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HEALTHY WATERSHEDS FOREST RETENTION PROJECT PHASE III:

FINAL REPORT TO CHESAPEAKE BAY TRUST

A Virginia project focused on meeting the challenges associated with creating the private and public infrastructure needed to finance high quality forest and agricultural land conservation/retention on a continuously sustainable, landscape scale basis.

Prepared for:

The Chesapeake Bay Trust

The Chesapeake Bay Program Partnership Healthy Watersheds Goal Implementation Team, Land Use Workgroup and Forestry Workgroup

The Local Government Advisory Committee to the Chesapeake Bay Executive Council

The US EPA Chesapeake Bay Program Office

The US Endowment for Forestry and Communities

The Commonwealth of Virginia

The Rappahannock River Basin Commission

The Chesapeake Conservancy

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ACKNOWLEDGEMENTS

The Healthy Watersheds Forest Phase III project would not have been possible without its sponsors and we would like to begin by thanking: the Virginia Department of Forestry, the Secretary of Agriculture and Forestry and the Rappahannock River Basin Commission for the strong commitment from their executive leadership and the technical and administrative resources they provided through all three phases of the project. We are also indebted to the organizations that recognized the importance of this initiative and provided the funding that made Phase III possible: the Chesapeake Bay Healthy Watersheds Goal Implementation team through the Chesapeake Bay Trust, and the U.S. Endowment for Forestry and Communities.

We would like to thank the Board of Supervisors of Orange and Essex Counties, their County Administrators, R. Bryan David and Michael Lombardo, respectively; and their staff for their support and participation as pilot communities in Phase III of the Healthy Waters Forest project. The elected and administrative leaders of these communities worked closely with the project team to formulate and execute strategies to make high conservation value forest and agriculture lands more familiar natural capital assets of value to the community and private land owners.

Finally, since this is the final chapter for an initiative that began five years ago literally as an idea sketched out on a napkin after dinner following a Chesapeake Bay-related meeting in Annapolis, on a personal note I would like to express my sincere appreciation to my colleague and partner since the beginning of this effort, Eldon James, the Coordinator for the Rappahannock River Basin Commission, who has co-led the initiative so ably; and to Delegate Keith Hodges, Chair of the Rappahannock River Basin Commission, whose leadership of, and advocacy for, new, innovative and envelope-pushing approaches for marrying natural infrastructure and economic development challenges to come up with new solutions was essential to the success of the project. I would also like to thank our Phase III expert subcontractor team members: Dan Spethmann, Chandler Van Voorhis, Darren Coffey, Denise Nelson, Kevin Byrnes and John Griffin. They embraced the idea, met every obstacle, and enabled the project to tackle its most significant challenge yet. In so doing, hopefully we have done the leg work necessary to begin to stimulate a change in the land conservation financing paradigm that will bring large-scale private capital investment into land conservation on a landscape-scale, long-term, sustainable basis.

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HEALTHY WATERSHEDS / FOREST CONSERVATION PROJECT, PHASE III REPORT TO THE CHESAPEAKE BAY TRUST

EXECUTIVE SUMMARY

The goal for Phase III of the Healthy Watershed Forest Project (herein after referred to as the HWF project) has been to develop and pilot the community policy and financial infrastructure necessary to facilitate high quality (HQ) forest and agricultural land conservation/retention on a sustainable, landscape scale basis. Two counties, Essex in the lower and Orange in the upper section of the Virginia Rappahannock River Basin, agreed to participate in the project and committed to work with project team members in a public process to review and identify possible revisions to their comprehensive plans and other policy documents with the goal of prioritizing forest and agricultural land retention and to encourage landowners to work with team members to develop the baseline of information needed to design and pilot the project's planned financial model.

The Rappahannock River Basin has been used as a proxy for the Chesapeake Bay watershed through all three phases of the HWF project. The two pilot counties operate under different Virginia environmental and land use regulatory policy frameworks, with Essex being within the area subject to Virginia's Chesapeake Bay Preservation Act (CBPA) and regulations, and Orange County being outside of and not subject to the CBPA regulations.

To accomplish its objectives, Phase III has been broken into two tasks. Task 1 is focused on collaborating with the municipal authorities responsible for the plans, policies and ordinances in the two pilot counties. The Task 1 team objective has been to work with these authorities and public stakeholders identified by the localities to develop potential amendments to the plans, policies and ordinances identified in HWF phase II that will continue to meet county objectives, and integrate that effort with task 2 to develop the desired working financial model. The ultimate goal has been to create a favorable regulatory environment and incentives for private landowner participation in land conservation while also contributing to the funding requirements of counties to help them meet basic services for their citizenry through a model that can attract private sector financial interest at a scale required to achieve the Phase III goal.

Task 2 has been focused on developing a transferable financial model in the pilot counties to incentivize private capital markets to invest in the retention of HQ forest and agricultural lands to offset future forecasted growth and development based on the 6.0 Chesapeake Bay Total Maximum Daily Load (TMDL) model. The objective is to harness the power of the private market economy to drive conservation of HQ forest and agricultural lands, as opposed to relying on philanthropic motives or further regulations.

Studies reviewed by the HWF/III project team (herein after referred to as the team) demonstrated that private investment capital wants to invest in forest conservation as an offset for environmental impact. Interviews with forest landowners within the pilot communities also found significant interest in accessing this investment capital as another income stream. The barrier is the scale mismatch. Institutional investors need a minimum project size of >$50 million to be feasible. The key therefore, has been to create an infrastructure that can aggregate individual landowner interests and offer them at a scale large enough to attract private capital on a return on investment (ROI) basis. Transactions must also be able to occur much faster if the level of private capital investment needed to sustain conservation on a long-term basis is to move into the financing role for forest and agricultural land conservation.

Step one in the development of the Phase III financial model was to account for existing land use programs and current tax programs. These were inventoried, including subsidies, and a compatibility matrix was developed to identify the potential mix and match of those programs which work, or not, with the others. Consideration was given to real and perceived competition for funds. Budget limits on programs that appeared to provide a funding opportunity but actually have limited impact were also considered.

By reviewing the total funds available, a realistic assessment of the competition for these funds, and the interplay of the programs, the team developed financial scenarios that characterize the opportunity for private financing of HQ forest retention, reforestation and agricultural land retention.

Ecological markets considered in this report were mitigation banks seeking to preserve wetlands and streams, nutrient banks that prevent nutrient water pollution, and greenhouse gas emissions markets - with a particular focus on forest carbon sequestration and the associated co-benefits. This context guides the report with the conviction that in order to achieve the HQ forest and agriculture land retention sought by Phase III requires that efforts be centered on their coordinated use to the extent possible, as they demonstrate what can be accomplished when capitalism and conservation function in concert.

The team's hypothesis has been that there is sufficient fragmented demand that, when aggregated, can reach an economic scale to attract investment. The key is aggregation of landowners' potential ecosystem services offerings, e.g. carbon credits, water quality credits, habitat enhancement, etc. This demand must be matched to the investment market's structural protocol(s) (e.g. trade regulations, trade restrictions, liquidity, tax treatment, secondary markets, etc.). The goal is to develop a financial conduit to link the aggregated demand with money. Done correctly, this will involve favorable tax treatment for landowners and investors, a fund source to help rural communities meet basic service needs, and a reduced cost for meeting TMDL requirements.

To pilot the financial model, the team has initially selected carbon values as a water quality proxy to provide these additional income streams and incentives for landowners and rural localities.

Carbon offers the potential for aggregating various acquisitions so they can be offered at scale and with the market convenience required to attract large-scale private capital investments. Further, the team and officials within Orange County where the financial model will be initially piloted, focused on Industrial or Economic Development Authorities (IDA/EDAs) as an aggregating mechanism. Adapting the IDA/EDA structure to carbon as a proxy for water quality enables a role for localities, combined by choice, into a regional (watershed basin) entity to exercise the authorities granted to the IDA/EDA.

This framework was generally defined, articulated, and used in HB2485 to achieve legislative authorization for expansion of local authorization under the Industrial Development and Revenue Bond Act (i.e. § 15.2-4901 of the Code of Virginia). This legislation, sponsored by the Chair of the Rappahannock River Basin Commission (RRBC) Delegate Keith Hodges, passed the General Assembly, and was signed by Governor Northam following the 2019 legislative session. The RRBC, along with the Virginia Department of Forestry, have been the principal sponsors in Virginia for all three phases of the HWF project.

This paper reports on the research, findings and activities from the start of phase III in April 2018 through September 30, 2019, the end-date for the Chesapeake Bay Trust-funded grant period.

The milestone steps completed to-date include:

A. Enlisting support from Orange and Essex Counties to participate in the HWF Phase III project.

B. Completing a review of the local Comprehensive Plan and related implementation ordinances (i.e. zoning, subdivision and planned unit development, and land disturbance, floodplain and/or stormwater management ordinances) for each pilot community to understand the public policy and regulatory arena. This review helped identify potential amendments to promote conservation of forest and agriculture lands.

C. Providing updated geographic information system data for the pilot localities to identify the location and type of existing forest and agricultural lands (and other natural areas) and the land ownership patterns and conservation practices.

D. Holding community meetings in both pilot counties with county officials and stakeholders to discuss the benefits of forest and agricultural conservation, the challenges to conserving forest and agricultural land, and potential strategies to address those challenges.

E. Preparing a Best Practices Manual on how to plan for forest and agricultural land conservation based on lessons learned, as a roadmap for localities within the Chesapeake Bay Watershed and across the country to emulate at the local and regional level as desired.

F. Developing and administering a landowner survey, conducting landowner interviews and accumulating property data in pilot communities needed to match possible financial incentive options with landowner objectives.

G. Starting the modelling process to determine the volume of Carbon that may be brought to bear in the market (*Note: Carbon is being used as a proxy for ecosystem services including clean water headed to the Chesapeake Bay – the result of forest retention and management*).

H. Completing research resulting in the IRS disposition toward Carbon as a real asset.

I. Identifying the entity and authority necessary to aggregate landowners' potential ecosystem service offerings (e.g. carbon credits, water quality credits and habitat enhancement) and creating a financial conduit linking the aggregated demand for those green resources with money for the landowners and host localities (putting "natural capital" on the local government balance sheet),

J. Working with Rappahannock River Basin Commission General Assembly members and Orange County, Virginia officials to define and articulate the concept of modifying the Industrial Development and Revenue Bond Act (i.e. § 15.2-4901 of the Code of Virginia) to allow IDA/EDA's to serve as an aggregator for private landowners interested in participating carbon value programs. Such a modification was passed by the Virginia General Assembly and signed by the Governor on March 18, 2019.

K. Communicating the overarching objectives of the HWF Phase III project to multiple stakeholders and constituencies representing the jurisdictions in the Chesapeake Bay Watershed.

Phase III will continue through the late spring of 2020, the end of the grant period for funding provided by the US Endowment for Forestry and Communities. At that time, a final HWF phase III project report covering the entire project period will be provided to the US Endowment and other interested parties, including the Chesapeake Bay program working groups and teams that originally tasked Virginia with the project in 2014.

The focus of the project team between now and then will be on: (1) designing and testing (in collaboration with Orange County, Virginia) the Economic Development Authority infrastructure required to aggregate landowner interests effectively, and (2) further engaging with the private financial sector to solicit its interest in participating in the Virginia approach, while refining the financial options to best meet landowner, locality and investor needs.

INTRODUCTION

The Healthy Watersheds/Forest project is a Virginia-led, multi-year, landscape-scale effort begun in 2015 that is now in phase III. Phase I focused on quantifying the value of retaining forestland for meeting water quality objectives to build the case for crediting forestland in the Chesapeake Bay Total Maximum Daily Load (TMDL) model. In phase II, Pennsylvania partnered with Virginia to determine what from the perspective of local leaders were the economic and policy incentives needed to prioritize forestland retention as a land use planning option. Phase III began in April 2018. Its scope was broadened to create the policy and financial infrastructure needed to facilitate forest ***and*** agricultural land conservation/retention on a landscape scale, long-term, sustainable basis.

The project sponsors in phase I, II, and III have been the Virginia Department of Forestry and the Rappahannock River Basin Commission (RRBC). Virginia project partners have been: the Virginia Department of Environmental Quality (phases I & II); the George Washington Regional Commission (phases I & II); the Water Resources Center at Virginia Tech (phase I); the Virginia Tech Land Use Education Program (phase II); The Chesapeake Bay Commission (phases I & II); The Commonwealth of Pennsylvania Department of Conservation and Natural Resources: Bureau of Forestry and the Department of Environmental Protection (phase II), and the Center for Watershed Protection (phase II); The Nature Conservancy (phase I), Regional Decision Systems, LLC (phases I, II, & III), The Berkley Group, LLC (phase III), Working Lands Investment Partners, LLC (phase III), ACRE Investment Management, LLC (phase III) and the Chesapeake Conservancy Partnership (phase III). Project grant funding has come from the Chesapeake Bay Program (phases I, II & III); the US Endowment for Forestry and Communities (phases I, II & III) and the Virginia Environmental Endowment (phase II). The Rappahannock River Basin was selected as a proxy for the Chesapeake Bay watershed and has been the study area for all three phases. It is important to note that Virginia project team members intend that lessons learned and incentives developed be applicable across all of Virginia not just the Chesapeake Bay if it is advantageous for the Commonwealth to do so.

Although forest cover is recognized as one of the best land uses for achieving Chesapeake Bay water quality outcomes, localities and particularly MS4 jurisdictions, long maintained that unless TMDL credit was given for retaining forestland, there is little local incentive for doing so. This project has been addressing that issue. An early objective was to determine the economic value implications of the reduction in nitrogen, phosphorus, and sediment loads of alternative land-use change scenarios and pass that value on to localities as a forestland credit in the TMDL model to create an incentive for local officials and private land owners to retain more high-conservation-value forestland.

In phases I and II, the project quantified the contribution of forestland toward achieving Chesapeake Bay cleanup goals in economic terms; and in Virginia, worked extensively with

localities and stakeholders throughout the RRBC study area to determine what could be done to incentivize forestland retention so that contribution was maximized. The project's findings contributed significantly to the decision in December 2017 of the Chesapeake Bay jurisdictions' Principal Staff Committee to credit forestland retention in the Bay TMDL model. The Phase II stakeholder engagement revealed that success depended on identifiable financial benefits for both landowners and localities with success equaling landowners retaining forests and localities effecting beneficial policies.

Phase III has had two programmatic tasks. Task 1 is to work with two Rappahannock river basin localities as pilots to develop and implement plans, policies and ordinances to foster high quality (HQ) forest and agricultural land retention drawing from the "tool box" of options identified in Phase II. Task 2 has been to develop, model and pilot long-term funding mechanisms supported by the private sector that may be scaled up and implemented on a landscape scale.

Two counties, Essex in the lower basin and Orange in the upper Rappahannock River basin agreed to participate in the project and committed to work with project team members in a public process to review and revise as needed, their comprehensive plans and other policy documents with the goal of prioritizing forest retention and to encourage landowners to work with the HWF tasks 1 & 2 teams to develop the baseline of information needed to design and pilot the project's financial model.

The objective for Phase III, task 2 has been to design and pilot a financial model that incentivizes landowner action, facilitates economic development for the community and attracts large-scale private investment. Studies reviewed by the HWF Phase III team showed there is considerable private investment capital looking to invest in forest conservation as an offset for environmental impact. Through their interviews with landowners, team members also found there is significant interest among forest landowners to access this investment capital as another income stream. The barrier is the scale mismatch. Institutional investors need to make investments at a minimum project size of $50 million because it takes them the same due diligence to do a billion-dollar deal as it does a few million. The key therefore, is to create a mechanism that can aggregate individual landowner interests and bundle them at a scale large enough to attract private capital on a return on investment rather than a philanthropic basis.

To address the scale and market convenience requirements needed, the team began focusing on using "carbon values" of existing forests (forest retention) as a proxy for water quality benefits. The advantage is the potential for bundling or aggregation of various acquisitions to be offered at scale and with the market convenience required to attract large-scale private capital investments. The second challenge has been to design an aggregating mechanism. A review of the Code of Virginia to assess what options might be available found that amending the Industrial Development and Revenue Bond Act (i.e. § 15.2-4901 of the Code of Virginia) to allow Industrial or Economic Development Authorities (IDA/EDA) formed by localities to be utilized as a means

of aggregating landowners' carbon (or other environmental offset) credits in one or more localities.

This is the objective of HB 2485 that was introduced in the Virginia General Assembly during its 2019 session and passed and signed into law earlier this year. Using carbon as a water quality proxy also capitalizes on the potential to provide additional income streams and incentives for farm or forest landowners, including those who have not participated in, or who do not qualify for existing federal programs to offset the loss of agricultural land resulting from retaining or installing riparian forest buffers.

This report addresses the progress to date along with a summary of the lessons learned. One of the key deliverables of interest to the Chesapeake Bay community is the set of recommendations in the "How To" manual provided in full in Appendix E. That document provides guidance on how other communities can: 1) develop and implement plans, policies and ordinances to foster high quality (HQ) forest and agricultural land conservation and 2) organize private landowner interest in accessing private natural capital markets. These actions are necessary for landowners to effectively use current land conservation programs and lay the foundation for potential future long-term funding mechanisms supported by the private sector.

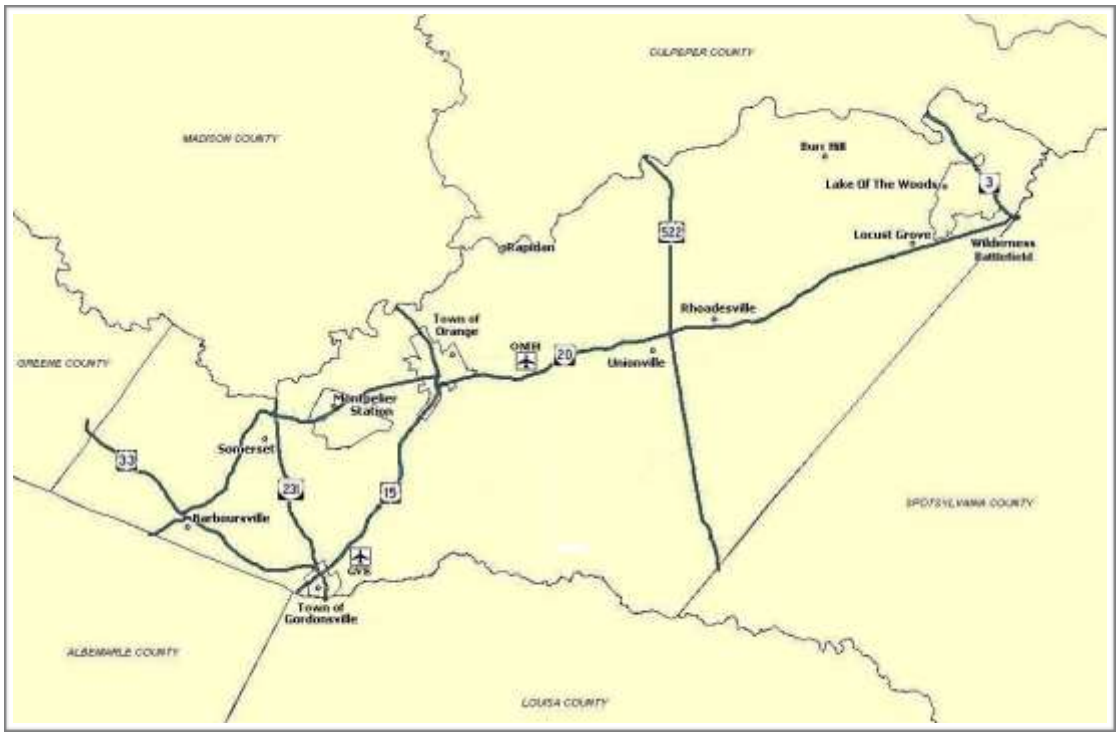
PILOT COUNTY PROFILES

The following section provides important contextual information, in the form of profiles, on the Virginia Counties of Orange and Essex, both of whom have adopted the Healthy Watershed Forest retention Phase III Pilot. The profiles address the three criteria for inclusion in the pilot: 1) pre-dominantly located within the Rappahannock River Watershed; 2) dominated by agricultural and forestal lands; and 3) currently experiencing economic distress. On May 22nd, 2018, the Orange County Board of Supervisors unanimously voted to adopt the pilot. Three months later, on August 14th, the Essex County Board of Supervisors also voted unanimously to adopt the pilot.

A. ORANGE COUNTY

Orange County is located in the northern third of the State of Virginia and is bounded (in clockwise order starting to the north) by Culpeper (N), Spotsylvania (E), Louisa (S), Albemarle (SW), Greene (W) and Madison (NW) Counties. Orange County encompasses a total area of 218,240 acres. Over half of the County lies within the upper section of the Rappahannock River basin. The population centers are the two incorporated towns and Gordonsville in the southwest quadrant, Orange, in the Northwestern quadrant; and, the planned community of Lake of the Woods, at the far eastern end of the County.

Figure 1. Orange County Location Map



1. Demographics

In 2010 Orange County was home to a population of 33,481 with a median age of 42. By 2017 the county is estimated to have grown by 1,392 people to a total of 34,873. The racial and ethnic make- up of the County population is 79.4 percent White, 12.2 percent

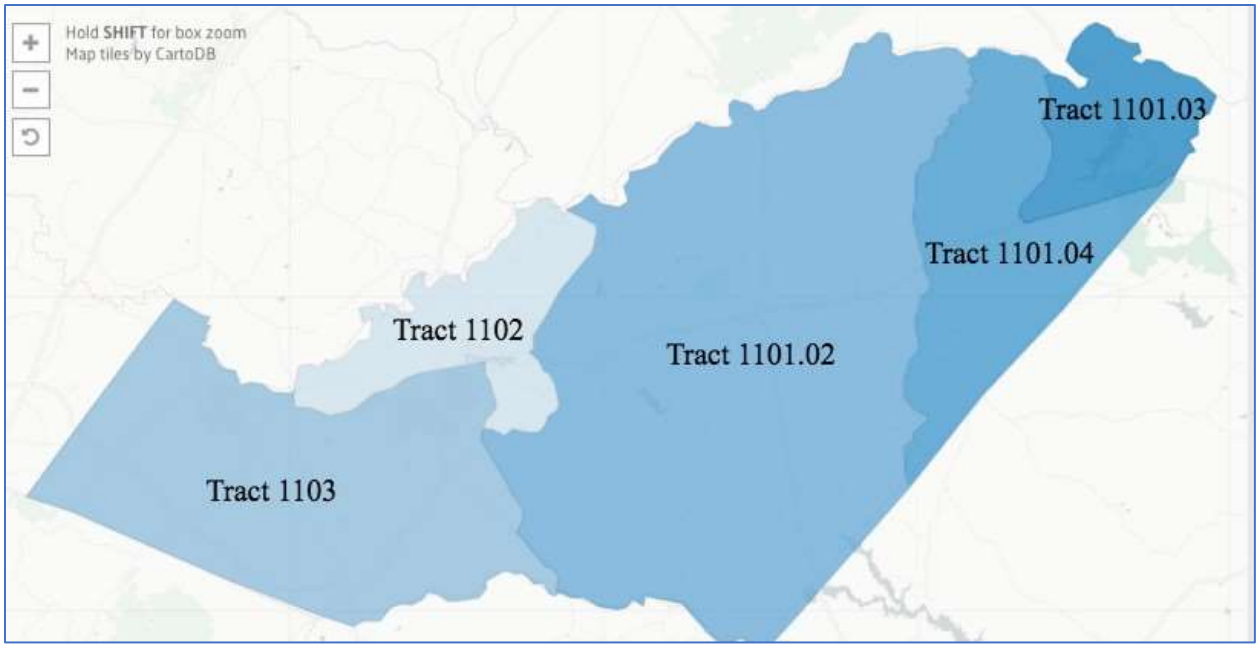
Black, 2.79 percent Bi-racial and 0.99 percent Asian, with 4.21 percent Hispanics. (Data USA). The U.S. Census Bureau delineates the County as mostly rural with just over half of the population (57 percent) residing in the rural areas. The Median household income is $66,990, which is below the State median household income of $68,114. The median property value is $236,100 which is below the state average of $264,000. The home ownership rate is 75 percent. The poverty rate of 9.2 percent and unemployment of 3.1 percent are both just below the State averages of 11.2 percent and 3.4 percent respectively. Of the total population that are at least 25 years old, approximately 26 percent has a two-year degree or higher. Eighty-five (85) percent of the County population (age 18 and over) has a two-year college degree or less education, compared to a Virginia state average of 75.3 percent.[1]

2. Current Economic Status and Future Economic Growth

The data above tells us that Orange County is currently experiencing a low to moderate level of economic distress. While the average unemployment and poverty numbers are on par with the state average, the overall level of education correlated to average salary indicates average wages are well below the Virginia average.

Census tract-level data provide a better view of areas within the County of greater economic hardship and financial stress. Moreover, the census tract areas are relevant to the New Market Tax Credit Program discussion later in this report.

Figure 2. Orange County Census Tracts, Opportunity Zone and NMCT Program Eligibility



Orange County's census tracts are numbered 1103, 1102, and 1101.02, 1101.04, and 1101.03 from West to East across the county (see Figure 2). Additional analysis of specific poverty and unemployment data by tract number in Table 1 below indicates that higher poverty rates and

[1] US Census Bureau, American Community Survey 5-Year Estimates, 2013-2017, Educational Attainment.

lower unemployment towards the west and lower poverty by higher unemployment towards the east.[2]

Table 1. Poverty and Unemployment Patterns, Orange County, 2013-2017, 5 Year Average

Census Tract	All Persons, Pct. at or Below Poverty Level	Persons Age 16 & Over, Number Unemployed	Persons Age 16 & Over, Percent Unemployed	Opportunity Zone & NMCT Program Eligibility
1101.02	10.4%	334	4.8%	No
1101.03	4.8%	316	3.7%	No
1101.04	5.7%	145	4.5%	No
1102	19.2%	192	4.7%	Yes
1103	7.0%	120	2.1%	No
County Total	8.9%	1,107	3.9%	N/A
Virginia	11.2%	236,648	3.5%	N/A

Source: US Bureau of Census ACS 5-year Estimates, 2013-2017, Selected Economic Characteristics.

The Orange County economy employs 15,787 people and currently specializes in Utilities[3], Construction, and Public administration. The largest industries in Orange County by employment are: Healthcare & Social Assistance (2,472), Construction (1,850), and Retail Trade (1,838).

For future growth in the County, analysis in the Orange County Economic Development Strategic Plan that compares current County base industries against Central Virginia partnership for Economic Development (CVPED) target industries as well as County Stakeholders surveyed target industries indicates future focus on agribusiness, advanced manufacturing, and Defense & Logistics.

Opportunity Zone Designation

Opportunity Zones are a federal economic development and community development tax benefit established as part of the 2017 Tax Cuts and Jobs Act available to investors with capital gains designed to encourage long-term private investment in low-income urban, suburban and rural census tracts. The zones were nominated by the Governor in the spring of 2017 and are comprised of low-income census tracts. Zones were eligible for nomination based on 2015 and 2016 American Community Survey data. Virginia had 901 eligible census tracts, and per the Tax and Jobs Act, each state was only able to nominate 25 percent or 212 tracts, and could have up to 5 percent or 11 as contiguous tracts. Virginia nominated the maximum number of census tracts allotted. The designations are permanent until Dec. 31, 2028.

Taxpayers can receive capital gains tax deferral for making timely equity investments in Opportunity funds that then deploy capital into Opportunity Zone business and real estate ventures. This is an economic and community development tax incentive that provides an avenue for investors to support distressed communities to address areas of the

[2] World Population Review. (2018). Orange County, Virginia Population 2018 [.com]. Retrieved September 3, 2018, from http://worldpopulationreview.com/us-counties/va/orange-county-population/

[3] The website datausa.io lists the top three occupations under this heading as Electrical power line installers & repairers; Miscellaneous managers; and water and wastewater treatment plant & system operators.

Commonwealth that have experienced uneven economic growth and recovery. The tax incentive offers three benefits: tax deferral, tax reduction through long-term investment, and exclusion of certain capital gains tax. Tract 1102 near the Town of Orange has been designated as a Virginia Opportunity Zone and is also included in the New Market Tax Credit (NMTC) program discussed later in this report.

3. Current and Future Patterns of Development

Current patterns of development are largely focused around the towns of Gordonsville and Orange and the Route 15 corridor in the western half; and the Route 20 corridor that runs through the middle of the County. Most recently (2015), Orange County approved the creation of the Germanna Wilderness Area Plan (GWAP) to maintain, focus and mediate continued development in the eastern end of the County.

The GWAP was designed to manage long term (50 years) growth in the county by being its "primary area of development". Its development is consistent with economic data indicating high unemployment at that end of the county. Growth forecasts indicate it will capture 80 percent of the growth in the next 50 years. GWAP is bounded by the Rapidan River to North and East, and Spotsylvania County to the South. It contains 14,600 acres, approximately 7 percent of the County's total area, and encompasses the entire Eastern tip, including the route 3 corridor and Lake of the Woods planned community.

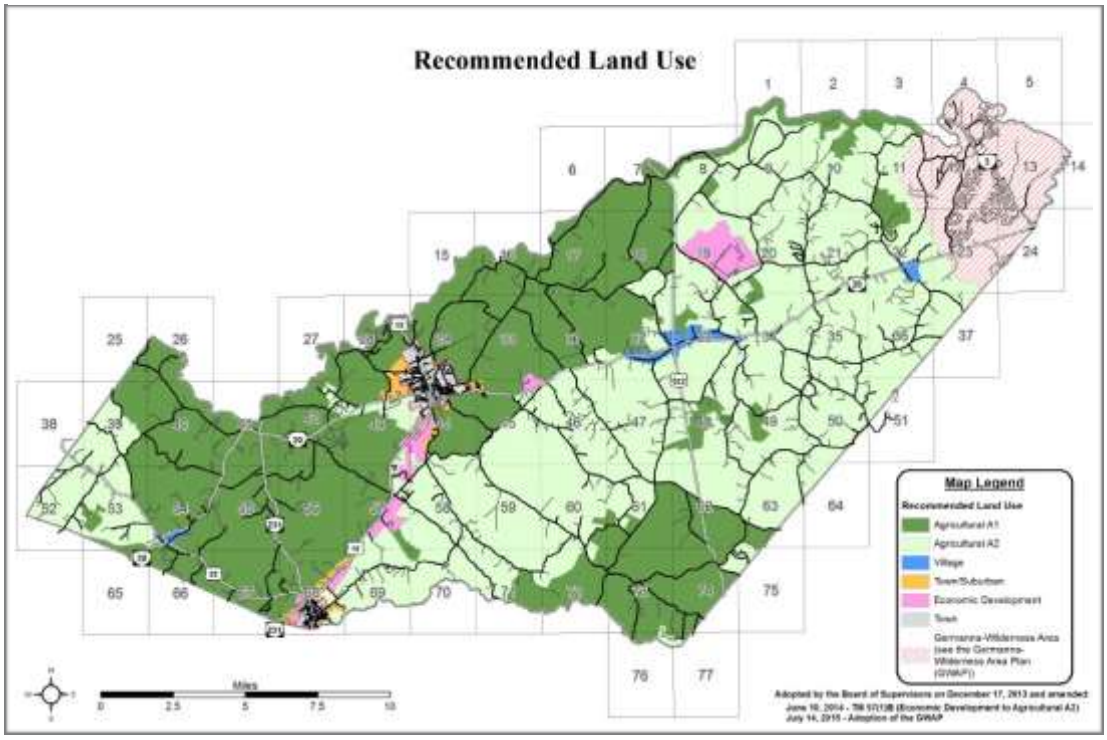
4. Land Conservation Trends

Among the most important land stewardship tools are the County's planning and zoning documents. The Orange County Economic Development Strategic Plan recommends that the majority of land in the County remain in Agricultural A1 and A2 zoning. These are the dominant land use categories currently and denoted as dark and light green In the Orange County Recommended Land Use Map below.

In conjunction with being designed as a focus for county development, the Germanna Wilderness Area Plan (denoted with white and red stripes) represents its own land use designation and has its own master plan and zoning ordinance to govern the planned extensive future growth.

Land conservation trends were positively affected by the addition of forest land as eligible for land use value taxation. In 2018, there were approximately 47,020 acres enrolled. Since that time, County records indicate there have also been 108 Private Land Preservation Tax Credit Open Space Easements recorded. The Virginia Department of Forestry's 8th Forest Inventory of Virginia (2009) determined that approximately 60 percent or 137,190 acres of forested land in Orange County is privately-held.

Figure 3. Orange County Future Land Use Map



5. Agricultural Trends

Data from the four most recent five-year Agricultural Censuses (i.e., 2002, 2007, 2012, and 2017) indicate several major trends of note over this 15-year period (See Table 2). First, from 2002-2017, the total amount of land in agriculture has declined (-9,633 acres), the number of farms has declined (-69) and the average acreage per farm has increased (12 acres). Second, over the same 15-year period, net farm income has been erratic, but reflects a gradual increase[4]. At the same time, the market value of products sold has been sharply increasing, along with average production costs; while the average net income per farm decreased after the 2009 economic recession, before rebounding in 2017.

Considered a part of the agricultural sector, the equestrian economy in Orange County is very strong. According to the 2011 study, "The Economic Impact of the Horse Industry in Virginia" (Rephann, 2011) the industry employs at least 286 people, generated sales of $16,518,479, and resulted in tax revenue of $511,381.

[4] However, net incomes reported are in current dollar values for the year prior to the reported census year and do not reflect any inflationary adjustment over time.

Table 2. Orange County Agricultural Trends

Calendar Year	2002	2007	2012	2017
Number of Farms	486	518	547	417
Land in Farms (Acre)	104,879	104,606	104,806	95,246
Average Size of Farms (acres)	216	202	192	228
Market Value of Products Sold (per Farm)	$75,693	$146,877	$165,589	$271,150
Average production expense (per farm)	$72,067	$98,077	$164,175	$189,510
Average net income of operation (per Farm)	$15,041	$52,723	$8,513	$90,000

Source: US Bureau of Census, Census of Agriculture, 2002, 2007, 2012, 2017.

6. Forestry Trends

The trends in the number of farm operations and total acreage engaged in forestry or silviculture is reported through the US Census of Agriculture. Over the last 10 years (2007-2017), there was a loss of 67 farm woodlot operations (-20 percent), and a loss of 5,163 acres of woodlot farms (or -19.45 percent).

Table 3. Trends in Local Forestry Operations, Orange County

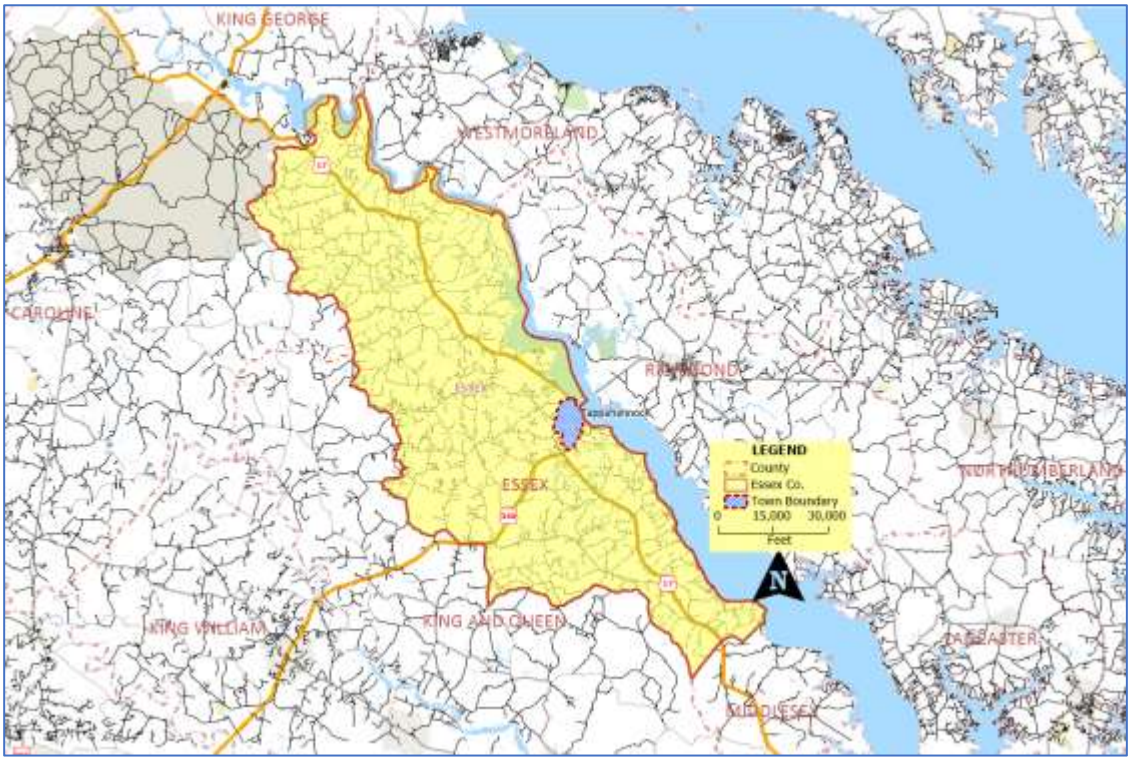
FARMS, LAND IN FARMS, VALUE OF LAND & BUILDINGS & LAND USE	Orange County, VA		
	2007	2012	2017
TOTAL COUNTY LAND AREA, INCLUDING NON-AGRICULTURE - ACRES	218,313	218,313	218,313
AG LAND, WOODLAND - NUMBER OF OPERATIONS	331	357	264
AG LAND, WOODLAND - ACRES	26,546	27,177	21,383
PERCENT OF COUNTY LAND AREA IN WOODLOT OPERATIONS	12.15%	12.44%	9.79%
AG LAND, WOODLAND – AVG ACRES PER OPERATION	80.19	76.13	80.99
GOVT PROGRAMS, FEDERAL, CONSERVATION & WETLANDS – NUMBER OF OPERATIONS	23	19	11
GOVT PROGRAMS, FEDERAL, CONSERVATION & WETLANDS - ACRES	1,301	534	240

Source: US Census Bureau, Census of Agriculture, 2007, 2012, 2017; Table 8.

B. ESSEX COUNTY

Essex County is located in the northern third of the state in Virginia's middle peninsula. Bordered to the East by the Rappahannock River, it is surrounded by (moving in a clockwise order from the North) Westmoreland (N), Richmond (NE), Middlesex (SE), King and Queen (S), Caroline (W), and King George (NW) Counties. Essex County encompasses 167,200 acres of the coastal plain. Over 80 percent of the County lies within the lower section of the Rappahannock River basin. The main population center is the Town of Tappahannock located on the Rappahannock River in the middle of the eastern side of the County.

Figure 4. Essex County Location Map



1. Demographics

In 2010 Essex County was home to a population of 11,151 with a median age of 45 years. 2017 estimates indicate that the population has undergone almost no growth or decline. The racial and ethnic make-up of the County's population is 56.9 percent White, 38.2 percent Black, 2.7 percent Bi-Racial, 1 percent Asian and 3.5 percent Hispanic. The U.S. Census Bureau delineates the County as mostly rural with just over three quarters of the population (77 percent) residing in the rural areas. The median household income is $50,629, which is well below the State median household income of $68,114. The local median home value is $177,200, which is below the State median property value of $255,800. The local home ownership rate of 71.4 percent is above the State average of 66.2 percent. The local poverty rate is 13.4 percent and unemployment is 4.7 percent, both of which are above the State averages of 11.2 percent and 3.5 percent, respectively. Almost 81 (80.77) percent of the County population (age 18 and over) has a two-year college degree or less education, compared to a Virginia state average of 75.3 percent.

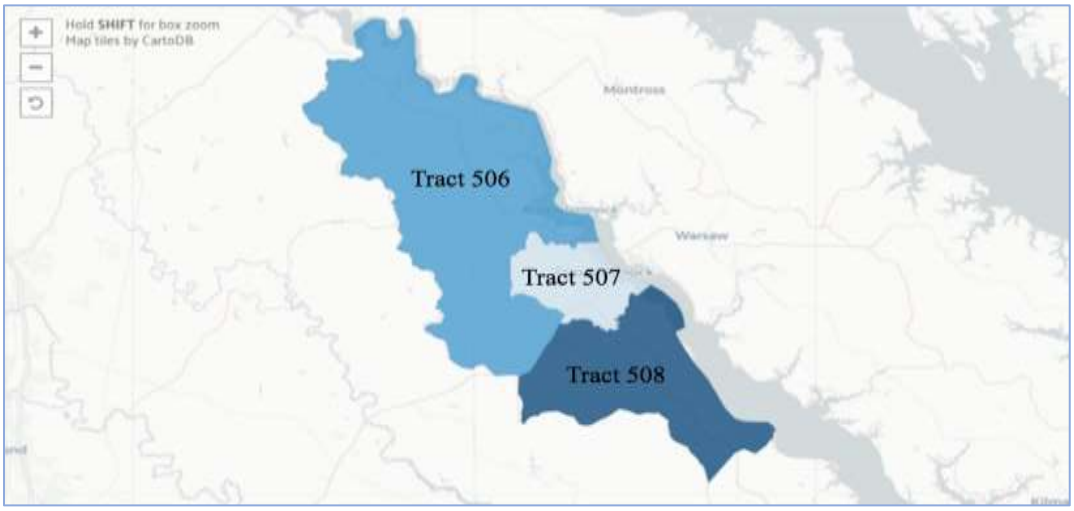
The economy of Essex County employs a total of 5,371 people, and specializes in Public Administration, Agriculture and Forestry, and retail trade. The largest employment sectors are retail trade (883), manufacturing (748), and healthcare & social assistance (669). Currently, roughly 70 percent of the county residents are considered out commuters (i.e. work outside Essex County).

2. Current Economic Status and Economic Growth

The data above indicates that Essex County is currently experiencing a moderate to severe level of economic distress. Both average unemployment and poverty numbers are higher than the state average. In addition, the overall level of education correlated to average salary indicates average wages are well below the Virginia average.

Essex County is divided into three census tracts, numbered 506, 507, and 508 from Northwest to southeast across the County (see Figure 5).

Figure 5. Essex County Census Tracts, Opportunity Zone and NMCT Program Eligibility



Additional analysis of specific poverty and unemployment data by tract number in Table 4 indicates the highest levels of both poverty and unemployment are located around the Town of Tappahannock.[5]

Opportunity Zone Designation

Opportunity Zones are a federal economic development and community development tax benefit established as part of the 2017 Tax Cuts and Jobs Act available to investors with capital gains designed to encourage long-term private investment in low-income urban, suburban and rural census tracts. The zones were nominated by the Governor in the spring of 2017 and are comprised of low-income census tracts. Zones were eligible for nomination based on 2015 and 2016 American Community Survey data. Virginia had 901 eligible census tracts, and per the Tax and Jobs Act, each state was only able to nominate 25 percent or 212 tracts, and could have up to 5 percent or 11 as contiguous tracts. Virginia nominated the maximum number of census tracts allotted. The designations are

[5] World Population Review. (2018). Orange County, Virginia Population 2018 [.com]. Retrieved September 3, 2018, from http://worldpopulationreview.com/us-counties/va/orange-county-population/

permanent until Dec. 31, 2028. Tract 507 near the Town of Tappahannock (see Figure 5) has been designated as a Virginia Opportunity Zone and is also included in the New Market Tax Credit program discussed later in this report.

Table 4. Poverty and Unemployment Patterns, Essex County, 2013-2017, 5 Year Average

Census Tract	All Persons, Pct. at or Below Poverty Level	Persons Age 18 & Over, Number Unemployed	Persons Age 18 & Over, Percent Unemployed	Opportunity Zone & NMCT Eligibility
506	10.2%	49	1.7%	No
507	**20.2%**	**185**	**10.5%**	**Yes**
508	6.7%	76	2.6%	No
Co. Total	12.3%	310	5.6%	N/A
Virginia	11.2%	236,648	3.5%	N/A

Source: US Bureau of Census ACS 5-year Estimates, 2013-2017, Selected Economic Characteristics.

Taxpayers can get capital gains tax deferral for making timely equity investments in Opportunity funds that then deploy capital into Opportunity Zone business and real estate ventures. This is an economic and community development tax incentive that provides an avenue for investors to support distressed communities to address areas of the Commonwealth that have experienced uneven economic growth and recovery. The tax incentive offers three benefits; tax deferral, tax reduction through long-term investment, and exclusion of certain capital gains tax.

3. Current and Future Patterns of Development

Current patterns of development are largely focused around the Town of Tappahannock; the Tappahannock Airport; the Route 17 corridor, which runs southeast to Northwest in the eastern third of the County; and the Route 360 corridor which runs Northeast to Southwest roughly in the middle of the County.

In addition to its inland features, Essex County has 317 miles of Rappahannock River shoreline. The majority of it is considered tidal marsh, and is, therefore protected by the Chesapeake Bay Preservation Act. Currently, only 7.5 percent of the shoreline is residentially developed. The remaining 92.5 percent is surrounded by forest land or by land in agricultural or other open space use.

Recent and future plans for growth are focused on strategic planning action across the County economy. The Virginia Economic Developers Association (VEDA) Cardinal Community Assistance (CCA) report recommends deploying the County's limited budget to include reinforcing the County's interest and effort to support existing industries and assets with strategic economic development plans. It also recommends focused-support of agribusiness. The county has industrial parks, old and new airport properties, that are currently in planning to be used to attract industrial/manufacturing business. The Town of Tappahannock continues to be a focus given its strategic location at the intersection of routes 17 and 360. In addition, planning focus is on the corridors along these two roads, and more specifically

the county infrastructure in these corridors. While the Rappahannock River Waterfront has limited potential in terms of new development, current plans include efforts to coordinate its stakeholders to consider refurbishments, economic development plans, and recommend focused support of agribusiness.

4. Land Conservation Trends

Essex also relies on its plans and zoning ordinances to drive stewardship of the County land. In addition to maintaining majority designations of Agricultural Preservation and Countryside in the land use recommendations, the County has added additional lands to the Resource Protection Area (RPA) and Resource Management Areas (RMA) designated under the Chesapeake Bay Preservation Act.

5. Recommended Future Land Uses

In Figure 6, the three largest land use categories (listed as Districts on the map) are:

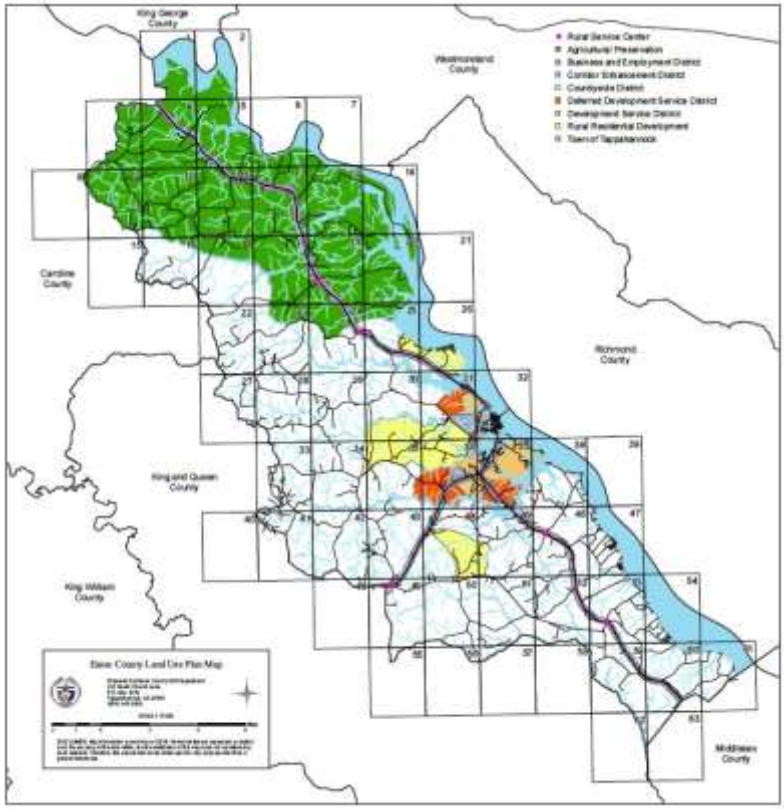
1) Agricultural preservation (Dark Green), which covers 30 percent of the County;

2) Countryside (White), which encompasses 55 percent of the County; and,

3) Rural Residential (Yellow) which covers 10 percent.

