

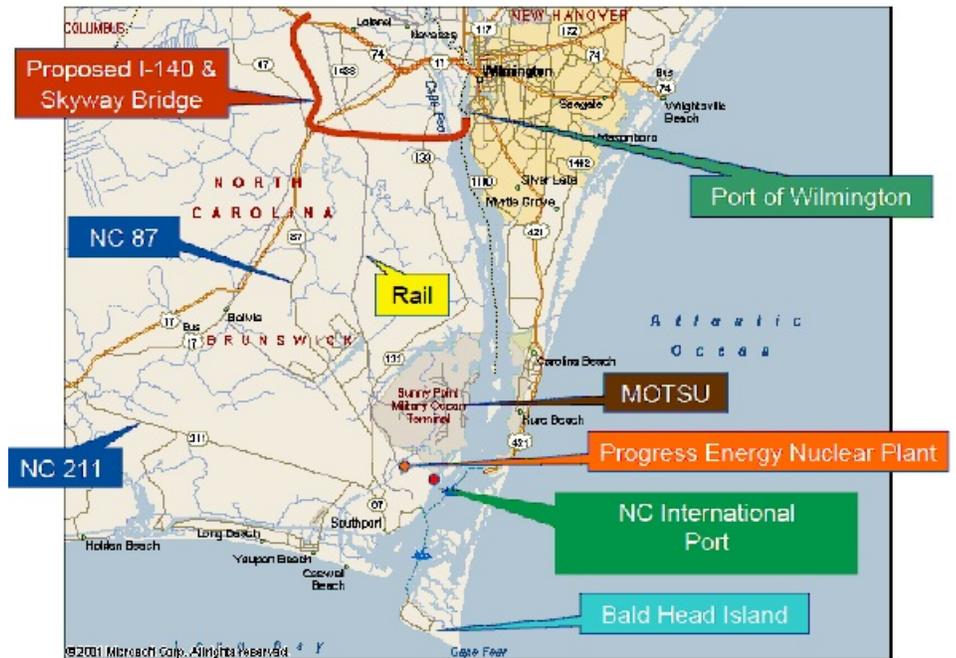
# Summary

## A Look at Economic and Environmental Aspects of the Proposed North Carolina International Terminal (Draft dated April 15, 2010)

The North Carolina State Ports Authority, a component of the North Carolina state government, has purchased 600 acres of undeveloped land on the Cape Fear River near Southport, and plans to develop an international marine container terminal with an annual capacity of 3,000,000 twenty-foot equivalent units (TEU). The terminal would be called the North Carolina International Terminal (NCIT).

The proposed terminal would serve a new generation of container ships (called “post-Panamax”) that are too large to transit the Panama Canal, now or after the capacity increases under construction for opening in 2014: over 1200 feet long, 185 feet in beam, and drawing 50 feet. A capacity of 12,000 TEU. The terminal would accommodate three of those at once. There are now five in the world.

Although the site purchased for the terminal is only about five miles from the mouth of the Cape Fear River, it is about a mile from the existing channel. That channel is maintained at a depth of 42 feet, and has sharp curves that cannot be navigated by the vessels for which the terminal is intended, or by the slightly smaller post-Panamax vessels that would be able to transit the Panama Canal after 2014 (called “new-Panamax”). Moreover, the continental shelf drops off gradually beyond the mouth of the river; water of sufficient depth for navigation by vessels of 50-foot draft lies at least 17 miles offshore.



Thus to accommodate post-Panamax vessels at the proposed terminal, a new channel and turning basin must be dredged to the existing channel in the Cape Fear River, substantial improvements must be made to the channel to the mouth of the river, and the existing offshore channel to deep water must be deepened, widened, and extended to 17 miles.

The US Army Corps of Engineers, Wilmington District, has conducted a reconnaissance study pursuant to section 905(b) of the Water Resources Development Act of 1986 to determine whether such a dredging project has sufficient merit to warrant further analysis in a feasibility study. Such a study would be a major project, initially estimated to cost approximately \$10 million. The State of North Carolina is being asked to participate to the extent of \$4.7 million initially. Should the study go beyond the estimate (which typically occurs), the State would provide 50%.

The Wilmington District of the Corps of Engineers has conducted the study in secret, with no opportunity for review of drafts for comment; the report that this document summarizes was prepared as a parallel activity, to cover the same issues that the Corps of Engineers should cover in the typical study done according to its *Principles and Guidelines*. A draft of the Wilmington District analysis has been discovered since the preparation of the report being summarized here, and some data from that analysis is included herein.

