



METROPOLITAN WASHINGTON AIRPORTS AUTHORITY

INFORMATION PAPER

FOR THE FINANCE COMMITTEE

TRAFFIC AND REVENUE STUDY UPDATE AND 2012 PROCESS FOR ESTABLISHING TOLL RATES

FEBRUARY 2012



MERCATOR ADVISORS LLC



FRASCA & ASSOCIATES, L.L.C.



Overview

- **Consistent with past practice, the Airports Authority engaged an independent Traffic & Revenue Consultant, CDM Smith, to conduct a 2012 comprehensive study as an input to its toll rate setting process**
 - **Wilbur Smith Associates conducted the Airports Authority's last T&R Study in 2009, which was refreshed in 2010**
 - **The 2012 Study includes recent data collection, research, and analysis**
 - **FAs and Staff asked CDM Smith to assume the Alternate Toll Rate Schedule, which served as the basis for the schedule attached to the MOA**
 - **CDM Smith produced transactions and revenue projections using those toll rate assumptions**
- **Financial Advisors analyzed the results of the 2012 T&R Study and conclude that toll revenue projections are sufficient to support the finance plan for the Metrorail Project**
- **The final step will be refinement and recommendation of potential toll rates**



Inputs to the 2012 Traffic & Revenue Study

- **CDM Smith conducted a significant amount of data collection, research, and analysis, incorporating the following in the 2012 T&R Study:**
 - **Latest release of Metropolitan Washington Council of Governments (MWCOC) regional travel demand model, including refined models for HOT Lanes and Transit and new state and local transportation improvement plans**
 - **Independent review of socioeconomic growth assumptions by Renaissance Planning Group, including 2010 Census data**
 - **Revised trip information, reflective of latest socioeconomic assumptions**
 - **New traffic counts, confirmation of travel speeds, and customer surveys**
 - **Construction impacts**



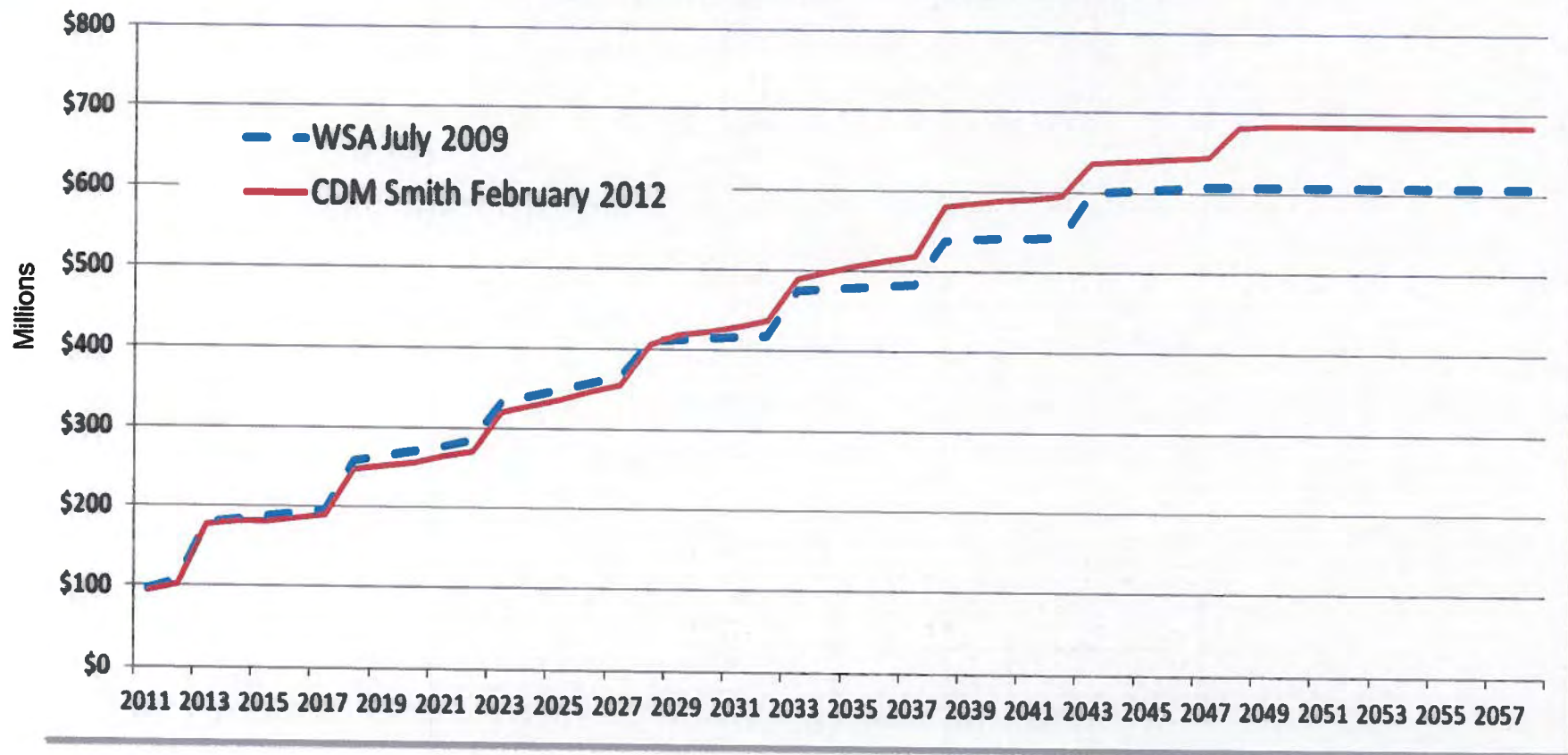
Key Findings: 2012 T&R Study

- **The DTR revenue forecasts included in our 2009 T&R Study were fairly accurate, given economic downturn**
 - **Actual 2010 revenue was 100.7% of forecast**
 - **Actual 2011 revenue was 97.5% of forecast**
- **Population and employment growth in the service area for the Dulles Toll Road through 2020 will be slightly less than levels forecasted in 2009, but by 2030, may exceed our previous forecast**
- **This results in lower levels of projected toll revenue in early years and higher levels of toll revenue beyond 2030 when compared to our 2009 forecast**



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Comparison of 2009 and 2012 Toll Revenue Projections



Revenue and Transactions projections were calculated using the Alternate Toll Rate Schedule, which served as the basis for the schedule attached to the MOA

**CDM
Smith**



METROPOLITAN WASHINGTON AIRPORTS AUTHORITY

Toll Revenue Projections in 2012 T&R Study

Calendar Year	Total Transactions	Mainline Toll Rate	Ramp Toll Rate	Trip Cost	GROSS TOLL REVENUE
2009	107,457,000	\$0.75	\$0.50	\$1.25	64,894,000
2010	102,592,000	<u>\$1.00</u>	<u>\$0.75</u>	\$1.75	88,038,000
2011	99,923,000	<u>\$1.25</u>	\$0.75	\$2.00	94,646,000
2012	99,911,000	<u>\$1.50</u>	\$0.75	\$2.25	103,508,000
2013	81,908,000	<u>\$2.75</u>	<u>\$1.75</u>	\$4.50	177,107,000
2014	83,502,000	\$2.75	\$1.75	\$4.50	181,740,000
2015	83,144,000	\$2.75	\$1.75	\$4.50	180,960,000
2016	85,118,000	\$2.75	\$1.75	\$4.50	185,257,000
2017	87,008,000	\$2.75	\$1.75	\$4.50	189,369,000
2018	75,062,000	<u>\$4.00</u>	<u>\$2.75</u>	\$6.75	246,441,000
2023	74,084,000	<u>\$5.00</u>	<u>\$3.75</u>	\$8.75	320,180,000
2028	76,311,000	<u>\$6.00</u>	<u>\$4.75</u>	\$10.75	407,841,000
2033	76,933,000	<u>\$7.00</u>	<u>\$5.75</u>	\$12.75	489,294,000
2038	77,507,000	<u>\$8.00</u>	<u>\$6.75</u>	\$14.75	581,330,000
2043	75,655,000	<u>\$9.00</u>	<u>\$7.75</u>	\$16.75	636,671,000

Revenue and Transactions projections were calculated using the Alternate Toll Rate Schedule, which served as the basis for the schedule attached to the MOA



Preliminary Financial Analysis

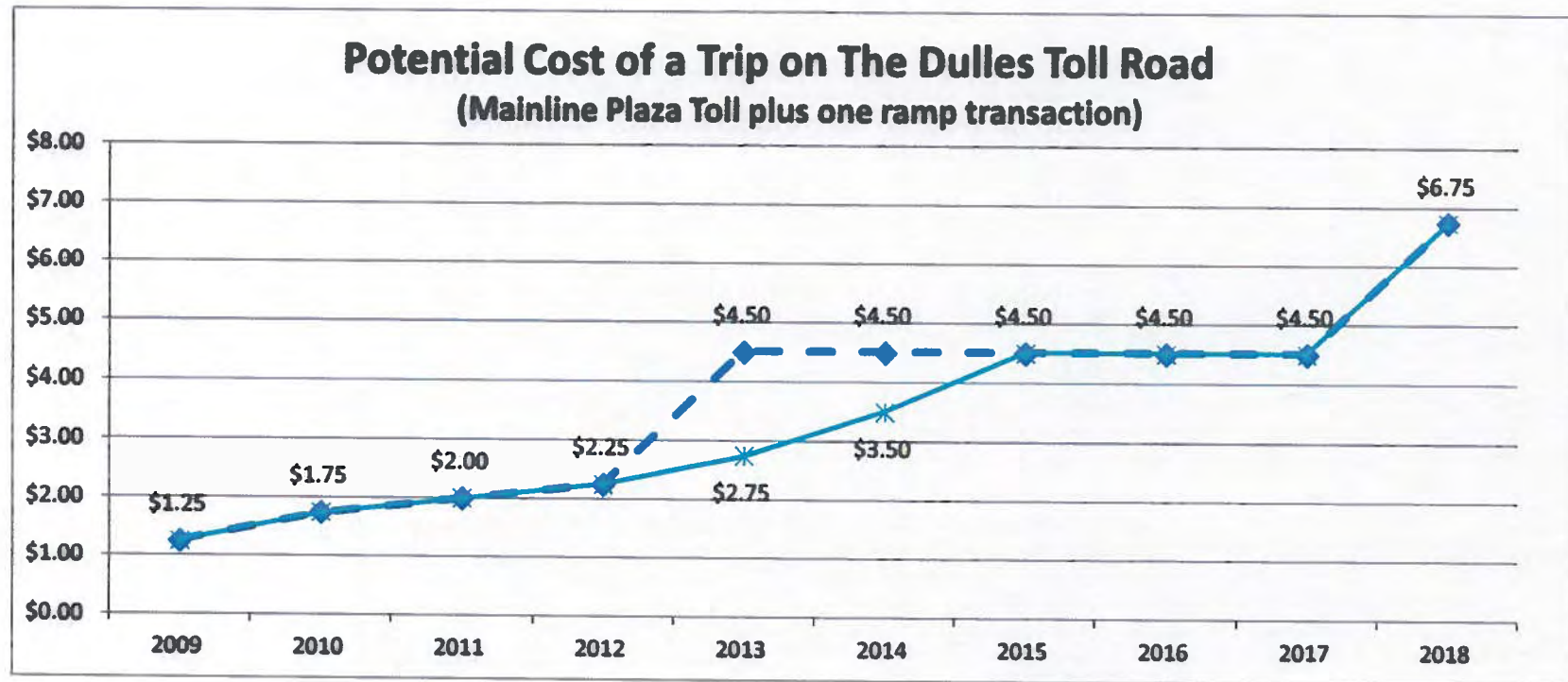
- As noted by CDM Smith, the 2012 toll revenue projections are slightly lower than previously estimated in years 2012 – 2028
- Thereafter, projected traffic and toll revenue is higher than previously projected

calendar year	<u>July 2009</u>	<u>February 2012</u>	<u>DIFFERENCE</u>		
	ESTIMATED GROSS TOLL REVENUE	ESTIMATED GROSS TOLL REVENUE	Amount \$	% Reduction	% of Prior
	(Millions)	(Millions)	(Millions)		
2011	\$ 97.13	\$ 94.65	(2.48)	-2.6%	97.4%
2012	107.10	103.51	(3.60)	-3.4%	96.6%
2013	178.80	177.11	(1.69)	-0.9%	99.1%
2014	183.02	181.74	(1.27)	-0.7%	99.3%
2015	187.35	180.96	(6.38)	-3.4%	96.6%
2016	191.79	185.26	(6.54)	-3.4%	96.6%
2017	196.36	189.37	(6.99)	-3.6%	96.4%
2018	257.24	246.44	(10.80)	-4.2%	95.8%
2023	331.31	320.18	(11.13)	-3.4%	96.6%
2028	410.89	407.84	(3.05)	-0.7%	99.3%
2033	475.53	489.29	13.77	2.9%	102.9%
2038	537.04	581.33	44.29	8.2%	108.2%
2043	599.00	636.67	37.67	6.3%	106.3%





Illustrative Toll Rate Options



- The dotted line shows the Toll Rate Schedule included in the 2012 T&R Study
- The solid line alternative illustrates one potential impact on projected toll rates in 2013 and 2014 assuming receipt of a \$150 million funding contribution that is used to pay near-term borrowing costs
- Estimates are for discussion purposes only





Preliminary Financial Analysis Conclusions

- **The updated toll revenue projections are sufficient to support the finance plan for the Rail Project**
- **As unknown project funding variables become finalized, there may be opportunities to lower toll rates**
- **Staff will work with CDM Smith to develop potential near-term tolling options for Board consideration in March 2012**





Process for Establishing Toll Rates

- **The Airports Authority has the exclusive right to establish, charge, and collect tolls and other fees for the use of the Dulles Toll Road**
- **Prior to establishing toll rates, the Airports Authority follows its regulatory process, which includes:**
 - **Convening public hearings in the Dulles Corridor; and**
 - **Reporting back to the Board on views collected during public hearings**
- **The Airports Authority also consults with the Dulles Corridor Advisory Committee (DCAC), in accordance with the DTR Permit and Operating Agreement**



Proposed 2012 Schedule for Establishing Tolls

February 15, 2012

Finance Committee Meeting

- Review 2012 process and schedule for establishing toll rates
- Receive Traffic and Revenue Study Update
- Receive Preliminary Financial Analysis of the Updated Dulles Toll Road Revenue Projections

March 21, 2012

Finance and/or Dulles Corridor Committee Meeting

- Receive potential toll rate schedule(s) for 2013 and future years
- Discuss considerations in setting future toll rates

April 18, 2012

Finance and/or Dulles Corridor Committee Meeting

- Receive staff and Financial Advisors recommendations for proposed tolls for 2013 and future years
- Solicit Committee concurrence or alternative direction

Late April /
Early May 2012

Proposed Dulles Corridor Advisory Committee Meeting

- Authority consultation on proposed tolls for 2013 and future years
- Solicit comments for Board consideration

Dates are preliminary; subject to change



Proposed 2012 Schedule for Establishing Tolls (continued)

May 16, 2012

Finance and/or Dulles Corridor Committee Meeting

- Receive staff report on DCAC comments on proposed toll rates
- Reconsider staff recommendation for proposed adjustments
- Provide Committee authorization to proceed with the regulatory process for proposed rate adjustments and effective dates

May 31, 2012

Estimated End of 90-Day Fairfax and Loudoun Option Period

June and July 2012

Proposed Public Comment Period

- Public comment period and public forums on proposed toll rate adjustments

August 15, 2012

Finance and/or Dulles Corridor Committee Meeting

- Receive staff report on the Public Forums and public comments
- Decision whether to recommend proposed resolution to set DTR toll rates for 2013 and possibly future years

Dates are preliminary; subject to change



Proposed 2012 Schedule for Establishing Tolls (continued)

September 19, 2012

Board of Directors Meeting

- Consideration of resolution to set new DTR toll rates for 2013 and possibly future years

**Late September /
Early October 2012**

Proposed Dulles Corridor Advisory Committee Meeting

- Authority briefing to DCAC to report on Board's consideration of DCAC advice, public comments, and actions with regard to DTR toll rate schedule

**4th Quarter 2012
(October – December)**

Potential issuance of Dulles Toll Road Revenue Bonds

January 1, 2013

Implementation of Potential Toll Rate Adjustment

Dates are preliminary; subject to change



Conclusion

- **The Financial Advisors conclude that toll revenue projections based on the Alternate Toll Rate Schedule presented as part of the MOA and updated 2012 T&R Study traffic forecasts are sufficient to support the finance plan for the Metrorail Project**
- **There are currently a number of outstanding variables that could impact recommended toll rates**
- **The Board will be presented initial toll rate options in March**
- **The draft schedule presented facilitates a potential DTR bond issuance in the 4th Quarter and future toll rate adjustments**
 - **The schedule should remain flexible and dynamic to accommodate changes in circumstance**

**INFORMATION PAPER FOR THE
FINANCE COMMITTEE**

**2012 TRAFFIC AND REVENUE STUDY UPDATE AND PROCESS FOR
ESTABLISHING TOLL RATES ON THE DULLES TOLL ROAD**

FEBRUARY 2012

PURPOSE

To provide information on the process and proposed schedule for validating or potentially adjusting toll rates on the Dulles Toll Road (DTR). In addition, the Traffic and Revenue (T&R) Study Consultant will provide an update and overview of the 2012 T&R Study, and the Financial Advisors will present a preliminary financial analysis of updated DTR traffic and revenue projections.

BACKGROUND

The Airports Authority has the exclusive right to establish, charge, and collect tolls and other fees for the use of the Dulles Toll Road. Prior to adjusting toll rates, the Airports Authority must follow its process for promulgating regulations, including convening one or more public hearings in the Dulles Corridor to provide members of the public and others an opportunity to become informed about, and express their views on, any proposed toll rate changes. Consistent with past practice, the Airports Authority engaged an independent Traffic and Revenue Study Consultant to conduct a comprehensive study as an input to its toll rate setting process.

DISCUSSION

2012 Traffic and Revenue Study

CDM Smith (formerly Wilbur Smith Associates) was engaged to conduct a comprehensive, investment-grade Traffic and Revenue Study. Wilbur Smith Associates prepared the 2009 Traffic and Revenue Study for the Airports Authority and the 2010 update. Their 2012 preliminary report reflects a significant amount of data collection, research and analysis, including an independent review of socioeconomic growth assumptions.

CDM Smith's Transmittal Letter, DTR Traffic & Revenue Study Update 2012 Executive Brief and Preliminary T&R Results, and Draft Analysis of Population and Employment Forecasts for the Washington, D.C. Region 2010-2040 are included as Attachment A.

Preliminary Financial Analysis

The Financial Advisors have performed a preliminary financial analysis based on the updated Dulles Toll Road traffic and revenue projections in CDM Smith's 2012 draft report. The Financial Advisors conclude that toll revenue projections based on the Alternative Toll Rate Schedule presented as part of the Memorandum of Agreement and updated 2012 T&R Study traffic forecasts are sufficient to support the finance plan for the Metrorail Project.

Toll Setting Process and Schedule

There are currently a number of outstanding variables that could impact recommended toll rates. Prior to establishing future toll rates, the Airports Authority follows its regulatory process, which includes convening public hearings in the Dulles Corridor and reporting back to the Board on public views collected during the public hearings. In addition, the Airports Authority also consults with the Dulles Corridor Advisory Committee (DCAC) with respect to any proposed toll rate adjustments, although DCAC consent or approval of toll rate adjustments is not required under the agreements with the Commonwealth.

To facilitate the potential issuance of Dulles Toll Road revenue bonds in the fourth quarter of 2012, Management proposes the following draft schedule for establishing toll rates on the Dulles Toll Road:

Proposed 2012 Process & Schedule for Establishing Toll Rates

2/15/12	Finance Committee Meeting <ul style="list-style-type: none">• Review 2012 process and schedule for establishing toll rates• Receive T&R Study Update• Receive Preliminary Financial Analysis of the Updated Dulles Toll Road Revenue Projections
3/21/12	Finance and/or Dulles Corridor Committee Meeting <ul style="list-style-type: none">• Receive potential toll rate schedule(s) for 2013 and future years• Discuss considerations in setting future toll rates
4/18/12	Finance and/or Dulles Corridor Committee Meeting <ul style="list-style-type: none">• Receive staff and Financial Advisors' recommendations for proposed tolls for 2013 and future years• Solicit Committee concurrence or alternative direction
Late April – Early May	Proposed Dulles Corridor Advisory Committee Meeting <ul style="list-style-type: none">• Authority consultation on proposed tolls for 2013 and future years• Solicit comments for Board consideration

	Finance and/or Dulles Corridor Committee Meeting
5/16/12	<ul style="list-style-type: none"> • Receive staff report on DCAC comments on proposed toll rates • Reconsider staff recommendation for proposed adjustments • Provide Committee authorization to proceed with the regulatory process for proposed rate adjustments and effective dates
5/31/12	Estimated End of 90-Day Fairfax and Loudoun Option Period
June & July	Proposed Public Comment Period <ul style="list-style-type: none"> • Public comment period and public forums on proposed toll rate adjustments
8/15/12	Finance and/or Dulles Corridor Committee Meeting <ul style="list-style-type: none"> • Receive staff report on the Public Forums and public comments • Decision whether to recommend proposed resolution to set DTR toll rates for 2013 and possibly future years
9/19/12	Board of Directors Meeting <ul style="list-style-type: none"> • Consideration of resolution to set new DTR toll rates for 2013 and possibly future years
Late Sept/Early October	Proposed Dulles Corridor Advisory Committee Meeting <ul style="list-style-type: none"> • Authority briefing to DCAC to report on Board's consideration of DCAC advice, public comments, and actions with regard to DTR toll rate schedule
4Q 2012	Potential issuance of Dulles Toll Road Revenue Bonds
1/1/13	Implementation of Potential Toll Rate Adjustment

It is important to note that all dates are tentative and subject to many variables, which may change the proposed schedule.

CONCLUSION

The Financial Advisors conclude that toll revenue projections based on the Alternative Toll Rate Schedule presented as part of the Memorandum of Agreement and updated 2012 T&R Study traffic forecasts are sufficient to support the finance plan for the Metrorail Project. There are currently a number of outstanding variables that could impact recommended toll rates. In addition, staff has proposed a schedule for establishing toll rates on the Dulles Toll Road, consistent with the regulatory process the Airports Authority is required to follow.

Prepared by:

Office of Finance
February 2012



3130 Fairview Park Drive
Falls Church, Virginia 22042
tel: 703 485-8500
fax: 703 698-1250

Transmittal

To: Mr. Andrew Rountree, CPA From: Jonathan Pagan
Organization/ Address: MWAA Date: February 3, 2012

Re: T&R Study 2012 – Preliminary Results
Job #: 87119/T8

Via: e-Mail:

Overnight:

Courier:

Enclosed please find:

For your information	
For your review	
For your signature	

Approved	✓
Approved as noted	
Returned to you for correction	

Message:

Dear Mr. Rountree:

I enclosed the following documents relating to the 2012 DTR Traffic and Revenue Study:

- Executive Brief and Preliminary Results, CDM Smith, January 2012
- Analysis of Population and Employment Forecasts, Renaissance Planning Group, October 2011

We look forward to presenting the preliminary results to MWAA on 2/15. We will provide detailed study documentation shortly thereafter. Following your review of the preliminary numbers and once you are able to provide us with final toll rate assumptions, we will provide a full draft Comprehensive T&R Report including final forecasts, sensitivity tests, and new toll sensitivity analysis within a timescale of approximately one month.

J Pagan

Signed _____

DTR Traffic & Revenue Study Update 2012

Executive Brief and Preliminary T&R Introduction

This Executive Brief summarizes preliminary results of a fully updated comprehensive traffic and toll revenue (T&R) study for Dulles Toll Road (DTR) in Virginia. The study is being conducted by CDM Smith. Full details of the study results will be provided initially as draft report chapters. A final report will be available later following MWAA's instructions of final toll rate assumptions.