Of particular note for these three Districts is that they are structured in a way that "limits development to a level which should never be expected to require substantial support services from the County". The minimum lot size per home is one acre, but the number of lots declines by use:

Figure 6. Essex County Future Land Use Map



- Rural residential -One dwelling an acre (zoning dependent),
- Countryside - One dwelling per five acres;
- Agricultural Preservation - one dwelling per 5 acres up to 20 acres and then one dwelling per 20 acres after that.

6. Chesapeake Bay Preservation

Due to its location on the Chesapeake Bay, Essex County has exercised its option to designate

additional lands in its own Resource Protection Area in concert with the State RPA regulations established under the Chesapeake Bay Preservation Act (CBPA). This is implemented through an overlay district of the County Zoning Ordinance. In addition, Essex has designated the remainder of the non-coastal lands as part of the RMA.

The Essex County agricultural and forestal designations covered under its use value taxation programs have been operating since 2014 and have maintained enrollments between 90,000 and 100,000 acres. These fluctuations can, in part be attributable to additions that brought the open space easements up to 84, totaling 27,569 acres. Acres migrating from land use and committed to open space easements are deducted from the land use total leading to fluctuations that do not reflect loss of conservation lands.

7. Agricultural Trends

Data from the 5-year U.S. Agricultural Census for 2002, 2007, 2012 and 2017 (Table 5) indicate that smaller farms are not surviving and are being subsumed by larger farms. The number of farms in Essex County has been decreasing, while the average size of the farms is increasing. At the same time, the total amount of land in farms has been fluctuating between 53,346 – 58,702 acres. From 2002-2012, the general trend of the Market Value of Products Sold (per farm); the average production expense (per farm): and average net income of operations (per farm) increased and in some cases, doubled. However, the average net farm income dropped significantly from 2012 to 2017.

Table 5. Essex County Agricultural Trends

Agricultural Indicator	2002	2007	2012	2017
Number of Farms	127	102	98	88
Land in Farms (Acre)	58,266	53,346	56,705	58,702
Average Size of Farms (acres)	459	523	579	667
Market Value of Products Sold (per farm)	$63,759	$96,717	$232,421	$239,164
Average production expense (per farm)	$64,744	$126,832	$221,561	$256,447
Average net income of operation (per Farm)	$11,106	$280	$56,256	$15,337

Source: US Bureau of Census, Census of Agriculture, 2002, 2007, 2012, 2017.

8. Forestry Trends

The trends in the number of farm operations and total acreage engaged in forestry or silviculture is reported through the US Census of Agriculture (Table 6). Over the last 10 years (2007-2017), there was a loss of 9 farm woodlot operations (-13.6 percent), and a modest increase of 1,145 acres of woodlot farms (or 9.7 percent).

Table 6. Trends in Local Forestry Operations, Essex County

FARMS, LAND IN FARMS, VALUE OF LAND & BUILDINGS & LAND USE	Essex County, VA		
	2007	2012	2017
TOTAL COUNTY LAND AREA, INCLUDING NON-AGRICULTURE - ACRES	**164,550**	**164,550**	**164,550**
AG LAND, WOODLAND - NUMBER OF OPERATIONS	66	70	57
AG LAND, WOODLAND - ACRES	11,702	15,664	12,847
PERCENT OF COUNTY LAND AREA IN WOODLOT OPERATIONS*	7.1%	9.5%	7.8%
AG LAND, WOODLAND – AVG ACRES PER OPERATION*	177.30	223.77	225.38
GOVT PROGRAMS, FEDERAL, CONSERVATION & WETLANDS - NUMBER OF OPERATIONS	38	31	36
GOVT PROGRAMS, FEDERAL, CONSERVATION & WETLANDS - ACRES	31,242	35,228	40,270

Source: US Census Bureau, Census of Agriculture, 2007, 2012, 2017; Table 8. * = calculated from data.

TASK 1 SUMMARY

A. *Project Review*

Task 1 of the project was divided into three main activities. First, for each pilot community, the team reviewed the local Comprehensive Plan and related implementation ordinances (i.e. zoning, subdivision and planned unit development, and land disturbance, floodplain and/or stormwater management ordinances) to understand the public policy and regulatory arena. This review helped identify potential amendments to promote conservation of forest and agriculture lands. The deliverable work product of this review effort for each pilot County is summarized as Appendix C1 and C2 for Orange and Essex Counties, respectively.

Second, the team worked with the administration and planning staff of each County to organize community workshop(s) to explain the HWF phase III project goals and to hear from community leaders, interested forest and agricultural landowners and the general public about community values related to forest and agricultural land conservation. Through a small group exercise, the workshops helped define various social, environmental and economic benefits of these land resources recognized by the groups and helped identify key opinion leaders in the community with a keen interest in or possible concerns over increased land conservation. A summary of this effort for each pilot County is included as Appendix D1 and D2 for Orange and Essex Counties, respectively.

In the third stage, the team developed key findings and recommendations for advancing forest and agricultural land conservation in each pilot county based on their policy review and the community workshop(s). These findings and recommendations were offered to each County Administrator to carry forward through local public processes to consider amendment of the local Comprehensive Plan and related implementation ordinances. To enable other communities to follow the path of promoting voluntary private land conservation, the HWF III team has prepared a generalized "How To" manual which is included as Appendix E.

B. *Summary of Key Public Meetings, Press Releases and Media Coverage*

External Meetings & Audiences
July 9 -11, 2018. HWF team members attended the US Climate Alliance Learning Lab in Washington DC and assisted the Team from Virginia in coordination with Maryland and North Carolina. All expressed interest in the approach of the HWF phase III project.
August 15, 2018. Briefed the Rappahannock River Basin Commission Technical Committee on project status.
February, 2019. Presented to Virginia. General Assembly – House Agriculture, Forestry and Chesapeake Bay Committee on carbon markets and how they can help rural landowners. This is a link to the presentation and discussion: https://vimeo.com/319064444
April, 2019. Briefed the Chesapeake Bay Program Forestry Work Group on the project status

External Meetings & Audiences

April, 2019. Briefed Chesapeake Bay Program Forest Buffers Action Team on the project status

April, 2019. Briefed the Chesapeake Bay Program Forest Buffers Action Team on the project status

April, 2019. Briefed the Sustainable Forestry Initiatives Conservation Impact Sounding Board on the goals and objectives of the project

April, 2019. Briefed the American Forests Forest-Climate Learning Lab on the goals and objectives of the project

Orange County

May 7, 2018. Met with Chair of the Orange County Board of Supervisors and Orange County. Administrator to explain the project.

May 22, 2018. Presented to Orange County Board of Supervisors where they unanimously approved Orange County's participation as a pilot community for the HWF Phase III project.

July 12, 2018. Team members met with the Orange Co. Farm Bureau. Jim White, Chairman of the Orange County Board of Supervisors, Bryan David, Orange Co. Administrator, Martha Moore, VP of Policy for the Virginia Farm Bureau, Rob Farrell, Virginia State Forester, and 30+ farmers at a Farm Bureau sponsored meeting. The meeting lasted two and a half hours with an additional hour spent with individual farmers. The Farm Bureau unanimously endorsed the pilot and provided a list of 6 names of landowners willing to be interviewed. This was proposed as a representative sample of landowners to collect information needed to determine what should be considered in developing the financial model parameters.

January 17, 2019. A community workshop was held in the Town of Orange Public Works Community Room in Orange, Va. Pre-workshop press coverage was very positive and 35-40 people attended the session. The purpose of this meeting was to discuss the benefits of forest conservation, the challenges to conserving forestland, and potential strategies to address these challenges. The meeting began with a project introduction by Mr. Bryan David, the Orange Co. Administrator. This was followed by a brief presentation by HWF III Task One team leader Darren Coffey of the Berkley Group and ended with a small group exercise in which seven small groups discussed forest conservation benefits, challenges for forest conservation, and potential strategies to address these challenges. Each group shared their responses.

Essex County

August 14, 2018. Team members presented to the Essex County Board of Supervisors during a Board work session. After 1.5 hours of presentations and questions, the Essex Board unanimously approved being the second county in the pilot project.

External Meetings & Audiences
September 6, 2018. Team members presented to the Essex County Farm Bureau Annual Meeting. Their presentation was well-received and resulted in several Essex landowners volunteering to participate in the project.
June 24, 2019. A community workshop was held at Tappahannock High School. The purpose of this meeting was to discuss the benefits of forest conservation, the challenges to conserving forestland, and potential strategies to address these challenges. The meeting had 14 participants that divided into four work group to discuss forest conservation benefits, challenges for forest conservation, and potential strategies to address these challenges. Each group then shared their responses.
August 5, 2019. The project findings & recommendations were presented at a public meeting with members of the Board of Supervisors, Planning Commission and the County's Agricultural and Forestal Economic Development Advisory Board in attendance. The project's recommendations were well-received and plans for implementation of comprehensive plan and related ordinance amendments are underway.

C. HWF Phase III Communities' Efforts and Actions

Orange County and Essex County were the two pilot localities assisted with the process of evaluating their Comprehensive Plan and key implementing ordinances (e.g., zoning and subdivision ordinances) to prioritize protection of HQ Forest and HQ Ag land.

1. Orange County

Orange County, with a vision to "Sustain the rural character of Orange County while enhancing and improving the quality of life for all its citizens," was an ideal location for the Healthy Watersheds pilot project. One of the three (3) foundational principles underlying the vision statement is "Wise resource planning and land use decisions directly impact our ability to attract and support a business base, while maintaining the rural nature of the County." The County's adopted Comprehensive Plan and land use ordinances all support the conservation of forested land.

Comprehensive Plan

The first of the four County goals, as listed in the Comprehensive Plan, is to "Promote and preserve our unique historic and environmental resources." Under that goal, several objectives and strategies outline specific activities with regard to supporting agricultural, forestal, open space, and other natural sites. The Comprehensive Plan notes that "forest" is the largest use of land in the County. It states that in Orange County there are 137,190 acres of forest land and 96 percent of this forest land is privately owned. For taxation purposes, the Comprehensive Plan notes that 47,020 acres of forest land are under land use assessment taxation. The Comprehensive Plan states that roughly 32,900 acres (15 percent of the County) have been placed in historic (3,900 acres) and conservation (29,000 acres) easements.

The County's second goal is to "Ensure the county is a competitive location for economic development opportunities." The County's plan references the value of land, recreation, health, and tourism opportunities and the County Supervisors believed the HWF Phase III project will further the County's economic development objectives by putting its "natural capital" (i.e., forest and wetlands) onto its balance sheet while also assisting the Commonwealth in meeting its water quality goals. Paying landowners to conserve or create forest as a best management practice is a key focus of the Healthy Watersheds project and was seen as supporting the County's economic development goal by creating a new conservation industry.

Zoning Ordinance

There are several provisions of the Zoning Ordinance that assist in conserving forestland and improving water quality:

- In the Agricultural Zoning District, forest and timber uses are allowed by-right. The development standards in the Agricultural Zoning District include a two (2) acre minimum for lot area, and the setback requirements for any new dwelling require that the dwelling be a minimum of fifty (50) feet from the shoreline of a waterway. The permitted uses and development standards of the Agricultural Zoning District will assist in sustaining the rural character and historic land development patterns of Orange County. The required fifty (50) foot setback of dwellings from shorelines acts similar to a water quality buffer area.

- Intensive livestock, dairy or poultry structures shall be set back at least one (1,000) feet from public water intake of a stream or river. The required one thousand (1,000) foot setback from streambanks again acts similar to a water quality buffer area.

- Provisions allow for the "Cluster Housing Development" subdivision method. In the Agricultural Zoning District, this subdivision method is only permitted on parcels that are one hundred twelve (112) acres or greater in size and do not feature a taxable improvement. In the Residential Zoning Districts, this subdivision method is allowed on any residentially zoned parcel. The Zoning Ordinance allows for the "preserved land" in a Cluster Housing Development to be used as forest land, and it requires that restrictive covenants or conservation easements be placed on the preserved land to prevent its future development. The Cluster Housing Development subdivision method is considered a low-impact development technique.

Subdivision Ordinance

There are several provisions in the Subdivision Ordinance that assist in conserving forestland and improving water quality by promoting the use of low impact design techniques in new development:

The following elements are required to be included on subdivision plats:

- Location of wells and septic drainfields on a property or within fifty (50) feet of a property.
- Location of the 100-year floodplain.
- Location of dam break inundation zones.
- Location of wetlands, waterbodies, perennial and intermittent streams.
- Soil analysis.
- Location of water and wastewater utilities.
- Erosion and sediment control plan.
- Stormwater management practices and facilities.
- Parcels located in floodplains must have enough area outside of the floodplain to accommodate the proposed improvements.
- Provisions related to water and wastewater:
    - Each proposed lot shall have a potable water supply approved by the Virginia Department of Health.
    - Proposed subdivisions with density greater than one (1) unit per two (2) acres are required to use a community water system or have a connection to a public water system.
    - For large subdivisions, a certification of adequate water supply by a professional geologist is required.
    - Subdivisions must have wastewater method approved by the Virginia Department of Health
    - Drainage accommodations must be made and pass a review process.

- Any subdivision containing twenty (20) or more lots may be platted, approved, and completed in phases. It requires that no phase of development may contain fewer than ten lots, and that each phase shall be subject to the utilities, zoning, plat standards, and other requirements in place at the time of platting, permitting, and/or construction.

Taxation Ordinances

Certain provisions of Orange County's property tax ordinances assist in conserving forestland and improving water quality include:

- Equipment and facilities that are certified as contributing to pollution control are exempt from local property taxes. This promotes cleaner water via state-of-the-art wastewater treatment plants and qualifying onsite sewage systems, cleaner air via solar energy facilities and other qualifying activities.
- The Land Use Value Taxation (LUVT), or land preservation assessment, allows for the tax assessment of real estate devoted to agriculture, forestry, or horticultural at a discounted rate.

Conclusions Drawn

After a review of Orange County's current Comprehensive Plan, land use regulations, and taxation ordinances it was determined that existing policies and regulations as highlighted above had been long-standing and accepted by property owners, forest land stakeholders, and elected and appointed officials. This has given stability and predictability to the local land use decision making process, and as such give Healthy Watersheds a higher likelihood of success.

The Orange County Planning Commission currently has under development the recurring five (5) year update the Comprehensive Plan as required by State law. In recognition of the Healthy Watershed Phase III project and to memorialize the goal of creating financial incentives for forest land owners to properly manage forest lands, a goal establishing the Orange County Economic Development Authority as the local institution tasked with this responsibility is being included in the Comprehensive Plan update.

Orange County is proceeding directly to develop, implement, and manage a robust program through its Economic Development Authority to aggregate and facilitate forestland owner access to the carbon credit markets in direct support of this Comprehensive Plan goal and the Healthy Watersheds program. The Economic Development Authority will rely on full authority to do so under Section §15.2-4901 et seq. of the Code of Virginia, as amended.

2. Essex County

With the tagline "*Essex County… from the forests to the water… Where Life is Good*," Essex County is an ideal location for the Healthy Watersheds pilot project. The County's Comprehensive Plan and land use tools all support the conservation of forested land.

Comprehensive Plan

The County's Comprehensive Plan was adopted in 2015. The overall goal is to *"Maintain and enhance the quality and character of the County by promoting the efficient use of the County's land and natural resources in order to effectively meet the social and economic needs of present and future residents providing for a more balanced and sustainable community."* The plan includes six topical goals aligned with the sections in the plan: ENVIRONMENTAL CHARACTERISTICS AND NATURAL RESOURCES, LAND USE, TRANSPORTATION (2 goals), COMMUNITY FACILITIES AND PUBLIC SERVICES, and THE ECONOMY.

The first goal, under ENVIRONMENTAL CHARACTERISTICS AND NATURAL RESOURCES, is *"Manage and enhance the natural resources and environmental quality of the County."* Under that goal, several objectives and strategies outline specific activities regarding supporting agricultural, forestal, open space, and other natural sites. The Comprehensive Plan notes that "forest" is the largest use of land in the County. Based on 2013 high-resolution land cover data, roughly 104,000 acres or 63% of the total County land area is established in forest cover.

The remaining goals all mention the desire for well-planned economic development and balanced growth for a sustainable community. The County's plan references the value of land, recreation, health, and tourism opportunities.

Zoning Ordinance

There are several provisions in the Zoning Ordinance that assist in conserving forestland and improving water quality:

- The ordinance was designed for 12 purposes, including "*To provide for the preservation of agricultural and forestall lands and other lands of significance for the protection of the natural environment.*"
- Agricultural Preservation District, A-1, encourages continued agricultural and forest uses and preservation of the natural beauty of rural areas of the County where urban services, such as sewer and water mains, are not planned. This district allows forestry, tree farming, wildlife preserves, and conservation areas, as well as other uses. It also limits dwelling density to one unit per 20 acres.
- Agricultural, Limited District, A-2, also allows forestry, tree farming, wildlife preserves, and conservation areas, as well as other uses. It limits dwelling density to one unit per 5 acres.
- Residential Districts R-1, R-2, R-3, and R-5 allow forestry and reforesting.
- Business Districts B-1 and B-2 allow forestry and tree farming.
- Industrial Districts M-1 and M-2 allow agriculture, forestry, and reforesting.
- The Chesapeake Bay Preservation Area Overlay District identifies Resource Protection Areas as a 100-foot vegetated buffer near, in and around wetlands, tidal shores, and water bodies with perennial flow. It designates the remainder of the County as a Resource Management Area. (Also see *Wetlands and Coastal Areas Ordinance* as enabled by VA Code §28.2-1300*).*

Subdivision Ordinance

There are a few provisions in the Subdivision Ordinance that assist in conserving forestland and improving water quality in new development:

- Mandatory dedication of open space.
- The following elements are required to be included on subdivision plats:
  - Location of wells and septic drain fields.
  - Location of water and wastewater utilities.
  - Location of areas dedicated or reserved for public use.
- Provisions related to utilities:
  - Each proposed lot shall have a potable water supply approved by the health department.
  - Subdivisions must have wastewater method approved by health department.

Erosion and Sediment Control Ordinance

The purpose of this ordinance is to prevent degradation of properties, stream channels, waters, and other natural resources by controlling soil erosion and deposition associated with land-disturbing activities according to the Virginia Erosion and Sediment Control Handbook.

Floodplain Ordinance

The ordinance applies to property subject to inundation by water from the 100-year flood event to ensure inhabitants and property in the floodplain are safe from damage and do not create hazards in compliance with the National Flood Insurance Program. The ordinance regulates and restricts certain land uses in the floodplain. Protecting the floodplain area and function protects water quality and may encourage forest cover. By federal regulation, any development activity (including tree removal or land clearing) in the floodplain is subject to local approval and issuance of a land use permit.

Wetlands and Coastal Areas Ordinance

The ordinance regulates and restricts certain land uses in wetlands and coastal primary sand dunes in order to protect habitats and water quality as authorized by VA Code §28.2-1300. The Essex County Wetlands Board oversees this permitting process (also see *Zoning Ordinance §15-1, Chesapeake Bay Preservation Act Overlay District*).

Taxation Ordinance

The provision in the Taxation Ordinance that assists in conserving forestland and improving water quality includes a special assessment for land preservation devoted to agricultural, horticultural, forest and open space uses in the public interest (Land Use Valuation Tax).

Conclusions Drawn

After a review of these documents and public comments, Essex County is updating its land use and taxation policies to promote more forest conservation by financially benefitting landowners who choose to conserve their forestland or provide for new forest. Amendments include describing the amount and characteristics of forestland in the county or relate to the goals of creating jobs, generating revenue, supporting short-term and long-term options, and establishing the Essex County Economic Development Authority as the local institution tasked with the responsibility of creating financial incentives for forest land owners to properly manage forest lands. The Economic Development Authority will rely on full authority to do so under Section §15.2-4901 et seq. of the Code of Virginia, as amended.

D. Project Team Lessons Learned: Internal and External Strategic Planning Review

Prior to undertaking public policy reform to support HQ forest and agricultural land conservation and mobilizing a local economic/industrial development authority (IDA/EDA) to organize landowners to enter into a carbon sequestration deal, the HWF project team recommends that the locality's public administration and planning team undertake a review of internal and external considerations that may affect, positively or negatively, policy maker and public actions/reactions and discuss this strategic assessment with the community's governing body. These

considerations are listed below (with further commentary found in Appendix E in the full "How To" manual).

1. **INTERNAL FACTORS**

   a. **The Stability of Elected Board/Council and Local Government Administration**

   An elected governing body (i.e. County Board of Supervisors or Town/City Council), local government administration or planning office with significant or frequent turn-over represents a challenging environment to undertake forest conservation or other land use policy changes.

   b. **The Working Relationship between Board/Council and Planning Commission**

   A close and constructive working relationship between a locality's planning commission and the governing body is critical to affect land use policy reform which is recognized by both bodies and the general public as being beneficial and "in the public interest."

   c. **The Locality's Fiscal Condition and Fiscal Stress**

   The opportunity to connect rural forest and agricultural landowners with private market revenue streams associated with carbon sequestration offset trading (and possibly other ecosystem service markets) could be a game-changing "windfall" for financially-stressed rural landowners and their local governments. This environment may promote a local rush to "cash-in" on a new revenue opportunity without providing an appropriate policy framework built upon a broader community understanding of the benefits and trade-offs resulting from new forest and agricultural land conservation programs.

   d. **The Locality's State of Resiliency Preparedness**

   Forest retention and riparian forest buffers may be important considerations for evaluating a community's resiliency and preparedness for catastrophic natural hazards, particularly flooding and forest fires.

   e. **The Locality's Existing Land Cover, Land Ownership, Conservation Easements and Land Use Value Taxation Patterns**

   Understanding the extent and ownership of a community's forest, agriculture and open space resources is important to assess how best to promote further forest retention, reforestation, and agricultural land conservation.

2. **EXTERNAL FACTORS**

   a. **The Locality's Development "Climate"**

   The community's development "climate" or the pace of development pressure can affect how the public and the governing body view proposed governmental actions to foster greater voluntary land conservation.

   b. **The Locality's Geo-Political Setting**

   Across Virginia, regional and local environmental management responsibilities with

respect to development, soil erosion and sediment control and nutrient reduction from agricultural runoff programs are highly variable, depending on their location within or outside of the Chesapeake Bay Preservation Area and the larger Chesapeake Bay watershed and local choices to opt-in or opt-out of certain state pollution control programs.

The vagaries in federal and state funding for forest, agricultural and septic system management cost-share and technical assistance programs may affect perceived community benefit from existing forest retention as well as reforestation of riparian buffer gaps.

c. Existing Regional Green Infrastructure Planning Efforts

Communities interested in adopting a forest retention policy and promoting private forest conservation and reforestation efforts may benefit from building on existing green infrastructure plans where they exist at the local or regional level.

d. The Political Election and Comprehensive Plan Review / Update Cycles

Localities are required under the Code of Virginia to review their community's comprehensive plan every 5 years in order to keep the plan relevant to the community's needs and changing circumstances (e.g. revised long-range population projections, new planning requirements or enabling legislation under state law). How this review cycle coincides with the four-year term of local Board of Supervisors or Council elections may affect the outcome of land use policy reform through comprehensive plan and related implementation ordinance amendments.

e. Utility-scale Solar Facilities

These facilities, while contributing to meeting the societal goal of energy-source diversification, can have a significant adverse impact on a community's forest resources due to the higher income stream that they generate for the landowner when compared to potential revenue from carbon offset annuity payments. With the restrictions imposed on Virginia localities' taxation authority over these solar installations, conservation of existing forest and agricultural lands through the IDA/EDA model proposed under this project may offer greater fiscal benefit to localities.

E. Defining and Identifying High Quality (HQ) Forest and Agricultural Lands

From a statewide perspective in Virginia, there are several State agencies involved with identifying and prioritizing lands most suited for conservation. The tools and resources developed through these programs may provide guidance to a community wanting to establish some objective basis for identifying high-conservation value forest and agriculture lands within the local jurisdiction. Most of these public domain resources are available as published maps, reports and, perhaps most usefully, spatial datasets[6] which can be used in a geographical information system (GIS) to overlay landscape features on a community tax parcel map to identify and

[6] It is important to note that, with a few notable exceptions, the relative spatial accuracy of some state-level datasets may make them less useful at the local government level, particularly when applied at the tax parcel level, and should be considered more of a general overview of the regional and community landscape.

prioritize where HQ forest and agriculture land is located, as well as community development patterns and planned development that may adversely impact these lands. The principal Virginia state agencies with relevant information are listed below. The source contacts and detailed descriptions of relevant information resources available are summarized in Appendix F.

1. VIRGINIA DEPARTMENT OF FORESTRY (VDOF)

VDOF recently released an updated statewide map of high conservation value forest lands based on 2013 imagery and a revamping of the prioritization criteria. This information, along with other reports and analytical tools, is helpful to localities trying to identify and prioritize HQ forest land.

2. VIRGINIA DEPARTMENT OF CONSERVATION AND RECREATION (VDCR)

VDCR, through its Natural Heritage and Land Conservation programs, has a wealth of spatial data and models, including *Conserve Virginia* that prioritize land for conservation based on numerous criteria. Moreover, the Land Conservation division of VDCR maintains a statewide database of lands under conservation easements, as well as other lands under federal, state or local government control.

3. VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY (VDEQ)

VDEQ, through its coastal zone, water quality and environmental GIS programs, has several spatial data sets to help identify, for example, local stream segments with various water quality impairments which contribute to Chesapeake Bay impairments. Mapping these streams along with high-resolution land cover data and tax parcel boundaries could help define opportunities for riparian buffer restoration, as well as targeted nutrient and sediment reduction strategies.

4. VIRGINIA GEOGRAPHICAL INFORMATION NETWORK (VGIN)

VGIN maintains the 2013 high-resolution (1 meter pixel resolution) land cover data that is being used by state, regional and some local government agencies to develop stormwater management plans for the Chesapeake Bay Total Maximum Daily Load (TMDL) program and state and regional Watershed Implementation Plans (WIPs) to meet the 2025 TMDL goals. These data files are huge, and require considerable GIS technical skill to manipulate. Several planning district commissions and regional non-governmental organizations (NGOs, e.g. Friends of the Rappahannock, Chesapeake Bay Conservancy) have assembled discrete GIS files for each of their member localities. Consequently, for communities starting "from scratch" in working with these files, it is recommended to explore other possible regional or local sources that may have created locality-specific files useful for land cover analysis.

F. HOW TO PLAN FOR FOREST AND AGRICULTURAL LAND CONSERVATION

Once a community and the governing body have decided to pursue forest and agricultural land conservation as a healthy watershed land use policy, and the recommended strategic planning review has been performed, a local strategy can be developed to adopt and implement such policies. There is no "one size fits all" methodology to adopting public policy revisions successfully as all communities have different priorities, politics, players and cultures. There are, however, some fundamental best practices that every community should take into consideration when developing their land use tools, including forest and agricultural conservation land use policies

and ordinances. These practices are enumerated below and discussed in greater detail in Appendix E.

1. Public Participation

   Once the Public Participation Plan is in place, it is important that the meetings allow for meaningful participation that will result in substantive input for the project. Developing an inclusive and meaningful public participation plan sets the parameters and expectations for all parties which should lead to the best possible project outcome.

2. Stakeholder Involvement

   As important as the public's input is to land use policy development, it is imperative that the relevant stakeholders participate throughout the process as well. Having those key stakeholders at the table throughout the process was an excellent way to ensure maximum buy-in and participation by key decision makers and community leaders.

3. Document Review

   It is often said that you can't know where you are going if you don't know where you've been, and that is true with developing forest and agricultural land conservation policies as well. Reviewing a community's comprehensive plan, zoning ordinance, subdivision ordinance, taxation ordinance, environmental ordinances (mostly state or federal mandates), regional (and/or local or adjoining local) green infrastructure plans and any other relevant materials is a time-consuming but vital step in developing a meaningful forest and/or agricultural land conservation policy. The document review may reveal that only minor amendments are needed to existing plans, policies or ordinances. The review may also show gaps or other deficiencies that can be corrected with the new or updated policies.

4. High Quality (HQ) Forest and Agricultural Land Cover Analysis

   Another foundational component of the process is the HQ forest and agricultural land cover analysis. This analysis, typically done with a geographic information system (GIS), identifies the location and type of existing forest and agricultural lands (and other natural areas) and the land ownership patterns and conservation practices (or lack thereof) which affect the control and use of these lands. Many of the key data sources and components of this analysis are discussed under "Defining and Identifying High Quality (HQ) Forest and Agricultural Lands," and additional information is provided in Appendix F.

   There are varying methodologies and prioritization mapping schemes to define high conservation value forest or agricultural lands in Virginia. From a layman's perspective, any land within 300 feet of a perennial stream could be considered high conservation value land for the purposes of water quality and, if forested, would provide an effective buffer to filter stormwater runoff.

5. PLAN/ORDINANCE RECOMMENDATIONS

Once all existing environmental-related documents and information have been reviewed and analyzed, the next step is to develop specific recommendations for plan or ordinance amendments or other policy tools, such as the development of related mapping layers and other data source updates. Updated data and visuals are an important part of telling any community's story and delineating the critical habitat and forests that exist or are planned. Text with specific implementation strategies and accountabilities are important, but good mapping based on up-to-date and appropriately-scaled information is just as critical for proper project planning and execution.

6. PLAN/ORDINANCE ADOPTION

Prior to conducting the required public hearing(s) (e.g. per §15.2-2204 of the Code of Virginia) for adoption of plan or ordinance amendments, the proposed updates should be reviewed by the public in an open house, public meeting setting where information (e.g. proposed new text and maps) is presented and questions can be asked (or additional ideas presented), preferably one-on-one. The goal of the open house meeting is to give the public project information in as effective, transparent and open a manner as possible to encourage dialogue and build support for the project and its implementation.

G. IMPLEMENTATION ACTIONS

The most important part of public policy development is that, once adopted, it is implemented effectively and successfully. Provided below are recommended actions that the Healthy Watersheds/Forest Project team has prepared for the local governments participating as pilot communities in Phase III. If implemented, these actions would assist governments in strengthening the ability of land use tools and public programs to encourage and incentivize the conservation of forestland. These actions could be grouped into two timeframes for implementation action:

- Short Term Actions: intended to be implemented in 1-6 months.
- Long Term Actions: intended to be implemented in 6-18 months.

For communities wanting to pursue public policy reform to create a policy framework supportive of active promotion of forest conservation and reforestation and/or agricultural land conservation, there are numerous tools which can and should be used to affect policy reform and voluntary landowner participation. These actions are listed and discussed further in Appendix E.

1. STAKEHOLDER ENGAGEMENT

Outreach and education activities with stakeholders are essential for successful implementation.

2. Comprehensive Plan Amendments

Supportive policy statements in the Comprehensive Plan provide an important framework for land use regulation, demonstrating a cohesive basis for guiding growth and development and protecting private lands from development.

3. Zoning Ordinance Amendments

Zoning ordinances specify the land uses (e.g. agriculture, residential, commercial, industrial, etc.) allowed in designated zones, and may also regulate lot size, placement, bulk (or density) and the height of structures. Oftentimes the zoning ordinance may ignore forestry as a recognized (much less encouraged) land use.

4. Subdivision and Planned Unit Development (PUD) Ordinance Amendments

Multi-lot residential and larger-scale commercial and industrial development is typically subject to the requirement to file a detailed site plan showing the entire layout of the planned development, rights of way and easements, and the delineation of reserved open space, stormwater management facilities, etc. These ordinances could include provisions to encourage phasing of land clearing and conservation of forest and wood lots.

5. Taxation Ordinance Amendments

In Virginia, local governments can give reduced tax assessments to landowners with qualifying lands in agricultural, horticultural, forest, and open space use. This special tax treatment is intended to encourage and promote preservation of these land uses to help foster long term public benefits.

6. Programmatic Changes and Development Actions

Outside of the Comprehensive Plan and local implementation ordinances, there are a variety of other planning activities which can support and enable forest and agricultural land conservation.

TASK 2 SUMMARY

A. *INTRODUCTION*

For many rural, working lands landowners, their land is their portfolio. Historically, their options have been limited to agriculture and timber. New natural capital markets expand landowner options. Options such as carbon, nutrients, wetlands, and streams — can be thought of as tools in a toolbox. The key is first to understand what the land is capable of providing, then to understand the objective of the landowner and finally to pick the right combination of tools to add to the mix of agricultural and timber practices.

For someone's retirement investment portfolio, a financial advisor might recommend, for example, that the portfolio be allocated 60 percent to bonds and 40 percent to equities; and that in the bond allocation, there should be a diversification among municipal, corporate, and treasury bonds. The same diversification strategy applies to land. One's lands should be diversified between extractive practices (like agriculture and/or timber) and restorative practices, like carbon and mitigation banking. In doing so, the landowner helps to optimize their income streams while diversifying at the same time. In many cases, the areas where lands are being restored can work in concert with agriculture and/or timber. For example, if a property has a stream meandering through it, it may be best to square off the field by placing a buffer around the stream. This helps water quality and by reducing the zigs and zags of a tractor and it saves the farmer on diesel fuel costs. Often times, the land also has depression spots or hard to farm soils that are wet all the time and these might be opportunities to engage in wetland banking.

1. Natural Capital and Project Diversity

Every piece of land can have varying levels at which aspects of the land's ecological function can be preserved. On the most macro, global scale, air quality and climate change can be affected by sequestering carbon. On a micro scale, smaller projects like restoring riparian buffers to enhance local water quality demonstrate local consequences. Each of these levels of preservation or restoration has been recognized as important by multiple levels of government. Moreover, some corporations are willing to provide capital for the preservation, creation, and/or enhancement of these natural resources.

In most cases, credits are provided for the landowner in return for the natural capital benefits which they are fostering. These credits can then be sold, providing financial support for the landowner's investment(s) in the environment. Additionally, many of the improvements that they make to their land may be done with the cost-share assistance of other entities, providing both financial aid as well as the expertise to implement them. This comprehensive assistance allows the landowner to profit off of both the positive externalities that they are protecting as well as to take care of their land.

2. Landowner Scenario

The options available to landowners can be seen through the example of James and Betty who have a farm that James inherited 20 years ago. Their family cares deeply for their 356 acre parcel that is valued at $3,550,000. They have invested their life into the farm through various agricultural practices such as raising cattle and cultivating crops. Unfortunately, through a series of economic depressions, James and Betty are in a poor financial state,

placed in the position of extracting capital out of their land. Like many landowners, James and Betty are “land-rich” and “cash-poor”. They have many land management options (such as timbering their forests and breaking up their land to be developed), but they would prefer to preserve the integrity of their land. Another option they have is to preserve their land through a series of conservation projects that can provide an additional revenue stream to help them economically.

On James and Betty’s farm, they have a few forests, streams and farmland. The projects that they could undertake in a ten-year period are nutrient mitigations, stream restorations, and a conservation easement. When looking at their options, they decided they could put aside 130 of their acres for their nutrient mitigation project. They also notice that they have streams that have been impacted by their cattle, presenting an opportunity to do a stream restoration project. They believe that their property has scenic views and its streams and forests play an important ecological role, so a conservation easement is also possible. From the stream restoration project, they can acquire credits for the 21,295 linear feet of stream repaired on their property by restoring riparian buffers along the stream and placing cattle exclusion fencing to block cattle access to the stream. The repairing of the stream would provide 13,200 stream credits which could be sold for $3,490,000 if the price of a stream credit is $425. For the Nutrient bank project, they have decided to convert row crops, hay, and pasture to forestry which would give them 130 nutrient credits which, if valued at $21,000 a credit, would give them $1,945,600. By placing their land under a conservation easement (thereby cancelling their right to subdivide and certain other limitations for land preservation), they reduced the value of their property by $1,051,900. Through this, they would be able to obtain 40 percent of the value lost through the easement, and if they sell their Virginia Land Preservation Credits at 0.89 cents to the dollar, they will make a profit of $374,476 from their conservation easement.

Additionally, the conservation easement would lower the value of their property making it easier and cheaper to pass along to their family. Through these conservation efforts, James and Betty would be able to financially support themselves and take care of the land. Even though every plot of land may vary, most significant parcels of land can benefit from some form of preservation that allows the landowner to profit as well.

B. *Survey Of Investment Criteria*

Natural capital markets can expand the options landowners have at their disposal. Historically, conservation has been either an act of philanthropy or subsidized through government programs, primarily administered by USDA, such as those programs James and Betty considered. With the advent of carbon markets, a price has been put on a tree as a tree. This was a radical change from viewing trees as board feet or tons of pulp on the stump. Carbon became a conduit by which private capital could enter the world of conservation. The value of a tree as a tree enabled new forms of capital to flow. A variety of ecological communities like wetlands, streams, and forests include a myriad of interrelationships and bio-geochemical functions. Many of these "services" can be characterized as "positive externalities" that have social and environmental value that are often neglected in financial markets.

The objective of Task 2 is to assign a tree a value as a tree inclusive of all the functions it provides

(e.g. *CO_2 sequestration, O2 production, aquifer recharge via root pathways, rainfall interception, and more)* and leverage all those values to create a financial incentive for landowners and localities to retain high conservation value forest and agricultural lands. Investment considerations for the purpose of Task 2 were characterized for three individual groups: landowners, localities, and private capital investors. For landowners, their landholdings are often a significant component of their asset portfolio. Management considerations and stewardship is generally considered in the context of this portfolio and responsible cash management. Because landowner stewardship considerations are guided by individual landowner's objectives and the costs to achieve these objectives, the team visited with landowners, community leaders and various stakeholders and surveyed a sample of landowners in Orange and Essex Counties designated by these groups to learn more about their priorities and considerations.

The landowner survey effort was a two-step process. First, for the landowners, the team established the landowner's current investment criteria based on current opportunities for cash flow generated by their properties consistent with owners' objectives. These individual landowner's data were combined to rank the current opportunities for land owner management based on their priorities, for instance the importance of land use taxation. In the second interview, the team reviewed the landowner's individual priorities with additional consideration for the opportunity to participate with the HWF program in order to gauge interest in, and demand, for the HWF program. The team then estimated the potential aggregate landowner demand, at a given level of compensation and commensurate commitment, for the revenue opportunity that private capital financing may represent.

The second group (with divergent interests from the landowners) is the local governments involved (i.e. in this case, the 2 pilot counties). The HWF program represents an investment opportunity for the localities, and depending on landowner demand, may represent the potential for revenue by putting the localities' natural capital on the public balance sheet and "leasing it'' for the benefit of the landowners, and Virginia's land conservation and water quality goals. The communities would stand to benefit from the potential for income not subject to revenue recapture by sponsoring and managing a regional Economic Development Authority (EDA) focused on the aggregation of natural capital and sale of associated rights / claims to private investment.

The third group is private capital investors seeking access to environmental markets. These investors deal in larger sums of money and there is a need to aggregate the landowner 'products' to a scale that matches their large investment threshold limits, typically $50 million or more. The function of the EDA[7] is to facilitate the investment community's need for aggregation to a scale with enough demand to meet their need to place minimum sums of capital.

A key concern for all investor groups is risk management. For example,

- For the landowner - what are the tradeoffs, the opportunity costs incurred with participation?
- For the Localities, what are the legal liabilities, and the administrative costs involved – can these be managed and generate revenue?

[7] IDA/EDA = Industrial or Economic Development Authorities as authorized under § 15.2-4900. Industrial Development and Bond Revenue Act, Code of Virginia.

- For the private investor what are the regulatory, market, and project risks – how can these be mitigated?

The initial phase of Task 2 was completed in order to define and to correctly characterize these questions, thereby, establishing the overarching requirements for a successful financing program from the unique perspectives of these three participant groups. This was done to establish the parameters the financing program requires to achieve the outcomes envisioned. Namely, the mechanism that provides access to private capital at required scale for investment in natural capital maintenance and restoration – and provides market rates of return by paying landowners acceptable rates for practices that provide environmental 'credits' sold in regulatory and voluntary markets.

Market mechanisms do exist to push entities to internalize the external costs borne by ecological destruction or degradation, or reward them for engaging in ecological conservation, preservation, or restoration. They can create markets around environmentally-mitigative or positive activities, wherein natural capital is commoditized in its natural, rather than extracted, state and is tradable in some representative form among interested parties. In the broadest sense, these ecological markets conventionally operate around a system, or instrument, resulting in the creation and trade of a defined measure of function or value, whereby the instrument (which defines the unit of value - often called a 'credit') represents the amount of an ecological function/value around which behavior is being shaped in some context. For example, the conservation of wetland habitat acreage of an endangered bird species, the removal of gaseous carbon dioxide tonnage from the atmosphere to be stored and preserved in trees, or the prevention of nitrogen and phosphorus pollution into impaired tributaries; all these ecological functions have value in the marketplace.

Such instruments can be created in the private sector by projects adhering to published and vetted project standards or legislation, or they can be distributed by governing authorities who then track the transaction and possession history of participating firms within regulated trading schemes carrying binding behavioral obligations. Project developers engage in the conservation, preservation, or restoration activity that generates the credits. Firms or individuals then purchase these credits to meet voluntary environmental commitments or compliance obligations, depending upon context. These exchanges ensure a financial incentive for the continuation of the activities going forward. For these credits to be created, a measurable ecological lift in excess of the site's baseline ecological function must take place, and the quantity of credits created is associated with the amount of improvement from the implemented practice. For example, a fundamental term for greenhouse gas (GHG) emissions reduction project developers is "*additionality"* - that is, the amount of emissions reductions *additional* to those reductions that may have taken place in the absence of the project (the baseline case).

The ecological markets considered in this report are mitigation banks seeking to preserve wetlands and streams, nutrient banks that prevent nutrient water pollution, and greenhouse gas emissions markets - with a particular focus on forest carbon sequestration and the associated co-benefits of forest growth. This context guides the report with the conviction that in order to achieve the HQ forest and agricultural land retention sought by Phase III requires that efforts be centered on their coordinated use to the extent possible, as they demonstrate what can be

accomplished when capitalism and conservation function in concert.

The HWF team selected carbon values as a water quality proxy which can provide additional income streams and land conservation incentives for both forest and agricultural landowners and rural localities for its initial pilot employing the EDA mechanism now being designed by the team in collaboration with Orange County. Carbon offers the potential for aggregating various acquisitions so they can be offered at a scale and with the market convenience required to attract large-scale private capital investments. Adapting and implementing the proposed Economic Development Authority structure to allow carbon as a proxy for water quality enables a role for localities, working voluntarily singly or together through a regional (watershed basin) entity, to exercise the authorities recently granted by the Virginia General Assembly to local IDA/EDAs in the Commonwealth (see Appendix G).

C. Determining Investment Criteria

The Task 2 team encountered hundreds of landowners via Farm Bureau-sponsored meetings in Orange and Essex Counties. In addition, the team attended, presented and addressed questions at multiple County Supervisor and Rappahannock River Basin Commission meetings. It learned that there is a strong general consensus among landowners at the meetings in regard to the value of land use taxation, maintaining the rural character of the landscape, and great interest in a program that compensates landowners for the creation and protection of public benefits such as clean water and air.

The team developed a survey instrument based on the feedback from the landowner meetings and validated the tool with volunteer landowners representing small, medium, and large ownership. This tool anecdotally validated the general consensus evident in the meetings and individual interaction with landowners. In addition, the tool is intended for use in propagating the program beyond the pilot counties

1. Landowners

The surveys of investment criteria for landowners participating in the HWF Phase III project in Virginia's Orange and Essex Counties were conducted in two separate site visits. The Site visit 1 consisted of an interview to administer the Landowner Interview Survey (See Appendix R) and to conduct a Forest Stand Basal Area Estimation Survey (see Appendix T). The information in the first survey of each landowner is being used to create the composite baseline to identify the most important financial criteria for landowners. These tools were used to build out the current alternatives available to individual landowners and with which the team's alternative management/economic scenarios intended to incentivize forest retention can be assessed.

Site visit 2 followed up with each of the participating landowners to discuss the alternate management/economic "scenarios" potentially available through the introduction of the HWF project model for landowner consideration and feedback.

Site Visit one: Landowner Interview and Forest Stand Basal Area Estimation Survey

The objective of the Landowner Interview Survey was to ascertain the current context of landowner stewardship regarding economic, tax liability, land management practices, and

intergenerational planning for each landowner. The Interview Survey was chosen as a tool in order to administer a prescribed series of questions while maintaining a discussion-like atmosphere to foster the most complete answers possible. The design, review, revision and administration of the survey was conducted by the Task 2 team.

The objective the Forest Stand Basal Area Estimation Survey was to provide a square foot basal area estimation to calculate an estimate of current Carbon content of the landowner's forest stand. This estimated Carbon content was used to help describe the potential of the U.S. Carbon market in the alternate economic scenarios for each landowner. An estimate of Basal area was used as a tool for the combination of its ease and accuracy. Members of the Task 2 team conducted the Forest Stand Basal Area Estimation Survey.

Site Visit Two: Presentation of Alternate Land Management/Economic Scenarios

The objective of site visit 2 was to present and gain feedback on an individualized set of alternate management and economic scenarios intended to incentivize each landowner to retain their forested lands. Alternate land management and economic scenarios were constructed by the Task 2 team for each landowner based on their responses to the Landowner Interview Survey conducted in site visit one with the additional consideration of IDA/EDA involvement as an aggregator for landowners.

Contextual and Demographic Summary of Pilot Counties

Participants

In Orange County, there were eight participating landowners. Seven out of eight landowners were 55 years old or older, Caucasian couples and the eighth was a trio of retirement age Caucasian brothers and a sister. The table at right summarizes years of ownership in 12-year increments. Seven out of the eight landowners currently farm their land in cattle.

Years Ownership (12 yr. blocks)	Number of Landowners
1-12	2
13-24	1
25-36	1
37-48	2
100+	2

In Essex County, there were two participating landowners.

Survey Data

Following below is an analysis and synthesis of data from the landowner surveys and found in Appendices U - Z. The synthesis of the raw survey data and its subsequent analysis suggests three primary areas of focus for landowners:

1. Tax relief as a primary driver for economic sustainability

Land Use Value Taxation (LUVT)

Six out of seven landowners are enrolled in the Land Use Value Taxation program. Five of those six indicated that, without the tax relief provided by this program, they would not be able to maintain ownership of some or all of their property. One of

those five that are enrolled indicated they would be able to maintain ownership without the LUVT program.

2. Flexibility and Speed of Land Management Decision Making

Conservation Easement (CE)

One out of seven landowners owns land that was placed in conservation easement by a previous generation. Six out of seven landowners are not enrolled in the CE program. All six landowners who are not enrolled indicated an interest in maintaining flexibility in the management of the land that they believe is unavailable through a CE program. Two out of the six who are not enrolled in the CE program specified in their opinion that the tax relief provided is not commensurate with the "encumbrances" of the program.

3. Sustainability of "Rural" and/or "working" character of the land

Seven out of seven landowners stated maintaining the "rural" and/or "working character of the land was a goal. Four out of seven landowners referenced the importance of being "close" to the production of agricultural goods. Two of these four also disclosed the importance of connecting urban centers to the rural/agricultural areas that produce their food. Five out seven landowners commented on the importance of maintaining "big, open spaces" for the next generation.

