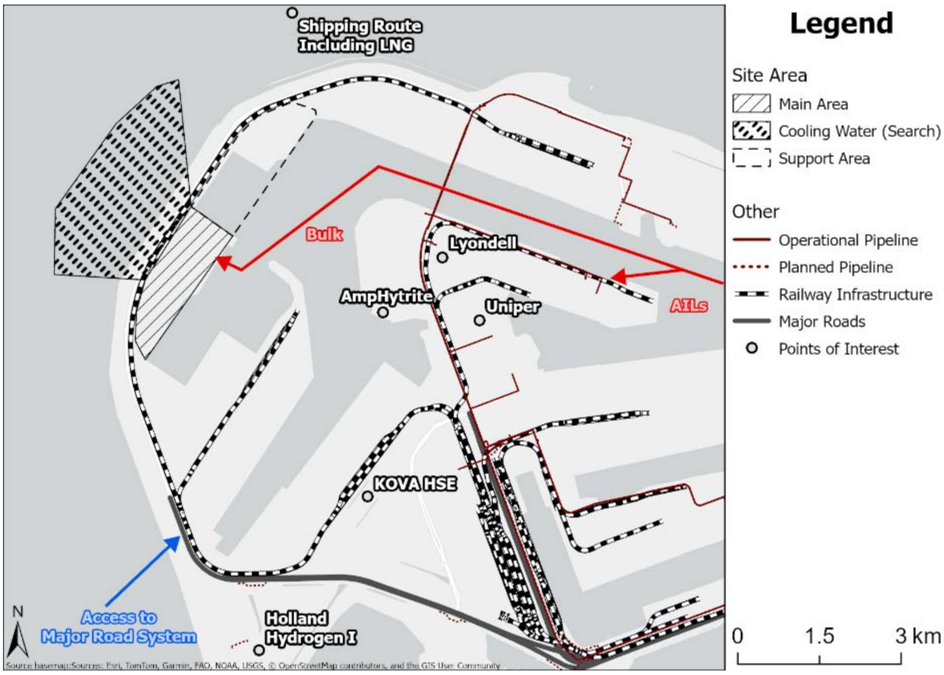


Figure 40: Transportation strategy B, Maasvlakte II, 1

Table 13: Explanatory notes on the transportation strategies for Maasvlakte II, 1

	Strategy A	Strategy B
Explainer	• BULK and AILs transported via a new quay structure at the working area. • Quay structure needs to be constructed in part of the harbour which is fully greenfield.	• Bulk is transported via a new to be built jetty directly to the main area. • AILs are transported to the Rhenus Deep Sea terminal and thereafter transported over road to the main site.
Advantages	• Bulk and AILs transported to the location (on the working area). • Sufficient space available to create a quay structure able to provide space for both AILs and bulk offloading.	• A jetty structure is less costly than a full quay structure.
Disadvantages	• Construction requires investment.	• AILs needs to be transported over road to the main site. Given the number of viaducts/bridges this route crosses this is considered as a red flag. • Offtake point and route for AILs needs to remain in place during operations.

6.5.2 Modifications to infrastructure

It should be noted that the Maasvlakte II area is fully reclaimed land. This study does not consider any additional works regarding further reclamation or site preparation of the land at the working area.

For transportation Strategy A, the necessary modifications to infrastructure are further detailed within this section. It should be noted that these are indicative based on the information available to date, so these should not be considered as final decisions.

Port infrastructure:

- Construction of a to-be built quay wall of c.500m. Including:
  - Construction of a quay structure of c.500m.
  - Construction of docking facilities to accommodate heavy lifting and transport of bulk goods.

Road Infrastructure:

- No additional modifications to road infrastructure are foreseen as the Maasvlakte II1 area is accessible via an extensive road network system.
- Upgrade of any existing infrastructure and the construction of any Park and Ride areas outside the construction are yet to be confirmed.

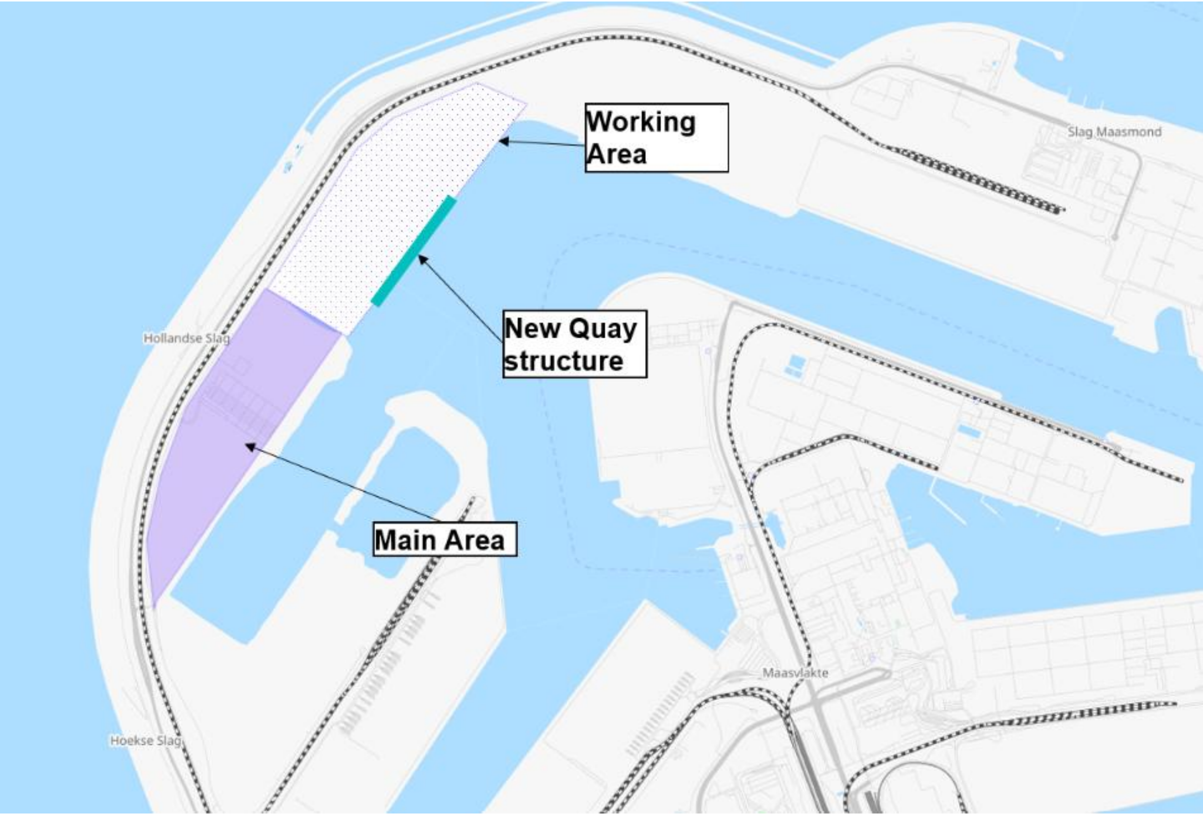


Figure 41: Additional infrastructure required at Maasvlakte II 1

6.6 Sloegebied 1

6.6.1 Transportation strategy

Workforce: Workforce is transported to the construction site predominantly by car or bus (from Park and Ride locations and/or from public transport hubs in the area (e.g., Middelburg)).

Conventional transport: Transported via road origins, and individual trips over road infrastructure. All daily trips (130) are anticipated to originate from A58 – N62 – N254 corridor.

Material transport: For the transport of bulk materials and AILs, three strategies are defined (Figure 42, Figure 43 and Figure 44). Table 14 presents a short summary of each strategy.

