The HRGreen study addresses many issues, but in this piece we consider only one. It is the description of TLW and Wave on page 10. The text is copied below (***emphasis added***):

* Background Information on Providers

    * Tillamook Lightwave & Wave / CoastCom

> *Tillamook Lightwave's incorporation originated with an Oregon ORS Chapter 190 Intergovernmental Agreement between Tillamook People's Utility District (PUD), the Port of Tillamook Bay, and Tillamook County on November 1, 2000 organized to advance broadband connectivity in Tillamook County **for public benefit**. By late 2000s, Tillamook Lightwave's stretched from north of Wheeler to south of Tillamook, with redundancy off the coast to the major metro centers. The project was built **for public benefit in partnership with the private sector where possible**. The fiber network shown in Figure 2, has been operated and managed by CoastCom since 2005. In 2010, TLW purchased the Pacific City cable landing station that facilitates the **National Science Foundation's Ocean Observatories Initiative to monitor for earthquakes and underwater volcanic activity.***

> *The CoastCom partnership allowed Tillamook to offer business service to the Tillamook Community and thereby spur economic development and growth for new corporate and local businesses. In 2016, CoastCom went from being a private local mid-mile carrier to being acquired by a much larger company, and now operates as Wave. According to public sources, **Wave has invested in excess of $100 million to rebuild and upgrade its distribution network and related transmission equipment. In 2015, CoastCom built over 1,500 miles of new fiber routes, and in 2017, Wave completed a self-healing 97-mile Nestucca Route backhaul network from the Oregon Coast to Hillsboro supporting undersea fiber cable connections**, 1 as shown in Figure 3 below.*

https://www.coastcom.net/assets/pdf/CoastCom-fiber-ring-brochure.pdf

> *Hillsboro Data Center Fiber Ring What we offer*
> *Hillsboro is home to our ultra-high count fiber ring that connects*
> ***six data centers**, including ViaWest (x2), EdgeConnex, Infomart, Pacific-spanning*

> *Tata, and Digital Realty (TelX).*
> *The fiber ring serves as a cross connect facility for several*
> *transpacific submarine cables, including FASTER, TPE, and TGN.*

> *Other cables that are coming to Hillsboro include New Cross*

> *Pacific and Hawaiki.*
> *If you're looking to exchange traffic with these cables and the*
> *first class data centers in .Hillsboro, CoastCom has the solution*

for dark fiber cross connection in this market.
Beyond access to the Hillsboro Data Center Fiber Ring, Coastcom

offers the following to customers:
Low-cost dark fiber cross connects
864ct ribbon fiber on the ring
432ct redundant drop cables to each data center

An optical loss of .25dB per km @ 1550 nm
Contact us for more information.
1-866-248-9857 coastcom.net

The TLW/Wave description does not mention their Ring II because it is based on Figure 3, a sales brochure created by CoastCom in September 2016; this is the same month that Wave closed their purchase of CoastCom:

https://www.coastcom.net/assets/pdf/WaveCoastComNewportOct2016.pdf

Though the text of HR Green's Figure 3 places them in future tense, the New Cross Pacific and Hawaiki cables landed more than three years ago:

https://www.submarinecablemap.com/submarine-cable/new-cross-pacific-ncp-cable-system
https://www.submarinecablemap.com/submarine-cable/hawaiki

Compare the 2016 graphic used in the HR Green study to the January 20, 2020 press release for the Ring II:

https://business.wavebroadband.com/resources/hillsoboro-fiber-ring-ii.pdf

Ring I: 864-strand ring/six datacenters/four cables

Ring II: 3,456 strands/13 datacenters/seven cables

Marine cables do not randomly turn up where there are tech centers; in fact, the reverse is true:

https://www.datacenterknowledge.com/networks/how-submarine-cables-are-redrawing-colocation-map

This document from 2011 shows that this plan has been developing for more than a decade:

http://www.tillamooklightwave.com/documents/pacific-city-cable-station-article.pdf

Pacific City Cable Station Acquired

The submarine cable landing station in Pacific City, Oregon, has been purchased
and a portion of it leased for a scientific research project.

The Pacific City cable station was built by Pacific Telecom Cable for the North Pacific Cable (NPC). Completed in 1991, NPC connected Pacific City to Miura, Japan, with a branch to Seward, Alaska. The cable was retired in 2005.

Last year, the cable station was acquired by Tillamook Lightwave (TLW), an Oregon ORS Chapter 190.