These preliminary results will be reviewed by the finance team and Airports Authority Board to determine further refinements that may be required to toll structures and/or rates. Initially CDM Smith has been asked to assume a single toll rate schedule for comparison with the 2009 Study.

Constructed in 1984, and situated mostly in Fairfax County, the DTR is a 13.43 mile, eight-lane toll facility in the Dulles-Reston-Herndon-Tysons Corridor in Northern Virginia, shown in Figure ES-1. Toll collection is by means of cash and electronic toll collection (E-ZPass) at one Main Line plaza at the eastern end near the Capital Beltway (Interstate 495) and 19 ramp plazas, as shown in Figure ES-2. The tolling system is designed to capture revenues from DTR customers at one or more tolling locations. The majority of toll-paying customers pay both a Main Line and ramp toll. DTR links directly to the Dulles Greenway at a shared Main Line plaza providing rapid access to Leesburg and elsewhere in Loudoun County. Currently, most west-facing ramps, towards Washington Dulles International Airport (Dulles International), are toll-free providing local travelers on the Dulles corridor with free access to the DTR and the Dulles Airport Access Road.

The DTR complements and competes with a combination of non-tolled local arterials and highways but generally provides a superior limited-access free flow level of service. Its comparative advantage is somewhat reduced in peak hours when, for the past decade, levels of service have begun to reach less satisfactory levels. There is evidence that peak travel, and hence toll revenues, are constrained in the peak hours due to congestion. There is substantial midday and non-peak travel but there remains capacity for growth in non-commuting trips as development along the Dulles corridor continues to expand.

During the life of the DTR facility, toll rates have not kept pace with inflation; there were no toll rate adjustments between 1984 and 2005. In 2005 a 25-cent increase was implemented, in order to begin securing funds for the Metrorail Project, resulting in Main Line tolls for two-axle vehicles of 75 cents in both directions and ramp tolls established at a uniform 50 cents. A \$0.25 increase in January 2010 at both the Main Line plaza and all ramps was followed by an increase of \$0.25 at only the Main Line plaza in 2011.

Despite the economic slowdown and other negative factors, annual toll revenues increased from \$41.9 million in 2004 to \$65.2 million in 2006 and annual toll revenues increased to \$88.0 million and \$94.6(est.) million in 2010 and 2011 respectively. Toll rate increases have therefore provided solid revenue realization due to relatively inelastic impacts. Local trips have been more sensitive than

through-traffic passing the Main Line plaza. A further \$0.25 Main Line only adjustment has been approved and implemented for January 2012.



Figure ES-1
DTR: Regional Location Map

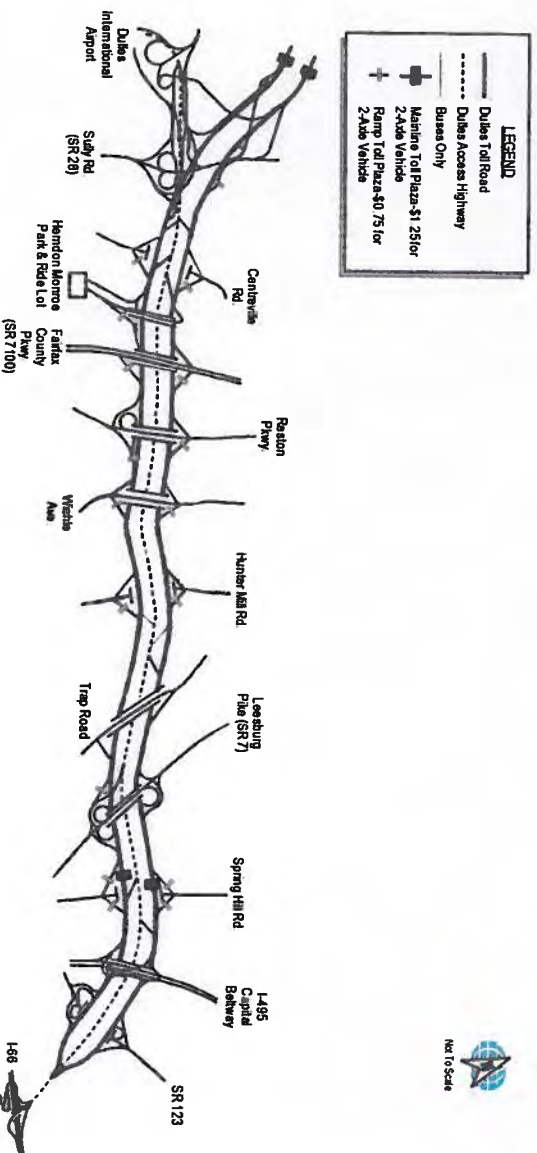


Figure ES-2
DTR: Tolling Configuration Schematic

Multi-axle vehicles are charged an additional 25 cents per axle, however the proportion of multi-axle vehicles is relatively small. Dulles Greenway remits the current value of the DTR ramp toll (less fee) at the shared Greenway mainline plaza. Greenway transactions have been falling in recent years due to toll increases on that facility but this has resulted in traffic diverting to the DTR ramps at Route 28 mostly offsetting the reductions in DTR revenue at the Greenway.

The customer base for the DTR is mature and extremely stable showing minimal variations during the working week and by time of year. Unlike many other commuter toll facilities the DTR exhibits strong peak demand in both directions due to the spatial distribution of commercial and residential centers in its service area. Although growth has been muted, the DTR has fared relatively well during the current economic downturn compared to non-tolled routes in Virginia and comparable toll facilities throughout the nation.

Historically, demand has been somewhat sensitive to economic growth but has rebounded immediately after economic slowdowns as illustrated in Figure ES-3. Also shown, and as described above, the toll rate adjustments in 2005, 2010 and 2011 resulted in solid revenue realization.

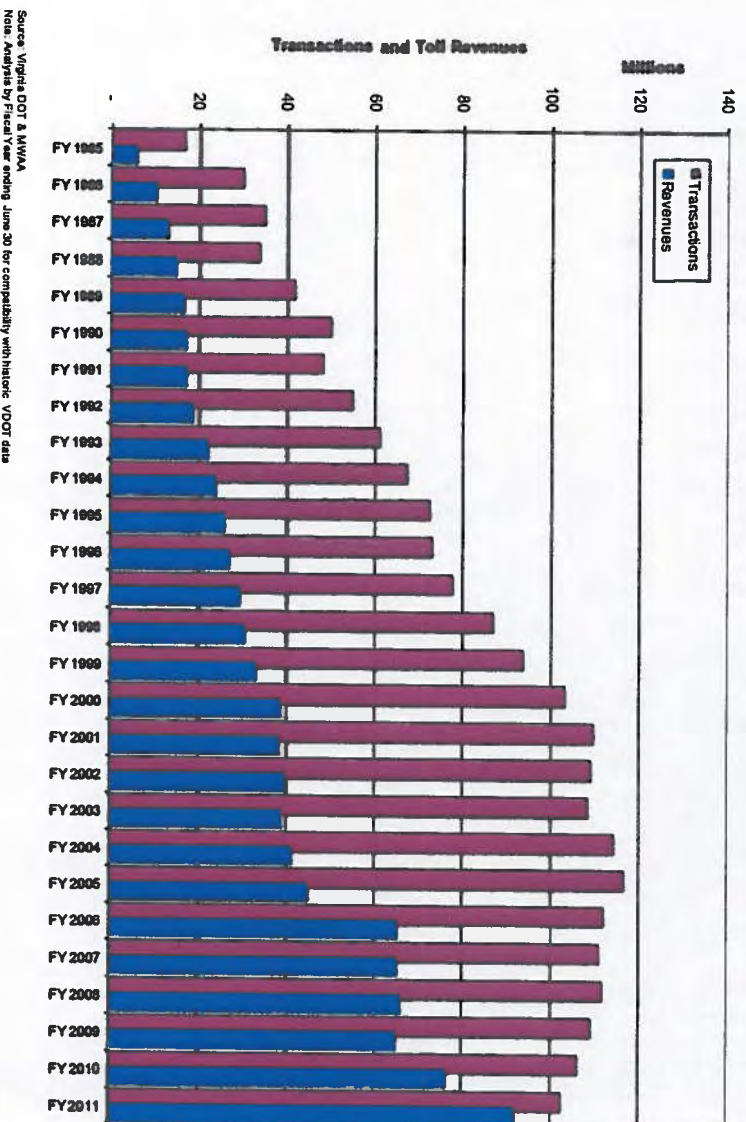


Figure ES-3
DTR: Transactions and Revenues FY1985-FY2011

Study Approach Overview

The fully updated T&R study is being conducted at a full investment grade level and should be considered suitable for use in project financing. The study has benefited from the release of the latest Metropolitan Washington Council of Governments (MWCOC) travel demand model (adopted November 2011) and socio-economic projections (December 2010) and reflects the most recently approved future transportation improvement plans including HOT Lanes projects and Metrorail

expansions. This model was the basis of the CDM Smith T&R study and was updated and refined based on professional experience and judgment. The traffic and toll revenue estimates on the DTR were calculated by using the trip tables that were generated from updated demographic datasets and taking into account estimated toll diversions.

To refine the model, CDM Smith embarked on a significant fresh data collection program including current traffic data and information related to travel characteristics in the DTR corridor. In addition to detailed corridor reconnaissance, speed and delay surveys and traffic counts in the DTR corridor, CDM Smith conducted new travel pattern and characteristic surveys at Main Line and ramp toll locations. In addition CDM Smith performed video license plate matching entry/exit pattern surveys to assist in model development and validation.

The use of previous stated preference surveys conducted by CDM Smith for the 2009 study resulted in very accurate estimates of the impacts of the January 2010 and January 2011 toll adjustments. These surveys provide useful estimates of how travelers in the DTR corridor value time, as well as motorists' preferences regarding toll collection options and other inputs. The surveys found average values of time generally in the range of \$0.17 to \$0.21 per minute, depending on trip purpose. CDM Smith also conducted a DTR stated preference survey in 2005 for VDOT yielding an almost identical range of values of time. It was therefore not considered necessary to repeat the Stated Preference surveys instead focusing on updating models to represent the revealed preference of customers.

Reflective of the relatively high incomes in the Dulles corridor, the value of time range is relatively high compared with some other toll facilities. These values of time were applied in the travel demand model based on the distribution of incomes in the region. This analysis was refreshed for this study based on new data on income distributions. 2011 incomes are typically lower than predicted in the prior study.

An independent review of the socioeconomic growth of the DTR corridor was undertaken by Renaissance Planning Group (RPG). The original socioeconomic projections were as provided by the MWCOG, which were used in the latest version of the regional travel demand model. Based on the RPG review some modifications were made to the MWCOG data. All socioeconomic data has been updated to reflect the 2010 Census results. The independent economist's report by RPG is included as an appendix to the traffic and revenue study. The expected growth through 2020 in population and employment is shown in Figures ES-4 and ES-5 respectively. The long term economic and demographic outlook for the corridor remains very favorable.

For the initial T&R analysis for this draft report, a detailed traffic and revenue analysis was undertaken based on an initial toll rate schedule (see Table ES-1). This is as follows:

- Toll Rate Schedule: following approved toll adjustments through 2012, a \$1.25 increase occurs at the Main Line plaza and a \$1.00 increase occurs at all ramp plazas in 2013 and 2018. Beginning in 2023, and occurring every five years thereafter, there is an increase of \$1.00 at the Main Line plaza and at all ramp plazas.

Dulles Greenway tolls were also adjusted in the model based on approved increases and expectations of additional future escalations. Base case traffic and toll revenue estimates were developed for the DTR, extending over a 40-year period up to 2050. A series of sensitivity tests are yet to be performed to assess the potential impacts on base case revenues associated with hypothetical changes in certain basic assumptions or other data inputs.

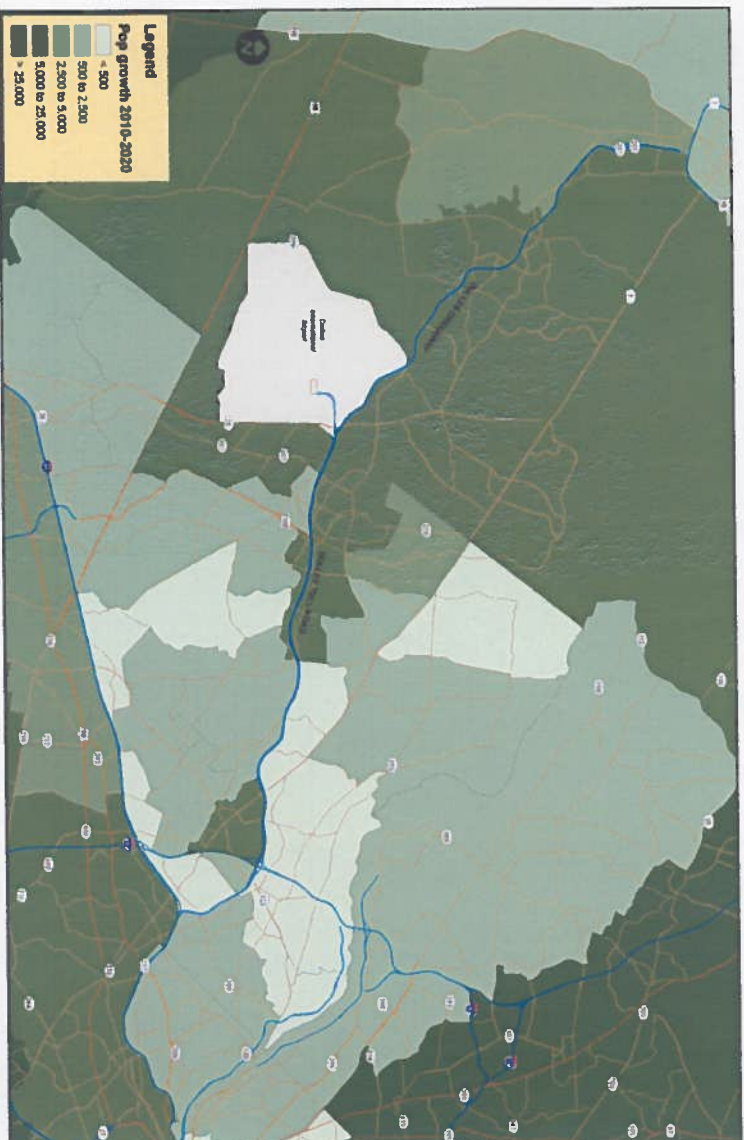


Figure ES-4
Population Growth 2010 to 2020

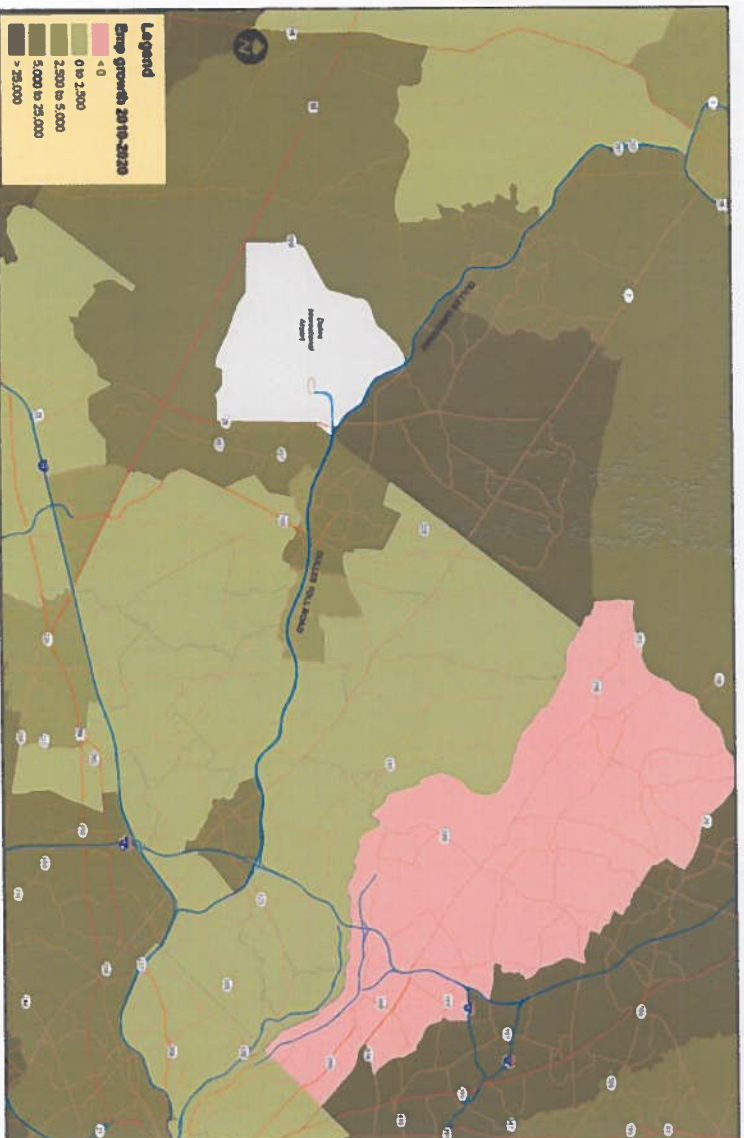


Figure ES-5
Employment Growth 2010 to 2020

Table ES-1 Preliminary Draft Toll Rate Schedule

	Main Line		Ramps	
	Tolls	Change	Tolls	Change
1984-2005	\$0.50	..	\$0.35/\$0.25	..
2005-2009	0.75	+\$ 0.25	0.50	+\$ 0.15
2010	1.00	+\$ 0.25	0.75	+\$ 0.25
2011	1.25	+\$ 0.25	0.75	..
2012	1.50	+\$ 0.25	0.75	..
2013	2.75	+\$ 1.25	1.75	+\$ 1.00
2014	2.75	..	1.75	..
2015	2.75	..	1.75	..
2016	2.75	..	1.75	..
2017	2.75	..	1.75	..
2018	4.00	+\$ 1.25	2.75	+\$ 1.00
2019	4.00	..	2.75	..
2020	4.00	..	2.75	..
2021	4.00	..	2.75	..
2022	4.00	..	2.75	..
2023	5.00	+\$ 1.00	3.75	+\$ 1.00
2024	5.00	..	3.75	..
2025	5.00	..	3.75	..
2026	5.00	..	3.75	..
2027	5.00	..	3.75	..
2028	6.00	+\$ 1.00	4.75	+\$ 1.00
2029	6.00	..	4.75	..
2030	6.00	..	4.75	..
2031	6.00	..	4.75	..
2032	6.00	..	4.75	..
2033	7.00	+\$ 1.00	5.75	+\$ 1.00
2034	7.00	..	5.75	..
2035	7.00	..	5.75	..
2036	7.00	..	5.75	..
2037	7.00	..	5.75	..
2038	8.00	+\$ 1.00	6.75	+\$ 1.00
2039	8.00	..	6.75	..
2040	8.00	..	6.75	..
2041	8.00	..	6.75	..
2042	8.00	..	6.75	..
2043	9.00	+\$ 1.00	7.75	+\$ 1.00
2044	9.00	..	7.75	..
2045	9.00	..	7.75	..
2046	9.00	..	7.75	..
2047	9.00	..	7.75	..
2048	10.00	+\$ 1.00	8.75	+\$ 1.00
2049	10.00	..	8.75	..

Note: Draft Only

Estimated Traffic and Toll Revenue

Travel demand models were obtained from the metropolitan planning organization, MWCOC. These were updated to reflect the latest project configurations and toll operations assumptions. Base year trip tables were also refined to reflect adjustments to socioeconomic forecasts and to better reflect observed travel patterns from the origin-destination and exit/entry pattern surveys. Future planned transportation improvement project information was obtained and appropriately reflected in the travel demand models.

A series of traffic assignments were performed at 2011, 2015, 2020, 2025, 2030, 2035 and 2040 levels. Separate assignments were made for morning peak, mid-day, afternoon peak and night conditions.

Future toll rates were tested in selected years and no other changes in toll collection methods were assumed at this stage, e.g. all electronic tolling, peak pricing, tolling un-tolled ramps, etc. All of the traffic assignments listed above were also modeled with the previous period's toll rates (i.e. no toll rate increase) to estimate toll impacts and aid interpolation.

Table ES-2 provides a summary of annual traffic and revenue estimates for the DTR under the Preliminary Draft Toll Rate Schedule. In CY2011 total annual transactions are estimated at more than 99.9 million per year. This translates to annual toll revenues of about \$94.6 million in 2011.

By 2013, with Main Line and ramp toll increases, annual total transactions decrease to approximately 81.9 million per year. These transactions produce almost \$177.1 million in annual toll revenues. By 2018, annual transactions are expected to be 75.1 million per year generating annual toll revenues of \$246.4 million.

In 2023, annual total transactions number more than 74.0 million. In the same year, the amount of toll revenue generated is over \$320.0 million. By 2033, the forecasted annual toll revenues are \$489.3 million based on nearly 76.9 million annual transactions.

With this toll schedule, toll revenues are estimated to surpass a half billion annual dollars in 2035 and reach almost \$685m by 2050.

For the final report, once the future toll rate schedule has been specified to us, a series of sensitivity tests will be performed to test the potential impacts on revenue associated with hypothetical changes in certain assumptions or basic study inputs. These tests will cover a range of potential risk factors, such as alternative economic growth, lower values of time and gas price increases.