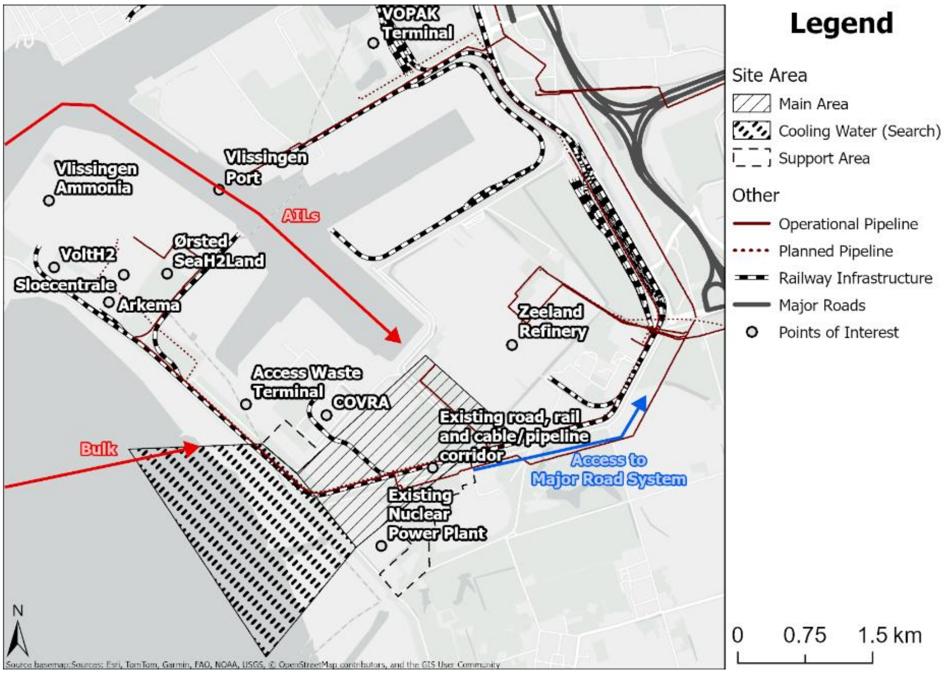


Figure 42: Transportation strategy A, Sloegebied 1

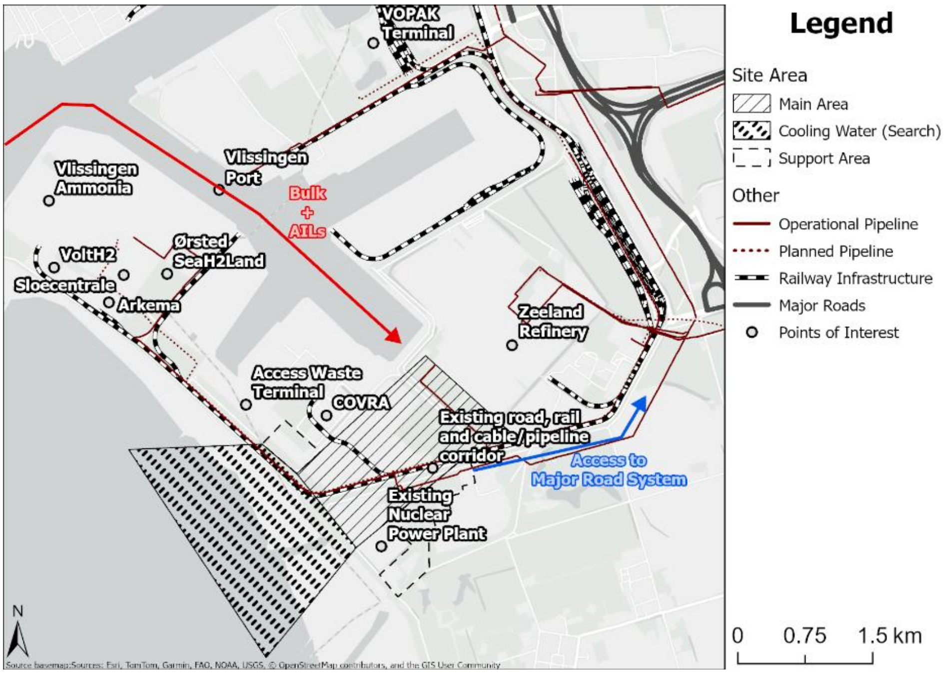


Figure 43: Transportation strategy B, Sloegebied 1

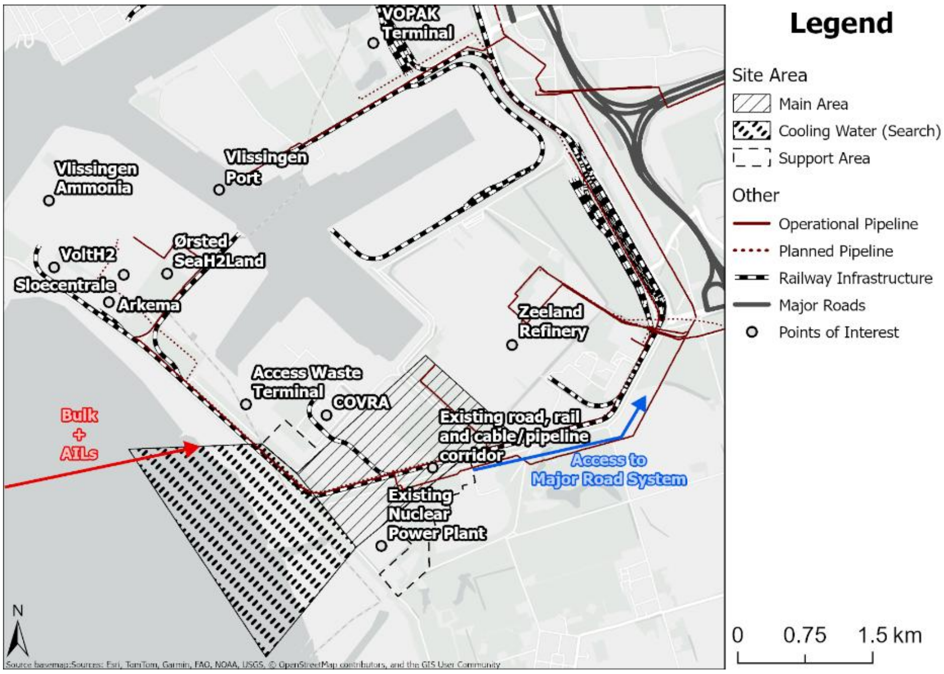


Figure 44: Transportation strategy C, Sloegebied 1

Table 14: Explanatory notes on the transportation strategies Sloegebied 1

	Strategy A	Strategy B	Strategy C
Explainer	• Bulk is transported via a temporary jetty built in the Westernscheldt. • Bulk is directly transported to a part of the working area. • AILs are transported via a new to be built quay structure in the Van Citershaven.	• Bulk and AILs are transported via new to be built quay structure in the van Citershaven and offloaded directly on the main site. • Bulk needs to be transported over the main site to the working area.	• Bulk and AILs are transported directly to the working area by constructing a new quay structure in the Westernscheldt.
Advantages	• Clear separation between bulk and AILs transport. • Bulk directly transported to the working area.	• Limited construction necessary because of already present infrastructure.	• Possibility to bring material more easily into the work area.
Disadvantages	• Construction of a temporary jetty in the Westernscheldt might not be possible because of environmental constraints. • Jetty construction may interfere with the cooling water in-/outlet construction.	• Quay for bulk and AILs can be constrained which might lead to efficiency loss. • Bulk needs to be transported over the main area to the working area.	• Construction of a permanent quay in the Westernscheldt might not be possible because of environmental constraints. • Quay construction may interfere with the cooling water in-/outlet construction.

6.6.2 Modifications to infrastructure

For transportation Strategy B, the necessary modifications to infrastructure are further detailed within this section. For Sloegebied it is anticipated all infrastructure would need to be replaced and that the adjacent infrastructure would cause restraints. It should be noted that these are indicative, based on the available information to date, so these should not be considered as final decisions.

Port infrastructure:

- Upgrade quay structure with a total length of c.300m. Including:
  - Removal of existing Infrastructure (Jetty Reinplus).
  - Construction of a pier/jetty structure of c.300m.
  - Upgrade of the existing docking facilities, to accommodate heavy lifting and transport of bulk goods.

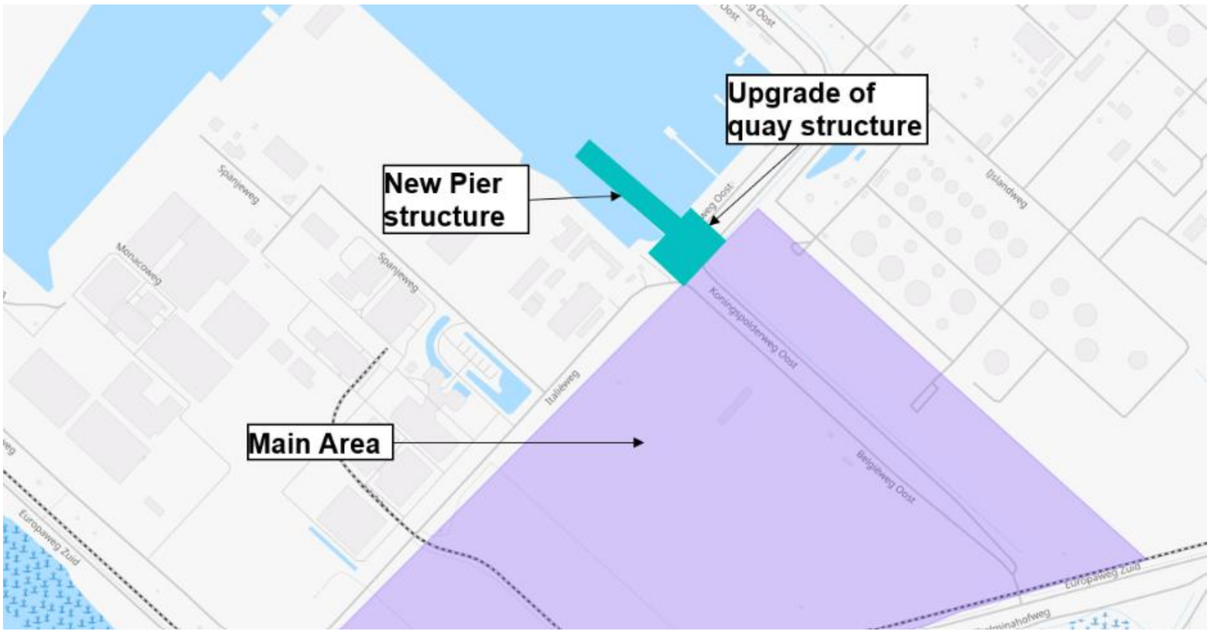


Figure 45: Upgrade to Sloegebied 1 port infrastructure

Road Infrastructure:

- No additional modifications to road infrastructure are foreseen to access the Sloegebied main or work areas as the current road infrastructure is considered sufficiently capable.
- Upgrade of any existing infrastructure and the construction of any Park and Ride areas outside the construction are yet to be confirmed.
- Relocation of infrastructure around the site.

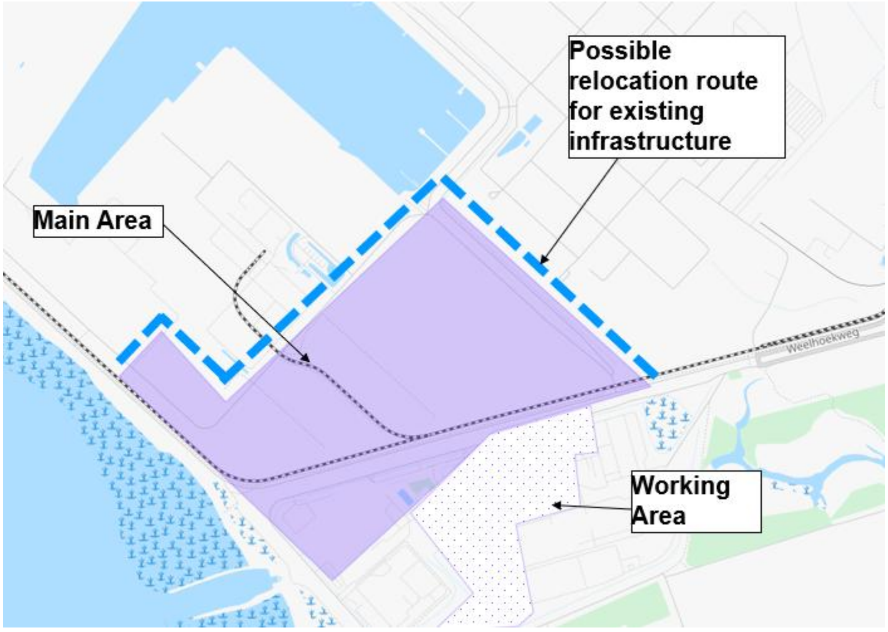


Figure 46: Possible relocation of existing road, rail and pipeline infrastructure

6.7 Sloegebied 2

6.7.1 Transportation strategy

Workforce: Workforce is transported to the construction site predominantly by car or bus (from Park and Ride locations and/or from public transport hubs in the area (e.g., Middelburg)).

Conventional transport: Transported via road origins and individual trips over road infrastructure. All daily trips (130) are anticipated to originate from A58 – N62 – N254 corridor.

Material transport: For the transport of bulk materials and AILs, two strategies are defined (figure 47 and Figure 48). Table 15 presents a short summary of each strategy.

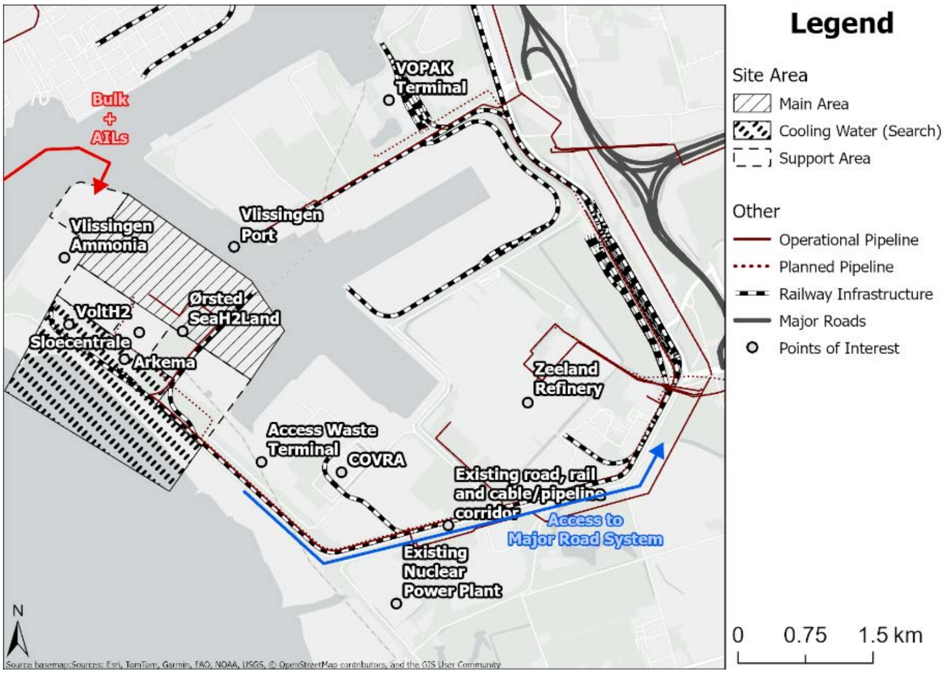


Figure 47: Transportation strategy, Sloegebied 2

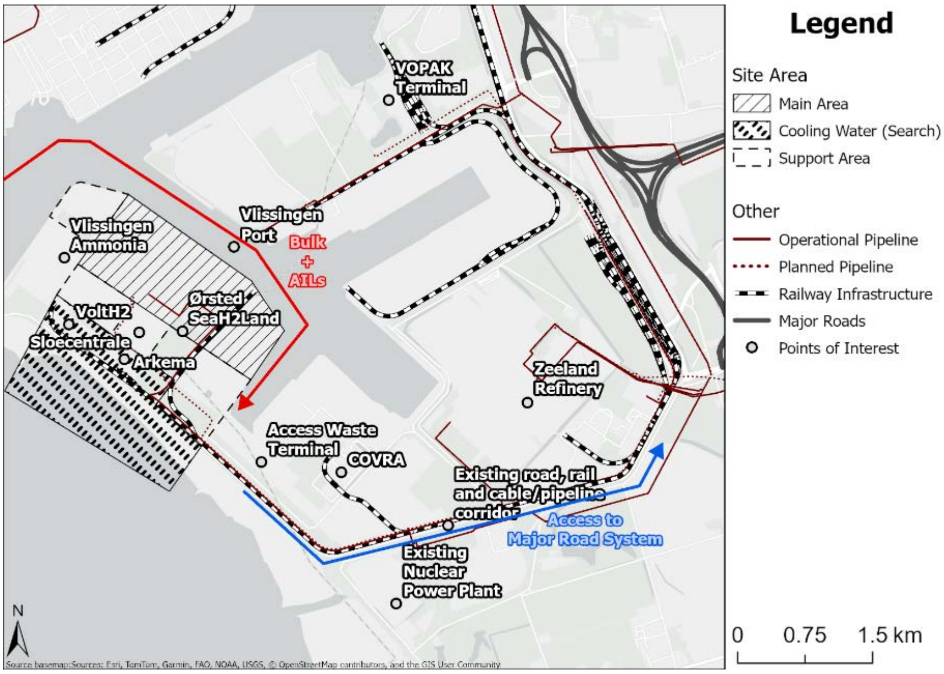


Figure 48: Transportation strategy, Sloegebied 2

Table 15: Explanatory notes on the transportation strategies for Sloegebied 2

	Strategy A	Strategy B
Explainer	• BULK and AILs transported via a new quay structure in the Sloehaven. • Bulk and AILs transported to the working area, thereafter, transported to the main area.	• Bulk and AILs transported via a new quay structure in the Kaloothaven.
Advantages	• Bulk and AILs transported to the location (on the working area). • Sufficient space available to create a quay structure able to provide space for both AILs and bulk offloading.	• Bulk can be transported directly onto the working area. • AILs can be transported directly onto the main area. • Sufficient space available to create a decent quay structure to separate AILs and bulk vessels. • Offloading points are more 'private', so less risk on interference with other vessels.
Disadvantages	• No quay structure available, more investment costs foreseen compared to Strategy B. • Higher possibility to interfere with other vessels in the port because of location quay structure.	• Port is currently being used as a coal terminal, infrastructure needs to be demolished.

