

Appendix G Planned Activity	Description	Units	Current	2010-2011	2012-2017	2017 - 2025	Total	Cost per Unit
Cover Crop - Traditional	Plant 66,400 acres of traditionally planted cover crops annually by 2025. Cover crops are small grains such as wheat, rye or barley that is planted in the fall after the harvest of corn, soybeans and/or other summer crops to absorb residual fertilizer that may remain in the soil. Cover crops provide a ground cover that prevents winter soil erosion. Funding for cover crops is provided through the State of Delaware Cost Share Program, CWA-Section 319 Grant, Chesapeake Bay Program Grant, and USDAs Environmental Quality Incentives Program.	acres (annual)	16,600 acres	3,320 additional acres	additional	additional	66,400 acres	Range \$15 - \$30 acre \$49,800 to \$99,600
Cover Crops - Commodity	Plant 26,365 acres of early planted cover crops annually by 2025. Cover crops are small grains such as wheat, rye or barley that is planted in the fall after the harvest of corn, soybeans and/or other summer crops to absorb residual fertilizer that may remain in the soil. Cover crops provide a ground cover that prevents winter soil erosion. Funding for cover crops is provided through the State of Delaware Cost Share Program, CWA-Section 319 Grant, Chesapeake Bay Program Grant, and USDAs Environmental Quality Incentives Program.	acres (annual)	6,595 acres	7,913 acres	7,908 acres additional acres	additional	26,365 acres	Range \$35 - \$50 acre

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Nutrient Management Compliance	Assure Nutrient Management Planning Compliance of 216,290 acres of farmland and urban turf areas. Nutrient Management Plans are required by landowners to assure the efficient use of manure or fertilizer needed to grow a healthy crop and minimize the application of excessive nutrients that could be lost to the environment. The State of Delaware Nutrient Management Commission will conduct Nutrient Management Compliance Audits on 216,290 acres.	acres (annual)	216,290 acres	Maintain	Maintain	NA	216,290 acres	NA
Soil Conservation & Water Quality Plans	Develop Soil Conservation and Water Quality Plans on 194,666 acres. Develop a comprehensive plan for a farm that addresses natural resource management on agricultural lands and recommends best management practices (BMPs) that control erosions and sediment loss and manage nutrient runoff. 194,666 acres of Delaware farm land will be managed under a current Soil Conservation and Water Quality Plans	acres (annual)	194,666 acres	Maintain	Maintain	NA	194,666	NA

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Conservation Tillage	Encourage Conservation Tiilage on an aditional 6,000 acres of farmland annually. Conservation Tillage involves planting and growing crops with minimal disturbance of the surface soil. No-till farming, a form of conservation tillage, is used to seed the crop directly into vegetative cover crop residue with no disturbance of the soil surface. Minimal tillage farming involves some disturbance of the soil, but uses tillage equipment that leaves much of the vegetative cover or crop residue on the surface.	acres	197,799 acres	6,000 additional acres	227,008 (max) acres	I NA	227,008 acres	\$13/acre
Continuous No-Till Conservation	Of the 197,779 acres in conservation tillage, expand to 36,159 acres of continuous no-till farming by 2025. Continuous No-Tillage has the seed applied into a vegetative cover or crop residue with no disturbance of the surface soil. Conservation Tillage involves planting and growing crops with minimal disturbance of the surface soil. No-till farming, a form or conservation tillage, is used to seed crop directly into vegetative cover or crop residue with no disturbance of the soil surface. Minimal tillage farming involves some disturbance of the soil, but uses tillage equipment that leaves much of the vegetative cover or crop residue on the surface.	acres	23,159 acres	additional 1,000 acres annually	· ·	additional	36,159 acres	\$40/acre

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Decision/Precision Agriculture	Use Precision Agriculture on an additional 20,637 acres of farmland from 2010-2011 and achieve a maximum implementation of 227,008 acres by 2017. Precision agriculture seeks to maximize the efficiency of nutrient application to cropland, thereby minimizing waste and nutrient runoff.	acres (annual)	103,186 acres	20,637 additional acres	227,008 (max)	NA	227,008 acres	\$30/acre
Heavy Use Poultry Area Pads	Construct 45 additional Heavy Use Poultry Area concrete pads for 2010-2011 and an additional 45 pads annually through 2025. Establishing a pad structure stabilizes areas frequently and intensively used by people, animal, or equipment to prevent nutrient movement into surface and groundwater. Costshare funds are available for the installation of these structures though the State of Delaware Cost Share Program and USDAs Environmental Quality Incentives Program.	structures	227 structures	45 additional structures	270 additional structures	I additionalstruc	857 structures	\$4,661/unit