Table ES-2 Dulles Toll Road Traffic and Toll Revenue Estimates 2009-2050

Preliminary Draft Toll Rate Schedule							
Forecast Year	Calendar Year	ML/Ramp Tolls	Total Transactions	% p.a.	Total Revenue	% p.a.	Average ¹ Revenue
-1	2009	\$0.75 / \$0.50	107,457,000	-2.0%	64,894,000	-1.1%	0.60
0	2010	\$1.00 / \$0.75	102,592,000	-4.5%	88,038,000	+35.7%	0.86
1	2011 ²	\$1.25 / \$0.75	99,923,000	-2.6%	94,646,000	+7.5%	0.95
2	2012	\$1.50 / \$0.75	99,911,000	-0.0%	103,508,000	+9.4%	1.04
3	2013	\$2.75 / \$1.75	81,908,000	-18.0%	177,107,000	+71.1%	2.16
4	2014	\$2.75 / \$1.75	83,502,000	+1.9%	181,740,000	+2.6%	2.18
5	2015	\$2.75 / \$1.75	83,144,000	-0.4%	180,960,000	-0.4%	2.18
6	2016	\$2.75 / \$1.75	85,118,000	+2.4%	185,257,000	+2.4%	2.18
7	2017	\$2.75 / \$1.75	87,008,000	+2.2%	189,369,000	+2.2%	2.18
8	2018	\$4.00 / \$2.75	75,062,000	-13.7%	246,441,000	+30.1%	3.28
9	2019	\$4.00 / \$2.75	76,595,000	+2.0%	251,473,000	+2.0%	3.28
10	2020	\$4.00 / \$2.75	78,158,000	+2.0%	256,605,000	+2.0%	3.28
11	2021	\$4.00 / \$2.75	80,225,000	+2.6%	263,393,000	+2.6%	3.28
12	2022	\$4.00 / \$2.75	82,347,000	+2.6%	270,360,000	+2.6%	3.28
13	2023	\$5.00 / \$3.75	74,084,000	-10.0%	320,180,000	+18.4%	4.32
14	2024	\$5.00 / \$3.75	76,044,000	+2.6%	328,650,000	+2.6%	4.32
15	2025	\$5.00 / \$3.75	78,056,000	+2.6%	337,343,000	+2.6%	4.32
16	2026	\$5.00 / \$3.75	80,152,000	+2.7%	346,406,000	+2.7%	4.32
17	2027	\$5.00 / \$3.75	82,306,000	+2.7%	355,711,000	+2.7%	4.32
18	2028	\$6.00 / \$4.75	76,311,000	-7.3%	407,841,000	+14.7%	5.34
19	2029	\$6.00 / \$4.75	78,361,000	+2.7%	418,798,000	+2.7%	5.34
20	2030	\$6.00 / \$4.75	79,097,000	+0.9%	422,731,000	+0.9%	5.34
21	2031	\$6.00 / \$4.75	80,493,000	+1.8%	430,194,000	+1.8%	5.34
22	2032	\$6.00 / \$4.75	81,914,000	+1.8%	437,788,000	+1.8%	5.34
23	2033	\$7.00 / \$5.75	76,933,000	-6.1%	489,294,000	+11.8%	6.36
24	2034	\$7.00 / \$5.75	78,291,000	+1.8%	497,932,000	+1.8%	6.36
25	2035	\$7.00 / \$5.75	79,673,000	+1.8%	506,723,000	+1.8%	6.36
26	2036	\$7.00 / \$5.75	80,566,000	+1.1%	512,401,000	+1.1%	6.36
27	2037	\$7.00 / \$5.75	81,469,000	+1.1%	518,143,000	+1.1%	6.36
28	2038	\$8.00 / \$6.75	77,507,000	-4.9%	581,330,000	+12.2%	7.50
29	2039	\$8.00 / \$6.75	77,962,000	+0.6%	584,740,000	+0.6%	7.50
30	2040	\$8.00 / \$6.75	78,419,000	+0.6%	588,169,000	+0.6%	7.50
31	2041	\$8.00 / \$6.75	78,879,000	+0.6%	591,619,000	+0.6%	7.50
32	2042	\$8.00 / \$6.75	79,341,000	+0.6%	595,089,000	+0.6%	7.50
33	2043	\$9.00 / \$7.75	75,655,000	-4.6%	636,671,000	+7.0%	8.42
34	2044	\$9.00 / \$7.75	75,912,000	+0.3%	638,828,000	+0.3%	8.42
35	2045	\$9.00 / \$7.75	76,169,000	+0.3%	640,992,000	+0.3%	8.42
36	2046	\$9.00 / \$7.75	76,427,000	+0.3%	643,163,000	+0.3%	8.42
37	2047	\$9.00 / \$7.75	76,686,000	+0.3%	645,342,000	+0.3%	8.42
38	2048	\$10.00 / \$8.75	73,223,000	-4.5%	683,209,000	+5.9%	9.33
39	2049	\$10.00 / \$8.75	73,290,000	+0.1%	683,830,000	+0.1%	9.33
40	2050	\$10.00 / \$8.75	73,357,000	+0.1%	684,453,000	+0.1%	9.33

Notes:

¹ Average revenue per transaction.² Estimate for 2011

**ANALYSIS OF POPULATION AND EMPLOYMENT FORECASTS
FOR THE WASHINGTON DC REGION 2010 TO 2040**

BY

RENAISSANCE PLANNING GROUP

FOR

METROPOLITAN WASHINGTON AIRPORTS AUTHORITY

INTERNAL REVIEW DRAFT

October 17, 2011

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Introduction

Renaissance Planning Group has conducted this independent economic analysis of the validity of the socioeconomic data that is used in conjunction with the Metropolitan Washington Transportation Planning Board travel demand forecasting model to forecast future travel demand in the Washington DC Metropolitan Area. The analysis includes a test of the reasonableness of the traffic analysis zone (TAZ) level and countywide socioeconomic data relative to current economic conditions and trends, the availability of vacant and underutilized land and the propensity for development and redevelopment in different parts of the region. This analysis has been conducted in support of a traffic and revenue study conducted for the Metropolitan Washington Airports Authority (MWAA) for the Dulles Toll Road in Fairfax County, Virginia. The economic analysis and socioeconomic data validation and adjustment will be used in the final phase of the traffic and revenue study, which will be undertaken by Wilbur Smith Associates (WSA). The findings of the analysis will be used by WSA to forecast future vehicle traffic and toll revenue for the Dulles Toll Road.

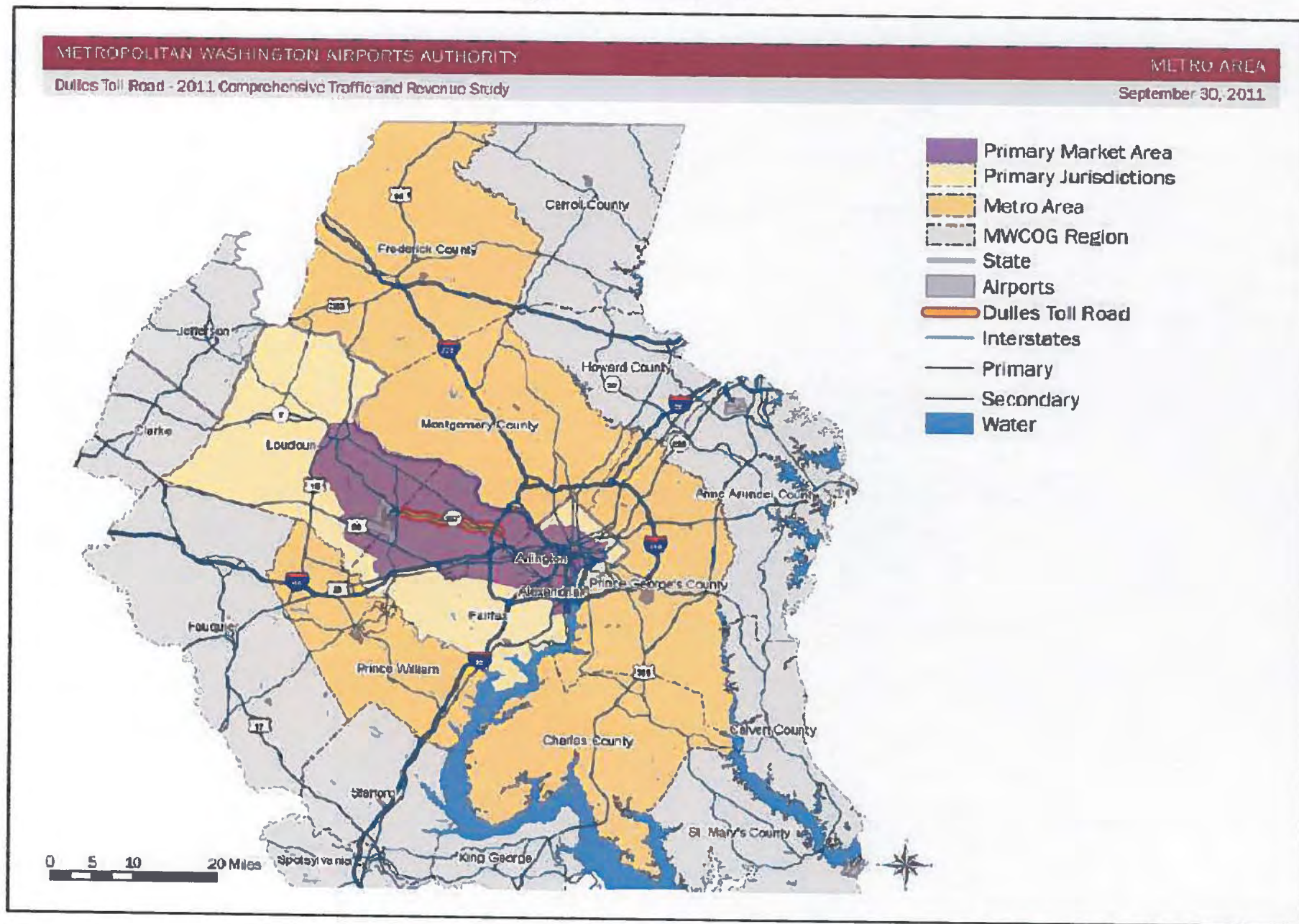
Based on the economic analysis, Renaissance has prepared countywide population and employment estimates for 2010 and forecasts for 2015, 2020, 2025, 2030, 2035, 2040, 2045 and 2050 for the core and suburban counties of the Washington D.C. metropolitan area: Arlington, Fairfax, Loudoun and Prince William Counties in Virginia; Frederick, Montgomery and Prince George's Counties in Maryland; and the District of Columbia (Figure 1). The forecasts have been generated considering 2010 and prior US Decennial Census results, public and private forecasts from a number of sources and forecasts created by the Metropolitan Washington Council of Governments (MWCOG) for the purposes of long range regional land use and transportation planning. The purpose of this report is to document the analysis undertaken by Renaissance and present the resulting county and TAZ level adjustments to the adopted population and employment forecasts for the Washington DC Metropolitan Area.

Approach

Renaissance assembled a team of professional land use planners, development specialists, transportation planners and geographic information systems analysts to evaluate economic conditions, local market dynamics, land use patterns, land availability and infrastructure investments that will affect the long term population and employment growth in the Washington DC Metropolitan Area. The approach included top down methods by testing and adjusting region-wide and jurisdictional population and employment control totals, bottom up methods analyzing the supply of land for residential and non-residential development, market-based macroeconomic information on the prospects for short and long term growth, and a forecasting tool integrating a variety of predicting variables that was used to analyze and adjust forecasts at the TAZ level. The approach to analyzing and refining the data for the region included several steps:

1. Definition of a Dulles Toll Road Primary Market Area based on a critical mass of origins and destinations for patrons;
2. Interagency and intergovernmental coordination to understand perspectives on MWCOG methods and forecasts;
3. County level evaluation and documentation of MWCOG population and employment forecasts at the jurisdictional level and comparison of those forecasts to a number of other public and private sources;
4. Macroeconomic assessment of past trends, present conditions and near term future prospects for residential development and absorption and job creation within the metropolitan region;
5. Forecast based on macroeconomic factors of population and employment at the jurisdictional level to be used as guidance in preparing the final adjusted forecast;
6. Detailed assessment at the TAZ level of the household and population forecasts relative to the 2010 US Decennial Census and employment forecasts relative to private sources and creation of new 2010 TAZ level population and employment;
7. Detailed parcel level evaluation of existing conditions and land supply side factors for the jurisdictions in the Primary Market Area
8. Methodology for modeling and testing the validity of MWCOG forecasts at the TAZ level for the jurisdictions in the Primary Market Area; and
9. Final TAZ level jurisdictional and Primary Market Area forecasts based on adjusted 2010 population and employment, supply side analysis, macroeconomic guidance and forecasting model based on MWCOG assumptions.

Figure 1 - Map of Metropolitan Area



Step 1: Dulles Toll Road Primary Market Area

The results of a 2007 Travel Pattern Survey for the Dulles Toll Road were used to identify the Primary Market Area for our analysis. The survey was conducted by Wilbur Smith Associates on behalf of MWAA and VDOT. The survey contained data points for 8,674 trip origins and 8,574 trip destinations within the COG model TAZs. These origins and destination points were mapped, and analyzed both by normalized density per acre, as well as total by TAZs. The Primary Market Area is defined by TAZ boundaries. TAZs with the highest concentration of both origins and destinations were manually selected to comprise the Primary Market Area. Wherever possible, TAZs were selected to form a cohesive study area, avoiding holes and rough edges. The selection process continued until the percent of total origins and destinations were both greater than 85%. The Primary Market Area and densities of origins and destinations by TAZ are depicted in Figure 2. The area includes all or portions of Loudoun County, Fairfax County, Arlington County and the District of Columbia. The entire City of Alexandria is also included in the area.

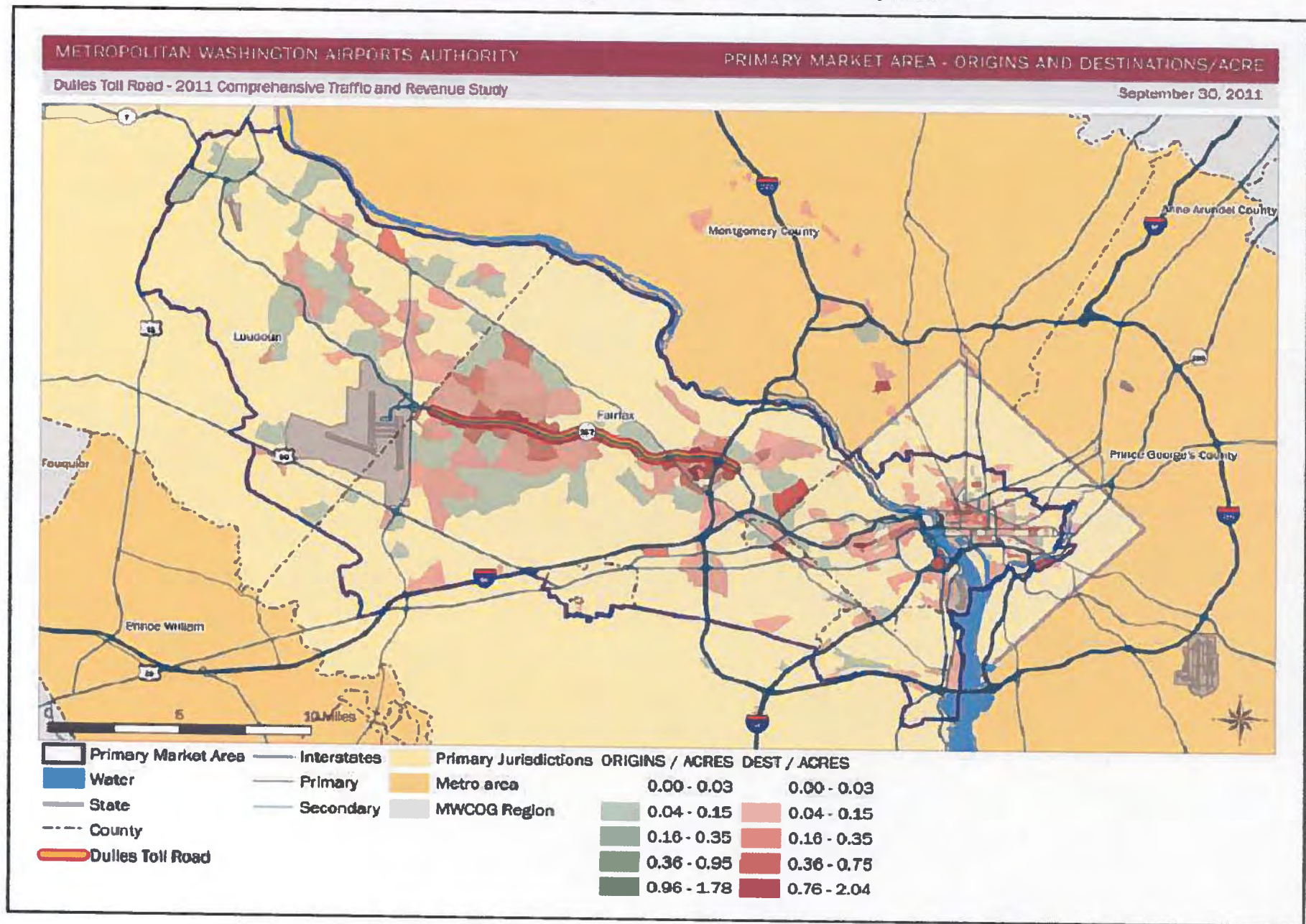
Step 2: Interagency and Intergovernmental Coordination and Interviews

At the beginning of the analysis in late August 2011, Renaissance contacted a number of agencies and governments to collect information and interview key staff. The interviews and meetings helped us gain perspective on trends and conditions in the housing and commercial development markets and hear their perspective on the MWCOG forecasts. The following is a list of those who were contacted and provided input:

- Arlington County Department of Community Planning, Housing and Development
- City of Alexandria Department of Planning and Zoning
- District of Columbia Office of Planning
- Fairfax County Department of Transportation
- Fairfax County Department of Planning and Zoning
- Loudoun County Department of Management and Financial Services
- Loudoun County Department of Planning
- Metropolitan Washington Council of Governments

These agencies and governments were contacted at the front end of the study. In order to keep this assessment wholly independent, we did not review findings or methods with those agencies prior to the publication of this document.

Figure 2 - Map of Density of Origins and Destinations in the Primary Market Area



Step 3: County Level Evaluation of MWCOG Forecasts

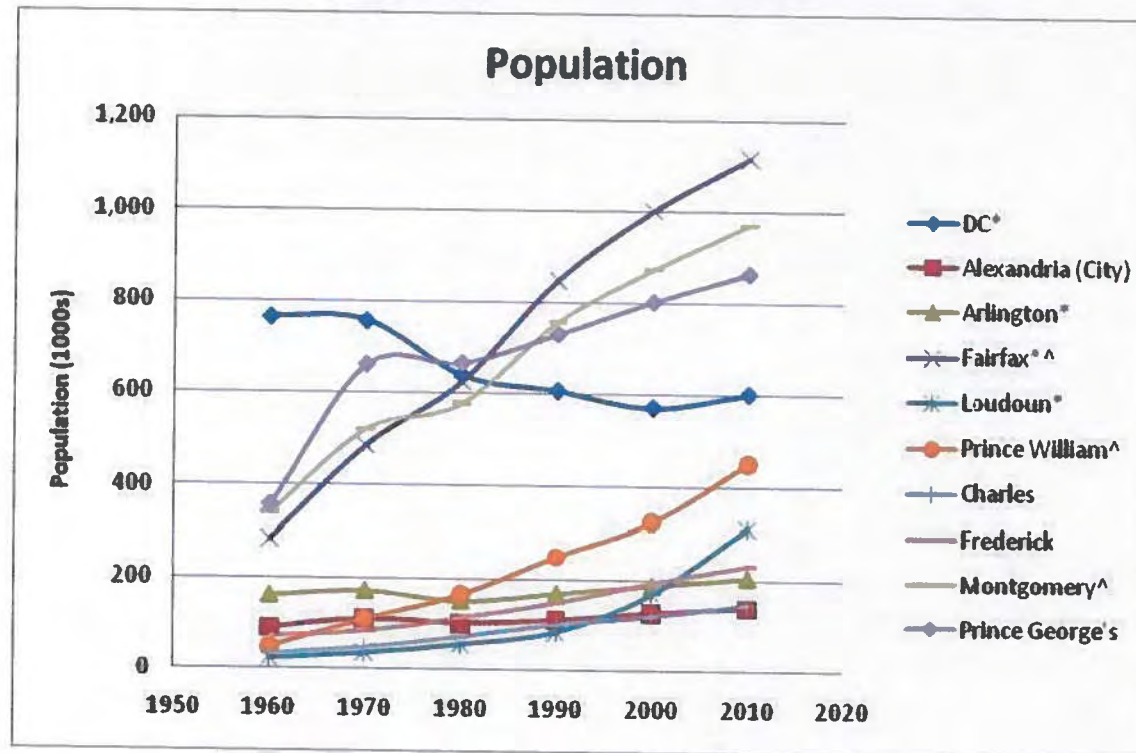
One component of the economic analysis is to conduct a top down evaluation of population and employment forecasts at the regional and jurisdictional level. This section summarizes the data sources used and presents graphs comparing historic trends and forecasts for a select number of jurisdictions within the metropolitan region. For this level of analysis, we have cast a wide net to include jurisdictions that do not have a significant impact on the Dulles Toll Road. The purpose is to ensure we understand the regional dynamics of job formation, population growth, and general trends and preferences that affect the long term prospects for change in the region and within the Primary Market Area for the Dulles Toll Road.

Population History and Forecasts

Historical population counts and estimates were obtained from the US Census Bureau. The primary historical sources were the decennial population counts, which are considered authoritative. Trends in population between census years were examined by consulting the Census Bureau's annual midyear population estimates, obtained through the US Bureau of Economic Analysis (BEA).

Population forecasts were obtained from four sources, one from the public sector and three from private data providers. The public sector source was the state government data center of either Maryland or Virginia (depending on the county location). No public sector source was identified for the District of Columbia. The State of Maryland forecasts were available in five-year increments extending to 2040. The State of Virginia forecasts were available only in ten-year increments extending to 2030. In order to compare the Virginia forecasts with the other sources which use five-year increments, Renaissance interpolated five-year forecasts using the expressed compound annual growth rate of the Virginia ten-year forecasts. The three private sources were Moody's Analytics, Woods & Poole Economics, and Economic Modeling Specialists, Inc. (EMSI). All produce annual forecasts out to 2040 except for EMSI. Since the standard unit of population measurement is universally understood to be an individual person, all of these sources can be directly compared without any adjustments.

Figure 3 – US Census Historical Population¹

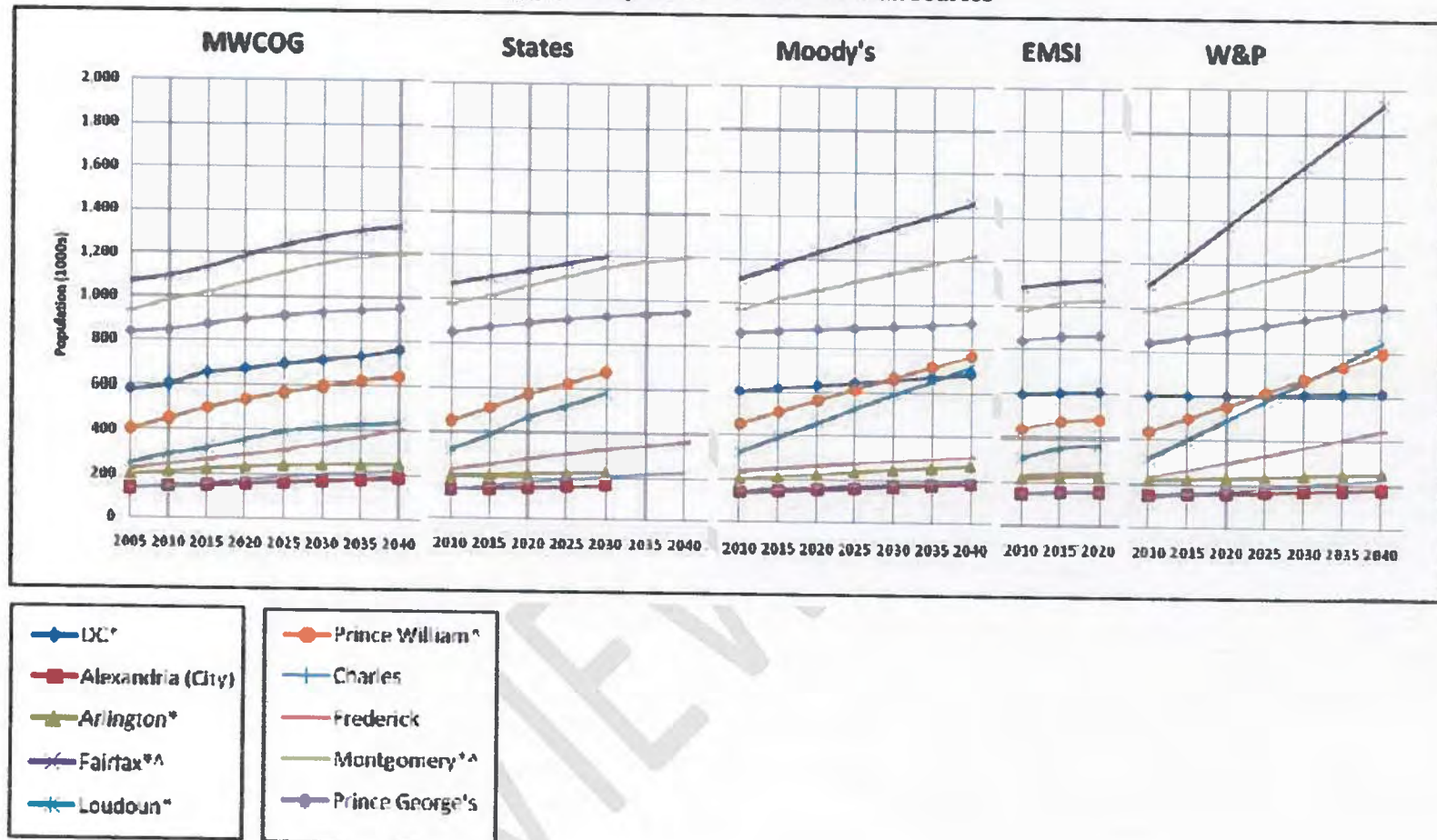


Observations

Visually, the population growth of Fairfax County looks most impressive as it has surpassed Montgomery County, Prince George's County and the District of Columbia. Its overall population growth from 1960 to 2010 was 292 percent. Several other jurisdictions have grown at more intense rates between 1960 and 2010, including Loudoun County (1,175 percent from 1960 to 2010), Prince William County (805 percent), and Charles County (350 percent). Growth rates in Fairfax County have steadily declined, from 71 percent between 1960 and 1970 to 11 percent between 2000 and 2010. Prince George's County experienced rapid growth in the 1960s (85 percent between 1960 and 1970), but has continued to grow at a much slower pace since 1970 (between one and ten percent for each decade). Loudoun County is the only locality experiencing an increasingly faster growth rate. Loudoun County had the highest rate of growth between 2000 and 2010 of all the localities (84 percent between 2000 and 2010). Prince William County was the next highest at 39 percent.