6.7.2 Modifications to infrastructure

For transportation Strategy B, the necessary modifications to infrastructure are further detailed within this section. It should be noted that these are indicative based on the available information to date, so these should not be considered as final decisions.

Port infrastructure: -

- Upgrade existing quay structure at the Kaloothaven with a total length of c.600m Including:
  - Removal of existing infrastructure.
  - Construction of a quay structure of c.600m.
  - Upgrade of the existing docking facilities, to accommodate heavy lifting and transport of bulk goods.

Road infrastructure:

- No additional modifications to road infrastructure are foreseen to access the Sloegebied main or work areas as the current road infrastructure is considered sufficiently capable.
- Upgrade of any existing infrastructure and the construction of any Park and Ride areas outside the construction are yet to be confirmed.

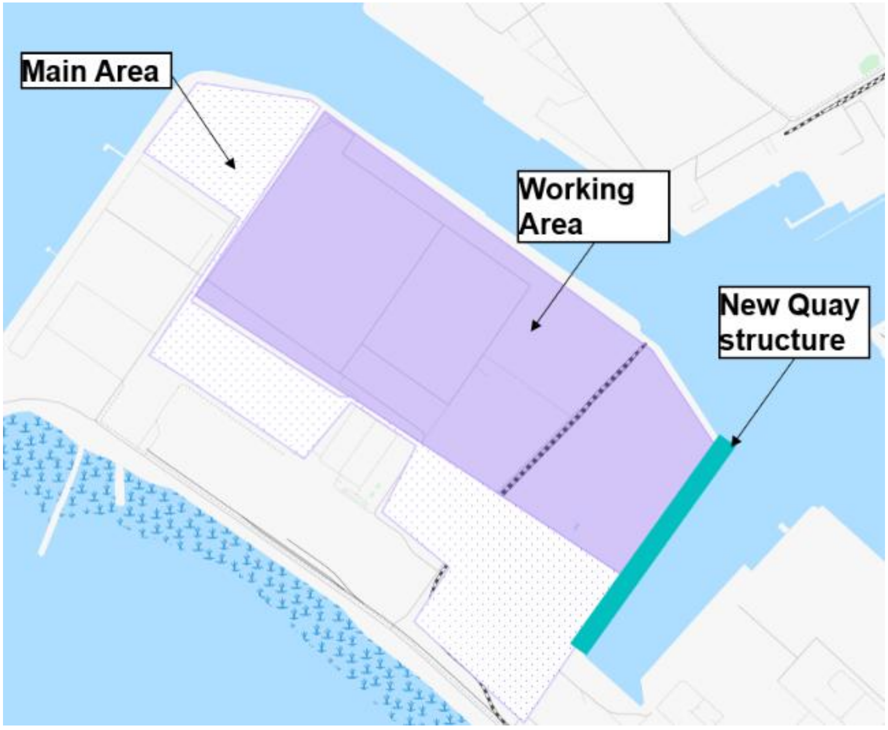


Figure 49: Infrastructure requirements for Sloegebied 2

6.8 Terneuzen 1A

6.8.1 Transportation strategy

Workforce: Workforce is transported to the construction site predominantly by car or bus (from P+R locations and/or from public transport hubs in the area (e.g., Gent, Middelburg)).

Conventional transport: Transported via road origins and individual trips over road infrastructure. All daily trips (94) are anticipated to originate from the N62 – N61(s) – E34 corridor and 36 daily trips are anticipated to originate from the N62 - N61(n) – A58 corridor.

Material transport: For the transport of bulk materials and AILs, three strategies are defined (Figure 50, Figure 51 and Figure 52). Table 16 presents a short summary of each strategy.

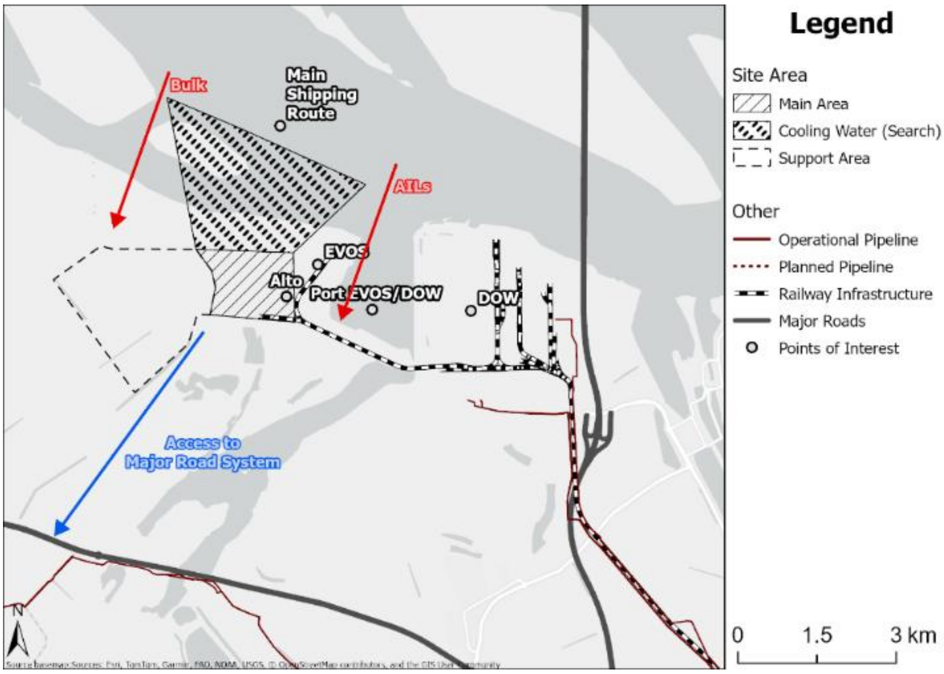


Figure 50: Transportation strategy A, Terneuzen 1A

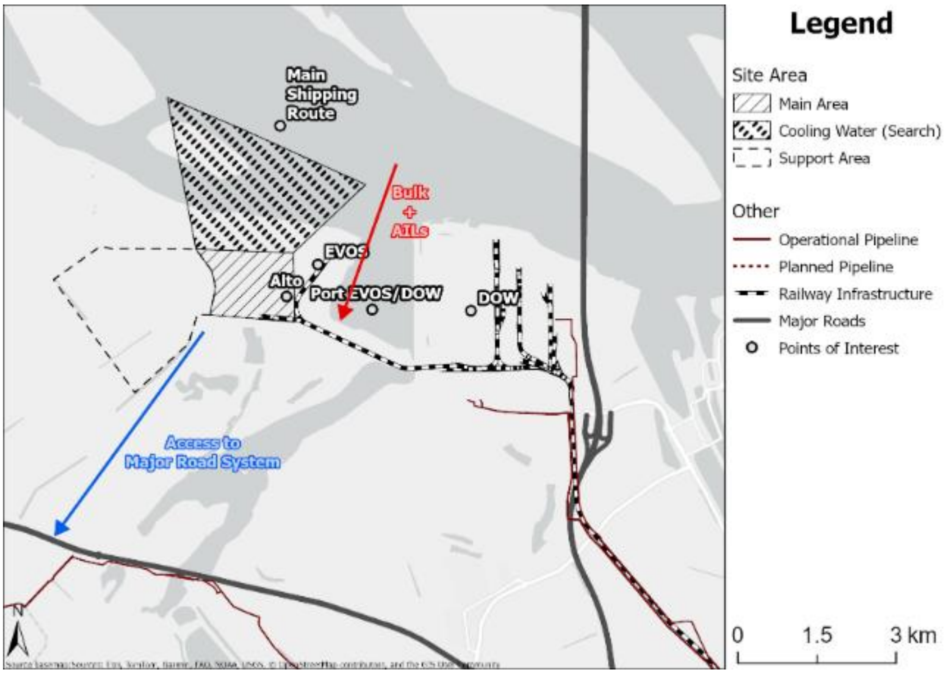


Figure 51:Transportation strategy B, Terneuzen 1A

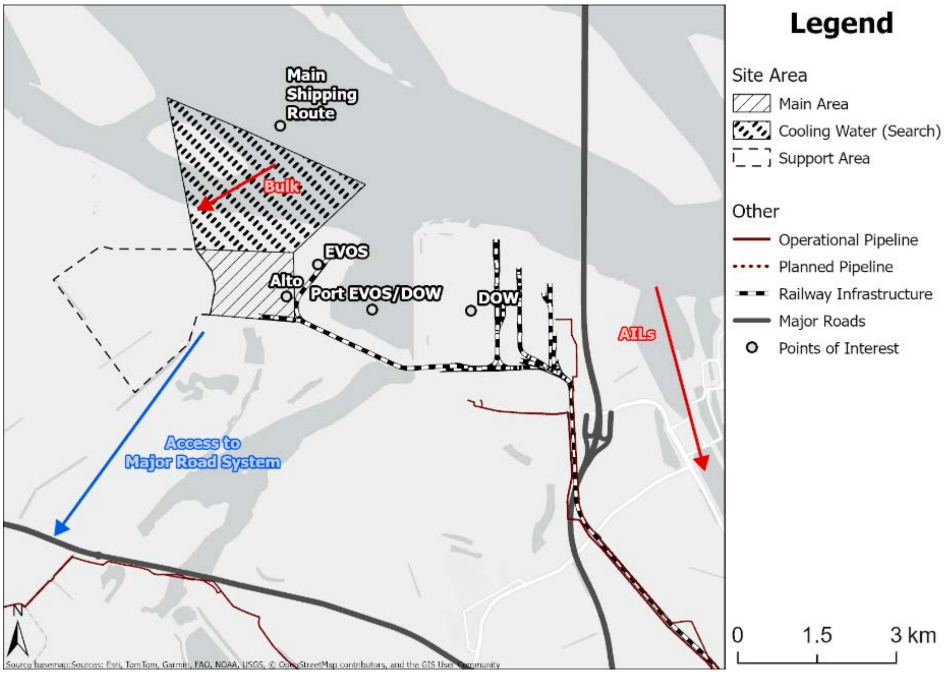


Figure 52: Transportation strategy C, Terneuzen 1A

Table 16: Explanatory notes on the transportation strategies for Terneuzen 1A

	Strategy A	Strategy B	Strategy C
Explainer	● Bulk is transported via a temporary jetty built in the Westernscheldt and transported directly to the working area. ● AILs are transported via the existing quay structure of Zeeland Container Terminal. ● AILs transported over private road of DOW to site.	● Bulk and AILs are transported via the Zeeland Container Terminal Quay. ● Bulk is transported via conveyor belt to the site. ● AILs is transported over road to the main site.	● Bulk transported via a temporary jetty (constructed in the Westernscheldt), to the working area. ● AILs transported to the Goese Kade Quay, thereafter, transported over road to the main site.
Advantages	● Clear separation between bulk and AILs transport. ● Bulk directly transported to the working area.	● Quay structure already available. ● Strategy is considered least costly. ● No structure in the Westernscheldt needed.	● Quay structure for AILs already available.
Disadvantages	● Construction of a jetty structure in the Westernscheldt might not be possible because of environmental constraints. ● Strategy is considered costly. ● Close attention needs to be paid how to bring AILs exact into site since this requires crossing pipeline structures.	● Port is considered to be congested because of ships going the oil terminal.[46] ● AILs needs to cross existing pipeline structures and railway lines before entering into the main site. ● Bulk needs to cross the main site before entering into the working area.	● AILs have to cross the Terneuzen Sea lock. ● quay construction is likely to interfere with the cooling water in-/outlet construction. ● AILs have to be transported over road to the site.[47]

6.8.2 Modifications to infrastructure

For transportation Strategy A, the necessary modifications to infrastructure are detailed within this section. It should be noted that these are indicative based on the information available to date, so these should not be considered as final decisions.

Port infrastructure:

- Modification of the Quay structure of Zeeland container terminal or a quay structure at the working area in the Westernscheldt. Including:
  - Increase the strength of the quay to c.20-30t/m^2.
  - Construction of the associated docking facilities to accommodate heavy lifting and roll-off possibilities for AILs.
- Construction of a jetty in the Westernscheldt to accommodate offloading of bulk carriers.

[46] This is considered as a red flag because of safety constraints

[47] This route includes some intersection with bridges / viaducts which is not considered feasible at the moment for the AILs.

Road infrastructure:

- Development of a new access road of c.4km to connect the working area to the N61. It is assumed that appropriate on/off ramps need to be built, including a bridge when connecting to the N61.
- Road upgrade from the AILs offloading point to the main site, including any measures to cross existing infrastructure such as pipelines and a railway.
- Upgrade of any existing infrastructure and the construction of any Park and Ride areas outside the construction are yet to be confirmed.

