

Center for Applied Demography & Survey Research
University of Delaware

Economic Impact on Delaware's Economy:
The Delaware National Guard

by

Daniel T. Brown
Edward C. Ratledge

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Executive Summary

The Delaware National Guard (DNG) provides the U.S. Army and U.S. Air Force with reserve forces in case such support is needed. The DNG also responds to domestic emergency situations in Delaware under the authority of the Governor. The DNG is comprised of the Delaware Army National Guard (DEARNG) and the Delaware Air National Guard (DEANG).

The Center for Applied Demography & Survey Research at the University of Delaware conducted this study to explore the broader economic impact of the DNG. The study was made possible by funding from the DEARNG. This report addresses four ways that the DNG and the DEARNG impact the state's economy: employment and wages, recurring non-labor spending, construction, and taxes. The authors are solely responsible for the report's design and execution.

The DEARNG employs 396 workers and pays approximately \$36 million in personnel costs. In addition, the DEARNG paid nearly 1,500 Soldiers almost \$6 million for attending drills on select weekends. In total, the DNG paid costs of nearly \$67.5 million to employ 759 military personnel and civilian employees and \$24.2 million to the 2,462 Soldiers and Airmen on drill status.

Purchases made by the DEARNG and the DNG were separated into two groups: recurring, non-labor expenses and planned future construction projects. The recurring non-labor expenses of the DNG and the DEARNG mostly captures building and equipment maintenance, as well as the materials and supplies needed for daily operations. We find that the DNG makes nearly \$35 million worth of such expenditures, of which the DEARNG represents \$14 million.

The Economic Impact of the Delaware National Guard

The other type of spending performed by the DNG is the planned military construction projects. Unlike the first type of expenditures, military construction projects vary considerably depending on the size and scope of the upcoming projects. Assuming that each construction project takes three years to complete and that each project's cost is expended uniformly in each of these years, we estimate that the DNG spent nearly \$33 million in construction FY 2011. The DEARNG was responsible for \$27.9 million of that spending. Future construction projects are expected to create between \$9 and \$26 million of spending each year over the next nine years.

Finally, we explored what effects the DNG would have on Delaware state revenues. On the one hand, the DNG is expected to expend \$3.75 million of GF revenue in FY 2012 and use another \$1.12 million in capital. On the other hand, DNG personnel are estimated to pay \$2.75 million in personal income taxes. Nearly \$130,000 of gross receipts tax revenues are expected from the DNG's military construction spending. This implies that the net burden placed on state revenues is only about \$2 million – which is less than one tenth of 1% of the total FY 2011 state operating budget.

Using the REMI PI+ economic simulation software, we modeled the DNG's total contribution to the Delaware economy. The software allowed us to understand how the direct impact of the DEARNG and DNG had larger ramifications in the state's economy. We estimate that the DEARNG adds an average of 828 jobs to the state's economy each year and \$61.8 million in gross domestic product (GDP). The DNG as a whole is attributed with 1,648 jobs in Delaware and \$122.3 million in GDP. The DNG is also responsible for an average of 251 construction related jobs and 163 jobs related to building maintenance and repair. Overall, we estimate that an additional 1.2 jobs are created for every full time military personnel or civilian employee in the DNG. We also find that the DNG adds approximately \$113 million in Delaware wages and salaries, \$39 million of which is in the private sector.

Introduction

The Delaware National Guard (DNG) is a reserve component of the U.S. Army and U.S. Air Force. The federal mission of the DNG is to maintain training and mobilization capabilities in order to respond to emergencies, war, or other events as needed. The state mission of the DNG is to provide military forces for domestic emergencies or other events as needed. As a direct result of fulfilling these missions, the DNG significantly impacts Delaware's economy. This report addresses the extent of that impact.

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There are two ways in which the armed forces affect the economy. First, by having a properly functioning military deter attacks, households and businesses can enter into free exchange and real economic value is added to all citizens. Second, the armed services employ persons and purchase goods and services from businesses in order to protect the nation. This report addresses only the second type of economic effects, though this attention in no way reflects on the value that military service adds to the economy. Instead, this report focuses on the direct impact the DNG activities have on Delaware's economy.

The Economic Impact of the Delaware National Guard

To address this issue, we look at three different areas. First, as an employer of both troops and civilians, the DNG reduces unemployment and raises household income. In turn, that income is used to purchase goods and services from other businesses in the state. Secondly, the DNG purchases goods and services from businesses in the economy. In order for these businesses to provide the DNG with goods and services, they require inputs of their own. Of course, those inputs draw on further inputs. While this process works its way up the supply chain, both output and employment is created in the economy. The third topic we address is the corresponding impact on state taxes. On the one hand, the DNG uses state funding through the General Fund and through bond issuances. On the other hand, the DNG also creates state revenue by giving compensation to its troops and civilians and by initiating construction projects.

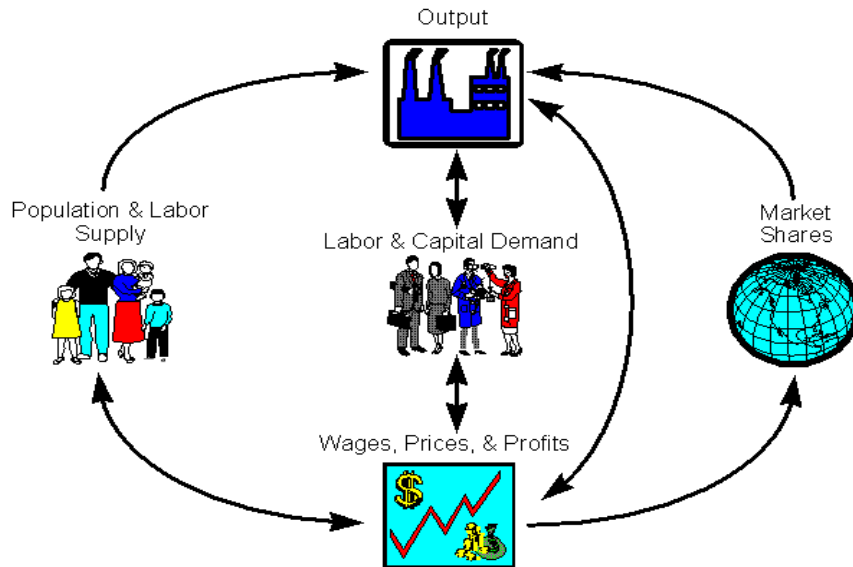
To help understand the full economic impact of the DNG, we use the REMI PI+ software. The software is a dynamic regional economic simulation that has been specially tailored to Delaware's economy. The next chapter of this report reviews the REMI PI+ model and discusses how it can be used to understand the larger impact that the DNG has on the state. In the third chapter, we use the simulation software to estimate the economic impact of the DEARNG and the DNG.