¹ * Primary Market Area jurisdiction; ^ Fairfax County includes City of Fairfax and City of Falls Church; Prince William County includes City of Manassas and City of Manassas Park; Montgomery County includes City of Rockville and City of Gaithersburg of Manassas Park; Montgomery County includes City of Rockville and City of Gaithersburg.

Figure 4 - Population Forecasts from all Sources²



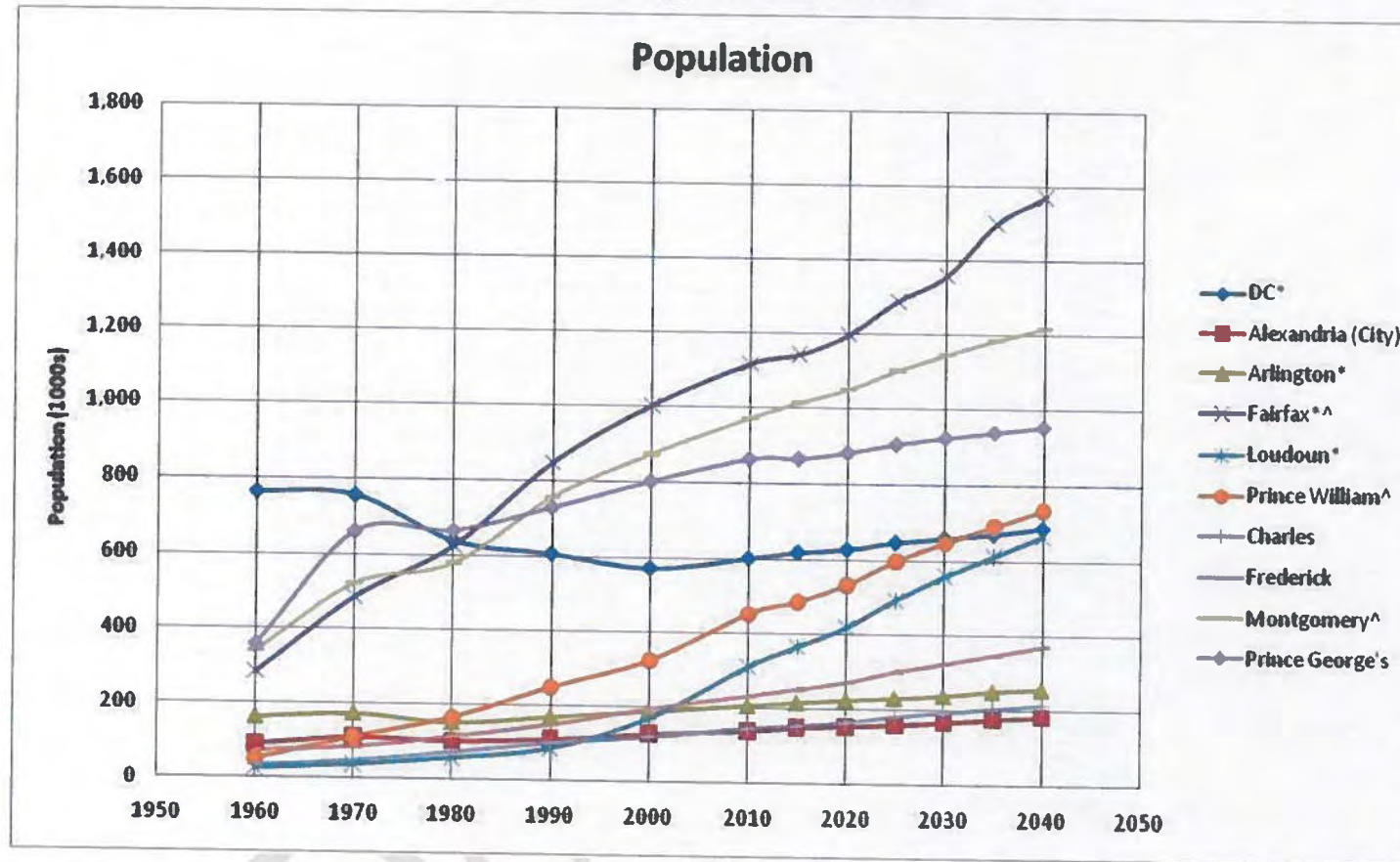
²* Primary Market Area jurisdiction; ^ Fairfax County includes City of Fairfax and City of Falls Church; Prince William County includes City of Manassas and City of Manassas Park; Montgomery County includes City of Rockville and City of Gaithersburg; State population projections for Maryland are provided by the Maryland Department of Planning through the Maryland State Data Center; State population projections for Virginia are provided by the Virginia Workforce Connection through the State Demographer Projections Decennial Population Data; Projections for 2015 and 2025 were interpolated; No independent local jurisdiction projections available for the District of Columbia.

Observations

- 2010 Population Forecasts for States and Moody's are all within 5% variance of 2010 Census.
- In MWCOG forecasts, Loudoun County 2010 pop is 9% lower than 2010 Census.
- In W&P forecasts, Alexandria and Arlington 2010 pop is 8% and 5% higher than 2010 Census.
- EMSI's 2010 forecasts are strikingly similar to W&P, but future years are more moderate.
- States and Moody's are generally more in line with average than MWCOG and W&P forecasts.
- MWCOG forecasts are significantly (15% or more) lower than other forecasts for Loudoun from 2020 to 2040.
- W&P data are significantly (15% or more) higher than average for Fairfax, Loudoun & Frederick from 2025 through 2040.
- Moody's data are slightly (10-15%) lower than average for Frederick from 2030 to 2040.
- EMSI data are slightly (10-15%) lower than average for Loudoun and Prince William in 2020.
- Projections for Fairfax County widely vary. Even through 2020, the projections are very different. Woods & Poole projects 1.4 million for Fairfax County 2020, whereas EMSI is closer to 1.1 million.
- Most DC forecasts other than the MWCOG show a straight line of 600k population with very little increase, but the MWCOG forecasts have it growing steadily to almost 800k by 2040.

A key variable in the population projections for the western suburbs is the degree to which jurisdictions that are at or near their residential capacity will react to increased housing demand, a topic of interest and concern from a regional perspective for several years. Both Fairfax and Loudoun Counties are reaching the end of their greenfield development phase, in part due to a conscious effort to maintain and preserve a green infrastructure plan that also acknowledges their agrarian histories. Accommodating increased residential development therefore means more infill development as now planned for Tysons Corner. The Woods and Poole forecasts suggest that demand in Fairfax and Loudoun County will be fulfilled by continuing the recent trends toward residential development (whether upwards into high rise or outwards into agricultural reserve). Conversely, the MWCOG forecasts, developed by planning staff in each jurisdiction, are more conservative regarding the ability to accommodate housing demand, a factor that influenced the MWCOG econometric analyses leading to the establishment of Round 8.0 regional control totals.

Figure 5 -Average Population Forecasts³



Observations

Taking the average of all the forecast sources and combining it with the historical census data shows a continuation of high growth rates in Loudoun County. Fairfax forecasts widely vary, but on average are expected to keep growing at a very high rate.

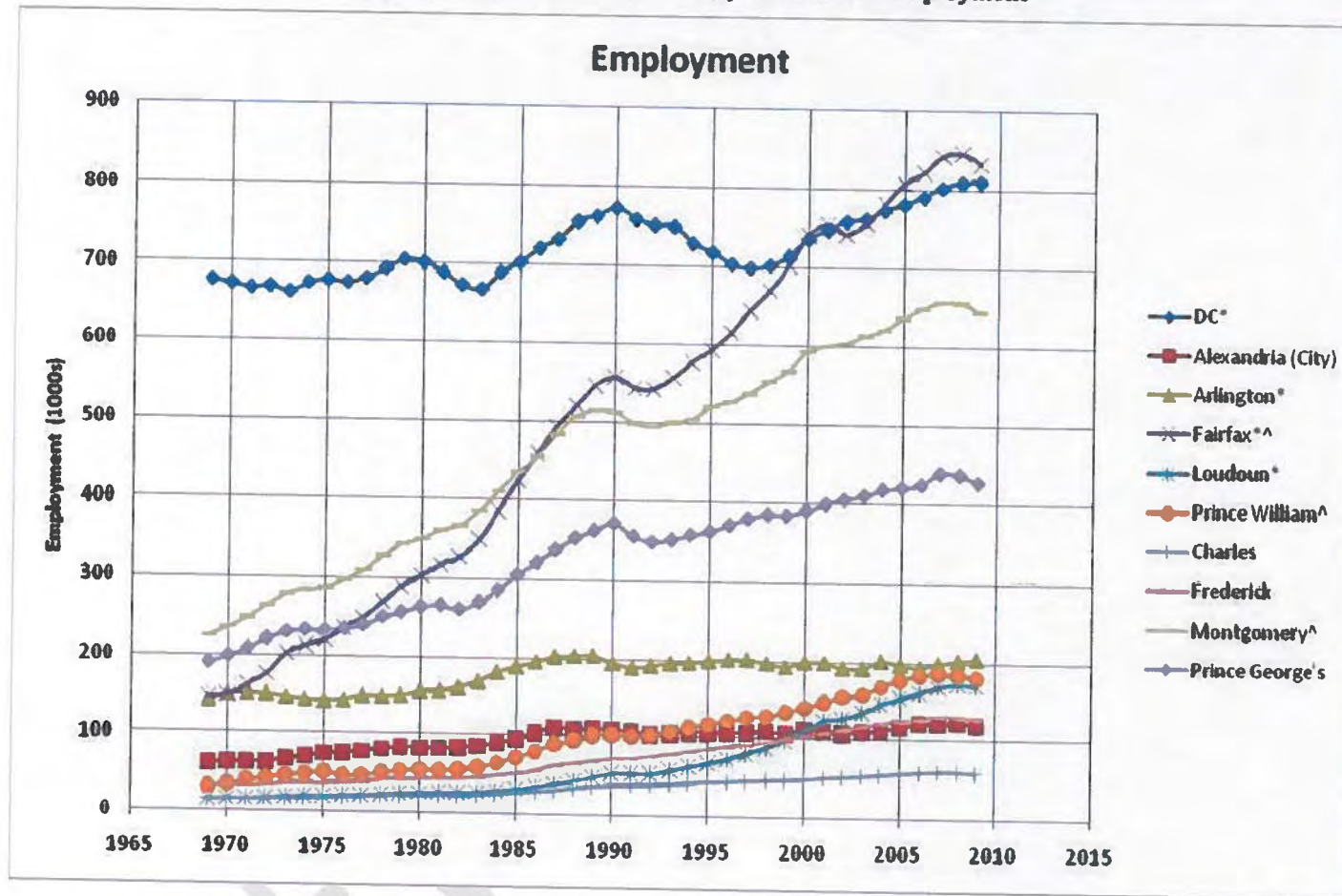
³ * Primary Market Area jurisdiction; ^ Fairfax County includes City of Fairfax and City of Falls Church; Prince William County includes City of Manassas and City of Manassas Park; Montgomery County includes City of Rockville and City of Gaithersburg; Historical population is from US Census.

Employment History and Forecasts

Historical employment estimates and forecasts for future years also were obtained from multiple sources, but comparing these sources required adjustments by Renaissance due to differences in methodology and the definition of “employment” used by each source. Two county-level employment estimates are produced by the federal government: the Quarterly Census of Employment and Wages (QCEW) produced by the US Bureau of Labor Statistics (BLS), and estimates produced by the BEA. The QCEW counts only positions covered by unemployment insurance, meaning that some workers, primarily the self-employed, are excluded. The standard BEA estimates include these “covered” wage and salary positions but also proprietors, which include the self-employed but also business owners and active business partnerships. Thus, the BEA numbers will normally be higher than the QCEW numbers for the same county and year, and they also tend to overstate self-employment due to the inclusion of partnerships. The BEA does report its wage and salary employment estimates separate from proprietors, so those figures were used since they are the most comparable to the QCEW estimates. Both of these sources must then be adjusted upward to account for self-employed workers, to be consistent with the methodology used by MWCOG. This adjustment factor was derived from the 2005-09 American Community Survey (ACS) average of the percentage of self-employed workers across all the counties being studied.

One or both of these two federal sources is the basis for each of the private forecast sources examined for this analysis. Moody’s Analytics uses the QCEW, the State of Maryland and Woods & Poole Economics use the BEA, and EMSI uses both along with other sources in a proprietary method that includes a broader definition of employment than the other sources. After adjusting the BEA-based sources to reflect only wage and salary employment, all of the sources except EMSI were adjusted upward to account for self-employed workers. Employment forecasts by county were not available from the State of Virginia or from the District of Columbia. For a 2010 baseline and any historical comparisons, Renaissance determined that the Moody’s estimates, adjusted upward for self-employed workers, were the preferred source since the methodology and near-term estimates were most consistent with MWCOG’s.

Figure 6 -Bureau of Economic Analysis Historical Employment⁴

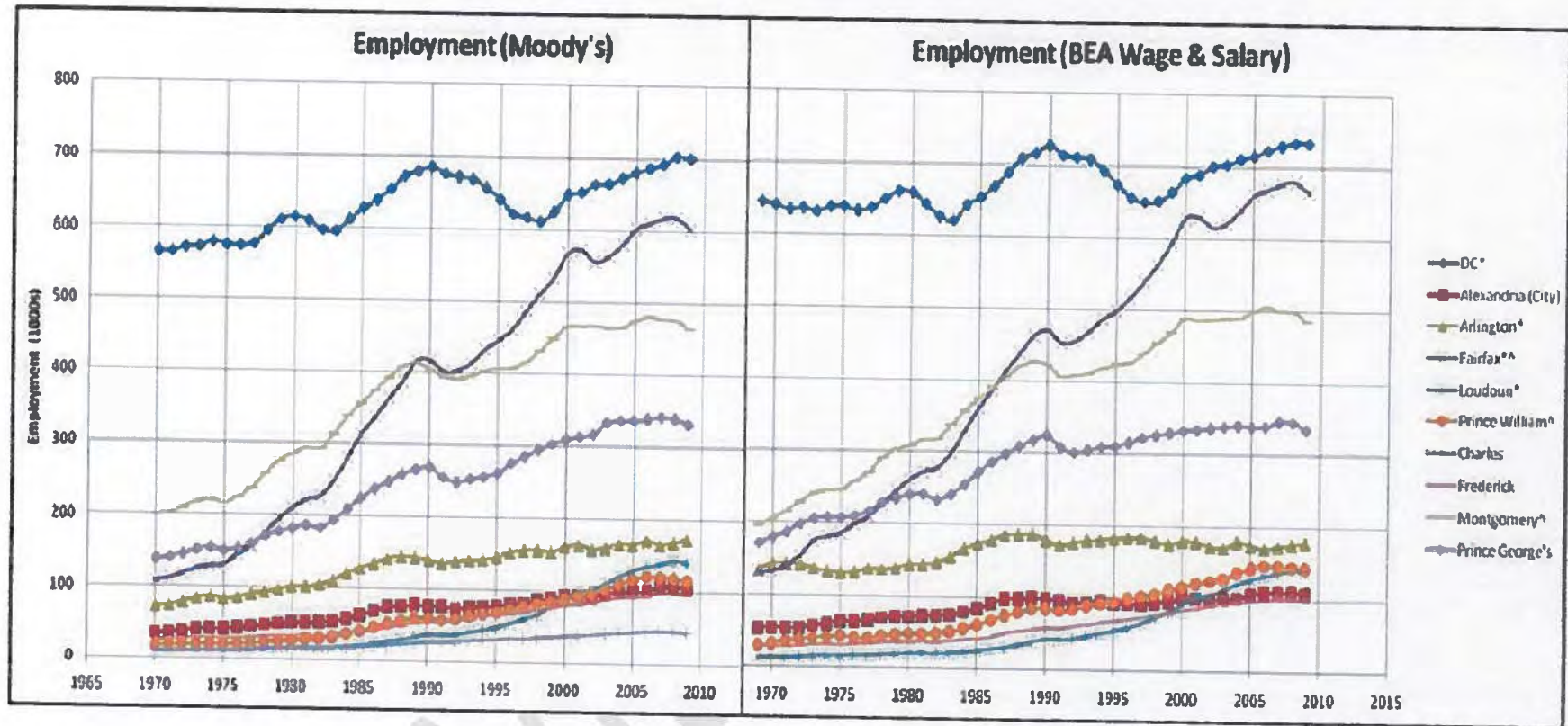


Observations

Fairfax County employment is growing much faster than all other localities. DC employment has fluctuated but on average is slowly continuing to rise. Loudoun County employment is also rising at a higher rate than most other localities.

⁴ * Primary Market Area jurisdiction; ^ Fairfax County includes City of Fairfax and City of Falls Church; Prince William County includes City of Manassas and City of Manassas Park; Montgomery County includes City of Rockville and City of Gaithersburg.

Figure 7 -Comparison of Moody's and Bureau of Economic Analysis Historical Employment⁵

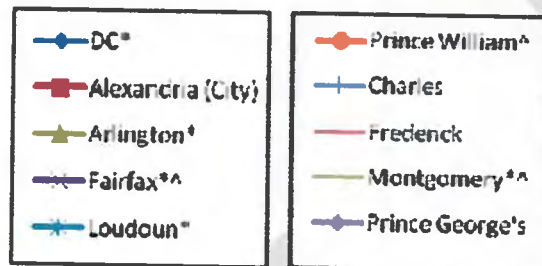
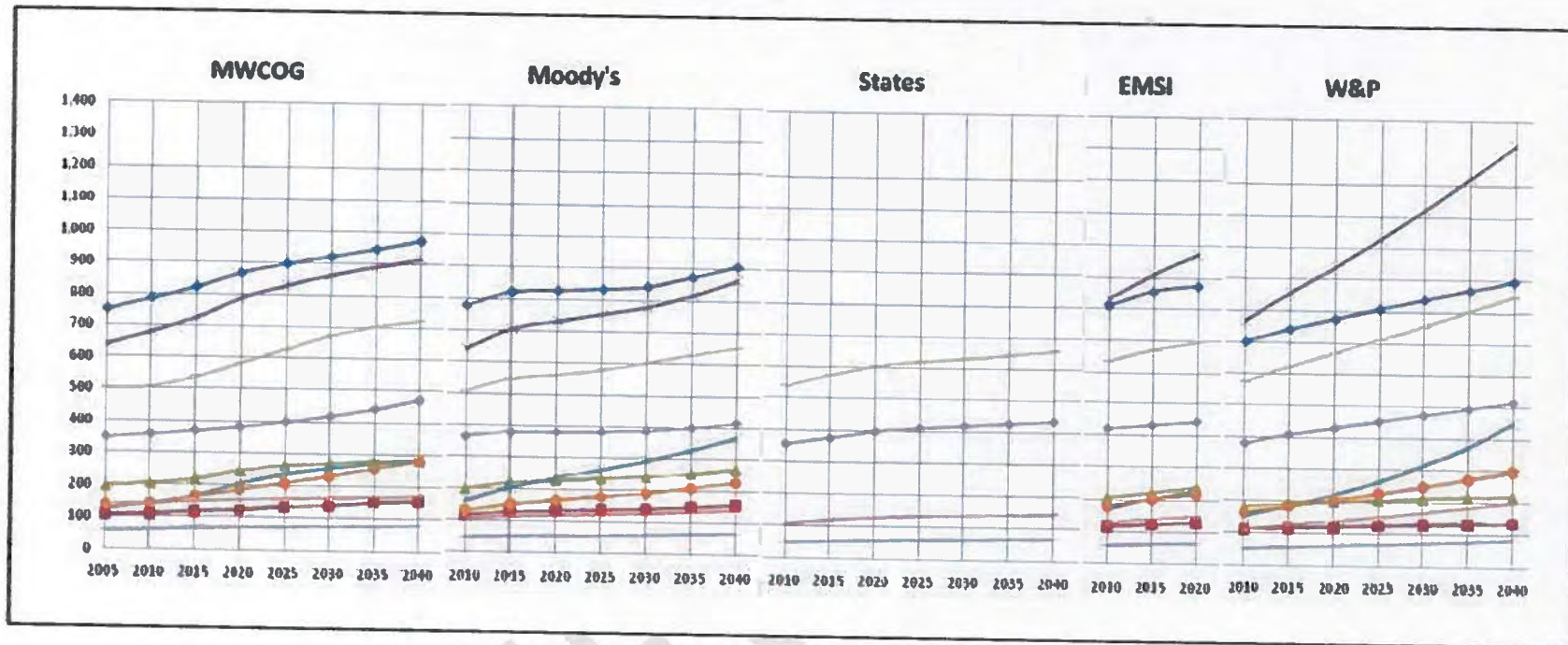


Observations

Moody's and BEA Wage and Salary are comparable sources in terms of methodology (types of jobs included), as opposed to the BEA Total Employment data. BEA total employment data includes proprietors including stock holders and owners of small businesses (e.g. selling beanie babies on e-bay from your basement) as secondary sources of income, whereas the Wage & Salary Data does not include proprietors.

⁵ * Primary Market Area jurisdiction; ^ Fairfax County includes City of Fairfax and City of Falls Church; Prince William County includes City of Manassas and City of Manassas Park; Montgomery County includes City of Rockville and City of Gaithersburg.

Figure 8 - Employment Forecasts from all Sources⁶

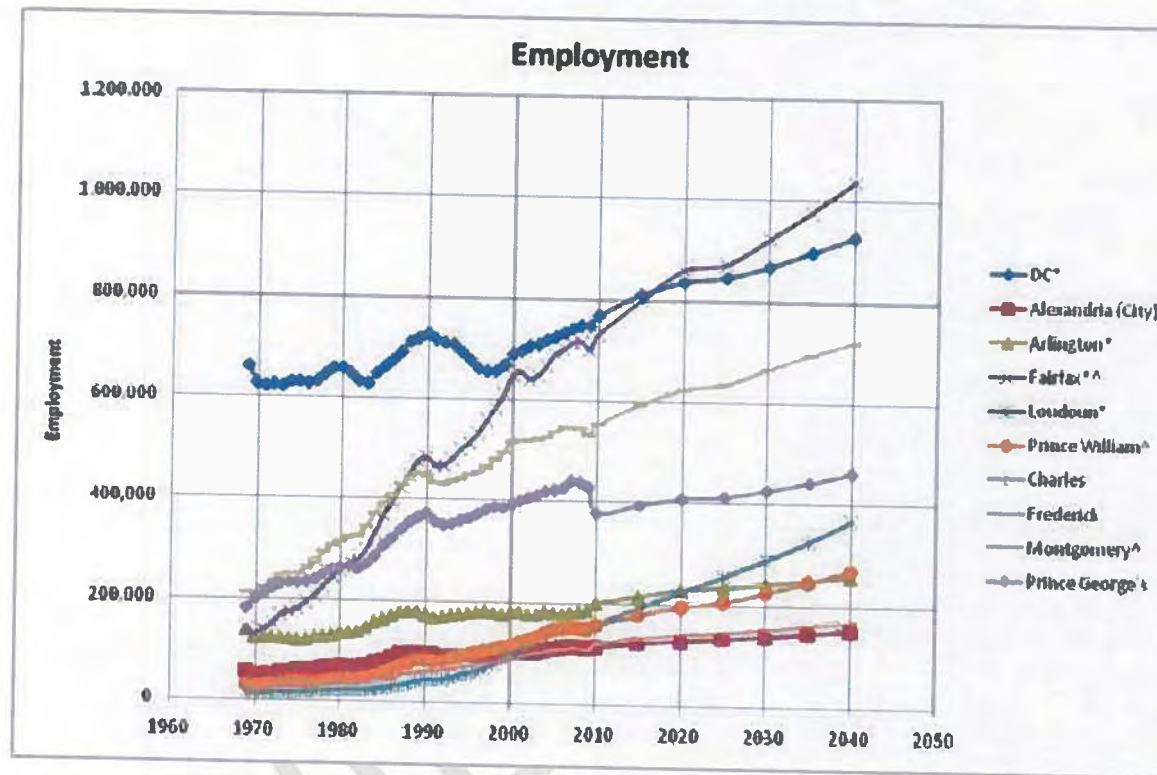


⁶* Primary Market Area jurisdiction; ^ Fairfax County includes City of Fairfax and City of Falls Church; Prince William County includes City of Manassas and City of Manassas Park; Montgomery County includes City of Rockville and City of Gaithersburg; State employment projections for Maryland are provided by the Maryland Department of Planning through the Maryland State Data Center. These values were adjusted to more closely align with the projection methodology of the other sources; other sources were adjusted as well; State employment projections for Virginia and local jurisdiction projections for DC were unavailable.