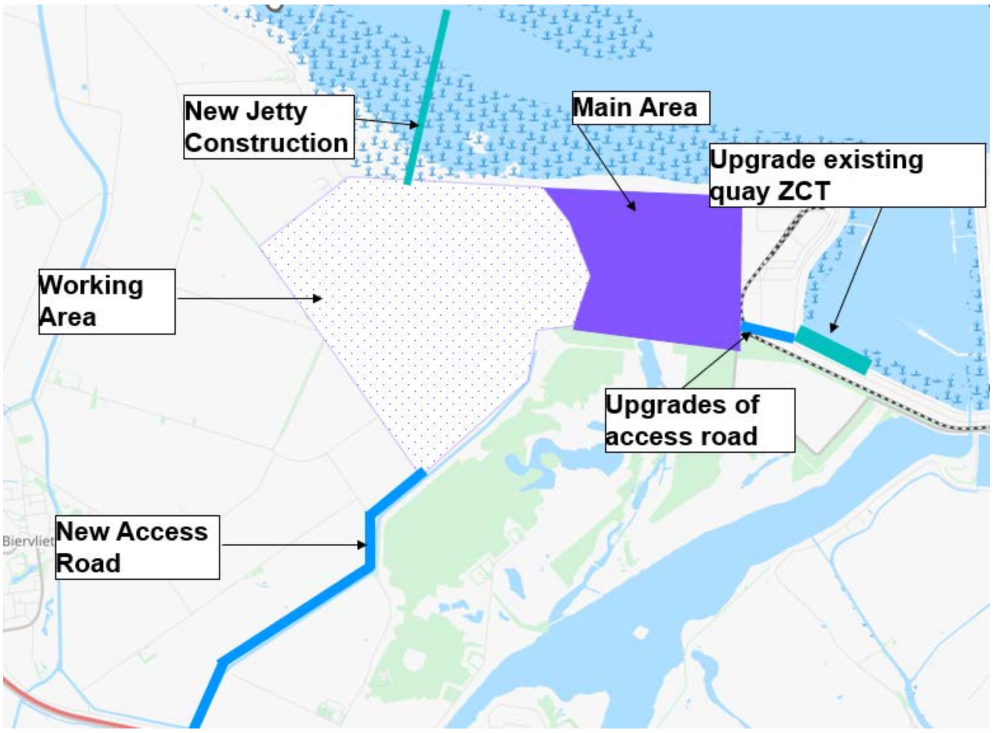


Figure 53: Upgrades to infrastructure considered for Terneuzen 1A

6.9 Terneuzen 1B

6.9.1 Transportation strategy

Workforce: Workforce is transported to the construction site predominantly by car or bus (from P+R locations and/or from public transport hubs in the area (e.g., Gent, Middelburg)).

Conventional transport: Transported via road origins and individual trips over road infrastructure. 94 daily trips are anticipated to originate from the N61 – N62(s) – E34 corridor and 36 daily trips are anticipated to originate from the N62 - N61(n) – A58 corridor.

Material transport: For the transport of bulk materials and AILs, three strategies are defined (Figure 54, Figure 55 and Figure 56). Table 17 presents a short summary of each strategy.

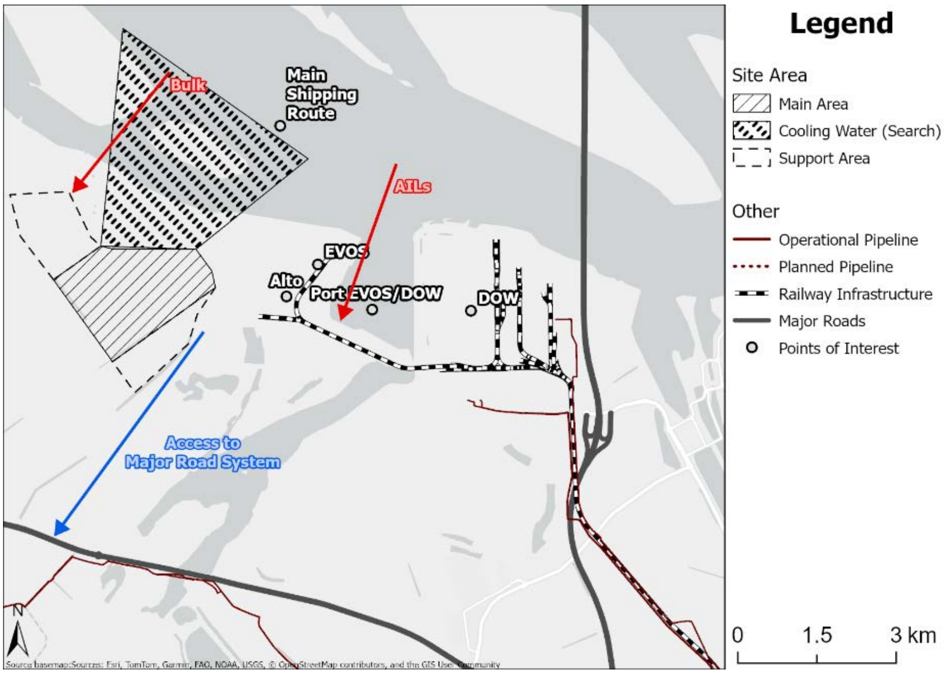


Figure 54:Transportation strategy A, Terneuzen 1B

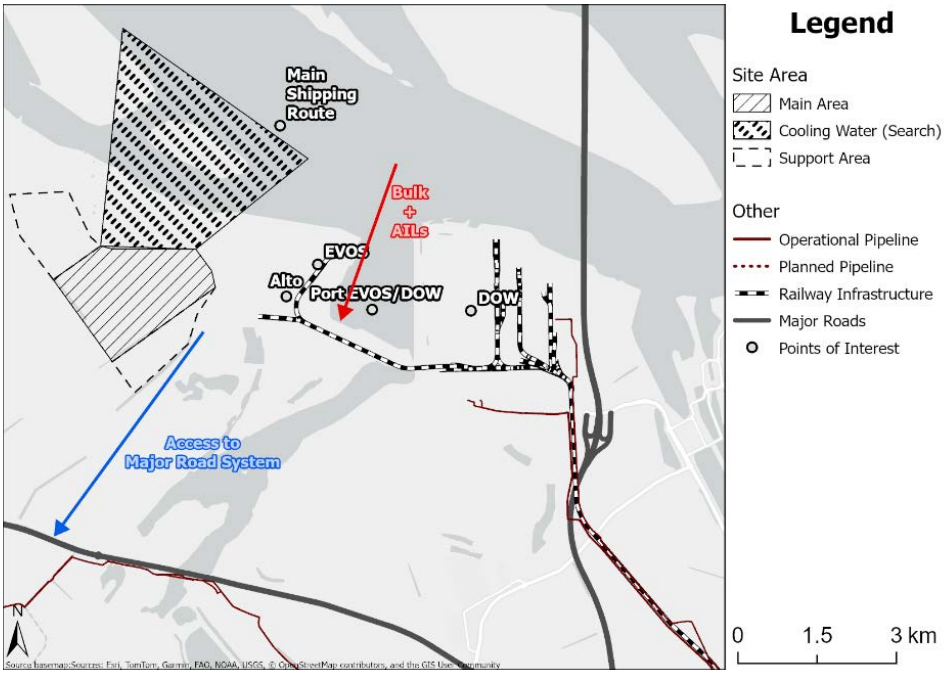


Figure 55: Transportation strategy B, Terneuzen 1B

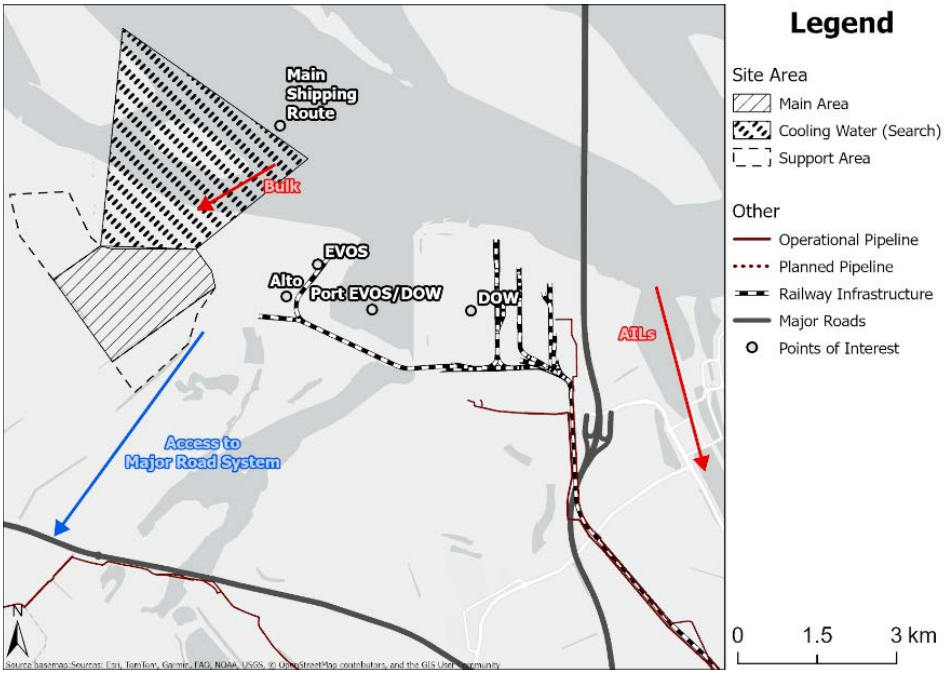


Figure 56: Transportation strategy C, Terneuzen 1B

Table 17: Explanatory notes on transportation strategies for Terneuzen 1B

	Strategy A	Strategy B	Strategy C
Explainer	● Bulk is transported via a temporary jetty built in the Westernscheldt and transported directly to the working area. ● AILs are transported via the existing quay structure of Zeeland Container Terminal. ● AILs transported over private road of DOW to site.	● Bulk and AILs are transported via the Zeeland Container Terminal quay. ● Bulk is transported via conveyor belt to the site. ● AILs is transported over road to the main stie.	● Bulk transported via a temporary jetty (constructed in the Westernscheldt), to the working area. ● AILs transported to the Goese Kade Quay, thereafter, transported over road to the main site.
Advantages	● Clear separation between bulk and AILs transport. ● Bulk directly transported to the working area.	● Quay structure already available. ● Strategy is considered least costly. ● No structure in the Westernscheldt needed.	● Quay structure for AILs already available. ● No permanent structure in the Westernscheldt needed.
Disadvantages	● Construction of a jetty structure in the Westernscheldt might not be possible because of environmental constraints. ● Strategy is considered costly. ● Close attention needs to be paid how to bring AILs exact into site since this requires crossing pipeline structures.	● Port is considered to be congested because of ships going the oil terminal.[48] ● AILs needs to cross existing pipeline structures and railway lines before entering into the main site.	● AILs have to cross the Terneuzen Sea lock. ● Quay construction is likely to interfere with the cooling water in-/outlet construction. ● AILs have to be transported over road to the site.[49]

6.9.2 Modifications to infrastructure

For transportation Strategy A, the necessary modifications to infrastructure are detailed within this section. It should be noted that these are indicative based on the information available to date, so these should not be considered as final decisions.

Port Infrastructure:

- Modification of the Quay structure of Zeeland container terminal or a quay structure at the working area in the Westernscheldt. Including:
  - Increase the strength of the quay to c.20-30t/m^2.
  - Construction of the associated docking facilities to accommodate for instance: heavy lifting and roll-off possibilities for AILs.
- Construction of a jetty in the Westernscheldt to accommodate offloading of bulk carriers.

[48] This is considered as a red flag because of safety constraints

[49] This route includes some intersection with bridges / viaducts which is not considered feasible at the moment for the AILs.

Road Infrastructure:

- Development of a new access road of c.4km to connect the working Area to the N61. It is assumed that appropriate on/off ramps need to be built, including a bridge when connecting to the N61.
- Road upgrade from the AILs offloading point to the main site, including any measures to cross existing infrastructure such as pipelines and a railway.
- Upgrade of any existing infrastructure and the construction of any Park and Ride areas outside the construction are yet to be confirmed.

