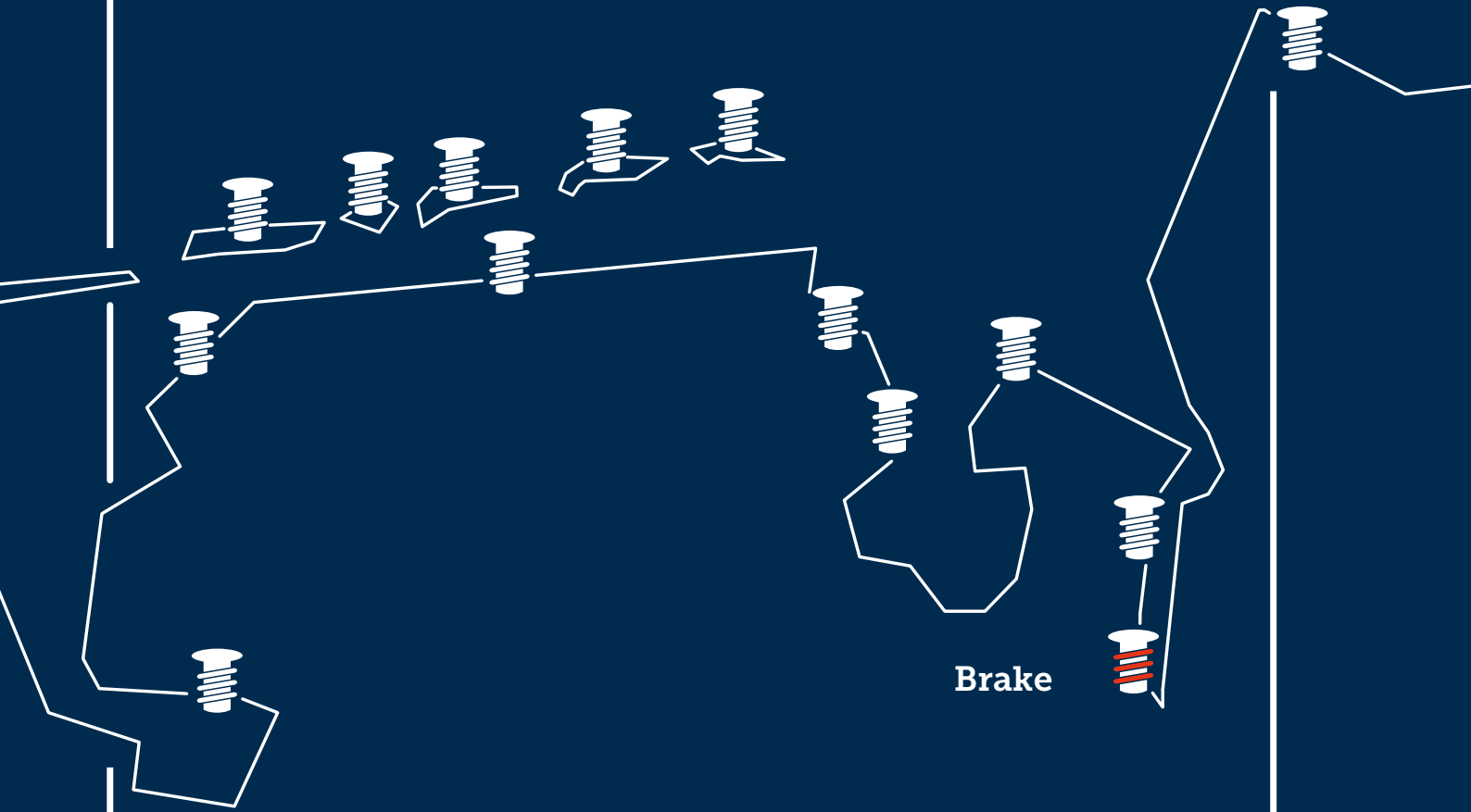


Outlook Paper Port of Brake



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Introduction

The Seaport of Brake is located 26 kilometers upstream on the Lower Weser River. On the sea-ship navigable waters along the river quay with a length of some 2.5 km, there are modern cargo handling and silo facilities, and a total of 8 berths. As a multi-functional specialty port, it takes on a niche function between the large allround ports. This port can be approached with a max. draft of 11.9 m (scheduled to be 12.8 m soon).

With its storage capacities, this port fulfills a vital regional and pan-regional supply function for the agricultural operations and the flour mill industry with feedstock and grain. In addition, Brake is one of the largest breakbulk ports in Europe and serves as a crucial hub for forest products, such as cellulose and lumber, and for vegetable oils, steel & project cargoes, as well as wind energy components.

The Seaport of Brake is organized according to the 'landlord' model. As the largest infrastructure operator of public seaports, island supply ports, and regional ports along the German North Sea shore, Niedersachsen Ports GmbH & Co. KG also functions as the operator for this public infrastructure, and is responsible for commissioning this outlook paper. The outlook paper at hand serves as a port development concept, following the paper of the Niedersachsen Ministry of Economic Affairs, Transport, Construction and Digitization and of the work group Niedersachsen Seaports, titled "The Port of Niedersachsen 2020 - an Outlook Paper" and the "Outlook Paper - The Port of Niedersachsen 2025". The intent of this outlook paper is to develop measures for securing the status quo, but also for the development and sustainable strengthening of the Seaport of Brake.