Observations

- W&P data are generally higher than the other forecasts, especially in Fairfax, Loudoun, Frederick, Prince William, Montgomery, and Prince George's.
- W&P data are significantly (10% or more) lower than average for Arlington from 2020 through 2040.
- Moody's data are generally lower than others, especially in Fairfax, Prince William, Frederick, Montgomery and Prince George's.
- MWCOG forecasts for Frederick are significantly (15% or more) higher than average for 2010 to 2015.
- MWCOG forecasts for Loudoun are significantly (15% or more) lower than average for 2035 to 2040.
- EMSI forecasts for Prince William are significantly (15% or more) higher than average for 2010 and 2015 and slightly higher than average for Fairfax and Montgomery for 2010 through 2020.

Figure 9 -Average Employment Forecasts⁷



Observations

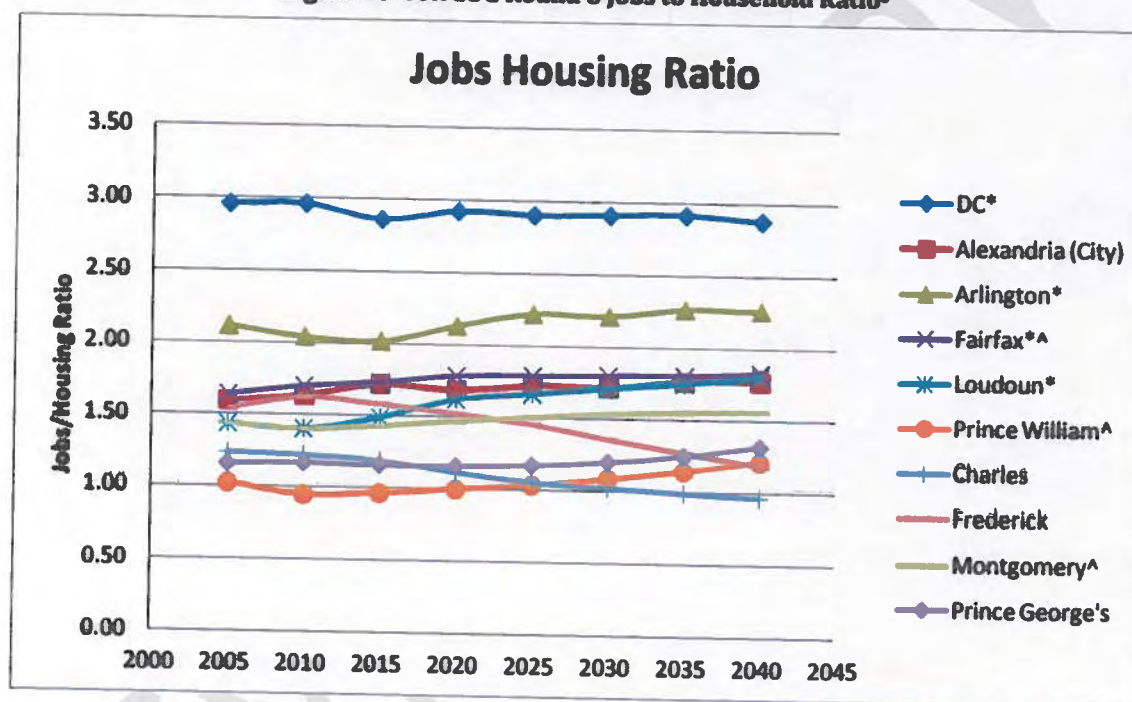
- Similar to the population forecasts, Fairfax and Loudoun County have the highest projected rates of growth. Between 2010 and 2020, the rate of growth for Montgomery County is also high.
- Despite large fluctuations in DC historical employment, DC employment is projected to continue to grow at a significant pace, especially between 2010 and 2020.
- As a result of the averaging methodology, the average employment from all sources of forecasts for most localities in 2010, and in particular Prince George's County, are significantly lower than the 2009 historical data.

⁷ * Primary Market Area jurisdiction; ^ Fairfax County includes City of Fairfax and City of Falls Church; Prince William County includes City of Manassas and City of Manassas Park; Montgomery County includes City of Rockville and City of Gaithersburg.

Jobs to Household Ratio

The jobs to household (J/HH) ratio is an indicator of total economic activity when compared to household and employment forecasts. It is one of the measures used to gain perspective on the type of growth (e.g., suburban residential, mixed suburban and employment center, aging urban, new urban) given knowledge of what is happening on the ground in jurisdictions and sub-markets.

Figure 10 -MWCOG Round 8 Jobs to Household Ratio⁸



Observations

- Frederick J/HH ratio rose from 2005 to 2010, but expected to steadily drop through 2040.
- Prince William J/HH ratio dropped from 2005 to 2010, but expected to steadily rise through 2040.
- Loudoun J/HH ratio expected to rise at a faster rate between 2010 and 2020, than in years further out. This is particularly interesting given the fast rate expected for population. It assumes that households will grow fast in Loudoun, but jobs will grow even faster.

⁸ * Primary Market Area jurisdiction; ^ Fairfax County includes City of Fairfax and City of Falls Church; Prince William County includes City of Manassas and City of Manassas Park; Montgomery County includes City of Rockville and City of Gaithersburg.

Step 4: Macroeconomic Assessment

The Washington DC Metropolitan Area is arguably the strongest regional economy and real estate market in the US. Within the Metropolitan Area the inner core is stable. The Primary Market Area of the Dulles Toll Road has been and is anticipated to be long term preferred growth corridor for the region. Infrastructure investments such as the Metrorail Silver Line will have long term effects on the desirability of the corridor. Washington DC, Alexandria and Arlington all exhibit strength in residential development, employment growth and urban mixed use projects that will increase the density of people and jobs over the long term. Fairfax County has been a primary growth engine within the regional economy. The combined proximity to Washington DC, the strength of job growth in Tysons Corner and the Dulles Toll Road corridor and the overall attractiveness of living there have been contributing factors. Loudoun County is poised for continued residential and employment growth.

Housing Observations

The housing market has proven to be very resilient in the past few years:

- Housing in the region has comparatively high value relative to other regions;
- Housing values did not decline as much as most markets during the Great Recession and thereafter; and
- Sales appear to be rebounding from recent lows.

Foreclosures and negative equity in the region will have a selective impact as strengths and weaknesses are not spread equally across the area:

- Negative equity will discourage some home sales in the short run;
- Foreclosures are affecting different parts of the region to a different degree; and
- Foreclosures are most prevalent in Prince William, Prince George's, and Loudoun Counties.

Excess inventory of vacant homes is relatively manageable:

- Montgomery and Fairfax should recover in 1-2 years;
- Prince George's has dual impact of a large excess inventory and high foreclosure rate, with an anticipated recovery in 3-4 years; and
- The new home construction market is poised for recovery.

Employment Observations

Recent trend and projections show that recovery is already here. The metro area made it through the recession relatively unscathed:

- Total employment has returned to the level seen just before the financial crisis of fall 2008; however
- The Washington DC, and Prince George's to a lesser extent, are exceptions.

The local job market is dominated by professional services and government:

- Professional services jobs have increased over the last four years;
- Primary location of growth for these jobs has been Fairfax, some in DC; other employment centers are stable;
- Local-serving sectors like construction, retail, and real estate have borne the brunt of job losses; and
- Federal civilian employment has grown over the past few years, but it is decentralizing and appears to be reaching a cyclical peak.

Figure 11 - Total Home Sales in Washington, DC Metro Area through June 2011

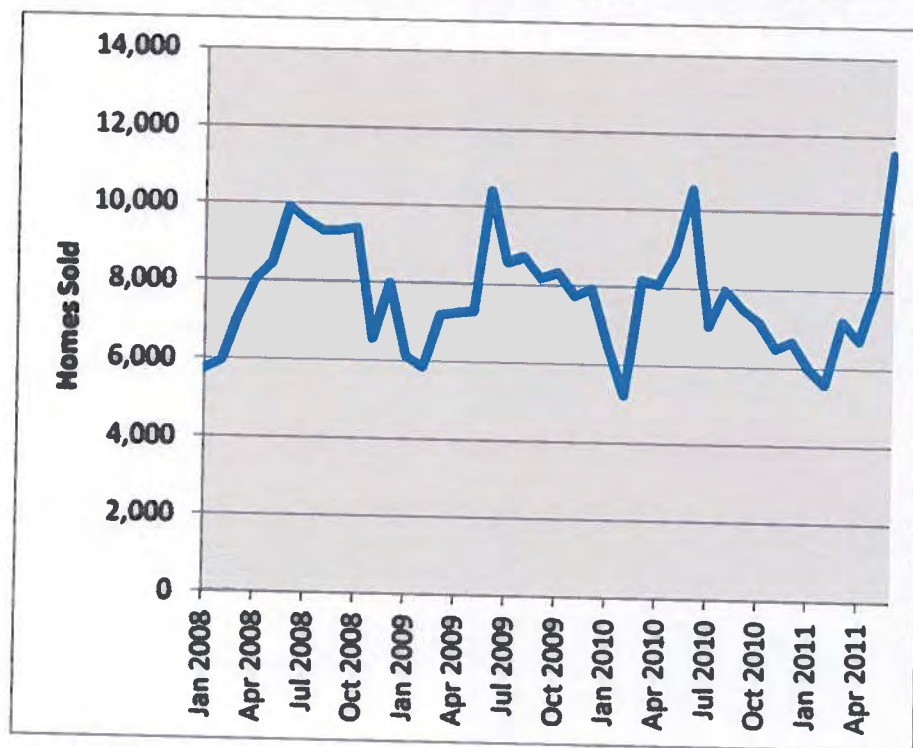
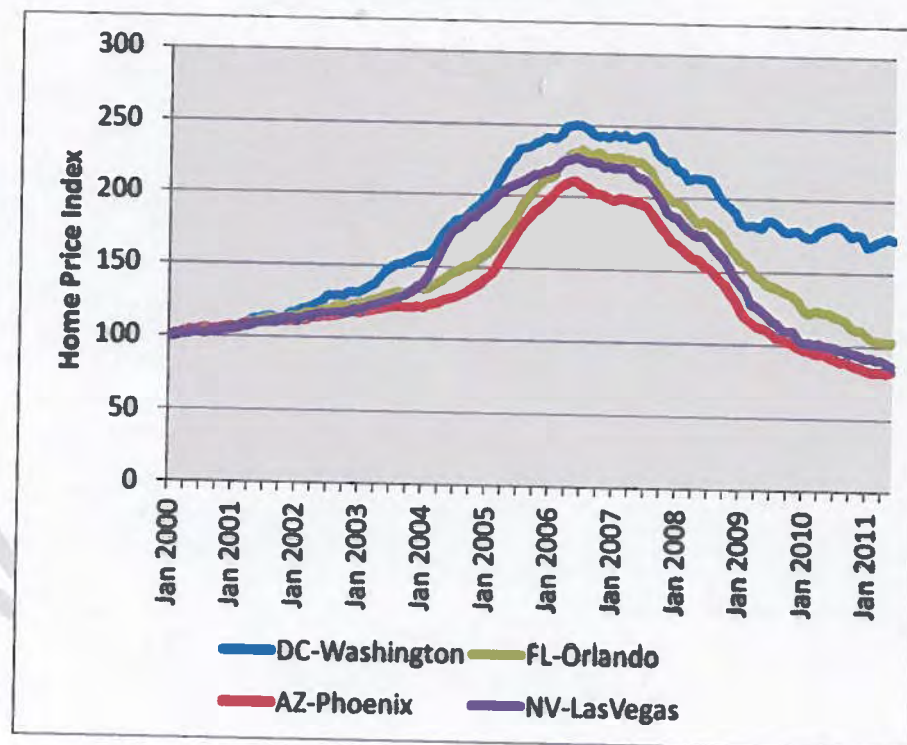


Figure 12 - Recent Home Price Trends



Observations

Sales of existing homes have spiked recently during the Spring selling season, though it remains to be seen if this increase in sales activity will be sustained (Figure 11⁹). Home sales prices in the metro area rose higher and faster than even prominent "bubble" markets during the housing boom of 2004-2006, and since the crash have declined much less, roughly stabilizing at mid-2004 levels (Figure 12¹⁰).

⁹ Total home sales in Washington, DC metro area through June 2011; Source: Zillow.

¹⁰ Repeat home sales index through June 2011; DC market represents the entire MSA, not the project metro area does not include distressed sales; Source: FNC, Inc.

Figure 13 - Table of Housing Markets Ranked by Share of Homes with Negative Equity

Rank	Metro Area	Mortgages	Negative Equity Mortgages	Negative Equity Share
1	Las Vegas-Paradise NV	431,004	283,714	65.8%
2	Phoenix-Mesa-Glendale AZ	937,702	514,522	54.9%
3	Orlando-Kissimmee-Sanford FL	497,769	270,913	54.4%
4	Fort Lauderdale-Pompano Beach-Deerfield Beach FL	430,028	212,606	49.4%
5	Tampa-St. Petersburg-Clearwater FL	665,012	320,162	48.1%
6	Riverside-San Bernardino-Ontario CA	847,626	398,280	47.0%
7	Miami-Miami Beach-Kendall FL	506,249	236,103	46.6%
8	Jacksonville FL	330,664	153,640	46.5%
9	West Palm Beach-Boca Raton-Boynton Beach FL	330,006	141,070	42.7%
10	Warren-Troy-Farmington Hills MI	518,241	217,537	42.0%
11	Sacramento-Arden-Arcade-Roseville CA	488,430	203,818	41.7%
12	Atlanta-Sandy Springs-Marietta GA	1,217,572	422,832	34.7%
13	Oakland-Fremont-Hayward CA	543,433	163,716	30.1%
14	Washington-Arlington-Alexandria DC-VA-MD-WV	986,756	282,916	28.7%
15	San Diego-Carlsbad-San Marcos CA	591,060	168,665	28.5%
16	Cleveland-Elyria-Mentor OH	480,809	131,213	27.3%
17	Chicago-Joliet-Naperville IL	1,540,601	388,017	25.2%
18	Virginia Beach-Norfolk-Newport News VA-NC	333,025	80,150	24.1%
19	Los Angeles-Long Beach-Glendale CA	1,535,429	365,128	23.8%
20	Denver-Aurora-Broomfield CO	631,852	141,673	22.4%

Observations

Even with this market resiliency, underwater mortgages and foreclosures will be a drag on the housing market in the near term. (Figure 13¹¹)

¹¹ Negative equity share rank out of the 50 markets with >50,000 mortgages; Source: CoreLogic 1Q 2011 report.

Figure 14 – Foreclosure Activity by Metropolitan Area Jurisdiction

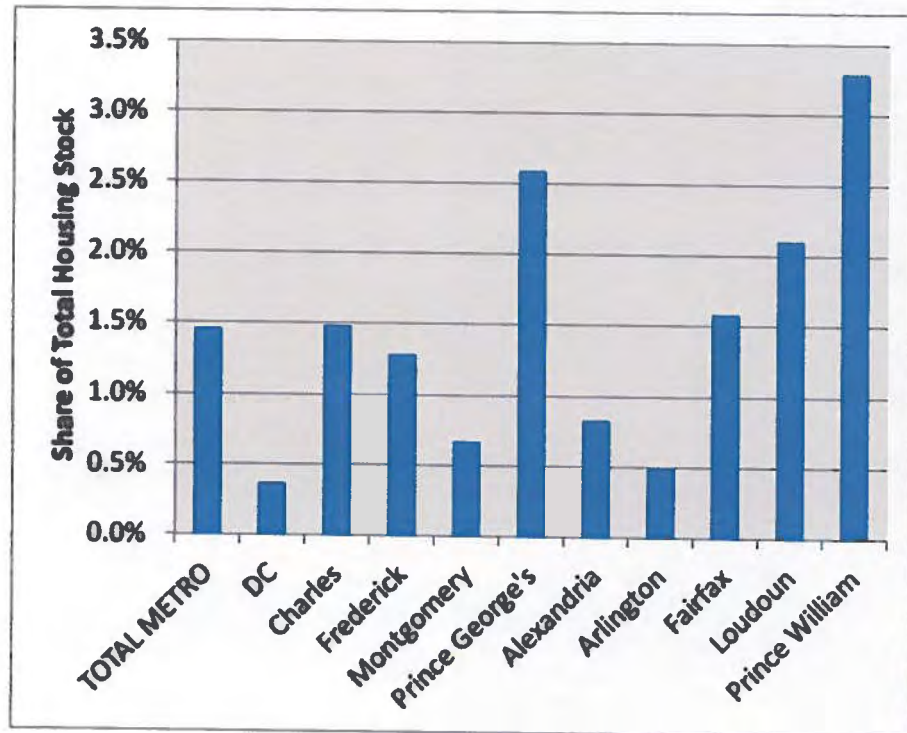
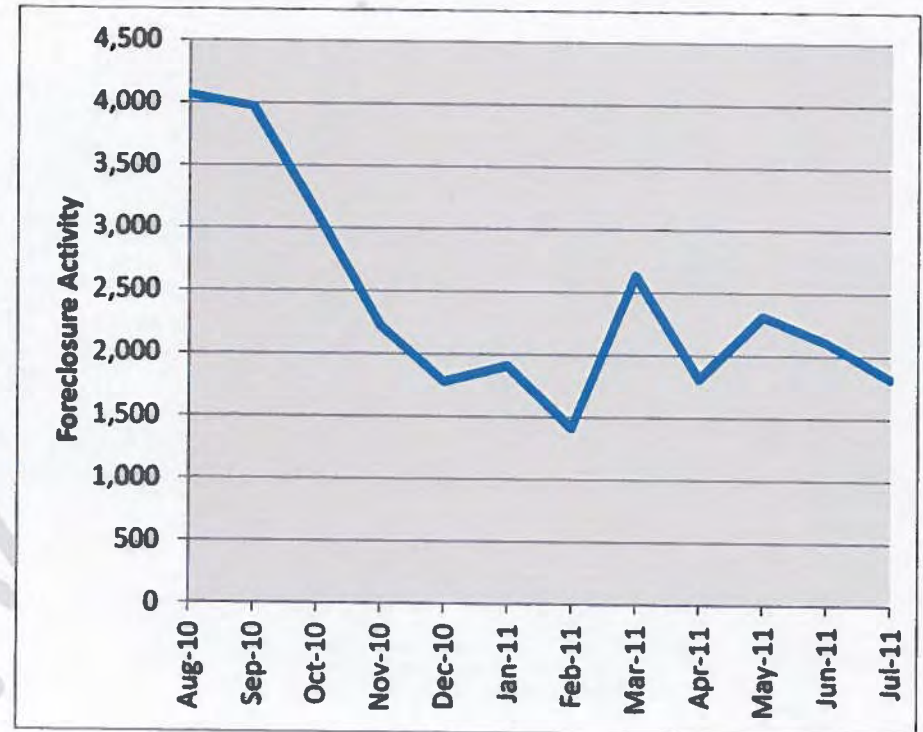


Figure 15 – Washington DC Metropolitan Area Foreclosure Activity



Observations

New foreclosure activity has decreased in the past year, but could ramp up again. Foreclosures have been less prevalent in the primary market area than in some of the peripheral counties of the metro area (Figure 14¹²)(Figure 15¹³).

¹² Foreclosure activity in the past year – share of total housing stock; Source: RealtyTrac and 2010 Census.

¹³ Source: RealtyTrac.

Figure 16 - New Home Construction in Metropolitan Area

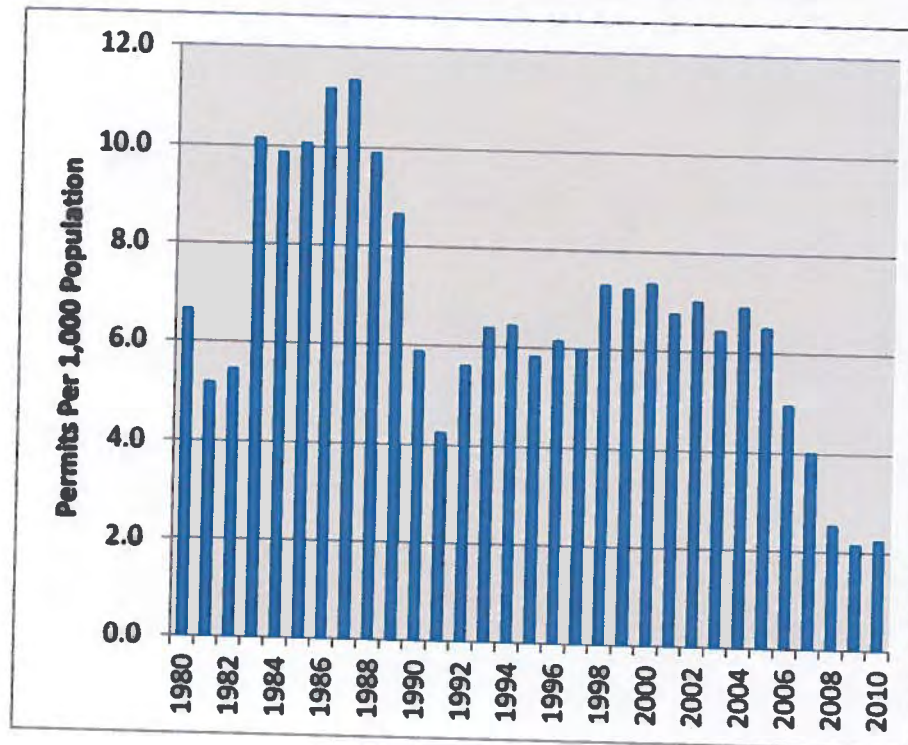
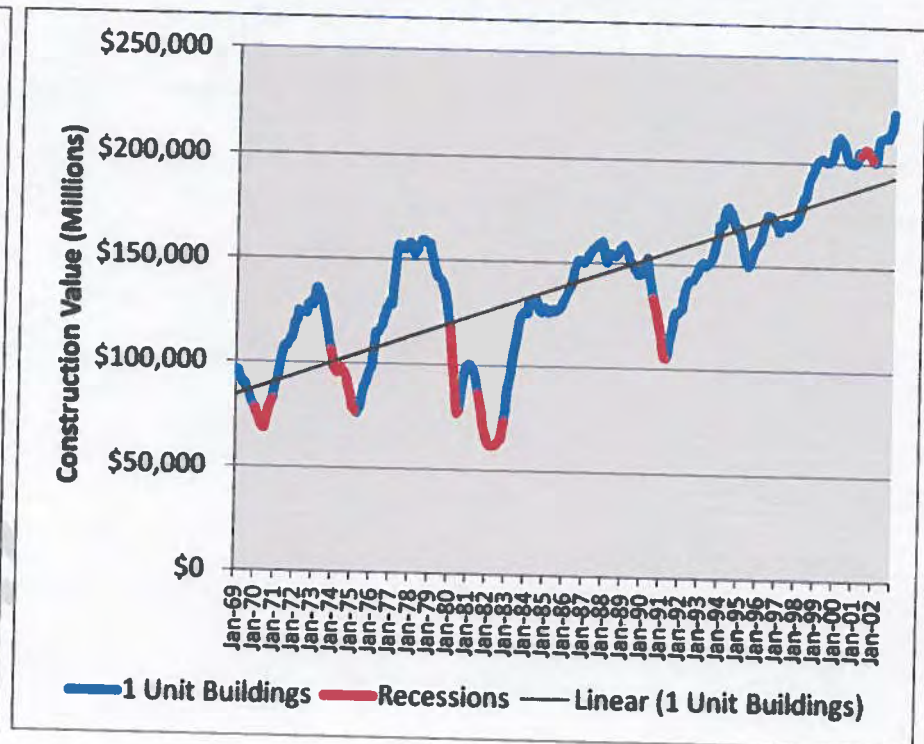


Figure 17 - Construction Value Relative to Recessions



Observations

New home construction activity is at a 30-year low relative to population (Figure 16¹⁴). Residential investment is a key metric in tracking economic recessions and recoveries. While a recovery in the housing market in itself will be a positive development for the regional economy, it is also critical to an overall economic recovery. This is demonstrated in Figure 17¹⁵, which tracks construction spending on single-family homes (in constant dollars) and official US recessions from 1969-2002. Looking at the historical trends shown in the graph, each stage of the cycle – expansion, contraction, or stabilization – typically averages around 20 months in duration.