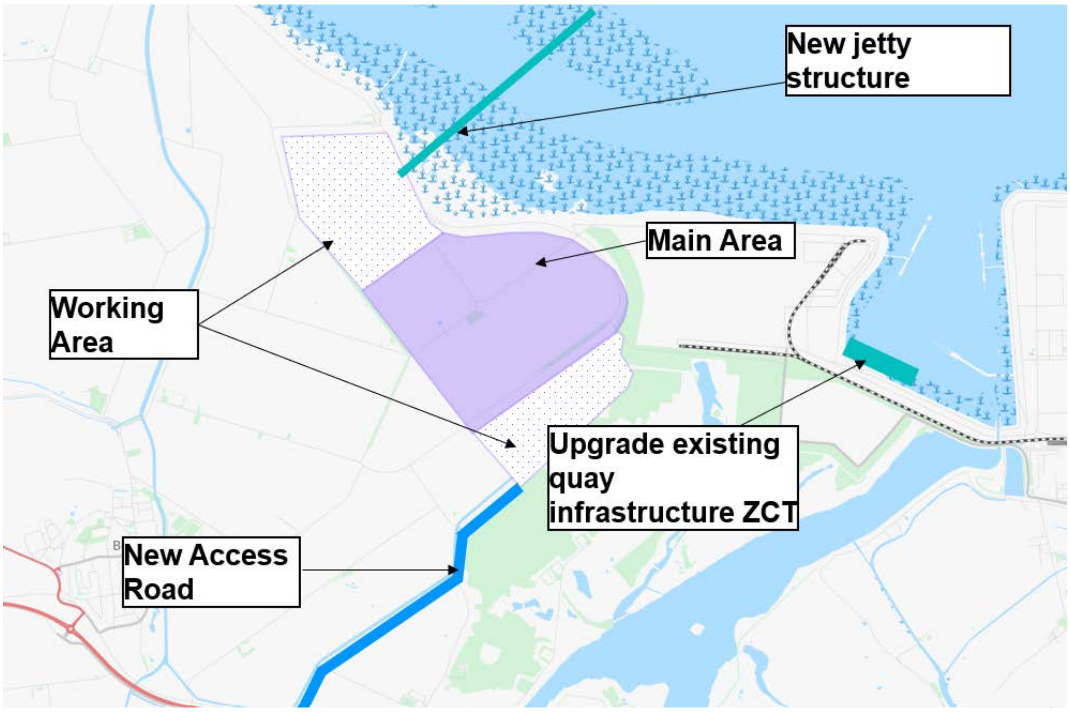


Figure 57: New infrastructure requirements Terneuzen 1B

7 Cost estimate per Site

Table 18 describes the costs for the additional infrastructure required per site (as indicated in Chapter 6). The assessment of the costs is done on a high-level estimate, based on publicly available data of which the sources are provided in the foot notes. As there is a high level of uncertainty of these costs, the outcomes per line item are rounded to €5M figures. Note that these figures are related to investment costs (agreed as construction costs times 3) and no other cost factors as preparation, engineering, land acquisition, permitting, financing etc are taken into account. Assumed costs are rounded up to the nearest €10 million.

Table 18: Assessment of the investment costs for the required additional infrastructure per site

Site	Item	Assumed costs[50]	Comments
Eemshaven 1A	Port infrastructure: • Removal exiting Infrastructure (Ro-Ro Facility, VOPAK). • Construction of a quay wall, 350m length, depth 12m and upgrade of the existing quay structure to accommodate heavy lifting.	€40M	Costs based upon following references: • Costs based on a rough estimate of €5M for the VOPAK jetty removal (+- 100m length), and €5M for the existing quay facilities. • Estimated figure for investment of a quay wall of 12m deep per m[1]: €30k – €70k/m[51], based on the fact that the quay is constructed in an existing port, the lower figure is used.
	Road infrastructure: • Construction of 4 bridges (4 lanes) with a span of c.60m, assumed width: 20m. • Upgrade of the Kwelderweg of 2km to 2x2 lanes. • Construction of a driveway (entering the construction site), including a bridge over the N46. • Construction of a driveway (exiting the construction site). • Any subsequent measures following out of the traffic study.	€90M	Costs based upon following references: • Estimated figure for investment of a bridge: €3,510 – 5,850/m^2[52]. • Estimated figure for investment of a road (2x2 lanes) is: €3.6M - €4.2M per km[53].
	Total	**€130M**	
Eemshaven 1B	Port infrastructure: • Construction of a jetty into the Waddensea, total length c.2km.	€110M	Costs based upon following figures: • Estimated figure for investment of a jetty: €30k – €50k/m[54], because of the long length, the higher value is used. • Assumed costs for investment of a jetty head, €10M
	Road infrastructure:	€80M	Costs based upon following references:

51 Source: Tabellen aanleg- en beheerkosten - Climate Resilient City Tool - Deltares Public Wiki
52 Source: Vernieuwingsopgave infrastructuur
53 Source: https://www.bouwkostenkompas.nl/en/cost-figure/CivilRoT
54 Source: MARAD Budget Estimates FY23

Site	Item	Assumed costs[50]	Comments
	• Construction of a connection bridge between the main area and working area. • Upgrade Kwelderweg. • Construction of driveways. • Any subsequent measures following out of the traffic study.		• Estimated figure for investment of a bridge: €3,510 – 5,850/m^2. • Estimated figure for investment of a road (2x2 lanes) is: €3.6M - €4.2M per km.
	Total	**€190M**	
Eemshaven 2	Port infrastructure: • Removal existing quay facilities at Eemshaven coal fired power plant.	€10M	Rough estimate of the removal costs.
	Road infrastructure: • Expansion of the Huibertgatweg. • Bridge over the Binnenbermsloot. • Construction of a new exit on the Kwelderweg. • Any subsequent measures following out of the traffic study.	€30M	Costs based upon the following reference figures: - • Estimated figure for investment of a road (2x2 lanes) is: €3.6M - €4.2M per km. • Ballpark figure for investment of a bridge: €3,510 – 5,850/m^2.
	Total	**€40M**	
Eemshaven 3	Port infrastructure: • Construction of a jetty into the Waddensea, total length c.2km • Continuous dredging required at the mooring place of the jetty.	€130M	• Estimated figure for investment of a jetty: €30k – €50k/m, because of long length, the higher value is used. • Assumed investment costs for jetty head: €10M. • Assumed investment costs for continuous dredging of the mooring place of the jetty: €20M.
	Road infrastructure: • Expansion of the Huibertgatweg (2km) to a 2x2 road. • Bridge over the Binnenbermsloot. • Construction of a new exit on the Kwelderweg. • Any subsequent measures following out of the traffic study.	€30M	Costs based upon the following reference figures: - • Estimated figure for investment of a road (2x2 lanes) is: €3.6M - €4.2M per km. • Ballpark figure for investment of a bridge: €3,510 – 5,850/m^2.
	Total	**€160M**	
Maasvlakte II 1	Port infrastructure: • Construction of a quay wall, 500m length, depth 12m and associated quay facilities.	€40M	Costs based upon following reference figures: • Estimated figure for investment of a quay wall of 12m deep per m^1: €30k – €70k/m^1. Because of construction in a fully reclaimed area the higher figure is used.
	Road infrastructure: - • Any subsequent measures following out of the traffic study	N/A	
	Total	**€40M**	
Sloegebied 1	Port infrastructure: • Removal of the existing infrastructure. • Construction of a jetty/pier structure of 300m length.	€30M	Costs based upon the following reference figures: • Rough estimate of the removal cost: €5M. • Estimated figure for investment of a jetty: €30k – €50k/m, because of

Site	Item	Assumed costs[50]	Comments
			limited length, the lower value is used. • Assumed costs for jetty head, €10M.
	Road infrastructure: • Relocation of infrastructure. • Any subsequent measures following out of the traffic study.	N/A	
	Total	**€30M**	
Sloegebied 2	Port infrastructure: • Removal of existing infrastructure at the Kaloothaven (coal terminal). • Construction of a quay wall, 500m length, depth 12m and construction of a quay structure to accommodate heavy lifting.	€20M	Costs based upon following reference figures: • Rough estimate of the removal cost, estimated at €5M. • Estimated figure for investment of a quay wall of 12m deep per m[1]: €30k – €70k/m[1], because of the construction in an existing port the lower value is used.
	Road infrastructure: - • Any subsequent measures following out of the traffic study.	N/A	
	Total	**€20M**	
Terneuzen 1A	Port infrastructure: • Upgrade of the existing quay at Zeeland Container Terminal, length 200m. • Removal of facilities at Zeeland Container Terminal. • Construction of associated docking facilities. • Construction of a jetty in the Westernscheldt, length c.2,000km.	€130M	Costs based upon following reference figures: • Estimated figure for investment of a quay wall of 12m deep per m[1]: €30k – €70k/m[1], existing quay is used so lower value applies. • Removal of existing docking facilities at the Zeeland Container Terminal estimated at €5M. • Estimated figure for investment of a jetty: €30k – €50k/m, because of the length the higher value applies. • Assumed costs for jetty head: €10M.
	Road infrastructure: • Construction of a 4km 2x2 access road. • Construction of an offramp (including a bridge over the N61. • Construction of a driveway (exiting the construction site). • Any subsequent measures following out of the traffic study.	€50M	Costs based upon following reference figures: • Estimated figure for investment of a road (2x2 lanes) is: €3.6M - €4.2M per km.
	Total	**€180M**	
Terneuzen 1B	Port infrastructure: • Upgrade of the existing quay at Zeeland Container Terminal, length 200m. • Removal of facilities at Zeeland Container Terminal. • Construction of associated docking facilities. • Construction of a jetty in the Westernscheldt, length c.2,000km.	€130M	Costs based upon following reference figures: • Estimated figure for investment of a quay wall of 12m deep per m[1]: €30k – €70k/m[1], existing quay is used so lower value applies. • Removal of existing docking facilities at the Zeeland Container Terminal estimated at €5M.

Site	Item	Assumed costs[50]	Comments
			• Estimated figure for investment of a jetty: €30k – €50k/m, because of the length the higher value applies. • Assumed costs for jetty head: €10M.
	Road infrastructure: • Construction of a 4km 2x2 access road. • Construction of an offramp (including a bridge over the N61. • Construction of a driveway (exiting the construction site). • Any subsequent measures following out of the traffic study.	€50M	Costs based upon following reference figures: • Estimated figure for investment of a road (2x2 lanes) is: €3.6M - €4.2M per km.
	Total	**€180M**	

8 Conclusion

Based on the preliminary stage of the construction programme for new nuclear powerplants this study indicates the necessary additional infrastructure on the 9 alternative construction locations selected by the KGG. To assess the location with the least additional infrastructure required, the infrastructure required is assessed on a cost basis, of which the results are provided in Table 19.

To assess the additional infrastructure the following assumptions have been made and set in collaboration with the ministry of KGG and Antea Group:

- Trucks are used to transport conventional goods and AILs goods where necessary. The number of trips to the construction site is 130/day.
- Trains are briefly considered for transport in this phase because of the limited availability on the Dutch railway network and the fact that trains are very rarely used in construction projects in the Netherland.
- Ships are used to transport bulk goods and preferably AILs. The number of ship movements to site is assumed to be 7/week at maximum.
- To moor ships, either a quay structure and / or jetty is required.
- Quays are the preferable option, albeit requiring upgrades, with jetties being the back-up option for some of those locations selected. Since the presence of Natura 2000 areas may restrict or prohibit jetty construction, it is proposed that the selected option should exclude the development of a jetty.
- The maximum workforce number is estimated to be 8,000 workers.
- It is assumed the workers will have a model split of c.60% during day, c.25% during evening and c.15% during night.
- No accommodation campuses are considered.
- At the construction site a parking area for 1,200 cars will be constructed.
- Several Park & Ride areas will be constructed, which will be based upon a first outcome of the traffic flow calculations.

This report further provides a general overview of the state of the Dutch Infrastructure network from the road, rail and marine perspectives to facilitate informed decision-making for future developments.

Assumed costs have been multiplied by three and placed into appropriate cost categories. These are indicative figures and should not be considered when making investment decisions.