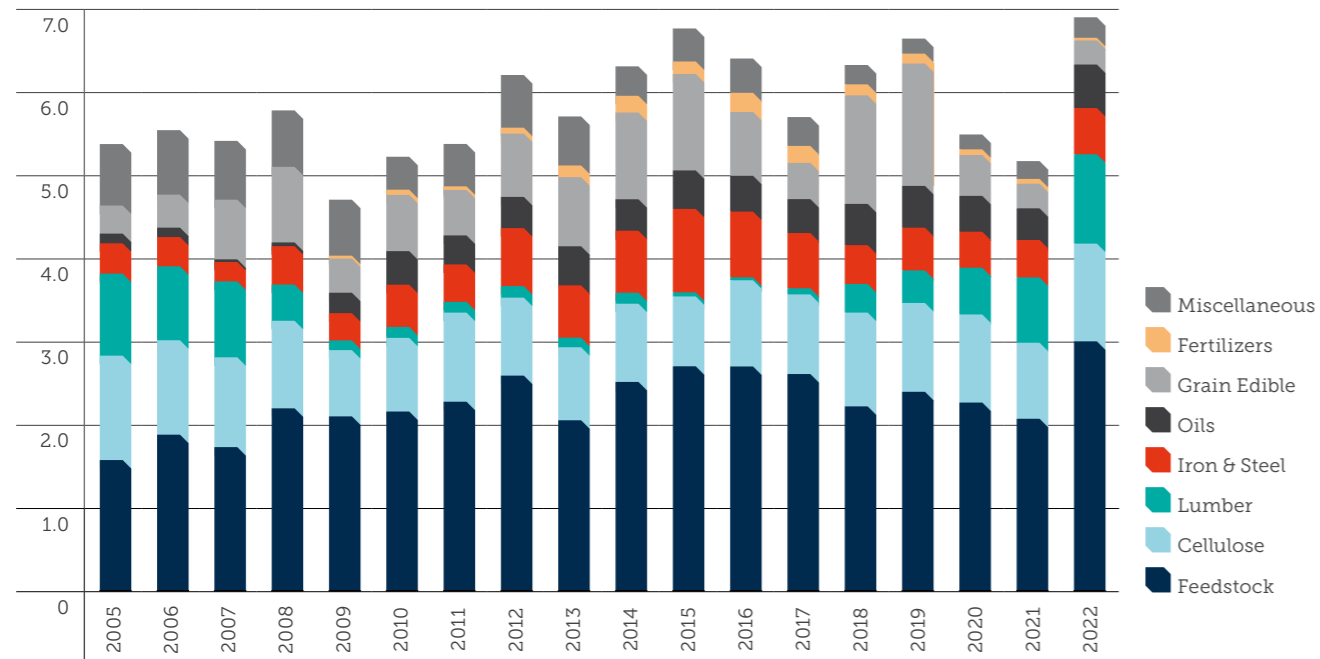


Seaward Cargo Handling Development Forecast

Looking at the statistics, it becomes apparent that the Port of Brake is not only a hub for many cargoes, from breakbulk to project cargo, but it also shows a generally positive development when it comes to the cargo quantities that are being transhipped here. After a decline in seaward cargo handling numbers during the years 2020 and 2021, which - by and large - can be traced back to the Covid 19 pandemic, 2022 once again returned numbers more in line with those from before the crisis, and, with an astounding 6.85 million metric tons of handling volume, even

produced a new record. The crucial catalysts for this trend were, among other things, the positive development in the by-far largest commodity group feedstock and gains in the handling of cellulose, lumber, and edible oils. The handling of iron & steel remains stable, while the commodity groups grain and fertilizer suffered a receding trend in transshipment numbers. The aforementioned 'Top 7' commodity groups comprise more than 96% of the total seaward cargo handling at the Port of Brake.