Landowner Perspectives from Survey Data

1. Tax relief as a primary driver for economic sustainability

All of the landowners reported that the tax burden, or "overhead" of landownership represented the greatest percentage of the carrying cost for their land, and therefore tax relief was of primary importance to them. As noted in the survey data, the tax relief provided by the Virginia Land Use Value Tax (LUVT) program enables the landowners to maintain ownership of their land. This is not surprising given that the majority of these landowners are managing cattle farms that operate at or just below cost based on the relationship between the area of their land, the number of cattle they can effectively manage in that area, and the established economics of the cattle industry. The first consideration of landowners surveyed is any potential tax implications of new programs.

2. Flexibility of Land Management Decision Making

All of the landowners prioritized flexibility for economic purposes in the land management decision-making process and eschewed programs that they considered to adversely impact this flexibility for themselves and their children. A range of reasons for this were given, for example, the potential volatility of international agricultural markets and/or the impact of state and local politics on County land taxes were cited as considerations. In general terms, flexibility in land management decision making is a preferred attribute of any tool for dealing with future economic

uncertainty. The conservation easements program is often cited as an example of a conservation program that has been avoided because it constrains flexibility in land management decision making now, and in the future, by the nature of its "in perpetuity" statutes. In other words, landowners want the opportunity to make whatever fiscal decisions they need to make; and, they want to pass this opportunity along to the next generation.

3. Sustainability of "Rural" and/or "working" character of the land

For all the landowners surveyed, maintaining the "rural" or "working" character of the land was an important goal. Whether they were working farmers or not, there was a strong emphasis on the importance of a "closeness" to the agricultural systems that supply our food; and, the importance of maintaining the connection between that "working" character to the urban centers that rely on it. There were numerous references to the importance of "big open spaces" and the opportunity to get back to the land for future generations.

4. Summary of Survey Data

A rural landowner's investment portfolio may be limited to his/her land. Natural Capital Markets (carbon, wetland, stream, nutrients, water quality, water storage, etc.) provide new monetization tools to add to a landowner's toolbox and decision matrix. Landowners can cultivate farm and timber products while providing services – ecological services. The challenge is: "how do we connect landowners to capital?" The connective tissue is local government and the ability to employ economic development techniques to natural capital development.

2. LOCALITIES

Local Revenue Concerns

In Virginia, independent cities and counties have fiscal responsibility for provision of community services, including K-12 education. Unsurprisingly, all localities are wary of financial or regulatory programs that may have consequences impacting their revenue base, either detracting from the tax base or adding to service obligations. Among these concerns are the potential impacts associated with land use value taxation and Virginia's composite index of local ability to pay used to determine the State contribution to local educational funding. The HWF Phase III program envisioned in its scope of work has the potential to contribute positively to a locality's revenues by representing the community's privately-owned natural capital on the local government's balance sheet.

Recalling the overarching objective of the Healthy Watershed Initiative to provide incentive for the retention of high conservation value forest and agricultural land – the financing mechanism under consideration is intended to provide landowners' compensation for forest retention and enhancement. Landowners bear the costs, often the opportunity cost, associated with the option to convert forested land, whether a forest or as part of a primarily agricultural land use, to other uses. The HWF program can provide a mechanism to compensate for forest retention by paying for the services the forest provides – water filtration and nutrient uptake, carbon sequestration and oxygen

production, biodiversity and wildlife habitat, and aesthetic values. Trees sequester carbon, and the other functions described 'come along for the ride'.

Filtering surface water running off the landscape and the uptake of nutrients in surface water are co-benefits of carbon sequestration by forests, representing outcomes necessary to meet the Chesapeake Bay TMDL requirements. The key is to connect communities of landowners with existing and emerging carbon markets to monetize the carbon sequestration benefit (along with its co-benefits) of Virginia's privately-owned forest resource. Local governments may hold the key to this opportunity.

The key to connecting private capital investors with landowners is through the Virginia EDA legislative amendment passed into law in early 2019. This legislation allows a local EDA to function as the aggregator of landowners' land holdings (and corresponding carbon offset credit value) to reach a bundle of carbon offset credits sufficient to attract the interest of institutional capital investors.

A feature of this mechanism is envisioned to be the ability of communities to manage the natural capital related EDA transactional activities required for the aggregation of landowners willing to commit to forest management plans consistent with their objectives. The communities would earn a percentage of the transaction values. These monies could flow directly to local coffers without passing through Richmond's state tax collection system. Moreover, these funds could be used for educational funding obligations without impacting the composite index methodology (as currently formulated).

Carbon credits are a proxy for all the benefits provided by forests and conservation agriculture. This new authority can provide a mechanism to aggregate the forest carbon from willing landowners, pool the carbon credits, and market them to voluntary and regulatory carbon markets. These markets include the California Climate Exchange and potentially the Regional Greenhouse Gas Initiative (RGGI). Membership in RGGI together with the Northeastern States has been under consideration in Virginia. In addition, unilateral agreements to sell offsets are a growing option. Although this program is independent of the RGGI initiative, it would be important for the RGGI Rules for Virginia to include consideration for offsets in order for the TMDL program to benefit. Virginia also stands to gain much with the potential to increase forest green infrastructure along the tidewater (see Appendix AA).

3. Private Capital Investment (Institutional Capital)

Institutional capital needs to make investments at a minimum project size of $50,000,000. They are limited by virtue of their scale and size. It takes the same due diligence to do a billion-dollar deal as it does a few million. A key attribute to the Virginia IDA/EDA mechanism is to provide access to aggregated demand and larger deal structure in order to engage private institutional capital. In addition, the IDA/EDA mechanism can be designed to de-risk the transactions making it possible for private capital to engage at market rates of return. A most important consideration for private capital is risk management – outlined further in the next section.

D. Survey Risk – Uncertainty

Uncertainty within the context of this paper deals with the elements of risk that can be quantified, and to some extent, controlled. There are four broad categories of risk of concern to private investment managers. These include project risk, property risk, portfolio risk, and fund management risk. The HWF program will address the first three of these concerns:

- Project Risk
- Property Risk
- Portfolio Risk

The HWF financial program is intended to be structured to dovetail with an investment manager's evaluation criteria, and in this way, to minimize investment risk exposures. The following is an example of the detailed consideration that will guide the investment manager's decision process in each of the three risk categories identified above. Further consideration is given to the investment manager's responsibility for fund management risk and the reporting structure that can be built into the HWF financial program to facilitate this responsibility.

1. Project Risk

Project risks are those associated with landowners' compliance with the terms of agreement, and recourse (Table 7).

Table 7. Project Risks, Impacts and Management Strategy

Risk	Potential Impact	Management Strategy
Scope for Ecological Restoration	Drives number of potential credits as well as costs of achieving credit generation targets	GIS-based ecological analysis (soils, hydrology, vegetation, topography, habitat structure)
Scope of Traditional Income	Influences timing and type of cash flows	Draft stewardship plan that preserves sufficient income generation potential from traditional sources
Deviation from Expected Ecological Performance	May slow release of environmental credits or reduce number of credits generated; may lead to increased costs	Align restoration plan with natural processes (seasonal timing, etc.); retain best in class field contractors
Deviation from Expected Financial Performance	May lead to underperformance	Scenario analyses; stress tests

Risk	Potential Impact	Management Strategy
Regulatory Agencies	Influence timing and performance hurdles for credit generation	Focus on regions where rules are clear and consistent with established legislation and where there is a track record of interagency cooperation
Environmental Credit Supply	Deflationary pressure in credit prices	Pre-acquisition supply analysis including current and future supply, projects under development, timing, strength of competitors, and local/regional drivers of credit supply
Environmental Credit Demand	Drives timing of credit sales and regional market size	Pre-acquisition demand analysis including buyer size, diversity of underlying demand (by industry, project type)
High Project Complexity	Increased probability of performance deviation	Focus on properties that use natural landscapes to achieve goals (vs. engineered solutions)
Project Failure	Underperformance / capital losses	Comprehensive due diligence prior to acquisition; retain full property options until project is approved; retain ownership of the underlying land as downside protection

Table 7 captures a comprehensive view of contributing individual project risks, from the investor's perspective. Not every project will reflect all the attributes under consideration. However, from the perspective of embedded risk, the investor will be keen to know that the portfolio assembled by the EDA has taken these criteria into consideration. In so far as the program is intended to accommodate maintaining current ecological functions (i.e. clean water via forest retention), a subset of risks (i.e. deviation from ecological performance) come into play. However, the HWF program is ultimately intended to accommodate ecological restoration (reforestation) and establishment of new forestland (afforestation).

The main point to be made here is that the risk management perspective the investor must take needs to be 'baked into' the HWF financial program to attract investment.

2. Property Risk

Building on project risks described in Table 18, the risks associated with property constraints are critical in the due diligence process as projects are brought into the EDA portfolio (Table 8).

Table 8. Property Risks, Impacts and Management Strategies

Risk	Potential Impact	Management Strategy
Property Encumbrances	May reduce scope (or preclude) environmental credit generation	Full entitlement review
Existing deeds, other tenants, leaseholders	May reduce traditional sources of income; reduced control; increased complexity in implementing environmental credit projects	Pre-acquisition due diligence
Existing Liens / Litigation	Increased costs	Pre-acquisition due diligence; avoid litigation risk
Surrounding Land Uses	May influence restoration upside potential	Review of surrounding owners / stakeholders
Remediation or Other Environmental Liabilities	Increased costs and/or litigation	Avoid
Exit Strategy	Conservation easement on property will impact type of buyers and exit price	Expected returns must exceed required returns without proceeds from final land sale

For example, from society's perspective, the EDA function further serves the purpose of providing support to landowners for retention of smaller timber tracts which are at a higher risk of conversion. In the aggregate these lands provide significant natural functions, including wildlife habitat (biodiversity) and water purification functions, and management and actual performance relative to the growth and yield models. Managed with audit and verification processes.

From the landowner's perspective, the commitment to a particular management regime (i.e. forest management plan) must be clearly spelled out in term of activities allowed and required, and activities not allowed or optional. Importantly, this includes consideration for the length of time the landowner's obligation persists, and the consequences for breach of contract. In addition, clear alternatives to withdraw from commitments must be available and quantifiable from the start. All of these important considerations are part of the EDA structure.

3. Portfolio Risk

The IDA/EDA is envisioned to operate as a portfolio manager consisting of landowners whose carbon assets are aggregated for marketing to the voluntary and emerging regulatory markets. Each property / landowner represents a 'project' in the portfolio. The IDA/EDA will represent the landowners' combined interests, and will manage in concert with the investor applying sensitivity to the markets and the operating environment (Table 9).

Table 9. Portfolio Risks, Impacts and Management Strategies

Risk	Potential Impact	Management Strategy
Regional Risk (Ecological, Regulatory, Geographic)	Influences individual environmental credit project performance	Diversification across regions

RISK	POTENTIAL IMPACT	MANAGEMENT STRATEGY
Supply / Demand	Drives market dynamics	Attempt to identify credit sales (or lock in pre-sales) prior to property acquisition; regional diversification
Sector	May create undesired cyclical exposure	Ensure sufficient diversification of end buyer industry; de-emphasize highly cyclical, smaller sources of demand (i.e. real estate development); focus on linear and/or infrastructure projects
Commodity Prices	Will influence demand / price for traditional income (timber, agriculture, etc.) and land	Diversification; focus on traditional income sources designed to supplement, not drive, investment returns
Market Development Risk	Environmental credit markets do not grow as planned	Weight portfolio in favor of proven markets (wetland/habitat) with less, more opportunistic exposure to more emerging markets (water); avoid markets that lack formal legislative backing and / or market infrastructure (carbon) until markets reach required level of maturity

4. Fund Management Risk

The design of the EDA will dovetail with the fiduciary reporting requirements of the private investment manager (Table 10). To the extent possible, the reporting structure will also conform to the Global Investment Performance Standards (**GIPS**).

GIPS are ethical **standards** that apply to the way investment **performance** is presented to potential and existing clients. Before **GIPS** was adopted, investment management firms complied with the Association for Investment Management and Research-**Performance** Presentation **Standards** (AIMR-PPS), which were published in 1993.

The fund management approach required of the fund manager will be mirrored as much as is practical. This framework can be incorporated into the IDA/EDA operating and reporting procedures – and can be fleshed out with the investment community over the course of the pilot program.

Table 10. Fund Management Risks and Management Strategies

RISK	MANAGEMENT STRATEGY
Compliance	Compliance manual governing solicitation, reporting, conflicts, due diligence; intend to become a registered investment advisor
Investment Process	Formal, written due diligence process and checklist; weekly project review; monthly performance review; internal personnel review structure
Asset Management Process	All aspects of project planning, negotiation with agencies, credit sales, and project oversight conducted by internal WLIP personnel. Local contractors formally vetted and supervised, and restricted to field activities
Fund Administration	Intend to conform to GIPS performance standards; meet registration requirements
Personnel	Expand the team with ample options for equity ownership across the organization

E. *Inventory Of Current Taxation Programs*

1. Land Use Taxation and the Composite Index

The following section will consider both the Land Use Taxation and the Composite Index programs used in the Commonwealth of Virginia. The discussion is included here because the relationship between the two programs has implications for the Phase III pilot Counties, Orange and Essex, which are important to understand. To be clear, the composite index is not a taxation program but a formula utilized to determine a locality's ability to contribute to its share of the cost to provide public education.

Land Use Value Taxation (LUVT)

Land use value taxation is a program that provides tax relief in the form of changes to the designation by which land is taxed. As its name suggests, it means that the portion of land (as distinct from any buildings contained thereon) in an eligible piece of real estate is valued and taxed on its class of use rather than on its market value. The benefit of the program is that the tax levied on the land use classification is less than that levied on the fair market value. The program is aimed at moderating inflationary pressure on tax assessments due to development and its effect on fair market value.

Also known as use value taxation or land use assessment, the program utilizes four Standards of Classifications (for land use) to target tax relief toward six goals on behalf of landowners:

- Reduce pressure to convert to more intensive land use.
- Promote proper land-use planning and orderly development.
- Assure an available source of forest products.
- Conserve natural resources in forms that will prevent erosion.
- Protect adequate and safe water supplies.
- Preserve scenic natural beauty and open spaces.

The four use classifications are agricultural, forestal, horticultural, and open space. In the years since its adoption in 1971 by the Virginia General Assembly, 69 of Virginia's 95 Counties, as well as 18 cities, have adopted land use taxation (i.e. by recognizing one or more of the four use classes).

In general terms, landowner participation in the program is contingent on several steps:

a) Approval for the land classification sought;
b) Approval of land review, application, and fee; and
c) Landowner certification of adherence to the guidelines specific to the desired land use.

In most localities, landowners must re-apply each year to participate in the land use program. The reduced tax from which the landowner benefits is determined by the local assessment office with consideration given to the values recommended by the State Land Evaluation Advisory Council (SLEAC). During the term that the landowner is in the program, they will maintain a relationship with the local or state governing body responsible for the land classification program in which they participate.

Virginia Composite Index of Local Ability to Pay (LCI)

The Local Composite Index (LCI) is a formula used by the Commonwealth of Virginia to determine each locality's ability to pay its share of the state and local combined budget for public education. The goal of the index is to show how much revenue a locality has per person and per student.

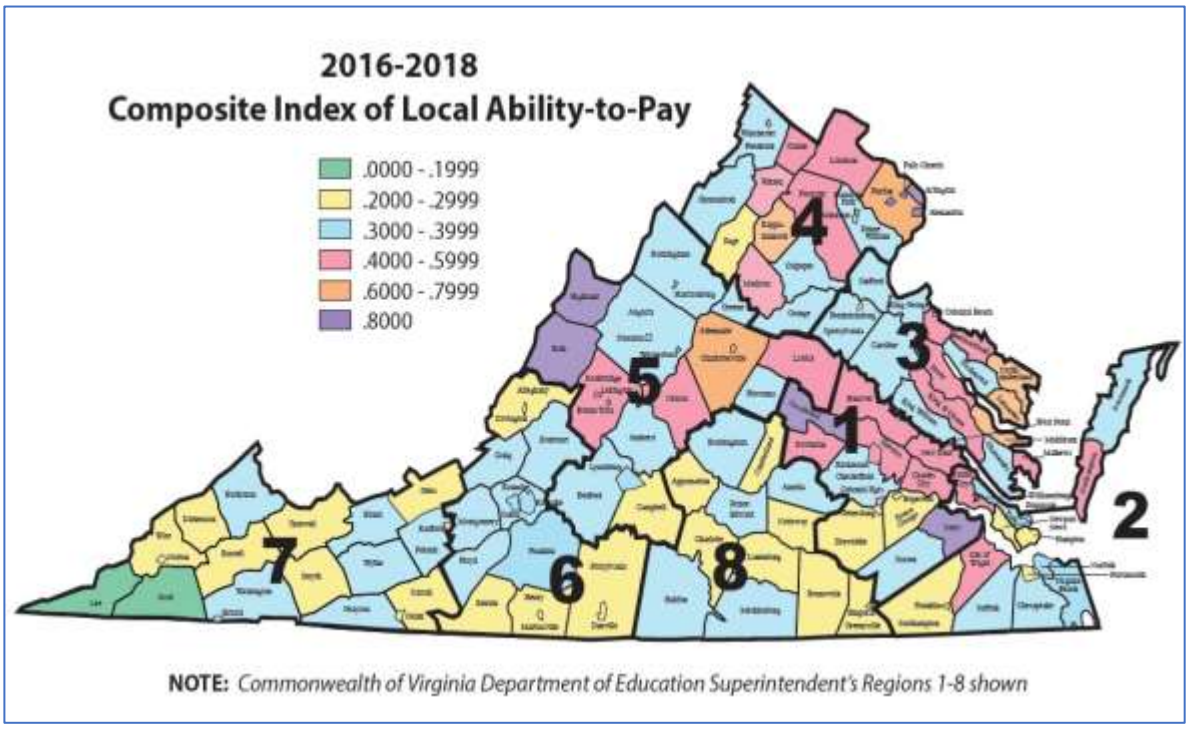
The LCI formula compares and assigns a weight (%) to a locality's three sources of revenue - fair market property value (50 percent), adjusted gross income (AGI) (40 percent), and local sales tax (10 percent) to the number of public school students in that locality (ADM), and the total population number of that locality. This is then compared to the State-wide size of local tax bases as it relates to statewide student population and overall population. (See Appendix J for the Composite Index for Local Ability to Pay Formula). The result is a number between "0" and "1" that indicates the amount of money a locality is able to contribute to education funding. An index value of "0" is considered "not able to contribute" and a value of "1" is "able to contribute the full amount. The following example in Table 11 is from the 2018-2020 Composite Index Ability to Pay.

Table 11. 2018-2020 Composite Index of Local Ability to Pay (Orange and Essex Counties Only)

Locality	True Value of the Property	AGI	Taxable Retail Sales	March 31 2016 ADM	Total population	Index calculated
Orange	$4,579,356,935	$900,340,066	$253,300,185	4,840	34,015	0.4025
Essex	$1,411,183,489	$240,430,772	$181,036,123	1,417	10,914	0.4298

Figure 7 displays the range of the composite index values (by color) for Virginia's localities.

Figure 7 Virginia's Local Composite Index Scores by Locality



The LCI has been criticized (when comparing a locality's three sources of revenue) because even slight changes to the sources of revenue (e.g. fair market property value or nominal adjust gross income) can have an impact on what the locality is expected to contribute and what can be expected from the State for school system financial aid. For example, a small number (relative to overall population) of wealthy individuals in a locality can artificially inflate the nominal gross adjusted income number to look higher than it actually is able to pay. Insofar as the fair market value assessment does not interact with the land use taxation program, there is no interaction between the LCI and the LUVT.

On the other hand, as property is placed under easement, the fair market value is diminished (as described previously) and there is a reduction in the "true property value" which acts to reduce the locality's contribution, and this increases the State's contribution to the school funding. The total allocation for each locality is a portion of the overall State school budget - thus setting the stage for competing interests between localities for a portion of the budget.

Land Use Taxation Program in the Pilot Counties

Data on the Land Use Taxation program for the pilot Counties of Orange and Essex (Table 12, which includes conservation easement acreage) indicates a significant loss of County tax revenue due to land use value taxation for conserving eligible agricultural and forestal lands.

Table 12. Pilot County LUVT Data

County	# Acres in LUVT Program	Percent of Total County Area in LUVT Program	Average Tax Cost	Average Annual Tax Savings
Orange	104,699	49.7%	$15 fee per 100 acres +$0.15 per acre after	$326,688,400
Essex	118,700	71.9%	$25 Fee + $0.25 p/ac	$796,000

2. Virginia Land Preservation Tax Credit (LPTC)

Certain states also have land tax credit donation systems for land placed in conservation easements where some others use grant-funded plans and land acquisition programs to purchase priority land to conserve. Virginia's Land Preservation Tax Credit created through Virginia Code § 58.1-510 allows landowners to donate or place their land in a conservation easement and take a tax credit. A typical diminution value is 40 percent of the value of their land. A limited portion of the tax credits can be spent per year, in 2015-2017 only $20,000 could be used. There is a thirteen-year span for the owner to use the tax credits but for people unable to use all of their credits, they can be sold.

The VA LPTC in Essex and Orange Counties

Disclosure on the state of the Land Preservation Tax Credit program comes in the form of annual reports issued by the Department of Conservation and Recreation (DCR) to the governor, the chairmen of the Virginia Senate Finance Committee, the Virginia House Appropriations Committee, and the Virginia House Committee on Finance; detailing donation and conservation behaviors and impacts over the previous calendar year as shown in Figures

8 and 9[8] and Table 13. Two key tables in the source material show between them, by locality, the number of easements donated, the aggregate tax credits requested, the acres preserved, and the composition of those acres claiming Conservation Value to be protected. The DCR aggregates together in each report all localities from which fewer than five donations were received during a particular calendar year, preventing an understanding of what took place ~~in~~ at a county level in such cases.

Task 2 researchers sought data to assist in filling in those data gaps left by the DCR annual reports where possible. They found in the data both significant open space easement placements for those years for which disaggregated LPTC data from the DCR are unavailable, and instances in which the number of open space easements for a particular calendar year exceeded donations made in the table above, indicating that room exists to more fully utilize the credit in these counties.

Figure 8. Essex County LPTC Acreages

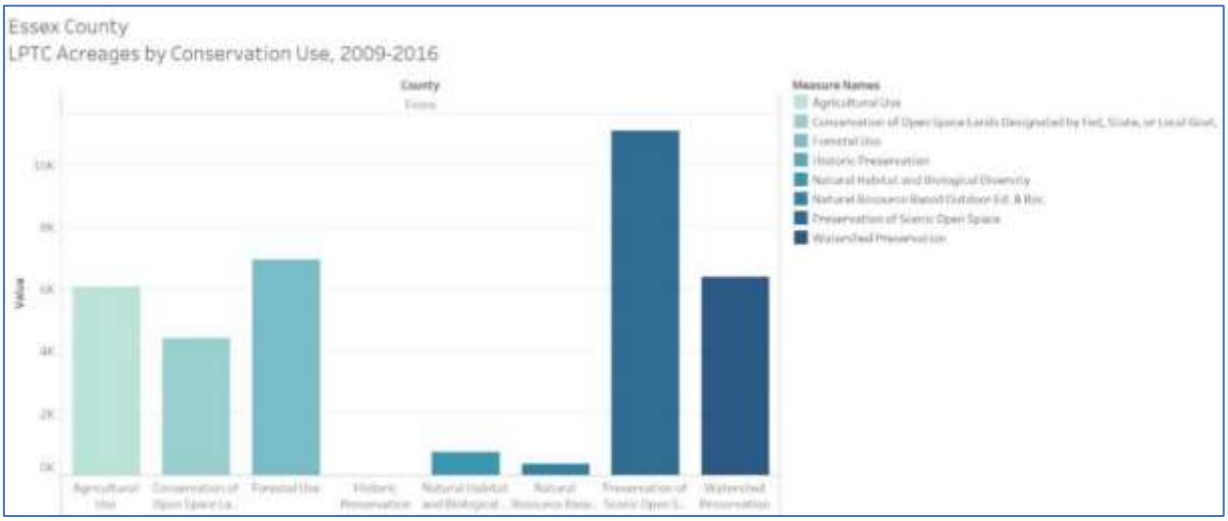
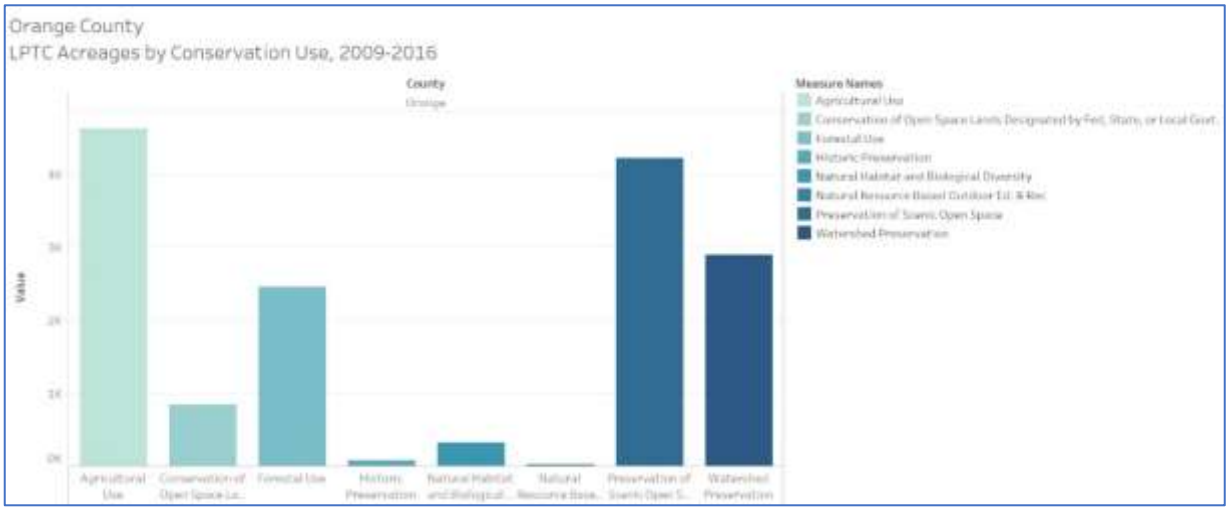


Figure 9. Orange County LPTC Acreages



[8] Reports can be downloaded here https://tax.virginia.gov/land-preservation-tax-credit.

Table 13. Essex and Orange County Land Preservation Tax Credit Donations, Tax Credits Requested, and Total Acreage Preserved[9]

Calendar Year	County	Donations	Percent of Statewide Credits	Tax Credits Requested	Total Acreage Preserved	Pct. (%) of Statewide Acres Preserved
2016	Essex	7	2.59%	$1,555,580	1542.80	4.84%
	Orange	N/A	N/A	N/A	N/A	N/A
	VA	182	-	$59,968,175	31,868.90	-
2015	Essex	N/A	N/A	N/A	N/A	N/A
	Orange	N/A	N/A	N/A	N/A	N/A
	VA	182	-	$48,625,672	42,361.91	-
2014	Essex	N/A	N/A	N/A	N/A	N/A
	Orange	N/A	N/A	N/A	N/A	N/A
	VA	91	-	$38,123,803	24,214.41	-
2013	Essex	8	8.68%	$6,843,980	5518.12	8.50%
	Orange	6	3.37%	$2,654,800	1373.20	2.12%
	VA	234	-	$78,882,596	64,890.22	-
2012	Essex	8	3.05%	$1,958,870	2101.15	4.64%
	Orange	6	3.37%	$2,169,319	1269.94	2.81%
	VA	227	-	$64,084,200	45,268.24	-
2011	Essex	7	1.60%	$1,734,305	1481.58	1.98%
	Orange	10	2.54%	$2,758,008	1812.88	2.42%
	VA	367	-	$108,424,000	75,024.75	-
2010	Essex	N/A	N/A	N/A	N/A	N/A
	Orange	N/A	N/A	N/A	N/A	N/A
	VA	144	-	$106,845,000	41,775.88	-
2009	Essex	5	0.91%	$974,680	984	0.91%
	Orange	7	8.18%	$8,728,390	1601	2.52%
	VA	229	-	$106,647,000	63,845	-

[9] VA DCR (2017, 2016, 2015, 2014, 2013, 2012, 2011, 2010); Authors' data inquiry. *N.B.* a 2007-2008 biennial report was issued by the DCR, but its data are omitted from the figure above because 2007 and 2008 are not present individually.

F. *Inventory Of Current Public Subsidy Programs*

1. United States Department of Agriculture (USDA)

The United States Department of Agriculture (USDA) provides a portion of its budget to protecting natural resources and the environment. The Agricultural Act of 2014 currently provides the source of funding for projects that fall under this category. USDA-supported programs include the Environmental Quality Incentives Program (EQIP), the Conservation Reserves Program (CRP), and the Wetlands Reserve Easement Program (WRP). Each of these programs involves the subsiding of private landowners to improve the environmental sustainability of their land. The program focuses on areas where the greatest conservative benefit can be achieved.

The Environmental Quality Incentives Program's (EQIP) primarily focus is on helping farmers improve the environmental resources on their property. This program provides cost-sharing measures for improvement and technical assistance. These measures may involve building livestock exclusion fencing, restoring riparian buffers, and animal waste management. Part of the capital cost of these improvements is covered by the Environmental Quality Incentives Program under their cost-sharing program which usually covers about 75 percent of the cost of best management practices (BMP) resulting in reduced nutrient loads into a watershed. Certain initiatives may cover more of the cost, and occasionally cover all of the cost to promote the installation of better practices (BMPs). The programs initiated by the Environmental Quality Incentives Program use an agreement with landowners to maintain the installations the program helps fund. These contracts often last a few years ranging up to a decade.

The USDA also supports the Conservation Reserve Program (CRP). This program is operated by the Farm Service Agency to help to protect environmentally-important land and promote its health. Often this will involve the conversion of farmland back to natural landscapes. This promotes the restoration of habitat, soil, and water quality on the participating land. Participating farmers usually commit to enter the CRP for a ten- to fifteen-year period. During this time USDA will compensate the farmer in the form of a yearly rental payment. The program also may provide technical and financial assistance to the landowner making the improvements needed to increase environmental benefit. Eligibility for the program is limited by caps on the total amount of land that can be conserved through the program.

The Wetland Reserve Easement Program (WREP) functions as a part of the Agricultural Conservation Easement Program. Under this program, wetlands are protected through an easement. These easements are bought by the Natural Resource Conservation Service (NRCS). The NRSC also provides assistance in the restoration and enhancement process. Cost-sharing measures may range from 75 percent to being fully covered (Trading Nutrient Reductions). The fees and technical work associated with the creation of the easement are also all processed by the agency. The easement is a conservation easement that exists in perpetuity. A landowner's eligibility for the program is again based on the environmental value of their land. Another evaluation criterion used in an assessment is the ease with which the wetland can be preserved, enhanced or restored. The NRCS provides a plan for the easement which is then implemented to further preserve its ecological functions.

The USDA supports significant activity in both Essex County and Orange County across a number of programs including the Environmental Quality Incentives Program (EQIP), Chesapeake Bay Watershed Initiative (CBWI), Conservation Reserve Program (CRP), Conservation Technical Assistance Program (CTA), Wildfires and Hurricanes Indemnity Program (WHIP), and Emergency Conservation Program (ECP). A summary count of practices applied within each of these programs appears below, with a supplementary table in Appendix O providing further detail into each NRCS practice code applied. Cumulative acreages put under perpetual easement in Rappahannock River Hydrological Unit localities through the Wetland Reserve Program (WRP), Grassland Reserve Program (GRP), and Farm and Ranch Lands Protection Program (FRPP) are also included.

Table 14. USDA Conservation Practices in Essex and Orange Counties

County	Program	Total Practices
Locality	USDA Program	Enrolled Acreage
Essex Note: Only practices that had 5 or more points in a 12 Digit HUC are included. All others have been expunged according to NRCS aggregation policy. Source: Authors' data inquiry to NRCS.	EQIP	1,782
	CBWI	1,410
	CRP	138
	CTA	4,311
	WHIP	12
	ECP	18
Orange Note: Only practices that had 5 or more points in a 12 Digit HUC are included. All others have been expunged according to NRCS aggregation policy. Source: Authors' data inquiry to NRCS.	EQIP	969
	CBWI	820
	CRP	244
	CTA	1,521
	WHIP	329
	ECP	0

Table 15. Conservation Easement Acreage in Essex and Orange Counties

County	USDA Program	Easement	Calculated Acres
Study Area			
Orange Co.	GRP	Permanent Easement	77.4
Orange Co.	FRPP	Permanent Easement	395.5
Essex Co.	FRPP	Permanent Easement	1,991.0
Balance of Rappahannock Basin			
Rappahannock Co.	WRP	Permanent Easement	13.9
Greene Co.	WRP	Permanent Easement	25.0
Fauquier Co.	WRP	Permanent Easement	60.6
Madison Co.	WRP	Permanent Easement	26.3
Richmond Co.	WRP	Permanent Easement	6.2
King George Co.	GRP	Permanent Easement	87.0
Middlesex Co.	FRPP	Permanent Easement	665.2

N.B. Acreage figures on a cumulative basis. Source: Authors' data inquiry to NRCS.

2. New Market Tax Credits

Established by congressional authorization in 2000, the New Market Tax Credit program (NMTC) is a financial mechanism designed to stimulate economic development and job growth in low-income communities (LIC) by enabling a flow of capital across the gap between underserved communities and conventional lenders.

The program utilizes census tract information to focus support for a wide variety of metropolitan (metro) and non-metropolitan (non-metro) qualified businesses in an under-served geographic location rather than pinpointing an economic activity. Businesses operating inside the boundary of a census tract that qualifies as "distressed" or "severely distressed"[10] are likely qualified and eligible to receive financing under the program. Utilizing this difference enables NMTC to be adaptable to the varying needs of different census tracts, and businesses therein, that need access to financing.

Because the NTMC program still generates over $8 of private investment for every $1 spent by the Federal government, it is not surprising to learn that it totaled $156 billion in economic activity, and created just over one million jobs in low-income metro and non-metro communities nation-wide from 2003 to 2015.[11] In addition, it proved itself a boon to state and local tax bases by generating $6.7 billion in revenue in the same period. Given these facts, as well as that the NMTC program receives bipartisan support and is stable (i.e. pricing has remained relatively steady across previous and more recent tax reform legislative action), there is a high level of competition for acceptance into the program.

a) How the NMTC Works

The NMTC program (see Figure 10) creates a system whereby tax credit authority is granted to qualified Community Development Entity (CDE) applicants through the Department of Treasury's Community Development Financial Institutions Fund (CDFI). These qualified CDEs are able to use this authority to exchange tax credits for private investment. CDEs attract investors with the federal tax credit, while using the equity investments to make loans and investments under favorable terms to Qualified Low-Income Community Businesses (QALICB).[12]

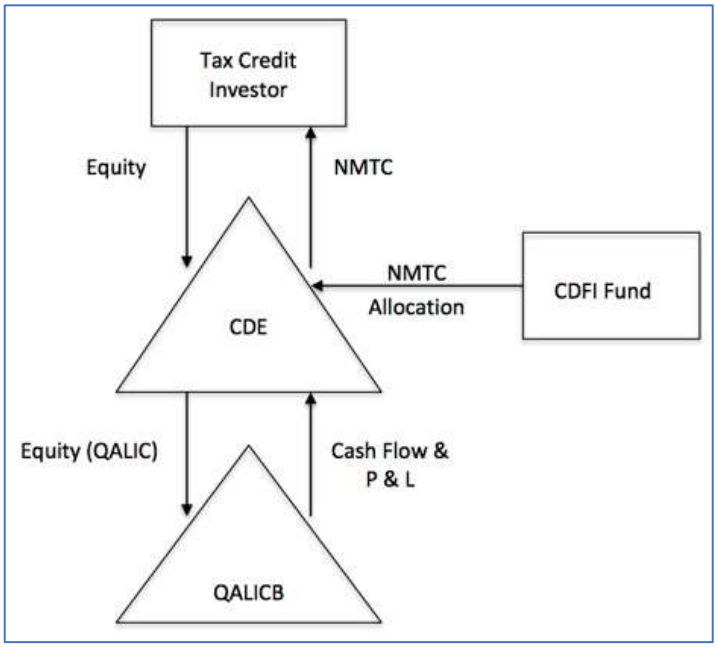


Figure 10. Basic NMTC Program Structure

[10] Anderson, P. (2013). *New Market Tax Credit Annual Progress Report* (New Market Tax Credit Progress Report No. 9–13). Washington, D.C.: New Market Tax Credit Coalition. Retrieved from http://nmtccoalition.org/reports-casestudies/

[11] Ibid.

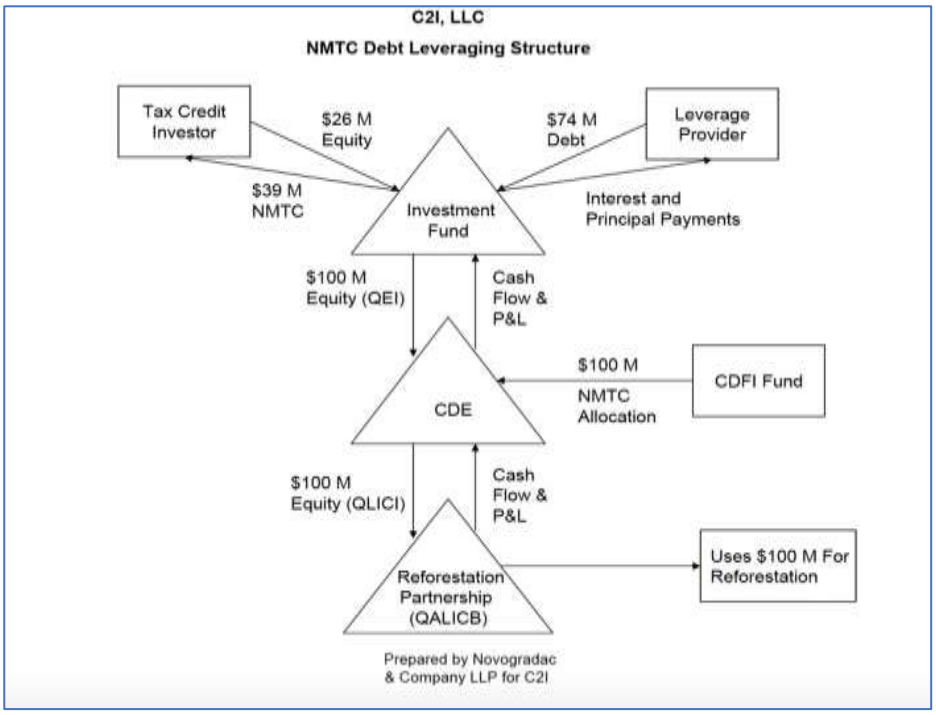
[12] Urban Institute & Brookings Institution. (2018). What is the new markets tax credit, and how does it work? Retrieved

These favorable terms include: low interest rates, flexible provisions such as subordinated debt, lower origination fees, higher loan to value, lower debt coverage ratios and longer maturity.

b) The Leverage Structure

To amplify the benefit of the NMTC program, it is commonly blended with more traditional debt structure, enabling more capital to be delivered to the target business in an eligible census tract.

Figure 11. The Leveraged NMTC Model



In the leverage structure (Figure 11), an intermediary investment fund is created, usually structured as a Limited Liability Corporation (LLC), which receives the tax credit investor equity as well as can take on a loan from a more traditional leverage provider as well; or, an additional equity investment from a non-tax credit seeking investor (see Appendix L). This equity and debt (or tax credit equity and non-tax credit equity) is combined and passed on to the CDE as a Qualified Equity Investment (QEI). The CDE uses this investment (combined equity and debt) to support QALICBs in the target community and pass the tax credits, granted by the CDFI Fund up to the investor through the LLC. Typically, the investor puts in 30 percent of the capital and receives 39 percent back in tax credits claimed over a 7- to 10-

July 11, 2018, from https://www.taxpolicycenter.org/briefing-book/what-new-markets-tax-credit-and-how-does-it-work

year schedule. For example, 5 percent of the investment for the first three years, and then 6 percent for the last four years.[13]

The CDE has some latitude in how it structures the terms of the QEI to benefit the QALICB. For example, depending on the specifics of the project, the loan could be fixed for 7 years and provided at 2 – 3 percentage points below market interest rates; or, again depending on deal specifics and market conditions, 20 percent of the overall loan is forgiven at the end of the 7-year loan period.

Ultimately, investors gain several benefits. First, perceived or real risk to investors is mitigated through the 39 percent tax credit on their equity stake apportioned out on a 7- to 10-year schedule. Second, equity and debt investors expand their footprint into new markets that have untapped asset bases and unmet consumer demand.[14]

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c) Census Information and the NMTC Eligibility Map

The NMTC eligibility map presents American Community Survey (ACS) 2011-2015 Low Income Community census information geographically so CDEs can begin to determine if their potential NMTC funded community development project falls within an eligible LIC census tract; and, by what other factors it may further qualify. As was mentioned earlier in the County profiles, the map of the census tracts tracks poverty rate and median family income for baseline eligibility. In addition, it classifies higher eligibility by level of distress (higher poverty rate and lower median family income) in combination with metropolitan (metro) vs. non-metropolitan (non-metro) status.

Basic eligibility for a project applying to the NMTC program is based on a poverty rate of 20 percent or greater or a median family income at or below 80 percent of the applicable area median family income. A Project can further qualify if the census tract in which the CDE is seeking approval is characterized by at least one of items 1 - 5:

1) Census tracts with poverty rates greater than 30 percent

[13] Ibid

[14] Kline, B., Spethmann, D., Hunt, T., Sunda, C., Yonavjak, L., Grant, D., … Oliphant, A. (2015). Private Sector Investments in Abandoned Mine Land Restoration: Identifying Barriers and Opportunities (No. 1) (p. 158). Virginia Department of Forestry.

[15] Kline, B., Spethmann, D., Hunt, T., Sunda, C., Yonavjak, L., Grant, D., … Oliphant, A. (2015). Private Sector Investments in Abandoned Mine Land Restoration: Identifying Barriers and Opportunities (No. 1) (p. 158). Virginia Department of Forestry.

2) Census tracts that (a) if located within a non-Metropolitan Area, have a median family income that does not exceed 60 percent of statewide median family income; or (b) if located within a Metropolitan Area, have a median family income that does not exceed 60 percent of the greater of statewide median family income or the Metropolitan Area median family income

3) Census tracts with unemployment rate at least 1.5 times the national average (8.3 percent for 2011-2015 ACS Survey, 7.9 percent for 2006-2010 ACS Survey).

4) Census tracts that are located in counties not contained within a Metropolitan Statistical Area (MSA) (i.e. non- metropolitan counties), as defined pursuant to 44 U.S.C. 3504(e) and 31 U.S.C. 104(d) and Executive order 10253 (3 C.F.R. Part 1949-1953 Comp., p.758), as amended, with respect to the 2010 Census and as made available by the CDFI Fund;

5) As permitted by IRS and related CDFI Fund guidance materials, projects serving Targeted Populations to the extent that:

   (a) Such projects are 60 percent owned by low-income persons (LIPs); or
   (b) At least 60 percent of the project's employees are LIPs; or
   (c) At least 60 percent of the project's gross income is derived from sales, rentals, services, or other transactions to customers who are LIP; or
   (d) Two of the remaining 11 items from Appendix AB, Qualification Criterion: Severely Distressed Census Tracts.[16]

d) CDEs, Virginia, and the Forestry Sector

Certified CDEs come in different sizes, geographic focus areas and project focus areas. An organization must be a legally-established entity, have a primary mission of serving Low Income Communities or Low-Income People and maintain accountability to residents of the Low-Income Communities that it serves. The CDE remains certified for the life of the organization as long as they continue to meet the primary mission and accountability requirements.

According to the NMTC Coalition progress reports, both Forestry projects and Full-Time Equivalent jobs (FTE) in the Forestry sector have been increasing, since they first appeared as data points in 2014, as a result of NMTC program financing in non-metro localities. That said forestry remains a small percentage of non-metro projects. Of the 5,468 projects completed between 2013 and 2017, only 67 (under 2 percent) were forestry projects.[17] Continued growth of Forestry projects is primarily the result of the flexibility of the NMTC as a financing tool, as well as an increase in the number of CDEs that focus on, or have begun to include forestry as part of their portfolio.

NMTC Coalition survey results indicate that there are seven CDEs whose service area include Virginia and whose project focus includes forestry.

[16] Cohn Reznick. (2018). Qualification Criterion: Severely Distressed Census Tracts [.com]. Retrieved from https://www.cohnreznick.com/nmtc-map/qualification-criteria

[17] Anderson, P. (2018, August 1). RE: Bern Hoffmann's inquiry into NMTC, Virginia and the Forestry Sector.

Contingencies

There are several contingencies to note when considering NMTC financing. A primary one is that the NMTC program is increasingly competitive, a non-permanent federal program, and currently there are only a small, albeit growing, number of projects.

Allocations for the NMTC program are highly competitive. In 2017 alone, 230 qualified CDEs applied for allocations totaling approximately $12.6 billion. Of that applicant pool, only 73 CDEs, or 32 percent, were awarded allocations totaling $3.9 billion. In addition to the competitive context for qualified CDEs being able to receive awards, the status quo for performance of CDEs, who receive allocations in the program, is very high. All 73 of the allocation recipients invested at least 95 percent of the QEIs in Quality Low-Income Community Investments (QALICIs), which exceeds the IRS, mandated 85 percent. Summit Consulting also found in their 2017 Compliance Review of the NMTC program, that 100 percent of the CDEs they surveyed, met or exceeded the compliance mandates for the CDFI[18] Fund.

From its inception the NMTC program, has been a non-permanent program and therefore needed annual Congressional renewal. It enjoys bipartisan support due to its success, and though it is in the middle of a five-year extension (2015-2019); in the current context, its future is far from secure even despite bills sponsored in both the House (H.R. 1098) and the Senate (S. 384) for its permanent, annual inflation adjusted, installment.

While working forestland and forestry-related projects have slowly been increasing in number, they remain a small percentage of the overall number of projects. This is a small group of projects from which to choose case studies that provide insight into these projects. It will take time to develop new CDEs and build relationships with local and nationally focused CDEs that include forestry as part of the focus within their NMTC portfolio.

e) NMTC Program Eligibility and Implications for Orange and Essex Counties

The HWF Phase III project pilot counties, Orange and Essex, both contain at least one census tract that is eligible for the NMTC Program (as well as the Virginia Opportunity Zone Program) and further qualify as severely distressed economically.

Orange County: Orange County has five census tracts total. All five tracts are designated non-metro. One tract is eligible for the NMTC program and qualifies as severely distressed. Tract 1102 qualifies for both poverty greater than 20 percent; and Median family income below the 80 percent benchmarked criteria. Refer to Figure 7 to see the census tract map for Orange County.

Essex County: Essex County has three census tracts, all of which are designated non-metro. Of these three, two qualify for the NMTC program as severely distressed. Of the two tracts that qualify, tract 507 qualifies for both poverty greater than 20 percent; and median family income below the 80 percent benchmarked criteria. Refer to Figure 8 to see the census tract map for Essex County.