Table 19: Assessment of investment costs for additional infrastructure per alternative (lowest costs - highest costs)

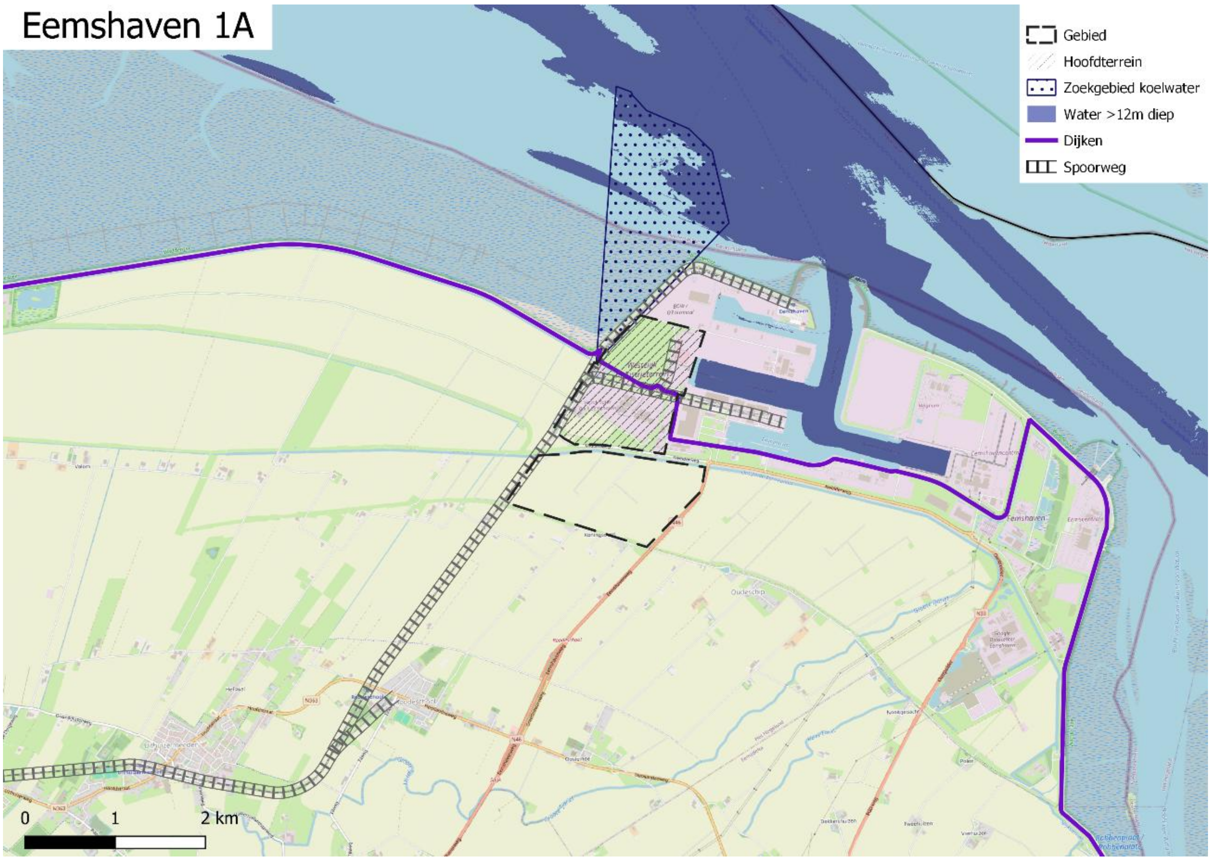
#	Site	Assumed costs[55]	Main remarks
1	Sloegebied 2	€100M-€500M	• The part at the Kaloothaven is currently used as bulk storage facility (e.g., coal, fertilizer, biomass etc.)[56]. Land contamination could be expected driving up the preparation costs because of cleaning activities, these are currently not considered.
2	Sloegebied 1	<€100M	• A road, railway, and pipeline corridor cross the site, which is not considered to be feasible from a safety perspective. The costs for relocation of such infrastructure are currently not considered. • The port facilities would require some additional land to be obtained - the exact details are still to be confirmed.
3	Eemshaven 2	<€100M	• Only the costs to remove port infrastructure at the RWE Coal Fired Power plant are included, not the costs to remove the entire RWE Coal fired powerplant.
4	Maasvlate II1	<€100M	• Part of the site still seems to be reclaimed - these costs are not included.
5	Eemshaven 1A	€100M-€500M	• The costs only include the removal of the existing Jetty of VOPAK, not the full VOPAK site. • Bulk and AILs are offloaded in the same area which might cause availability issues.
6	Eemshaven 3	€100M-€500M	• To transport AILs, an offsite location is considered (Quay at Wagenborg Stevodin). The costs for renting / using these facilities are not considered. Additionally seems the route sufficient to transport AILs however, exact details on structural integrity should be examined. • The feasibility of construction a jetty in the Eems-Dollard area is to be confirmed.
7	Terneuzen 1A	€500M - €1,000M	• To transport AILs, the current facilities at the Zeeland Container Terminal (ZCT) are considered. The costs for acquiring this infrastructure/location are not considered. • Construction of a jetty in the Westernscheldt might cause issues because of environmental constraints. • The route to transport AILs uses a private road operated by DOW.
7	Terneuzen 1B	€500M - €1,000M	• To transport AILs, the current facilities at the Zeeland Container Terminal (ZCT) are considered. The costs for acquiring this infrastructure/location are not considered. • Construction of a jetty in the Westernscheldt might cause issues because of environmental constraints. • The route to transport AILs uses a private road operated by DOW.
9	Eemshaven 1B	€500M - €1,000M	• To transport AILs, an offsite location is considered (Quay at Wagenborg Stevodin). The costs for renting / using these facilities are not considered. • The jetty is considered in the Waddensea, which might cause concerns because of environmental constraints. • The jetty construction might interfere with the cooling water options.

[55] Note that these figures are related to investment costs and no other cost factors as preparation, engineering, land acquisition, permitting, financing etc are taken into account.

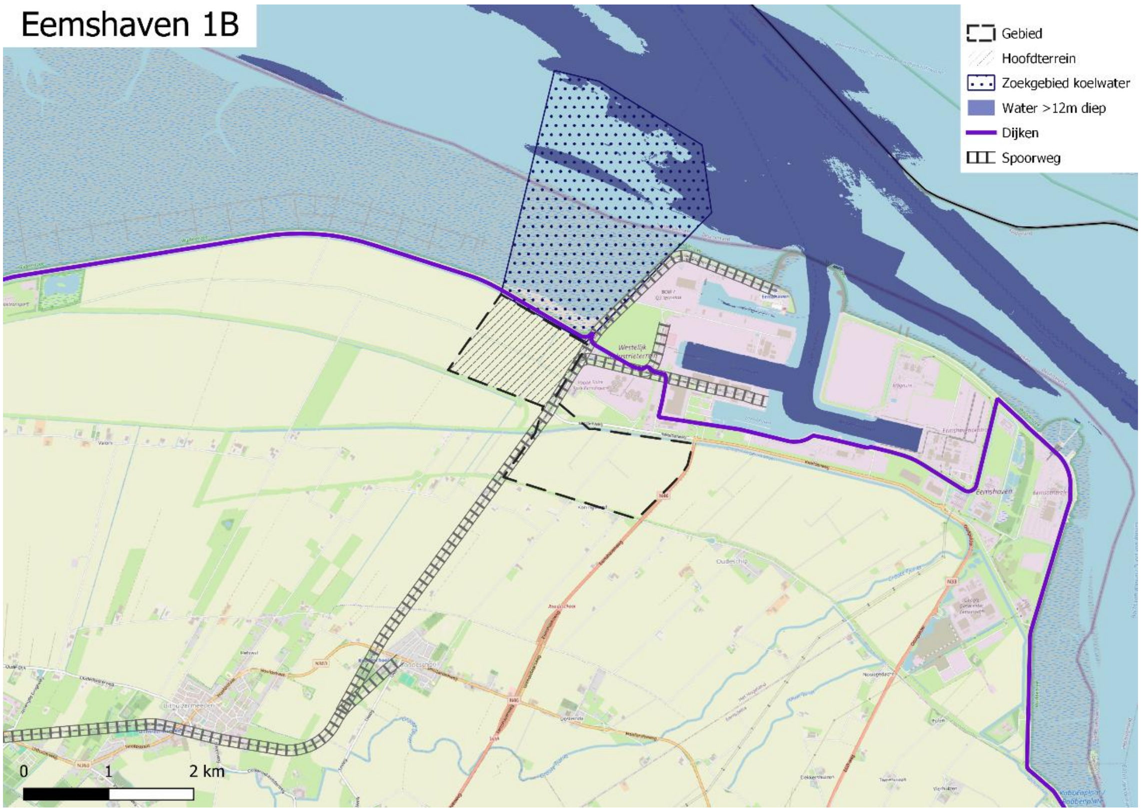
[56] Source: OVET bulk terminal | HES International