Graphic 1 – Seaward Cargo Handling by Commodity Groups in Million Metric Tons



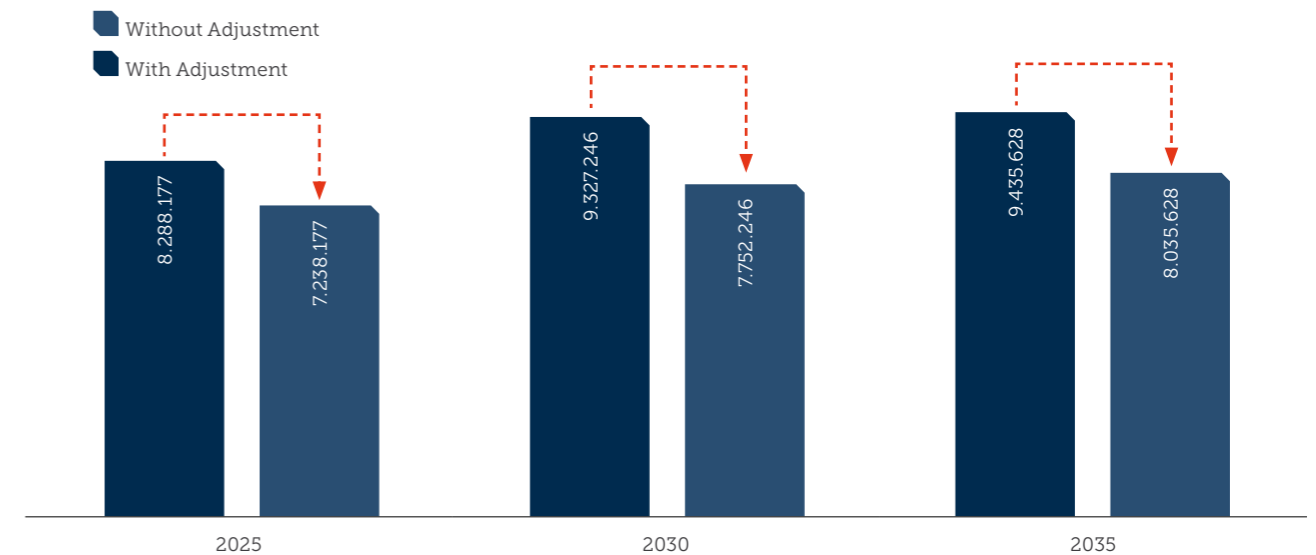
Source: NPorts

Cargo Handling Forecast

The cargo handling forecast for the strategic market potentials of the Port of Brake until 2035 is based on an extensive inclusion and survey of relevant stakeholders and accounts for influencing factors on a macro, meso, and micro level. It is composed of a prognosis for the so-called legacy commodity groups, i.e. goods that have been handled by the Port of Brake for years; and of potential commodities, i.e. goods that to date have not been transhipped via the Port of Brake. The results of the prognosis have

revealed that there are significantly higher potentials for cargo handling at the Port of Brake, which would surpass any other seaward cargo handling amounts accomplished, even those of the prior top contender years 2015 and 2022. This forecast assumes completion of the adjustment of the navigable Weser fairway. In case such adjustment does not occur, the resulting effect was also taken into account.

Graphic 2 – Special Effect Weser Fairway Adjustment in Metric Tons

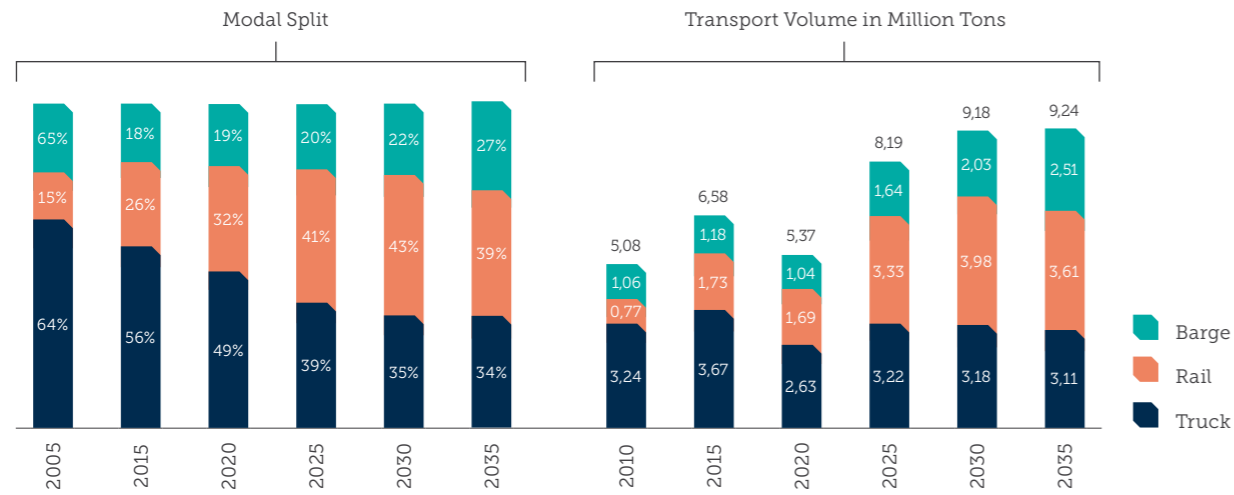


Based upon the prognosis of potential for the seaward handling of the individual main commodity groups, the following hinterland transport forecast

emerges for the various hinterland transport modes road, rail, and barge.

Source: Own Calculations

Graphic 3 – Hinterland Transport Forecast

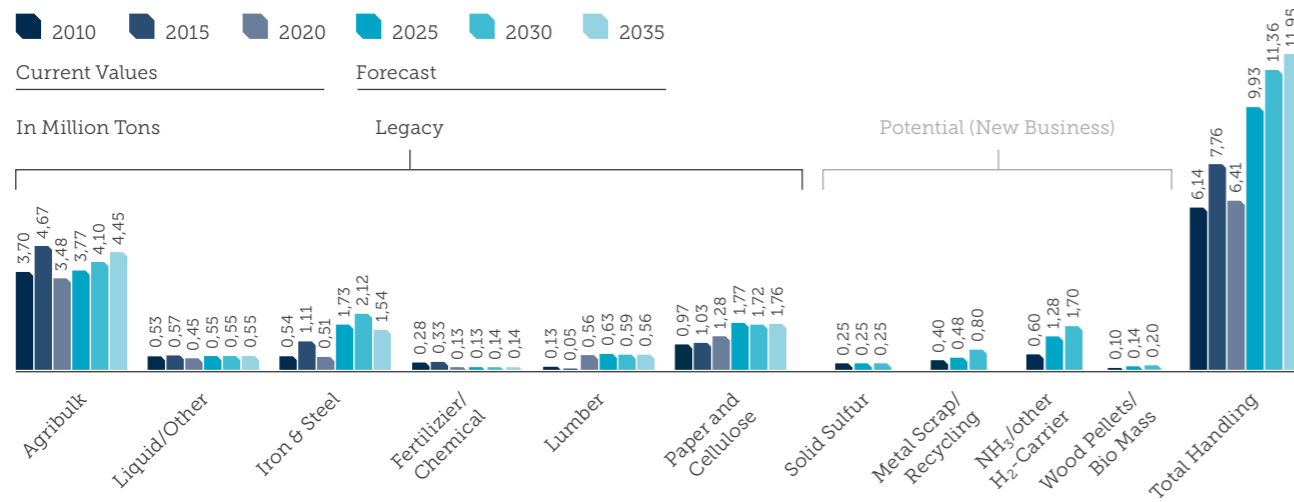


Driving the hinterland distribution transport, e.g. for agribulk, is the continuing trend away from the road and onto the rail. The same is true for the barge, which - due to its sustainable traits - is also participating in the trend 'away from the road'.