¹⁴ Metro area residential building permits-population index; Source: US Census Bureau and Renaissance Planning Group.

¹⁵ US private residential construction spending in constant 1996 dollars; Source: US Census Bureau and National Bureau of Economic Research.

Figure 18 - Comparison of Residential Construction in US and Metropolitan Area

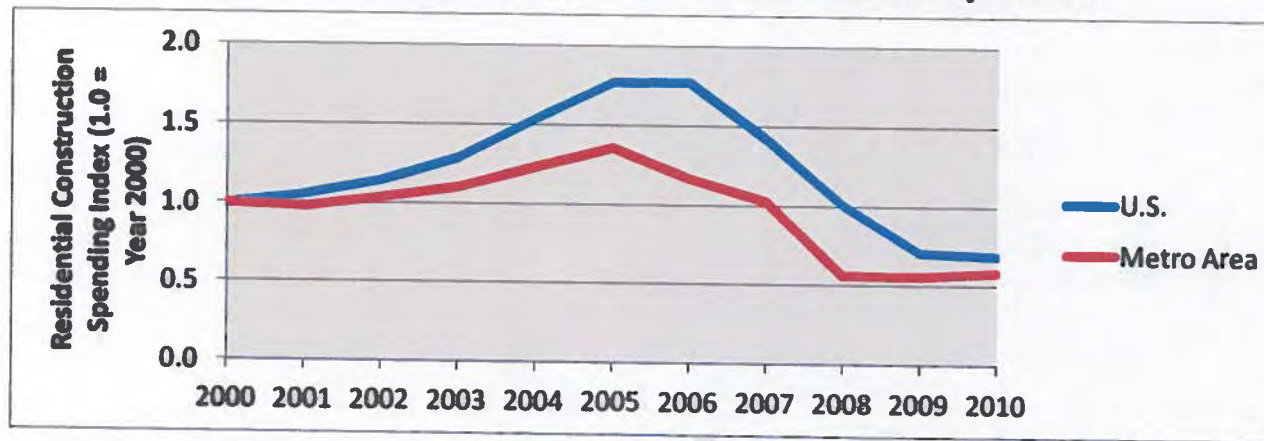


Figure 19 - Table of New Construction Activity by Metropolitan Area Jurisdiction

County	Low	High	Median	2010	2010 % Chg from High	2010 % Chg from Median
DC	0.0	4.9	1.0	1.2	-75%	22%
Charles	3.9	18.9	9.8	3.9	-79%	-60%
Frederick	2.7	19.4	10.2	4.0	-79%	-60%
Montgomery	0.9	17.7	4.9	2.0	-89%	-60%
Prince George's	0.8	8.2	4.3	0.8	-90%	-81%
Alexandria	0.0	3.3	0.1	3.3	0%	2,545%
Arlington	0.0	14.8	4.2	4.2	-71%	0%
Fairfax	0.7	18.3	7.4	0.8	-95%	-89%
Loudoun	5.9	38.4	24.7	6.5	-83%	-74%
Prince William	4.7	32.5	10.2	4.7	-85%	-54%

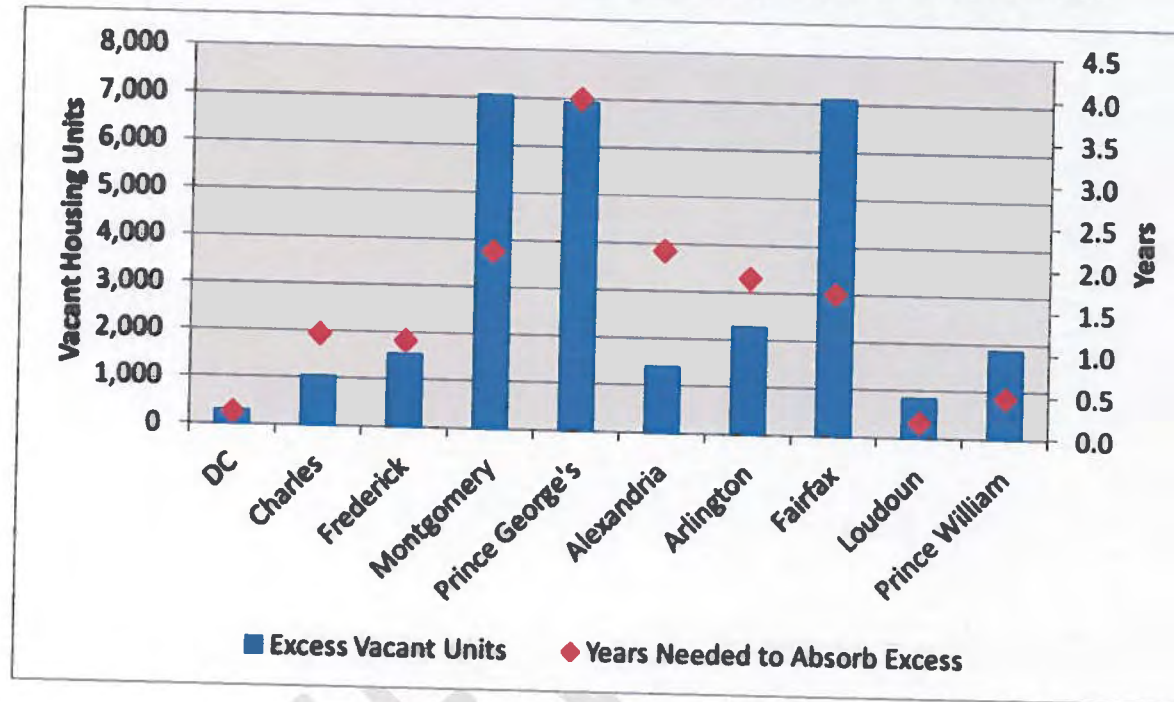
Observations

Residential construction spending in the metro area bottomed out one year before the nation as a whole (Figure 18¹⁶), potentially setting the stage for an earlier recovery. Arlington and DC peaked the highest, at 6.4 and 5.3, respectively. No other individual county peaked at higher than 2.0. The inner core jurisdictions are showing some signs of life most likely due to multi-family development (Figure 19¹⁷). The 2010% change from median column shows Washington DC, Alexandria and Arlington are in the strongest position relative to historical levels of new residential construction.

¹⁶ Private residential construction spending index; Source: US Census Bureau and Renaissance Planning Group.

¹⁷ Residential building permits-population index by county, 1980-2010; Source: US Census Bureau and Renaissance Planning Group.

Figure 20 –Excess Housing Inventory and Absorption by Metropolitan Area Jurisdictions



Observations

Full recovery of the housing market is dependent on clearing the excess inventory of vacant homes. A rough estimate shows that at historical absorption rates the metro area overall, and the primary market area in particular, should accomplish this within 1-2 years, which is a relatively manageable time frame compared to other markets (Figure 20¹⁸). For the overall metro area, the estimated excess units are approximately 29,000. The absorption timeframe for that excess inventory is approximately 1.2 years.

¹⁸ Current excess vacant housing units and time needed to absorb them; Source: 2000 and 2010 Censuses, Renaissance Planning Group.

Figure 21 - Unemployment Rate for Metropolitan Area

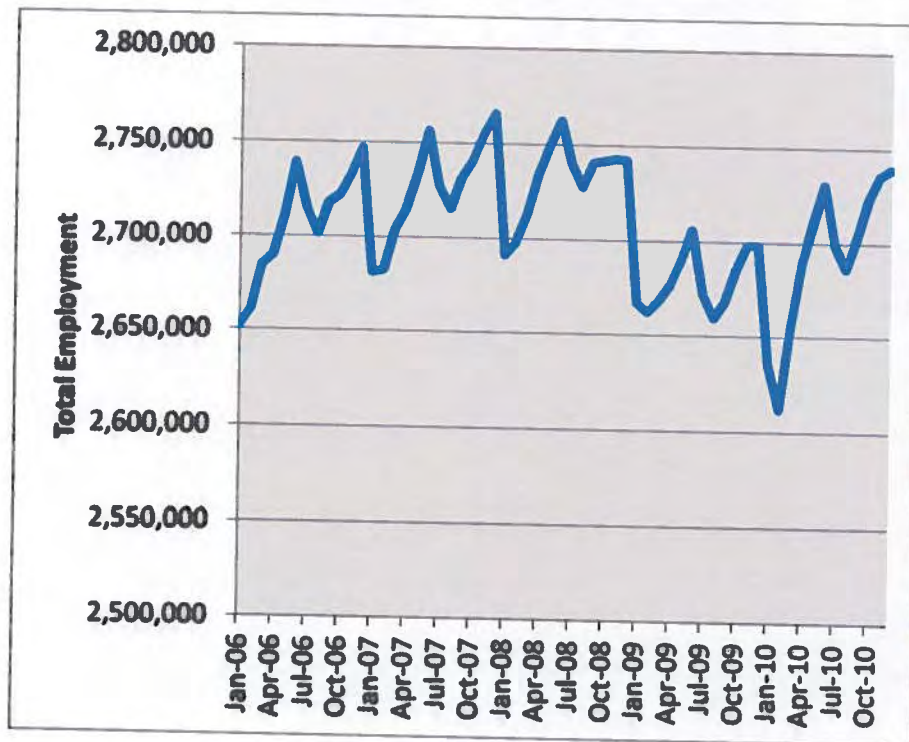
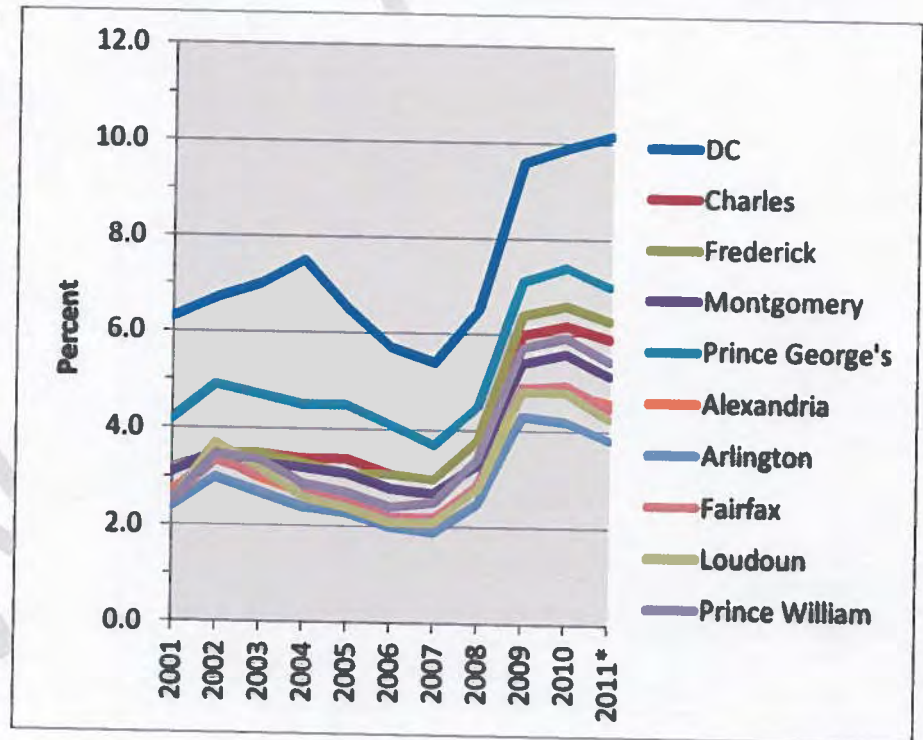


Figure 22 - Unemployment Rate by Metropolitan Area Jurisdiction



Observations

The metro area has weathered the Great Recession relatively unscathed. On a monthly basis, total employment has returned to the level seen just before the financial crisis of fall 2008 (Figure 21¹⁹). Unemployment has increased, but in nearly all of the jurisdictions that peak was around six percent at most (Figure 22²⁰). The exceptions are the District of Columbia and Prince George's County.

¹⁹ Monthly total employment in the metro area; NSA; Source: US Bureau of Labor Statistics (QCEW).

²⁰ Annual employment rate, NSA; 2011 is the average through June; Source: US Bureau of Labor Statistics.

Figure 23 – Table of Metropolitan Employment by Industry 2007 and 2011

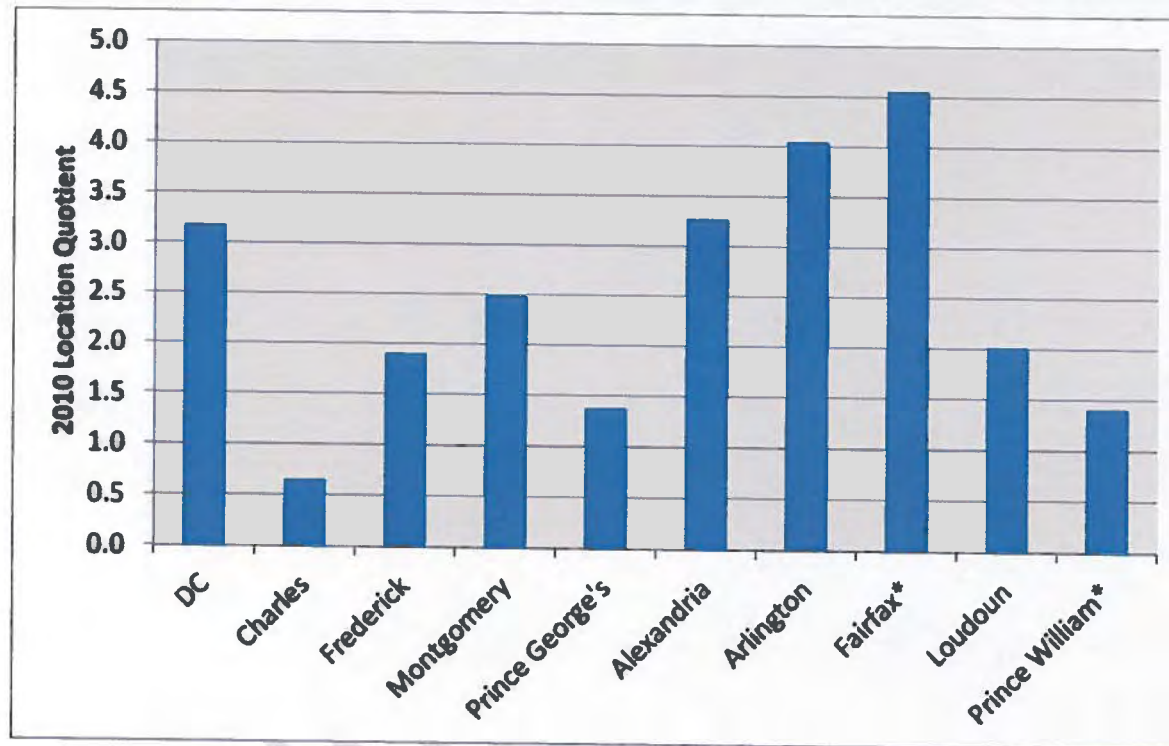
NAICS	Description	2007 Jobs	2011 Jobs	Change	% Change
23	Construction	224,964	181,867	(43,097)	-19%
51	Information	107,942	90,434	(17,508)	-16%
44-45	Retail Trade	288,335	271,737	(16,598)	-6%
53	Real Estate and Rental and Leasing	164,947	155,244	(9,703)	-6%
31-33	Manufacturing	61,435	54,137	(7,298)	-12%
42	Wholesale Trade	71,147	65,135	(6,012)	-8%
48-49	Transportation and Warehousing	96,202	90,802	(5,400)	-6%
56	Administrative & Support and Waste Management & Remediation Services	232,940	227,645	(5,295)	-2%
22	Utilities	7,540	6,514	(1,026)	-14%
55	Management of Companies and Enterprises	39,922	39,592	(330)	-1%
11	Agriculture, Forestry, Fishing and Hunting	7,376	7,096	(280)	-4%
52	Finance and Insurance	132,557	133,182	625	0%
71	Arts, Entertainment, and Recreation	68,848	69,941	1,093	2%
81	Other Services (except Public Administration)	215,974	217,318	1,344	1%
21	Mining, Quarrying, and Oil and Gas Extraction	1,843	3,205	1,362	74%
72	Accommodation and Food Services	213,890	218,785	4,895	2%
61	Educational Services	104,712	112,005	7,293	7%
62	Health Care and Social Assistance	274,405	300,682	26,277	10%
54	Professional, Scientific, and Technical Services	573,930	606,448	32,518	6%
90	Government	679,333	721,725	42,392	6%
	Total	3,568,242	3,573,496	5,254	0%

Observations

However, the strength in employment is not evenly spread across industries and jurisdictions. While total employment has shown a small net increase from 2007-2011, over 43,000 construction jobs, over 17,000 information jobs (telecommunications, publishing, etc.), over 16,000 retail jobs, and almost 10,000 real estate jobs have been lost in that timeframe. Meanwhile, the government sector has added over 42,000 jobs, professional services has added over 32,000 jobs, and health care has added over 26,000 jobs (Figure 23²¹).

²¹ Metro area employment by industry; 2007 & 2011 – sorted by change; Source: EMSI.

Figure 24 – 2010 Location Quotients for Professional and Technical Services by Metropolitan Area Jurisdictions



Observations

The metro area overall is highly specialized in the professional and technical services sector, and that specialization is focused within the primary study area (Figure 24²²). A location quotient of 1.0 is equal to the level of concentration in the US overall. Key industry sector concentrations in the Metropolitan Region besides professional services include:

NAICS 23 Construction - 2 times or more the national mix in Prince George's, Loudoun, and Prince William and close to 2 times in Charles (1.95) and Frederick (1.85)

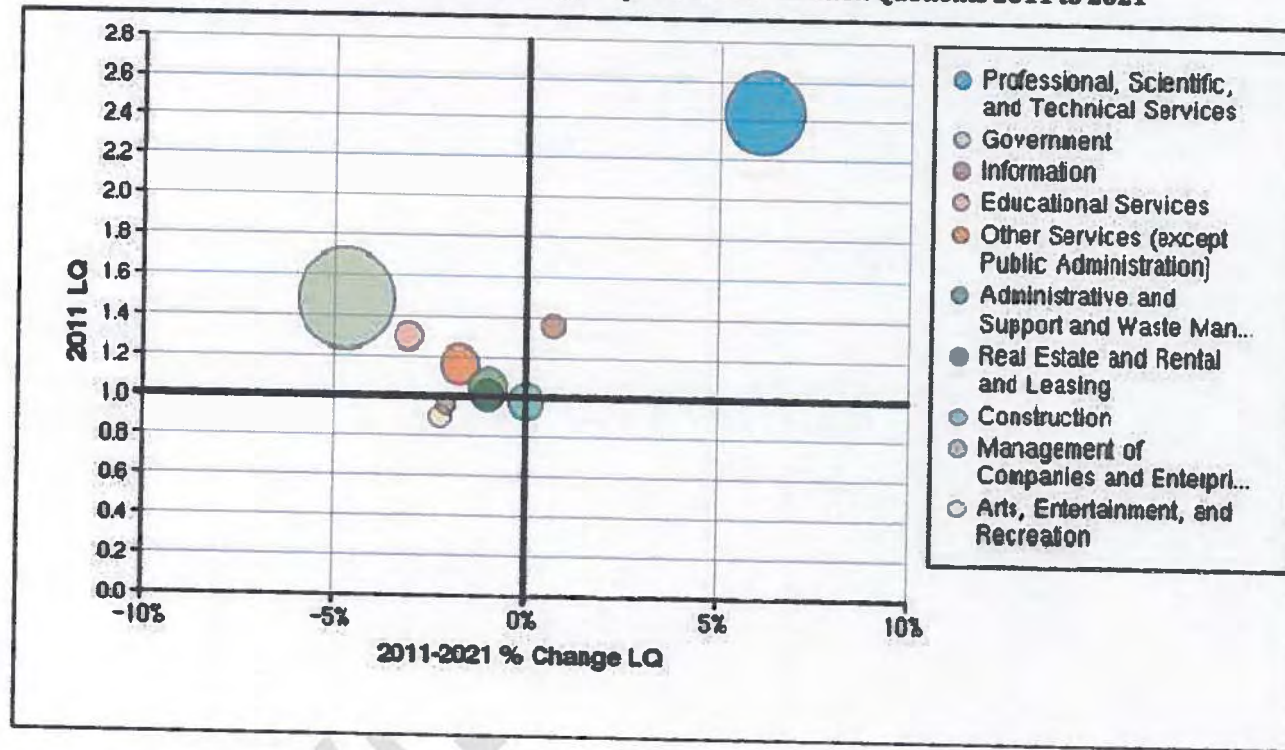
NAICS 61 Educational Services - DC (3.6) and Arlington (2.2)

NAICS 81 Other Services, Except Public Administration - More than 3 times the national mix in DC and Alexandria, 2 times the national mix in Arlington

Other Key Sector Concentrations in Specific Counties - Loudoun: Information (2.5) and Transportation (2.3); Charles: Retail Trade (2.0)

²² 2010 Location quotient for NAICS 54 Professional & Technical Services; * Fairfax and Prince William do not include independent cities; Source: US Bureau of Labor Statistics.

Figure 25 - Projected Change in Metropolitan Area Location Quotients 2011 to 2021



Observations

This specialization is projected to increase (Figure 25²³), and should reinforce Fairfax County's position as the engine of growth in the metro area (Figure 26²⁴)(Figure 27²⁵).

²³ Projected change in metro area location quotients, 2011-2021; Size of bubble represents the number of jobs in the sector; Source: EMSI.

²⁴ Projected metro area job growth by 3-digit NAICS code, 2011-2021; Shows top 10 sectors; Source: EMSI.

²⁵ Annual employment in NAICS 54 Professional & Technical Services; Source: US Bureau of Labor Statistics (QCEW).