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Livestock Waste Structures	Construct Livestock Waste Structures. Animal waste is stored in structures to protect it from the weather until it can be used as a crop fertilizer when conditions are appropriate or transport to another location. Cost-share funding is available for the installation of these structures though the State of Delaware Cost Share Program and USDAs Environmental Quality Incentives Program.		3 Swine; 7 Equine; 4 Dairy; 10 Dairy Waste; 3 Bovine	Dairy; 2 Dairy Waste; 1	Swine; 18	NA	Total Structures: 10 Swine; 28 Equine; 11 Dairy; 14 Dairy Waste; 10 Bovine	Swine-\$25,000 Equine \$15,000 Dairy \$60,000 Bovine \$50,000
Water Control Structures	Construct Water Control Structures on 10,846 acres by 2025. These structures are used in constructed drainage systems to control water depth and flow rates. They also increase water retention and decrease the quantity and quality of pollutants downstream. Cost-share funding is available for the installation of these structures though the State of Delaware Cost Share Program and USDAs Environmental Quality Incentives Program.	acres	50 units @ 8,343 acres	1 additional unit	6 additional units	8 additional units		\$5,000/each
Stream Protection with Fencing	Protect 258 acres of Pastureland Using Fencing by 2025. Pasture fencing keeps farm animal out of streams and prevents stream bank erosion. Cost-share funding is available for the installation of these structures though USDAs Environmental Quality Incentives Program.	acres	108 acres	10 additional acres	60 additional acres	80 additional acres	258 acres	\$2.00/ft

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Stream Protection without Fencing	Utilize Stream Protection without Fencing on an additional 325 acres through 2025. Watering troughs provide a safe reliable source of water from livestock that is away from streams. The troughs help protect steams banks from erosion that may be caused by farm animals. Cost-share funding is available for the installation of these structures though USDAs Environmental Quality Incentives Program.	acres	None	25 acres	150 additional acres		325 acres	\$700/each
Upland Prescribed Grazing	This data has not been reported in Delaware in the past. NRCS maintains a data set which indicates that there are 214 acres of prescribed grazing in the Chesapeake.	acres	214 acres	20 additional acres	450 additional acres		1,134 acres	varies
Manure Relocation	Transport an additional 48,757 tons of manure out of the Chesapeake Bay Watershed for 2010-2011 and an additional 4,000 tons annually through 2025. Excess manure is transported away from farms with high soil phosphorus levels to other farms or locations that can use the manure safely. Funding for this program is provided through CWA Section-319 Grant, Delaware Cost Share Program, Chesapeake Bay Program Grant, USDAs Environmental Quality Incentives Program and Delaware's Poultry Integrators.	tons (annual)	48,757 tons	4,000 additional tons	24,000 additional tons	32,000 additional tons	110,757 tons	average of \$4.32/ ton

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Poultry Waste Structures	Increase current capacity to 723 Constructed Poultry Waste Structures. These structures protect poultry waste from rain so that is can be used as a crop fertilizer when conditions are appropriate or transport to another location. Cost- share funding is available for the installation of these structures though the State of Delaware Cost Share Program and USDAs Environmental Quality Incentives Program.		444 structures	88 additional structures	723 (all)	NA	723 structures	\$27,005 ea = \$2,376,440
Run-Off Control Systems	Construct 120 Runoff Control Systems by 2025. Runoff control systems use a variety of techniques to direct rainwater to places where it won't cause nutrient runoff or soil erosion. Gutters and downspouts on barns and grading of the land are examples of ways to direct runoff from rainfall. Cost-share funding is available for the installation of these structures though the State of Delaware Cost Share Program and USDAs Environmental Quality Incentives Program.	systems	none	8 additional systems	48 additional systems		120) systems	\$5.25/ft average project is 2000 ft
Phytase Utilization	With the advent of phytase addition to the diet and feed for all poultry in Delaware we have realized a steady reduction in the phosphorus levels in poultry manure. Research demonstrates a 30 - 40 % reduction is easily achievable.	% reduction	30%	NA	NA	NA	NA	NA