In summary, it can be stated that the Port of Brake with its well-developed tri-modal connections is benefiting tremendously from the various growth/structural trends and can really shine by applying its crucial local and regional logistics function.

Source: Own Calculations

Graphic 4 – Cargo Handling Forecast Sea Ship & Barge Transport



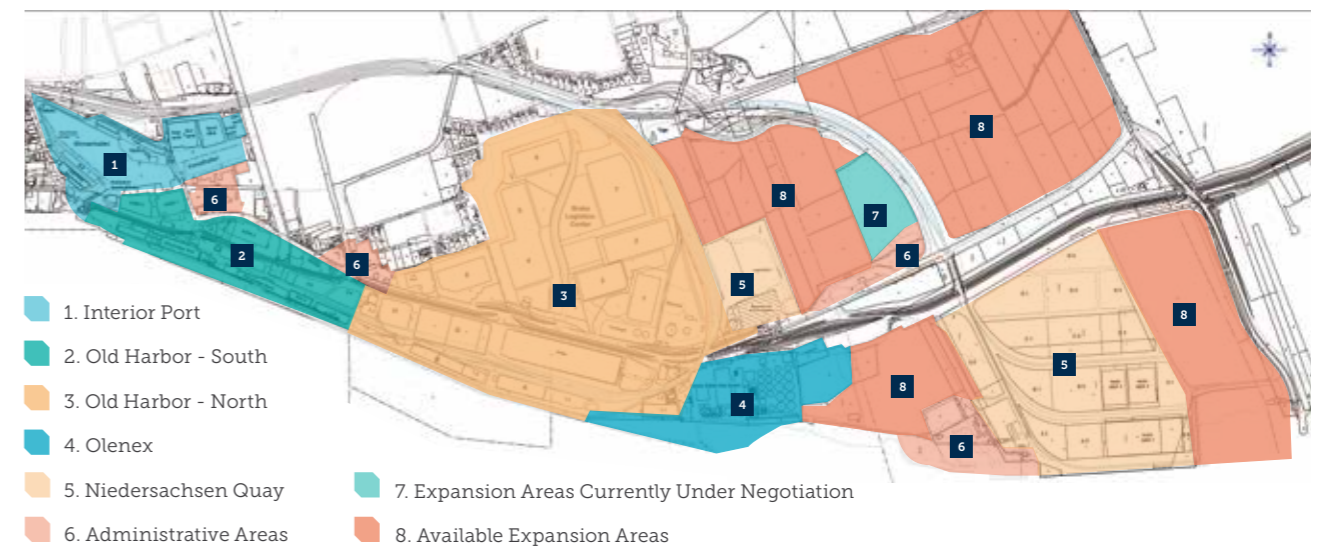
Source: Own Calculations

Review of the Status Quo

Currently, the Port of Brake comprises an actively used area of some 120 hectares, which, compared to the year 2000, means a doubling of the port's area from 60 hectares. This outlines the overall positive economic dynamics of this port within the past years. The graphic below shows a division of the port into individual port areas, where the most important

value chains and port functions as well as potentials for development are located. Here, the goal is to create a differentiation level that is not too broad, but not too detailed, either. A differentiation that leaves room for the development of your own strategic paths, and that will result in commensurate recommendations for action.

Graphic 5 – Allocation of Areas According to Added Value Functions (schematic depiction)



No.	Name / Port Section	Function
1	Interior Port/Canal Port	Oldest port section of the seaport/interior port with relatively close ties to non-industrial usage by the city and with hardly any waterside cargo handling (large mixed usage).
2	Old Harbor - Grain/Feedstock Handling (South Pier)	Here, a material part of the core business of the Port of Brake is performed, with a high degree of transshipment and storage automation for grain and feedstock.
3	Old Harbor - Multi-Purpose (North Pier)	Here is where the cargo handling of breakbulk and project cargo takes place (Brake Logistics Center of the company J. Müller), as well as the storage of lumber and cellulose, the handling of bulk cargo that is not processed via the silo facility (like organic grains, feedstock supplements, fertilizers, scrap metal).
4	Olenex	These areas are exclusively dedicated to the cargo handling of vegetable oil.
5	Niedersachsen Quay - Breakbulk/Project Cargo	These areas comprise a concentrated amount of the cargo handling business of steel pipes and project cargo that had been developed during the last years, and also onshore wind power components, plus cellulose and lumber.

6 Port Administration Areas/Support Areas	These areas chiefly comprise the activities of NPorts and other public institutions, such as the WSA authority and the administrative building of J. Müller.
7 Areas for Development With Known Utilization	These are developable areas within the port that already have concrete usage plans, and that are earmarked to be awarded by Niedersachsen Ports to future private operators through Erbbau-recht (Leasehold contracts) contracts. These private operators/ investors will likely perform customized construction work there.
8 Areas Available for Development	These are port development areas that have already been formally designated as such, or areas that - from Niedersachsen Ports' point of view - could generally be used for port development, but there are no interested private parties for their utilization yet.