Overview of the REMI PI+ Model

The economy is a complex system of businesses, households, and government policies. Economic modeling tools help us navigate those critical linkages in the economy by breaking the complex system down into a series of simplified mathematical equations. By thinking of the economy as a system of equations, we can model the effects of the DNG by changing those equations in ways that resemble the DEARNG's and DNG's direct contributions. This section describes the economic model that we use to estimate the larger macroeconomic impacts.

The REMI PI+ software is a dynamic and structural model of Delaware's economy that is capable of estimating causal relationships. It is a regionalized version of a benchmarked national model. Ten sub-regions are in the model, including each of the three counties in Delaware; Salem County, NJ; Burlington, Camden, and Gloucester counties in New Jersey (combined); Bucks, Montgomery and Philadelphia counties in Pennsylvania (combined); Delaware and Chester counties in Pennsylvania (combined); Cecil County, MD; Harford County, MD; and the combination of 10 counties in Maryland and Virginia that constitute the remainder of the Delmarva peninsula. Each sub-region is treated as an independent, fully functioning economy that interacts with every other sub-region specifically and with the nation in general.

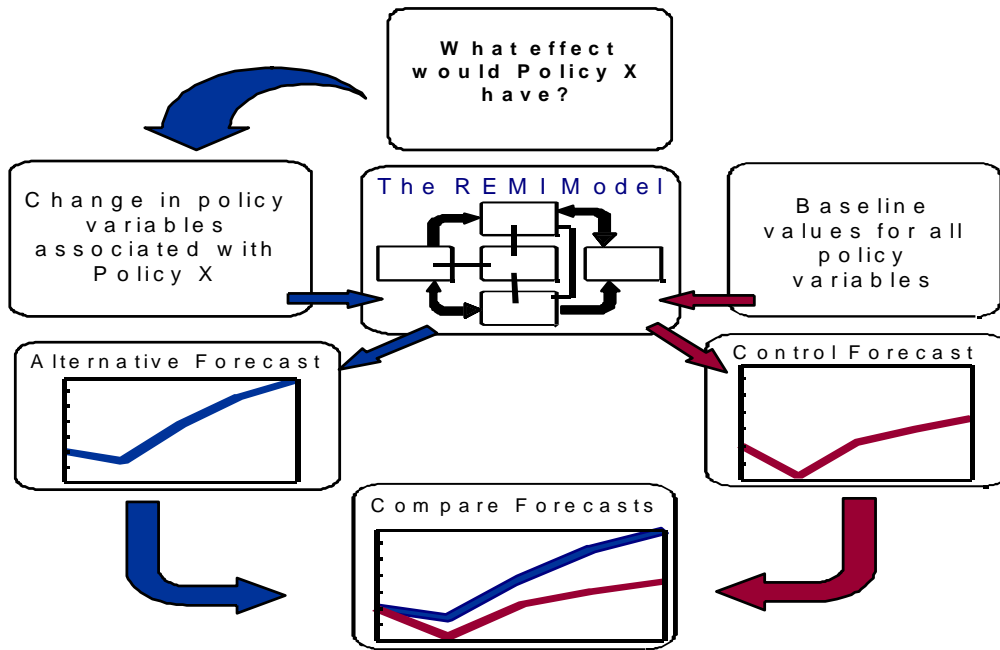
Figure 1 Illustration of the REMI PI+ Model



The model is founded on conventional economic assumptions, such as households maximize utility and firms maximize profits. Hundreds of equations have been developed over the last 25 years to describe the economy's structure mathematically. These equations can be organized into five major components: Output and Demand, Labor and Capital Demand, Population and Labor Force, Wages-Prices-Costs, and Market Shares. Figure 1 illustrates REMI's main structure and components.

The equations assume that businesses use labor, capital, and fuel as inputs to supply goods and services as output. Households (and some businesses) supply the inputs of production and generate the demand for goods and services. Wages, prices, and profits adjust to form equilibriums in each market, but the equilibrating process might take more than one year to achieve. High market shares can generate cluster effects that influence factor productivity and input prices.

Figure 2 Illustration of a Policy Forecast in REMI



REMI PI+ is a general equilibrium model with feedback. This means that the model describes the entire economy as it changes over time. For example, changes in population, demographics, and wages each influence the labor supply at any moment, but are themselves influenced in the future by changes in the labor supply. Adjustments happen gradually, so the economy does not statically jump from one equilibrium to another. This is a major advantage of using REMI versus other economic simulation models (RIMS II, IMPLAN).

The general equilibrium model can capture the multiplier effect due to the repeated interaction and eventual equilibration in other parts of the economy. In a sense, the multiplier effect is the cumulative impact of any single change to the economy. For example, as final demand generates intermediate demand, one dollar of retail sales will increase sales in construction 0.28¢, sales in fabricated metal product manufacturing 0.30¢, sales in utilities 1.1¢, etc. The total impact from these effects can be quite large.

Figure 2 illustrates how REMI estimates the effects of a policy. First, the REMI model is calibrated and a standard future scenario is predicted. This is called the control forecast. Then a policy is proposed that changes the economy. A modeler adapts this change into REMI by selecting input variables and simulating the outcome. This alternative forecast is then compared to the control forecast. Differences between the two forecasts are attributed to the policy.

In the upcoming sections of this report, we employ the REMI PI+ model to understand the economic effect of the DEARNG and the DNG. Before proceeding, we should be clear that even though the REMI model is a model of the entire economy, it is most useful as tool to help us understand certain elements within the economy affect other elements. In addition, since there are thousands of variables influenced in the PI+ model, we cannot detail how the DNG affects each one. Instead, we restrict our attention to key macroeconomic variables.