### ***Problem Identification***

The project is a solution looking for a problem. The North Carolina State Ports Authority operates a container terminal at the Port of Wilmington, 26 miles up the Cape Fear River from the mouth. That terminal offers the lowest rates on the Atlantic coast, and businesses paying taxes in North Carolina are entitled to a credit for using the terminal. The user charges covers the terminal operating costs in some years, but not in others. All capital costs are paid by the State.

The terminal at Wilmington currently handles approximately 200,000 twenty-foot equivalent units (TEU) annually. (International shipping containers are of various lengths, from 20 feet long to 45 feet. Most are 40 feet long. 200,000 TEU represents about 120,000 containers of the usual mix.)

The container terminal at Wilmington has a capacity of 350,000 TEU today, and the State Ports Authority has underway a project to increase that to 500,000 TEU. If container traffic grows at a compound annual rate of 4.4%, the average rate over the past 20 years, that capacity would not be reached until 2030.

The Cape Fear River, with a channel maintained at a depth of 42 feet, would not be able to accommodate post-Panamax container ships, ships of deeper draft that would be able to navigate the Panama Canal after the expansion planned for 2014. But other nearby ports can. Hampton Roads has a depth of 50 feet, and the Charleston harbor is 45 feet deep and may be deepened. Those ports are closer to major markets, within and without North Carolina, than Wilmington. Wilmington is closer only to the Raleigh-Durham area and points east. Southport, where the proposed terminal would be, is twenty miles farther away.

There is no shortage of container handling capacity at nearby ports. The table below shows the dates at which capacity of south Atlantic container terminals would be reached at various rates of growth, using the estimates of future capacity prepared by CH2M Hill, Inc., and Martin Associates, both consultants to the State Ports Authority and other ports:

	<u>Current Capacity (CH2M Hill)</u>	<u>Future Capacity (CH2M Hill)</u>	<u>Potential Capacity (Martin Associates)</u>
At 6.3% annual growth	2016	2027	2032
At 4.3% annual growth	2017	2034	2041

Addition of capacity at Jasper County, South Carolina, would extend each date another year.

These forecasts, prepared in 2008, disregard the current downturn. Container movements have reverted to 2004 levels, and are not expected to return to the peak of 2007 until 2011 or 2012. This effectively extends the time of capacity saturation for five more years, to 2037 using the growth rate of 6.3%, and 2046 using 4.3%.

### *Opportunities*

Finding an opportunity for a deeper channel in the Cape Fear River is as difficult as finding a problem. The existing channel is now maintained at the depth of 42 feet, the result of a current project. The channel was opened at that depth in 2004. Accommodating the vessels proposed to be accommodated by the North Carolina State Ports Authority at a new terminal involves an additional eight to ten feet of depth. The State Ports Authority proposes 52.5 feet, the Wilmington District of the Corps 50 or 48 feet. In any case, these problems emerge when such depths are considered for the Cape Fear River:

- Investigation of the geology underlying the Cape Fear River by CH2M Hill, Inc., showed that rock would be encountered at the depths contemplated in several parts of the existing channel and in the new access channel needed for the proposed terminal. Removal of rock is substantially more expensive than removal of softer materials, and often involves blasting.
- The Castle Hayne aquifer underlies the Cape Fear River. Test wells shown on subsurface topographical maps of the United States Geologic Survey place the top of that aquifer at 43 feet below sea level at the terminal site. Dredging in that area would penetrate the aquifer over a large area.
- The continental shelf at the mouth of the Cape Fear River falls off only gradually. Reaching water deep enough for the vessel drafts contemplated by the project requires

extending the channel eight to ten miles, depending on the depth selected . That would take the channel 15 to 17 miles out to sea, where it would be very difficult to maintain.

- The existing channel has turns in the vicinity of Southport (Lower Swash, Battery Island Channel, and Southport Channel) that do not conform to the Corps of Engineers design parameters set forth in Engineering Manual 1110-2-1613. Ship simulation tests conducted in 1999 show that Panamax vessels, with overall length of 960 feet and beam of 106 feet, cannot navigate the turns without leaving the marked channel. CH2M Hill, Inc., has determined that turns conforming to the manual for vessels of 1260-foot length and 160-foot beam cannot be fit between the banks of the river in this area.
- The depth and width of the channel at the river mouth has caused substantial problems of beach erosion due to the “sediment” sink” created by the channel, which captures sand normally moving along the shore. This has been recognized by plans for additional studies. A deeper, wider channel would only exacerbate that problem.
- Three Civil War era shipwrecks, including the *CSS North Carolina*, one of two ironclads built at Wilmington, lie along the channel in the vicinity of Southport. Other wrecks of archeological significance, and the remains of the quarantine station built in 1895, lie along the channel. Widening and deepening the channel in that area would require investigation of those sites, and disinterment and preservation of those artifacts.