Figure 26 - Table of Professional Services Jobs Forecast 2011 and 2021

NAICS	Description	2011 Jobs	2021 Jobs	Change	% Change
541	Professional, Scientific, and Technical Services	606,448	780,674	174,226	29%
561	Administrative and Support Services	221,426	261,499	40,073	18%
621	Ambulatory Health Care Services	123,887	156,219	32,332	26%
531	Real Estate	144,994	174,666	29,672	20%
930	Local Government	235,739	255,882	20,143	9%
611	Educational Services	112,005	132,007	20,002	18%
722	Food Services and Drinking Places	179,320	196,826	17,506	10%
523	Securities, Commodity Contracts, and Other Financial	48,172	64,379	16,207	34%
238	Specialty Trade Contractors	124,171	138,113	13,942	11%
624	Social Assistance	64,731	77,529	12,798	20%

Figure 27 - Professional Services by Metropolitan Area Jurisdiction

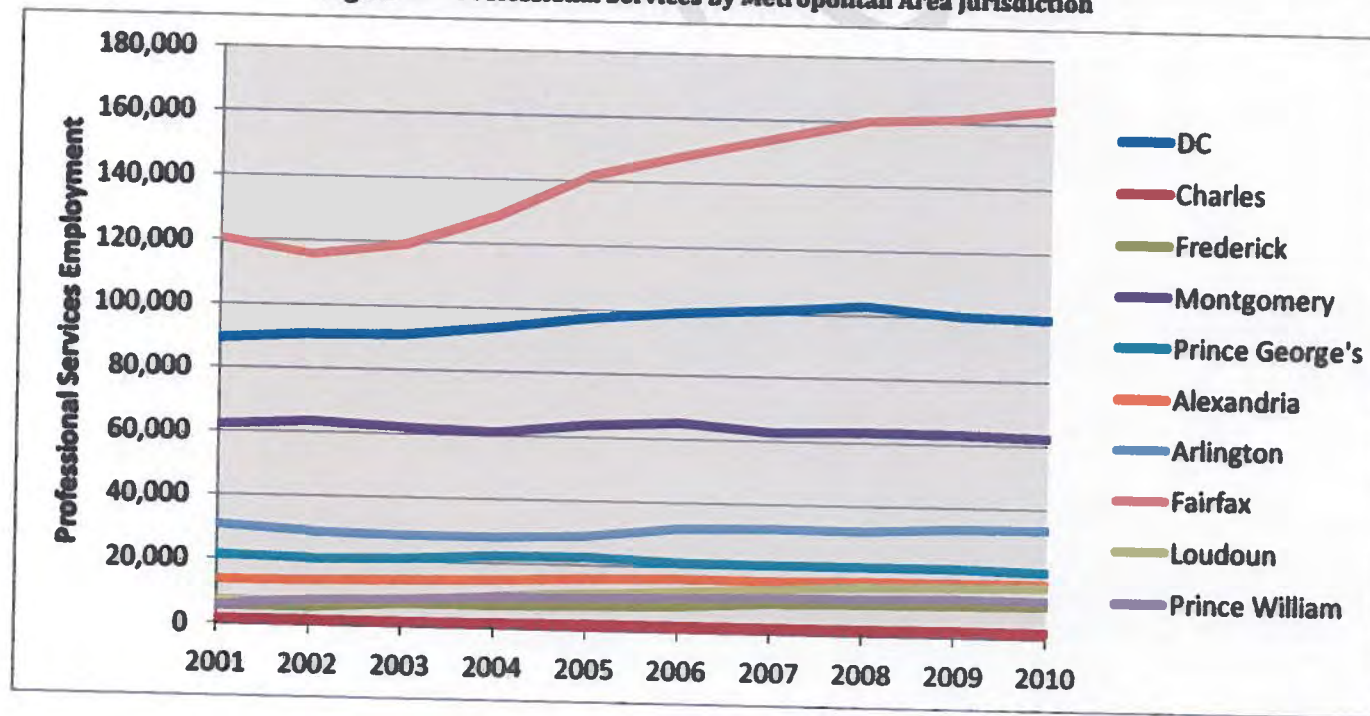


Figure 28 - Historical Federal Civilian Employment in Metropolitan Area

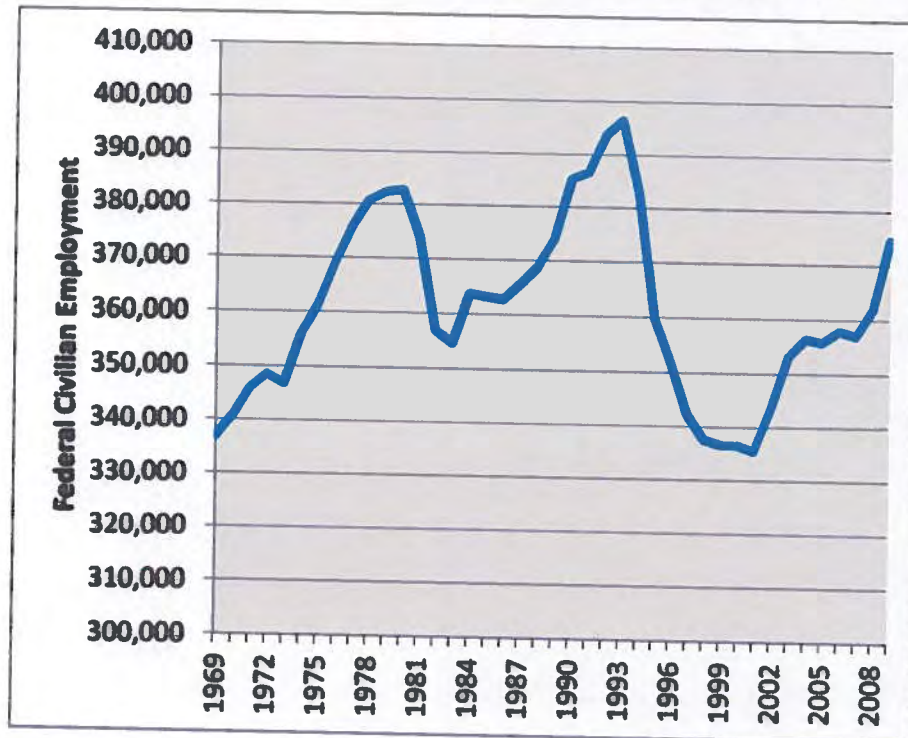
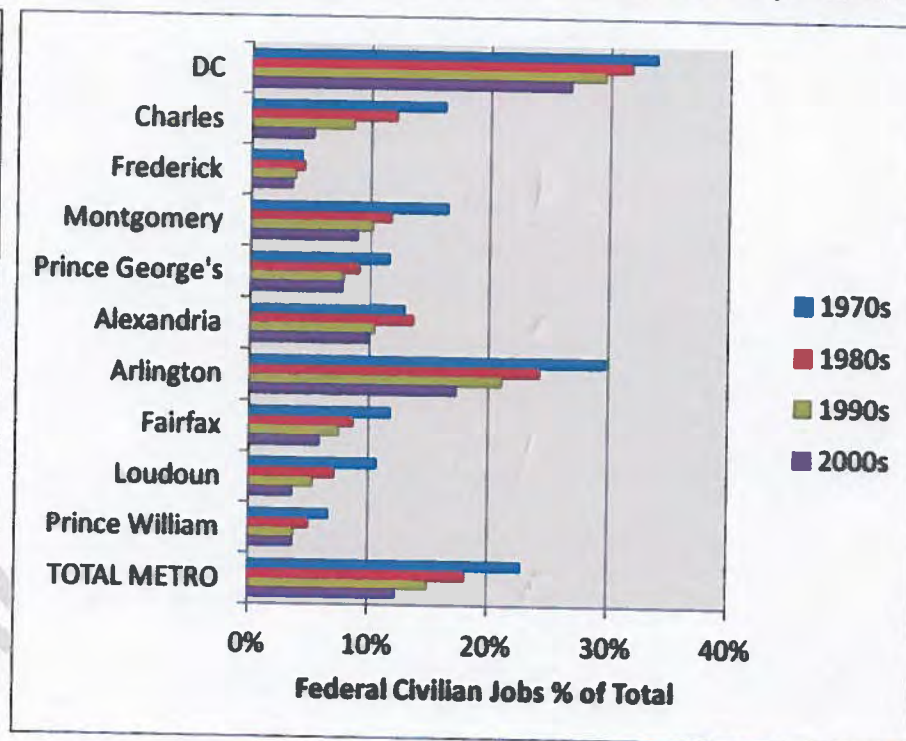


Figure 29 - Federal Share of Employment by Metropolitan Area Jurisdiction



Observations

Federal civilian employment in the metro area is approaching another historical peak (Figure 28²⁶). Even though the proportion of federal employment has declined significantly as the metro economy has grown (Figure 29²⁷), the possible local economic implications of federal budget decisions are another key question to consider.

²⁶ Source: US Bureau of Economic Analysis.

²⁷ Source: US Bureau of Economic Analysis.

Figure 31 - Historical Average Federal Civilian Employment by Metropolitan Area Jurisdictions

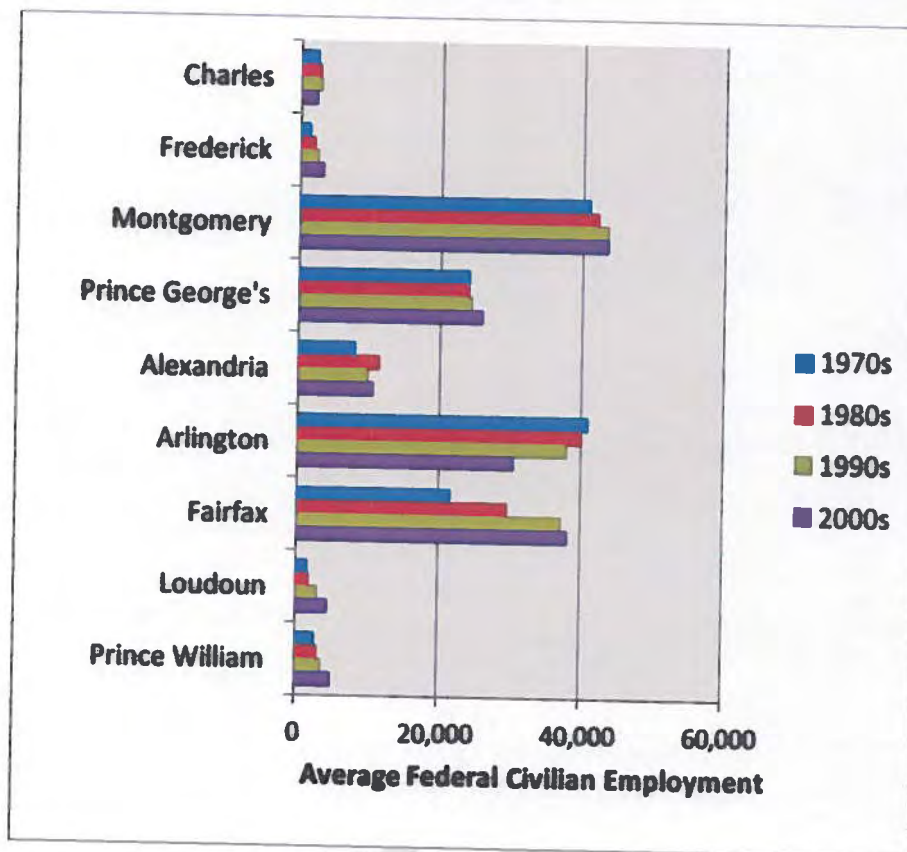
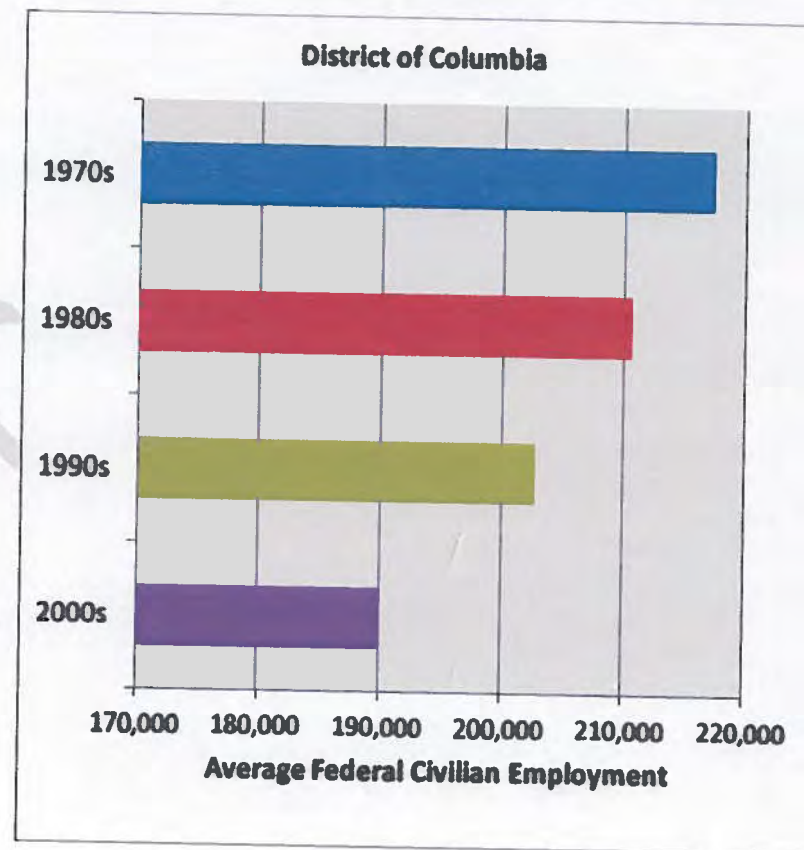


Figure 30 - Historical Average Federal Civilian Employment in Washington DC



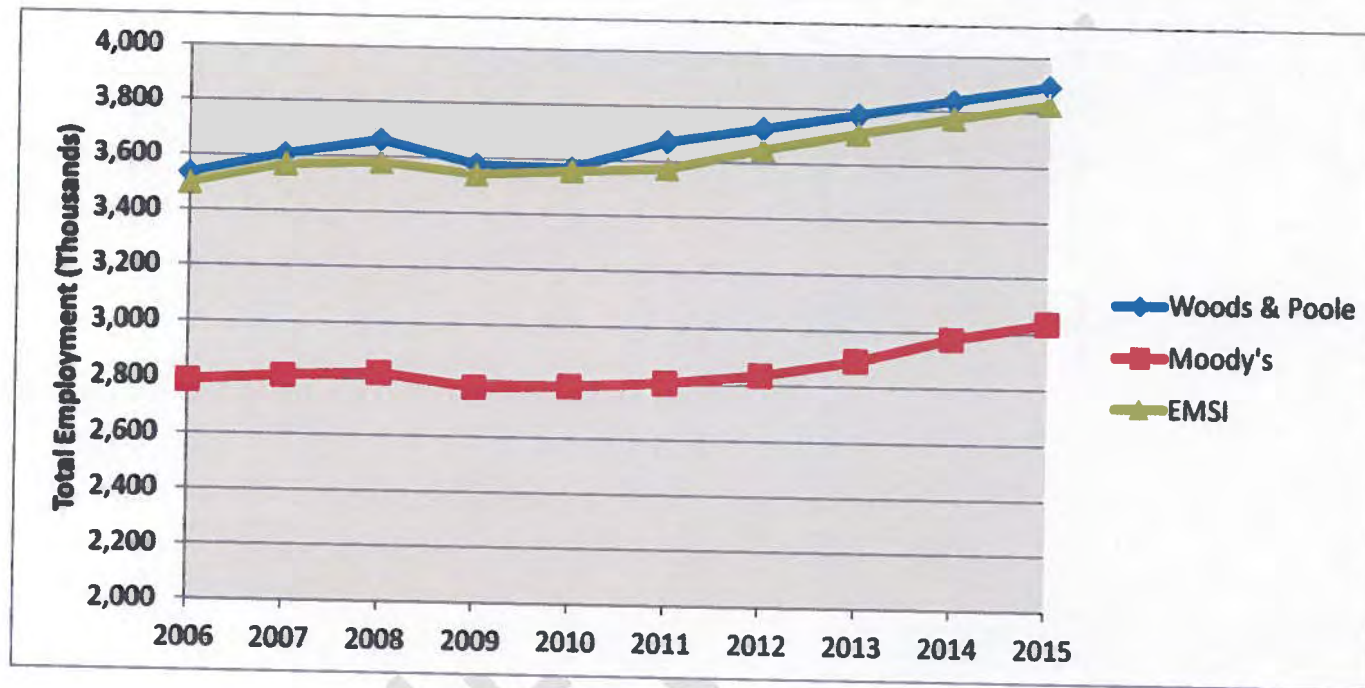
Observations

Employment continues to decentralize from the District of Columbia (Figure 31²⁸)(Figure 30²⁹). DC is shown on a separate chart in order to show the change in the smaller counties.

²⁸ Average federal civilian employment by decade; Source: US Bureau of Economic Analysis.

²⁹ Average federal civilian employment by decade; Source: US Bureau of Economic Analysis.

Figure 32 – Total Metropolitan Area Employment Forecasts 2006 to 2015



Observations

All told, the effects of the Great Recession on the metro area have been relatively mild, and total employment is estimated to have returned the level seen prior to the start of the downturn (Figure 32³⁰). The three data sources estimate employment through different methods, so the numerical amounts are not directly comparable. The primary market area is the center of economic strength of what probably is the strongest regional economy in the nation at the current time.

The development of the land use forecasts will incorporate the findings to date and use our analysis of parcel level data, current and evolving land use planning and policy in the primary market area, and applied knowledge of both national and regional trends to address the key questions raised by this review.

³⁰ Total metro area employment, 2006-2015; Source: Woods & Poole Economics, Moody's Analytics, and EMSI.

Step 5: New 2010 Baseline

The 2010 Census results were made available prior to this assessment, but after the latest round of updates to the MWCOG population forecasts. The release of this information provides the opportunity to establish a new, Census-validated 2010 baseline to support travel demand forecasting. The 2010 Census results were compared to the 2010 MWCOG population and household forecasts. The results of the population comparison at the jurisdictional level showed the two sources are relatively consistent (Figure 33). We also completed a comparison of TAZs and traffic analysis districts (TAD) to the 2010 Census block level data. These findings are mapped in Figure 34 and Figure 35 and show there are inconsistencies within sub-areas that warranted further study and adjustment. On the maps, red indicates where MWCOG totals are higher than Census and blue indicates where Census is higher than MWCOG. For the adjustment to create the new 2010 baseline, we applied multiplicative factors at the TAD level to adjust each TAZ's 2010 population and 2010 housing. The difference between the MWCOG 2010 population and the new 2010 baseline is shown in Figure 36.

The new 2010 baseline for employment was undertaken by comparing the existing MWCOG employment forecasts for 2010 to MWCOG's Pseudo Round 8 revisions for each jurisdiction.³¹ For the adjustment to create the new 2010 employment baseline, we applied multiplicative factors at the jurisdictional level to adjust each TAZ's ORIO job totals. This included adjusting total jobs and the distribution of ORIO job types within each TAZ. The difference between the MWCOG 2010 population and the new 2010 baseline is shown in Figure 37.

For both population and employment, we concluded that the corrective trends reflect recessionary trends that will return to the prior MWCOG trend line over time, with the expectation that economic slowdown exists through 2017 and another 10-13 years of recovery will be required to regain forecast trends:

- More households and lower population than estimated in DC and inner suburbs;
- More population, fewer households in outer suburbs; and
- A slightly higher proportion of office jobs and lower proportion of retail jobs.

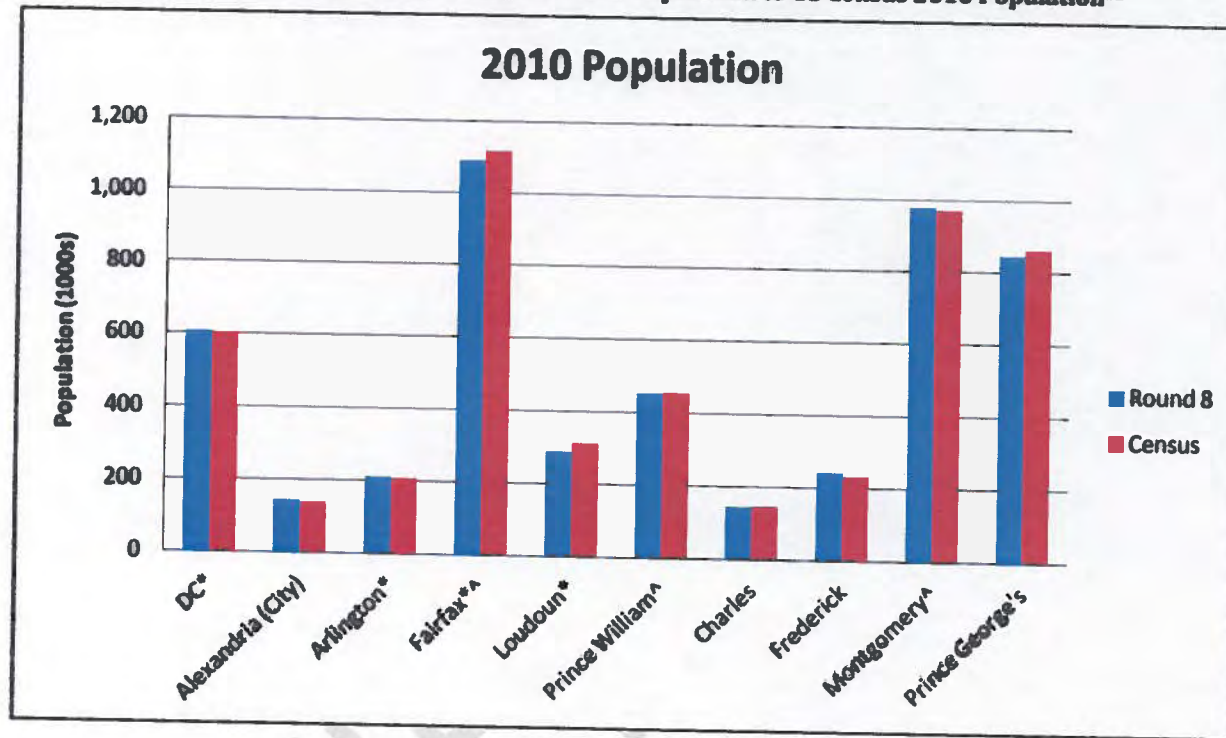
Some individual TAZ adjustments were necessary in cases where:

- Difference-based, rather than ratio-base, factors were more appropriate, such as in the identification/correction of Group Quarters errors in/near Fort Belvoir; and
- Adjustments were needed to avoid the systematic calculations yielding negative results, due in about 20-25 TAZs, where persons/HH or job type changes were severe.

The jurisdiction level population and employment totals for the MWCOG 2010 and the 2010 Adjusted can be seen in the tables in Step 9. The adjustments were incorporated into the final "Renaissance" forecast.

³¹ Version 2.3 of the regional travel demand model was validated using adjustments to calibrate 2007 estimates (linear interpolation of 2005 and 2010 Round 8.0) to 2007 MWCOG estimates from Dun and Bradstreet.

Figure 33 - Comparison of Round 8.0 2010 Population to US Census 2010 Population³²



Observations

At the jurisdictional level, the MWCOG Round 8.0 Forecasts are generally supported by the just released US Census 2010 population data. For the MWCOG region as a whole, the 2010 Census population is less than one percent higher than the Round 8.0 forecast. This gives us confidence in the unadjusted Round 8 Forecasts for most of the MWCOG jurisdictions. The greatest difference in population at the jurisdictional level was for Loudoun County, where the 2010 Census population is 7% higher than the Round 8.0 forecast. Part of the difference is attributable to changes in household size; the number of households in Loudoun County is only 2% higher in the 2010 Census than in the Round 8.0 forecast.

³² * Primary Market Area jurisdiction; ^ Fairfax County includes City of Fairfax and City of Falls Church; Prince William County includes City of Manassas and City of Manassas Park; Montgomery County includes City of Rockville and City of Gaithersburg.