Economic Impact

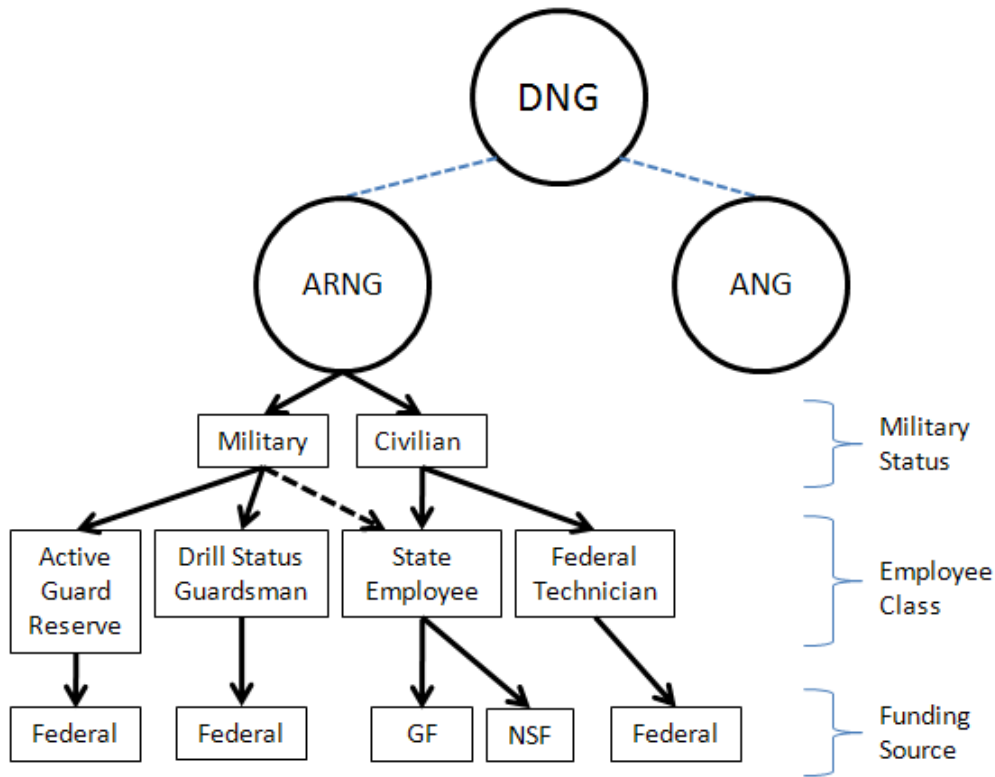
Employment and Wages

The DNG is comprised of both the Delaware Army National Guard (DEARNG) and Delaware Air Force National Guard (DEANG). These two components provide wages and other forms of compensation to military personnel and civilians. Final demand is generated as the households use their wages to purchase goods and services in the economy. As they do, businesses employ workers to meet those demands, and that pulls on other elements from the economy. In turn, this creates more wages in the state and induces additional spending. In this section, we estimate the total economic impact of the DNG's compensation.

In order to estimate how the employment and wages affect the economy, it is important to understand the personnel structure and source of funding within the DNG. Civilians are classified as either federal technicians or as state employees. Federal technicians are funded directly from the Department of Defense, as are most other uniformed Soldiers and Airmen. State employees may either be funded by non-appropriated special funds (NSF) through a Master Cooperative Agreement or from the state's General Fund (GF). Although Delaware initially pays for some NSF expenses, the U.S. government reimburses the state for these expenses.

The Economic Impact of the Delaware National Guard

Figure 3 Diagram of the Delaware National Guard Employee and Funding Structure



There are three types of military personnel affiliated with the DNG.¹ A select number of full time military positions, known as Active Guard Reserve (AGR), are required for recruiting, training, and organizing the DNG. Most of the other DNG troops are considered “drill status guardsman” (DSG), which means that they normally report to a training facility one weekend a month and for a two week period each year to perform operational readiness drills in order to maintain an effective level of unit preparedness. All of these uniformed Soldiers receive direct funding from the Department of Defense. The Adjutant General and a combination of Soldiers, Airmen, and civilians are classified as state employees and receive paid by GFs and NSF. Although Figure 3 indicates the composition for the Delaware ARNG, the same structure holds for the DEANG.

¹ Civilian employees include those employees directly paid with GF or NSF funds through the Master Cooperative Agreement. Persons employed by outside companies providing contractual services to the DNG are not included.

The Economic Impact of the Delaware National Guard

Table 1 Annual Employment and Personnel Costs within Delaware National Guard, 2011

FTEs

	Active Guard Reserve	Drill Status Guardsmen*	Federal Technicians	State Employees	State Employees
	Federal	Federal	Federal	NSF	GF
DEARNG	173	1,478	194	17	12
DNG	279	2,462	371	80	29

Personnel Costs

	Active Guard Reserve	Drill Status Guardsmen*	Federal Technicians	State Employees	State Employees
	Federal	Federal	Federal	NSF	GF
DEARNG	\$17,506,533	\$5,853,500	\$15,958,900	\$1,084,239	\$1,195,497
DNG	\$29,234,975	\$24,160,292	\$29,579,900	\$5,102,300	\$2,615,394

- Source: Delaware National Guard

- * Total number of Drill Status Guardsmen reported. Not FTE.

Table 1 indicates the total employment and compensation² for the different types of employees within the DEARNG and the DNG. There are 1,478 drill status Soldiers within the DEARNG and 2,462 drill status Soldiers and Airmen in the entire DNG. The DNG also has 279 active guard reserve personnel and 371 federal technicians. These three groups receive \$84 million in compensation directly from federal sources. Eighty (80) state employees are funded \$5.1 million from NSF sources, and the remaining 29 state employees are funded \$2.6 million from GF sources.³ Because the state is reimbursed for NSF expenditures, Delaware’s budgeted share of DNG labor compensation is 2.9%.

² Compensation and personnel costs are treated synonymously in this report. Compensation includes wages, FICA taxes, pension benefits, health insurance, workers compensation insurance, unemployment insurance. AGR compensation also includes other allowances, such as compensation for meals and housing, special leave pay, clothing allowances, and additional retirement compensation.

³ Compensation paid by GF revenues also includes supplemental funding for State Active Duty Pay for DSG members mobilized when the Governor declares a state of emergency.

The Economic Impact of the Delaware National Guard

Table 2 Expected Economic Impact from Employees and Wages in the Delaware National Guard

	DEARNG	DNG
Total Employment	692	1,355
Federal Military Employment	173	279
State Government Employment	59	163
Federal Civilian Employment	194	371
Private Non-Farm Employment	245	503
Private Wage and Salary Disbursements	\$9.9	\$19.9
State and Local Wage and Salary	\$4.4	\$10.8
Federal Military Wage and Salary	\$14.0	\$37.2
Federal Civilian Wage and Salary	\$10.3	\$19.6
Total Wage and Salary Disbursements	\$38.5	\$87.6
Real Disposable Personal Income	\$32.6	\$71.7
Gross Domestic Product (GDP)	\$50.6	\$97.5
Personal Consumption Expenditure	\$25.8	\$56.8

- Source: Center for Applied Demography & Survey Research

Using the REMI model, we trace the total impact that DNG wages have in the economy. AGR Soldiers and Airmen were modeled as federal military employment, federal technicians as federal civilian employees, and state employees as state government employees. Any compensation received by DSG personnel was treated as an increase in wages, not employment.⁴

Table 2 indicates the total macroeconomic impact that this spending has on the economy. The table finds that compensation paid to the 759 full time Soldiers, Airmen and employees as well as the 2,462 DSG troops adds nearly 1,355 jobs to the state. In addition, \$19.9 million of private wages in the state are attributable to the DNG, as is \$97.5 million in GDP. Similarly, \$71.7 million in disposable personal income occurs in the state, of which \$56.8 million is attributable to personal consumption. Compared to the total DNG, compensation paid by the DEARNG can be attributed with 51% of employment, 52% of GDP, and 45% of consumption.

⁴ Because 229 out of 1,484 DSG in the DEARNG do not live in Delaware, their wage bill was reduced by 17%. (Ratledge and Laznik, 2010). We assume that the DEANG has a similar fraction of out of state DSG personnel.