[18] CDFI = Community Development Financial Institutions

Table 16. NMTC Eligibility for Essex County

2010 Census Tract Number FIPS code GEOID	OMB Metro/ Non-metro Designation July, 2015 (OMB 15-01)	Does Census Tract Qualify For NMTC Low Income Community (LIC) on Poverty or Income Criteria?	Census Tract Poverty Rate % (2011-2015 ACS)	Does Census Tract Qualify on Poverty Criteria>= 20%?	Census Tract Percent of Benchmarked Median Family Income (%) 2011-2015 ACS	Does Census Tract Qualify on Median Family Income Criteria<= 80%?
510579506	Non-Metropolitan	No	9.70	No	87.70	No
510579507	Non-Metropolitan	**Yes**	24.40	Yes	65.43	Yes
510579508	Non-Metropolitan	**Yes**	5.90	No	68.94	Yes

Table 17. NMTC Eligibility for Orange County

2010 Census Tract Number FIPS code GEOID	OMB Metro/ Non-metro Designation July, 2015 (OMB 15-01)	Does Census Tract Qualify For NMTC Low Income Community (LIC) on Poverty or Income Criteria?	Census Tract Poverty Rate % (2011-2015 ACS)	Does Census Tract Qualify on Poverty Criteria>= 20%?	Census Tract Percent of Benchmarked Median Family Income (%) 2011-2015 ACS	Does Census Tract Qualify on Median Family Income Criteria<= 80%?
5113711010	Non-Metropolitan	No	10.70	No	89.49	No
5113711010	Non-Metropolitan	No	7.40	No	112.50	No
5113711010	Non-Metropolitan	No	5.50	No	97.30	No
5113711020	Non-Metropolitan	**Yes**	26.90	Yes	50.79	**Yes**
5113711030	Non-Metropolitan	No	13.90	No	92.18	No

These data establish an important baseline insofar as general tract eligibility in the pilot counties is concerned. Given the aforementioned competitive environment for qualified projects in eligible census tracts, a next step would be to research potential projects in the pilot counties.

While project research of this nature is not yet underway and candidly beyond the scope of the HWF Phase III project, it should be noted that the Task 2 team believes that despite its size and complexity, the NMTC program is a potential addition to the "toolbox" at the county level for use on a case by case basis. For example, even though there is at least one eligible census tract in both Orange and Essex Counties, Essex County's current focus on infrastructure aligns better with how the NMTC Program could be deployed.

REGULATORY MARKET PROGRAMS – NUTRIENTS

Nutrient banking is a system focused on the prevention of polluting nutrient runoff into waterways for the betterment of water quality. Nutrient banks like their mitigation counterparts have their origin closely tied with those regulations borne of the Clean Water Act. Specifically, the National Pollutant Discharge Elimination System (NPDES) program delineated by Section 402 of the Act requires distinctly identifiable 'point sources' to purchase an NPDES permit for such discharges into waters the Environmental Protection Agency has classified as 'impaired' to be considered legal (https://www.epa.gov/npdes). This system is complemented by caps, referred to as total maximum daily loads (TMDLs) of particular pollutants into impaired waters.

The Environmental Protection Agency maintains oversight of the NPDES but has largely granted the enforcement and implementation of the program to states, who can then innovate as they see fit within the confines of the CWA. Virginia is one such state that has built upon these foundations with strong success. Virginia created through Article 4.02 of its state code in 2005 a Chesapeake Bay Watershed Nutrient Credit Exchange Program, which requires point source polluters to offset new or increased pollution into the Chesapeake's impaired tributaries. The program draws from the EPA's 2003 Water Quality Trading Policy, which espouses the calculation of exchange rates to guide the trading of different pollutants with equivalent impact.[19]

A baseline of nutrient reductions arising from Best Management Practices (BMP) is established, and reductions in excess of this baseline then create offsets, in units of lbs. of nitrogen or phosphorus, that the reducer can trade to either point or nonpoint sources.[20]

How Forestry Works in the Nutrient Market

Presently, the only way forestry works in the Virginia Nutrient program is the conversion to a forest. The Virginia Department of Environmental Quality (DEQ) has prescribed tables outlining what the land is converting from in terms of Phosphorous (P) and Nitrogen (N). While the tables show both, generally the only tradable asset is P. The N gets retired along with the P credit.

For the Rappahannock River Basin, Table 18 applies. Note that Interstate 95 is a dividing line. Consequently, the first things to determine is what type of land conversion is involved and where the property is located in relation to Interstate 95.

Table 18. Land Conversion Nutrient Credit in Rappahannock River Basin

Pollutant	West of I-95		East of I-95	
	Total Nitrogen (TN)	Total Phosphorus (TP)	Total Nitrogen (TN)	Total Phosphorus (TP)
Cropland to Forest	4.24	1.35	6.51	0.62
Hay to Forest	3.85	0.98	5.83	1.04
Pasture to Forest	0.74	0.49	2.30	0.67

For the Rappahannock River Basin, P credits are trading around $10,000-14,000 per pound. These are one-time credits and require a restrictive covenant to be placed over the bank area. Credits

[19] Cited in ACRE Investment Management, LLC. (2017). Primer on Natural Capital Markets: Wetland/Stream, Nutrient, Conservation Tax, and Carbon. PowerPoint Presentation.
[20] Cited in ibid.

can be traded within the service territory of the Rappahannock River Basin. To date, most of the sales are occurring along the I-95 corridor.

There are four main costs of establishing a nutrient bank, namely:

1) The application for and design of the bank.
2) The establishment of the bank itself.
3) The bonding that is required to be placed over the bank. The bonding has three different components to it: a) $15.08 per pound of phosphorus for five years, b) the cost of planting for five years if the average stem count falls below 400 stems per acre, and c) $5,000 for monitoring over ten years.
4) The DEQ Water Quality Enhancement Fee. This is calculated at 6 percent of the gross dollars transacted.

Table 19. Current Nutrient Banks in the Rappahannock River Basin

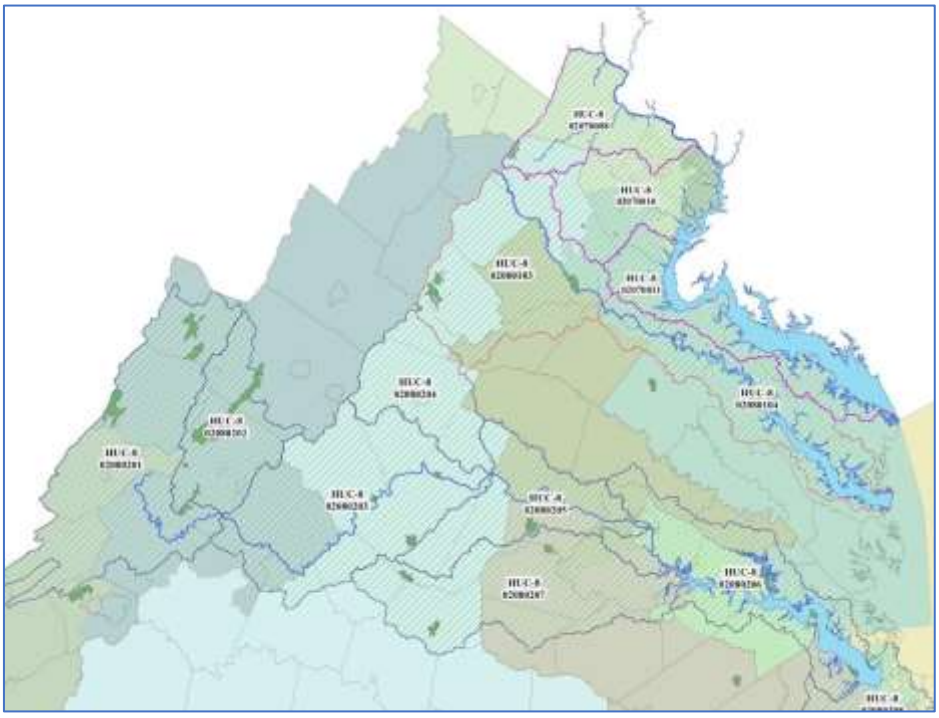
Nutrient Bank	Location	Type	P Credits Available (lbs.)
Rappahannock Nutrient Bank	Orange	Ag Land Conversion	79.89
Culpeper	Culpepper	Ag Land Conversion	19.79
Pristine Waters	Orange	Ag Land Conversion	62.33
Twyman's Mill	Madison	Ag Land Conversion	34.80
			196.81

CLEAN WATER ACT 404/401 PROGRAM

Mitigation banks are ecological areas that have been restored, established, enhanced, or preserved in some way to offset or compensate for aquatic resource loss in other similar areas to ensure that there is no let loss to the environment. Mitigation banking is a system of creating credits whose amount is tethered to some unit of magnitude of the restoration, establishment, enhancement, or preservation taken over the area. Firms then purchase credits to offset those anticipated ecological impacts associated with some development project.

Mitigation banking's regulatory history in the United States began with the support of the Fish and Wildlife Service in 1983 and assistance with federal agencies on compensatory projects.[21] The FWS's success encourage the Environmental Protection Agency and Army Corps of Engineers to consider how mitigation banking could complement existing regulation under the 1972 Clean Water Act, Section 404 Permit Program under. Section 404 permits are issued for a variety of construction material defined as 'fill' material. A 'no net loss' policy for wetlands proposed by President H.W. Bush during the 1988 Presidential campaign built on President Carter's previous Executive Order that required minimization of wetland destruction or degradation from all federal agencies. In 1995, federal guidance on the establishment, use, and operation of mitigation banks was issued during the Clinton Administration by a number of cooperating federal agencies. More recently, in 2008 the Environmental Protection Agency and Army Corps of Engineers released Compensatory Mitigation for Losses of Aquatic Resources, which revised existing Section 404 guidance including mitigation banking.

Figure 12. Hydrological Units of the Chesapeake Bay Watershed in Virginia



[21] US EPA, 'Mitigation Banking Fact Sheet'; US Fish and Wildlife Service, 1983.

The Environmental Protection Agency identifies four components of a mitigation bank:

- "The bank site: the physical acreage restored, established, enhanced, or preserved;
- The bank instrument: the formal agreement between the bank owners and regulators establishing liability, performance standards, management and monitoring requirements, and the terms of bank credit approval;
- The Interagency Review Team (IRT): the interagency team that provides regulatory review, approval, and oversight of the bank; and
- The service area: the geographic area in which permitted impacts can be compensated for at a given bank".[22]

These ecological areas most generally take the form of wetland and stream banks, through which ecological losses of these areas are offset, or of conservation banks, through which endangered species or habitat loss is offset. Responsibility for regulatory oversight is dependent upon the type of bank being created. A wetland or stream bank instrument is established with the Army Corps of Engineers and Environmental Protection Agency, while conservation bank instruments are established through the Fish and Wildlife Service and the National Marine Fisheries Service.[23]

Before a mitigation bank is established, the applicable agencies must assess the potential bank site according to several criteria related both to credit market participation and the use of the land itself. Once eligibility has been determined and any associated compliance obligations have been identified at the state and local level, a sponsor submits a proposal to the Army Corps of Engineers after preliminary discussions with those agencies to be involved in bank creation. The Corps will also assist the sponsor of the proposal in the creation of the IRT[24] to provide regulatory oversight of the bank. A four-phase approval process lasting no more than 225 days in total and that involves a preliminary review of the proposal, a public comment period, a review of the draft proposal by the IRT, and a resolution of issues raise both by the IRT and the public, results in the creation of the banking instrument.

The unit of restoration, establishment, enhancement, or preservation that generates mitigation credits in some volume – for example, the feet of stream impact or acres of wetland restored – will have been decided upon and agreed upon by all signatories to the bank instrument. The sponsor who submitted the initial proposal bears responsibility to properly track all creation and trade of credits in the bank's accounts and alerting the appropriate agencies within the IRT to all changes, as well as carrying out those activities that generate the credits in the first place per the terms of the instrument.

Monitoring reports thereto are submitted annually, and site monitoring of the bank is conducted as necessary to ensure these activities are being carried out. The amount and

[22] US EPA, 'Mitigation Banking Fact Sheet'.
[23] Cited in ACRE Investment Management, LLC. (2017). *Primer on Natural Capital Markets: Wetland/Stream, Nutrient, Conservation Tax, and Carbon*. PowerPoint Presentation.
[24] IRT = Interagency Review Team, part of the US Army Corps of Engineers mitigation program.

frequency of monitoring visits is site- and case-dependent, but all mitigation banks are to be protected by the sponsor through a conservation easement that permanently restricts those developmental activities that would degrade or destroy the bank site. While the bank's operational life may end of the sponsor's own volition or satisfaction of the level of activities described in the terms of the bank instrument, the conservation easement over the site will remain. Table 20 provides a typical credit release schedule for wetland and stream mitigation banks.

Table 20. Sample Credit Release Schedule for Wetland Mitigation Banks

Year	Mitigation Milestone	Percent of Credit Release
1	Baseline, permitting and design	0%
2	Bank concurrence, recordation of restrictive covenant and initiation of bank construction	15%
3	Completion of construction and Year 1 annual monitoring report	35%
4	Year 2 annual monitoring report	6%
5	Year 3 annual monitoring report	6%
6	Year 4 annual monitoring report	6%
7	Year 5 annual monitoring report	6%
8	Year 6 annual monitoring report	6%
9	Year 7 annual monitoring report	20%
		100%

CARBON MARKET BASICS

A. PRIVATE CARBON MARKET PROGRAMS

With rising levels of greenhouse gases, carbon markets have been resourceful in reducing emissions. There are six greenhouse gases identified and traded on markets, each having unique effects on the environment as represented by the Global Warming Potentials (GWP) rating assigned to them by the Intergovernmental Panel on Climate Change (IPCC) in their periodic Assessment Reports.[25] These gases are Methane (CH4), Nitrous Oxide (N2O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulfur Hexafluoride (SF6), and Carbon Dioxide (CO2). GWPs quantify the atmospheric effects a particular greenhouse gas has over multiple time horizons positioned against carbon dioxide's constant benchmark value of one. This benchmark also lends itself to the conventional practice of referring to a volume of some greenhouse gas in terms of 'carbon dioxide equivalent,' or CO2e. As such, the term "carbon markets" is used similarly to refer more broadly to all those trading markets for the referenced greenhouse gases.

Carbon markets take one of two general structural forms - compliance markets, often conversationally referred to as 'cap-and-trade' schemes, and voluntary markets. To participate, landowners have three project types to choose from:

1. Improved Forest Management,
2. Avoided Conversion and
3. Afforestation/Reforestation.

1. Compliance Markets

These are politically-created markets such as California Compliance Market. In a compliance market, a ton is a ton is a ton. Examples of Compliance Markets are:

North America:	Regional Greenhouse Gas Initiative (RGGI) California Compliance Market
Europe:	EU Emission Trading System
Australia:	New South Wales Greenhouse Gas Reduction Scheme (GGAS)
International:	From Kyoto Protocol to Paris Accord CORSIA (Carbon Offset Reduction Scheme for International Aviation)

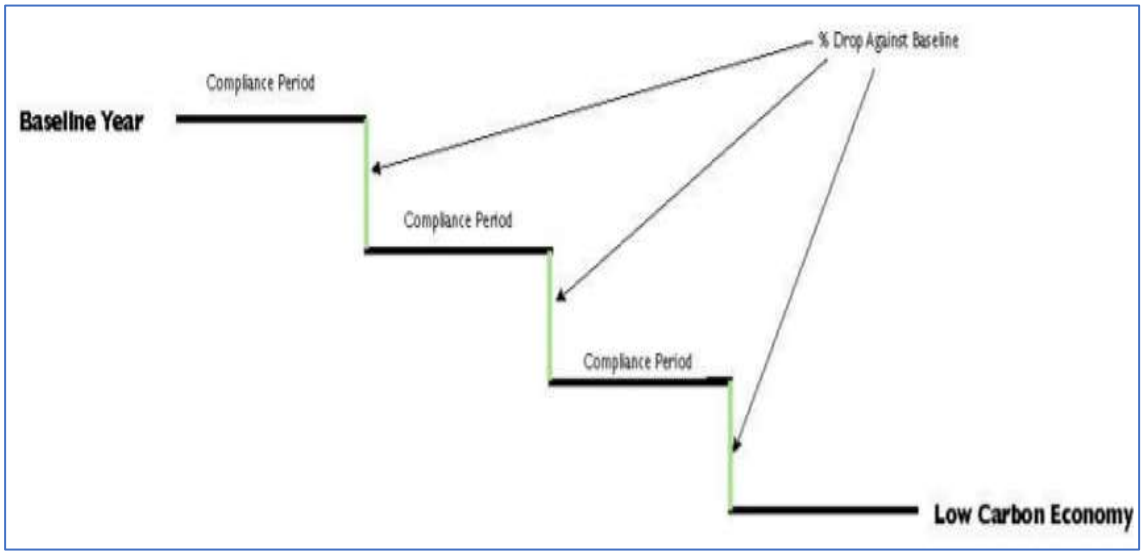
Under a compliance scheme, a governing body sets a greenhouse gas (GHG) emissions cap over its jurisdictional boundary, and all participating firms are bound by law to contribute to the emissions reductions necessary for the jurisdiction to meet an aggregate emissions reduction target in some future year. Firms are given or auctioned allowances, each one of which is a financial instrument that represents the right to pollute some volume of CO2e, to the tune of their share of the aggregate jurisdictional cap for the compliance period. It must then surrender to the governing body at the end of the compliance period those allowances

[25] https://www.ipcc.ch/publications_and_data/publications_and_data_reports.shtml

representing its *actual* emissions for the period. So, if a firm emits underneath its cap, it may sell its surplus allowances to those firms who need them to comply; if a firm emits over its cap, it must suffer the financial penalty of entering the market to purchase the necessary shortfall. The governing body can then continue to reduce these allowances forcing down the total carbon emitted each year and achieving progress towards the jurisdiction's aggregate emissions reduction target. In some instances, a compliance scheme may allow firms to import instruments from other compliance schemes or programs or even the voluntary market to meet compliance needs, subject to potential discretional restrictions. This and other features, including price floors, price ceilings, or allowing firms to let allowances move between compliance periods to meet compliance needs, can be implemented at the discretion of the scheme's jurisdictional authority.

Think of Cap and Trade as the profile of a descending staircase (Figure 13). The goal is to walk industry and the economy from where we are today to a low emissions economy. Each step represents a compliance period of time to achieve that descent.

Figure 13. Carbon Cap and Trade Descending Staircase



One of the problems that often face compliance markets is leakage, which is the concept that new regulatory policies will have an effect outside of the area regulated. Positive results may be reported in the area regulated while neglecting external environmental damage. For example, participating firms may decide to move production to a place where the regulatory policy does not apply. Leakage can often be stopped by expanding the area which the regulation affects to encompass a greater boundary. Moreover, some regulatory policy can actually cause a positive effect as some companies outside of the original regulatory boundary may comply.

The two U.S. compliance markets are the Regional GHG Initiative (RGGI) and the California Air Resources Board (ARB) Compliance Offset Program. RGGI started in 2012 and currently includes Connecticut, Delaware, Maryland, Maine, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont as participating members. It mandates a declining emissions cap for those fossil fuel electric power plants with a nameplate capacity greater than or equal

to 25 MW.[26] It serves as a good example of the utility of pricing instruments and other structural elements a compliance scheme could conceivably implement. A cost containment reserve (CCR) and emissions containment reserve (ECR) respectively inject and retract supply contingent upon predetermined price shock triggers to ensure market stability. It also allows for intertemporal banking - keeping allowances from one compliance period to use for compliance in later ones as necessary. Additionally, subject to the satisfaction of some protocol and paperwork, RGGI allows for offsets from a small list of project types, including afforestation/reforestation, to be used for compliance purposes in place of auctioned allowances to a maximum of 3.3 percent of a firm's compliance obligation.

The California ARB is based off of California's Cap and Trade program, which started in 2013 that was borne out of the 2006 Global Warming Solutions Act (AB32).[27] This program attempts to reduce carbon levels and affects 80 percent of all carbon producing companies forcing them to reduce emissions at a rate to meet total emissions of 431 million tons of carbon by 2020. Similarly, to its northeastern counterpart, the ARB Compliance Offset Program allows a firm to use offsets to meet no more than 8 percent of its compliance obligation in a period, falling to 4 percent in 2025 and rising to 6 percent for the period 2026-2030. There is also a restrictive cap on the use of offsets from projects based outside of California for compliance purposes.

Common in compliance markets is a form of linkage with others and with some portion of the voluntary market. RGGI started through a form of linkage of smaller state markets that linked together into what exists today. California has linked itself with Quebec's cap and trade scheme. Linkage in the broadest sense refers to two or more markets allowing for the fungibility of instruments between the two, subject to discretionary restriction. When linkage between markets is possible, the potential economic benefits of linkage between markets are clearly identifiable. Among these are increased market efficiency, increased liquidity, reduced price volatility, and the achievement of better cost containment overall by having jurisdictions with higher marginal costs purchase and import instruments from jurisdictions with lower marginal cost.[28]

However, two important potential downfalls include the overall disproportionate realization of benefits by those parties privy to a linkage and the vulnerability of jurisdictions to systemic foreign shocks that may not have been mitigated from the outset. The minutia of negotiations before the linkage is official are critically important to get right to make sure the linked market is functional, let alone effective, particularly since greater opportunities for aggregate benefits exist in those cases where quite heterogeneous markets are trying to link rather than homogeneous ones; harmonization must take place with respect to emissions cap discrepancies, supply controls, MRV[29] architecture, allowance tracking systems, among

[26] https://www.rggi.org/program-overview-and-design/elements.

[27] https://www.arb.ca.gov/cc/ab32/ab32.htm.

[28] Flachsland, C., Marschinski, R., and Edenhofer, O. (2009). "*To link or not to link: Benefits and disadvantages of linking cap-and-trade systems*." Climate Policy, 9(4):358-372.

[29] MRV refers to the Monitoring, Reporting and Verification process of carbon market protocols.

others.[30] An excellent example of such 'linking without thinking' is the New Zealand Emissions Trading System (ETS). The government opened the door to a preponderance of hot-air credits with serious additionality concerns flood its market with cheap supply that nearly crashed the entire system. In order for the eventual linkage between all of North America combining the Regional Greenhouse Gas Initiative and the California ARB, and eventually linkage on a global scale, common terms for the units of the market and homogenous policies must be drawn up as well as oversight to protect market stability and manipulation and accounting for overseeing the tracking of credits and transactions.[31]

2. Voluntary Markets

Voluntary carbon markets, by contrast, are not overseen directly by a governmental authority of some kind, but by verifying private organizations that have created standards for the methodology by which carbon is verified. The credits within these markets are often used by a wide range of investors to partially or fully offset the emissions for which they are responsible over a period (conversationally referred to as a person or firm's 'carbon footprint').

A voluntary market can be anywhere in the world but in a voluntary market, all tons are not equal. The standard and the story drive the price. For example, reforestation tons price significantly higher than other forestry tons or methane destruction projects. Each market consists of the following components: Standards, Methodologies, Registries, Verifiers, and Project Proponents.

Each market is different in how it is designed. Some markets allow offsets to participate, others do not. Each market has different baselines, percent reductions, compliance phases and banking requirements. Unless, there is a linkage agreement, the markets do not impact or relate to one another.

Voluntary markets have emerged and matured in a more organic way that has afforded them the freedom to innovate at the project level and the ability to draw upon the methodological rigor of compliance-based standard setters. As noted, unlike compliance schemes, there is also subjectivity in pricing and production and the ability for investors to be very particular about what credits they buy. For example, a cooking equipment manufacturer may decide internally that it will only purchase those credits generated by cooking stove projects to offset its carbon footprint because those projects have a more observable connection to the firm's day-to-day operations than, say, an offshore wind farm. Another firm may simply seek out the cheapest credits it can find that are less expensive or as expensive on a ton-by-ton basis as an internally determined but undisclosed price of carbon kept and used by corporate

[30] Flachsland, C., Marschinski, R., and Edenhofer, O. (2009), pp.8-9; Burtraw, D., Palmer, K., Munnings, C., Weber, P., and Woerman, M. (2013). Linking by degrees: Incremental alignment of cap-and-trade markets. RFF Discussion Paper 13-04; Marcu, A. (2015). Mitigation value, networked carbon markets and the Paris climate change agreement. [Online]. Available at: http://www.worldbank.org/en/topic/climatechange/brief/globally-networked-carbon-markets; Lazarus, M., Schneider, L., Lee, C., and van Asselt, H. (2015). Options and issues for restricted linking of emissions trading systems. Stockholm Environment Institute.

[31] Bodansky, D., Hoedl, S.A., Metcalf, G.E., and Stavins, R.N. (2014). Facilitating linkage of heterogeneous regional, national, and sub-national climate policies through a future international agreement. Harvard Project on Climate Agreements.

management with regard for neither geographic nor project origin. This diversity of investor behavior lends itself to significant credit price spreads (see Figure 14) within and between project types and countries.

Figure 14. Volume of Offsets Sold and Number of Transactions by Price, 2016.

Source: Ecosystem Marketplace (2017), "State of the Voluntary Carbon Markets: 2017"

One of the largest voluntary markets is the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), which connects different aviation systems together to achieve carbon neutral growth. By creating a large voluntary carbon market that oversees much of the international aviation industry, it has positive leakage effects that cover aviation programs that are not compliant in the scheme. Additionally, the unified market allows there to be a synergy between different aviation programs in the scheme. There are also other voluntary programs like the United States Carbon Alliance which was created by states to continue with the goals of the Paris Agreement after the United States nationally pulled out. The Alliance continues to meet the climate goals set in Paris by each state reducing its emissions to levels around 25 percent lower than a 2005 baseline by 2025 while also promoting clean energy and public health.

Companies participate in voluntary carbon markets for a variety of reasons. Many companies buy offsets to show climate leadership and give their products a greener image marketing them as environmentally friendly or carbon neutral. Some companies offset their emissions to meet their emissions reduction goals which is often for the purposes of reducing the risk to investment in their company that comes from their emissions, in turn making its shares more appealing. There are also large programs like The Carbon Offsetting and Reduction Scheme companies participate in to have one unified regulation over an industry and avoid smaller schemes.

On the carbon markets, especially on the compliance side, carbon credits may not directly be retired and often be sold to investors. When carbon credits are sold on the market, the income received can be taxed in different ways depending on the characteristics of the selling of the emission. If the carbon is being directly sold from an onsite project, the carbon may be seen as a commodity and ordinary income tax will have to be paid. For investors in the carbon market, the resale of carbon may be taxed differently as capital gains. A capital gains tax treatment is preferable to ordinary income tax treatment, given the lower statutory rate.

3. How Forestry Works in Voluntary and Compliance Carbon Markets

Forestry has been and must continue to be an important strategy in the fight against climate change, as it is estimated that, since 1750, one-third of all CO_2 emissions have come from deforestation and land use change.[32] The three main tree-based project types are Improved Forest Management (IFM), Avoided Conversion (AC), and Afforestation or Reforestation (AR). There are four key elements to a forestry project — baseline, permanence, additionality, and leakage.

THE FOUR ELEMENTS OF A CO_2 EMISSIONS REDUCTION PROJECT

Baseline

Baselines are the starting point for the carbon accounting of any emissions reduction project. Each project type has different approaches to establish the baseline. For AR projects the baseline is relatively simple, as a project is starting with a bare dirt field and has a null baseline. As the trees grow, the stock change is measured year over year and is converted into CO2e. For IFM projects, there are several ways to establish a baseline. One is through modeling, while the other is using Forest Inventory and Analysis (FIA) data to determine the ecoregion of a project, stand type, and what is common practice for that type of stand.

For Avoided Conversion (AC) projects, the baseline is established by determining the threat of conversion. If the threat has an economic increased value of 40 percent or greater as compared to the current use, then a project can take 9 percent of the current carbon stock plus the annual growth every year for 10 years. After year 10, the 9 percent stops and all a project can claim is the annual growth. Avoided conversion places a conservation easement on the land preventing owners from using the land for agriculture or development.

Permanence

The definition of permanence (that is, the permanence of the emissions reductions a project generates) differs widely in the carbon markets. In the compliance market, the term permanence equates to 100 years since the point or year of the ton being sequestered. For voluntary markets, the term is for 40 years. The difference between the two is hooked to past science and policy development. The California compliance market chose the Global Warming Potential[33] (GWP) values at 100 years when the prevailing science was informing society that carbon was a 100-year problem. GWP values measure the atmospheric impact of GHG over different increments of time (Table 21).

[32] Intergovernmental Panel on Climate Change (IPCC). Working Group I Contribution to the IPCC Fifth Assessment Report. Climate Change 2013: The Physical Science Basis. Summary for Policymakers.

[33] The Global Warming Potential (GWP) was developed to allow comparisons of the global warming impacts of different gases. Specifically, it is a measure of how much energy the emissions of 1 ton of a gas will absorb over a given period of time, relative to the emissions of 1 ton of carbon dioxide (CO_2). The larger the GWP, the more that a given gas warms the Earth compared to CO_2 over that time period. The time period usually used for GWPs is 100 years. GWPs provide a common unit of measure, which allows analysts to add up emissions estimates of different gases (e.g., to compile a national GHG inventory), and allows policymakers to compare emissions reduction opportunities across sectors and gases.

Table 21. Greenhouse Gas Global Warming (GWP) Potentials, 20-year and 100-year time horizons

GHG	20 Years	100 Years
Methane (CH_4)	86	34
HFC-134 (hydrofluorcarbon)	3,790	1,550
CFC-11 (chlorofluorocarbon)	7,020	5,350
Nitrous Oxide (N_20)	268	298
Carbon tetrafluoride (CF_4)	4,950	7,350
Carbon Dioxide Equivalent (CO2e)	**1**	**1**

Source: 2013 IPCC (2013) Fifth Assessment Report (AR5), p.714.

GWP values act as an exchange rate. If a market picks the 100-year timeframe, then the destruction of 1 metric ton of Methane generates 34 metric tons of CO2e. All GHG types convert into CO2e. The key is to understand where the science is in relation to policy and regulatory initiatives. The IPCC AR5[34] radically changed the game in that a 2 Degree C rise was no longer thought to be a 100-year problem but rather a 20 to 35-year problem. Additionally, that report also introduced the issues associated with short-lived climate forcers[35] such as black carbon[36]. These evolutionary leaps have a dramatic impact on market changes and cascade down to how to handle commitments made by land-based offsets such as forestry.

The 40-year timeframe was an outgrowth of the Waxman-Markey Offset legislation under the Obama Administration's push for a climate bill. In that offset title, permanence equates to a risk of reversal. Therefore, the bill contemplated the ability to assign the risk of reversal to any party explicitly. The party holding that risk does so for the duration of the law, which was contemplated at 38 years from start to sunset.

Additionality

Additionality is aimed at making sure those emissions reductions generated by a project are additional to any emissions reductions that would have taken place in the project's absence. Additionality usually has several components to it. First, was the project forced into this action by a regulation? Second, is it ecologically additional? Third, was it financially additional? Other elements include the use of technology or institutional barriers. The one most people key in on is financial additionality - that is, is the prospect of carbon revenues a driver or material consideration in the landowners' decision to make a land-use change?

[34] IPCC AR5 = Intergovernmental Panel on Climate Change - Assessment Report 5

[35] Climate Forcers = any atmospheric material that alters the energy balance of the climate system, i.e. changes the relative balance between incoming solar radiation and outgoing infrared radiation from Earth. Such mechanisms include changes in solar irradiance, volcanic eruptions, and enhancement of the natural greenhouse effect by emissions of greenhouse gases.

[36] Black carbon (BC) is the most strongly light-absorbing component of particulate matter (PM), and is formed by the incomplete combustion of fossil fuels, biofuels, and biomass. It is emitted directly into the atmosphere in the form of fine particles.

Leakage

Leakage has two components — direct and indirect. Direct leakages are that the landowner restricts the harvesting on an acre and increases the harvesting on another. Indirect is dealing with the elasticity of supply and demand between two non-related landowners. Leakage is very subjective and hard to prove. Therefore, the California Compliance market uses a table to determine whether leakage should be applied. The voluntary market tends to say if the scientific community can prove leakage with more than one peer-reviewed study, it will consider applying a leakage deduction to the overall carbon accumulation.

Pools of Carbon

It is important to note that carbon is stored in soil, live tree matter below ground (roots), live tree matter above ground, leaf litter, standing and fallen deadwood and long-term, manufactured wood products. Each of these pools of carbon is measurable, and depending on the project's election, are aggregated up to give a per acre carbon number.

a) Market Mechanics

Registries

For both the voluntary and compliance markets, registries serve as the central place that a project interfaces with and where credit issuances are electronically memorialized. They also contain a variety of publicly available project documents and reports. For example, while the California ARB is responsible for issuing tons under its offset program, the *registry* is where the project is listed and the volume issued. For voluntary markets, the applicable registry is responsible for both issuance and project accounts. For example, Winrock International's American Carbon Registry is the leading Compliance Registry for California as well as Voluntary. The only difference is nuances in the standard.

Standards and Methodologies

The California Compliance Market went through a public comment process concerning the standard for how projects are to be conducted. The standard includes the four key elements described previously as well as approved methodologies, practices, and project participant requirements. For example, does a standard allow projects to be aggregated? Does the standard require non-enrolled forest land to be certified under a sustainable forestry program such as Forest Stewardship Council (FSC) or the Sustainable Forestry Initiative (SFI)? Essentially, the standard is what a project must meet to gain approval in the verification process. To do so, a project submits a Project Design Document that conforms to the standard and the approved set of methodologies. A methodology is an accepted approach for measuring and quantifying carbon.

Validation, Verification, Verifiers and Vintages

The first time a project undergoes a verification, it must pick and contract with an approved third-party verifier. During the first verification, the verifier will validate the Project Design Document to make sure it is in conformance with the Standard. Then, the

verifier will audit both the on-the-ground measurements, the geospatial data as well as all the documentation. This process takes months.

Forestry projects must randomly assign plot locations in an unbiased manner. The plot locations must be numerous enough to meet minimum thresholds. For example, in the voluntary market, the threshold is a 90/10 confidence interval. If a project has more than 10 percent uncertainty, then the project will take a deduction of the said amount against its gross creditable carbon. If the project is below the 10 percent, then a 0 deduction is applied.

During the course of the verification, a project does a risk buffer analysis. This analysis measures things like risk of fire, infestation, floods, political risk and requires the project to respond to how it manages those risk. The outcome of this process assigns a buffer risk rating. That number is applied to the gross credits and those corresponding tons are contributed to a buffer pool managed in the Registry. One might think of this as an insurance mechanism for Acts of God Risk. The risk associated with intentional loss of carbon are handled under a penalty structure.

After this process completes, the verifier will submit a verification report to Market and/or Registry. Once further reviews are completed, the approval body will issue serialized tons in the year that the sequestration occurred. This is known as the "vintages". If 100 tons were verified to have grown in 2018, then the project would receive "100 vintage 2018 tradable credits". For the California Market, the appropriate term would be the Air Resources Board Offset Credits (ARBOC) or California Carbon Offsets (CCOs). For the voluntary market, it is known as Voluntary Emissions Reductions (VERs). Within each voluntary registry, they may have their specific naming convention. For example, American Carbon Registry issues Emission Reduction Tons (ERTs). The requirements and guidelines for regulatory markets are prescriptive, while the voluntary markets are variable and subject to change.

b) Market Pricing

The California Compliance Market has two instruments — California Compliance Allowance (CCAs) and California Carbon Offsets (CCOs). The CCAs are the allowances. The underlying legislation put in a price floor for the auction of CCAs. Example: the starting price point was $10 a metric ton for a CCA, inflating at 5 percent + CPI per year. The CCOs are the offsets. The CCOs trade at a discount to the CCA. This discount is typically 20 percent. The reason is allowances are a creature of the State and offsets have a risk of reversal or invalidation. There are some other nuance variations where insurance companies or banks will put wraps around the CCOs to squeeze the discount. These are commonly referred to as Golden CCOs.

The voluntary market has no price floor. Credits can trade higher or lower than the compliance market. The buyers for voluntary credits tend to be publicly traded companies that are under pressure to reduce the shareholder material risk associated with the company's environmental emissions profile.

Many of the companies report their emissions in three different scopes. Scope 1 are emissions associated with combustion on-site at the company. If Company A has its own

power source creating emissions, these emissions would be Scope 1. Scope 2 are emissions associated with the purchase of electricity from the local grid. Scope 3 are emissions associated with leased assets and supply chain.

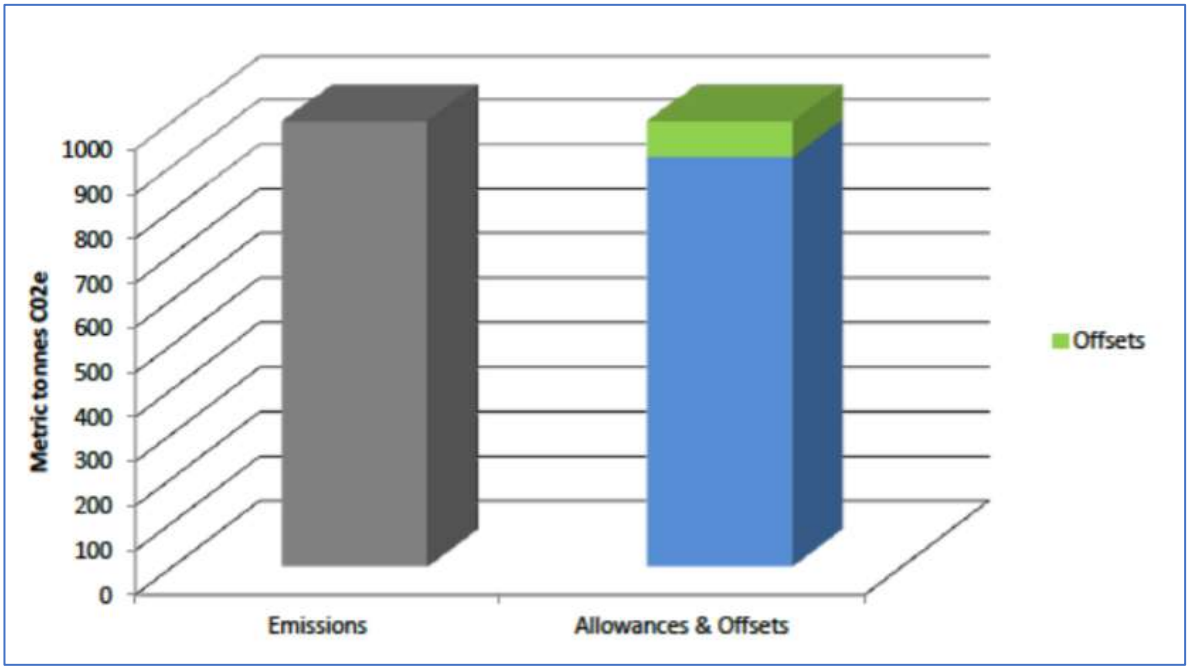
The overall CDP[37] score shows up on Bloomberg Terminals in the trading markets. This allows investors to make decisions on the "material" risk associated with how the company is performing in relation to environmental liabilities.

Types of Compliance Instruments

- Allowances:
  - Allowances are a company's right to pollute under the cap.
  - These allowances are either given away free or auctioned
- Offsets:
  - Such as forestry, mine methane capture, rice, etc.
  - Offsets are used to help companies get their emissions at or below the cap

Emissions, Allowances and Offsets

Figure 15. Emissions, Allowances and Offsets



Greenhouse Gases and Global Warming Potential

There are Six Greenhouse Gases (GHG): Carbon Dioxide (CO_2), Methane (CH_4), Nitrous Oxide (N_2O), HFC-23, HFC-134a, and Sulfur Hexafluoride (SF6). Each GHG has a Global Warming Potential (GWP).

[37] CDP Score: CDP is a global non-profit organization that developed methodology and reporting systems that focuses investors, companies, and cities on taking action to build a sustainable economy by measuring and understanding their environmental impact. www.cdp.net

Global Warning Potential (GWP) Exchange Rate

GHG Type	20 Years	100 Years	500 Years
Methane	72	25	7.6
Nitrous Oxide	289	298	153
HFC-23	12,000	14,800	12,200
HFC-134a	3,830	1,430	435
Sulfur Hexafluoride	16,300	22,800	32,600
Carbon Dioxide	1	1	1

The IPCC looks at the Global Warming Potential of the Greenhouse Gases (GHG) over different periods of time and converts or equates the GHGs into units of Carbon Dioxide Equivalence (CO2e). For some GHGs, their impact is more acute in the first 20 years than in subsequent years. The key is to match the GWP time frame to what one is managing to.

Trading Instruments

When internalizing the cost of emissions, the emissions profile of different energy sources needs to be included in how energy is traded and hedged. Because the carbon market is so closely linked with power generation markets, there are a number of trading instruments for "hedges."[38] Power is a global commodity and hedging power risks and price volatility is an important part of the energy complex.

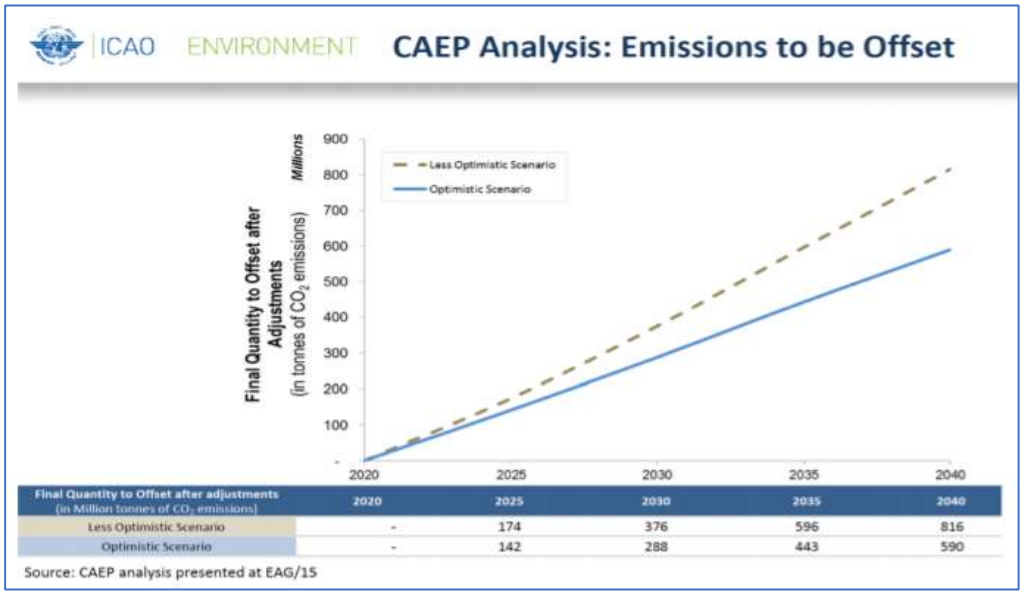
- ICE[39] Carbon Futures: Definition Link
- ICE Carbon Options: Definition Link
- Spreads
  1. Clean Dark Spread [40]
  2. Clean Spark Spread[41]
  3. Bark Spread[42] (created by C2I[43])
  4. Climate Spread[44]

[38] Hedge = to limit or qualify (something) by conditions or exceptions.
[39] ICE = Intercontinental Exchange. The Intercontinental Exchange (ICE) was founded in May 2000 in Atlanta, Georgia, to facilitate the electronic purchase and sale of energy commodities. ICE operates entirely as an electronic exchange and is linked directly to individuals and companies looking to trade in oil, natural gas, jet fuel, emissions, electric power, commodity derivatives, and futures.
Source: https://www.investopedia.com/terms/i/intercontinentalexchange.asp
[40] Clean Dark Spread = Refers to the profit realized by a power generator (typically coal-fired generation plants) after paying for the cost of coal fuel and carbon allowances.
[41] Clean Spark Spread = The spread equal to the regular (or 'dirty') spark spread minus the CO^2 emissions cost for gas-fired power plants. This spread then represents the net revenue on power sales after gas costs and emissions allowance costs. An analogous spread for coal-fired generation plants is typically referred to as a clean dark spread or a dark green spread.
[42] Bark Spread refers to the cost of biomass versus the cost of energy leaving the plant when incorporating the renewable profile of biomass
[43] C2I = Parent company of HWF Phase III team member ACRE Investment Management LLC
[44] Climate Spread = The difference between the dark green spread and the spark green spread is known as the "Climate Spread". Source: https://en.wikipedia.org/wiki/Spark_spread

Carbon Offset Reduction Scheme for International Aviation (CORSIA) Projected Demand

CORSIA is projected to be the largest global marketplace for carbon as the industry is looking to cap the emissions at 2020 levels. The industry is growing at 5 percent per annum. Figure 16 indicates the projected demand for offsets assuming different scenarios.

Figure 16. CORSIA Emissions Offset Demand Projections



Final Quantity to Offset after adjustments (in Million tonnes of CO_2 emissions)	2020	2025	2030	2035	2040
Less Optimistic Scenario	-	174	376	596	816
Optimistic Scenario	-	142	288	443	590

Source: CAEP analysis presented at EAG/15

How Carbon Credits From a Forest Stand Are Created

Table 22. Creating Carbon Credits from A Forest Stand

Activity	Means of Creating "Carbon Credit"
Improved Forest Management	Offset credits are issued for actual carbon stocks relative to baseline plus accrued growth
	The baseline reflects the most intensive timber management possible on the property and regional stocking averages.
Avoided Conversion	A conservation easement is placed on the property preventing conversion to non-forest land use, such as housing or agriculture.
	Offset credits are issued based on carbon that would have been emitted in conversion plus accrued growth.
Afforestation/Reforestation	Qualifying reforestation projects may be issued offset credits for carbon stored over time in newly-planted trees.