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Mortality Composters or Incinerators	Require dead bird composters/Incent orators on all poultry operations for bird mortality.	structures	449 structures	95 additional structures	723 (all)	NA	723 structures	\$6,618 = \$595,620
Large Animal Mortality Program	Offer large animal mortality handling for operations with large animals. Program will assure offsite transport for large animal mortality.	animals	110 annually	maintain	maintain	NA	110 annually	\$175 to \$250 per anima
Private Lands	1							
Streamside Grass Buffers	Plant an additional 69 acres annually of Streamside Grass Buffers on Private Lands. Pplant an additional 1,734 acres by 2025. Grasses planted next to waterways filter and take up nutrients from run off, stabilize the soil, and provide wildlife habitat. Cost share funds are available for the implementation of grasses buffers on agricultural lands through the Delaware Conservation Reserve Enhancement Program and USDAs Conservation Reserve Enhancement Program. Costs are based on a 10 year contract agreement.	acres	699 acres	69 additional acres	414 additional acres		1,734 acres	\$300/acre for installation; \$65, acre/year land rental \$35.17/acre/yea r interes

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Streamside Forest Buffers	Plant an additional 223 acres of Streamside Forest Buffers on Private Lands annually. Plant an additional 5,571 acres by 2025. Trees planted next to waterways filter and take up nutrients from run off, stabilize the soil, and provide wildlife habitat. Cost share funds are available for the implementation of streamside forest buffers on agricultural lands through the Delaware Conservation Reserve Enhancement Program and USDAs Conservation Reserve Enhancement Program. Costs are based on a 10 year contract agreement.	acres	2,226 acres	223 additional acres	I additional	additional	5,571 acres	\$425/acre average for installation; \$138/ acre/year land rental; \$35.60/acre/yea r interest; \$5 acre/year maintenance

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Wetland Restoration	Construct an additional 29 acres of Wetland Restoration on Private Lands annually. Establish an additional 721 acres by 2025. A wetland is an are of land where the soil is wet or covered with water. Wetlands can be in the form of bogs, swamps, or marshes. Cost share funds are available for the implementation of wetland restoration on agricultural lands through the Delaware Conservation Reserve Enhancement Program and USDAs Conservation Reserve Enhancement Program. Funding for wetland creation, restoration, and enhancement is also available from various federal sources, State and local government and nonprofit organizations. Costs are based on a 10 year contract agreement.	acres	286 acres	increase by 29 acres to 315	174 additional acres		721 acres	\$1,702/acre average for installation; \$138/ acre/year land rental; \$5 acre/year maintenance
Shoreline Erosion Control	Shore stabilization projects on private agricultural land that reduces erosion and stabilizes shorelines. Mitigation options to protect shorelines provide nutrient and sediment reductions.	feet	6,343 feet	600 additional feet	,	4,800 additional feet	15,343 feet	varies

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Retire Highly Erodible Land	Retire 697 acres of Highly Erodible Land by 2025. Land that is especially vulnerable to erosion is removed from crop or hay production and is planted in either grass or forest. This land usually is not disturbed for at least 10 years. Cost share funds are available for the retirement of highly erodible agricultural lands through the Delaware Conservation Reserve Enhancement Program and USDAs Conservation Reserve Enhancement Program.	acres	0	277 acres	180 additional acres	240 additional acres	697 acres	\$300/acre average cost
Land Retirement	Land retirement influences multiple environmental concerns beyond reducing soil erosion, such as improving water quality and protecting wildlife habitat. Land retirement programs include NRCS Conservation Reserve Program and, to a lesser extent, the Wetland Reserve Program.	acres	416 acres	Maintain	Maintain	NA	NA	NA
Forest Harvesting Practices	The Delaware Forest Service is the permitting agency for any logging operations that are 1 acre or larger if the land is to remain as forest afterwards. The primary laws enforced are water quality BMPs (all harvests) and adequate regeneration of commercial tree species (only when the Seed Tree Law is triggered by a harvest that is at least 10 acres, at least 25% pine and/or yellow-poplar, and not to be converted to a non-forest land use).	acres	2,070 acres	210 additional acres	l additional	additional		varies by BMPs

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Public Lands  Tree Planting	Plant 108 trees on public lands by 2025.	acres	63 acres	3 additional acres	18 additional acres		108 acres	Up to \$400/acre
Wetland Restoration	Construct 15 acres of Wetland Restoration on Public Lands by 2025. A wetland is an are of land where the soil is wet or covered with water. Wetlands can be in the form of bogs, swamps, or marshes. Cost share funds are available for the implementation of wetland restoration on agricultural lands through the Delaware Conservation Reserve Enhancement Program and USDAs Conservation Reserve Enhancement Program. Funding for wetland creation, restoration, and enhancement is also available from various federal sources, State and local government and nonprofit organizations.	acres	NA	1 acre annually	6 additional acres		15 acres	\$1,702/acre average for installation
Streamside Forest Buffers	Plant 30 acres of Streamside Forest Buffers on Public Lands by 2025. Trees planted next to waterways filter and take up nutrients from run off, stabilize the soil, and provide wildlife habitat. Cost share funds are available for the implementation of streamside forest buffers on agricultural lands through the Delaware Conservation Reserve Enhancement Program and USDAs Conservation Reserve Enhancement Program.	acres	NA	2 additional acres	12 additional acres		30 acres	\$425/acre average for installation