*Intergovernmental Agency comprised of the Tillamook People's Utility District, the Port of Tillamook Bay and Tillamook County. **The mission of TLW is to develop a fiber network within the County to support high-speed telecommunications which will promote economic development and improve the overall availability of broadband services in Tillamook County**.*

*In 2005, Tillamook Lightwave (TLW) awarded CoastCom, a privately held Oregon Competitive Local Exchange Carrier (CLEC) based in Newport, Oregon, **a perpetual 5-year rolling forward contract to act as their network operator with the responsibility for all aspects of managing and deploying TLW assets.***

***In 2009, CoastCom and TLW purchased a 100 mile underground fiber optic cable route from Pacific City to Beaverton with TLW owning 24 miles and CoastCom owning 76 miles of the route**. This fiber route was built in 1990 by Pacific Telecom Cable to provide for a terrestrial backhaul route for their cable landing station in Pacific City.*

In 2010, TLW purchased the Pacific City cable landing station and leased a portion of it to the University of Washington for their Regional Scale Nodes Project -- a network of submarine fiber optic and power cables that is a component of the National Science Foundation's Ocean Observatories Initiative (OOI). The nearly 800 kilometers of RSN cable create a large-aperture natural laboratory for conducting a wide range of long-term and innovative experiments within the ocean volume using real-time control over the entire cabled system.

CoastCom and TLW are continuing the build out of fiber optic cables from the cable station by the building of diverse routes to Portland. A southern route will be operational in February 2011, while a northern route will be operational by February 2012. Both routes will offer twenty 10 Gbps wavelengths of bandwidth.

CoastCom is looking to further develop the cable station and is interested in customers who have the need to land a submarine fiber optic cable on the West Coast of the United States. The company says that Oregon is the best state on the West Coast to land a submarine fiber optic cable, saying that the regulatory process is far less lengthy and arduous. The State of Oregon's permitting process is 6 months, but there is an exemption that provides less time for using existing facilities. Recently a firm acquired necessary state permits in 53 days, CoastCom notes.

Wave is neither a bit player nor just a contractor.

In 2018, Wave was acquired by a private equity fund and combined with Grande, enTouch and RCN into Astound Broadband, forming the sixth-largest broadband provider in the country. Astound was sold to Stonepeak Partners in 2020 for $8.1 billion, more than half of it debt. It was the biggest private equity deal of the year in any industry:

https://www.fiercetelecom.com/telecom/private-equity-firm-forks-out-8-1b-to-buy-wave-rcn-entouch-grande

Clearly, it is considered valuable enough for that much leverage.

Press releases tend to focus on the number of retail accounts served, but this is not representative of the value of deeper infrastructure. A fiber ring connecting datacenters and networks across hemispheres is as much an advantage for an online retailer as locating in a mall anchored by a luxury brand or being "freeway close" is to a brick-and-mortar store; financial traders, Bitcoin miners, even game businesses can flourish or crash depending on the milliseconds of difference in latency:

https://www.transformingnetworkinfrastructure.com/news/2020/10/13/9236520.htm

> STACK INFRASTRUCTURE ("STACK" or the "Company"), the digital infrastructure partner to the world's most innovative companies, today announced its new Portland campus will join the Wave Business Hillsboro Data Center Ring II, connecting to major long haul fiber routes, cloud on-ramps, the Pittock Internet Exchange, and seven transpacific submarine cables with access to Asia and other Pacific nations.
>
> Hillsboro currently serves as an international hub for clouds and enterprises doing business globally. The Hillsboro Data Center Ring II is a 3,456-strand fiber optic network commissioned and built by telecommunications provider *Wave Business* to provide access to the 13 major data centers in the Hillsboro market, including STACK's *existing facilities* and its future builds slated for 2021 and beyond. Ring II will serve several Pacific markets including China, Taiwan, Japan, Korea, Guam, Hawaii, New Zealand, Australia, and American Samoa. The area is already home to Ring I, with 864 low-loss, single-mode fiber cables connecting six data centers in the region.
>
> "Hillsboro continues to be an exceptionally well-connected, low-latency access point for major international and West Coast availability zones. Our facilities here offer incredible opportunities for scale, and our proximity to the Hillsboro Data Center Ring enables STACK clients to expand their global businesses, particularly in these fast-growing markets," said Brian Cox (*News* - *Alert*), CEO of STACK.

Wave Business is a leader in fiber connectivity that serves the Hillsboro and Portland regions, as well as numerous other key markets across the nation. "The backbone of our Hillsboro Data Center Ring II is now complete. This new ring addresses the increasing demand for high-count fiber driven by new facilities like STACK in the fastest growing data center cluster on the West Coast," said Patrick Knorr, Executive Vice President and Chief Commercial Officer for Wave Business. "Together the two rings in Hillsboro enable business customers in any of the connected data centers to seamlessly cross-connect and gain access to dense, transpacific capacity to and from key overseas markets on one of seven submarine cable systems."

As the HR Green study notes,

Wave has invested in excess of $100 million to rebuild and upgrade its distribution network and related transmission equipment. In 2015, CoastCom built over 1,500 miles of new fiber routes, and in 2017, Wave completed a self-healing 97-mile Nestucca Route backhaul network from the Oregon Coast to Hillsboro supporting undersea fiber cable connections.