A. Alternatives

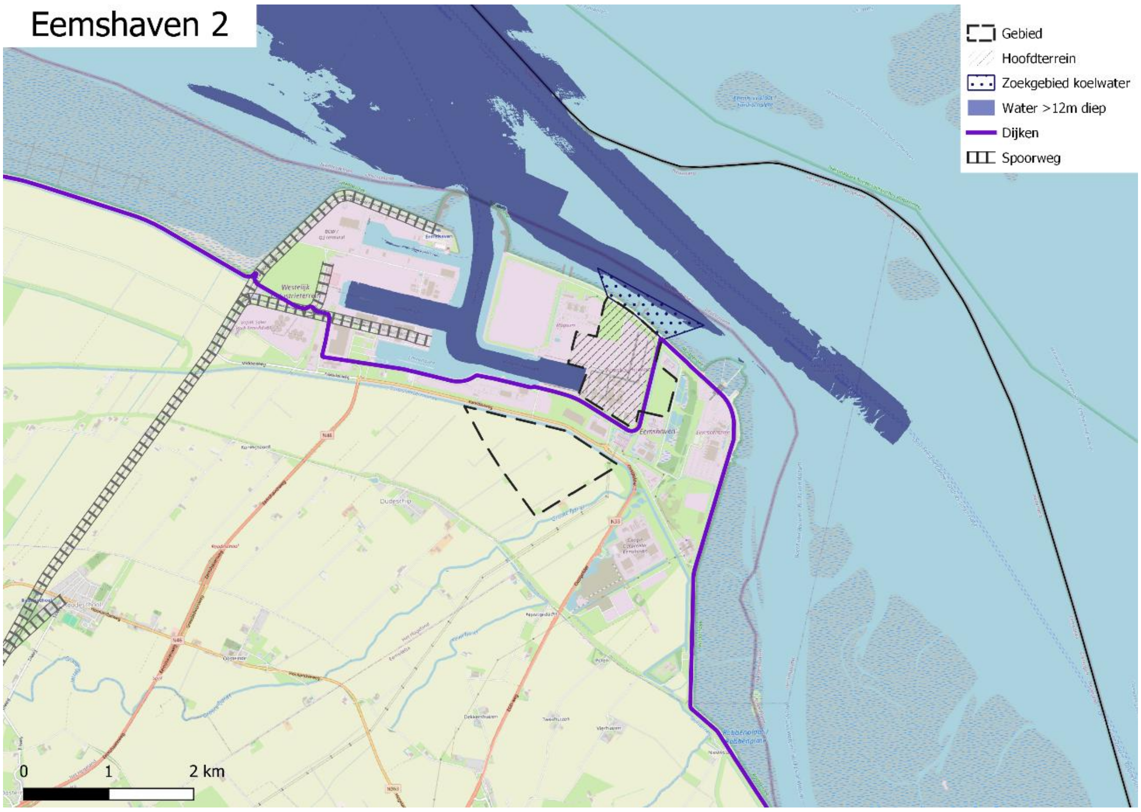
A.1 Alternative Eemshaven 1a



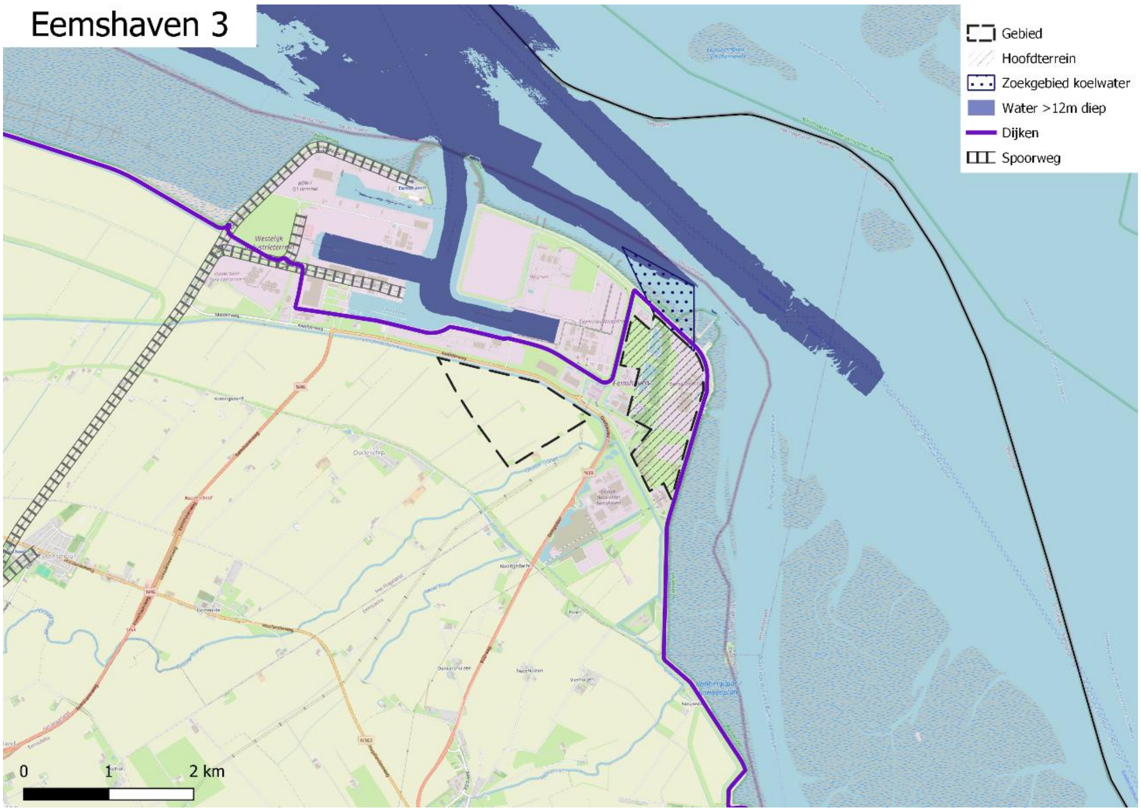
A.2 Alternative Eemshaven 1b



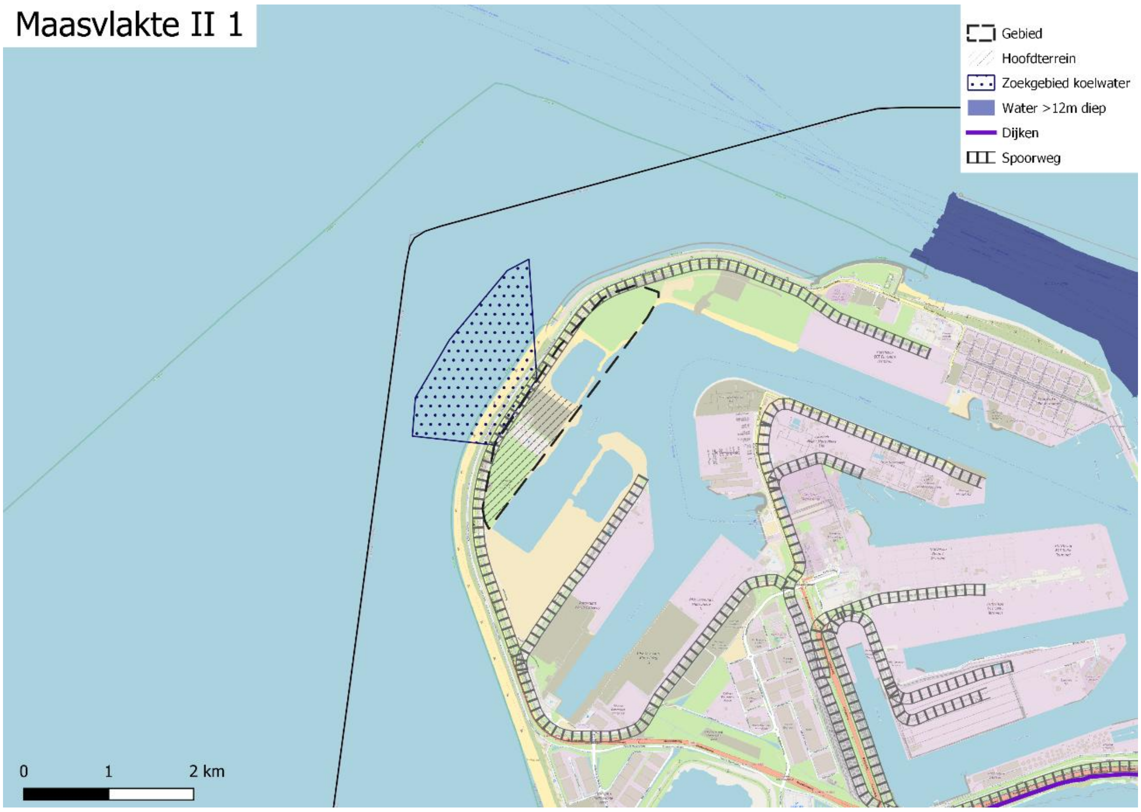
A.3 Alternative Eemshaven 2



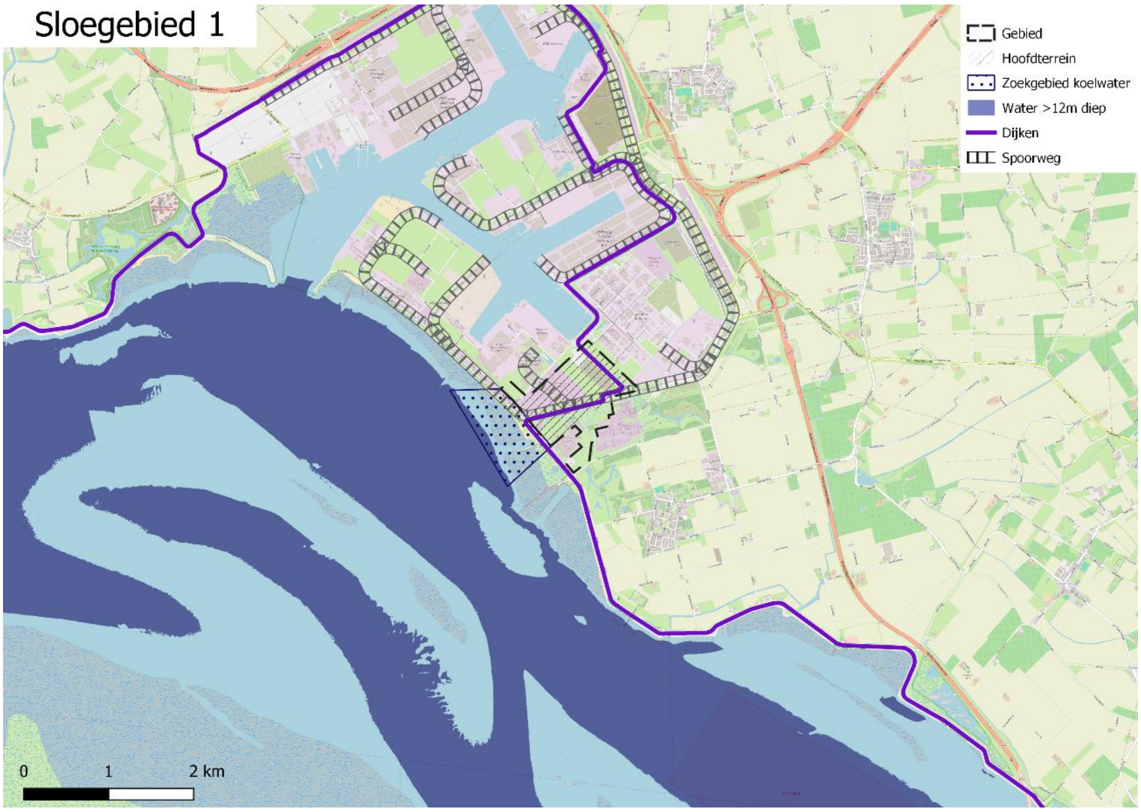
A.4 Alternative Eemshaven 3



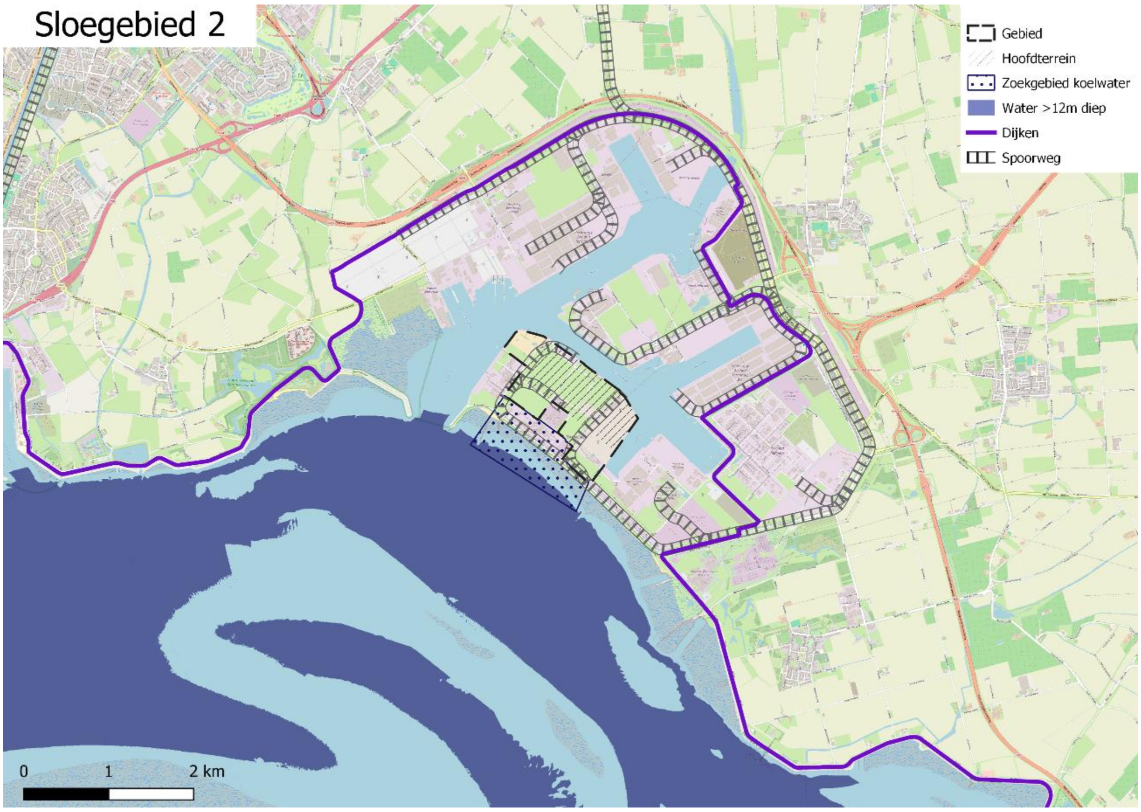
A.5 Alternative Maasvlakte II



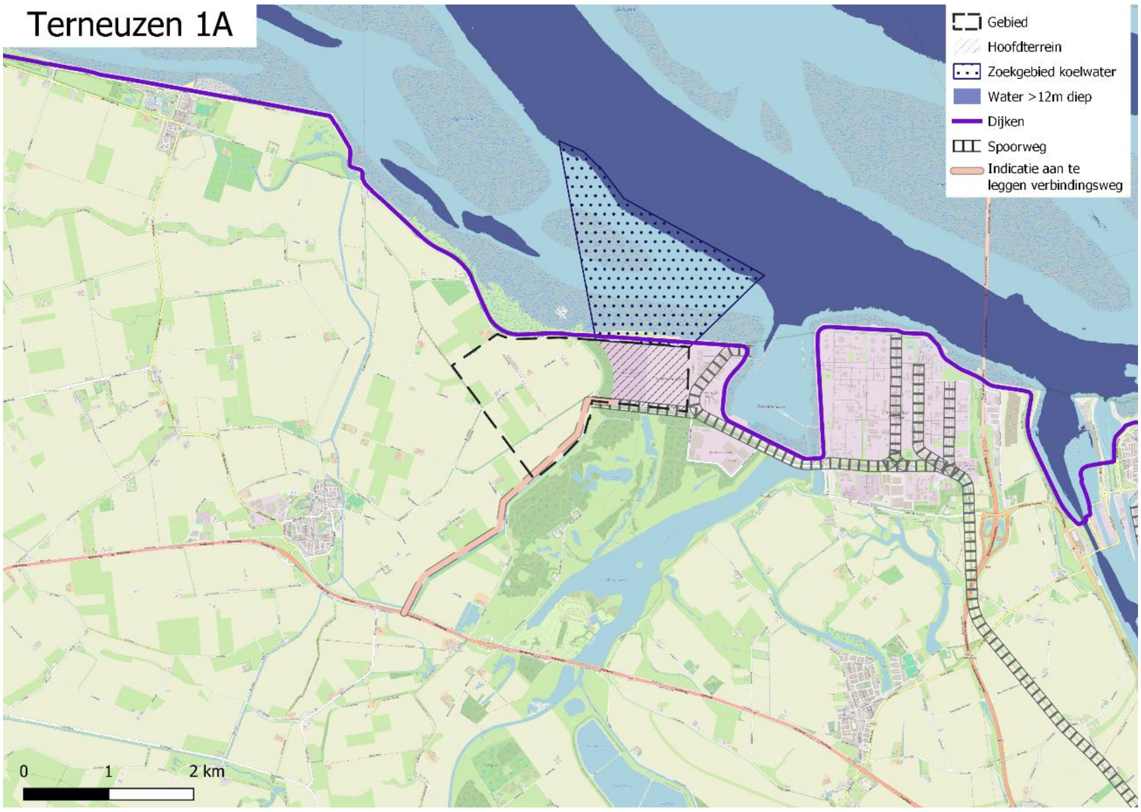
A.6 Alternative Sloegebied 1



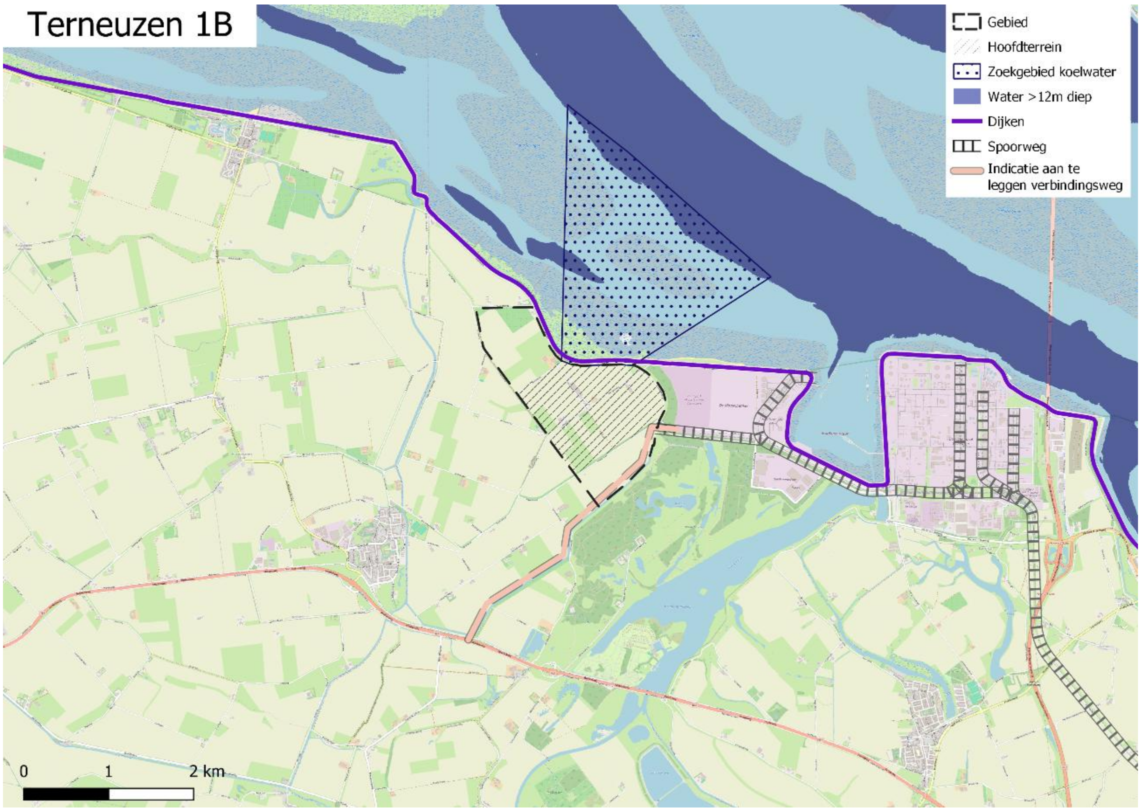
A.7 Alternative Sloegebied 2



A.8 Alternative Terneuzen 1a



A.9 Alternative Terneuzen 1b



B. Examples of transportation options

B.1 Cargo train transporting containers

Figure 58: Source: https://nl.dbcargo.com/rail-nl-nl/services/soorten-transport

B.2 Cargo train transporting bulk to Sizewell C

Figure 59: Source: https://www.railfreight.com/technology/2025/04/23/first-freight-train-to-sizewell-c-reactor/

B.3 Transportation of AILs (steam generator) at Voglte NPP construction site

Figure 60: Source: https://eu.augustachronicle.com/story/news/2015/06/09/steam-generator-latest-large-delivery-plant-vogtle-nuclear-construction-site/14365422007/

B.4 Hinkley Point C jetty

Figure 61: Source: https://www.edfenergy.com/energy/nuclear-new-build-projects/hinkley-point-c/news-views/first-ships-dock-jetty

B.5 Reactor vessel transport via Combwhich Wharf (Hinkley Point C)

Figure 62: Source: https://www.edfenergy.com/energy/nuclear-new-build-projects/hinkley-point-c/local-community/plugged-in/article/combwich-wharf-in-action

B.6 Steam generator transport via road (Hinkley Point C)

Figure 63: Source: https://www.nucnet.org/news/first-of-eight-steam-generators-arrives-at-uk-nuclear-station-site-5-1-2024

B.7 On-site concrete batching facility Hinkley Point C

Figure 64: Source: https://www.constructionnews.co.uk/project-reports/rising-power-on-site-at-hinkley-point-c-22-11-2017/

C. Assessment of the investment costs for the required additional infrastructure per site per strategy

Table 20: Assessment of investment costs for additional infrastructure per alternative (lowest costs - highest costs)

#	Site	Assumed costs[57]	Main remarks
1	Sloegebied 2	€100M- €500M	• The part at the Kaloothaven is currently used as bulk storage facility (e.g., coal, fertilizer, biomass etc.)[58]. Land contamination could be expected driving up the preparation costs because of cleaning activities, these are currently not considered.
2	Sloegebied 1	<€100M	• A road, railway, and pipeline corridor cross the site, which is not considered to be feasible from a safety perspective. The costs for relocation of such infrastructure are currently not considered. • The port facilities would require some additional land to be obtained; the exact details are still to be confirmed.
3	Eemshaven 2	<€100M	• Only the costs to remove port infrastructure at the RWE Coal Fired Power plant are included, not the costs to remove the entire RWE Coal fired powerplant.
4	Maasvlate II1	<€100M	• Part of the site still seems to be reclaimed; these costs are not included.
5	Eemshaven 1A	<€100M	• The costs only include the removal of the existing Jetty of VOPAK, not the full VOPAK site. • Bulk and AILs are offloaded in the same area which might cause availability issues.
6	Eemshaven 3	€155M	• To transport AILs, an offsite location is considered (Quay at Wagenborg Stevodin). The costs for renting / using these facilities are not considered. Additionally seems the route sufficient to transport AILs however, exact details on structural integrity should be examined. • The feasibility of construction a jetty in the Eems-Dollard area is to be confirmed.
7	Terneuzen 1A	€100M - €200M	• To transport AILs, the current facilities at the Zeeland Container Terminal (ZCT) are considered. The costs for acquiring this infrastructure/location are not considered. • Construction of a jetty in the Westernscheldt might cause issues because of environmental constraints. • The route to transport AILs uses a private road operated by DOW.
7	Terneuzen 1B	<50,000/mt	• To transport AILs, the current facilities at the Zeeland Container Terminal (ZCT) are considered. The costs for acquiring this infrastructure/location are not considered. • Construction of a jetty in the Westernscheldt might cause issues because of environmental constraints.

[57] Note that these figures are related to investment costs and no other cost factors as preparation, engineering, land acquisition, permitting, financing etc are taken into account.

[58] Source: OVET bulk terminal | HES International

#	Site	Assumed costs[57]	Main remarks
			• The route to transport AILs uses a private road operated by DOW.
9	Eemshaven 1B	€100M - €200M	• To transport AILs, an offsite location is considered (Quay at Wagenborg Stevodin). The costs for renting / using these facilities are not considered. • The jetty is considered in the Waddensea, which might cause concerns because of environmental constraints. • The jetty construction might interfere with the cooling water options.

Table 21: Assessment of the investment costs for the required additional infrastructure per site per strategy

<table>
<tr><th>Site</th><th>Item</th><th>Item Cost[59]</th><th>Additional Risk</th></tr>
<tr><td rowspan="4">Eemshaven 1A Strategy A</td><td>Demolition of oil pier</td><td>€1,330,000</td><td rowspan="3">0%</td></tr>
<tr><td>New bulk quay</td><td>€4,200,000</td></tr>
<tr><td>New AIL quay</td><td>€4,050,000</td></tr>