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Streamside Grass Buffers	Plant 30 acres of Streamside Grass Buffers on Public Lands by 2025. Grasses planted next to waterways filter and take up nutrients from run off, stabilize the soil, and provide wildlife habitat. Cost share funds are available for the implementation of grasses buffers on agricultural lands through the Delaware Conservation Reserve Enhancement Program and USDAs Conservation Reserve Enhancement Program.	acres	NA	2 acres annually	12 additional acres	16 additional acres	30 acres	\$300/acre for installation
Grassland	Restore 185 acres of Grassland on Public Lands by 2025. Grasses planted next to waterways filter and take up nutrients from run-off, stabilize the soil, and provide wildlife habitat. Cost share funds are available for the implementation of grasses buffers on agricultural lands through the Delaware Conservation Reserve Enhancement Program and USDAs Conservation Reserve Enhancement Program.	acres	110 acres	5 additional acres		40 additional acres	185 acres	\$300/acre for installation
Agriculture strategies on DNREC/DDA Lands	Adopt applicable actions and practices from Chesapeake Bay Executive Order Section 502 on Publicly Lands owned and maintained by DNREC, DDA and DelDOT. E.g. Cover Crops. Available Public owned ag lands is 4,226.	acres	0	422 additional acres	I additional	additional		depends on BMPs implemented

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Natural Filters on Other Public Lands	Delaware will increase partnerships with local governments, nonprofits, universities, other State of Delaware agencies to implement natural filters on Public Lands.	acres	Evolving BMP	50 additional acres	300 additional acres		750 acres	\$300/acre
New Farming BMPs								
CAFO Setbacks	Manure application setbacks to be implemented on the CAFO operations in accordance with State Technical Standards.	acres (annual)	0	250 additional acres	750 additional acres		1,750 acres	Regulatory Conditions
Cropland Irrigation Management	Crop irrigation is used to decrease climate variability and maximize crop yields. This results in a decrease in runoff and an increase in the crop's ability to uptake nutrients therefore less available for nutrient runoff. Yields are estimated at 20% to 25% higher than non-irrigated fields. Nutrient uptake or irrigated acres are greater, resulting in less residual nutrients remaining in the soil for runoff.	acres (annual)	60,000 acres	5,000 additional acres	additional	additional	135,000 acres	None

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Vegetative Environmental Buffers	A vegetative environmental buffer is the strategic planting of combinations or trees and shrubs around poultry houses to address environmental, production, and public relations issues by providing a vegetative filter to lower emissions of ammonia, dust, odor, feathers, and noise on a potential of 222 operations. In addition to offering a practical, efficient, and cost effective means of capturing emissions, a properly designed vegetative environmental buffer program can help to conserve energy and reduce air borne pathogens by offering shade and slowing wind speeds, as well as create a more attractive landscape and screen routine operations from view.	operations	72 operations	10 additional operations	60 additional operations			\$4,000 per system = \$40,000
Streamside/Tax Ditch Restoration	A suite of innovative alternative practices designed to enhance the removable of nutrients once they leave the field. These include increasing vegetative buffers that protect ditches from sediment and nutrient runoff. This may include reengineering of drainage channels to reestablish floodplains or redirect storm flows to wetland areas.	linear feet	17,700 linear feet	l additional	7,500 additional linear feet	additional	41,200 linear feet	\$75 per linear foot

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Evolving BMPs								
5, 10, or 35-Ft Riparian Buffer Setback	Encourage a 5, 10, or 35 foot Riparian Buffer set back for the application of nutrients on all streams and secondary drainages. The potential for affect are is 852 acres with a 5 foot buffer, 1,706 with a 10 foot buffer, and 5,930 with a 35 foot buffer.	acres (annual)	Evolving BMP	250 additional acres	i additional	additional	5,750 acres	TBD
P-sorbing Materials	"Phosphorous-sorbing" materials soak up dissolved phosphorus keeping it from flowing downstream on a potential acres. Engineered systems in which drainage water passes through phosphorus-sorbing materials, such as gypsum, drinking water residuals, or acid mine drainage residuals, can potentially remove large percentages of phosphorus as well as sediment, heavy metals, and other pollutants.		Evolving BMP	TBD	TBD	TBD	TBD	TBD
Poultry Litter Treatment	A surface application of alum, an acidifier, is added to poultry litter to acidify poultry litter and maintain ammonia in the no-volatile ionized form (ammonium) for potential of 50,000 tons. Limited funding available.	tons (annual)	Evolving BMP	ТВО	ТВО	ТВО	ТВО	TBD

