JAN DE NUL

NORTH ATLANTIC TRANSMISSION ONE-LINK

Technical Feasibility and Initial Engineering Framework

JDN | Offshore Energy | RPT | 001 | en | R00
Business Development and Commercial

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NATO-L: Technical Feasibility and Initial Engineering Framework

The North Atlantic Transmission One-Link (NATO-L) is a large-scale energy infrastructure initiative designed to connect North America and Western Europe through one or more bundles of high voltage direct current (HVDC) subsea cable. The project aims to establish a dedicated corridor for carbon-free electricity transmission between allied nations, leveraging complementary renewable energy profiles on each side of the Atlantic, hydropower and wind resources in north-eastern America, and diversified generation assets across Europe. Beyond its clean energy objectives, NATO-L is positioned as a strategic response to growing energy security concerns among Western democracies, offering supply diversification and resilience at a time when energy resources are increasingly subject to geopolitical risk.

Jan De Nul – "World Builders shaping water, land and energy" – is a global leader in the construction of marine and offshore infrastructure. Jan De Nul's in-house team undertook a scoping assessment across nine topic areas: early-stage seabed and geophysical surveys; route optimisation and corridor selection; seabed terrain and geological risk management; seismic risk assessment and mitigation; environmental and oceanographic risk; cable protection and burial strategies; sectional cable laying and jointing strategy; repair and recovery capability in deep and remote waters; and installation vessels and payload capacity.

The assessment is structured around the four principal risks that underpin every major subsea cable project: Design, Depth, Distance and Damage.

NATO-L targets an offshore construction start in **2035**, a financial investment decision in the **early 2030s**, and full operational ramp-up by **2040**. Routing work was based on a **525 kV** HVDC cable system, the highest voltage class currently in commercial service, with a **4,000 m** water depth limit as the key subsea cable engineering constraint. NATO-L is separately pursuing an **800 kV** solution in active discussion with the major cable OEMs.

KEY PARAMETERS

2035
OFFSHORE CONSTRUCTION START

2040
FULL OPERATIONAL RAMP-UP

525 kV
COMMERCIAL HVDC BASELINE

4,000 m
DEPTH ENGINEERING LIMIT

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Preliminary Route Assessment

Four cable routes were evaluated, each staying within the 4,000 m engineering depth ceiling that governs HVDC cable installation in the early 2030s.

Recommended route: Sept-Îles (Québec) – Princess Elisabeth Island (Belgium).

- ~40% of the route lies above 200 m water depth (burial and protection required); ~60% lies between 200 m and 4,000 m (cable laid on the seabed without burial).
- The route exits Québec via the mouth of the St. Lawrence River, heads east across the Atlantic Ocean, transits around the British Isles and connects into the Princess Elisabeth Island.
- Jan De Nul is currently constructing Princess Elisabeth Island, a key enabler for the development of future offshore grids in the North Sea, serving as an offshore energy hub that integrates large-scale wind generation and facilitates future international interconnections.
- The follow-up desktop study should formally evaluate the updated landing-point matrix: Sept-Îles (Québec), Halifax (Nova Scotia) and St. John's (Newfoundland and Labrador) on the Canadian side; Belgium, Denmark and Scotland on the European side.