Carbon Components

Carbon is measured in the following:

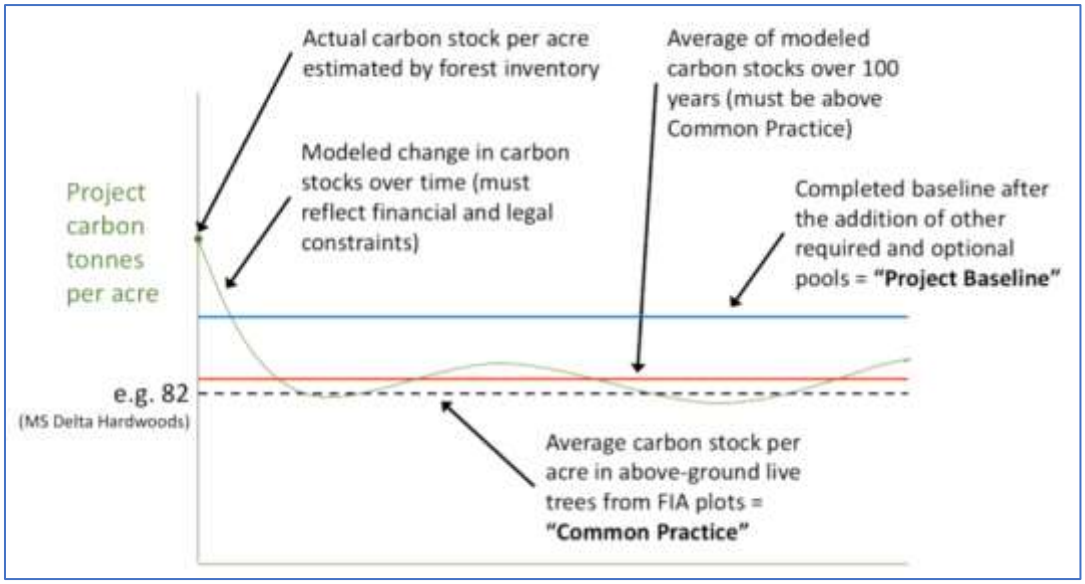
- Live above ground (i.e. trunk, branches and leaves)
- Live below ground roots
- Soil (reforestation only)
- Deadwood (i.e. in fallen trees)
- Long-term wood product (i.e. manufactured goods)

Carbon is sold in Vintage Years like wine, in the year it was produced. Most carbon registries and standards require carbon to verified *ex post facto (after the fact).* Some registries issue tons to project *ex ante (before the fact).* Ex ante faces credibility concerns. Therefore, vintage years tends to relate to *ex post facto.*

Mature Stands: Quantifying Integrated Forest Management (IFM)

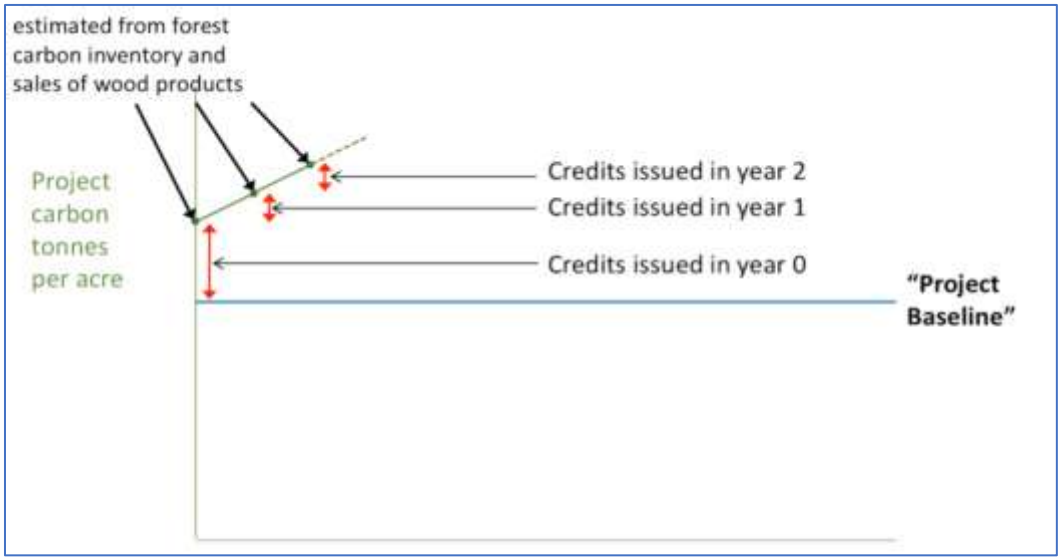
After initial carbon is determined, the next step is to analyze the future growth rate of the stand. If a stand is growing at 4% per year, the landowner must determine how much of the annual growth, he or she wants in carbon and how much they want to reserve for future timbering. The answer to this question will depend on the management objectives of the landowner and the need for future flexibility.

Figure 17. Modelling Credits for IFM Project



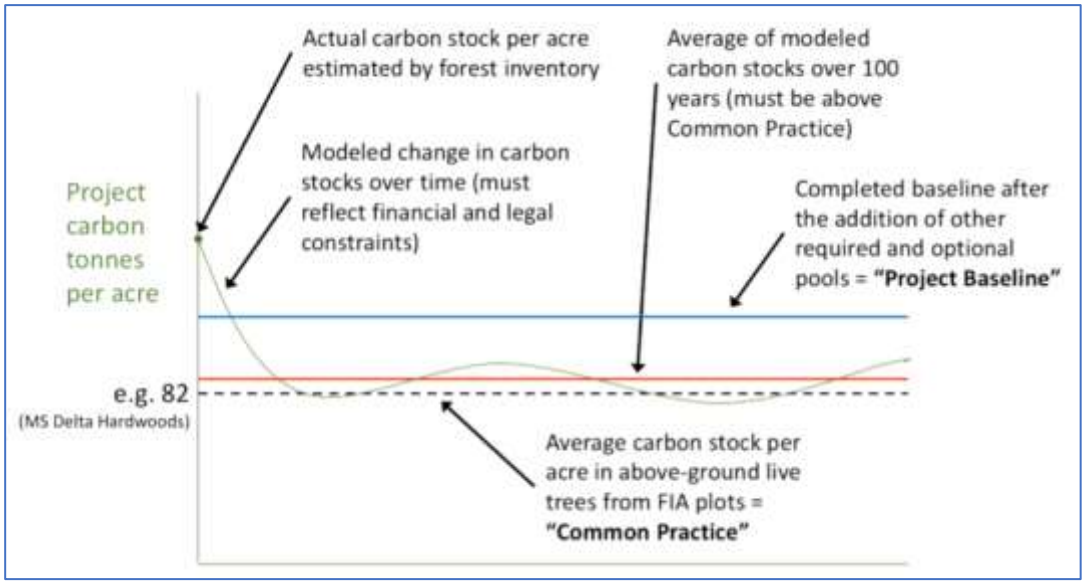
For an IFM project, there are several ways to determine baseline. One such way as adopted by the California ARB is to compare how the stand compares to other similar stands in the same eco-region using common practice. US Forest Inventory Analysis (FIA) provides common practice values for all the eco-regions in the US. If the stand is above the common practice values after modeling for change in stocks, then the project will have up front credits. From a landowner perspective, this is like a stewardship payment.

Figure 18. Mature Stands: IFM Issuance of Credits



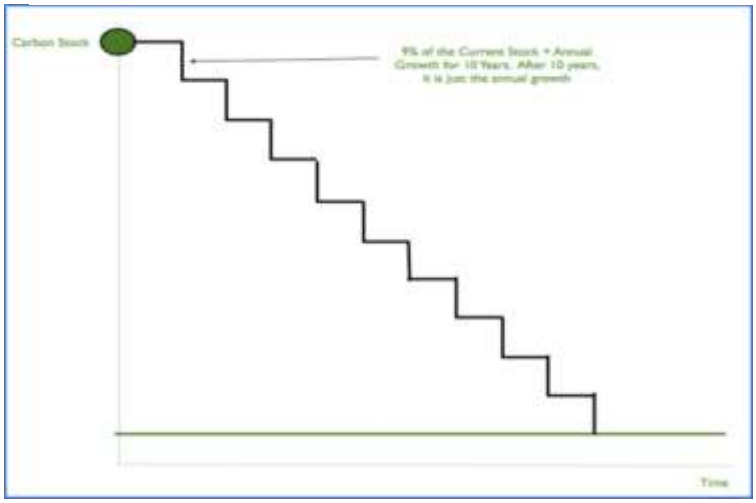
For afforestation, where one starts counting, known as baseline, is from bare dirt (Figure 19). For an IFM project, there are several ways to determine where the baseline starts. One way, adopted by the California ARB is to compare how the stand compares to other similar stands in the same eco-region using common practice. US Forest Inventory Analysis (FIA) provides common practice values for all the eco-regions in the US. If the stand is above the common practice values after modeling for change in stocks, then the project will have up front credits. From a landowner perspective, this is like a stewardship payment.

Figure 19. Afforestation Value Determination



Under California ARB protocols, an avoided carbon project receives 9% of the current biomass stock every year for 10 years plus the annual growth. After year 10, the annual growth is the only thing that continues (Figure 20).

Figure 20. Avoided Conversion Example for a Forest Carbon Project



How Can Landowner Exit?

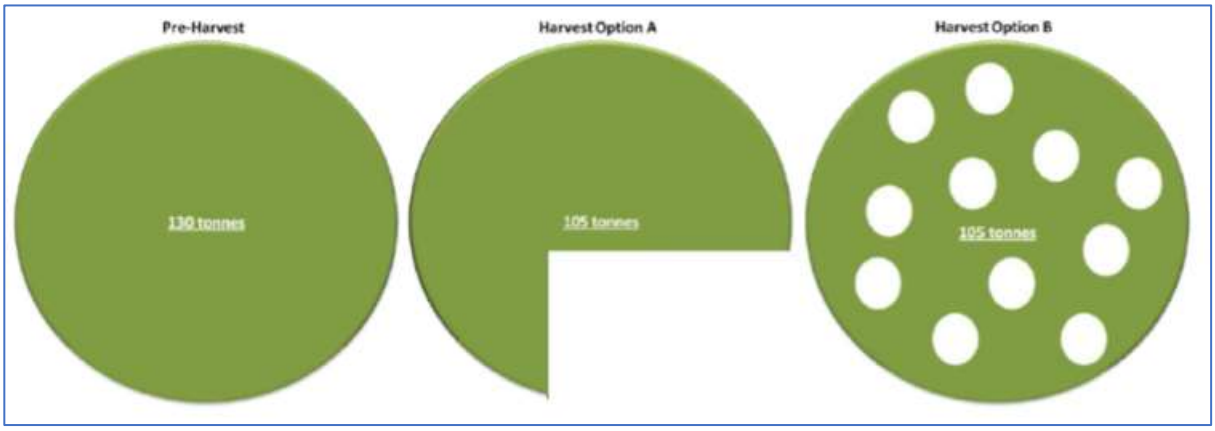
In the California ARB market, if the legislation sunsets, the permanence of 100 years for each ton sequestered also sunsets. However, if a landowner wants to exit, the landowner can purchase their way out. The table illustrates a sliding scale of how many tons need to be replaced per ton sold at market price.

No. of Years Elapsed between Project Commencement & the Date of Termination	Compensation Rate
0 - 5	1.40
6 - 10	1.20
11 - 20	1.15
21 - 25	1.10
30 - 50	1.05
50+	1.00

Can Landowners Still Cut Timber?

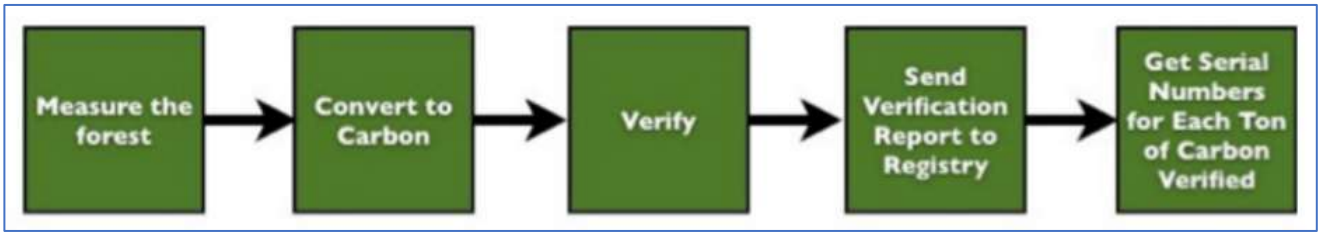
Yes, however, the landowner must maintain the project baseline. For example, with a project baseline of 100 metric tons, you could have several harvesting options.

Figure 21. Timber Harvest Options For Maintaining Baseline Conditions



The Carbon Process

Figure 22. Forest Carbon Calculation Process



The Carbon calculation conversion process is illustrated in Figure 22. It describes the process of converting biomass grown into a tradable commodity that has been independently verified by either a voluntary or compliance registry that requires *ex post facto.*

What Is This Going to Cost the Landowner?

Most project developers will include all the costs inside their portion of the credits. However, in the California Compliance Market, a landowner commits to the following schedule of monitoring and verification.

- Annual reports of stock change (prepared by a registered professional forester based on growth and yield monitoring)
- Every Sixth year, an on-site third-party verification
- Every 12 years, a full re-inventory by a registered professional forester.

Buffers and Reversals

- Every project must contribute to a buffer reserve. Buffers are designed to cover unintentional reversals, such as flood, fire, tornado, etc.
- The buffer is assigned during the verification process. Many factors go into determining the buffer percentage. A typical buffer is 20%.
- Therefore, if 100 tons are sequestered and you have a buffer of 20%, then 20 tons go into the buffer account and the project can transact 80 tons.
- Intentional Reversals are the liability of the landowner.

If landowners harvest biomass that reverses the tons sequestered it is an example of an intentional reversal as opposed to an Act of God risk.

Illustrative Income For Landowners

What Kind of Income Can A Participating Landowner Expect?

The short answer is: “It depends”:

- On the stand (as in relation to how the baseline is determined).
- On the growth rate of the stand.

- How the credit yield amortization is determined
- How the price curve develops.

Illustration of a 1,400 acre Property

- ACR IFM methodology for non-federal forest lands, version 1.3, excluding deadwood, no fire risk
- 3% Annual Growth of the stand
- 0% Leakage Deduction
- 15% Buffer Contribution
- Starting Price of $10 per mtCO2e, inflating at 5% per annum

Table 23. Illustrative Income For Landowners

	20 Year Total[45]
Credits Issued	182,462
Average Carbon Price over 20 Years	$17.00
Gross Income	$3,049,422
Total Per Acre Income	$2,130
Cumulative Credits Per Acre	$127.00
Average income per acre per year over 20 years	$106.00

B. *Scale, Structure, and Strategy*

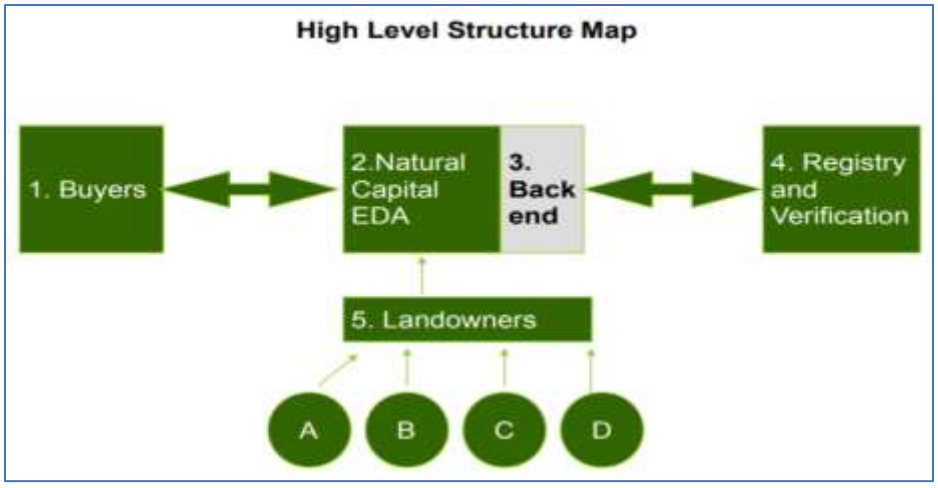
Scale

From the previous example, one can see that 1,400 acres generates 182,000 credits over 20 years. However, if this example were based on 50,000 acres under same circumstances, the pool of credits would be 6,350,000 over 20 years

Scale through Aggregation is key!

Structure

Figure 23. Conceptual Structure of "Natural Capital" EDA Model



[45] Illustration only. Actual returns will vary

STRATEGY AND COSTS

1. **Buyers**: Putting a forward contract in place for some of the projected volume on a unit contingent basis. Compensation as a percentage of dollars received.

2. **EDA**: Will the EDA need to create a SPV to assign the Landowner Contracts? Determine EDA share of gross revenue.

3. **Back-end Infrastructure**: A third-party will need to be sourced to bring in the expertise to develop landowner contracts, put the databases in place, field protocols, stratification strategies, product design document PDD validation, GIS mapping, data rooms and carbon calculations. *Pricing to be conducted on a per ton verified basis.*

4. **Registry and Verification**: The best registry for programmatic aggregation is American Carbon Registry.

5. **Landowners**: Determine who is responsible for marketing to landowners, marketing channels, what the financial arrangements will be with landowners, permanence requirements, etc. *Compensation paid on a per acre enrolled and successfully verified basis*.

CONCLUSION

The Healthy Watersheds Forest Retention Phase III project has demonstrated through three project phases that forested land is one of the most effective, and cost-effective, stormwater best management practices (BMPs) available. Consequently, the conservation of forest land has been included, along with reforestation, as an eligible BMP in the Chesapeake Bay TMDL model. Localities that conserve forested land through public policy actions to achieve their TMDL requirements will receive credit in the Bay model. Now, markets around the globe are saying that they too would like to place a premium value on conserved forested land and pay a premium to receive carbon credits for it. As such, Phase III of the Healthy Watersheds project has:

1. Tested and provided a land use policy path for localities within the Chesapeake Bay watershed to conserve forest and agricultural lands,

2. Identified an entity and authority necessary to aggregate landowners' potential ecosystem service offerings (e.g. carbon credits, water quality credits and habitat enhancement) and created a financial conduit linking the aggregated demand for those green resources with money for the landowners and host localities (putting "natural capital" on the local government balance sheet), and

3. Provided a Best Practices Manual as a roadmap for localities across the country to emulate at the local and regional level as desired.

This ***Report to the Chesapeake Bay Trust (CBT)*** constitutes a final deliverable for the CBT-funded portion of the Healthy Watersheds Phase III project. More importantly, it is intended to be a one-stop shop (although not a one size fits all) "how to" manual for any locality, or region, wishing to pursue similar forest and agricultural land conservation techniques to protect watersheds. Creating an economic value for existing and new forest is a new landowner incentive for forest conservation.

With the continued support of the U.S. Endowment for Forestry and Communities, additional work remains to be done over the next 6 – 9 months in documenting additional steps in the implementation and structure of the EDA land aggregator implementation model and documenting the steps necessary to stand up viable pilot programs in Orange and Essex Counties. Moreover, over the next year, Task 3 of the project will take on increasing importance through coordinating the findings and recommendations of Tasks 1 and 2 with Virginia's Chesapeake Bay Watershed Implementation Plan III, and with the Chesapeake Bay Goal Implementation Teams, work groups and committees to achieve wider impact throughout the Chesapeake Bay watershed.

APPENDICES

Appendix A. Abbreviations and Acronyms

Abbreviation	Explanation
AC	Avoided Conversion
ACR	American Carbon Registry
ACS	American Community Survey
A/R	Afforestation/Reforestation
AR5	Assessment Report 5 by IPCC
ARBOC	Air Resource Board Offset Credits
C	Carbon
CO2e	Carbon Dioxide Equivalent
CBPA	Chesapeake Bay Preservation Act
CBT	Chesapeake Bay Trust
CBWI	Chesapeake Bay Watershed Initiative
CCA	California Compliance Allowance
CCO	California Compliance Offset
CDE	Community Development Entity
CDFI	Community Development Financial Institutions Fund
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
CTA-GENRL	Conservation Technical Assistance Program (general)
CTA-GLC	CTA Program - Grazing Land Conservation
CRP	Conservation Reserve Program
CWA	Clean Water Act
DEQ	Department of Environmental Quality
ECP	Emergency Conservation Program
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
FIA	Forest Inventory Analysis
FRPP	Farm and Ranch Lands Protection Program
FSA	Farm Service Agency
FTE	Full Time Equivalent
IFM	Improved Forest Management
IPCC	Intergovernmental Panel on Climate Change
GHG	Greenhouse Gas
GRP	Grassland Reserve Program
GWAP	Germanna Wilderness Area Plan

ABBREVIATION	EXPLANATION
GWP	Global Warming Potential
HUC	Hydrological Unit Code
LCI	Local Composite Index
LIC	Low Income Community
LLC	Limited Liability Corporation
LPTC	Land Preservation Tax Credit
NMTC	New Market Tax Credit
NRCS	Natural Resource Conservation Service
QALICB	Qualified Active Low-Income Community Business
QALICI	Qualified Low-Income Investment
QEI	Qualified Equity Investment
RGGI	Regional Greenhouse Gas Initiative
RIBITS	Regulatory In-lieu Fee and Banking Information Tracking System
SLEAC	State Land Evaluation Advisory Council
TMDL	Total Maximum Daily Load
USACE	United States Army Corp of Engineers
USDA	United States Department of Agriculture
VA DCR	Virginia Department of Conservation and Recreation
VERs	Voluntary Emission Reductions
WHIP	Wildfires and Hurricanes Indemnity Program
WRP	Wetland Reserve Program or Wetland Reserve Easement

Key Terms and Conversions

Term	Definition
TERM	Definition
Conversion	**Description**
Short Ton to Metric Tons	US short ton is 2,000 pounds and a Metric ton contains 2,205 pounds. It takes 1.1025 short tons to equal 1 metric ton.
Carbon (C) to Carbon Dioxide Equivalent (CO_2e)	1 metric ton of Carbon = 3.6667 tons of CO_2e

Online Tools

Tool	Link
ArcGIS Portal	http://mfc.maps.arcgis.com/home/webmap/viewer.html?webmap=147777dffe9a455899f1b8209016bb66
Conserve Virginia Natural Heritage Data Explorer	http://vanhde.org/content/map
Chesapeake Bay Preservation Act	https://www.deq.virginia.gov/Programs/Water/ChesapeakeBay/ChesapeakeBayPreservationAct/RegulationsGuidanceandPublications.aspx
Novogradac NMTC Mapping Tool	https://www.novoco.com/resource-centers/new-markets-taxcredits/data-tools/nmtc-mapping-tool
The Nature Conservancy (TNC) State Climate Mitigation Pathways Tool	http://mitigationpathways.s3-website-us-west-1.amazonaws.com/
Trust for Public Lands (TPL) Tool	https://web.tplgis.org/carbonmap/
USACE RIBITS Registry	https://ribits.usace.army.mil/ribits_apex/f?p=107:2
Virginia Tech Use-Assessment Program	https://aaec.vt.edu/extension/use-value.html
Virginia Department of Forestry (VDOF) Agriculture and Forestal District Information	http://dof.virginia.gov/land/agforest/index.htm
Virginia Department of Education (VDOE) Composite Index Information	http://www.doe.virginia.gov/school_finance/budget/compositeindex_local_abilitypay/

APPENDIX C1: TASK 1 PLANNING REVIEW FINDINGS AND RECOMMENDATIONS FOR ORANGE COUNTY

Background

The Healthy Watershed Forest Project began in 2015 as an effort to quantify the value of forest cover for achieving Chesapeake Bay water quality and healthy watershed goals and outcomes. Localities in the watershed have long maintained that unless total maximum daily load (TMDL) credit is given for retaining forestland, which has already been thought of as one of the best land use solutions for clean water, there is little local incentive for conserving forestland. The goal of phase III is to address challenges associated with creating the policy and financial infrastructure needed to facilitate forest and agricultural land conservation/retention on a sustainable, Chesapeake Bay-wide basis. Phase III works with landowners and other County stakeholders to develop specific policies and financial benefits to landowners and taxpayers to achieve the environmental goals that have been established. Phase III has two tasks: (1) Develop and implement plans, policies and ordinances to foster high quality (HQ) forest and HQ agricultural land retention; and (2) Develop long-term funding mechanisms supported by the private sector. Essex County is one of two localities being assisted with the process of evaluating and potentially revising its Comprehensive Plan and key implementing ordinances (e.g., zoning and subdivision ordinances) to prioritize and promote protection of HQ Forest and HQ Agriculture land. The first task (i.e. making policy and regulatory recommendations) lays the foundation for task 2 (which is also in development) and will provide economic incentives for landowners to achieve the established environmental goals.

Orange County, with a vision to "Sustain the rural character of Orange County while enhancing and improving the quality of life for all its citizens," was an ideal location for the Healthy Watersheds pilot project. One of the three (3) foundational principles underlying the vision statement is "Wise resource planning and land use decisions directly impact our ability to attract and support a business base, while maintaining the rural nature of the County." The County's adopted Comprehensive Plan and land use ordinances all support the conservation of forested land.

Comprehensive Plan

The first of the four County goals, as listed in the Comprehensive Plan, is to "Promote and preserve our unique historic and environmental resources." Under that goal, several objectives and strategies outline specific activities with regard to supporting agricultural, forestal, open space, and other natural sites. The Comprehensive Plan notes that "forest" is the largest use of land in the County. It states that in Orange County there are 137,190 acres of forest land and 96 percent of this forest land is privately owned. For taxation purposes, the Comprehensive Plan notes that 47,020 acres of forest land are under land use assessment taxation. The Comprehensive Plan states that roughly 32,900 acres (15 percent of the County) have been placed in historic (3,900 acres) and conservation (29,000 acres) easements.

The County's second goal is to "Ensure the county is a competitive location for economic development opportunities." The County's plan references the value of land, recreation, health,

and tourism opportunities and this project will further the County's economic development objectives by putting its "natural capital" (i.e., forest and wetlands) onto its balance sheet while also assisting the Commonwealth in meeting its water quality goals. Paying landowners to conserve or create forest as a best management practice is a key focus of the Healthy Watersheds project and supports the County's economic development goal by creating a new conservation industry.

Zoning Ordinance

There are several provisions of the Zoning Ordinance that assist in conserving forestland and improving water quality:

- In the Agricultural Zoning District, forest and timber uses are allowed by-right. The development standards in the Agricultural Zoning District include a two (2) acre minimum for lot area, and the setback requirements for any new dwelling require that the dwelling be a minimum of fifty (50) feet from the shoreline of a waterway. The permitted uses and development standards of the Agricultural Zoning District will assist in sustaining the rural character and historic land development patterns of Orange County. The required fifty (50) foot setback of dwellings from shorelines acts similar to a water quality buffer area.

- Intensive livestock, dairy or poultry structures shall be set back at least one (1,000) feet from public water intake of a stream or river. The required one thousand (1,000) foot setback from streambanks again acts similar to a water quality buffer area.

- Provisions allow for the "Cluster Housing Development" subdivision method. In the Agricultural Zoning District, this subdivision method is only permitted on parcels that are one hundred twelve (112) acres or greater in size and do not feature a taxable improvement. In the Residential Zoning Districts, this subdivision method is allowed on any residentially zoned parcel. The Zoning Ordinance allows for the "preserved land" in a Cluster Housing Development to be used as forest land, and it requires that restrictive covenants or conservation easements be placed on the preserved land to prevent its future development. The Cluster Housing Development subdivision method is considered a low-impact development technique.

Subdivision Ordinance

There are several provisions in the Subdivision Ordinance that assist in conserving forestland and improving water quality by promoting the use of low impact design techniques in new development:

The following elements are required to be included on subdivision plats:

- Location of wells and septic drainfields on a property or within fifty (50) feet of a property.
- Location of the 100-year floodplain.
- Location of dam break inundation zones.

- Location of wetlands, waterbodies, perennial and intermittent streams.
- Soil analysis.
- Location of water and wastewater utilities.
- Erosion and sediment control plan.
- Stormwater management practices and facilities.
- Parcels located in floodplains must have enough area outside of the floodplain to accommodate the proposed improvements.
- Provisions related to water and wastewater:
    - Each proposed lot shall have a potable water supply approved by the Virginia Department of Health.
    - Proposed subdivisions with density greater than one (1) unit per two (2) acres are required to use a community water system or have a connection to a public water system.
    - For large subdivisions, a certification of adequate water supply by a professional geologist is required.
    - Subdivisions must have wastewater method approved by the Virginia Department of Health
    - Drainage accommodations must be made and pass a review process.
- Any subdivision containing twenty (20) or more lots may be platted, approved, and completed in phases. It requires that no phase of development may contain fewer than ten lots, and that each phase shall be subject to the utilities, zoning, plat standards, and other requirements in place at the time of platting, permitting, and/or construction.

Taxation Ordinances

Certain provisions of Orange County's property tax ordinances assist in conserving forestland and improving water quality include:

- Equipment and facilities that are certified as contributing to pollution control are exempt from local property taxes. This promotes cleaner water via state-of-the-art wastewater treatment plants and qualifying onsite sewage systems, cleaner air via solar energy facilities and other qualifying activities.
- The Land Use Value Taxation (LUVT), or land preservation assessment, allows for the tax assessment of real estate devoted to agriculture, forestry, or horticultural at a discounted rate.

Conclusions Drawn

After a review of Orange County's current Comprehensive Plan, land use regulations, and taxation ordinances, it was determined that existing policies and regulations as highlighted above had been long-standing and accepted by property owners, forest land stakeholders, and elected and appointed officials. This has given stability and predictability to the local land use decision making process, and as such give Healthy Watersheds a higher likelihood of success.

The Orange County Planning Commission currently has under development the recurring five (5) year update the Comprehensive Plan as required by State law. In recognition of the Healthy Watershed Phase III project and to memorialize the goal of creating financial incentives for forest land owners to properly manage forest lands, a goal establishing the Orange County Economic Development Authority as the local institution tasked with this responsibility is being included in the Comprehensive Plan update.

Orange County is proceeding directly to develop, implement, and manage a robust program through its Economic Development Authority to aggregate and facilitate forestland owner access to the carbon credit markets in direct support of this Comprehensive Plan goal and the Healthy Watersheds program. The Economic Development Authority will rely on full authority to do so under Section §15.2-4901 et seq. of the Code of Virginia, as amended.

APPENDIX C2: TASK 1 PLANNING REVIEW FINDINGS AND RECOMMENDATIONS FOR ESSEX COUNTY

Background

The Healthy Watershed Forest Project began in 2015 as an effort to quantify the value of forest cover for achieving Chesapeake Bay water quality and healthy watershed goals and outcomes. Localities in the watershed have long maintained that unless total maximum daily load (TMDL) credit is given for retaining forestland, which has already been thought of as one of the best land use solutions for clean water, there is little local incentive for conserving forestland. The goal of phase III is to address challenges associated with creating the policy and financial infrastructure needed to facilitate forest and agricultural land conservation/retention on a sustainable, Chesapeake Bay-wide basis. Phase III works with landowners and other County stakeholders to develop specific policies and financial benefits to landowners and taxpayers to achieve the environmental goals that have been established. Phase III has two tasks: (1) Develop and implement plans, policies and ordinances to foster high quality (HQ) forest and HQ agricultural land retention; and (2) Develop long-term funding mechanisms supported by the private sector. Essex County is one of two localities being assisted with the process of evaluating and potentially revising its Comprehensive Plan and key implementing ordinances (e.g., zoning and subdivision ordinances) to prioritize and promote protection of HQ Forest and HQ Agriculture land. The first task (i.e. making policy and regulatory recommendations) lays the foundation for task 2 (which is also in development) and will provide economic incentives for landowners to achieve the established environmental goals.

Findings

With this tagline "Essex County… from the forests to the water… Where Life is Good," Essex County is an ideal location for the Healthy Watersheds pilot project. The County's Comprehensive Plan and land use tools all support the conservation of forested land.

Comprehensive Plan

The County's Comprehensive Plan was adopted in 2015. The overall goal is to "Maintain and enhance the quality and character of the County by promoting the efficient use of the County's land and natural resources in order to effectively meet the social and economic needs of present and future residents providing for a more balanced and sustainable community." The plan includes six topical goals aligned with the sections in the plan: ENVIRONMENTAL CHARACTERISTICS AND NATURAL RESOURCES, LAND USE, TRANSPORTATION (2 goals), COMMUNITY FACILITIES AND PUBLIC SERVICES, and THE ECONOMY.

The first goal, under ENVIRONMENTAL CHARACTERISTICS AND NATURAL RESOURCES, is "Manage and enhance the natural resources and environmental quality of the County." Under that goal, several objectives and strategies outline specific activities regarding supporting agricultural, forestal, open space, and other natural sites. The Comprehensive Plan notes that "forest" is the largest use of land in the County. Based on 2013 high-resolution land cover data, roughly 104,000 acres or 63 percent of the total County land area is established in forest cover.

The remaining goals all mention the desire for well-planned economic development and balanced growth for a sustainable community. The County's plan references the value of land, recreation, health, and tourism opportunities, and this project will further the County's economic development objectives by putting its "natural capital" (i.e., forests and wetlands) onto its balance sheet while also assisting the Commonwealth in meeting its water quality goals. Devising

the means to pay landowners to conserve or create forest as a best management practice is a key focus of the healthy watersheds project and meets the County's economic development goal by creating a new revenue-generating conservation industry.

Zoning Ordinance

There are several provisions in the Zoning Ordinance that assist in conserving forestland and improving water quality:

- The ordinance was designed for 12 purposes, including "To provide for the preservation of agricultural and forestall lands and other lands of significance for the protection of the natural environment."
- Agricultural Preservation District, A-1, encourages continued agricultural and forest uses and preservation of the natural beauty of rural areas of the County where urban services, such as sewer and water mains, are not planned. This district allows forestry, tree farming, wildlife preserves, and conservation areas, as well as other uses. It also limits dwelling density to one unit per 20 acres.
- Agricultural, Limited District, A-2, also allows forestry, tree farming, wildlife preserves, and conservation areas, as well as other uses. It limits dwelling density to one unit per 5 acres.
- Residential Districts R-1, R-2, R-3, and R-5 allow forestry and reforesting.
- Business Districts B-1 and B-2 allow forestry and tree farming.
- Industrial Districts M-1 and M-2 allow agriculture, forestry, and reforesting.
- The Chesapeake Bay Preservation Area Overlay District identifies Resource Protection Areas as a 100-foot vegetated buffer near, in and around wetlands, tidal shores, and water bodies with perennial flow. It designates the remainder of the County as a Resource Management Area. (Also see Wetlands and Coastal Areas Ordinance as enabled by VA Code §28.2-1300).

Subdivision Ordinance

There are a few provisions in the Subdivision Ordinance that assist in conserving forestland and improving water quality in new development:

- Mandatory dedication of open space.
- The following elements are required to be included on subdivision plats:
    - Location of wells and septic drain fields.
    - Location of water and wastewater utilities.
    - Location of areas dedicated or reserved for public use.

- Provisions related to utilities:

    o Each proposed lot shall have a potable water supply approved by the health department.

    o Subdivisions must have wastewater method approved by health department.

Erosion and Sediment Control Ordinance

The purpose of this ordinance is to prevent degradation of properties, stream channels, waters, and other natural resources by controlling soil erosion and deposition associated with land-disturbing activities according to the Virginia Erosion and Sediment Control Handbook.

Floodplain Ordinance

The ordinance applies to property subject to inundation by water from the 100-year flood event to ensure inhabitants and property in the floodplain are safe from damage and do not create hazards in compliance with the National Flood Insurance Program. The ordinance regulates and restricts certain land uses in the floodplain. Protecting the floodplain area and function protects water quality and may encourage forest cover. By federal regulation, any development activity (including tree removal or land clearing) in the floodplain is subject to local approval and issuance of a land use permit.

Wetlands and Coastal Areas Ordinance

The ordinance regulates and restricts certain land uses in wetlands and coastal primary sand dunes in order to protect habitats and water quality as authorized by VA Code §28.2-1300. The Essex County Wetlands Board oversees this permitting process (also see Zoning Ordinance §15-1, Chesapeake Bay Preservation Act Overlay District).

Taxation Ordinance (LUVT)

The provision in the Taxation Ordinance that assists in conserving forestland and improving water quality includes:

- Special assessment for land preservation devoted to agricultural, horticultural, forest and open space uses in the public interest (Land use valuation tax).

Community Workshop

On Monday, June 24, 2019 a community workshop was held at the Tappahannock High School Cafeteria Common Area in Tappahannock, VA. The purpose of this meeting was to discuss the benefits of forest conservation, the challenges to conserving forestland, and potential strategies to address these challenges. The meeting began with a brief presentation by Darren Coffey and Denise Nelson of the Berkley Group, a member of the Healthy Watershed Forest Project team, and ended with a small group exercise in which four small groups discussed forest conservation benefits, challenges, and potential strategies to address these challenges.

The most commonly identified benefits of forest conservation and reforestation were related to economics (job creation, employment, business growth, attracting new businesses and staff, and supporting eco-tourism), improved water and air quality, increased wildlife habitat, and overall quality of life in the community. Preserving the county's rural character, opportunities for outdoor recreation, and the potential for revenue were also acknowledged.

The most commonly identified challenges were competition with other land uses, the decline in local timber processing facilities, the lack of education regarding conservation opportunities and benefits, and tax policies. There was also a concern over Virginia Department of Forestry (VDOF) capacity and the commitment to conservation strategies over the long-term.

Most commonly identified strategies that could address these challenges included increasing funding and capacity for existing programs (Reforestation of Timberlands, Agriculture and Forestry Industries Development, etc.) and significant outreach and education on opportunities and benefits. Other strategies included emphasizing conservation in the county's Comprehensive Plan, tighter restrictions on solar and fracking developments, and requiring offsets for developments that lead to deforestation.

Recommendations

Based on stakeholder input and conservation best practices, the following amendments to Essex County's land use and taxation policies are recommended to promote more forest conservation by financially benefitting landowners who choose to conserve their forestland or provide for new forest.

➢ Comprehensive Plan

- Section Two: Population Characteristics and Trends
    - Update demographic data
- Section Three: Environmental Characteristics and Natural Resources
    - Under the Objectives, add statements as indicated in italics
        - *Protect and improve the water quality of the Chesapeake Bay and its tributaries through the implementation of federal, state and local regulations, while at the same time encouraging economic growth. Identify opportunities to create jobs and generate revenue related to improving water quality.*
        - *Protect and enhance the natural resources and environmental quality of the County through measures which safeguard the County's natural resources and environmentally sensitive lands and waters. Provide landowners a variety of short-term and long-term options.*
        - *Protect and conserve the agricultural and forestry resources within the County, maintaining Essex's rural character, and supporting these important components*

of the County's economy. Support new approaches to enable landowners to generate revenue from these land uses.

- Create and include a high conservation value forest map
- In the discussion on Forest Resources, add these statements in italics
  - *More acres in Essex County are forested than any other single feature. Based on 2013 high-resolution land cover data, roughly 104,000 acres or 63 percent of the total County land area is established in forest cover.*
  - *Beyond the timber industry, the County recognizes that landowners find it difficult to conserve their forestland without a way to monetize conservation. As a significant County resource, forestry is also addressed in Section 4 LAND USE and Section 7 THE ECONOMY.*
- In the discussion on Forest Resources, add:
  - The amount of forest land that is public land and privately-owned.
  - The amount of forest land that is in land use taxation.

- Section Four: Land Use
  - Under the Objectives, add this statement:
    - *Facilitate and support landowner access to carbon markets through aggregation of landowners to reach a size that attracts the investment of private capital.*
  - Under Implementation, add these statements
    - *Create an Economic Development Authority (EDA), or work with the existing EDA, to facilitate landowner access to private capital investments associated with carbon markets.*
    - *Work with and educate landowners of various sized tracts of land about enhanced opportunities to access capital and benefits that support and enhance the agriculture and forest industries.*

➢ Zoning Ordinance

- Rename Agricultural Zoning Districts to Agricultural-Forestry (A-1 and A-2 to AF-1 and AF-2).
- Offer open space density bonuses for conservation without increasing overall density (see TDR discussion below).
- Specify conservation areas as a type of open space.

➢ Subdivision Ordinance

- Add the following elements to include on subdivision plats:
    - Location of the 100-year floodplain.
    - Location of dam break inundation zones.
    - Location of wetlands, waterbodies, perennial and intermittent streams.
    - Soil analysis.
    - Erosion and sediment control plan.
    - Stormwater management facilities.
    - Any areas of the tract under conservation or historic easement.
- Add that parcels located in floodplains must have enough area outside of the floodplain to accommodate the proposed improvements.
- Add the following provisions related to utilities:
    - Drainage accommodations must be made and pass a review process.
    - For major subdivisions, a certification of adequate water supply by a professional geologist is required.
- Require land clearing in phases.

➢ Taxation Ordinance

- Maintain some level of special assessment for land preservation to financially assist landowners with agricultural and forestall uses.
- Add an article to exempt equipment and facilities that are certified as contributing to pollution control from county taxes. This promotes cleaner water via state-of-the-art wastewater treatment plants and qualifying onsite sewage systems, cleaner air via solar energy facilities and other qualifying activities.

➢ Transfer of Development Rights (TDR) Program

A TDR program is another land use and economic development tool the County may wish to consider that could further enhance forest conservation and the local economy by strengthening designated urban growth areas while also preserving agrarian-forestal activities. Under Code of Virginia sections 15.2-2316.1 and 15.2-2316.2, Virginia localities are empowered to create Transfer of Development Rights (TDR) programs in order to conserve and promote the public health, safety, and general welfare.

A TDR program is a voluntary program that creates a financial return for landowners in the amount they receive from the purchase of their development rights. TDR is a concept in which some or all of the rights to develop a parcel of land in one district (the “sending”

district) can be transferred to a parcel of land in a different district (the "receiving" district). "Development rights" are assigned to landowners in the sending district, typically on the basis of a certain number of permitted dwellings per acre or square footage of commercial use. Owners of land in the sending district, instead of developing at the full level of their development rights, may sell their development rights to owners of land in the receiving district, who may then use the newly-acquired development rights to build at higher densities than normally allowed by existing zoning. TDR is a tool used to conserve open space, farmland, water resources and other resources in areas where a locality wishes to limit or curtail development or to foster higher densities to generate greater demand for commercial development, public transit, public utilities, etc.

To incorporate TDR, the County would need to amend the Comprehensive Plan to:

- Identify "Urban Development Areas" and designate them as "receiving areas" and
- Designate agriculturally-zoned land or conservation areas such as high value conservation forests or prime agricultural lands as "sending areas."

The County could also enter into an agreement with the Town of Tappahannock to include areas of the Town as "receiving" districts for development rights transferred from elsewhere in the County. Such an arrangement could benefit both jurisdictions by increasing densities that boost assessed values and add utility customers served by the Town-operated utility systems, while reducing development pressure on rural County agricultural and/or forest lands.

Conclusion

These recommendations can expand and monetize Essex County's natural capital, further promote forest conservation, and benefit from the resulting ecosystem services and financial benefits. This project focuses on including the County's natural capital on its balance sheet while also assisting the Commonwealth in meeting its water quality goals. Paying landowners to conserve or create forest, especially where existing riparian forest buffers may have become fragmented, as a best management practice is a key focus of the healthy watersheds project and meets the County's economic development goal by expanding the conservation industry.

APPENDIX D1: ORANGE COUNTY PUBLIC WORKSHOP SUMMARY

Community Workshop: Discussing Conservation Strategies in Orange County
Thursday, January 17, 2019
Town of Orange Public Works Community Room, 235 Warren Street, Orange, VA
6:00 – 7:30 PM
Agenda

✓ Welcome and Introductions

✓ Overview of the Healthy Watershed Project

- Purpose of the Healthy Watersheds Project
- Orange County's role in the Healthy Watersheds Project
- Overview of Forest Conservation/Reforestation
  - Defining forest conservation and reforestation
  - The benefits of forest conservation/ reforestation
  - Obstacles to forest conservation/reforestation
  - Common tools used to achieve forest conservation and reforestation

✓ Small Group Exercise

✓ Report Out Small Group Results

✓ Next Steps

✓ Adjourn

Healthy Watersheds: Improving Our Environment Through Conservation
Orange County: Discussing Forest Conservation Strategies
Small Group Exercise Worksheet

I. Appoint a group recorder to report out results.

II. Discuss the benefits of forest conservation and reforestation in the community (list 3-5 items) and list them in order of importance to the group. (15 min)

1. _____
2. _____
3. _____
4. _____
5. _____

Note any additional comments on challenges:

_____

_____

III. Discuss the top challenges for the community to conserve forestland and/or promote the reforestation of underutilized or marginal agricultural land (list 3-5 items) and list them in order of importance to the group. (15 min)

1. _____
2. _____
3. _____
4. _____
5. _____

Note any additional comments on challenges:

_____

_____

IV. Discuss strategies that could be used to address these challenges. List three to five strategies. (15 min)

1. _____
2. _____
3. _____
4. _____
5. _____

Note any additional comments on challenges:

_____

_____

V. Reconvene and report this group's recommendation(s).

Healthy Watersheds: Improving Our Environment Through Conservation
Orange County: Discussing Forest Conservation Strategies
Small Group Results

Group 1:

I. Benefits of Forest Conservation and Reforestation (in order of importance):

- Impact on water quality
- Wildlife habitat
- Air quality
- Reduces pollution
- Aesthetics (rural character)

II. Challenges to conserving forestland (in order of importance):

- Government bureaucracy (red tape)
- Resistance to change (resistance to new ideas)
- Lack of personal benefits (what's in it for the land owners?)

III. Strategies

- Educational program about the benefits of forest conservation
- Hosting roundtables and forums to spur discussion between land owners and conservation community
- Work with Farm Bureau and Logger's Association

Group 2:

I. Benefits of Forest Conservation and Reforestation (in order of importance):

- Environmental benefits
- Economic benefit (timber)
- Aesthetics (rural character)

II. Challenges to conserving forestland (in order of importance):

- Excessive bureaucracy
- Zoning
- Needs to suit the individual landowners needs

III. Strategies

- Voluntary programs
- Flexible arrangements with landowners

Group 3:

I. Benefits of Forest Conservation and Reforestation (in order of importance):

- Water quality
- Aesthetics (rural character)
- Wildlife and ecosystem
- Local economy
- Air quality

II. Challenges to conserving forestland (in order of importance):

- Residential development/sprawl
- Coordination and communication with government, neighbors, community
- Financial pressure (taxes, short term gain versus long term gain)

- Patience
- Lack of knowledge of alternatives and resources

III. Strategies:

- Transfer of Development Rights
- Orange County Green Infrastructure Plan
- Public relations and outreach programs
- Incentives for landowners to implement green infrastructure plan
  - ➢Reoccurring payments instead of lump sum
  - ➢ Shorter lease terms and smaller acreage, not entire property, conserved

Group 5:

I. Benefits of Forest Conservation and Reforestation (in order of importance):

- Air and water quality
- Controls urban sprawl
- Storm water and erosion control benefits
- Renewable commodity
- Wildlife habitat

II. Challenges to conserving forestland (in order of importance):

- Tax policies
- Regulation enforcement of land use planning
- Cost of land ownership

III. Strategies:

- Education to the public
- Tax policies to encourage forest ownership
- Get money to the owners

Group 6:

I. Benefits of Forest Conservation and Reforestation (in order of importance):

- Rural character
- Water quality
- Protects habitat, as well as provides opportunities for hunting
- Tourism
- Gradual financial benefit to land owners

II. Challenges to conserving forestland (in order of importance):

- Cost of establishing and maintaining forest
- Financial benefit of forest conservation compared to other opportunities

III. Strategies:

- Make forestland a more compelling land use than “open space”
- Public education about benefits of forestland
- Provide forum to understand interests of landowners
- Incentivize conservation

Group 7:

I. Benefits of Forest Conservation and Reforestation (in order of importance):

- Water quality
- Air quality
- Habitats and Wildlife
- Lower taxes
- Tourism, preserving rural character

II. Challenges to conserving forestland (in order of importance):

- Residential development
- Commercial development
- Poor management of forests
- Lack of financial incentives to be managed forest
- Monetizing an unhealthy forest

III. Strategies:

- Subdivision Ordinance to limit development
- Strengthen zoning ordinance to protect large forest properties
- Conservation easements for protection of large forest properties
- EDA to recruit companies with sustainability goals that will become forest conservation partners
- Environmental credits for residents in towns

Group 8:

I. Benefits of Forest Conservation and Reforestation (in order of importance):

- Support timber, logging and sawmill industry
- Wildlife benefits
- Water quality benefits
- Ground water re-charge

II. Challenges to conserving forestland (in order of importance):

- Development
- Small to little financial return for small forest owners
- Cost to reforest and maintain forestland
- Fencing of forest areas

III. Strategies:

- Create a program that accommodates individual circumstances
- Locally administered programs
- Forest management plans for land owners that recognizes life cycle of individual forests

APPENDIX D2: ESSEX COUNTY PUBLIC WORKSHOP SUMMARY

Community Workshop: Discussing Conservation Strategies in Essex County
Monday, June 24, 2019
Tappahannock High School Cafeteria Common Area
833 High School Circle, Tappahannock, VA
7:00 – 9:00 PM
Agenda

✓ Welcome and Introductions

✓ Overview of the Healthy Watershed Project

- Purpose of the Healthy Watersheds Project
- Orange County's role in the Healthy Watersheds Project
- Overview of Forest Conservation/Reforestation
  - Defining forest conservation and reforestation
  - The benefits of forest conservation/ reforestation
  - Obstacles to forest conservation/reforestation
  - Common tools used to achieve forest conservation and reforestation

✓ Small Group Exercise

✓ Report Out Small Group Results

✓ Next Steps

✓ Adjourn

Healthy Watersheds: Improving Our Environment Through Conservation
Essex County: Discussing Forest Conservation Strategies
Small Group Exercise Worksheet

I. Appoint a group recorder to report out results.

II. Discuss the benefits of forest conservation and reforestation in the community (list 3-5 items) and list them in order of importance to the group. (15 min)

1. _____
2. _____
3. _____
4. _____
5. _____

Note any additional comments on challenges:

_____

_____

III. Discuss the top challenges for the community to conserve forestland and/or promote the reforestation of underutilized or marginal agricultural land (list 3-5 items) and list them in order of importance to the group. (15 min)

1. _____
2. _____
3. _____
4. _____
5. _____

Note any additional comments on challenges:

_____

_____

IV. Discuss strategies that could be used to address these challenges. List three to five strategies. (15 min)

1. _____
2. _____
3. _____
4. _____
5. _____

Note any additional comments on challenges:

_____

_____

V. Reconvene and report this group's recommendation(s).

Healthy Watershed Forest Project
Essex County Community Workshop Results

Group 1:
I. Benefits of Forest Conservation and Reforestation (in order of importance):

- Economic benefit (jobs)
- Improved water quality; air quality
- Wildlife habitat
- Hunting
- Eco-tourism

Comments: Jobs for young people, attracts businesses to come

II. Challenges to conserving forestland (in order of importance):

- Other land uses / options
- Urban sprawl
- Agricultural users
- Family not willing to pass on to siblings

III. Strategies

- RT program required to replant cut land
- Need to reinforce programs already established
- Need programs in schools to education children on importance of forest

Group 2:
I. Benefits of Forest Conservation and Reforestation (in order of importance):

- Economics (employment, business growth)
- Tax implications (cost of services is low)
- Landowner benefits (quality of life, ability to manage land)
- Wildlife habitat
- Environmental (water, air)

Comments: efficient growth long term; good government (short term decision for a long term problem)

II. Challenges to conserving forestland (in order of importance):

- Good timber markets promote better forestry management practices. We lost 2 pulp mills.
- Education for landowners, publicity, education component
- Broadband focus
- Taxation – land use, government, schools – education funding does not recognize land use
- Marginal cropland, small fields

Comment: nutrient bank program

III. Strategies

- AFID grants
- State tax incentives for RT
- Education funding / land use formula
- Hiring good people in rural areas, services (broadband), quality of life, good schools
- Good government

Group 3:
I. Benefits of Forest Conservation and Reforestation (in order of importance):

- Water quality
- Eco-tourism
- Landowner quality of life
- Possible revenue stream
- Species variety

II. Challenges to conserving forestland (in order of importance):

- Uncontrolled development
- Economic drivers / concerns
- Keeping DOF funded during this program
- Balance between agriculture and forest land use
- Competition from solar and alternative energy (fracking)

III. Strategies:

- Getting more community involvement, incentivize participation
- Educating farmers and landowners on farmland conversion
- Inclusion in county's comprehensive plan
- Tighter restrictions on solar and alternative energy (fracking)

Group 4:
I. Benefits of Forest Conservation and Reforestation (in order of importance):

- Rural preservation, county heritage
- Economic (jobs, income)
- Water quality
- Wildlife habitat, recreation, other forest uses
- Carbon sequestration for cleaner air

Comments: Value of forest: primary for ecological value; healthy environment = healthy community.