Recurring Non-Labor Spending

As with any business, the DNG also has non-labor expenses needed to conduct day-to-day operations. For example, computers, software, and printing supplies are necessary to perform administrative tasks. Building maintenance and repair is actually the most critically important recurring expense to the DNG, especially considering that the average age of the 11 state owned Readiness Centers/armories is 48 years old.⁵ When the DNG makes these purchases, they draw on resources in the economy and create an indirect economic impact. This section estimates the total economic impact of these purchases.

Using information obtained by the DNG and the Governor's recommended FY 2012 operating budget, we decompose the recurring non-labor costs into three groups. The first group includes those operating and maintenance expenditures entirely funded from direct federal sources. The second group includes those contractual services purchased using GF (\$290,100) and NSF (\$3,273,100) revenues. The third group refers to all other non-labor, non-construction expenditures paid for via GF and NSF revenue.

At \$36.5 million, expenditures paid directly with federal sources were the largest type of recurring, non-labor expenditures. Based on discussions with the DNG, this money primarily reflects repairs and maintenance on the numerous DNG facilities. Because repair and maintenance needs vary over time, we assume that 20% of these expenditures is spent on purchasing new equipment, 30% is spent on equipment maintenance, and 50% is spent on building maintenance.

⁵ Information supplied by the Delaware National Guard.

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The second group of expenditures (\$3.5 million) reflects those contractual services paid with GF revenues or NSF revenues. The DNG provided decomposition of GF expenditures as well as descriptions of cooperative agreements paid with NSF funds. We estimate that the bulk of these expenditures reflects building maintenance and repair, telecommunications, administrative support services, and information processing.⁶

All other non-labor recurring expenditures purchased using GF or NSF funds (\$1.8 million) includes energy expenses, supplies, materials, travel, and other expenses. We assume that supplies and materials are spent on vehicle fuel (5%), administrative and support services (50%), food (15%), computers and other electronic devices (10%), printing and related activities (10%), paper supplies (5%), and office furniture (5%).⁷ Money allocated to travel was assumed to be split between ground transportation (20%), air transportation (30%), and accommodation (50%). Finally, GF allocations to Educational Assistance, the Unit Fund and the SGLI Premium Assistance were modeled as educational services, recreation services and insurance, respectively.

Table 3 shows what assumptions we made regarding recurring, non-personnel expenditures made by the DEARNG and the DNG. The table designates whether the expenditures are paid using funds coming from the state's GF or from other NSF and federal funds. Like personnel costs, most of the DNG's recurring, non-labor expenditures (95.8%) are paid directly or reimbursed from federal revenues.

⁶ For contractual services paid with NSF funds, a list of cooperative agreements was received that aggregated labor and non-labor expenditures. We removed expected labor costs from each respective agreement based on the salary and occupations of all NSF-funded employees. The remaining NSF funds for contractual services were then allocated proportionally according to the expected non-labor costs of these cooperative agreements.

⁷ The DEARNG's share of NSF money in this final category was assumed to be 37%, since the DEARNG receives 37% of the DNG's federal funding for operations and maintenance.

The Economic Impact of the Delaware National Guard

Table 3 Assumed Recurring, Non-Personnel Expenditures of the Delaware National Guard

	<u>DEARNG</u>		<u>DNG</u>	
	GF	Federal	GF	Federal
Operations and Maintenance				
Equipment purchase	-	\$1,962.0	-	\$5,342.4
Equipment maintenance	-	\$2,942.9	-	\$8,013.6
Building repair and maintenance	-	\$4,904.9	-	\$13,356.0
Contractual Services	GF	NSF	GF	NSF
Repair and maintenance	\$62.0	\$2,493.5	\$150.0	\$2,493.5
Truck and transit ground transportation	\$33.1	-	\$80.0	-
Utilities (water)	\$12.4	-	\$30.0	-
Waste mgmt & remediation	\$7.9	-	\$19.1	-
Telecommunications	\$4.5	\$449.6	\$11.0	\$449.6
Administrative and support services	-	\$82.4	-	\$82.4
Educational services	-	-	-	\$39.0
Social assistance	-	-	-	\$79.7
Data processing & other info services	-	\$129.1	-	\$129.1
Supplies, Materials, and Other	GF	NSF	GF	NSF
Utilities (energy)	\$408.9	\$415.4	\$641.7	\$1,131.0
Oil & gas	\$7.2	\$11.0	\$7.6	\$30.0
Admin & support services	\$72.3	\$110.2	\$76.0	\$300.0
Food Services	\$14.5	\$22.0	\$15.2	\$60.0
Computer and electronic product mfg	\$14.5	\$22.0	\$15.2	\$60.0
Printing and related support activities	\$14.5	\$22.0	\$15.2	\$60.0
Furniture and related product mfg	\$7.2	\$11.0	\$7.6	\$30.0
Paper manufacturing	\$7.2	\$11.0	\$7.6	\$30.0
Insurance carriers and related services	\$2.0	-	\$2.0	-
Military recreational activities	\$12.2	-	\$12.2	-
Education Assistance	\$300.0	-	\$300.0	-
Truck and transit ground transportation	\$0.9	\$4.4	\$1.0	\$12.0
Air transportation	\$1.3	\$6.6	\$1.5	\$18.1
Accommodation	\$2.2	\$11.1	\$2.5	\$30.1
Total	GF	Federal/NSF	GF	Federal/NSF
	\$984.6	\$13,611.0	\$1,395.4	\$31,746.3

• Source: Center for Applied Demography and Survey Research

The Economic Impact of the Delaware National Guard

Table 4 Expected Economic Impact Recurring, Non Personnel Expenditures in Delaware National Guard

	DEARNG	DNG
Total Employment	91	244
Private Non-Farm Employment	85	226
Other Services Employment	45	123
Construction Sector Employment	13	36
Professional and Technical Services	3	8
Administrative/Waste Services Empl.	7	17
State Government Employment	4	10
Wage and Salary Disbursements	\$2.9	\$7.8
Compensation	\$3.5	\$9.3
Personal Consumption Expenditure	\$2.6	\$7.0
Real Disposable Personal Income	\$3.3	\$8.9
Gross Domestic Product	\$7.1	\$19.0
Output	\$10.8	\$28.8

- Source: Center for Applied Demography & Survey Research
- Dollars are in millions of 2010 prices.

Table 4 indicates what the total effect these recurring, non labor expenditures will have on the Delaware economy each year. This spending due to the Delaware ARNG is expected to stimulate 91 jobs in Delaware, approximately half of which will be in the “Other Services” industry, which includes building repair and equipment repair companies. The spending will also stimulate \$7.1 million in GDP and create \$10.8 million in economic output. The purchases are estimated to increase Delaware wages by \$2.9 million and consumption by \$2.6 million.

The table also indicates that the total recurring non-labor spending by the DNG adds nearly 244 jobs to the state. 123 of these jobs are in the industry that performs equipment and building maintenance and 36 of these jobs are in construction. Approximately \$19 million of the state’s GDP and \$29 million in output can also be attributed to the DNG. In addition, wages in the state increase by \$7.8 million as a result of the purchases made by the DNG.