The Port of Brake features state-of-the-art port facilities with eight berths for loading and unloading of ocean-going vessels, coasters, and barges with a

length of up to 270 m. Large and heavy pieces of breakbulk can be processed through these just as swiftly and efficiently as loose bulk cargo.

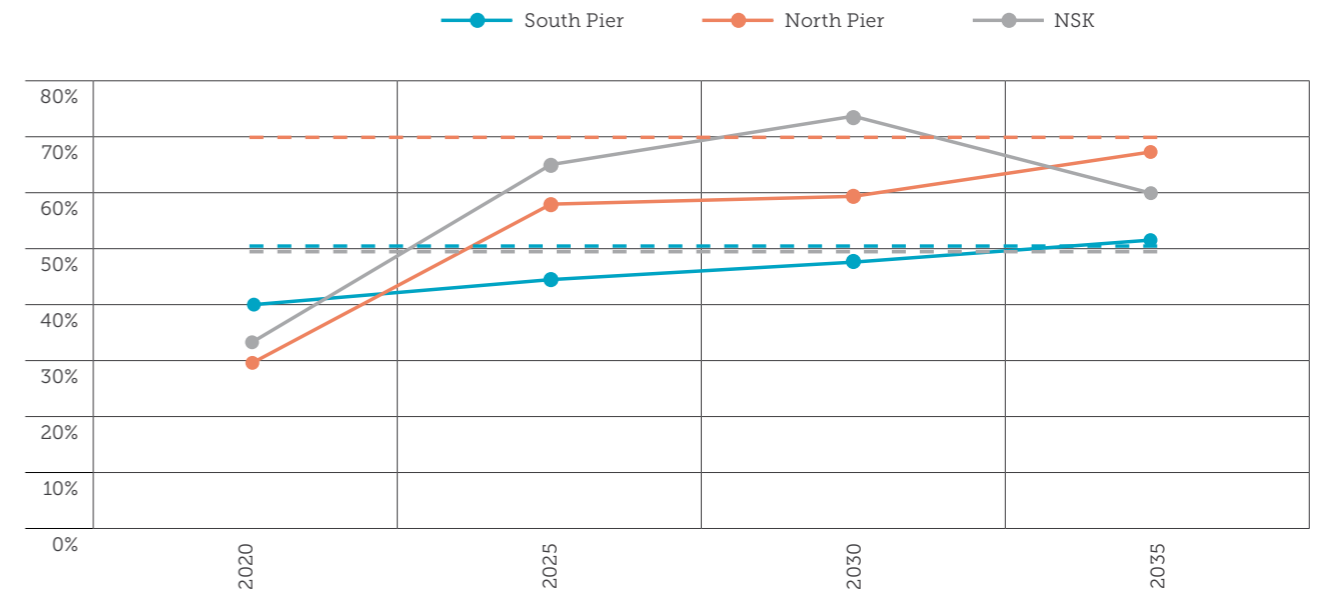
Capacity Utilization

Capacity Utilization of the Berths

For the analysis of the berths' capacity utilization, one should notice - according to expert literature - that the max. achievable utilization of a berth depends on the number of berths within a group, and can vary in range between 40 and 70% (see table below). The remaining 30 to 70% contain time-based factors for the docking and undocking processes and for the gaps between the ships. In connection with the analysis, it should be noted that the availabilities of the berths may be reduced even further by

additional effects that were not captured here. Mainly, the tidal dependency of the port and the regularly needed dredging for maintaining the water depths should be mentioned in this context. Additional goods from new business that may require their own berth have not yet been taken into account (liquid cargo, H₂ carriers). The results are depicted in the following diagram. In addition, the max. reachable capacity utilizations were entered (dotted lines).

Graphic 6 – Forecast for the Capacity Utilization of Berths



Source: Own Analysis

The analysis shows that all the berth groups will soon reach the limit of their max. capacity. In particular at the Niedersachsen Quay, the necessity for an additional berth becomes apparent.

In the future, this berth will also take on the overflow from the North Pier, since we are expecting a significant increase in capacity utilization there.