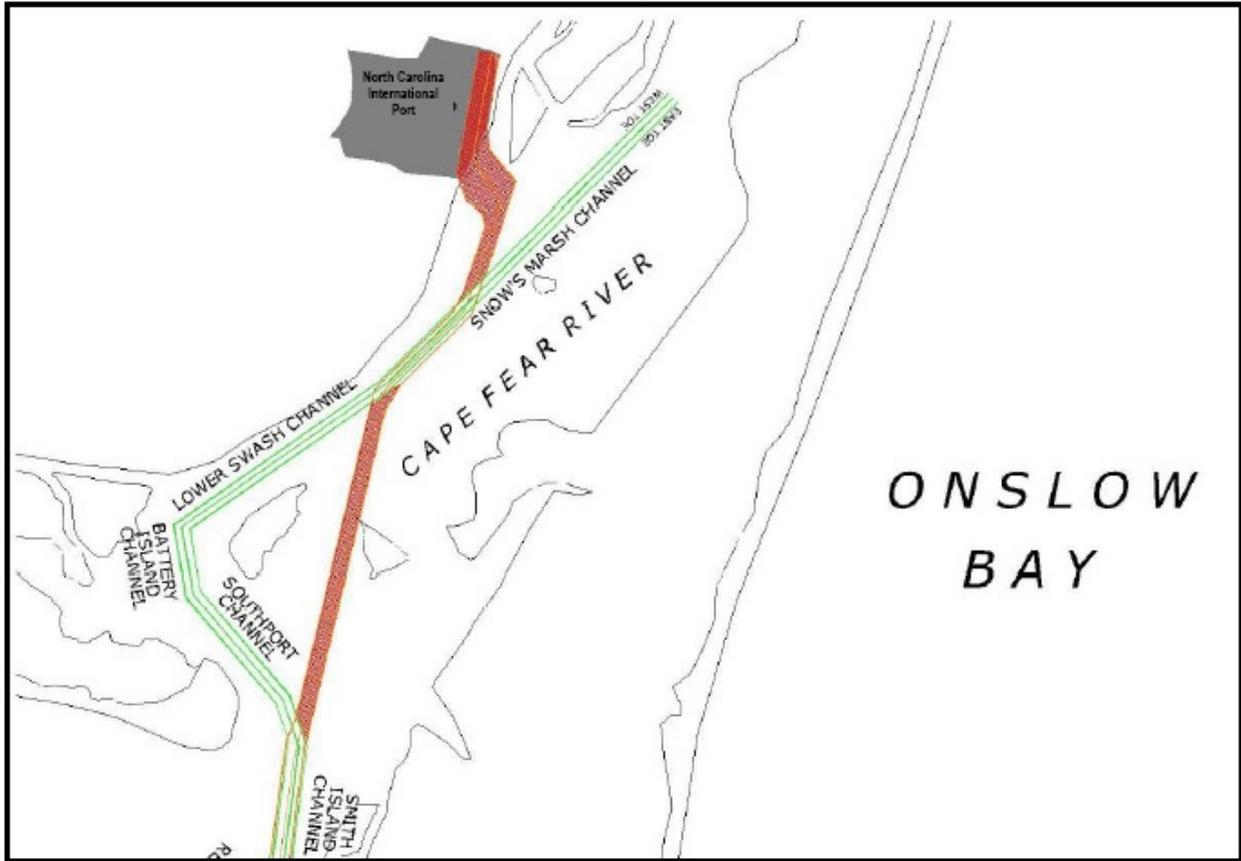
When compared with other harbors in the region, particularly Hampton Roads with a depth of 50 feet, the Cape Fear River is a poor candidate for further deepening.

### *Alternative Plans*

The site of the proposed North Carolina International Terminal lies approximately a mile from the existing channel in the Cape Fear River. At the site, the river is one to four feet deep. Along the site, in the proposed wharf and berth area, is an 86-acre salt marsh. Any dredging plan involves dredging a new channel in this area to the depth of 52.5 to 48 feet, more than 600 feet wide (at the bottom), with a turning basin 1900 feet in diameter.