The Economic Impact of the Delaware National Guard

Table 5 Historical State-Funded National Guard Construction Costs (\$000's), and Requested Future Costs

	Bond	MCI - Bond	MCI - GF
2009	-	-	\$600
2010	-	\$600	-
2011	\$750	\$500	\$600
2012	\$271	-	\$850
2013	\$2,500	-	\$850
2014	\$780	-	\$850

- Source: Office of Management and Budget, State of Delaware (2011).

Construction Spending

The other major purchase that the DNG has on Delaware's economy is military construction. By stimulating the construction sector, the DNG provides a source of demand to a vital sector of the state's economy. Moreover, state spending is a relatively small part of military construction and can be leveraged to include larger sources of federal funds. As with maintenance and repairs, funding for military construction comes from both state and federal sources.

Table 5 indicates the historical budget requests for state-funded military construction projects. The first column indicates construction costs for one-time expenses, paid for by issuing bonds. The second and third columns indicate funds allocated to minor capital improvements (MCI). The MCI budget rose from \$600,000 in FY 2009 to \$1.1 million in FY 2011 due to one-time funding associated with a pending relocation to a new Joint Force Headquarters Building. Currently, \$850,000 is allocated for MCI for FY 2012 and an additional budget of \$850,000 is requested for MCI in each of the next two fiscal years. We assume that all of this budgeted money will be expended.

The Economic Impact of the Delaware National Guard

Table 6 Planned National Guard Military Construction Projects

FY	Component	Location	Cost (\$ M)	Project Description	Joint Project?	Funding Scheduled?
2009	ANG	New Castle Airport	3.2	TFI Network Warfare Squadron (NWS) Facility		Yes
2009	ARNG	New Castle Airport	27.31	AASF Add/Alt		Yes
2009	USAR	To be determined	20.0	Delaware Armed Forces Reserve Center (BRAC)	ARNG	
2010	ANG	New Castle Airport	11.6	Replacement A/C Maintenance Shops (Ph II)		Yes
2011	ARNG	New Castle Airport	36.5	Joint Forces HQ - Armed Forces Reserve Center	ANG & USNR	Yes
2012	ANG	New Castle Airport	11.6	Addition to NWS Facility		
2012	ANG	New Castle Airport	8.7	Replacement A/C Maintenance Shops (Ph III)		
2013	ARNG	Bethany Beach	5.5	RTI Academy Building		Yes
2014	ARNG	Dagsboro	10.0	Dagsboro Readiness Center		
2014	ANG	New Castle Airport	3.5	ASE Maintenance Storage		
2014	ANG	New Castle Airport	7.8	Renovate Hanger for Aerial Port Training Facility		
2016	ANG	New Castle Airport	11.2	Replace Fuel System Hangar		
2016	ANG	New Castle Airport	2.75	Construction Mobility Processing Center		
2017	ARNG	New Castle Rifle Range	36.0	Combined Spt Maintenance Shop Add/Alt	USMCR	
2018	ARNG	Dagsboro	12.0	Field Maintenance Shop 5		
2018	ANG	New Castle Airport	9.1	Replace Base Engineering Complex		
2018	ANG	New Castle Airport	7.1	Replace Dining Hall		
2019	ANG	New Castle Airport	5.8	Aerial Port Training Facility		

- Source: Joint Service Reserve Component Facility Board, Meeting Minutes, 3-11-2010
- Source: Office of Legislative Liaison, National Guard Bureau (2011).
- Source: Office of the Undersecretary of Defense (Comptroller), 2009-2011
- Source: Delaware National Guard
- USNR – United States Navy Reserve; USAR – United States Army Reserve; USMCR – United States Marine Corps Reserve

The Economic Impact of the Delaware National Guard

Figure 4 Smoothed Potential Annual Spending on Military Construction due to the Delaware National Guard

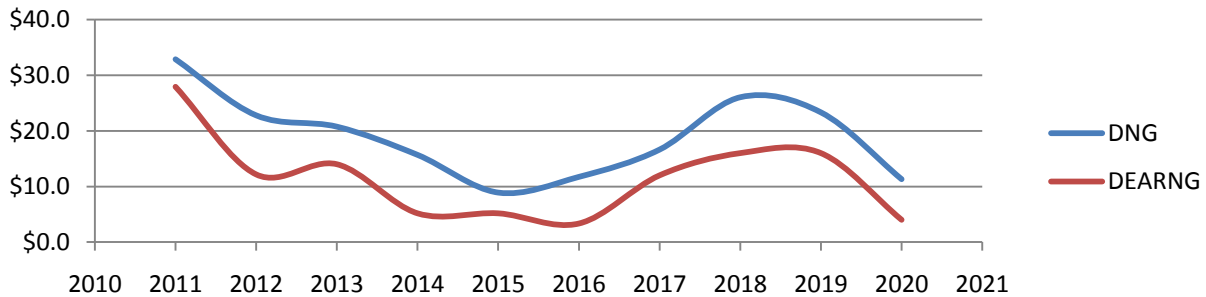


Table 6 indicates the DNG’s planned military construction projects for the next decade. A few large projects are planned for Delaware in the near future, most of which are scheduled to receive federal funding. In total, the DNG has plans for nearly \$230 million of military construction, of which the ARNG represents nearly \$147 million. Comparing the total construction expenditure in Table 6 to the state’s contribution (Table 5) shows that state funding is again a relatively small component of the DNG’s economic footprint.

Table 5 and Table 6 indicate that revenue requests for military construction projects are lumpy. For example, \$11.6 million of construction spending was scheduled for FY 2010, while construction spending in FY 2011 was more than three times that amount (\$36.5 million). Of course, construction often takes multiple years to complete, which implies that the actual expenditures will be smoother than revenue requests.

Figure 4 smooths the military construction expenditures for the DNG and DEARNG. We assume that each project in Table 6 is completed at the expected costs and takes three years to finish. The figure also assumes that no additional construction projects are introduced and that all of the projects proceed as planned. Under these assumptions, annual construction spending peaks at nearly \$33 million in FY 2011, falls to approximately \$9 million in FY 2015, and then reaches \$26 million in FY 2018.