~40% above 200 m — burial & protection required

~60% 200–4,000 m — unburied seabed lay

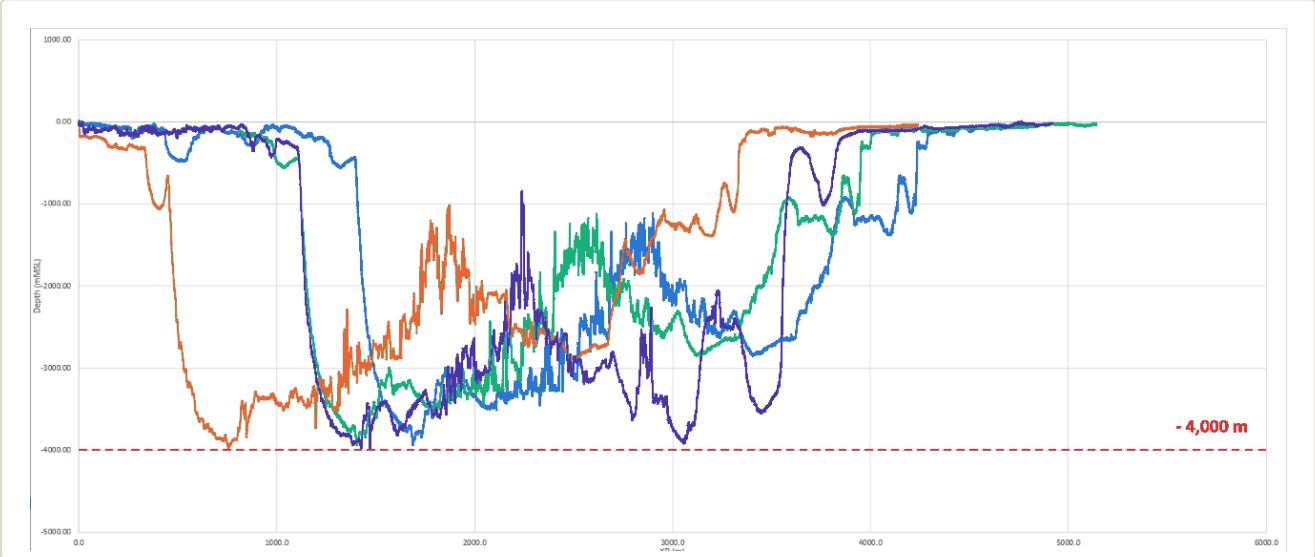

Figure 1: Bathymetry profiles for all four proposed routes.

- Halifax (Nova Scotia) – Scotland (UK)
- St John's (Newfoundland) – Danish Energy Island (Denmark)
- Sept-Îles (Québec) – Princess Elisabeth Island (Belgium) – North
- Sept-Îles (Québec) – Princess Elisabeth Island (Belgium) – South

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Delivery Feasibility & Fleet Capability

With its diverse and extensive fleet, Jan De Nul is uniquely positioned to successfully deliver unprecedented projects such as the proposed NATO-L interconnection. Each individual delivery step required for the recommended route is within current or near-term industry capability. Vessel capability is not a constraint, but some further subsea cable assurance will be required to meet the needs of this project.

Figure 2: Jan De Nul's newest subsea cable-lay sister vessels (left) and supporting fleet line-up (right).

Vessels

- Fleeming Jenkin and William Thomson, the world largest subsea cable-laying vessels, are designed to install subsea HVDC power cables to depths of **4,000 m**. The vessels will be delivered in the **fourth quarter of 2026** and the **first quarter of 2027**, respectively, and will thus be operational well before the 2035 offshore construction start. Each sister vessel has a cable carrying capacity of **28,000 tonnes**.
- In addition to cable-lay vessels, Jan De Nul owns and operates a diverse and extensive fleet of supporting vessels, such as trenching support vessels for the deployment and recovery of burial tools, subsea rock installation vessels and multi-purpose vessels, required to support complex offshore construction works.

Technical Cable Gap

- No HVDC submarine cable has yet been certified for the static and dynamic tensile loads encountered at 4,000 m water depth.
- Increasing the operating voltage level from currently commercially available **525 kV** up to **800 kV** will require a customer-driven engagement programme with the major cable OEMs in Europe and Asia to advance type-testing and certification on a schedule consistent with the 2035 construction start.

Fault Detection & Repair

- Today's fault detection technologies are inadequate to mitigate the risk of cable faults for ultra-long deepwater HVDC cable systems. We have identified mitigation pathways which require more work in the years ahead.
- Repair fleet: Jan De Nul offers a unique spread of capable repair vessels including Fleeming Jenkin, William Thomson and Connector which are equipped with work-class ROVs rated up to 4,000 m.

> A more comprehensive version of this document can be obtained after signing a NDA.