<tr><td></td><td>Total</td><td>€9,580,000</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="5">Eemshaven 1A Strategy B</td><td>Construction of bulk jetty trestle land fall</td><td>€2,000,000</td><td rowspan="4">10% for trestle and head for weather</td></tr>
<tr><td>2.4km trestle</td><td>€100,800,000</td></tr>
<tr><td>Jetty head</td><td>€12,600,000</td></tr>
<tr><td>Modification of general-purpose quay for AIL</td><td>€2,030,000</td></tr>
<tr><td></td><td>Total</td><td>€129,173,000</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="3">Eemshaven 1A Strategy C</td><td>Modification of general-purpose quay for bulk</td><td>€2,100,000</td><td rowspan="2">0% no special factors</td></tr>
<tr><td>Modification of general-purpose quay for AIL</td><td>€2,030,000</td></tr>
<tr><td></td><td>Total</td><td>€4,130,000</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="5">Eemshaven 1B Strategy A</td><td>Construction of bulk jetty trestle land fall</td><td>€2,000,000</td><td rowspan="4">10% for trestle and head for weather</td></tr>
<tr><td>2.4km trestle</td><td>€100,800,000</td></tr>
<tr><td>Jetty head</td><td>€12,600,000</td></tr>
<tr><td>Modification of general-purpose quay for AIL</td><td>€2,030,000</td></tr>
<tr><td></td><td>Total</td><td>€4,130,000</td></tr>
<tr><td rowspan="3">Eemshaven 1B Strategy B</td><td>Modification of general-purpose quay for bulk</td><td>€2,100,000</td><td rowspan="2">0% no special factors</td></tr>
<tr><td>Modification of general-purpose quay for AIL</td><td>€2,030,000</td></tr>
<tr><td></td><td>Total</td><td>€129,173,000</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>Eemshaven 1B Strategy C</td><td>Modification of general-purpose quay for bulk</td><td>€2,100,000</td><td>0% no special factors</td></tr>
</table>

59 Item costs are initial high level estimates for purpose of site selection to compare costs between sites and should not be used to underpin investment decisions.

Site	Item	Item Cost[59]	Additional Risk
	Modification of general-purpose quay for AIL	€2,030,000	
		Total	€4,130,000
Eemshaven 2 Strategy A	Construction of bulk jetty trestle land fall	€2,000,000	10% for trestle and head for weather
	0.3km trestle	€12,600,000	
	Jetty head	€12,600,000	
	Modification of general-purpose quay for AIL	€2,030,000	
		Total	€32,153,000
Eemshaven 2 Strategy B	Modification of general-purpose quay for bulk	€2,100,000	0% no special factors
	Modification of general-purpose quay for AIL	€2,030,000	
		Total	€4,130,000
Eemshaven 3 Strategy A	Construction of bulk jetty and AIL land fall	€2,000,000	0% no special factors
	0.5km trestle	€2,100,000	
	Jetty head	€12,600,000	
	Dredge 1.6km 0.3km 0.08km 38,400,00	€96,000,000	
		Total	€112,700,000
Eemshaven 3 Strategy B	Construction of bulk jetty trestle land fall	€2,000,000	0% no special factors
	0.5km trestle	€2,100,000	
	Jetty head	€12,600,000	
	Dredge	€96,000,000	
	Modification of general-purpose quay for AIL	€2,030,000	
		Total	€114,730,000
Eemshaven 3 Strategy C	Construction of bulk jetty land fall	€2,000,000	0% no special factors
	0.5km trestle	€2,100,000	
	Jetty head	€12,600,000	
	Dredge	€96,000,000	
	Modification of general-purpose quay for AIL	€2,030,000	
		Total	€114,730,000
Maasvlakte II Strategy A	New bulk quay	€4,200,000	c.5% good location for construction
	New AIL quay	€4,050,000	
		Total	€32,153,000
Maasvlakte II Strategy B	New bulk quay	€4,200,000	c.5% good location for bulk only
	Modification of general-purpose quay for AIL	€2,030,000	

Site	Item	Item Cost[59]	Additional Risk
		Total	**€6,541,500**
Sloegebied 1 Strategy A	Construction of bulk jetty land fall	€2,000,000	0% no special factors
	0.3km trestle	€12,600,000	
	Jetty head	€12,600,000	
	Modification of general-purpose quay for AIL	€2,030,000	
		Total	**€ 29,230,000**
Sloegebied 1 Strategy B	Demolition of existing piers	€1,330,000	0% no special factors
	New bulk quay	€4,200,000	
	New AIL quay	€4,050,000	
		Total	**€ 9,580,000**
Sloegebied 1 Strategy C	Construction of bulk jetty and AIL landfall	€2,000,000	0% no special factors
	0.3km trestle	€12,600,000	
	Jetty head	€12,600,000	
		Total	**€27,200,000**
Sloegebied 2 Strategy A	Re-use of commercial bulk quay	€2,100,000	0% no special factors
	Construction of quay for AIL	€4,050,000	
		Total	**€6,150,000**
Sloegebied 2 Strategy B	Modification of bulk coal quay for bulk	€2,100,000	10% Significant changes to quay anticipated
	Modification of bulk coal quay for AIL	€2,030,000	
		Total	**€45,430,000**
Terneuzen 1a Strategy A	Construction of bulk jetty landfall	€2,000,000	10% weather and environmental for trestle only
	1.8km trestle	€75,600,000	
	Jetty head	€12,600,000	
	Construction of quay for AIL	€4,050,000	
		Total	**€94,250,000**
Terneuzen 1a Strategy B	New bulk quay	€4,200,000	10% difficult work in oil harbour
	New AIL quay	€4,050,000	
		Total	**€9,075,000**
Terneuzen 1b Strategy A	Construction of bulk jetty landfall	€2,000,000	10% weather and environmental for trestle only and on AIL quay for oil harbour
	1.8km trestle	€75,600,000	
	Jetty head	€12,600,000	
	Construction of quay for AIL	€4,050,000	
		Total	**€103,675,000**
Terneuzen 1b Strategy B	New bulk quay	€4,200,000	10% difficult work in oil harbour
	New AIL quay	€4,050,000	
		Total	**€9,075,000**

Site	**Item**	**Item Cost**[59]	**Additional Risk**
Terneuzen 1b Strategy C	Construction of bulk jetty landfall	€2,000,000	10% weather and environmental on trestle and head, inside lock for AIL
	1.8km trestle	€75,600,000	
	Jetty head	€12,600,000	
	Modification of general-purpose quay for AIL	€2,025,000	
		Total	**€101,447,500**