The Economic Impact of the Delaware National Guard

Table 7 Estimated Economic Impact of Military Construction Spending for the Delaware Army National Guard

	2011	2012	2013	2014	2015	2016	2017	2018	2019
Personal Consumption Expenditures	\$7.9	\$3.6	\$4.0	\$1.5	\$1.5	\$1.1	\$3.6	\$4.7	\$4.8
Wage and Salary Disbursements	\$11.9	\$5.7	\$6.2	\$1.9	\$1.6	\$0.9	\$5.0	\$6.5	\$6.6
Compensation	\$14.3	\$6.8	\$7.4	\$2.3	\$2.0	\$1.1	\$6.1	\$7.8	\$8.0
Real Disposable Personal Income	\$9.9	\$4.6	\$5.1	\$1.9	\$1.8	\$1.2	\$4.3	\$5.6	\$5.7
Gross Domestic Product (GDP)	\$22.5	\$9.3	\$10.0	\$1.6	\$1.4	\$0.3	\$8.2	\$10.6	\$10.4
Output	\$38.3	\$15.9	\$16.9	\$2.9	\$2.6	\$0.7	\$13.7	\$17.5	\$17.2
State Government Employment	10	4	4	1	1	0	3	4	4
Administrative and Waste Services	7	2	2	0	0	-1	1	2	2
Professional and Technical Services	8	3	2	-1	-1	-1	1	2	1
Construction	185	81	100	55	54	33	71	110	108
Private Non-Farm Employment	249	104	122	54	51	28	85	129	126
Total Employment	266	111	130	56	54	29	91	137	134

- Source: Center for Applied Demography & Survey Research
- Dollars are in millions of 2010 prices.

Table 8 Estimated Economic Impact of Military Construction Spending for the Delaware National Guard

	2011	2012	2013	2014	2015	2016	2017	2018	2019
Personal Consumption Expenditures	\$9.2	\$6.6	\$6.0	\$4.5	\$2.6	\$3.5	\$5.0	\$7.6	\$6.9
Wage and Salary Disbursements	\$14.0	\$10.4	\$9.3	\$6.7	\$3.4	\$4.6	\$7.0	\$10.8	\$9.8
Compensation	\$16.8	\$12.4	\$11.2	\$8.0	\$4.1	\$5.5	\$8.5	\$13.1	\$11.8
Real Disposable Personal Income	\$11.7	\$8.4	\$7.5	\$5.7	\$3.2	\$4.2	\$5.9	\$9.1	\$8.3
Gross Domestic Product (GDP)	\$26.5	\$17.8	\$15.1	\$9.6	\$3.6	\$6.1	\$10.7	\$17.5	\$14.9
Output	\$45.0	\$30.3	\$25.7	\$16.4	\$6.3	\$10.4	\$17.9	\$28.9	\$24.7
State Government Employment	12	8	7	4	2	3	4	7	6
Administrative and Waste Services	8	5	4	2	0	0	2	3	2
Professional and Technical Services	10	6	4	1	-1	0	1	3	2
Construction	218	152	144	123	77	85	99	169	150
Private Non-Farm Employment	293	198	179	140	77	90	115	200	174
Total Employment	313	211	191	149	81	95	122	212	185

- Source: Center for Applied Demography & Survey Research
- Dollars are in millions of 2010 prices.

Table 7 and Table 8 indicate the total economic impact that the DEARNG and DNG's planned construction spending will likely have on Delaware over the next nine years. The construction plans from the DNG are forecasted to add a maximum of 313 jobs in 2011, 218 of which will be in construction. After that, we estimate that the DNG will stimulate between 77 and 200 construction sector jobs in the latter part of the next decade. The majority of jobs are attributable to military construction for the DEARNG.

Similar to jobs, most other economic factors are affected by the lumpiness of construction spending. For example, the construction projects are expected to add \$26.5 million in the state's GDP in 2011, but that falls to \$3.6 million just four years later. Future construction spending is also expected to add between \$3.6 and \$9.1 million in real disposable income and between \$2.6 and \$7.6 million in consumption. Averaging over 2011 and 2019, we find that just over 60% of the DNG's military construction projects can be attributed to the DEARNG.

We should point out that the economic impact measured in all of the previous tables reflects the economic impact arising from spending DEARNG and the DNG expenditures. Of course, in order for governments to have money to spend, funds must either be raised from tax revenues or by taking on debt (paid for via future tax revenues). While collecting taxes will negatively impact an economy, the DNG also generates tax revenue for the state, so the net effect of the DNG on state tax revenues could be positive or negative. This issue is addressed in the next section.

State Tax Revenues

Because the military protection is not sold in private markets, all of its funding must come from taxes or public debt. Because most of the DNG's funding comes from federal sources, the total economic effect depends on how the US government obtained the funds. In general, the federal revenue could have been diverted away from some other program, federal tax rates could have been increased, or larger deficits could be undertaken. The total economic impact of funding the DNG, or any other National Guard unit or military organization for that matter, comes down to larger issues that are outside the scope of this report.

Instead, this report estimates the impact that the DNG has on Delaware's economy. To that end, decisions over federal tax policy are beyond the control of state policy. For this reason, it is common for federal funds to be treated as pure benefits to a state's economy. State tax decisions, on the other hand, impose costs that can be controlled by state policy. This section explores the impact that the DNG has had on state taxes. In particular, we analyze the taxes received through the personal income tax and gross receipts tax.

Recall from the earlier section that the DNG pays nearly \$90 million in compensation to its personnel. Delaware considers the wage component of this compensation to be gross income for most people. The exception is that active duty military personnel that have residences outside of Delaware are not subject to state income tax. Thus, any AGR or DSG personnel with residences outside of Delaware are assumed not to pay state personal income taxes. Using the results of a previous study (Ratledge and Laznik, 2010), we estimate that nearly 17% of military personnel are out of state residents. Federal technicians and state employees, on the other hand, are subject to state income tax regardless of their current residence.

The Economic Impact of the Delaware National Guard

Table 9 Estimated Delaware Personal Income Tax Revenue Collected from the Wages and Salaries of DNG Personnel

		In-state AGR	Federal Technicians	State Employees	State Employees	In-state DSG
		100% Federal	100% Federal	100% NSF	100% GF	100% Federal
# Taxpayers	DEARNG	146	194	17	12	1,250
	DNG	236	371	80	29	2,082
Taxpayer Compensation	DEARNG	\$14,805,053	\$15,958,900	\$1,084,239	\$1,195,497	\$4,950,231
	DNG	\$24,723,648	\$30,500,800	\$5,102,300	\$2,615,394	\$20,432,053
Average Compensation	DEARNG	\$101,194	\$82,262	\$63,779	\$99,625	\$3,960
	DNG	\$104,785	\$82,212	\$63,779	\$90,186	\$9,813
Adjusted Gross Income	DEARNG	\$68,656	\$53,927	\$39,546	\$67,435	\$3,081
	DNG	\$71,450	\$53,888	\$39,546	\$60,092	\$7,635
Expected Tax	DEARNG	\$3,545	\$2,606	\$1,807	\$3,460	\$131
	DNG	\$3,739	\$2,604	\$1,807	\$2,950	\$324
Expected Tax Revenue	DEARNG	\$518,663	\$505,564	\$30,719	\$41,523	\$163,300
	DNG	\$882,272	\$966,084	\$144,560	\$85,547	\$674,021

- Source: Center for Applied Demography & Survey Research

Table 9 indicates the total estimated personal income taxes paid to the state by military and civilian personnel in the DEARNG and DNG. We estimated these taxes in six separate steps. In the first two steps, we calculated the number of Delaware taxpayers and their total compensation using the same information originally reported in Table 1. The table above assumes that approximately 83% of AGR and DSG personnel are in-state-residents.