There may be choices for the alignment of the channel from this point to deep water:

CH2M Hill, Inc., consultants to the State Ports Authority, examined the configuration and geology of the existing channel in the Cape Fear River, and recommended constructing a new channel to the east of Battery Island to avoid the sharp turns in the channel near Southport. This firm concluded that the configuration of the river at that point prevented construction of a channel adequate for the larger vessels that would conform to the Corps of Engineers Engineering Manual.



**Channel Configuration Proposed by Consultants to State Ports Authority (Red)**

The Wilmington District of the Corps of Engineers proposes to retain the original channel configuration and simply enlarge the channel. The resulting turn radius, however, at three times the length of the “design vessel,” would be a clear violation of the Corps manual requirement of ten times vessel length for turns of this deflection. A ship simulation study conducted for the Corps in 1999 showed that vessels of the design size cannot navigate such turns without leaving the marked channel. The resolution of this problem would be to use tugboat assistance for the larger vessels.

A third possibility is to reopen the “New Inlet” to the ocean to the east of the terminal site. This had been opened by a storm in the eighteenth century and was used as the main navigation channel through most of the nineteenth century, until it was closed by the Corps of Engineers.

The Wilmington District concluded that the cost of the channel dredging for its proposed plan, using the existing channel alignment, would be \$1.2 billion dollars for a 50-foot depth. The other alternatives involve dredging much more material, and accordingly are

even more expensive. Both of the other alternatives also involve dredging through areas of the John H. Chaffee Coastal Barrier Reserve System, which is prohibited. The environmental consequences are much more severe with those alternative plans.

The alternative with the least economic and environmental cost, even taking into account the cost of tugboat assist, is the plan advanced by the Wilmington District of the Corps of Engineers, the widening of the channel along the existing alignment.

### *Analysis*

Section 905(b) of the Water Resources Development Act of 1986 requires examination of the costs and benefits of the proposed project. Such analyses require careful consideration of what costs and benefits should be included. The basic rule is that all of the costs related to the system generating the benefits must be included for a proper comparison of costs and benefits.

The channel cannot generate benefits by itself. The generating system for any benefits includes the channel, the proposed container terminal, and its land infrastructure. CH2M Hill, Inc., consultants to the State Ports Authority for the project, estimated in 2008 that the terminal and its land infrastructure would cost approximately \$1.85 billion.

Another important element of the analysis is proper definition of the “base case,” that is, the situation if nothing is done. All costs and benefits would be measured against that. In the base case for this project, container traffic would continue to move through the existing terminal at the Port of Wilmington. When the Panama Canal expansion is opened in 2014 (or later), deeper draft vessels may be used for container traffic to the Atlantic coast, and such vessels, when fully loaded, could not navigate the channel to Wilmington. Some diversion of container traffic to other ports with deeper harbors would be expected. The extent is difficult to predict. The Panama Canal expansion will permit vessels of much broader beam (106 feet now, 160 feet after expansion), and marine architects could increase vessel capacity substantially without increasing draft. The container terminal at the Port of Wilmington has cranes to accommodate much wider vessels than are now calling at the port.

There is no issue of capacity restrictions at other terminals until sometime between 2037 and 2046.

## Cost

Using the Wilmington District's cost estimates for the 50' depth, and adding in the terminal and the landside infrastructure, we have these costs:

Terminal and infrastructure	\$1,850,000,000
Channel improvements	1,200,000,000
Total	3,050,000,000
Amortized as annual costs at 4.375%	152,000,000
Annual maintenance costs	4,500,000
Aggregate annual costs	\$ 156,500,000

The annual costs are based on a fifty-year life. The interest rate used is specified by Corps of Engineers headquarters for studies during 2010, and is based on the yield of long-term government bonds.

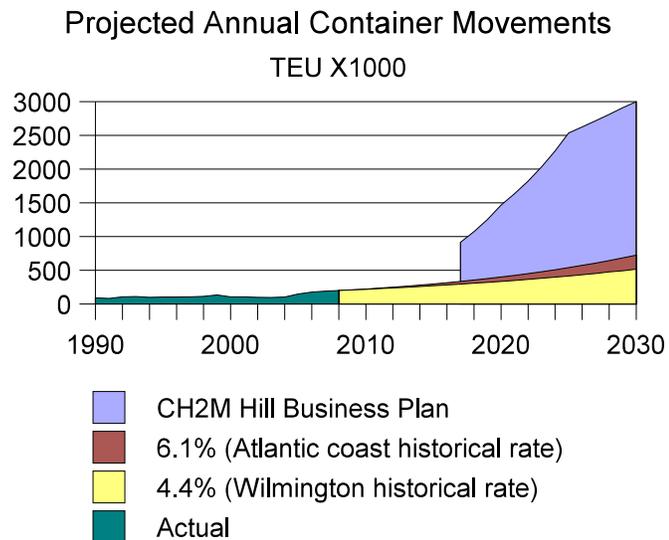
The Corps of Engineers analysis used in its February 2010 draft of the section 905(b) analysis did not include the cost of the terminal and infrastructure. That was based on the observation, from a *Pro Forma Business Plan* prepared by CH2M Hill, Inc., for the State Ports Authority, that the terminal would be self-liquidating from revenues. There are many reasons this assumption is improper:

- The business plan is based on increasing market share to 6.75% of the Atlantic coast container movements. The current market share of the Port of Wilmington is 1.1%, and it has never been higher than 1.4%. The proposed terminal at Southport would have no characteristics that would be expected to increase market share at all, let alone multiply it by six. Indeed, the site at Southport is 20 miles farther from markets than Wilmington.
- The business plan is also based on increasing container movement charges to \$220 per move. In fiscal year 2009, the average charge at the Port of Wilmington was \$81 per container move. The consultants to the State Ports Authority have not explained how increasing charges would increase market share.
- Moffatt & Nichol, another consultant to the State Ports Authority, delivered a report in February 2010 with an analysis of the market for the Port of Wilmington, based on determination of the least-cost path for containers to and from 179 business economic areas in the United States. The firm concluded that the Port of Wilmington was on the least-cost path, and thus enjoyed a competitive advantage, only for markets within North Carolina. There was not any potential for increase in market share.

- The container terminal at the Port of Wilmington is not self-liquidating. Revenues cover operating costs in some years, but not in others. All capital costs are contributed by the State of North Carolina.
- Section 904 of the Water Resources Development Act of 1986 prohibits including in project benefits any thereof transferred from other regions.

This graph shows the CH2M Hill, Inc. forecast of the container movements at the proposed container terminal at Southport (blue) overlaid on projections of movements at the container terminal at Wilmington at two hypothetical rates.

It is evident that the CH2M Hill, Inc., forecast, which embodies a larger market share, represents grievous analytical error. There are no characteristics of the proposed project that could attract more traffic than would move through Wilmington.



### ***Benefits***

By comparison to the base case, the proposed terminal and its related channel improvements and land infrastructure would permit containers arriving in post-Panamax vessels to discharge cargoes for North Carolina at the Cape Fear, rather than at Hampton Roads or Charleston. Thus a benefit of the proposed project is the saving in land transportation for such container movements.

The only markets in North Carolina closer to the Cape Fear than such other ports, and for which such savings in cost would be available, are Raleigh-Durham and points east.

The annual savings in such land transportation, at \$1.80 per mile trucking cost, would be approximately \$3,250,000 per year.

There would also be savings in marine transportation, because the voyage to Southport is about 20 miles shorter than to Wilmington. That would be worth about \$4,070,000 per year.

Offsetting effects, called negative benefits or “disbenefits,” would be the additional cost off longer land trips to markets from Southport compared to Wilmington, and the cost of tugboat assistance at the channel turns. The longer land trips would cost about \$5,340,000 per year. Tugboat assistance (which is only an incremental cost, because tugboats would be required for docking and undocking), would be about \$1,680,000 for 200 vessel calls per year.

These are the aggregate annual benefits:

Savings in land transportation from other ports	\$ 3,250,000
Vessel trip shortening	4,070,000
Longer land trip vis-a-vis Wilmington	(5,340,000)
Tugboat assist	(1,680,000)
Aggregate annual benefits	\$ 300,000

The negative benefits nearly cancel out the positive benefits, and in any event all are trivial compared to the cost.

### ***Environmental Effects***

Environmental effects are entirely negative: loss of aquatic and terrestrial habitat, air pollution from vessels, trucks and locomotives, groundwater contamination from aquifer penetration, beach erosion due to increased channel depth and width at the river mouth increasing the propensity capture sand, loss of recreational opportunity due to conflicting river uses. The Wilmington District has compiled a list in its draft report.

### ***Conclusion***

To be considered economically feasible, a project should have a ratio of benefits to costs of greater than one, that is, benefits exceeding costs. For this project, the annual benefits would be \$300,000 and the annual costs would be \$156,500,000. This yields a benefit/cost ratio of 0.002.

This disregards environmental effects, most of which would be difficult to quantify, but all of which are negative.

There is no reason whatever to consider this project any further.