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In-house Poultry Ammonia Emission Control	Ammonia emission reduction could be achieved by constructing and retrofitted poultry houses with flooring that helps reduce the creation of ammonia. Companies are researching new ventilated plenum flooring (patent pending) for poultry houses that will result in drier litter thus reducing the volume of waste by using less bedding material, lowers ammonia emissions, and promotes fastergrowing and healthier chickens.	Operations	Evolving BMP	TBD	TBD	TBD	TBD	TBD
Agronomic Improvements	New seed varieties are being developed for additional nutrient efficiency. Current seed varieties are 40% to 50% efficient at utilization and up-take of nutrients. Current test varieties of some new seeds will provide up to 60% efficiency in utilizing available fertilizer.	acres (annual)	Evolving BMP	TBD	227,008 (max)	TBD	TBD	TBD
Voluntary BMPs	A program to conduct farm assessments and inventory of voluntary conservation practices that have been installed but farmers and landowners, since 2005, that are not part of current data inventories.	acres (annual)	Currently Not Measured	I IBD	TBD	TBD	ТВО	TBD

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Alternative Use of Manure	Livestock Manure (primarily poultry litter) generated on Delaware farms is currently applied as fertilizer to Delaware crop fields or transported to areas of need through DDA's Nutrient Relocation Program. A small percentage is pelletized and sold as an organic fertilizer for residential and commercial use through Perdue AgriRecycle.  Developing alternative uses for manure produced in the Chesapeake Bay Watershed represents a large opportunity for area farmers. One potential use for the region's excess manure is energy generation. Using excess manure to feed energy generation systems could potentially result in a reduced nutrient load to the Chesapeake Bay, thus improving water quality.	tons (annual)	Evolving BMP	TBD	TBD	TBD	TBD	TBD

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Revised P-Index for Nutrient Management Planning	The Phosphorus Site Index is a site-specific assessment tool that identifies the relative risk for phosphorus losses from agriculture production fields to nearby bodies or water. The Phosphorus Site Index is currently used in the development of agriculture nutrient management plans. Delaware will support development of a revise Phosphorus Site Index that incorporates the best available science in an effort to more appropriately identify the risk for phosphorus loss from agricultural lands. The revised Phosphorus Site Index will offer site-specific management options for reducing off-site phosphorus transport. The process of revising the current Phosphorus Site Index will conducted in conjunction with the University of Delaware.		Evolving BMP	NA	100,000 acres	TBD	TBD	No additional cost as practice will be included within Nutrient Management Planning
Dairy manure Incorporation Technology	Dairy manure is incorporated into the soil at the time of application utilizing low disturbance technology. Ammonia loss from incorporation will be reduced up to 95% compared to surface application.	acres (annual)	Evolving BMP	TBD	TBD	TBD	TBD	ТВО
Poultry Manure Incorporation Technology	Poultry litter is incorporated into the soil at the time of application utilizing minimum disturbance technology which significantly reduces ammonia loss.	acres (annual)	Evolving BMP	TBD	TBD	TBD	TBD	TBD

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Carbon Sequestration/Alternative Crops	The NRCS has a practice called long term no-till which they consider a carbon sequestration practice. EPA modelers have indicated that this would instead fall under continuous no-till. Thus, there does not currently appear to be any cost-shared programs that contain this practice.	acres (annual)	Evolving BMP	TBD	TBD	TBD	TBD	TBD
Poultry Litter Windrowing	This is a relatively new practice being pushed by integrators for poultry growers which appears to reduce the amount of poultry litter produced in a year, thus reduces the amount of manure available for field application. Poultry litter/manure is windrowed within the piultry houses as a composting method. Once complete, the litter is re-used within the house to serve as litter for a second flock.	tons (annual)	Evolving BMP	TBD	TBD	TBD	TBD	TBD
Poultry House Remediation	This BMP practice decommissions abandoned poultry houses. The amount of legacy nutrients under poultry houses is sizable. This practice removes and composts the wood materials and soil below the house to eliminate this pollutant source.	operations	6 operations have been remediated	TBD	TBD	TBD	TBD	Varies based upon size