The third step adjusts average compensation to total wages. Based on discussions with the DNG, we assume that each employee receives an average of \$9,500 in health care benefits and 28.53% in other nonwage compensation.⁸ Given these assumptions, the adjusted gross income was calculated for each type of employee assuming a standard tax deduction of \$3,450 per person.

⁸ Because DSG troops are not eligible for health insurance coverage, the only nonwage benefits were assumed to equal 28.53% of compensation.

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Table 10 Estimated Average Tax Rate for DSG Personnel

# of DSG Personnel	Age	Avg. Adj. Gross Income	Average Tax Rate
66	17-19	\$5,809	1.68%
316	20-24	\$15,935	3.42%
262	25-29	\$30,957	4.30%
169	30-34	\$41,293	4.61%
179	35-39	\$50,209	4.78%
176	40-44	\$43,305	4.66%
164	45-49	\$54,735	4.84%
92	50-54	\$48,477	4.75%
52	55-59	\$49,098	4.76%
8	60-64	\$51,616	4.80%
			4.24% Weighted Average

- Sources: Center for Applied Demography & Survey Research
2010 Current Population Survey, March Supplement
Ratledge and Laznik (2010)

In the fifth step, the personal state income tax was calculated for the average adjusted gross income using 2010 tax rates. For most personnel, this merely involved looking up the appropriate tax rate. However, because DSG personnel are citizens during most of the year, most of their adjusted gross income is expected to come from a private employer. Using data from the March 2010 Current Population Survey, we estimated the average adjusted gross income of employed Delawareans at different age brackets (see Table 10). A weighted average of these tax rates was calculated based on the age profile of DSG personnel within the DEARNG (see Ratledge and Laznik, 2010). In total, we assume that the average tax rate of DSG pay is 4.24% of adjusted gross income.

The final step in Table 9 multiplies the expected personal income tax by the number of taxpayers. In total we estimate that the DEARNG adds \$1.26 million to state personal income tax revenues, and the DNG as a whole adds \$2.75 million to state personal income tax revenue.

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The other type of tax revenue we attribute to the DNG is the gross receipts of the planned military construction projects. For construction companies in Delaware, the gross receipts tax is calculated as 0.6739% of their adjusted gross receipts. Total receipts are adjusted by removing any subcontracted work, and then applying an annual deductible of \$960,000 to those net receipts.

In practice, these rules only determine the tax liabilities for single companies. Because any subcontracted work will likely be performed by other construction companies, the cost of that work will still be subject to gross receipts tax. However, the \$960,000 annual deductible implies that the effective tax rate will be less than 0.6739%, but precisely how much less depends on how many other net receipts the typical construction company received that year. According to the 2007 Economic Census, construction companies in Delaware paid \$27,418,000 in license and taxes and had receipts net of subcontract work totaling \$4,304,730,000.⁹ This implies an average tax rate of 0.6369%. Multiplying this average effective tax rate by the project costs yields the estimated total impact that military construction spending will have on tax revenues in Delaware.

⁹ License fees are nominal costs that we ignore in this analysis.

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Table 11 Estimated Gross Receipts for Military Construction

	Construction Costs (million \$)		Est. Gross Receipts (\$)	
	DEARNG	DNG	DEARNG	DNG
2011	\$27.9	\$32.9	\$177,936	\$209,358
2012	\$12.2	\$22.8	\$77,493	\$145,219
2013	\$14.0	\$20.8	\$89,170	\$132,269
2014	\$5.2	\$15.7	\$32,908	\$99,998
2015	\$5.2	\$8.9	\$32,908	\$56,899
2016	\$3.3	\$11.8	\$21,231	\$74,839
2017	\$12.0	\$16.7	\$76,431	\$106,048
2018	\$16.0	\$26.1	\$101,908	\$165,920
2019	\$16.0	\$23.3	\$101,908	\$148,616
	Avg		\$79,099	\$126,574

- Sources: Center for Applied Demography & Survey Research

Table 11 estimates the gross receipts tax for military construction projects over the next nine years for both the DEARNG and the DNG. As before, we assume that every planned construction project will occur and that each project takes exactly three years to complete. The table indicates that the estimated construction spending by the DEARNG will add approximately \$79,000 to the state tax revenue each year. Construction spending by the entire DNG will add \$127,000 per year, on average. Since the bulk of the construction spending is expected to occur within the next year, the effect on the gross receipts will be greatest in the immediate future. In 2012, we estimate that the DNG’s military construction spending will add \$145,200 to state tax revenues.

Combining the personal income tax and the gross receipts tax, we find that the DEARNG stimulates nearly \$1.34 million of state tax revenue each year and the DNG stimulates \$2.88 million of state tax revenue per year.

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Table 12 Economic Impact of Funding the DNG with Net State Tax Revenues

	DEARNG	DNG
Total Employment	-14	-13
Private Non-Farm Employment	-13	-11
Wage and Salary Disbursements	-\$0.4	-\$0.3
Real Disposable Personal Income	-\$2.7	-\$2.4
Personal Consumption Expenditure	-\$2.1	-\$1.9
Gross Domestic Product	-\$0.9	-\$0.8

- Source: Center for Applied Demography & Survey Research
- Dollars are in millions of 2010 prices.

The Delaware Office of Management and Budget estimated that the DNG required \$3.755 million of GF expenditures in FY 2011.¹⁰ If one were to add in the \$271,000 bond for the Dagsboro Readiness Center and the \$850,000 budget for minor capital improvements, the DNG has a total cost to the state tax payer of \$4.875 million. However, because the DNG adds \$2.752 million in personal income tax revenue and \$0.127 million in gross receipts tax revenue, the DNG’s net draw on the state tax revenue is approximately only \$2.0 million.

Table 12 shows the estimated impact of collecting \$2.0 million in personal income taxes from the state. As households reduce their spending, businesses use fewer inputs, and this creates a negative multiplier effect in the economy. However, the table also indicates that raising \$2.0 million is not terribly burdensome to the economy. Overall, the REMI PI+ model estimates that 13 jobs will be lost in the state, as would \$2.4 million in personal income and \$0.8 million lost GDP. Because the DEARNG uses proportionally more of the GF revenue, the net impact of funding the DEARNG is nearly equal in size to the impact of the DNG as a whole.

¹⁰ The DEANG is attributed with \$400,000 of the budgeted GF allowances, and state employees assigned to neither the DEANG or the DEARNG are budgeted with \$1,195,000 in labor compensation. Thus, we attributed the DEARNG with nearly 75% of the GF revenue.