II. Challenges to conserving forestland (in order of importance):

- Tax policies that don't drive forest owners away
- Loss of forestland – development, conversion to agriculture, solar, etc.
- Education for landowners (opportunities to sustain their forests) and voting public (benefits of forests)
- Fragmentation / zoning practices
- Healthy markets for forest resources

Comment: it's hard to rank these – all are important

III. Strategies:

- Land use taxation – improve, clarify, strengthen
- More extension education opportunities
- Conservation easements
- Fully fund RT program
- Offset programs for actions that lead to deforestation

Summary

The most commonly identified benefits of forest conservation and reforestation were related to economics (job creation, employment, business growth, attracting new businesses and staff, and supporting eco-tourism), improved water and air quality, increased wildlife habitat, and overall quality of life in the community. Preserving the county's rural character, opportunities for outdoor recreation, and the potential for revenue were also acknowledged.

The most commonly identified challenges were competition with other land uses, the decline in local timber processing facilities, the lack of education regarding conservation opportunities and benefits, and tax policies. There was also a concern over VDOF capacity and the commitment conservation strategies over the long-term.

Most commonly identified strategies that could address these challenges included increasing funding and capacity for existing programs (Reforestation of Timberlands, Agriculture and Forestry Industries Development, etc.) and significant outreach and education on opportunities and benefits. Other strategies included emphasizing conservation in the county's Comprehensive Plan, tighter restrictions on solar and fracking developments, and requiring offsets for developments that lead to deforestation.

APPENDIX E: "HOW TO" MANUAL FOR COMMUNITY PARTICIPATION IN HIGH-QUALITY FOREST AND AGRICULTURAL LAND CONSERVATION

A. Internal and External Strategic Planning Review

Prior to undertaking public policy reform to support HQ forest and agricultural land conservation and mobilizing a local economic/industrial development authority (EDA.IDA) to organize landowners to enter into a carbon sequestration deal, it is suggested that the locality's public administration and planning team undertake a review of internal and external considerations that may affect, positively or negatively, policy maker and public actions/reactions and discuss this strategic assessment with the community's governing body. These considerations are outlined below with some commentary to elaborate what impacts or bearing they could have on the policy reform process.

1. Internal Factors

a. The Stability of Elected Board/Council and Local Government Administration

An elected governing body (i.e. County Board of Supervisors or Town/City Council), local government administration or planning office with significant or frequent turn-over represents a challenging environment to undertake forest conservation or other land use policy changes. The ability to communicate a coherent justification or rationale to the policy Board and the general public for such land use policy reform may be significantly impaired where key locality staff or appointed or elected positions are or have been in transition.

b. The Working Relationship between Board/Council and Planning Commission

Under the Code of Virginia, the local Planning Commission plays an important role in developing and recommending the comprehensive plan and land use ordinances. Still, the governing body (Board/Council) may accept, revise or reject the recommendations of the planning commission or refer recommendations back to the commission "for further study" which may have the effect of tabling the recommendation for some period of time. Consequently, a close and constructive working relationship between a locality's planning commission and the governing body is critical to affect land use policy reform which is recognized by both bodies and the general public as being beneficial and "in the public interest."

c. The Locality's Fiscal Condition and Fiscal Stress

Many localities in Virginia (and elsewhere), particularly rural ones, find themselves struggling to fund basic public services and facilities to serve the community while maintaining a competitive business and economic climate. The combined effects of rural population decline, economic decline, public school costs and constrained tax base growth (e.g. state or federal land, reduced land valuation from conservation easements and land use tax credits) make it difficult for many localities to sustain a reliable tax revenue stream. Additional costs such as inflation and unfunded program mandates passed on by the state and federal governments further compound this fiscal stress.

The opportunity to connect rural forest and agricultural landowners with private market revenue streams associated with carbon sequestration offset trading (and possibly other ecosystem service markets) may be seen as a game-changing "windfall" for financially-strapped rural landowners and their local governments. This environment may promote a local rush to "cash-in" on a new revenue opportunity without providing an appropriate policy framework built upon a broader community understanding of the benefits and trade-offs resulting from new forest and agricultural land conservation programs.

d. The Locality's State of Resiliency Preparedness

Forest retention and riparian forest buffers may be important considerations for evaluating a community's resiliency and preparedness for catastrophic natural hazards, particularly flooding and forest fires. Communities in Virginia are advised to review their adopted regional all-hazard mitigation plan for strategies that promote or encourage forest retention and restoration of forested stream buffers to mitigate flood and forest fire hazards.

e. The Locality's Existing Land Cover, Land Ownership, Conservation Easements and Land Use Value Taxation Patterns

While a community may have extensive forested land cover, it may be on federal or state-owned lands and not under private ownership where local land use policy and ordinances impact the conservation or development of land. Moreover, there may be significant forested acreage already being conserved through conservation and historic easements, agricultural and forestal districts and through the local land use value taxation program. Understanding the extent and ownership of a community's forest and open space resources is important to assess how best to promote further forest retention, reforestation, and agricultural land conservation. This understanding can be developed using spatial analysis tools (i.e. geographic information systems or "GIS") and the analysis of tax parcel data in combination with publicly-available high-resolution land cover data.

2. External Factors

a. The Locality's Development "Climate"

The community's development "climate" or the pace of development pressure can affect how the public and the governing body view proposed governmental actions to foster greater voluntary land conservation. In a community "starved" for new revenue streams to sustain and meet governmental obligations, there may be both a desire to foster participation in private market-based forest and agricultural land conservation programs (bringing in outside private capital to support conservation) as well as a desire to rescind or revise existing land use value taxation programs (thereby reducing fiscal stress on local budgets). On the other hand, in communities with a more robust economy and significant development activity, there may be a reluctance to adopt forest conservation policies and programs unless they are seen as complementary to the locality's conventional development climate.

b. The Locality's Geo-Political Setting

Across Virginia, localities' environmental management responsibilities with respect to development and associated soil erosion and sediment control programs are highly variable, depending on their location within or outside of the Chesapeake Bay Preservation Area and the larger Chesapeake Bay watershed and their choice to opt-in or opt-out of certain state pollution control programs.

Many urban communities are affected by federal MS4 stormwater management permit program requirements and permit provisions which may lack the flexibility to realize adequate pollution-reduction benefits from existing or enhanced forest conservation initiatives, even those with substantial remaining forest land cover. Significant financial benefits could still be realized by landowners even if additional environmental remediation credit is not given to the locality.

The administrative landscape of regional soil and water conservation districts can affect the existence and efficacy of various non-point pollution programs in any specific jurisdiction. Furthermore, the vagaries in state and federal funding for cost-share programs for forest, agricultural and septic system management programs may affect how much perceived community benefit may be derived from promotion of existing forest retention as well as reforestation of riparian buffer gaps.

c. Existing Regional Green Infrastructure Planning Efforts

Where existing regional green infrastructure plans exist, this effort may identify and prioritize regional forest and woodland assets which could be better protected by coordinated local actions. Communities interested in adopting a forest retention policy and promoting private forest conservation and reforestation efforts may benefit from identifying and fostering political and community interest in this initiative. The opportunity to act collaboratively with other localities to address problems of forest loss, fragmentation and riparian forest buffer gaps would strengthen the overall benefit to fragile or endangered ecosystems, and contribute to improved local stream water quality, improved storm water management and protection of natural habitat that supports local flora and fauna. Localities acting together in a regional context, where clear local and regional benefits are identifiable, can enhance the overall social, environmental and economic impact of a forest conservation initiative.

d. The Political Election and Comprehensive Plan Review / Update Cycles

Localities are required under the Code of Virginia to review their community's comprehensive plan every 5 years in order to keep the plan relevant to the community's needs and changing circumstances (e.g. revised long-range population projections, new planning requirements or enabling legislation under state law). How this review cycle coincides with the four-year term of local Board or Council elections may affect the outcome of land use policy reform through comprehensive plan and related implementation ordinance amendments.

e. Utility-scale Solar Facilities

Corporate and public demand for clean, renewable energy has contributed to a shift in the regulatory environment that, in turn, has fostered a proliferation in the siting and increasing size of utility-scale solar facilities throughout the country, including Virginia. These facilities, while contributing to meeting the societal goal of energy-source diversification and resiliency, can have a significant adverse impact on a community's forest resources. With the restrictions imposed on Virginia localities' taxation authority over these utility-scale solar installations, conservation of existing forest and agricultural lands, along with implementation of the Natural Capital EDA model, may offer greater fiscal benefit to localities.

To preserve these resources and the rural character of the community, local governments should make it clear in their comprehensive plans (and associated land use ordinances) that these large-scale solar facilities should not be located on land that is forested (i.e., do not timber the land in anticipation of a utility-scale solar facility) or on prime farmland or farmlands of statewide importance as defined by the USDA and Commonwealth of Virginia, respectively.

B. Defining and Identifying High Quality (HQ) Forest and Agricultural Lands

From a statewide perspective in Virginia, there are several State agencies involved with identifying and prioritizing lands most suited for conservation. The tools and resources developed through these programs may provide guidance to a community wanting to establish some objective basis for identifying high-conservation value forest and agriculture lands within the local jurisdiction. Most of these public domain resources are available as published maps, reports and, perhaps most usefully, spatial datasets[46] which can be used in a geographical information system (GIS) to overlay landscape features on a community tax parcel map to identify and prioritize where HQ forest and agriculture land is located, as well as community development patterns and planned development that may adversely impact these lands. The principal state agencies with relevant information are listed below. The source contacts and detailed descriptions of relevant information resources available are summarized in Appendix A.

1. Virginia Department of Forestry (VDOF)

VDOF recently released an updated statewide map of high conservation value forest lands based on 2013 imagery and a revamping of the prioritization criteria. This information, along with other reports and analytical tools, is helpful to localities trying to identify and prioritize HQ forest land.

2. Virginia Department of Conservation and Recreation (VDCR)

VDCR, through its Natural Heritage and Land Conservation programs, has a wealth of spatial data and models, including ***Conserve Virginia,*** that prioritize land for conservation

[46] It is important to note that, with a few notable exceptions, the relative spatial accuracy of some state-level datasets may make them less useful at the local government level, particularly when applied at the tax parcel level, and should be considered more of a general overview of the regional and community landscape.

based on numerous criteria. Moreover, the Land Conservation division of VDCR maintains a statewide database of lands under conservation easements, as well as other lands under federal, state or local government control.

3. Virginia Department of Environmental Quality (VDEQ)

VDEQ, through its coastal zone, water quality and environmental GIS programs, has several spatial data sets to help identify at-risk natural assets; for example, local stream segments with various water quality impairments which contribute to Bay impairments. Mapping these streams along with high-resolution land cover data and tax parcel boundaries could help define opportunities for riparian buffer restoration, as well as targeted nutrient and sediment reduction strategies.

4. Virginia Geographical Information Network (VGIN)

VGIN maintains the 2013 high-resolution (1 meter pixel resolution) land cover data that is being used by state, regional and some local government agencies to develop stormwater management plans for the Chesapeake Bay Total Maximum Daily Load (TMDL) program and state and regional Watershed Implementation Plans (WIPs) to meet the 2025 TMDL goals. These data files are huge, and require considerable GIS technical skill to manipulate. Several planning district commissions and some regional non-governmental organizations (NGOs, e.g. Friends of the Rappahannock) have assembled and constructed discrete GIS files for each of their member localities. Consequently, for communities starting "from scratch" in working with these files, it is recommended to explore other possible regional or local sources that may have created locality-specific files useful for land cover analysis.

C. How to Plan for Forest and Agricultural Land Conservation

Once a community, or the governing body, has decided to pursue forest and agricultural land conservation as a healthy watershed land use policy, and the preceding strategic planning review has been performed, a local strategy can be developed to adopt and implement such policies. There is no "one size fits all" methodology to adopting public policy revisions successfully as all communities have different priorities, politics, players and cultures. There are, however, some fundamental best practices that every community should take into consideration when developing their land use tools, including forest and agricultural conservation land use policies and ordinances.

1. Public Participation

Public policy development should always include a meaningful public participation component. This can be different depending on the community's demographics, political processes, stakeholder involvement practices and many other factors. Prior to creating or updating land use policies, a Public Participation Plan should be adopted by, or acknowledged by, the governing body. This plan needs to be informed by the internal and external factors mentioned above and be tailored to the community's citizens and other

stakeholders to receive useful input to shape the policies to be developed. A Public Participation Plan should lay out the project process and each opportunity for public engagement. The plan sets forth the expectation that there will be some significant level of public involvement during the formulation of the land use policies under consideration. An example is:

EVENT	DATE
Community workshop to solicit public input	January 20XX
Joint work session with Planning Commission and Board of Supervisors	February 20XX
Open House style meeting to review findings and recommendations	March 20XX
Presentation of Final Report to Planning Commission and Board	April 20XX
Comprehensive Plan or Ordinance Amendments – schedule public hearings	May/June 20XX

Some communities would desire much more participation than in the example above, but this example demonstrates that you can have both a meaningful and streamlined process. While extensive public participation can significantly prolong a land use project, it does not have to unnecessarily delay it.

Once the Public Participation Plan is in place, it is important that the meetings allow for meaningful participation that will result in substantive input for the project. There are many ways to achieve this and professional planners and trained planning commissions will know what is best for their community in most cases. Often, the fear of letting go of process control will inhibit a project and limit what it can achieve. Sometimes community leaders are concerned that, if given the chance, the public will take over the process. It is important that a process is facilitated so the public participate in it rather than try to lead it. Developing an inclusive and meaningful public participation plan sets the parameters and expectations for all parties which should lead to the best possible project outcome.

2. Stakeholder Involvement

As important as the public's input is to land use policy development, it is imperative that the relevant stakeholders participate throughout the process as well. These stakeholders should always include the governing body and the planning commission but may also include other parties such as the economic development authority, agriculture/forestal board, the local soil and water conservation district, and other appointed or elected bodies as appropriate to the discussion. In Virginia's Healthy Watersheds pilot community of Essex County, the Board of Supervisors, Planning Commission and Agricultural and Forestal Economic Development Advisory Board participated in every community meeting and public discussion. Having those key stakeholders at the table throughout the process was an excellent way to ensure maximum buy-in and participation by key decision makers and community leaders.

3. Document Review

It is often said that you can't know where you are going if you don't know where you've been, and that is true with developing forest conservation policies as well. Reviewing a community's comprehensive plan, zoning ordinance, subdivision ordinance, taxation ordinance, environmental ordinances (mostly state or federal mandates), regional (and/or local or adjoining local) green infrastructure plans and any other relevant materials is a time-consuming but vital step in developing a meaningful forest conservation policy. The document review may reveal that only minor amendments are needed to existing plans, policies or ordinances. The review may also show gaps or other deficiencies that can be corrected with the new or updated policies.

A key component of the document review process (and sometimes a separate task) is the environmental diagnostic analysis of the locality's land use tools, namely the comprehensive plan and zoning and subdivision ordinances. This in-depth review goes deeper than the literature review of existing policies. The diagnostic shows if there are any state code, Chesapeake Bay Preservation Act or other State- or watershed-specific mandates that are not being addressed in the local plans and ordinances. It also can identify and recommend best practices that can be incorporated into the plans and ordinances. This step lays the foundation for other project tasks.

4. High Quality (HQ) Forest and Agricultural Land Cover Analysis

Another foundational component of the process is the HQ forest and agricultural land cover analysis. This analysis identifies the location and type of existing forest and agricultural lands (and other natural areas) and the land ownership patterns and conservation practices (or lack thereof) which affect the control and use of these lands. This is typically an advanced analysis of GIS data. Many of the key data sources and components of this analysis are discussed herein under "Defining and Identifying High Quality (HQ) Forest and Agricultural Lands," and additional information is provided in Appendix F. As with the document review task, this HQ land cover analysis establishes a baseline of a community's public and private forested and agricultural lands, and lays a powerful foundation for where it would be beneficial to establish new riparian forest buffers, as well as protect privately-held forest lands that adjoin public forestland or convert marginal agricultural lands into forest production.

It should also be noted that there is no formal or consistent definition used in Virginia to define high conservation value forest or agricultural lands and there are varying methodologies and prioritization mapping schemes. In compiling and analyzing this data, it is recommended that each locality determine the forest and agricultural lands of value. While the Healthy Watersheds project began with an emphasis on conserving high quality forest and agricultural lands, it is equally as important to determine where new forest or agricultural lands might be located. From a layman's perspective, any land within 300 feet of a perennial stream could be considered high conservation value land for the purposes of water quality and, if forested, would provide an effective buffer to filter stormwater runoff. Obviously, wetlands, sensitive habitats, old growth forest, and other

such lands would be considered HQ for purposes of forest conservation to achieve a healthy watershed. State and federal land, land under conservation easement, agricultural and forestal district land, and other public or private land that is considered protected open space is also of significant value.

5. Plan/Ordinance Recommendations

Once all existing environmental-related documents and information have been reviewed and analyzed, the next step is to develop specific recommendations for plan or ordinance amendments or other policy tools, such as the development of related mapping layers and other data source updates. These amendments might consist of revising or adding new comprehensive plan goals, objectives and strategies as appropriate to support project recommendations regarding forest and agricultural land conservation and watershed protection. Implementation- oriented strategies should be in direct support of identified objectives or goals and prioritized with clearly-defined accountability and timelines. Each strategy should be identified as short-term or long-term and have stakeholders assigned to ensure strategies are implemented successfully.

Once recommendations are made, the text can be tailored to fit the existing plan and ordinances including section numbers, etc. When amending a comprehensive plan or an ordinance, it is important to clearly show existing text versus the proposed revised or new text along with any new exhibits, maps, etc. This transparency is critical to linking the public input, the findings and recommendations, and the subsequent plan/ordinance changes; and builds credibility and project legitimacy with the general public.

Updated mapping may be an initial project deliverable, or it may have to be a long-term deliverable that is performed by a third-party (i.e. regional planning agency, SWCD or private entity). Updated data and visuals are an important part of telling any community's story and demonstrating the critical habitat and forests that exist or are planned. Text with specific implementation strategies and accountabilities are important, but good mapping based on up-to-date and appropriately-scaled information is just as critical for proper project planning and execution.

6. Plan/Ordinance Adoption

Prior to conducting the required public hearing(s) for adoption of plan or ordinance amendments, the proposed updates should be reviewed by the public in an open house, public meeting setting where information (e.g. proposed new text and maps) is presented and questions can be asked (or additional ideas presented), preferably one-on-one. This addition public meeting is a direct follow-up to the initial public workshop where ideas were gathered from the public and incorporated into the project recommendations. This meeting provides a venue that demonstrates the work done by any committees, commissions, or boards in the development of the project and a final, less formal setting for comments to be given and received prior to the formal public hearing input process. The goal of the open house meeting is to give the public project information in as

effective, transparent and open a manner as possible to encourage dialogue and build support for the project and its implementation.

After the open house has been conducted, the planning commission and governing body need to conduct public hearings in accordance with State code and consistent with other land use amendment procedures. In Virginia, this is governed by §15.2-2204 of the Code of Virginia, but other states have their prescriptive procedures that are similar and set forth in their state code.

D. Implementation Actions

The most important part of public policy development is that, once adopted, it is implemented effectively and successfully. Provided below are recommended actions that the Healthy Watersheds Forest Conservation Project team has prepared for the local governments participating as pilot communities in Phase III. If implemented, these actions would assist governments in strengthening the ability of land use tools and public programs to encourage and incentivize the conservation of forestland. These actions have been split into two timeframes:

- Short Term Actions: intended to be implemented in 1-6 months.
- Long Term Actions: intended to be implemented in 6-18 months.

Each recommended action is accompanied by identified stakeholders that should participate in the development and adoption of the recommended action. For all actions the governing body, planning commission, and staff are critical stakeholders. Other actions require additional stakeholders as well.

For communities wanting to pursue public policy reform to create a policy framework supportive of active promotion of forest conservation and reforestation, there are a host of tools which can and should be used to affect policy reform and voluntary landowner participation. These actions are discussed further below.

1. Stakeholder Engagement

Outreach and education with stakeholders are essential for successful implementation.

Short-Term Actions:

1. *Community Forums*
   - Recommendations:
     - Host a community workshop with breakout group discussions on the benefits, challenges, and strategies related to supporting forest conservation (see Appendix B for an example group exercise).
     - Host an open house style meeting for project information presentation and interactive, one-on-one dialogue with participants.
2. *Public Hearings*

- Recommendation: As required by State code, advertise public hearings allowing the general public to listen and make comments when enacting revisions to local government policies and procedures prior to their adoption.

LONG-TERM ACTIONS:

1. *Annual community forums to discuss conservation goals and strategies*
   - Stakeholders: Planning commission, planning staff, general public, agricultural community (including the farm bureau), timber community and conservation community.

2. *Public education program on the benefits of forest conservation*
   - Stakeholders: Planning commission, planning staff, public schools, general public, agricultural community, timber community and conservation community.

2. Comprehensive Plan Amendments

SHORT-TERM ACTIONS:

1. *Update Goals, Objectives, Strategies*
   - Recommended additions:
     - Protect and improve the water quality of regional surface waters through the implementation of federal, state and local regulations, while at the same time encouraging economic growth. Identify opportunities to create jobs and generate revenue related to improving water quality.
     - Implement measures which safeguard natural resources and environmentally sensitive lands and waters. Provide landowners a variety of short-term and long-term options.
     - Protect and conserve forestry and agricultural lands, maintaining the rural character, and supporting these important components of the economy. Support new approaches to enable landowners to generate revenue from these land uses.
     - Protect and conserve areas that are important to plant and wildlife habitats within the community.
     - Facilitate and support landowner access to carbon markets through aggregation of landowners to reach a size that attracts the investment of private capital.
       - Create an Economic Development Authority (EDA), or work with the existing EDA to amend its authority, to allow the EDA to facilitate landowner access to private capital investments associated with carbon markets.
       - Work with and educate landowners of various size or strategically-located tracts of land about enhanced opportunities to access capital and benefits that support and enhance the agriculture and forest sectors.

2. *Update demographic data, parcel and acreage data, land use and land cover data, forest and woodlands data*
   - Additional stakeholders: Regional or local GIS staff (or a third-party under contract).
   - Recommendations:
     - Update data and associated mapping.
     - Determine the amount of forest land that is public land and privately-owned as well as the amount that is under conservation easement, located within an agricultural-forest district or participating in land use taxation.

3. *Identify Urban Development Areas (UDAs) for future Small Area Plans*
   - Additional stakeholders: may involve regional entities (e.g. planning district commissions, soil and water conservation districts, or chambers of commerce).

LONG-TERM ACTIONS:

1. *Identify "sending areas" and "receiving areas" for Transfer of Development Rights (TDR) program.*
   - Recommendations:
     - Consider delineating HQ forest and agriculture lands as "sending areas" where developers are encouraged to buy-up development rights for transfer to urbanizing "receiving areas".
     - Collaborate with local planners, planning commissions and governing bodies to accept designation of "receiving areas" with corresponding amendments to comprehensive plans and local ordinances (e.g. designated areas of towns, cities and counties).

2. *Update Future Land Use Map to reflect conservation goals, high value conservation forested areas, sending and receiving areas for TDR and UDAs*.

3. Zoning Ordinance Amendments

SHORT-TERM ACTIONS:

1. *Allow for phasing of development projects*
   - Recommendation: Permit or require the development of projects in discrete phases. This better controls deforestation and mitigates sediment erosion as well as stormwater runoff.

2. *Rename Agricultural Zoning Districts to Agricultural-Forestry Zoning Districts*
   - Recommendation: Rename zones to highlight the forestry component of all agricultural zoning districts.

3. *Increasing the minimum lot size in the Agricultural-Forestry Zoning District*

- Recommendation: Increase minimum lot sizes in agricultural and forestry districts to more than 2 acres and not less than 5 acres in areas where forest conservation is a primary goal.

4. *Adjusting maximum densities in zoning districts (increasing density in higher density districts, decreasing density in lower density districts)*
   - Recommendation: Decrease overall density in agricultural and forestry districts where forest conservation is a primary goal is recommended. Areas designated for growth could permit additional density to offset the restrictions in conservation designated areas.

5. *Restructuring PUD Districts to further incentivize conservation*
   - Recommendation: Permit additional density in PUDs. Open space is also a vital and valuable component to a well-planned mixed-use district.

6. *Restructuring Cluster Development regulations to allow for cluster developments on agricultural parcels of 50 acres or greater*
   - Recommendation: Preserve open space as part of the community and locate all of the permitted dwelling units to be located more closely together, ideally on a central water and sewer system which would allow for even smaller lots. If the open space were forested, it could be eligible for carbon market related revenue as proposed in the Healthy Watersheds project.

7. *Offer open space density bonuses for conservation without increasing overall density*
   - Recommendation: Permit the total number of dwelling units on a tract of land to be located more closely together than typical development that would be more spread out and isolated in order to more effectively conserve forested land and other open space.

8. *Name conservation areas as a type of open space*
   - Recommendation: Account for conservation areas as a type of open space.

LONG-TERM ACTIONS:

1. *Establishing a Riparian Buffer Overlay District*
   - Recommendation: Restrict development in the identified area (e.g., within 100' of either side of identified riparian streams) and better protect existing (or future) forest from being timbered for agriculture or development.

2. *Establishing a Transfer of Development Rights (TDR) program*
   - Recommendation: Enable a TDR program and corresponding zoning text amendments to legally implement such a transfer of rights as authorized by State code.

3. *Update Zoning Map to reflect changes to the Future Land Use Map of the Comprehensive Plan*
   - Recommendation: Update the Zoning Map. It is the legal instrument designating all base or overlay zoning districts in jurisdictions consistent with the zoning district regulations set forth in the zoning ordinance. The zoning map is also the implementation method for recommendations made on the Future Land Use Map.

4. Subdivision and Planned Unit Development (PUD) Ordinance Amendments

SHORT-TERM ACTIONS:

1. *Update requirements for items included on subdivision plats and PUD site plans*
   - Recommendations:
     In addition to other State Code requirements, add:
     - Location of the 100-year floodplain.
     - Location of dam break inundation zones.
     - Location of wetlands, waterbodies, perennial and intermittent streams.
     - Soil analysis.
     - Erosion and sediment control plan.
     - Stormwater management facilities.
     - Any areas of the tract under conservation or historic easement.

2. *Update requirements*
   - Recommendations:
     - Require dedication of open space.
     - Add that parcels located in floodplains must have enough area outside of the floodplain to accommodate the proposed improvements.
     - Add the following provisions related to utilities:
       - Drainage accommodations must be made and pass a review process.
       - For large subdivisions, a certification of adequate water supply by a professional geologist is required.
     - Require land clearing in phases.
     - Incorporate a cluster section to directly support that form of subdivision.

5. Taxation Ordinance Amendments

SHORT-TERM ACTIONS:

1. *Allow special land use valuation tax for forestry and agricultural preservation*
   - Stakeholders: Commissioner of Revenue, large land owners, development community, general public

2. *Allow special tax exemption for pollution control equipment and facilities*

- This promotes cleaner water via state-of-the-art wastewater treatment plants and qualifying onsite sewage systems, cleaner air via solar energy facilities and other qualifying activities.

6. Programmatic Changes and Development Actions

LONG-TERM ACTIONS:

1. *Development or update of a regional or local "Green Infrastructure Plan" which provides a local "roadmap" of priority forest and agricultural lands for conservation and an action agenda to achieve the defined conservation goals.*
   - Stakeholders: Planning Commission, Planning Staff, general public, agricultural community, timber community, conservation community, development community

2. *Development of Small Area Plans for newly identified Urban Development Areas*
   - Stakeholders: County and Town (if any) Planning Commissions, Planning Staffs, general public

3. *Create and maintain a reliable database on amount of impervious surface area within the local community (i.e. city, county or town).*
   - Stakeholders: County and Town (if any) Planning Commissions, Planning Staffs, County and Town (if any) GIS staff

4. *Establishing a partnership between locality and Virginia universities. Allow for students to assist landowners in developing forest management or conservation plans*
   - Stakeholders: Planning commission, planning staff, public schools, soil & water conservation districts, agricultural community, timber community, conservation community, Virginia universities

APPENDIX F. INFORMATION RESOURCES AND DATA SOURCES FOR DEFINING AND IDENTIFYING HIGH QUALITY FOREST AND AGRICULTURE LANDS

A. Federal/National Agency Resources

1. US Dept. of Agriculture (USDA) & National Resource Conservation Service (NRCS)

   - Geospatial Data Gateway:
     - Direct Data/NAIP Download
     - Web Soil Survey

2. USDA & US Forest Service: I-Tree Toolkit

   - The Carbon On Line Estimator and i-Tree are two of the tools available from the U.S. Forest Service for carbon inventory, management, and reporting.
   - Forest Incentive Programs Available in Virginia

3. Federal Emergency Management Agency (FEMA): FEMA Map Specialist

4. National Oceanic and Atmospheric Administration (NOAA)

   - Digital Coast Toolkit

B. Virginia Agency Resources

1. Virginia Department of Forestry (VDOF)

   Since 1914, the Virginia Department of Forestry (VDOF) has worked to protect and improve Virginia's working forests. Today the VDOF is taking the lead in protecting working forests from conversion.

   - Ways to Conserve Forest Land
   - Conservation Incentive Programs - summary of "cost-share" programs help landowners manage the cost of conservation projects.
   - Landowner Options for Forest Land Conservation (English; PDF format)
   - Summary of Local Comprehensive Plans (PDF, 313 pp., 6MB, Dec. 2011)

   The natural assets of forest can be valued so that landowners can keep their land in a forested state. The list below provides access to information to help landowners educate themselves about these options.

   - Forest Conservation Value (DOF) - The Forest Conservation Value (FCV) model is a tool designed by the Virginia Department of Forestry (VDOF) to strategically identify the highest priority forestland for conservation in Virginia. The intent is to maximize the efficiency of limited resources by focusing conservation efforts on the highest quality, most productive, and most vulnerable forestland statewide. The model was created in 2013 and updated with current data[47] and a

[47] Note: These data are based on 30-meter pixel resolution imagery and are best applied to watershed and locality level analyses as they are too generalized to be accurate at the parcel level.

new approach in 2018. The 2018 FCV model evaluates a number of criteria, including size of forested blocks, connectivity to other conserved lands, management potential, watershed integrity, and threat of conversion to prioritize the highest value forestlands for conservation. The model ranks all forestland in Virginia from 1 (lowest) to 5 (highest) FCV. It is intended to be used by natural resource professionals, conservation practitioners, and local and statewide planners as a tool for planning and prioritization. (21.5 MB)

- InFOREST. This user-friendly software tool that enables many users to access and run the various models that estimate ecosystem services.
- Ecosystem Services. The Forest Service is exploring national opportunities to advance markets and payments for ecosystem services. With help from our partners and others, we will encourage broader thinking and collaboration that stimulates market-based conservation and stewardship.
- Ecosystem Marketplace, a project of Forest Trends, is a leading source of news, data, and analytics on markets and payments for ecosystem services (such as water quality, carbon sequestration, and biodiversity).
- Urban Tree Canopy Analysis Inventory

2. Virginia Department of Conservation and Recreation (VDCR)

- The Virginia Outdoors Plan (2018)
- The Natural Heritage Program

- **Conservation Lands and Conservation Planning Data, Maps and Information:**

  Conservation Lands data can be downloaded from the DCR-Natural Heritage **Conservation Lands database** website.

  Anyone can access all mapped Virginia Conservation Lands and associated information in the interactive map viewer on **Virginia Natural Heritage Data Explorer** (NHDE). This tool also allows query of the Conservation Lands Database and map making with this and many other reference layers (boundaries, aerial photography, streams, etc.). The Virginia NHDE also provides interactive mapping access to **Virginia Conservation Vision**, as suite of Green Infrastructure models used for conservation planning through Virginia.

- Land Conservation: The Virginia Department of Conservation and Recreation has developed the Commonwealth's first comprehensive, continually maintained GIS data layer for Virginia's protected conservation lands. This database includes mapped boundaries[48] and attributes for public and certain

[48] These boundaries are not intended for legal uses; no warranty, expressed or implied, is made by the Virginia Department of Conservation and Recreation (DCR) as to the accuracy of this data. Distribution of the data shall not constitute any such warranty, and no responsibility is assumed by DCR in the use of these data. Re-distribution of these data for profit is prohibited.

private lands having various conservation, recreation and open-space roles. **DCR's Natural Heritage Program** staff was charged by the **Virginia Land Conservation Foundation** and the Department of Technology Planning to develop the database.

Most federal, state, regional and interstate lands are included. This includes water and park authorities, parks and undeveloped or partially-developed lands owned by localities, as well as lands owned as preserves by nonprofit conservation organizations such as The Nature Conservancy. Also included are conservation easements held by the Virginia Outdoors Foundation, land trusts and others.

State resource agencies, universities, land trusts, and regional and local government will find this database invaluable for environmental, recreation and conservation planning. This database will also serve agencies with economic development interests, including such groups as the Virginia Economic Development Partnership, planning district commissions and localities.

Existing GIS boundaries were collected from the landowner or managing agency and integrated into the database. DCR's Natural Heritage Program staff digitized new boundaries using best available sources. Shapefiles have been re-projected to decimal degrees NAD83, and attributes have been standardized for consistency.

- Soil and Water Conservation Districts

3. Virginia Department of Environmental Quality (VDEQ)
   - Va. Environmental GIS (VEGIS) data
4. Virginia Department of Agriculture and Consumer Services (VDACS)
   - Farmland Preservation
5. Virginia Geographical Information Network (VGIN)
   - Land Cover**:** With the increasing importance of having more accurate land cover data at a local or regional level to support stormwater management, the Virginia General Assembly determined that it was important to provide funding for the development of land cover geospatial data. The General Assembly has charged the Department of Environmental Quality (DEQ) and the Virginia Geographic Information Network (VGIN) to develop the data. Statewide land cover GIS data will support land use determinations at the local level and help ensure that state regulatory decisions impacting localities are using the most current and accurate sources of data. The data is based upon the VBMP 2011-2014 4 band orthophotography.

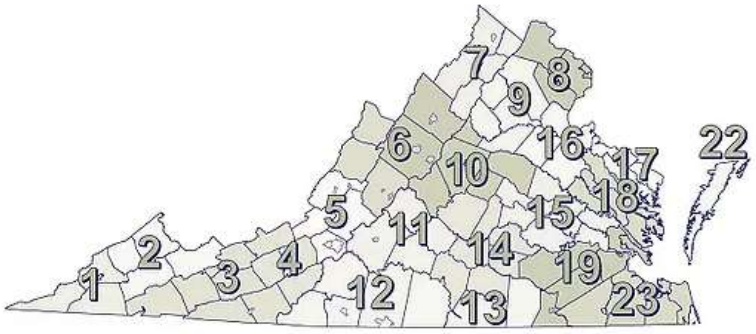
     QAQC Webinar - March 2, 2016 (pdf)

Technical Plan of Operations (pdf)
Virginia Land Cover Product (2016 Download)

- Update of this dataset (and related LIDAR data) [49] to support State and local stormwater management and coastal resiliency planning is provided for in VDEQ's budget authorization for FYs 2019 and 2020.

[49] Virginia 2019-2020 Budget Bill (HB1700), Chapter 854, Item 368. Environmental Financial Assistance (51500), "F. Out of such funds available in this item, the Department shall provide funding to the Virginia Geographic Information Network in an amount necessary to implement statewide digital orthography to improve land coverage data necessary to assist localities in planning and implementing stormwater management programs. As part of this authorization, the Department shall also include data to update prior LIDAR surveys of elevations along coastal areas to support activities related to management of recurrent coastal flooding."

C. Virginia's 22 Regional Planning District Commissions (alphabetical list order)



Accomack-Northampton Planning District Commission (#22)
Executive Director: Elaine K.N. Meil
P.O. Box 417, 23372 Front Street, Accomac, VA 23301
757-787-2936, emeil@a-npdc.org
Representing: Counties of Accomack, Northampton; Town of Chicoteague
- Regional All-Hazard Mitigation Plan

Central Shenandoah Planning District Commission (#7)
Executive Director: Bonnie Riedesel
112 MacTanly Place, Staunton, VA 24401
540-885-5174, bonnie@cspdc.org
Representing: Counties of Augusta, Bath, Highland, Rockbridge, Rockingham; Cities of Buena Vista, Lexington, Harrisonburg, Stauton, Waynesboro; Towns of Broadway, Bridgewater, Craigsville, Dayton, Elkton, Glasgow, Goshen, Grottoes, Monterey, Mt. Crawford, Timberville
- Regional All-Hazard Mitigation Plan

Central Virginia Planning District Commission (#12)
Executive Director: Gary F. Christie
828 Main Street, 12th Floor, Lynchburg, VA 24504
434-845-3491, gchristie@cvpdc.org
Representing: Counties of Amherst, Appomattox, Bedford, Campbell; Cities of Bedford, Lynchburg; Towns of Altavista, Amherst, Appomattox, Brookneal
- Regional Strategic Plan for Forest and Agriculture Economy
- Regional All-Hazard Mitigation Plan

Commonwealth Regional Council (#14)
Executive Director: Melody Foster
P.O. Box P, 102 1/2 High Street, Farmville, VA 23901
434-392-6104, mfoster@virginiasheartland.org
Representing: Counties of Amelia, Buckingham, Charlotte, Lunenburg, Prince Edward
- Regional All-Hazard Mitigation Plan

Crater Planning District Commission (#19)
Executive Director: Dennis K. Morris
P.O. Box 1808, 1964 Wakefield Street, Petersburg, VA 23805
804-861-1666, dmorris@craterpdc.org
Representing: Counties of Charles City, Chesterfield, Dinwiddie, Greensville, Prince George, Surry, Sussex; Cities of Colonial Heights, Petersburg, Hopewell, Emporia
- Regional Green Infrastructure Plans and Urban Forestry Canopy Analysis
- Regional All-Hazard Mitigation Plan

Cumberland Plateau Planning District Commission (#2)
Executive Director: James A. Baldwin
P.O. Box 548, 224 Clydesway Drive, Lebanon, VA 24266
276-889-1778, jimbaldwin@bvu.net
Representing: Counties of Buchanan, Dickenson, Russell, Tazewell

- Regional All-Hazard Mitigation Plan

George Washington Regional Commission (#16)
Executive Director: Linda Struyk Millsaps, PhD
406 Princess Anne Street, Fredericksburg, VA 22401
540-373-2890, millsaps@gwregion.org
Representing: Counties of Caroline, King George, Spotsylvania, Stafford; City of Fredericksburg

- Regional Green Infrastructure Plans and Urban Forestry Canopy Analysis
- Regional All-Hazard Mitigation Plan

Hampton Roads Planning District Commission (#23)
Executive Director: Robert A. Crum, Jr.
723 Woodlake Drive, Chesapeake, VA 23320
757-420-8300, rcrum@hrpdcva.gov
Representing: Counties of Gloucester, Isle of Wight, James City, Southampton, Surry, York; Cities of Chesapeake, Franklin, Hampton, Poquoson, Williamsburg, Newport News, Norfolk, Portsmouth, Suffolk, Virginia Beach

- Regional Green Infrastructure Plans and Urban Forestry Canopy Analysis
- Regional All-Hazard Mitigation Plan

Lenowisco Planning District Commission (#1)
Executive Director: Duane A. Miller
372 Technology Trail Ln. Ste 101, Duffield, VA 24244-5330
276-431-1913 ext 23, dmiller@lenowisco.org
Representing: Counties of Lee, Scott, Wise; Towns of Jonesville, Pennington Gap, St. Charles, Clinchport, Duffield, Dungannon, Gate City, Weber City, Nickelsville, Appalachia, Big Stone Gap, Coeburn, Pound, St. Paul, Wise; City of Norton

- Regional Agricultural Development Strategic Plan

Middle Peninsula Planning District Commission (#18)
Executive Director: Lewis Lawrence
P.O. Box 286, 125 Bowden Street, Saluda, VA 23149
804-758-2311, LLawrence@mppdc.com
Representing: Counties of Essex, Gloucester, King and Queen, King William, Mathews, Middlesex; Towns of Tappahannock, Urbanna, and West Point

- Middle Peninsula Conservation Corridor Plan
- Regional All-Hazard Mitigation Plan

Mount Rogers Planning District Commission (#3)
Executive Director: Aaron Sizemore
1021 Terrace Drive, Marion, VA 24354
276-783-5103, asizemore@mrpdc.org
Representing: Counties of Bland, Carroll, Grayson, Smyth, Washington, Wythe; Cities of Bristol and Galax

New River Valley Regional Commission (#4)
Executive Director: Kevin Byrd
6580 Valley Center Drive, Suite 124, Radford, VA 24141
540-639-9313, kbyrd@nrvrc.org

Representing: Counties of Floyd, Giles, Montgomery, Pulaski; City of Radford; Towns of Blacksburg, Christiansburg, Floyd, Narrows, Pearisburg, Pulaski, Rich Creek; Universities: Virginia Tech and Radford University

- Regional Green Infrastructure Plans and Urban Forestry Canopy Analysis
- Livability in the NRV: From Vision to Action

Northern Neck Planning District Commission (#17)
Executive Director: Jerry W. Davis, AICP
P.O. Box 1600, 457 Main Street, Warsaw, VA 22572
804-333-1900, jdavis@nnpdc17.state.va.us
Representing: Counties of Lancaster, Northumberland, Richmond, Westmoreland

- Regional All-Hazard Mitigation Plan

Northern Shenandoah Valley Regional Commission (#7)
Executive Director: Brandon Davis
400-E Kendrick Lane, Front Royal, VA 22630
540-636-8800, bdavis@nsvregion.org
Representing: Counties of Clarke, Frederick, Page, Shenandoah, Warren; City of Winchester; Towns of Front Royal, Luray, Middletown, Stephens City, Strasburg

- Regional All-Hazard Mitigation Plan

Northern Virginia Regional Commission (#8)
Executive Director: Robert Lazaro
3040 Williams Drive, Suite 200, Fairfax, VA 22031
703-642-0700, rlazaro@novaregion.org
Representing: Counties of Arlington, Fairfax, Loudoun, Prince William; Cities of Alexandria, Fairfax, Falls Church, Manassas, Manassas Park; Towns of Dumfries, Herndon, Leesburg, Purcellville, Vienna

- Regional Green Infrastructure Plans and Urban Forestry Canopy Analysis
- Regional All-Hazard Mitigation Plan

PlanRVA (#15) (formerly known as "Richmond Regional Planning District Commission")
Executive Director: Martha Shickle
9211 Forest Hill Avenue, Suite 200, Richmond, VA 23235
804-323-2033, mshickle@richmondregional.org
Representing: Counties of Charles City, Chesterfield, Goochland, Hanover, Henrico, New Kent, Powhatan; City of Richmond; Town of Ashland

- Regional Green Infrastructure Plans and Urban Forestry Canopy Analysis
- Regional All-Hazard Mitigation Plan

Rappahannock-Rapidan Regional Commission (#9)
Executive Director: Patrick L. Mauney
420 Southridge Parkway, Suite 106, Culpeper, VA 22701
540-829-7450, plmauney@rrregion.org
Representing: Counties of Culpeper, Fauquier, Madison, Orange, Rappahannock; Towns of Culpeper, Gordonsville, Madison, Orange, Remington, Warrenton, Washington

- Regional Green Infrastructure Plans and Urban Forestry Canopy Analysis
- Regional All-Hazard Mitigation Plan

Roanoke Valley-Alleghany Regional Commission (#5)
Executive Director: Wayne G. Strickland
P.O. Box 2569, 313 Luck Avenue, SW, Roanoke, VA 24010
540-343-4417, wstrickland@rvarc.org
Representing: Counties of Alleghany, Botetourt, Craig, Franklin, Roanoke; Cities of Covington, Roanoke, Salem; Towns of Clifton Forge, Rocky Mount, Vinton

- Regional Green Infrastructure Plans and Urban Forestry Canopy Analysis
- Regional Open Space Study
- Regional All-Hazard Mitigation Plan

Southside Planning District Commission (#13)
Executive Director: Gail P. Moody
P.O. Box 150, 200 S. Mecklenburg Ave., South Hill, VA 23970
434-447-7101, gmoody@southsidepdc.org
Representing: Counties of Mecklenburg, Halifax, Brunswick; Towns of South Hill, South Boston
- Regional All-Hazard Mitigation Plan

Thomas Jefferson Planning District Commission (#10)
Executive Director: Chip Boyles
401 East Water Street, P.O. Box 1505, Charlottesville, VA 22902-1505
434-979-7310, cboyles@tjpdc.org
Representing: Counties of Albermarle, Fluvanna, Greene, Louisa, Nelson; City of Charlottesville
- Regional Green Infrastructure Plans and Urban Forestry Canopy Analysis
- Regional All-Hazard Mitigation Plan

West Piedmont Planning District Commission (#12)
Executive Director: Dave Hoback
P.O. Box 5268, 1100 Madison Street, Martinsville, VA 24115
276-638-3987, dhoback@wppdc.org
Representing: Counties of Franklin, Henry, Patrick, Pittsylvania; Cities of Danville, Martinsville; Town of Rocky Mount
- Regional All-Hazard Mitigation Plan

D. Non-Governmental Organization (NGO) Resources

1. The Green Infrastructure Center: Green Infrastructure in Virginia
2. Wetlands Watch: Conservation Landscapes
3. Virginia Conservation Network

VIRGINIA ACTS OF ASSEMBLY --2019 SESSION

CHAPTER 546

An Act to amend and reenact § 15.2-4901 of the Code of Virginia, relating to industrial development authorities; legislative intent.