Wave has been investing in equipment and infrastructure, all right – backhaul and rings for the hyperscale and wholesale data companies like Amazon, Microsoft, Google and Alibaba. None of the stuff that they build and they own and they use benefits the people here. This freeway has no onramps or exits in Tillamook, it goes straight up to Hillsboro.

Wave has quoted thousands of dollars to an upstanding local business owner for extending a line a few yards across the rail line from the trunk fiber that goes right past their property. Wave demand a five-year contract from businesses with a one-year lease on their premises. Had Wave and their customers paid a tiny percentage of that for the hundreds of miles of that trunk line linking the cables up to Hillsboro, Tillamook County could have had FTTH years ago and ice cream socials on Sundays.

The NSF project began Wave's pivot toward cables and datacenters as a business model but is now dwarfed by commercial traffic:

https://www.fiercetelecom.com/telecom/wave-completes-oregon-coast-underground-fiber-route-links-undersea-cable-landing-station

"The University of Washington was awarded the West Coast contract for the NSF's OOI and we were awarded the terrestrial backhaul piece for the University of Washington," [Matt] Updenkelder said. "That was our interlude [sic] into the submarine cable business and because we had one route on an aging cable, we decided this was a good business model for us to try to push forward."

https://interactiveoceans.washington.edu/technology/cables-connectors/

*The [OOI](#) Regional Cabled [Array](#) (RCA), through a partnership with L3 MariPro, builds on telecom industry sub-sea cable to provide power (10 kV DC, up to 8 A) and **communications (10 Gb/s) via fiber-optics and copper between the Primary Nodes and the Shore Station in Pacific City, Oregon**.*

Hawaiki cable advertises 67 Tbps:

https://www.hawaiki.co.nz/

Southern Cross = 22 Tbps:

https://www.southerncrosscables.com/home/network/overviewandmap

Transpacific Express = 5.1 Tbps

https://tpecable.org:59876/about.jsp

FASTER comes in at 60 Tbps:

https://www.submarinenetworks.com/systems/trans-pacific

JUPITER claims 60 Tbps:

https://www.submarinenetworks.com/en/systems/trans-pacific/jupiter
they
NCP claims 70 Tbps:

https://www.submarinenetworks.com/en/systems/trans-pacific/ncp

Though the Ring II press release referenced the North Star cable, it is unclear if it is currently operational. Even without it, the capacity of the other six cables total 281.1 Tbps. 1000 Gps is 1 Tbps. The NSF experiment is 0.0356% or 1/28090th of the commercial bandwidth.

It has been 11 years since TLW bought the Pacific City landing and it is just now being paid off. The budget published by TLW for 1 July 2020 – 28 September 2021 lists rent from the University of Washington as bringing in $41,336.73 and Hawaiki paying $34,207.77. According to the renters themselves, they have capacities of 10 Gbps and 67 Tbps respectively; this results in rates of $4,133.67 per Gbps for the NSF experiment and just 51 cents per Gbps for Hawaiki. Had the private operators been charged proportionally to a public American university, TLW would have brought in $3,599,981,868.99 more than it has since Hawaiki began operations in July 2018.

Nearly $3.6 billion could fund fiber-to-the-home, schools, social services, housing… And that is just the Hawaiki cable, and just for rental of the landing. We have six more cables, and each traverses the county for at least 80 miles. They go up Port rail rights of way and public land. They require permits and power. We are getting neither the benefits of the industry nor the

compensation for the use of our public lands and property. The jobs installing and maintaining the infrastructure do not flow here, and neither do the jobs delivered by that infrastructure.

Being a flyover county for the economy of the future only exacerbates the urban – rural divide that people of all parties decry. Locals are told that it is folks in Hillsboro and places like it that who deprive them of opportunities to thrive in the future, but it is Tillamook LightWave that is enabling the exploitation of Tillamook's land and people. It is Tillamook LightWave that tells us that basic infrastructure for people is too expensive, that ARPA may cover 75% of the costs of FTTH but the future of the county's young people do not rate investing the other 25%. They would like to take advantage of the best infrastructure funding bill for a generation, but we are poor and do not deserve it. We are not poor, and we do deserve it. Who is broadening the urban – rural divide, the people in Hillsboro or the leadership here?

> ***The mission of TLW is to develop a fiber network within the County to support high-speed telecommunications which will promote economic development and improve the overall availability of broadband services in Tillamook County.***

TLW has utterly failed at its mission. The deceptive language and materials of the HR Green report undermine any credibility it might have.

…

"Economic opportunity doesn't just happen, it happens because people think about what is needed, what ingredients are required in order to create fertile territory in order for the growth of new businesses, and I can tell you that among the ingredients infrastructure is an important part, especially if you are going to build a business that has anything to do with the Internet."

- Vint Cerf
Internet pioneer