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Table 13 Total Expected Economic Impact of the Delaware Army National Guard

	2011	2012	2013	2014	2015	2016	2017	2018	2019	Avg.
Total Employment	1035	879	885	794	772	728	771	800	786	828
Private Non-Farm Employment	565	421	428	343	323	281	322	350	336	374
Federal Military Employment	173	173	173	173	173	173	173	173	173	173
State Government Employment	72	65	65	61	60	58	60	60	60	62
Federal Civilian Employment	194	194	194	194	194	194	194	194	194	194
Administrative and Waste Services	45	39	38	33	31	29	29	28	27	33
Professional and Technical Services	44	37	34	28	26	24	25	23	22	29
Other Services, exc. Public Admin.	77	70	69	64	62	59	60	59	58	64
Construction	228	135	156	111	107	83	118	154	149	138
Private Wages and Salaries	\$24.3	\$19.5	\$20.7	\$16.6	\$16.2	\$15.2	\$19.1	\$20.2	\$20.0	\$19.1
Total Wages and Salaries	\$54.2	\$49.6	\$51.5	\$47.6	\$47.8	\$47.3	\$52.1	\$53.9	\$54.2	\$50.9
Real Disposable Personal Income	\$43.3	\$38.7	\$39.4	\$36.6	\$36.9	\$36.5	\$39.8	\$41.3	\$41.7	\$39.4
Personal Consumption Expenditure	\$34.3	\$30.4	\$31.4	\$29.3	\$29.6	\$29.6	\$32.5	\$34.0	\$34.3	\$31.7
Gross Domestic Product	\$79.5	\$66.0	\$65.9	\$56.3	\$54.9	\$52.5	\$59.5	\$61.0	\$60.5	\$61.8

- Source: Center for Applied Demography & Survey Research
- Dollars are in millions of 2010 prices.

Total Economic Impact

In this section, we bring together all of the individual effects of the DNG to analyze the total impact on the state’s economy. This includes analyzing the employment and wage effects of the DEARNG and the DNG, the spending on recurring non-labor costs, the expected military construction spending, and the net tax burden on the state’s economy.

Rather than isolating the individual effects as was done previously, Table 13 and Table 14 bring together the total effects of that the DEARNG and the DNG has on the state, respectively. The tables assume that recurring personnel and non-personnel expenses are the same in the future as they are today. The DNG is also expected to use approximately \$2.0 million of net state tax revenues in all future years.

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Table 14 Total Expected Economic Impact of the Delaware National Guard

	2011	2012	2013	2014	2015	2016	2017	2018	2019	Avg.
Total Employment	1899	1797	1752	1672	1563	1534	1521	1575	1523	1648
Private Non-Farm Employment	1011	919	876	803	701	674	661	714	665	780
Federal Military Employment	279	279	279	279	279	279	279	279	279	279
State Government Employment	184	178	176	172	168	166	166	167	165	171
Federal Civilian Employment	371	371	371	371	371	371	371	371	371	371
Administrative and Waste Services	86	80	75	68	63	59	56	55	52	66
Professional and Technical Services	76	69	63	55	48	45	43	41	37	53
Other Services, exc. Public Admin.	185	179	173	167	160	156	152	150	147	163
Construction	318	278	277	255	203	203	209	271	245	251
Private Wages and Salaries	\$41.4	\$40.9	\$41.3	\$39.0	\$35.5	\$36.1	\$37.8	\$40.9	\$39.0	\$39.1
Total Wages and Salaries	\$111.1	\$111.6	\$113.2	\$111.9	\$109.3	\$111.2	\$114.4	\$119.0	\$118.1	\$113.3
Real Disposable Personal Income	\$90.1	\$88.4	\$87.9	\$87.0	\$85.2	\$86.6	\$88.8	\$92.3	\$92.1	\$88.7
Personal Consumption Expenditure	\$71.3	\$69.6	\$70.1	\$69.5	\$68.4	\$70.1	\$72.4	\$75.9	\$75.8	\$71.4
Gross Domestic Product	\$142.5	\$133.5	\$129.0	\$121.0	\$112.3	\$112.2	\$114.5	\$119.3	\$115.9	\$122.3

- Source: Center for Applied Demography & Survey Research
- Dollars are in millions of 2010 prices.

Table 13 shows that the DEARNG is responsible for nearly 828 jobs per year over the next nine years, 379 of which are in the private sector. The REMI model also suggests that 374 of these jobs will be in the private sector, 138 of which will be in construction and 64 of which will be in other services (i.e. maintenance and repair). In addition, the DEARNG is responsible for an average of \$61.8 million in Delaware's GDP each year, \$31.7 million in consumption, and \$50.9 million in wages and salaries.

Table 14 evaluates the projected economic impact of the DNG over the next nine years. The table indicates that 1,648 jobs in the economy are attributable to the compensation that the DNG provides as well as the purchases it makes in the economy. On average, the DNG either directly or indirectly creates \$122.3 million in Delaware's GDP and \$88.7 million in real disposable income. The DNG stimulates \$113.3 million of wage and salary disbursements in Delaware and \$71.4 million in consumption each year.

Conclusions

The Delaware National Guard (DNG) provides reserve support to the US Army and US Air Force when such support is needed. They also provide the state of Delaware with a deployable force ready to respond to domestic emergency situations. Although these services clearly are valuable to our state and country, they also directly affect the Delaware economy. This report reviews the economic impact of the DNG and the Delaware Army National Guard (DEARNG).

The greatest economic impact from the DNG comes from the nearly \$90 million in military personnel and civilian compensation. On average, the compensation represents nearly 80% of the total contribution and is attributed with approximately 1,342 jobs in the state economy. In total, the DNG employs approximately 759 military and civilian personnel, but as a result of their activities, stimulate an average of 895 additional employees. Thus, the employment multiplier for the DNG is approximately 2.2.¹¹

Our report also found that almost all of the funds for the DNG come directly from federal sources or are reimbursed by federal revenue sources (i.e. NSF). For example, just 4.2% of the total expenditures made on nonrecurring labor expenses come from the General Fund (GF) as does 2.9% of compensation. Because so much of the DNG's funding comes from federal sources, the FY 2012 operating and capital budgets assign the DNG with \$5.45 million. Of that, the DNG is expected to spend approximately \$4.88 million each year. However, the DNG is also expected to stimulate \$2.88 million in state tax revenue through the personal income tax and gross receipts tax. In sum, the DNG's *net* annual demand on state taxes is \$2.0 million.

¹¹ $(759+895)/759$

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We also find that the activities of the DEARNG represent approximately half the total economic impact of the DNG. On the one hand, the total compensation per DEARNG employee is generally less than that of the DNG, and this causes the total economic impact per DEARNG employee to be reduced. On the other hand, the DEARNG makes up for the lower compensation by having proportionally more federal and civilian employees, and performing relatively larger construction projects. For example, the DEARNG was accredited with approximately 54% of the DNG's employment contribution in FY 2011 due to the large construction projects.

In conclusion, our Center undertook this report to estimate the economic footprint of the Delaware Army National Guard and the Delaware National Guard. We found that the Delaware National Guard makes up a relatively large contribution to our state's economy.

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