[H 2485] Approved March 18, 2019

Be it enacted by the General Assembly of Virginia:

1. ***That § 15.2-4901 of the Code of Virginia is amended and reenacted as follows:***

§ 15.2-4901. Purpose of chapter.

It is the intent of the legislature by the passage of this chapter to authorize the creation of industrial development authorities by the localities in the Commonwealth so that such authorities may acquire, own, lease, and dispose of properties and make loans to the end that such authorities may be able to promote industry and develop trade by inducing manufacturing, industrial, governmental, nonprofit and commercial enterprises and institutions of higher education to locate in or remain in the Commonwealth and further the use of its agricultural products and natural resources, and to vest such authorities with all powers that may be necessary to enable them to accomplish such purposes, which powers shall be exercised for the benefit of the inhabitants of the Commonwealth, either through the increase of their commerce, or through the promotion of their safety, health, welfare, convenience or prosperity. Such authority shall not itself be authorized to operate any such manufacturing, industrial, nonprofit or commercial enterprise or any facility of an institution of higher education.

It is the further intent of the legislature and shall be the policy of the Commonwealth to grant to industrial development authorities the powers contained herein with respect to pollution control facilities to the end that such authorities may protect and promote the health of the inhabitants of the Commonwealth and the conservation, protection and improvement of its natural resources by exercising such powers for the control or abatement of land, sewer, water, air, noise and general environmental pollution derived from the operation of any industrial or medical facility and to vest such authorities with all powers that may be necessary to enable them to accomplish such purpose, which powers shall be exercised for the benefit of the inhabitants of the Commonwealth, either through the increase of their commerce, or through the promotion of their safety, health, welfare, convenience or prosperity.

It is the further intent of the legislature and shall be the policy of the Commonwealth to grant to industrial development authorities the powers contained herein with respect to medical facilities and facilities for the residence or care of the aged to the end that such authorities may protect and promote the health and welfare of the inhabitants of the Commonwealth by assisting in the acquisition, construction, equipping, expansion, enlargement and improvement of medical facilities and facilities for the residence or care of the aged in order to provide modern and efficient medical services to the inhabitants of the Commonwealth and care of the aged of the Commonwealth in accordance with their special needs and also by assisting in the refinancing of medical facilities and facilities for the residence or care of the aged owned and operated by organizations which are exempt from taxation pursuant to § 501(c)(3) of the Internal Revenue Code of 1954, as amended, in order to reduce the costs to residents of the Commonwealth of utilizing such facilities and to vest such authorities with all powers that may be necessary to enable them to accomplish such purposes, which powers shall be exercised for the benefit of the inhabitants of the Commonwealth and for the promotion of their health and welfare. It is not intended hereby that any such authority shall itself be authorized to operate any such medical facility or facility for the residence or care of the aged.

It is the further intent of the legislature and shall be the policy of the Commonwealth to grant to industrial development authorities the powers contained herein with respect to facilities for use by organizations (other than institutions organized and operated exclusively for religious purposes) which are described in

§ 501(c)(3) of the Internal Revenue Code of 1954, as amended, and which are exempt from federal income taxation pursuant to § 501(a) of the Internal Revenue Code of 1954, as amended, to the end that such authorities may protect or promote the safety, health, welfare, convenience, and prosperity of the inhabitants of the Commonwealth by assisting in the acquisition, construction, equipping, expansion, enlargement, improvement, financing, and refinancing of such facilities of the aforesaid entities and organizations in order to provide operations, recreational, activity centers, and other facilities for the use of the inhabitants of the Commonwealth and to vest such authorities with all powers that may be necessary to enable them to accomplish such purposes, which powers shall be exercised for the benefit of the inhabitants of the Commonwealth and for the promotion of their safety, health, welfare, convenience or prosperity. It is not intended hereby that any such authority shall itself be authorized to operate any such facility.

It is the further intent of the legislature and shall be the policy of the Commonwealth to grant to industrial development authorities the powers contained herein with respect to facilities for accredited nonprofit private institutions of higher education in the Commonwealth whose primary purpose is to provide collegiate or graduate education and not to provide religious training or theological education to the end that such authorities may protect and promote the health and welfare of the inhabitants of the Commonwealth by assisting in the acquisition, construction, equipping, expansion, enlargement, and improvement of facilities of aforesaid institutions in order to provide improved educational facilities for the use of the inhabitants of the Commonwealth and to vest such authorities with all powers that may be necessary to enable them to accomplish such purposes, which powers shall be exercised for the benefit of the inhabitants of the Commonwealth and for the promotion of their health, welfare, convenience or prosperity. It is not intended hereby that any such authority shall itself be authorized to operate any such educational facility.

It is the further intent of the legislature and shall be the policy of the Commonwealth to grant industrial development authorities the powers contained herein with respect to facilities for a locality, the Commonwealth and its agencies, and governmental and nonprofit organizations and to vest such authorities with all powers that may be necessary to enable them to accomplish such purposes, which powers shall be exercised for the benefit of the inhabitants of the Commonwealth and for the promotion of their health, welfare, convenience or prosperity.

It is further the intent of the legislature and shall be the policy of the Commonwealth to grant to industrial development authorities the powers contained herein with respect to facilities for museums and historical education, demonstration and interpretation, together with any and all buildings, structures or other facilities necessary or desirable in connection with the foregoing, for use by nonprofit organizations in order to promote tourism and economic development in the Commonwealth, to promote the knowledge of and appreciation by the citizens of the Commonwealth of the historical and cultural development and heritage of the Commonwealth and the United States and to promote thereby their health, welfare, convenience and prosperity. It is not intended hereby that any such authority shall itself be authorized to operate any such facility.

It is the further intent of the legislature and shall be the policy of the Commonwealth to grant to industrial development authorities the powers contained herein with respect to facilities devoted to the staging of equine events and activities (other than racing) for use by governmental or nonprofit, nonreligious organizations and operated by such governmental or nonprofit, nonreligious organizations in order to promote the equine industry and equine-related activities (other than racing) which are integral to the Commonwealth's economy and heritage and to promote thereby the safety, health, welfare, convenience, and prosperity of the inhabitants of the Commonwealth.

It is the further intent of the legislature and shall be the policy of the Commonwealth to grant to industrial development authorities the powers contained herein with respect to acquiring, developing, owning and operating an industrial park and any utilities that are intended primarily to serve the park and to issue bonds for such purposes. The bonds may be secured by revenues generated by the industrial park or the utilities being financed or by any other funds of the authority.

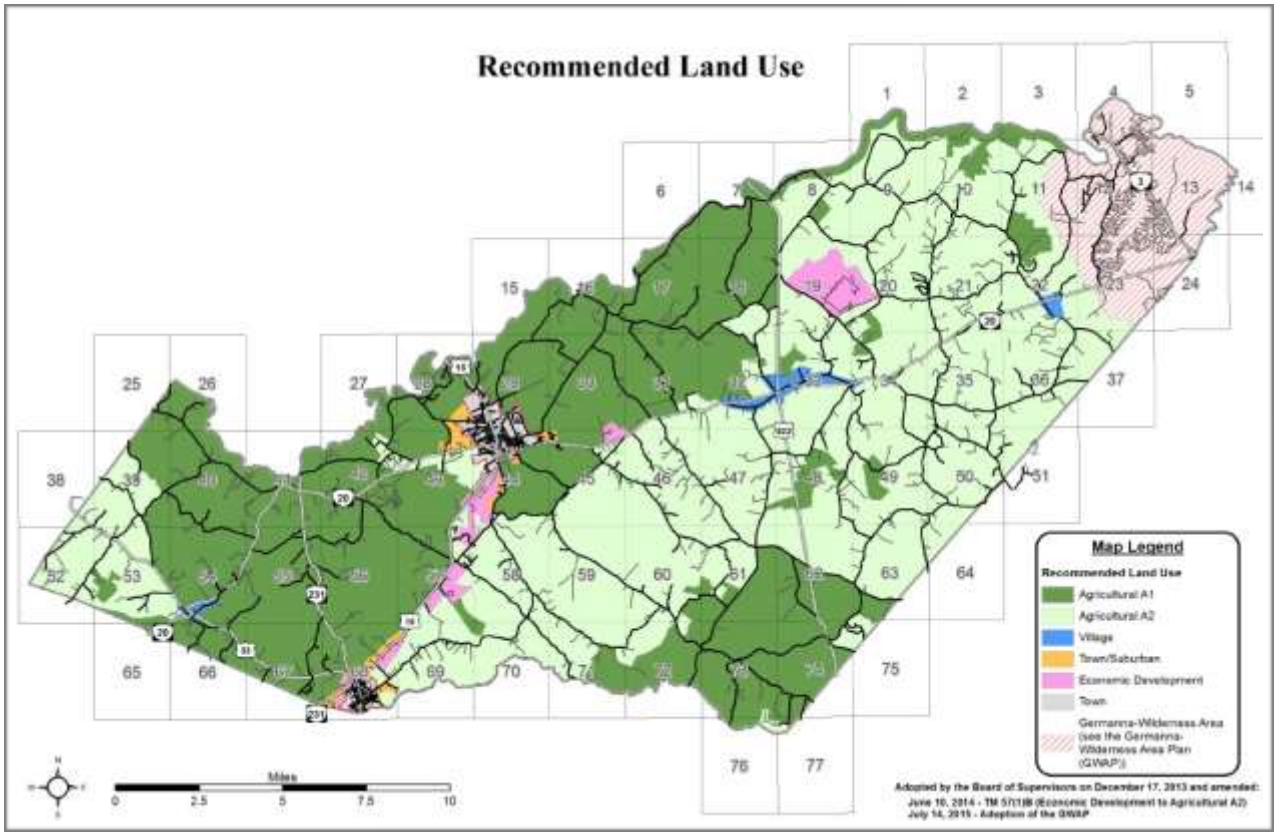
It is the further intent of the legislature and shall be the policy of the Commonwealth to grant to industrial development authorities created by one or more municipalities whose housing authorities have not been activated as provided by §§ 36-4 and 36-4.1, in addition to the powers previously or hereafter granted in this chapter, the powers contained herein with respect to facilities used primarily for single or multi-family residences in order to promote safe and affordable housing in the Commonwealth and to benefit thereby the safety, health, welfare and prosperity of the inhabitants of the Commonwealth. It is not intended hereby that any such authority shall itself be authorized to operate any such facility or exercise any powers of eminent domain set forth in § 36-27.

It is the further intent of the legislature and shall be the policy of the Commonwealth to grant to industrial development authorities the powers contained herein with respect to facilitating and supporting landowner access to carbon markets through aggregation of landowners to reach a size that attracts the investment of private capital. Such aggregation provides landowners of various size tracts of land enhanced opportunities to access capital and benefits that support and enhance the agriculture and forest industries for the health, welfare, convenience and prosperity of the inhabitants of the Commonwealth.

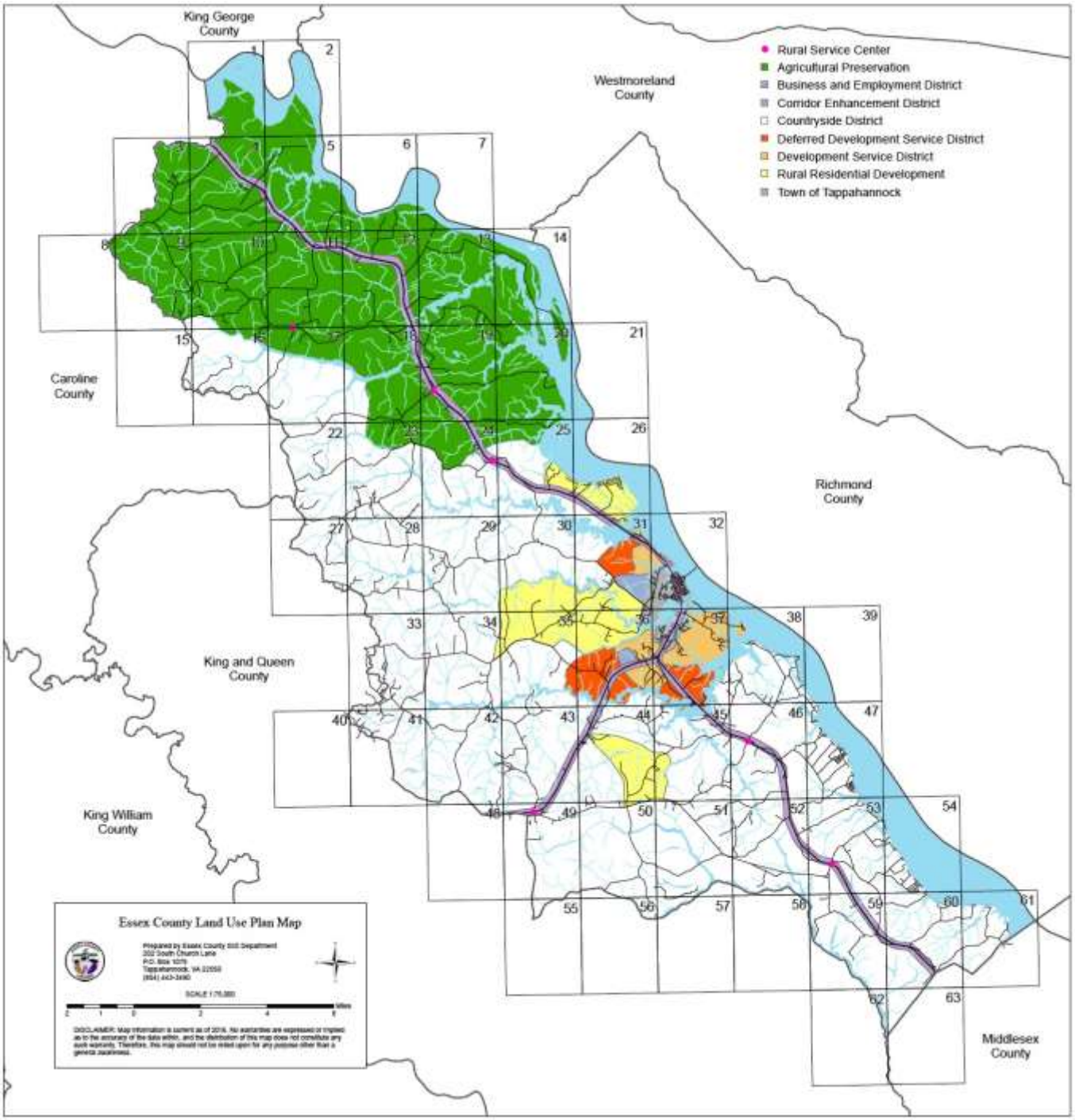
In any instance in this chapter where an industrial development authority may issue bonds through its authority to finance, the authority may also refinance such bonds.

This chapter shall be liberally construed in conformity with these intentions.

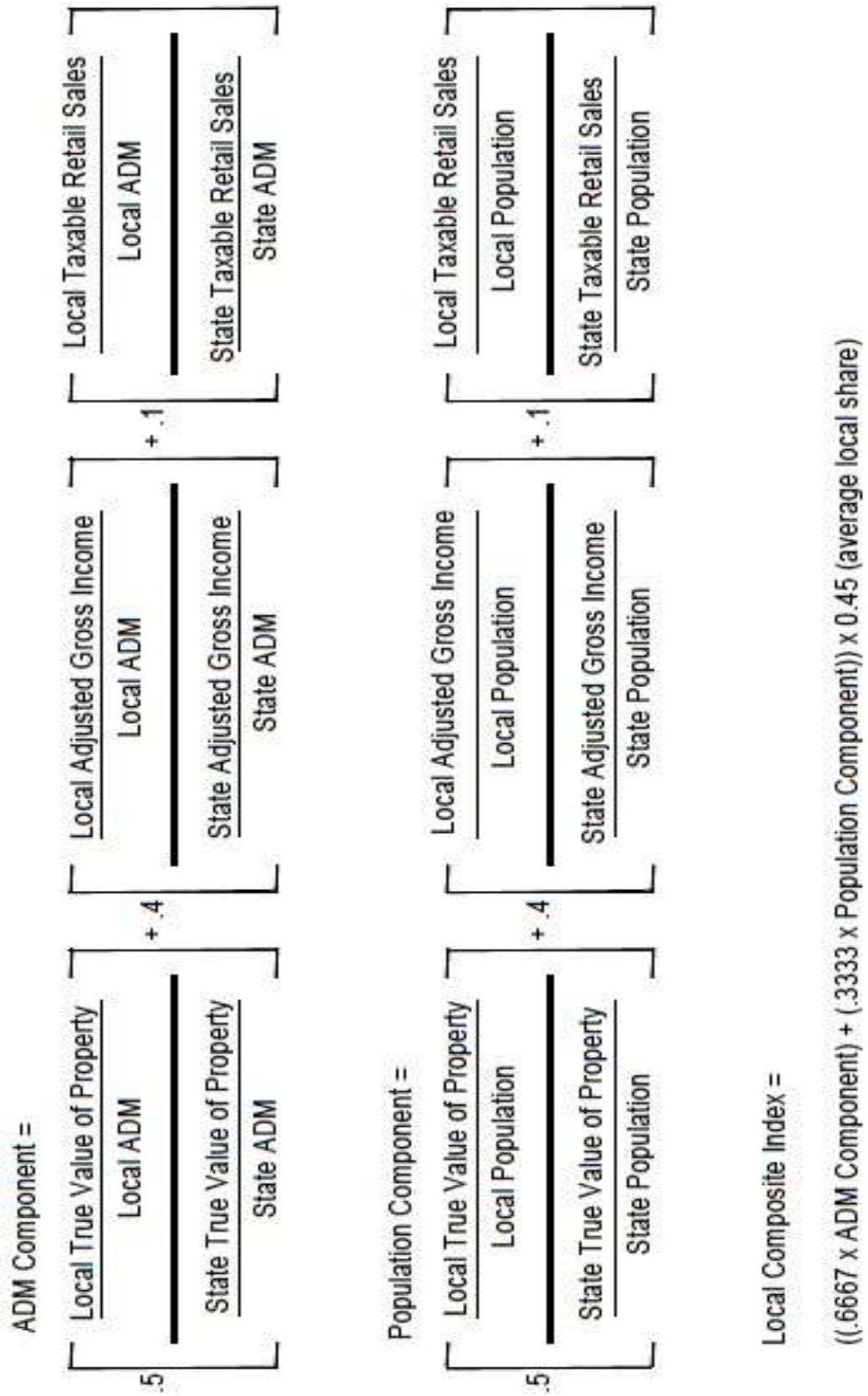
APPENDIX H: ORANGE COUNTY FUTURE LAND USE MAP



APPENDIX I: ESSEX COUNTY FUTURE LAND USE MAP

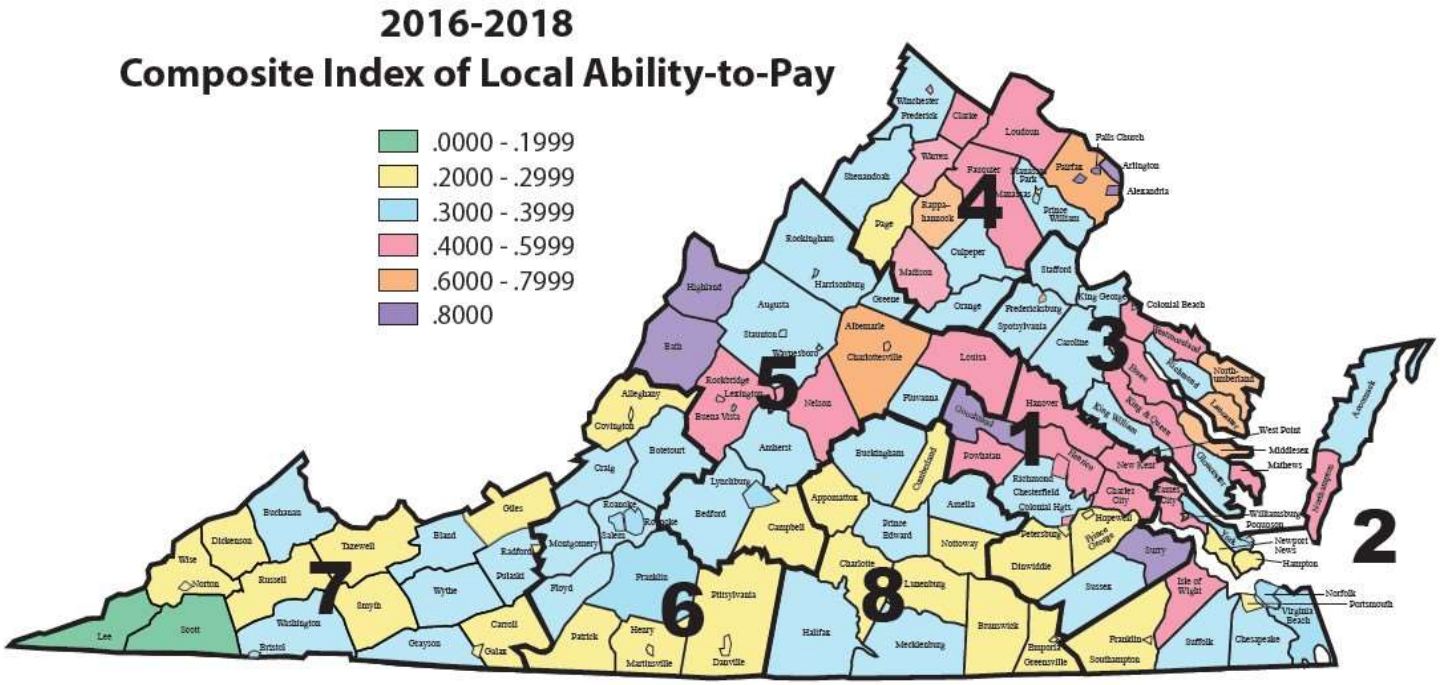


APPENDIX J: COMPOSITE INDEX OF LOCAL ABILITY TO PAY FORMULA[50]



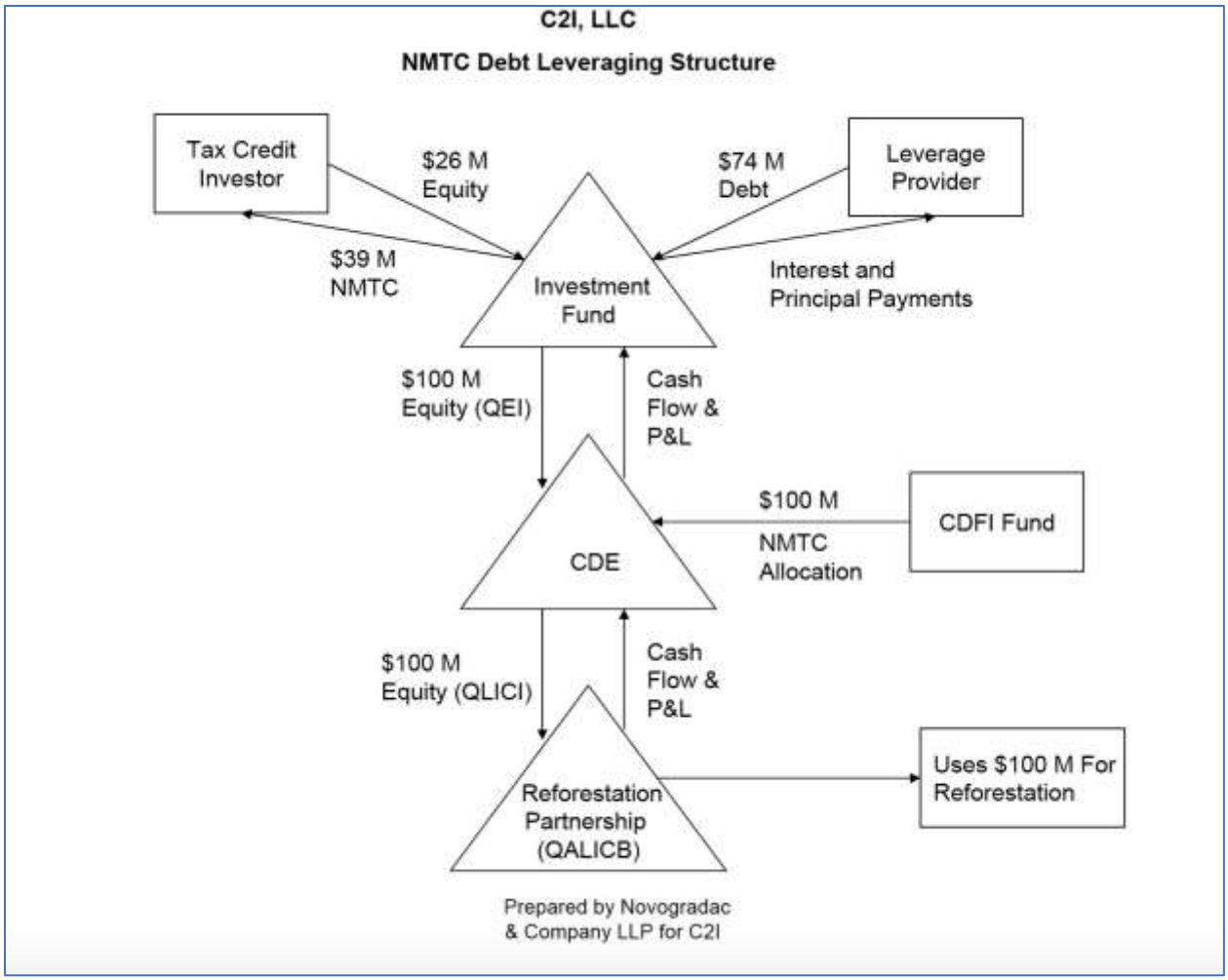
[50] Virginia Municipal League. (2015). Local Composite Index. Virginia Municipal League. Retrieved from https:// www.vml.org/wp-content/uploads/pdf/Local%20Composite%20Index.pdf

APPENDIX K: COMPOSITE INDEX OF LOCAL ABILITY TO PAY MAP

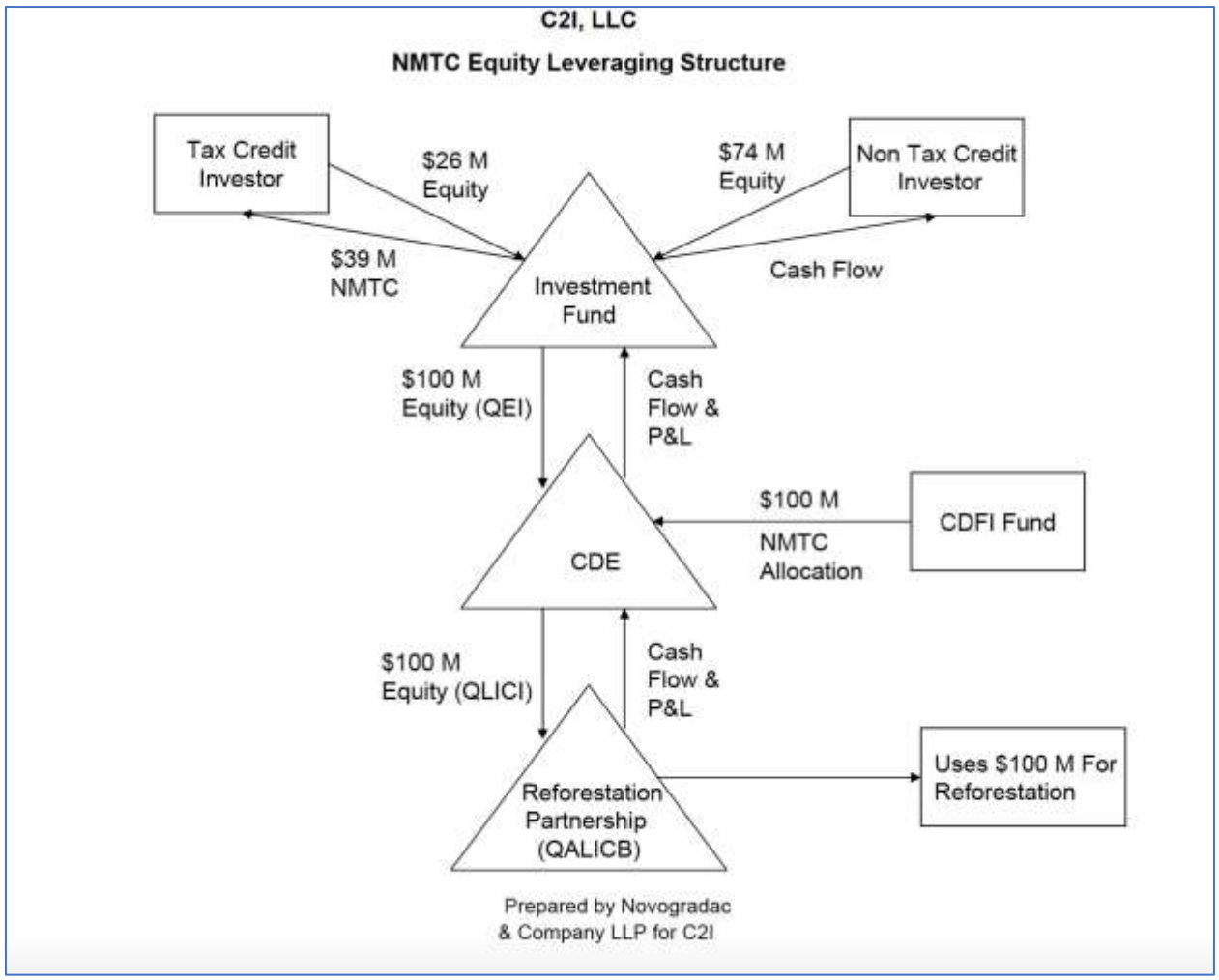


NOTE: *Commonwealth of Virginia Department of Education Superintendent's Regions 1-8 shown*

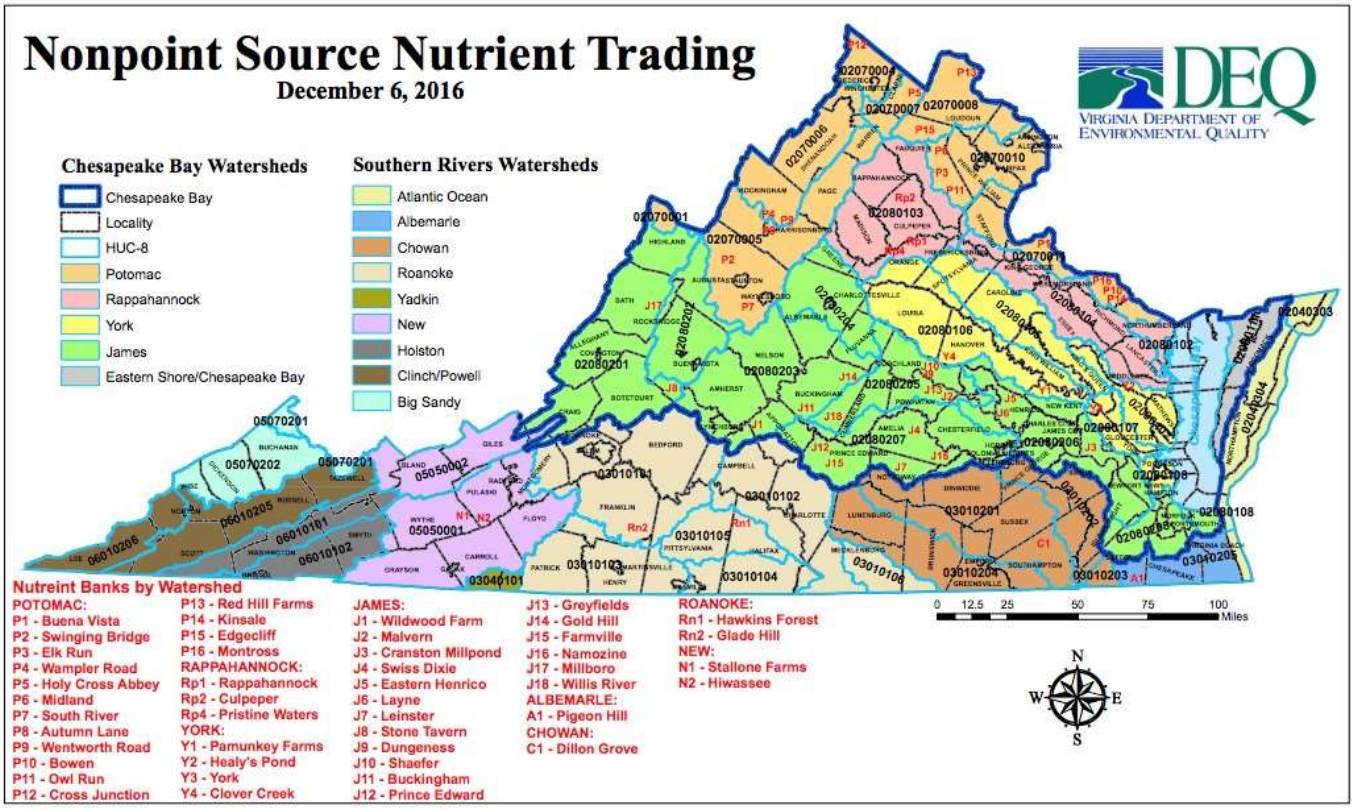
APPENDIX L: DEBT LEVERAGING STRUCTURE



APPENDIX M: EQUITY LEVERAGING STRUCTURE



APPENDIX N: NUTRIENT CREDIT MARKET MAP



APPENDIX O: ESSEX AND ORANGE COUNTY USDA PROGRAM CONSERVATION PRACTICES

County	Practice Code	Practice Name	Measurement Unit Display	Program Code	Sum of Applied Amount	Count of Number of Practices
ESSEX	104	Nutrient Management Plan - Written	no	EQIP	22.0	22
	106	Forest Management Plan - Written	no	CBWI	6.0	6
				EQIP	27.0	27
	327	Conservation Cover	ac	CRP	566.1	79
				CTA-GENRL	112.3	11
	328	Conservation Crop Rotation	ac	CBWI	8856.8	520
				CTA-GENRL	12953.7	751
				EQIP	5637.7	343
	329	Residue and Tillage Management, No-Till	ac	CBWI	3134.7	200
				CTA-GENRL	6113.9	377
				EQIP	1713.0	138
			ac-ft	CTA-GENRL	3939.9	202
	330	Contour Farming	ac	CTA-GENRL	204.5	6
	338	Prescribed Burning	ac	CTA-GENRL	406.4	21
				EQIP	532.2	10

County	Practice Code	Practice Name	Measurement Unit Display	Program Code	Sum of Applied Amount	Count of Number of Practices
ESSEX				WHIP	127.0	5
	340	Cover Crop	ac	CBWI	3194.5	196
				CTA-GENRL	4247.5	245
				EQIP	6092.1	366
	342	Critical Area Planting	ac	CTA-GENRL	71.9	65
	344	Residue Management, Seasonal	ac	CTA-GENRL	4570.4	242
	345	Residue and Tillage Management, Reduced Till	ac	CBWI	2130.0	35
				EQIP	615.9	75
	382	Fence	ft	CTA-GENRL	17613.0	10
	386	Field Border	ac	CTA-GENRL	22.9	9
			ft	CTA-GENRL	40127.2	35
	393	Filter Strip	ac	CRP	24.1	9
				CTA-GENRL	36.6	38
	394	Firebreak	ft	CTA-GENRL	44850.6	17
				EQIP	11.292.6	8
				WHIP	23800.0	7
	410	Grade Stabilization Structure	no	CBWI	5.0	5

County	Practice Code	Practice Name	Measurement Unit Display	Program Code	Sum of Applied Amount	Count of Number of Practices
ESSEX	412	Grassed Waterway	ac	CTA-GENRL	10.3	34
	490	Tree/Shrub Site Preparation	ac	CTA-GENRL	273.0	7
				EQIP	502.0	7
				RCPP-EQIP	351.0	6
	500	Obstruction Removal	ac	ECP	32.1	18
	511	Forage Harvest Management	ac	CTA-GENRL	217.7	10
				CTA-GLC	106.9	8
	512	Forage and Biomass Planting	ac	CTA-GENRL	430.8	46
	516	Livestock Pipeline	ft	CTA-GENRL	10464.0	10
	590	Nutrient Management	ac	CBWI	7979.0	430
				CTA-GENRL	19251.7	1244
				EQIP	14209.9	698
	595	Integrated Pest Management (IPM)	ac	CTA-GENRL	5695.1	387
	612	Tree/Shrub Establishment	ac	CBWI	276.0	8
				CTA-GENRL	1713.7	62
				EQIP	960.9	19

County	Practice Code	Practice Name	Measurement Unit Display	Program Code	Sum of Applied Amount	Count of Number of Practices
ESSEX				RCPP-EQIP	355.0	6
	614	Watering Facility	no	CTA-GENRL	17.0	10
	615	Upland Wildlife Habitat Management	ac	CRP	169.2	50
				CTA-GENRL	387.8	40
	659	Wetland Enhancement	ac	CTA-GENRL	40.2	5
	666	Forest Stand Improvement	ac	CBWI	269.5	10
				CTA-GENRL	631.0	18
				EQIP	557.3	15
	329A	Residue Management, No-Till / Strip Till	ac	CTA-GENRL	6507.3	401
				EQIP	1278.9	54

County	Practice Code	Practice Name	Measurement Unit Display	Program Code	Sum of Applied Amount	Count of Number of Practices
Orange	313	Waste Storage Facility	no	CTA-GENRL	6.0	6
	315	Herbaceous Weed Treatment	ac	EQIP	429.5	18
				WHIP	29.7	5
	327	Conservation Cover	ac	CRP	107.1	14
				WHIP	19.7	5
	328	Conservation Crop Rotation	ac	CBWI	1998.6	143
				CTA-GENRL	2468.1	170
				EQIP	3254.8	185
	329	Residue and Tillage Management, No-Till	ac	CBWI	1177.9	80
				CTA-GENRL	1915.5	108
				EQIP	1044.3	52
			ac-ft	CTA-GENRL	388.1	29
	330	Contour Farming	ac	CTA-GENRL	191.0	15
	340	Cover Crop	ac	CBWI	1098.5	60
				CTA-GENRL	2263.4	151
				EQIP	740.4	35
	342	Critical Area Planting	ac	EQIP	6.9	8
	344	Residue Management, Season	ac	CTA-GENRL	160.1	12
	374	Farmstead Energy Improvement	no	EQIP	5.0	5

County	Practice Code	Practice Name	Measurement Unit Display	Program Code	Sum of Applied Amount	Count of Number of Practices
Orange	382	Fence	ft	CBWI	35014.0	12
				CRP	69219.0	57
				CTA-GENRL	133241.3	102
				CTA-GLC	16044.0	16
				EQIP	24939.0	17
	386	Field Border	ft	CTA-GENRL	5756.0	7
				WHIP	5704.3	6
	390	Riparian Herbaceous Cover	ac	CTA-GENRL	24.2	15
	391	Riparian Forest Buffer	ac	CTA-GENRL	149.0	45
	393	Filter Strip	ac	CRP	23.3	9
	394	Firebreak	ft	WHIP	8995.0	5
	412	Grassed Waterway	ac	CTA-GENRL	149.3	12
	472	Access Control	ac	CTA-GENRL	88.6	13
	484	Mulching	ac	EQIP	2.6	5
	511	Forest Harvest Management	ac	CTA-GENRL	427.9	28
	512	Forage and Biomass Planting	ac	CTA-GENRL	704.8	51
				EQIP	454.2	16
	516	Livestock Pipeline	ft	CBWI	11723.0	7
				CRP	19930.0	20
				CTA-GENRL	65272.5	80
				EQIP	9078.0	19

County	Practice Code	Practice Name	Measurement Unit Display	Program Code	Sum of Applied Amount	Count of Number of Practices
Orange	528	Prescribed Grazing	ac	CBWI	259.0	30
				CTA-GENRL	704.0	31
				CTA-GLC	105.3	11
				EQIP	1428.4	143
	558	Roof Runoff Structure	no	CBWI	5.0	5
				CTA-GENRL	21.0	21
	574	Spring Development	no	CTA-GENRL	17.0	16
	590	Nutrient Management	ac	CBWI	2336.0	170
				CTA-GENRL	3214.3	243
				CTA-GLC	86.2	8
				EQIP	5939.5	297
	595	Integrated Pest Management (IPM)	ac	CRP	48.8	9
				CTA-GENRL	1398.1	112
				CTA-GLC	86.2	8
				EQIP	508.0	95
	612	Tree/Shrub Establishment	ac	CRP	183.1	56
				CTA-GENRL	63.0	10
	614	Watering Facility	no	CBWI	14.0	9
				CRP	21.0	19
				CTA-GENRL	122.0	91

County	Practice Code	Practice Name	Measurement Unit Display	Program Code	Sum of Applied Amount	Count of Number of Practices
Orange				EQIP	20.0	20
	633	Waste Recycling	ac	CTA-GENRL	487.5	28
				EQIP	794.1	54
	642	Water Well	no	CTA-GENRL	18.0	18
	644	Wetland Wildlife Habitat Management	ac	CTA-GLC	7.9	5
	645	Upland Wildlife Habitat Management	ac	CRP	17.7	5
				CTA-GENRL	150.7	28
	647	Early Successional Habitat Development / Management	ac	WHIP	51.7	12
	657	Wetland Restoration	ac	CTA-GLC	7.9	5
	733	Cross Slope Farming	ac-ft	CTA-GENRL	153.1	15
	329A	Residue Management, No-Till / Strip Till	ac	CTA-GENRL	170.2	10
	528A	Prescribed Grazing	ac	GTA-GENRL	661.2	46

APPENDIX P: VA HUC WETLAND AND STREAM MITIGATION CREDIT VOLUMES

	HUC	Credits	Acres	Linear Feet
Credits Potential:				
Stream (Upper)	2080103	580,166	5,941	475,538
Wetland (Upper)	2080103	1,422	3,078	0
Stream (Lower)	2080104	169,325	699	327,870
Wetland (Lower)	2080104	1,804	4,218	0
Credits Release:				
Stream (Upper)	2080103	566,817	6,742	429,575
Wetland (Upper)	2080103	1,126	1,929	0
Stream (Lower)	2080104	140,692	12	191,113
Wetland (Lower)	2080104	1,370	4,199	0
Credits Withdrawn:				
Stream (Upper)	2080103	498,704	6,724	33,349
Wetland (Upper)	2080103	965	1,638	0
Stream (Lower)	2080104	98,412	12	126,326
Wetland (Lower)	2080104	1,119	2,893	0
Credits Available:				
Stream (Upper)	2080103	68,113	18	99,226
Wetland (Upper)	2080103	161	291	0
Stream (Lower)	2080104	42,280	0	64,787
Wetland (Lower)	2080104	251	1,306	0

Appendix Q: Orange and Essex Landowners

Participants from Orange

Land Owner	Contact Info	Acres	Location
Robert Brame		120	
Joe & Elizabeth Hall		100	
Doug Harris		10	
David Brickman		40	
Wells Waugh		500	
Thomas Graves		500	
TOTAL TO DATE		**1,270**	

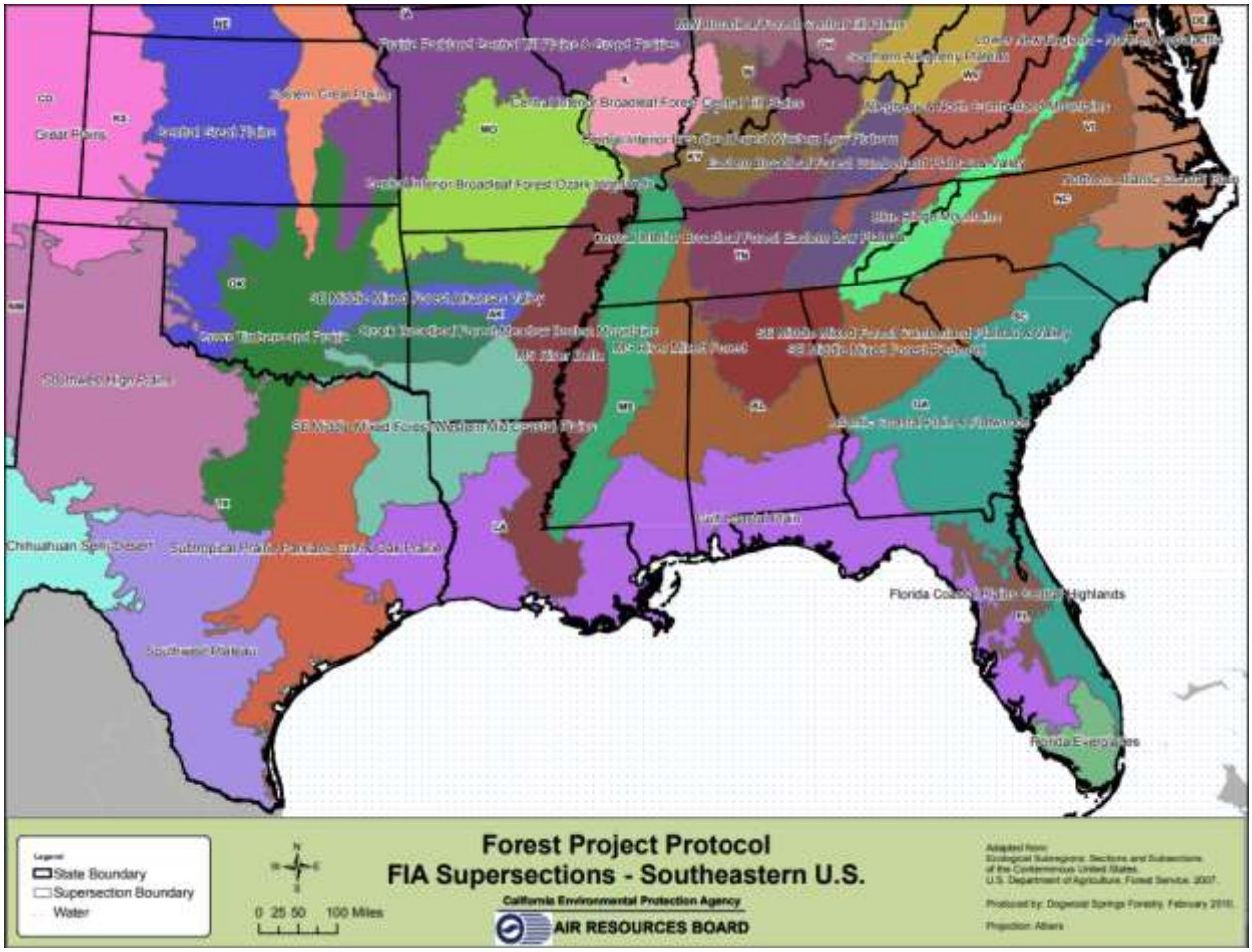
Participants from Essex

Land Owner	Contact Info	Acres	Location
John Haile		700	
Ted Rennolds		800	
TOTAL TO DATE		**1,500**	

Appendix R: Initial Survey Questions for Landowners

Q #	Survey Question	Response
1	How Many Acres do you own?	
2	How Long Have You Owned the Land?	
3	Do you farm the land or lease it out?	
4	Do you live on the property?	
5	Do you have children?	
6	Do they live on the land?	
7	If not, where do you and/or your children live?	
8	Is there an intergenerational plan?	
9	Is the land under a conservation easement?	
10	If so, when was it placed under easement?	
11	If not, would you consider?	
12	If not why?	
13	What is the primary objective of your ownership?	
14	Do you have a forest management plan?	
15	When was the last time you harvested?	
16	Who was your logger?	
17	Was the harvest for pulp or saw timber or both?	
18	If you have not harvested, why?	
19	What is the age of the timber stand?	
20	What are the 3 predominate species?	
21	Determine average basal area of stand	
22	Is the stand part of ag/forest district?	
23	Is any part of your property enrolled in a USDA program (CRP, WRP, EQIP)	
24	Any livestock?	
25	Any Streams on the property?	
26	Has the cattle been fenced out of streams?	
27	Any row crop(s)?	
28	Do you hunt or fish on the land?	
29	Are the recreational values important to your property management?	
30	Do you lease out your land for hunting?	
31	Is the Land in the County Land Use Value Taxation Program (LUVT)?	
32	Does your property break even?	
33	If Yes, what is the main driver?	
34	If No, what reason(s) would you attribute (e.g. size, prices, location, taxes, etc.)?	
35	On a per acre basis, what annual dollar value of income would be meaningful to you?	
36	Do you have any wetlands, low spots or tough to farm areas on your property?	
37	If so, could you show us where?	
38	If you could add new income streams from your property, would you use them for increased liquidity or endowment for future generations or a combination of both?	
39	What are your deepest hopes, wants and concerns for your land?	
40	What have we not asked you that we should know?	