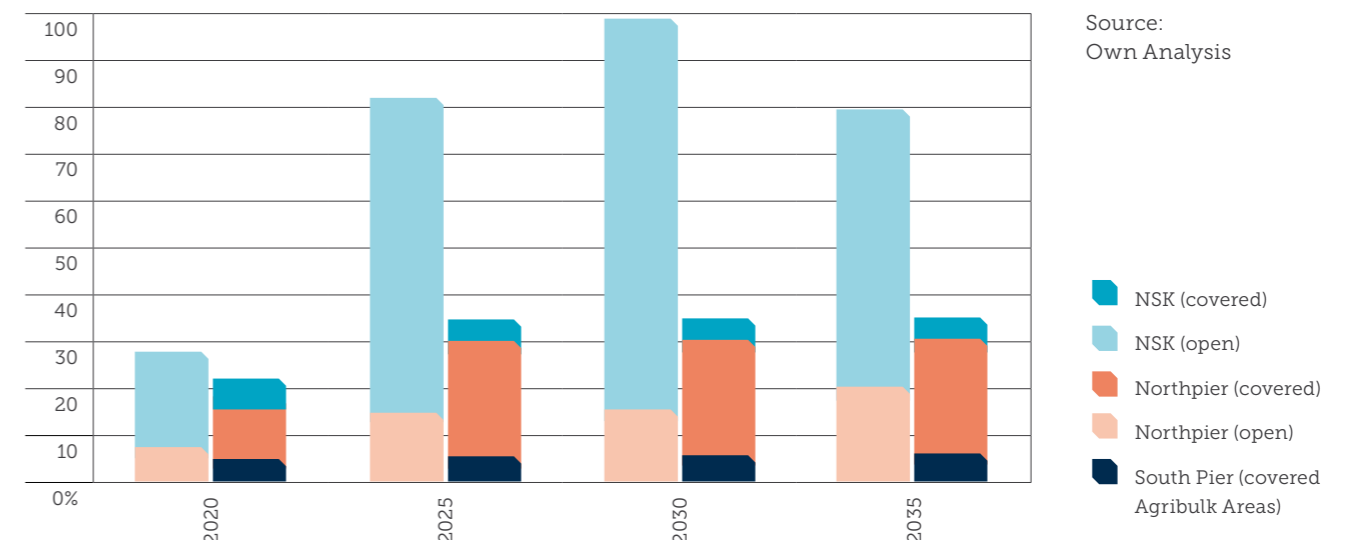
Capacity Utilization of the Storage and Handling Areas

Analogous to the capacity utilization of the berths, the forecast for the demand for surface areas was generated under consideration of the expected

increase in the individual commodity groups. For the considered years, the following requirements are focused upon:

Graphic 7 – Surface Area Demand for Open and Closed Storage Areas

Total Demand by Spatial Dependency at the Berths/Quays



Source: Own Analysis

Table 1 – Annual Increase in Surface Area Demand

Annual Increase Area Demand in hectares		existing (absolute)	up to 2025	up to 2030	up to 2035	Total Increase	Total (absolute)
Open Storage Areas	North Pier	7.1	7.3	0.8	4.7	12.8	19.9
	NSK	20.3	47.3	15.9	-23.8	39.4	59.6
	Total	27.4	54.6	16.7	-19.1	52.1	79.5
Covered Storage Areas	South Pier	4.6	0.5	0.4	0.4	1.4	5.9
	North Pier	13.5	10.1	-0.1	-0.1	9.8	23.3
	NSK	3.6	1.1	-0.1	-0.1	0.8	4.5
	Total	21.7	11.6	0.2	0.2	12.0	33.7

Own Analysis

Recommended Courses of Action

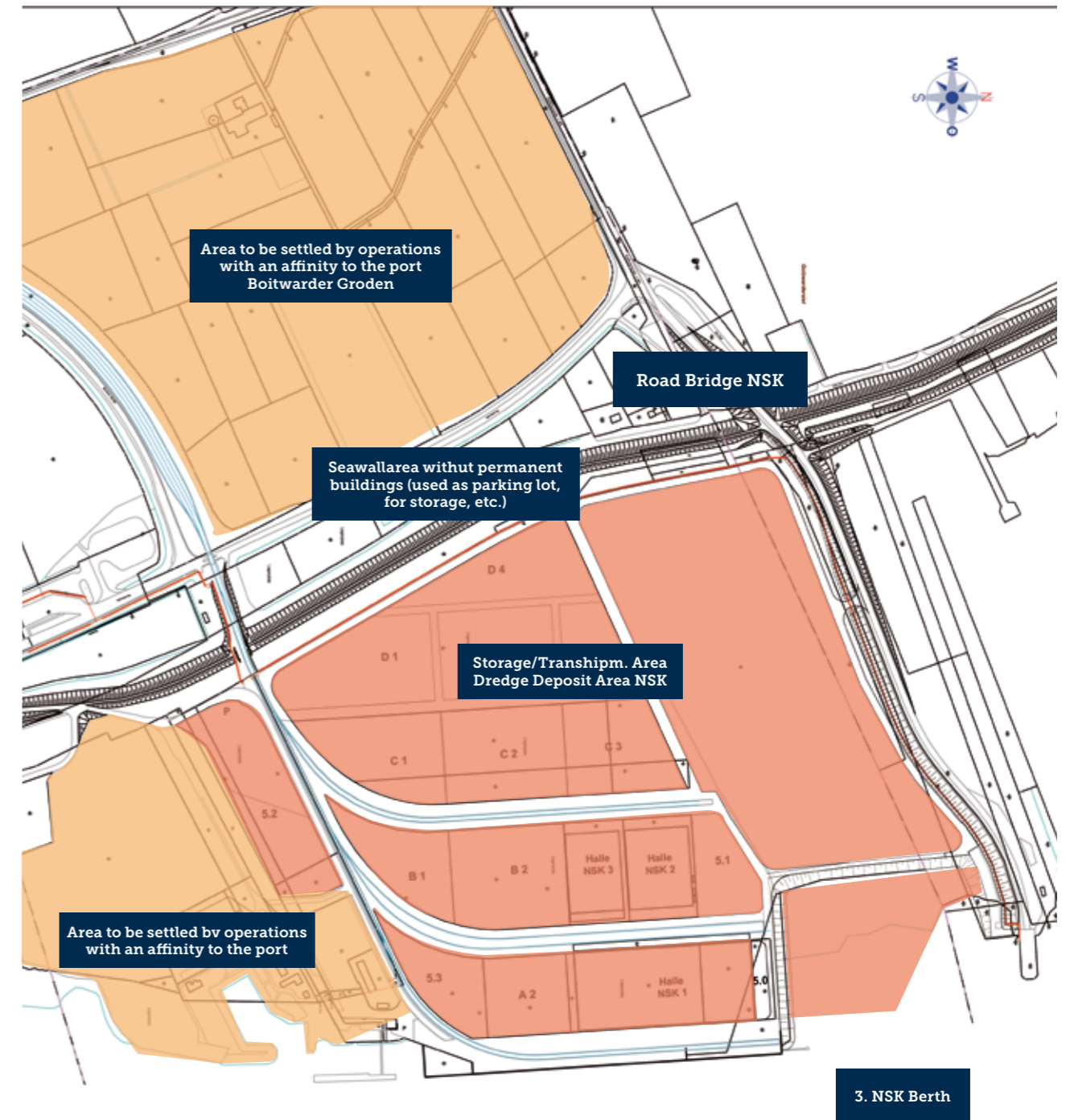
Development of Port Infrastructure, Port Areas & Structures for Legacy and New Business