Appendix S: FIA Supersection Map



Supersection	Assessment Area	Associated Species	Site Class	Basal Area (Sq Ft / acre)	Common Practice - Above Ground Carbon Mean (mtCO2e / acre)	Species Diversity Index	Rotation Length	Value of Harvest
Atlantic Coastal Plain & Flatwoods	Atlantic Coastal Plain Loblolly-Shortleaf-Oak	Eastern red cedar, loblolly pine, oak, shortleaf pine, southern scrub oak, Virginia pine, white pine, red pine, jack pine	High	91.17	65.76	70%	Short	Medium
			Low	72.37	44.98	70%		
	Atlantic Coastal Plain Longleaf-Slash Pine	Longleaf pine, oak, palms, sand pine, slash pine, spruce pine, tropical hardwoods	High	75.76	56.74	70%	Medium	Low
			Low	70.50	48.02	70%		
	Atlantic Coastal Plain Oak-Hickory	Chestnut oak, black oak, scarlet oak, hickory, post oak, blackjack oak, white oak, red oak	High	85.01	80.62	65%	Long	Medium
			Low	72.08	61.07	65%		
	Atlantic Coastal Plain Riverine Hardwood	Cottonwood, willow, elm, ash, red maple, oak, river birch, sycamore, sweetgum, nuttail oak, willow oak	High	100.54	89.03	70%	Long	Very Low
			Low	97.93	80.87	70%		
	Atlantic Coastal Plain Swamp Hardwood & Cypress	Atlantic white-cedar, bald cypress, pond cypress, water tupelo, oak, gum, overcup oak, water hickory, pond pine, red maple, swamp chestnut oak, cherrybark oak, sweetbay,	High	118.42	97.81	65%	Long	Low
			Low	108.81	77.98	65%		
	Atlantic Coastal Plain Upland Hardwood	Sassafras , persimmon, sugarberry, hackberry, elm, green ash, sweetgum, yellow poplar, sycamore, pecan, American elm, white oak, northern red oak	High	70.54	57.78	65%	Long	Low
			Low	68.27	51.42	65%		

Appendix T: Landowner Survey

Q #	Survey Question	Response
1	How long have you owned this land?	
2	How Many Acres do you own?	
3	How many acres are Open/Ag Land?	
4	How acres many are Forested?	
5	How many Perennial Streams?	
6	HUC 12	
7	VA HUG	
8	Name(s)	
9	How many streams in forest?	
10	(located on map)	
11	(est. Linear Ft of streambank)	
12	Do you have any wetlands?	
13	(est. acreage)	
14	(located on Map)	
15	Other unique geographic formations?	
16	(located on Map)	
17	What is the primary objective of your ownership?	
	County / State / Federal Programs	
18	Is the land under a conservation easement?	
19	If yes, when was it placed?	
20	If no, why not?	
21	Is the land in Land-use Taxation program?	
22	If yes, what category(ies)?	
23	est. tax relief you receive?	
24	If no, why not	
25	Is the stand part of ag/forest district?	
26	If yes, how many acres?	
27	Is any part of your property enrolled in a USDA program (CRP, WRP, EQIP)	
28	(program name)	
29	(year)	
30	(program name)	
31	(year)	
	Open / Agricultural Land	
32	Do you farm the land or lease it out?	
33	How long have you been doing this?	
34	Currently any crops?	
35	If yes, what are they	
36	(Est. Acres)	
37	If no, have there been in last 15yrs?	
38	(What)	
39	Currently any livestock? (incl. horses)	Y / N
40	If yes, how many annually?	
41	Exclusion fencing employed?	Y / N
42	Additional management practices?	
	Forest Land	
43	Estimated age of timber stand(s)	
44	Forest Management Plan?	Y / N
45	If no, why not?	
46	If yes, Date of most recent?	
47	Who wrote it?	
48	Most recent Cruise	

Q #	Survey Question	Response
49	Who was the logger	
50	Harvested?	
51	Pulpwood or timber?	
52	Type of harvest?	
53	How many acres?	
54	3 predominant species?	
55	Additional Info	
56	Is your intention to continue to sell pulpwood or timber?	
57	Average basal area based on our survey	
	Recreational Use	
58	Are recreational values/uses important to your property management?	
59	Do you hunt or fish the land?	
60	Do you lease for hunting or fishing?	
61	What seasons?	
62	How many people?	
63	Annual charge?	
64	Do you carry additional liability insurance?	
65	How much?	
66	Other recreational uses?	
	Intergenerational Planning	
67	Do you live on the property?	
68	How long have you lived on the property?	
69	Do you have other family living with you, on, or near the land?	
70	family member(s)	
71	How long?	
72	If yes, Is there an intergenerational or extended family plan?	
73	If yes, are there basic structures that secure this?	
74	If not, would you consider it?	
	General Economics	
75	Does the property break even?	
76	If no, to what do you attribute this?	
77	If yes, what is the Main Driver?	
78	What % does this driver represent?	
79	Is there a Secondary Driver?	
80	What % does this driver represent?	
81	On a per acre basis, what annual dollar amount would be meaningful?	
82	If you add new income would you use it for liquidity or intergenerational endowment?	
83	What are deepest hopes, wants and concerns for your land?	
84	What have we not asked you that we should know?	

Appendix U: Survey Raw Data - Landowner 1 (Personal Identifying information deleted)

How long have you owned this land?	Bought in 1979 / built house in 1983
How Many Acres do you own?	88 acres
How many acres are Open/Ag Land?	48
How acres many are Forested?	40
How many Perennial Streams?	1
HUC 12	20801060501
VA HU	YO16
Name(s)* xxxx	xxxx
How many str. in forest?	
(located on map)	Y
(est. Linear Ft of streambank)	700-800
Do you have any wetlands?	N
(est. acreage)	
(located on Map)	
other unique geographic formations?	Y - springhouse on property - civil war camp site
(located on Map)	N
What is the primary objective of your ownership?	use lease to help with taxes, hold onto
County / State / Federal Programs	
Is the land under a conservation easement?	N
If yes, when was it placed?	
If no, why not?	
Is the land in Land-use Taxation program?	Y
If yes, what category(ies)?	ag/open

est. tax relief you receive?	
If no, why not	
Is the stand part of ag/forest district?	N
If yes, how many acres?	
Is any part of your property enrolled in a USDA program (CRP, WRP, EQIP)	N
(program name)	
(year)	
(program name)	
(year)	
Open / Ag Land	
Do you farm the land or lease it out?	Lease
How long have you been doing this?	
Currently any crops?	N
If yes, what are they	
(Est. Acres)	
If no, have there been in last 15yrs?	
(What)	
Currently and livestock? (incl. horses)	Y
If yes, how many annually?	
Exclusion fencing employed?	N
Additional management practices?	Horses / cattle wander through forest stand
Forest Land	
Estimated age of timber stand(s)	50+
Forest Management Plan?	N
If no, why not?	expedience

If yes, Date of most recent?	N
Who wrote it?	
Most recent Cruise	N/A
who was the logger	Wells Waugh
Harvested?	select poplar / 20 yrs ago
Pulpwood or timber?	timber
Type of harvest?	thinning
How many acres?	40
3 predominant species?	WO, RO, POP
Additional Info	Cattle have access to stand
Is your intention to continue to sell pulpwood or timber?	Y
Average basal area based on our survey P1-100, P2-160, P3-120	126.66
Recreational Use	
Are recreational values/uses important to your property management?	Y
Do you hunt or fish the land?	Y
Do you lease for hunting or fishing?	N
what seasons?	Deer turkey
how many people?	4-5
annual charge	0
do you carry additional liability insurance?	n
how much	
Other recreational uses?	n/a
Intergenerational Planning	
Do you live on the porperty?	Y
How long have you	xx
Do you have other family living with you, on, or near the land?	xx
family member(s)	xx

How long ?	
If yes, Is there an intergenerational or extended family plan	xx
If yes, are there basic structures that secure this?	nothing beyond standard
If not, would you consider it?	
General Economics	
Does the property break even?	
If no, to what do you attirbute this?	
If yes, what is the main driver?	land use taxation program is invaluable
what % does this driver represent?	
Secondary Driver	
what % does this driver represent?	
On a per acre basis, what annual dollar amount would be meaningful?	Any amount
If you add new income would you use it for liquidity or intergenerational endowment?	both weighted to intergenerational
What are deepest hopes, wants and concerns for your land?	Keep the land in Ag
What have we not asked you that we should know?	N/A

Appendix V: Survey Raw Data - Landowner 2 (Personal Identifying information deleted)

How long have you owned this land?	4
How Many Acres do you own?	272
How many acres are Open/Ag Land?	120
How acres many are Forested?	150
How many Perennial Streams?	2/ forest & open
HUC 12	20801060401
VA HUG	YO12
Name(s)	xxx
How many str. in forest?	2
(located on map)	Y
(est. Linear Ft of streambank)	
Do you have any wetlands?	N
(est. acreage)	
(located on Map)	
other unique geographic formations?	N
(located on Map)	
What is the primary objective of your ownership?	Keep it in working land
County / State / Federal Programs	
Is the land under a conservation easement?	N
If yes, when was it placed?	
If no, why not?	No discernable benefit. too tied up / don't trust orgs that hold the land
Is the land in Land-use Taxation program?	Y
If yes, what category(ies)?	open / forest
est. tax relief you receive?	
If no, why not	

Is the stand part of ag/forest district?	N
If yes, how many acres?	
Is any part of your property enrolled in a USDA program (CRP, WRP, EQIP)	State Program
(program name)	Stream Exclusion with grazing management SL-6
(year)	3
(program name)	NRCS rotational grazing
(year)	3
Open / Ag Land	
Do you farm the land or lease it out?	farm
How long have you been doing this?	4
Currently any crops?	N
If yes, what are they	
(Est. Acres)	
If no, have there been in last 15yrs?	N
(What)	
Currently and livestock? (incl. horses)	Y
If yes, how many annually?	35 cows / 3 horses
Exclusion fencing employed?	Y /
Additional management practices?	
Forest Land	
Estimated age of timber stand(s)	50+
Forest Management Plan?	Y but didn't follow it
If no, why not?	only select cutting ash
If yes, Date of most recent?	
Who wrote it?	not known
Most recent Cruise	n/a

who was the logger	
Harvested?	Y
Pulpwood or timber?	timber
Type of harvest?	select ash
How many acres?	n/a
3 predominant species?	R/W oak, ash, walnut, cherry-
Additional Info	No pine
Is your intention to continue to sell pulpwood or timber?	not likely due to damage
Average basal area based on our survey -100, 110, 90, 100	100
Recreational Use	
Are recreational values/uses important to your property management?	Y
Do you hunt or fish the land?	Y
Do you lease for hunting or fishing?	N
what seasons?	Deer
how many people?	8-10 family friends
annual charge	0
do you carry additional liability insurance?	N
how much	
Other recreational uses?	N
Intergenerational Planning	
Do you live on the porperty?	Y
How long have you	4
Do you have other family living with you, on, or near the land?	xxx
family member(s)	xxx
How long ?	
If yes, Is there an intergenerational or extended family plan	N
If yes, are there basic structures that secure this?	

If not, would you consider it?	Y
General Economics	
Does the property break even?	N
If no, to what do you attirbute this?	thin margins /
If yes, what is the main driver?	Taxes
what % does this driver represent?	
Secondary Driver	thin margins
what % does this driver represent?	
On a per acre basis, what annual dollar amount would be meaningful?	Any amount in taxes taxes
If you add new income would you use it for liquidity or intergenerational endowment?	liquidity
What are deepest hopes, wants and concerns for your land?	keep it in farming
What have we not asked you that we should know?	n/a

Appendix W: Survey Raw Data - Landowner 3 (Personal Identifying information deleted)

How long have you owned this land?	1995 - 22yrs
How Many Acres do you own?	640
How many acres are Open/Ag Land?	400
How acres many are Forested?	240
How many Perennial Streams?	1 - blue run tributaries start here
HUC 12	20801030802
VA HUG	RA28
Name(s)	xxx
How many str. in forest?	
(located on map)	Y
(est. Linear Ft of streambank)	unknown
Do you have any wetlands?	N - nearby
(est. acreage)	
(located on Map)	
other unique geographic formations?	
(located on Map)	
What is the primary objective of your ownership?	Maintain rural aspect
County / State / Federal Programs	
Is the land under a conservation easement?	N
If yes, when was it placed?	
If no, why not?	wants to maintain liquidity / like them but it isn't right time
Is the land in Land-use Taxation program?	Y
If yes, what category(ies)?	Ag
est. tax relief you receive?	$2500

If no, why not	
Is the stand part of ag/forest district?	N
If yes, how many acres?	
Is any part of your property enrolled in a USDA program (CRP, WRP, EQIP)	N/A
(program name)	
(year)	
(program name)	
(year)	
Open / Ag Land	
Do you farm the land or lease it out?	Y
How long have you been doing this?	
Currently any crops?	Y
If yes, what are they	Hay
(Est. Acres)	100
If no, have there been in last 15yrs?	
(What)	
Currently and livestock? (incl. horses)	Y
If yes, how many annually?	50+/-
Exclusion fencing employed?	Y / N
Additional management practices?	
Forest Land	
Estimated age of timber stand(s)	unknown
Forest Management Plan?	N
If no, why not?	no cutting so far
If yes, Date of most recent?	
Who wrote it?	

Most recent Cruise	
who was the logger	
Harvested?	
Pulpwood or timber?	
Type of harvest?	
How many acres?	
3 predominant species?	Oak, Beech, poplar,
Additional Info	
Is your intention to continue to sell pulpwood or timber?	
Average basal area based on our survey	
Recreational Use	
Are recreational values/uses important to your property management?	Y
Do you hunt of fish the land?	Y
Do you lease for hunting or fishing?	N
what seasons?	deer
how many people?	xxx
annual charge	
do you carry additional liability insurance?	
how much	
Other recreational uses?	
Intergenerational Planning	
Do you live on the property?	Y
How long have you	23
Do you have other family living with you, on, or near the land?	xxx
family member(s)	xxx
How long ?	

If yes, Is there an intergenerational or extended family plan	
If yes, are there basic structures that secure this?	
If not, would you consider it?	xxxx
General Economics	
Does the property break even?	
If no, to what do you attirbute this?	50K carrying costs
If yes, what is the main driver?	
what % does this driver represent?	
Secondary Driver	taxes
what % does this driver represent?	
On a per acre basis, what annual dollar amount would be meaningful?	tax relief is biggest driver $24K
If you add new income would you use it for liquidity or intergenerational endowment?	
What are deepest hopes, wants and concerns for your land?	flexibility / keep away from Feds
What have we not asked you that we should know?	what am I going to have to surrender to be part of this program beyond Pilot?

Appendix X: Survey Raw Data - Landowner 4 (Personal Identifying information deleted)

How long have you owned this land?	Family since 1769/outright owner
How Many Acres do you own?	1100
How many acres are Open/Ag Land?	500+/-
How acres many are Forested?	500 +/-
How many Perennial Streams?	small
HUC 12	20801060501
VA HUG	YO16
Name(s)	xxx
How many str. in forest?	50%
(located on map)	Y
(est. Linear Ft of streambank)	DOM Power owns deed around stream - 30ft buffer
Do you have any wetlands?	Y (owned by Dominion
(est. acreage)	15-20
(located on Map)	Y
other unique geographic formations?	N
(located on Map)	
What is the primary objective of your ownership?	Always considered it $ in bank - wildlife management
County / State / Federal Programs	
Is the land under a conservation easement?	N
If yes, when was it placed?	
If no, why not?	want o pass it on w/ as few encumbrances
Is the land in Land-use Taxation program?	Y
If yes, what category(ies)?	Ag
est. tax relief you receive?	couldn't own without it

If no, why not	
Is the stand part of ag/forest district?	N
If yes, how many acres?	
Is any part of your property enrolled in a USDA program (CRP, WRP, EQIP)	N/A
(program name)	
(year)	
(program name)	
(year)	
Open / Ag Land	
Do you farm the land or lease it out?	N
How long have you been doing this?	30+yrs
Currently any crops?	Y
If yes, what are they	Corn silage, wheat hay, cattle
(Est. Acres)	500 +/-
If no, have there been in last 15yrs?	
(What)	
Currently and livestock? (incl. horses)	Y/cattle
If yes, how many annually?	
Exclusion fencing employed?	Partially
Additional management practices?	N
Forest Land	
Estimated age of timber stand(s)	variable
Forest Management Plan?	N
If no, why not?	just needed the $/it was fast
If yes, Date of most recent?	
Who wrote it?	xxx

Most recent Cruise	5 yrs ago
who was the logger	xxx
Harvested?	Y
Pulpwood or timber?	timber
Type of harvest?	thinning / release / clear cut 5 yrs ago
How many acres?	see map
3 predominant species?	WO, RO, POP, Pine
Additional Info	
Is your intention to continue to sell pulpwood or timber?	Y
Average basal area based on our survey P1-100, P2-100, P3-110	103.3
Recreational Use	
Are recreational values/uses important to your property management?	Y
Do you hunt or fish the land?	Y
Do you lease for hunting or fishing?	N
what seasons?	Deer/turkey
how many people?	1-4
annual charge	
do you carry additional liability insurance?	N
how much	
Other recreational uses?	N/A
Intergenerational Planning	
Do you live on the property?	Y
Do you have other family living with you, on, or near the land?	
family member(s)	
How long ?	
If yes, Is there an intergenerational or extended family plan	Y/parcels owned-never divided
If yes, are there basic structures that secure this?	ownership

If not, would you consider it?	
General Economics	
Does the property break even?	Y
If no, to what do you attirbute this?	
If yes, what is the main driver?	land use taxation
what % does this driver represent?	
Secondary Driver	
what % does this driver represent?	
On a per acre basis, what annual dollar amount would be meaningful?	Any revenue streams + tax relief is helpful
If you add new income would you use it for liquidity or intergenerational endowment?	liquidity
What are deepest hopes, wants and concerns for your land?	maintaining it for his family given his age
What have we not asked you that we should know?	None

Appendix Y: Survey Raw Data - Landowner 5 (Personal Identifying information deleted)

How long have you owned this land?	Family since 1897 / xxx
How Many Acres do you own?	242
How many acres are Open/Ag Land?	0
How acres many are Forested?	240
How many Perennial Streams?	"xxx" borders property to the South /2-3 other small str. run 80% of year
HUC 12	20801060401
VA HUG	YO 12
Name(s)	xxx
How many str. in forest?	All
(located on map)	Y
(est. Linear Ft of streambank)	unknown
Do you have any wetlands?	N
(est. acreage)	
(located on Map)	Y
other unique geographic formations?	none
(located on Map)	Y / N
What is the primary objective of your ownership?	Want the forest to remain healthy/looking good - support wildlife
County / State / Federal Programs	
Is the land under a conservation easement?	N
If yes, when was it placed?	
If no, why not?	no reason - haven't looked into it
Is the land in Land-use Taxation program?	Y
If yes, what category(ies)?	forest

est. tax relief you receive?	
If no, why not	
Is the stand part of ag/forest district?	N
If yes, how many acres?	
Is any part of your property enrolled in a USDA program (CRP, WRP, EQIP)	N/A
(program name)	
(year)	
(program name)	
(year)	
Open / Ag Land	N/A
Do you farm the land or lease it out?	
How long have you been doing this?	
Currently any crops?	
If yes, what are they	
(Est. Acres)	
If no, have there been in last 15yrs?	
(What)	
Currently and livestock? (incl. horses)	
If yes, how many annually?	
Exclusion fencing employed?	
Additional management practices?	
Forest Land	
Estimated age of timber stand(s)	50-60 yrs
Forest Management Plan?	Y
If no, why not?	

If yes, Date of most recent?	2009
Who wrote it?	xxx
Most recent Cruise	2001
who was the logger	xxx
Harvested?	N
Pulpwood or timber?	
Type of harvest?	Salvage / thinning
How many acres?	240
3 predominant species?	red, scarlet and WO / pine
Additional Info	20 year cycle followed
Is your intention to continue to sell pulpwood or timber?	Y
Average basal area based on our survey P1-100, P2-120, P-110	110
Recreational Use	
Are recreational values/uses important to your property management?	Y
Do you hunt or fish the land?	N
Do you lease for hunting or fishing?	N
what seasons?	N/A
how many people?	N/A
annual charge	N/A
do you carry additional liability insurance?	N
how much	
Other recreational uses?	
Intergenerational Planning	
Do you live on the porperty?	Y
How long have you	@10yrs
Do you have other family living with you, on, or near the land?	N
family member(s)	xxx
How long ?	

If yes, Is there an intergenerational or extended family plan	Y
If yes, are there basic structures that secure this?	Land use tax / want to maintain flexibility
If not, would you consider it?	
General Economics	
Does the property break even?	N
If no, to what do you attirbute this?	no source of revenue
If yes, what is the main driver?	
what % does this driver represent?	
Secondary Driver	
what % does this driver represent?	
On a per acre basis, what annual dollar amount would be meaningful?	Taxes would be a start
If you add new income would you use it for liquidity or intergenerational endowment?	intergenerational
What are deepest hopes, wants and concerns for your land?	keeping in family/ conservation
What have we not asked you that we should know?	none

Appendix Z: Survey Raw Data - Landowner 6 (Personal Identifying information deleted)

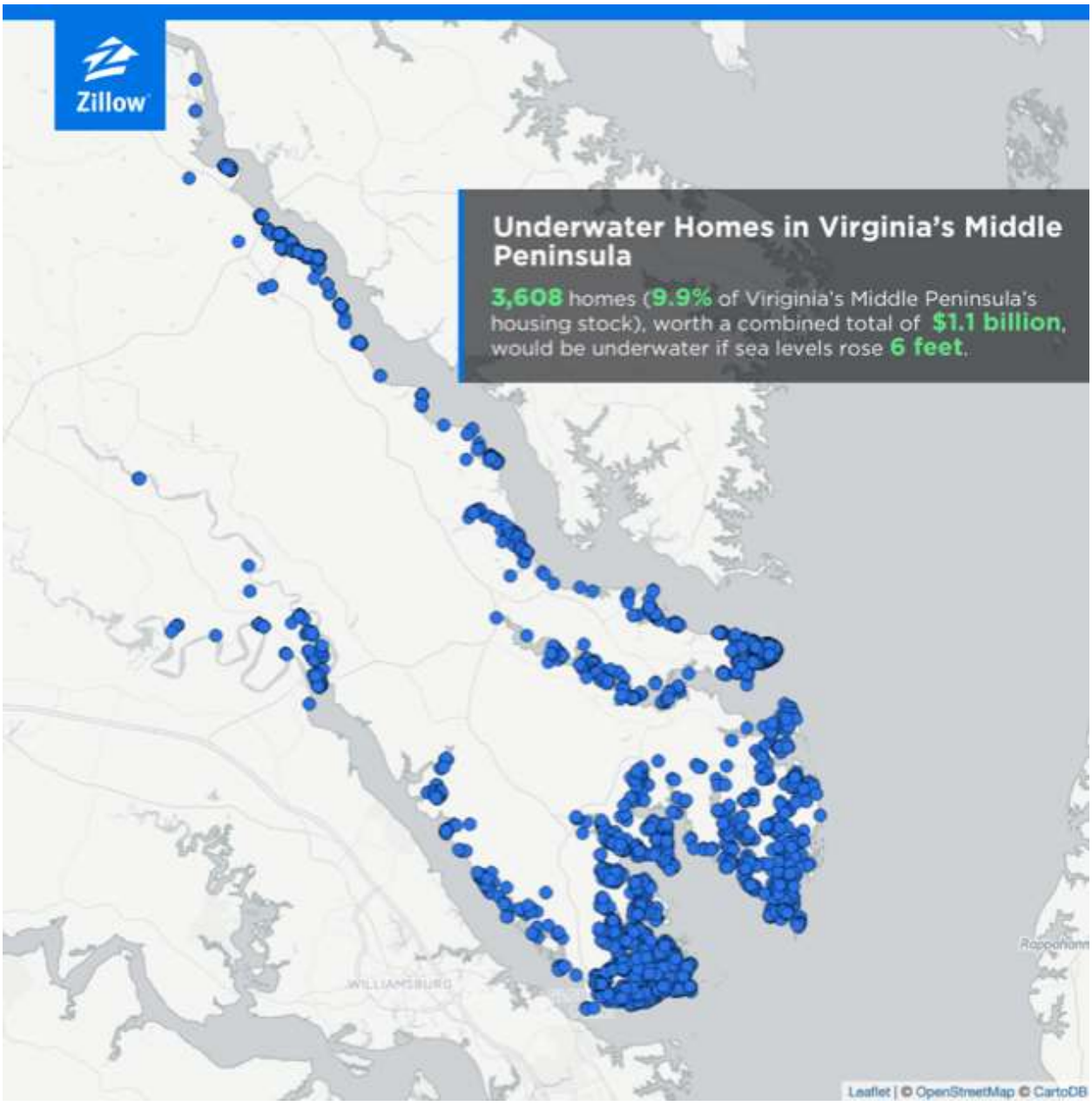
How long have you owned this land?	1992 / 26
How Many Acres do you own?	82
How many acres are Open/Ag Land?	72
How acres many are Forested?	10
How many Perennial Streams?	3 feeders combine to go out as one. Named xxx
HUC 12	020801060501
VA HUG	YO16
Name(s)	xxx
How many str. in forest?	all are in and out of forest
(located on map)	Y
(est. Linear Ft of streambank)	unknown
Do you have any wetlands?	no
(est. acreage)	
(located on Map)	Y
other unique geographic formations?	low area
(located on Map)	Y
What is the primary objective of your ownership?	Get the most $ I can out of it while I have it. Zoned R3 – development a possibility
County / State / Federal Programs	
Is the land under a conservation easement?	no
If yes, when was it placed?	
If no, why not?	high Constraint vs low money

Is the land in Land-use Taxation program?	Y
If yes, what category(ies)?	Farm Cattle/Ag
est. tax relief you receive?	
If no, why not	
Is the stand part of ag/forest district?	N
If yes, how many acres?	
Is any part of your property enrolled in a USDA program (CRP, WRP, EQIP)	
(program name)	Exclusion Fencing
(year)	20ish years / extended 2X
(program name)	cover cropping
(year)	
Open / Ag Land	
Do you farm the land or lease it out?	Both
How long have you been doing this?	
Currently any crops?	Y
If yes, what are they	Hay
(Est. Acres)	20-30
If no, have there been in last 15yrs?	
(What)	
Currently and livestock? (incl. horses)	Y
If yes, how many annually?	100
Exclusion fencing employed?	Y
Additional management practices?	N
Forest Land	

Estimated age of timber stand(s)	70+
Forest Management Plan?	N
If no, why not?	Never been cut
If yes, Date of most recent?	
Who wrote it?	
Most recent Cruise	
who was the logger	
Harvested?	
Pulpwood or timber?	
Type of harvest?	
How many acres?	
3 predominant species?	
Additional Info	The ten acres has never been cut to xxx knowledge. quite a few large old trees. Wife wants to keep them. (at least the oaks).
Is your intention to continue to sell pulpwood or timber?	
Average basal area based on our survey	80
Recreational Use	
Are recreational values/uses important to your property management?	Yes
Do you hunt or fish the land?	used to. maybe once a season now
Do you lease for hunting or fishing?	N
what seasons?	
how many people?	

annual charge	
do you carry additional liability insurance?	
how much	
Other recreational uses?	
Intergenerational Planning	
Do you live on the property?	Y
How long have you	26
Do you have other family living with you, on, or near the land?	xx
family member(s)	xxx
How long ?	
If yes, Is there an intergenerational or extended family plan	N
If yes, are there basic structures that secure this?	
If not, would you consider it?	no xxx children xxx can't carry property costs
General Economics	
Does the property break even?	not consistently
If no, to what do you attribute this?	small size of operation, thin margins
If yes, what is the main driver?	
what % does this driver represent?	
Secondary Driver	
what % does this driver represent?	
On a per acre basis, what annual dollar amount would be meaningful?	Any tax breaks or additional revenue are helpful

If you add new income would you use it for liquidity or intergenerational endowment?	Liquidity
What are deepest hopes, wants and concerns for your land?	Chose to raise their kids in this setting. Didn't get into farming for the $ but the lifestyle. Would like to maintain character of land for future if possible. Indicated a willingness to sell to development given R3 designation and profit.
What have we not asked you that we should know?	Feels there is a problem in the difference between what his land costs the county and what his house costs the county. This needs to be dealt with in some fashion. He gets how important the LUT program is but doesn't like that his neighbor thinks he's getting a tax break for just the land. Among other things, there needs to be better communication around this issue.



These results through the end of the century are generated based on today's existing property numbers, property values, and related data (Zillow 2017). In some cases, our underlying source datasets may not reflect all local features such as recently-constructed seawalls and locally-controlled levees. In those cases, the flood-mitigating effects of such structures may not be reflected in the projected degree of flooding.

Year	Projection	State	County Code	Name	Homes at Risk	Value at Risk	Property Tax at Risk	Population Currently housed in at risk homes	Total Homes	Total Value	Total Property Tax
2030	NCAH	VA	1	Accomack Co. District 1	1,347	$263,338,400	$1,290,060	876	3,475	$657,864,300	$3,223,262
2030	NCAH	VA	103	Lancaster Co. District 1	10	$3,207,900	$13,794	14	1,732	$450,393,300	$1,936,694
2030	NCAH	VA	131	Northampton Co. District 1	3	$3,738,300	$5,069	5	1,160	$213,695,849	$1,156,684
2030	NCAH	VA	133	Northumberland Co. District 1	90	$20,159,700	$87,296	141	1,616	$373,324,521	$1,617,653
2030	NCAH	VA	1	Accomack Co. District 2	39	$6,389,700	$40,360	50	1,949	$224,108,500	$1,396,381
2030	NCAH	VA	131	Northampton Co. District 2	1	$438,300	$2,498	1	1,184	$263,428,613	$1,347,842
2030	NCAH	VA	133	Northumberland Co. District 2	6	$1,987,100	$8,605	8	1,943	$422,667,046	$1,830,348
2030	NCAH	VA	103	Lancaster Co. District 3	59	$16,119,900	$69,316	80	1,725	$597,287,400	$2,575,463
2030	NCAH	VA	127	New Kent Co. District 3	1	$233,100	$1,935	2	1,367	$338,955,400	$2,814,181
2030	NCAH	VA	131	Northampton Co. District 3	2	$574,400	$2,249	4	866	$93,323,395	$773,480
2030	NCAH	VA	159	Richmond Co. District 3	1	$65,717	$460	2	665	$142,023,454	$947,628
2030	NCAH	VA	199	York Co. District 3	11	$2,973,900	$21,044	26	4,641	$1,202,271,200	$8,507,118
2030	NCAH	VA	1	Accomack Co. District 4	129	$9,296,300	$56,571	267	1,560	$135,647,900	$826,918
2030	NCAH	VA	127	New Kent Co. District 4	2	$560,000	$4,648	5	1,238	$267,394,500	$2,219,374
2030	NCAH	VA	131	Northampton Co. District 4	11	$2,213,000	$16,281	19	1,262	$306,617,296	$1,476,140
2030	NCAH	VA	133	Northumberland Co. District 4	10	$4,180,500	$18,103	13	2,020	$682,906,100	$2,956,983
2030	NCAH	VA	159	Richmond Co. District 4	14	$3,463,178	$24,242	25	918	$143,205,452	$967,846
2030	NCAH	VA	199	York Co. District 4	1	$305,700	$2,163	3	3,698	$1,227,763,900	$8,687,657
2030	NCAH	VA	1	Accomack Co. District 5	1	$111,800	$682	2	1,086	$108,844,000	$661,990
2030	NCAH	VA	131	Northampton Co. District 5	5	$1,533,050	$6,012	8	1,165	$210,633,969	$1,182,066
2030	NCAH	VA	133	Northumberland Co. District 5	12	$4,914,000	$21,279	12	2,702	$687,281,900	$2,975,931
2030	NCAH	VA	159	Richmond Co. District 5	1	$16,506	$116	2	720	$123,488,361	$819,733
2030	NCAH	VA	1	Accomack Co. District 6	298	$23,585,800	$144,303	593	1,625	$163,895,600	$999,716
2030	NCAH	VA	1	Accomack Co. District 7	32	$7,475,200	$45,549	55	1,703	$294,119,300	$1,792,730

Year	Projection	State	County Code	Name	Homes at Risk	Value at Risk	Property Tax at Risk	Population currently housed in at risk homes	Total Homes	Total Value	Total Property Tax
2030	NCAH	VA	1	Accomack Co. District 8	41	$7,063,200	$42,974	71	1,460	$189,344,600	$1,154,272
2030	NCAH	VA	1	Accomack Co. District 9	5	$754,200	$4,601	10	1,662	$200,838,100	$1,224,336
2030	NCAH	VA	73	Abingdon	13	$3,361,800	$23,324	31	3,022	$728,843,100	$4,896,496
2030	NCAH	VA	510	Alexandria	21	$14,562,449	$151,886	40	41,616	$28,038,410,688	$299,688,420
2030	NCAH	VA	179	Aquia	2	$1,129,400	$9,596	5	6,731	$2,001,288,700	$16,999,421
2030	NCAH	VA	95	Berkeley	14	$7,441,100	$42,851	29	6,384	$2,301,980,110	$11,004,572
2030	NCAH	VA	41	Bermuda	7	$156,400	$1,526	17	24,065	$4,765,387,900	$45,175,256
2030	NCAH	VA	97	Buena Vista	2	$519,700	$2,858	4	665	$101,841,522	$575,778
2030	NCAH	VA	57	Central	1	$198,700	$1,192	2	1,360	$219,887,400	$1,319,324
2030	NCAH	VA	115	Chesapeake	98	$24,437,000	$1,319,602	143	1,259	$277,487,800	$14,963,581
2030	NCAH	VA	550	Chesapeake	188	$47,841,400	$485,064	494	73,866	$19,454,811,640	$200,305,643
2030	NCAH	VA	181	Claremont	12	$3,106,400	$22,055	23	456	$75,492,000	$535,993
2030	NCAH	VA	193	Cople	64	$21,904,900	$113,109	93	8,137	$864,008,059	$4,461,966
2030	NCAH	VA	99	Dahlgren	3	$1,543,800	$8,141	7	1,480	$371,673,200	$1,960,204
2030	NCAH	VA	73	Gloucester Point	6	$927,600	$6,892	13	2,479	$599,279,900	$4,017,648
2030	NCAH	VA	179	Griffis-Widewater	1	$381,000	$3,237	3	5,902	$1,532,119,200	$13,300,921
2030	NCAH	VA	650	Hampton	133	$26,253,400	$425,959	298	44,249	$8,304,564,000	$104,553,846
2030	NCAH	VA	93	Hardy	3	$266,800	$10,428	7	3,610	$579,242,800	$5,140,710
2030	NCAH	VA	119	Jamaica	2	$273,400	$1,285	4	1,260	$247,489,000	$1,163,304
2030	NCAH	VA	99	James Monroe	1	$23,300	$123	3	2,845	$752,408,800	$3,968,204
2030	NCAH	VA	193	Montross	4	$1,587,500	$8,197	7	3,449	$393,405,487	$2,031,910
2030	NCAH	VA	59	Mount Vernon	2	$3,271,470	$38,590	5	36,958	$18,783,414,450	$218,515,360
2030	NCAH	VA	59	Mount Vernon	2	$3,271,470	$38,590	5	41,083	$18,783,414,450	$254,801,903
2030	NCAH	VA	93	Newport	2	$535,000	$4,692	5	3,883	$1,001,439,300	$8,609,464
2030	NCAH	VA	700	Newport News	12	$3,304,700	$41,802	27	47,612	$9,957,579,625	$130,110,617
2030	NCAH	VA	710	Norfolk	248	$59,103,700	$739,391	548	59,054	$13,341,133,920	$157,294,258
2030	NCAH	VA	73	Petsworth	2	$471,600	$3,370	5	3,261	$685,150,600	$4,421,423
2030	NCAH	VA	115	Piankatank	24	$6,856,500	$370,252	36	1,995	$477,927,000	$25,804,254
2030	NCAH	VA	119	Pine Top	12	$4,179,700	$19,645	16	3,324	$985,823,900	$4,641,349
2030	NCAH	VA	735	Poquoson	223	$40,142,600	$348,277	571	4,371	$1,380,542,300	$11,975,985
2030	NCAH	VA	740	Portsmouth	50	$10,396,810	$122,369	113	29,967	$4,972,122,588	$63,734,416

Year	Projection	State	County Code	Name	Homes at Risk	Value at Risk	Property Tax at Risk	Population currently housed in at risk homes	Total Homes	Total Value	Total Property Tax
2030	NCAH	VA	95	Powhatan	17	$5,084,100	$34,868	38	5,617	$1,809,168,600	$8,795,530
2030	NCAH	VA	95	Roberts	5	$5,238,200	$26,740	10	4,875	$1,859,216,400	$9,616,068
2030	NCAH	VA	119	Saluda	7	$3,866,500	$18,173	11	2,234	$587,810,500	$2,762,709
2030	NCAH	VA	93	Smithfield	1	$289,900	$2,536	2	3,323	$892,788,800	$7,556,182
2030	NCAH	VA	57	South	41	$9,288,100	$55,729	60	1,798	$333,724,000	$2,002,164
2030	NCAH	VA	95	Stonehouse	2	$1,062,200	$6,242	5	5,694	$1,619,306,800	$7,572,780
2030	NCAH	VA	800	Suffolk	1	$99,600	$614	3	28,862	$6,694,311,000	$34,991,747
2030	NCAH	VA	181	Surry	1	$133,300	$946	2	718	$148,866,700	$1,056,954
2030	NCAH	VA	57	Tappahannock	1	$30,000	$180	2	1,058	$216,609,654	$1,299,658
2030	NCAH	VA	810	Virginia Beach	263	$96,956,700	$963,203	634	144,427	$44,166,768,670	$434,587,259
2030	NCAH	VA	73	Ware	7	$2,657,100	$17,035	17	3,021	$707,133,600	$4,649,329
2030	NCAH	VA	193	Washington	24	$7,528,900	$38,877	40	10,323	$1,054,217,060	$5,444,809
2030	NCAH	VA	101	West Point	11	$3,004,300	$14,619	25	2,230	$389,915,678	$2,451,592
2030	NCAH	VA	115	Westville	54	$12,702,060	$685,914	92	1,599	$407,084,960	$21,978,001
2030	NCAH	VA	830	Williamsburg	4	$73,100	$368	8	3,759	$1,199,016,600	$6,407,787
2030	NCAH	VA	153	Woodbridge	6	$1,067,700	$12,978	17	16,236	$5,534,055,200	$66,181,688
2030	NCAH	VA	73	York	120	$17,207,500	$123,102	272	2,716	$607,117,600	$4,196,526
				TOTAL	**3,849**	**$ 838,437,710**	**$ 8,296,637**	**6,086**	**747,975**	**$219,926,605,217**	**$2,293,595,436**

APPENDIX AB: NMTC QUALIFICATION CRITERIA: SEVERELY DISTRESSED CENSUS TRACTS

Severely Distressed Areas are (1) characterized by at least one of items 1-5 on the list below for each QLICI, or (2) characterized by at least two of items 6-16 on the list below for each QLICI:

1. Census tracts with poverty rates greater than 30 percent
2. Census tracts that (a) if located within a non-Metropolitan Area, have a median family income that does not exceed 60 percent of statewide median family income; or (b) if located within a Metropolitan Area, have a median family income that does not exceed 60 percent of the greater of statewide median family income or the Metropolitan Area median family income
3. Census tracts with unemployment rates at least 1.5 times the national average (8.3% for 2011-2015 ACS Survey, 7.9% for 2006-2010 ACS Survey).
4. Census tracts that are located in counties not contained within a Metropolitan Statistical Area (MSA) (i.e. non-metropolitan counties), as defined pursuant to 44 U.S.C. 3504(e) and 31 U.S.C. 104(d) and Executive order 10253 (3 C.F.R. Part 1949-1953 Comp., p.758), as amended, with respect to the 2010 Census and as made available by the CDFI Fund;
5. As permitted by IRS and related CDFI Fund guidance materials, projects serving Targeted Populations to the extent that: (a) such projects are 60% owned by low-income persons (LIPs); or (b) at least 60% of the projects' employees are LIPs; or (c) at least 60% of the projects' gross income is derived from sales, rentals, services, or other transactions to customers who are LIP;
6. Census tracts with one of the following: (a) poverty rates greater than 25%; or (b) if located within a non-Metropolitan Area, median family income that does not exceed 70% of statewide median family income, or, if located within a Metropolitan Area, median family income that does not exceed 70% of the greater of the statewide median family income or the Metropolitan Area median family income; or (c) unemployment rates at least 1.25 times the national average
7. U.S. Small Business Administration (SBA) designated HUB Zones, to the extent that the QLICIs will support businesses that obtain HUB Zone certification from the SBA
8. Brownfield sites as defined under 42 U.S.C. 9601(39)
9. Areas encompassed by a HOPE VI redevelopment plan
10. Federally designated as Indian Reservations, Off-Reservation Trust Lands or Alaskan Native Village Statistical Areas, or Hawaiian Home Lands
11. Areas designated as distressed by the Appalachian Regional Commission or Delta Regional Authority
12. Colonial areas as designated by the U.S. Department of Housing and Urban Development
13. Federally designated medically underserved areas, to the extent that QLICI activities will support health related services

14. Federally designated Promise Zones, Impacted Coal Counties, base realignment and closure areas, State enterprise zone programs, or other similar state/local programs targeted towards particularly economically distressed communities
15. Counties for which the Federal Emergency Management Agency (FEMA) has (a) issued a "major disaster declaration" and (b) made a determination that such County is eligible for both "individual and public assistance;" provided that the initial project investment was made within 36 months of the disaster declaration
16. A Census tract identified as a Food Desert, which must either: 1) be a census tract determined to be a Food Desert by the U.S. Department of Agriculture (USDA), as identified in USDA's Food Desert Locator Tool; or 2) a census tract that qualifies as a Low-Income Community and has been identified as having low access to a supermarket or grocery store through a methodology that has been adopted for use by another governmental agency, to the extent QLICI activities will increase access to healthy food.

Note: Census data for tracts located in the Island Areas of the United States (American Samoa, Guam, Northern Mariana Islands and the US Virgin Islands) utilize 2006-2010 ACS Survey data and were not updated for the 2011-2015 survey.

Source: https://www.cohnreznick.com/nmtc-map/qualification-criteria

APPENDIX AC: HEALTHY WATERSHEDS/FORESTS PHASE III PROJECT TEAM

PARTNERS:

Virginia Department of Forestry

The mission of the Virginia Department of Forestry is to protect and develop healthy, sustainable forest resources for Virginians. The Department protects 15.8 million acres of forest land from fire, insects and disease; and manages 22 State Forest lands totaling 67,920 acres for timber, recreation, water, research, wildlife and biodiversity.

Rappahannock River Basin Commission

As stated in Section 62.1-69.27 of the Code of Virginia the mission of the RRBC is: "To provide guidance for the stewardship and enhancement of the water quality and natural resources of the Rappahannock River Basin. The Commission shall be a forum in which local governments and citizens can discuss issues affecting the Basin's water quality and quantity and other natural resources. Through promoting communication, coordination and education, and suggesting appropriate solutions to identified problems, the Commission shall promote activities by local, state and federal governments, and by individuals, that foster resource stewardship for the environmental and economic health of the Basin."

TASK ONE TEAM MEMBERS

The Berkley Group, LLC

The Berkley Group is a local government consulting firm with experts specializing in the areas of local administration, executive recruitment, organizational assessment, planning, zoning, environmental program support, finance, public works, project management, community involvement, and more. We bring a collaborative approach to our projects with an array of professional resources. Our staff brings over four centuries of direct experience in local government. We have strong ties to localities and understand their unique challenges. We provide personal attention and superior service delivery to our clients

Regional Decision Systems, LLC

Regional Decision Systems, LLC is a sole entrepreneurship established by Kevin F. Byrnes, AICP, the retired former Director of Regional Planning for the George Washington Regional Commission where Phase 1 of this project began. He has worked throughout his career in local and regional planning and public service administration in Michigan, Florida and Virginia. Kevin's skillset covers a wide spectrum, including demographic and economic research at the State, regional and local levels; environmental planning, applications of geographic information systems technology (GIS), land use planning and real estate market research and many other areas. Kevin provided invaluable project support on all three phases of the HW/FR project, including project proposals, budget development and management; assembly and editing of report submissions by other VA and PA team members, and compilation and production of the final project reports.

TASK TWO TEAM MEMBERS

ACRE Investment Management, LLC

ACRE Investment Management, LLC (AIM) is a wholly owned investment platform created by C2I, LLC. The AIM platform is designed to both deploy the ACRE mechanism across a portfolio of companies while driving scaled impact into the restoration economy. The ACRE (Advanced Carbon Restored Ecosystem) represents all the environmental and conservation attributes associated with the restoration and/or conservation of one physical acre of property. We recognize that there is a genius to nature. Ultimately, ACRE is about putting a price and value on its services—water, wildlife, carbon and so much more.

Working Lands Investment Partners, LLC

Working Lands Investment Partners LLC operates as an investment management firm. The Company provides clients with investment in rapidly growing environmental markets for wetlands mitigation credits, water quality and quantity instruments, habitat banking, and carbon. Working Lands Investment Partners offers a portfolio of land investments combined with natural resources.

COORDINATION WITH CHESAPEAKE BAY PROGRAM PARTNER GROUPS

Chesapeake Conservancy

Chesapeake Conservancy is a non-profit organization based in Annapolis, Maryland. It works in closepartnership with the National Park Service, the U.S. Environmental Protection Agency's Chesapeake Bay Program, the United States Fish and Wildlife Service, as well as other federal, state and local agencies, private foundations, and corporations to advance conservation. In that capacity, it serves as a catalyst for change, advancing strong public and private partnerships, developing and using new technology, and driving innovation throughout its work.