For the expansion of the seaward and landward port handling structures in connection with the forecasted increase in cargo handling volume, the following measures are recommended:

- › Construction of a third berth at the Niedersachsen Quay (NSK) and creation of large-area storage capacities (dredge deposit area NSK or the area at the northern part of the local subdistrict Golzwarden) by building a quay wall of some 290 m (taking over the ferry jetty), dredging and refilling with sand, some 1.5 km of rail track, plus covered and open storage possibilities.
- › Gradual development of the area Boitwarder Groden, south of the rail bend, for mixed use by the North Pier and Niedersachsen Quay as port storage and cargo handling area of some 20 hectares. Aside from the regular road connection to the Nordstraße, this area should further be developed by adding its own rail siding. For the improvement of connectedness of the area, an extension of

- Nordstraße and of the existing road bridge across the rail tracks 20 and 21 should be investigated. Several spacious halls should be constructed on the area for weather-protected storage.
- › The expansion of storage capacities at the Agri-Bulk terminal could be accomplished by re-designation of areas in the southern section of the North Pier that are currently chiefly used for the storage of lumber. Private investments, such as the construction of silo facilities and conveyor belts could also contribute to this purpose.
- › A rest stop and filling station facility should be established to achieve a higher service quality and efficiency for the truck traffic.
- › For the near future it should be examined; if the WSA areas and jetty could be made available to the port. Due to its central location, these areas are ideally suited to be developed into an additional berth, e.g. for RoRo cargo, or as a transhipment location for liquid cargoes.

Graphic 8 – Outlook 2035 Niedersachsen Quay



In connection with the desired settlement of companies with an affinity to the port, the following measures are suggested:

- › The Boitwarder Groden area north of the rail track bend should be earmarked for the settlement of companies with an affinity to the port, and it should be prepared as such by gradual development. Depending on the design of the investment model, NPorts could take on the construction of access roads for development and supply the media/utilities. Depending on the requirements of the operations, even the construction of their own rail siding could be considered, which may be supplemented by private investments. The development requires the construction of some 4 km of roads and intersections, including media/utilities supply.
- › In order to improve traffic flow within the port and to accomplish a thoroughfare route unencumbered by intersections between the Niedersachsen Quay

Developing City & Port in Unison

The positive development of the Port of Brake was also made possible, because the City of Brake and NPorts were combining their efforts and had collaborated in regulatory approval issues regarding the further development of the port and the surface areas at hand. This joint-effort approach is also necessary when it comes to the development and construction management planning of currently available and future expansion areas so that the port can be further developed in a demand-driven and future-oriented manner. In light of the demonstrated demands in connection with this, the focus should be put on the area Boitwarder Groden, north of the rail bend, and on the land use plan required for it.

Making a Contributing to the Regional Economic Transformation

The port is already making a major contribution to the services of general economic interest within the State of Niedersachsen and beyond. Particularly in the area energy transition and in the closed substance cycle economy, we were able - within the context of the study - to uncover new potentials that may be developed in synch with synergies of existing

and the area Boitwarder Groden, north of the rail bend within the ISPS area, a road bridge across Nordstraße, with a length of some 200 m, should be constructed.

- › The area in proximity to the water, between the Waterways and Shipping Authority (WSA) Weser-Jade-Nordsee, Klippkanne base, the Niedersachsen Quay, and Olenex should be developed to make it available for port usage. Other investigations concentrated on delineating the extension of the port railroad as an additional crucial measure for the Port of Brake. This resulted in the following individual measures:
 - › Creation of electrified tracks for the shunting yard Boitwarder Groden
 - › Creation of brake testing facilities at the shunting yard Boitwarder Groden and Niedersachsen Quay
 - › Additional staging tracks north of the shunting yard NSK, after construction of the 3rd NSK berth
 - › Construction of a dynamic rail track scale at track

But also, in view of the interior port and its strategic significance as a buffer zone between residential buildings and port activities, a joint and coordinated approach will be needed in light of the urban architecture ambitions expressed in the 'Master Plan Inner City'. Within the periphery of the interior port, there is potential for development for a targeted area upgrade without impairing the port basin's function as a sheltering harbor. Here is a special potential for developing a commercial quarter for the City of Brake, but this will be tied to some additional conditions, and/or NPorts as port operator must be given the opportunity to directly participate in a positive economic development. Within this context, residential use should be excluded so that potential target conflicts

business fields within the port that are exemplified hereafter:

- › Closed Substance Cycle Economy: The Port of Brake is a crucial export site for steel products, in particular for pipes. Within the past years, it established itself as the most important logistics site for Salzgitter AG, the largest steel producer in

Niedersachsen. And, in the future, the steel production - within the spirit of the closed substance cycle economy - will increasingly rely on high-end steel scrap, that is either imported or "produced" in Germany. "Produced", meaning that within the industrial recycling process of facilities, a significant amount of steel scrap is produced, e.g., during the scrapping of sea ships. Due to the current scrapping practices of sea ships in third-world countries, which tends to be extremely detrimental to the environment, and due to the aforementioned demand for steel scrap, new technologies have been established within the past few years that allow for the eco-friendly, but also highly efficient, partially automated scrapping of ships. The submitted study shows that the Port of Brake has the prerequisites for the settlement of such a state-of-the-art ship scrapping facility and that the site - under consideration of the entire flow of goods of the regional steel industry (upstream/downstream) and any additional import of steel scrap and the existing export of high-end steel - could be developed to become a real steel hub within the meaning of the closed substance cycle economy. This approach should be developed consistently by NPorts, together with the industry, i.e., with both, the investors and operators of a recycling plant, and also with the buyers of the steel scrap, such as steel producers.

Developing the Infrastructure of the Periphery Surrounding the Port in a Demand-Driven and Future-Oriented Manner

A high-capacity connection of the port to the greater road and rail grid is as important for the competitiveness of seaports in general, and the site Brake, in particular, as an efficient seaward reachability.

Within this context, the focus should aim at the following projects:

- › Adjustment of the navigable fairway at the Outer Weser/Lower Weser River and thus the improvement of the tide-independent seaward reachability
- › Expansion of the federal highway B 212 and thus improvement of the reachability by road in view of

› Alternative energy sources (hydrogen-based): The study also shows that Brake has the prerequisites for the construction of a "smaller" import terminal for hydrogen carriers, such as ammonia, methanol, or LOHC, plus for liquid hydrogen. Potentially, supply from one of the recently established large import terminals in Germany or the Netherlands could be a feasible option. On the one hand, certain parts of the operation within the port (mobile electric shore power supply and the transformation of the propulsion forms of cargo handling equipment) could be converted to these new, "eco-friendly" energy sources, and/or sea ships and barges could be fueled (bunkering) with these novel fuels, so that the emissions within the port are reduced and in the future, the goal of CO₂ neutrality can be reached. On the other hand, the local/regional demand could be met, for instance in the area of mobility (both, for the transport of passengers, and for the transport of goods), and the increasing demand of the industry and the manufacturing sector, as well. This scenario could also enable parts of the port development areas to be used for technical facilities for the re-abstraction of hydrogen from the hydrogen carriers (there are a number of potential investors for this): To the extent possible, the activities should be harmoniously orchestrated and synchronized with other development project activities within the district with a similar topic.

an important target region of the port within its closer proximity (local/regional transport)

- › Dissolution of the Hunte bridge bottleneck, thereby improving the rail-ward reachability with focus on the port's target markets within the larger surroundings (long-distance transport)
- › Implementation of the planned filling and rest stop station for trucks, thereby creating parking and buffer zones for trucks and additional services and supply opportunities (H₂-gas station) to accelerate de-carbonization of truck transports within the port's surroundings and the region at large.

Sustainability

Acting sustainably and the commitment to further develop environmental standards within the port operation are things that are implemented by NPorts even today; any activities within this context are consolidated under the hafen+ brand and comprise any economic, social, and environmental measures that lead to the goal of a sustainable port management. Sustainable action in the port industry generally requires the following measures or requisites:

Construction

- › Implementation of an energy efficient construction method
 - › Use of sustainable building materials
 - › Resource-saving use of construction materials
- › Consideration of transport distance and the choice of means of transport in the evaluation of tenders for construction material deliveries (e.g. asphalt delivery)

Operation

- › Continued granting of discounts for environmentally friendly ships that fulfill high environmental standards
- › Electronic traffic guidance systems: Streamlining of transport processes, reduction of waiting times at the gates (reduction of pollutant and noise emissions)
- › Record keeping and proper disposal of shipgenerated wastes
- › Use of low-emission handling equipment: Use of electric motors, encapsulation of the motors for soundproofing
- › Use of renewable energies (photovoltaics, wind energy) for the supply of port areas
- › Use of LED technology for lighting
- › Deployment of eco-friendly vehicles, e.g. natural gas or electricity-powered vehicles
- › Thermal insulation of buildings
- › Process-driven optimization of the duration of the devices under electric power (e.g. in the conveyor technology)
- › Recycling of process water
- › Work processes within the office building (if necessary)
 - › Utilization of electric devices with low power consumption
 - › Waste separation
 - › Use of recycled paper

During the assessment of developmental variants we are identifying primarily those measures from the list above that are best suited to aid in the minimization of environmental pollution within the port areas.

Transport Connections



The Seaport of Brake is located 26 kilometers upstream from the Weser delta. On the sea ship navigable waters, along the river quay of some 2.5 km, there are modern cargo handling and silo facilities, and a total of 8 berths. As a multi-functional specialty port, Brake will win you over with its speed, flexibility, and wide range of services. You can reach the port with a max. draft of 11.9 m (scheduled to be 12.8 m soon).

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