Figure 34 - Map of Difference between Round 8.0 2010 and 2010 Census Population

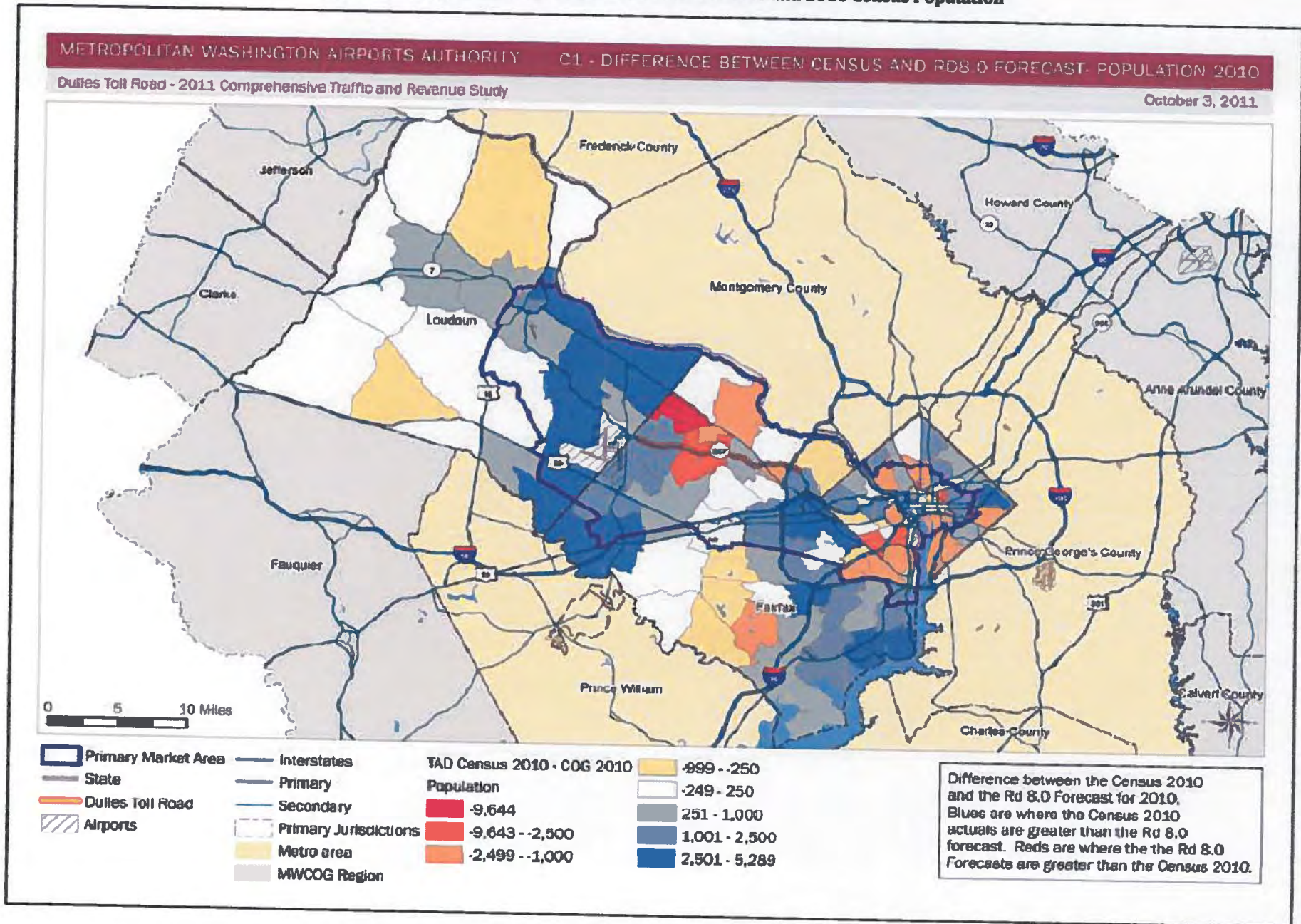


Figure 35 - Map of Difference between Round 8.0 2010 and 2010 Census Households

METROPOLITAN WASHINGTON AIRPORTS AUTHORITY

C2 - DIFFERENCE BETWEEN CENSUS AND RD8.0 FORECAST, HOUSEHOLDS 2010

Dulles Toll Road - 2011 Comprehensive Traffic and Revenue Study

October 3, 2011

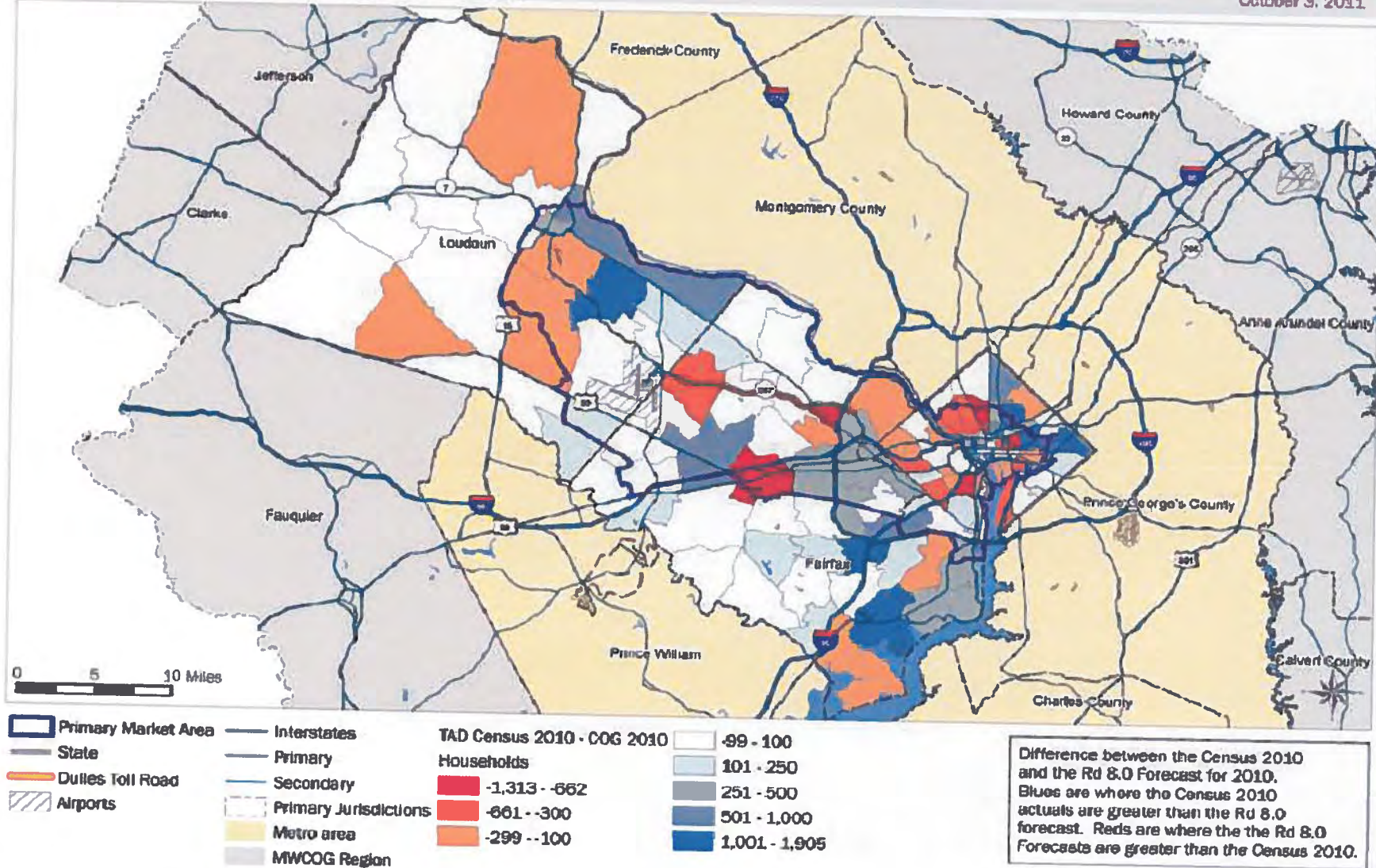


Figure 36 - Map of Difference between Round 8.0 and Adjusted 2010 Population

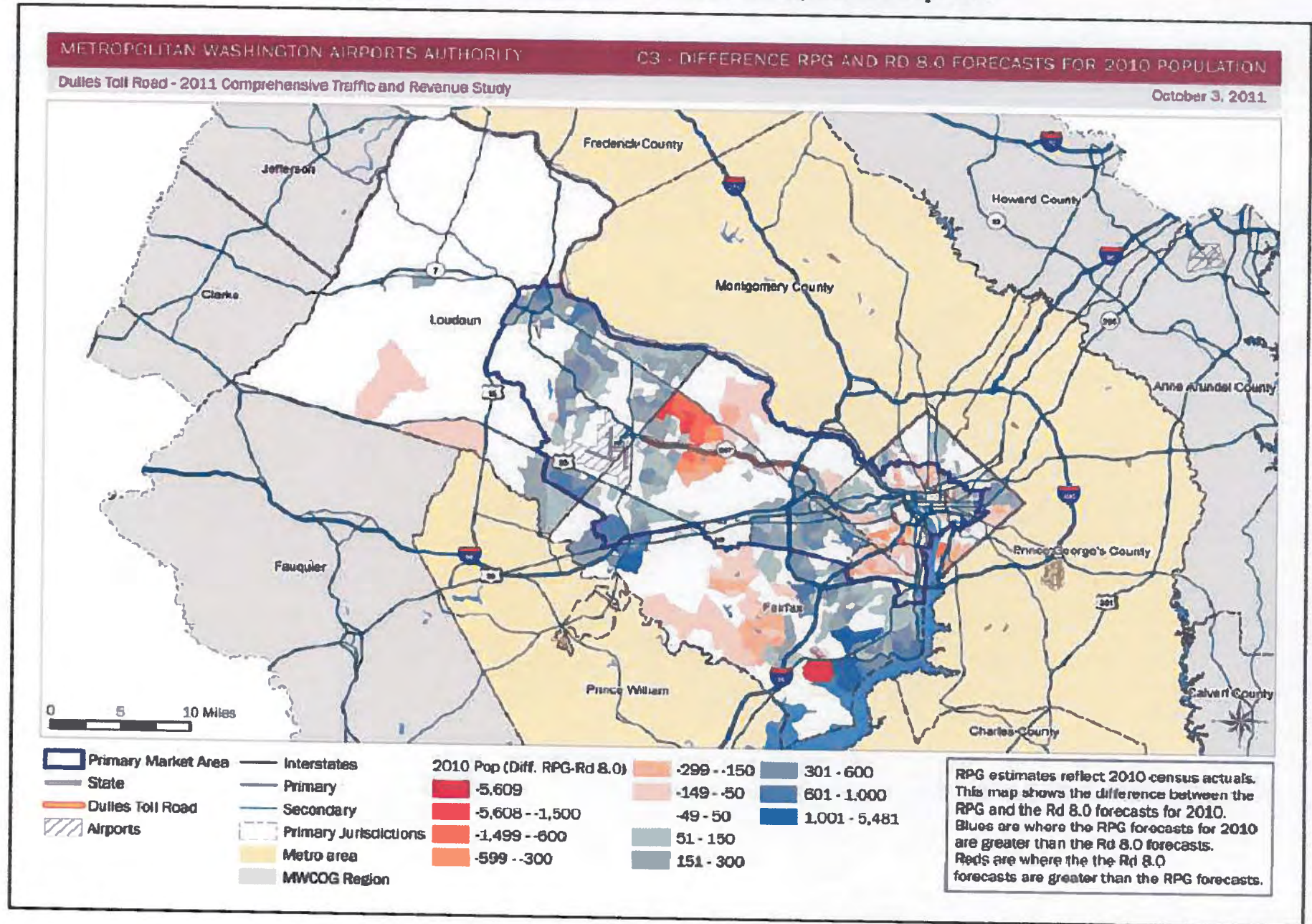
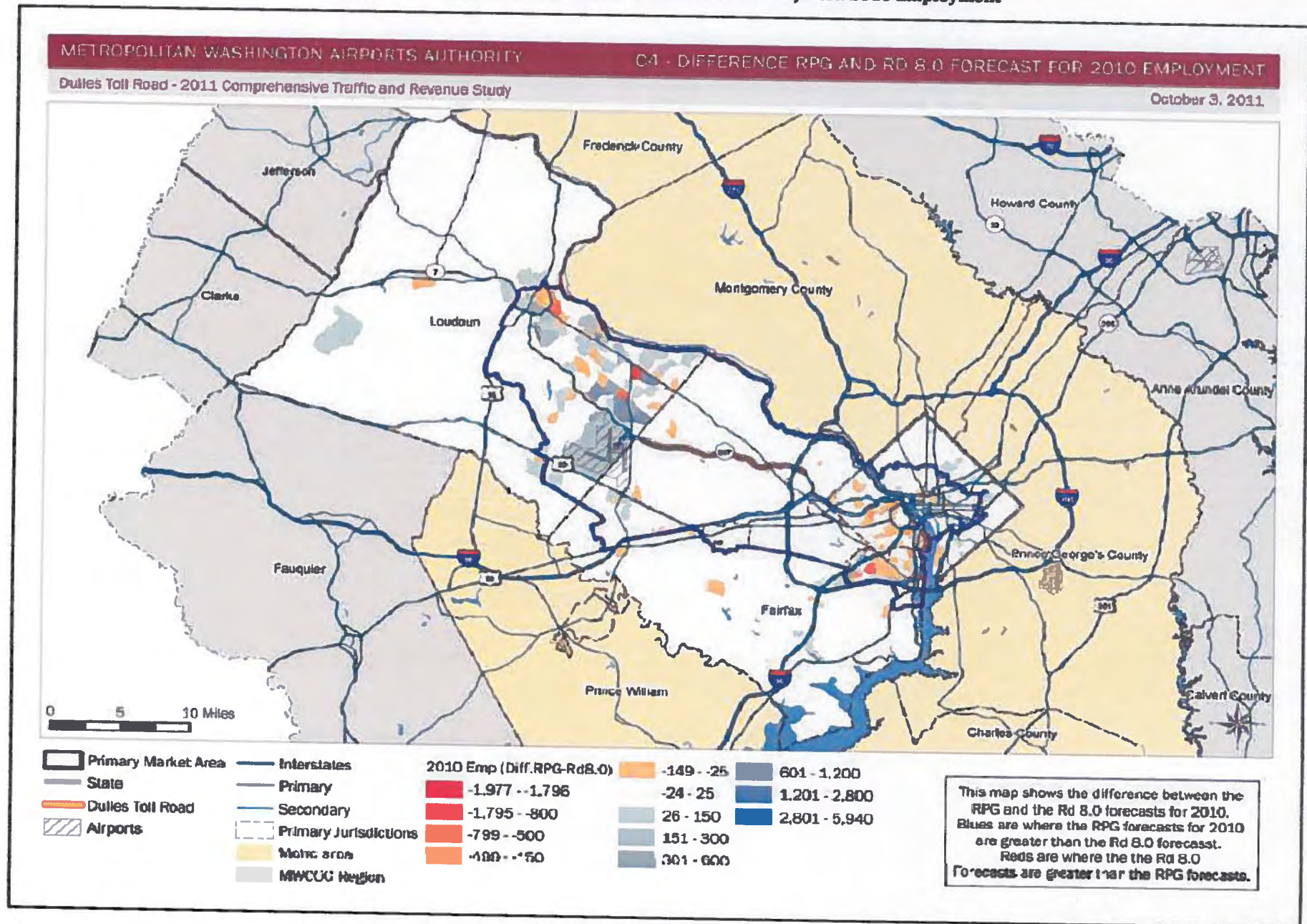


Figure 37 - Map of Difference between Round 8.0 and Adjusted 2010 Employment



Step 6: Macroeconomic Forecast and Guidance

The Round 8 county-level population and employment control totals for each jurisdiction in the metro area were evaluated through a comparison with long-term forecasts obtained from several different sources. For population, we obtained forecasts from the relevant state government departments of Maryland and Virginia, Woods & Poole Economics, Moody's Analytics, and Economic Modeling Specialists, Incorporated (EMSI). For employment, the sources were the same except that forecasts were not available from the State of Virginia. EMSI forecasts only extend to 2021, so they were used for additional context rather than as a primary source. The employment forecasts were adjusted as necessary to account for differing definitions of "employment" so that they would be relatively comparable.

The basic approach was to plot the Round 8 control totals against the various forecast sources for each county and identify jurisdictions and time periods where the Round 8 forecasts diverged significantly from a blend of the outside forecasts. Our objective was to highlight places where adjustments to the Round 8 control totals seem to be advisable. The intent is to refine the Round 8 forecasts to better reflect the macroeconomic trends being projected in the outside forecasts.

We also used recent data to establish a 2010 base year estimate for each demographic variable. For population, we used the 2010 Census count. For employment, we used the 2010 estimate by Moody's Analytics adjusted to include self-employed workers, which was determined to be the preferred baseline employment estimate.

Population Adjustments

Starting from the 2010 Census count, we applied the compound annual growth rates within each five-year period of the original Round 8 forecasts to produce updated control totals for comparison with the outside forecasts. Our evaluation indicated that adjustments to the following jurisdictions and time periods would be advisable:

- The Round 8 forecast for the District of Columbia is dramatically higher than the outside forecasts. Our examination revealed that most of the difference is found primarily in the high rate of growth projected by MWCOG between 2010 and 2015; after 2015 the Round 8 growth rate is relatively similar to the outside forecasts. We adjusted the 2010-2015 growth rate down to be consistent with the long-term trend, and made minor adjustments in later periods to maintain a smooth curve.
- For Frederick County, the Round 8 forecast projects a significantly faster rate of growth after 2025 than the outside forecasts. We adjusted the growth rates in those periods downward to reflect a slowing growth trend overall.
- The Round 8 forecast for Loudoun County is dramatically lower than the outside forecasts, especially in the later periods. We adjusted the growth rates upward in all periods, but assumed a steadily declining growth rate as the forecast moves into the later periods. This general trend of slowing growth is seen in the other counties on the suburban periphery of the metro area.
- For Prince William County, the Round 8 forecast projects a slightly slower rate of growth after 2020 than the outside forecasts. We adjusted the growth rates in those periods upward, but still maintained a slowing growth rate overall.

Since the Round 8 forecasts only extend to 2040, we extrapolated forecasts for 2045 and 2050 for each county using the average of the compound annual growth rates we assumed for the 2030-2035 and 2035-2040 periods. Figure 38 shows the growth rates for the Round 8 forecasts and Figure 39 shows the adjusted rates.

Figure 38 – Table of Compound Annual Growth Rates for Round 8.0 Population Forecasts

	2010-2015	2015-2020	2020-2025	2025-2030	2030-2035	2035-2040	2040-2045	2045-2050
District of Columbia	1.5%	0.6%	0.7%	0.5%	0.5%	0.8%	n/a	n/a
Frederick	1.8%	1.6%	1.6%	1.8%	1.8%	1.8%	n/a	n/a
Montgomery	0.7%	0.9%	0.8%	0.8%	0.5%	0.3%	n/a	n/a
Prince George's	0.6%	0.5%	0.4%	0.3%	0.2%	0.2%	n/a	n/a
Alexandria	0.6%	1.2%	1.0%	0.8%	0.9%	0.8%	n/a	n/a
Arlington	1.2%	0.9%	0.5%	0.5%	0.2%	0.2%	n/a	n/a
Fairfax	0.7%	1.0%	0.8%	0.6%	0.5%	0.3%	n/a	n/a
Loudoun	1.9%	2.3%	2.1%	1.1%	0.6%	0.4%	n/a	n/a
Prince William	2.1%	1.5%	1.2%	0.9%	0.7%	0.6%	n/a	n/a
TOTALS	1.1%	1.0%	0.9%	0.7%	0.6%	0.5%	n/a	n/a

Figure 39 – Table of Adjusted Compound Annual Growth Rates for Macroeconomic Population Forecasts

	2010-2015	2015-2020	2020-2025	2025-2030	2030-2035	2035-2040	2040-2045	2045-2050
District of Columbia	<u>0.6%</u>	0.6%	<u>0.6%</u>	0.5%	0.5%	<u>0.5%</u>	0.5%	0.5%
Frederick	1.8%	1.6%	1.6%	<u>1.4%</u>	<u>1.2%</u>	<u>1.0%</u>	1.1%	1.1%
Montgomery	0.7%	0.9%	0.8%	0.8%	0.5%	0.3%	0.4%	0.4%
Prince George's	0.6%	0.5%	0.4%	0.3%	0.2%	0.2%	0.2%	0.2%
Alexandria	0.6%	1.2%	1.0%	0.8%	0.9%	0.8%	0.8%	0.8%
Arlington	1.2%	0.9%	0.5%	0.5%	0.2%	0.2%	0.2%	0.2%
Fairfax	0.7%	1.0%	0.8%	0.6%	0.5%	0.3%	0.4%	0.4%
Loudoun	<u>3.5%</u>	<u>3.2%</u>	<u>2.9%</u>	<u>2.5%</u>	<u>2.2%</u>	<u>1.9%</u>	2.1%	2.1%
Prince William	2.1%	1.5%	<u>1.5%</u>	<u>1.4%</u>	<u>1.2%</u>	<u>1.0%</u>	1.1%	1.1%
TOTALS	1.1%	1.1%	1.0%	0.9%	0.7%	0.6%	0.7%	0.7%

Employment Adjustments

We created updated Round 8 employment control totals using the adjusted 2010 estimates from Moody's Analytics and the original Round 8 compound annual growth rates. Our evaluation of the Round 8 forecasts versus the outside sources suggested the following adjustments:

- While the Round 8 forecast for the District of Columbia tracks closely with Moody's and EMSI from 2010-2015, Round 8 continues at a faster growth rate in later periods than the other two sources, which project a flattening growth rate until after 2030. The two outside sources are updated on a monthly or quarterly basis, and appear to incorporate an assumption of declining federal government employment (one of the major employment drivers in the District). Given the anticipated cuts in federal spending to address budget deficit and debt issues and an approaching cyclical peak in federal civilian employment in the metro area, we believe that this is a reasonable assumption. Therefore, we adjusted the 2015-2030 growth rates down slightly to reflect a flat growth trend.
- The Round 8 forecasts for both Fairfax and Loudoun Counties show lower growth rates than the outside forecasts for the period after 2020. Given Fairfax's position as the primary economic engine of the region and Loudoun's position directly on the path of growth coming from Fairfax, we believe that a forecast of faster growth in the later years for both of these counties is advisable. Furthermore, the Round 8 employment forecasts were deliberately constrained based on assumption that there would be insufficient capacity for household growth needed to fill all of the potential new jobs without resorting to high levels of commuting in from outside of the region. With the construction of the Metrorail Silver Line and corresponding increase in development density around the transit stations, we believe that the justification for the constraint is reduced. Therefore, we adjusted the 2020-2040 growth rates upward for both counties – somewhat more in Loudoun than in Fairfax to reflect the greater availability of developable land.
- In the course of conducting the economic assessment, it was revealed that the employment numbers for Frederick County needed to be adjusted based on an error in the original forecasting assumptions used. This correction has been accounted for in the adjusted forecast. This adjustment can be seen in Figure 60.

Again, we prepared 2045 and 2050 forecasts through extrapolation, using the average of the compound annual growth rates from 2030-2035 and 2035-2040. Figure 40 shows the growth rates for the Round 8 forecasts and

Figure 41 shows the adjusted rates.

Figure 40 – Table of Compound Annual Growth Rates for Round 8.0 Employment Forecasts

	2010-2015	2015-2020	2020-2025	2025-2030	2030-2035	2035-2040	2040-2045	2045-2050
District of Columbia	0.9%	1.1%	0.7%	0.6%	0.6%	0.6%	n/a	n/a
Frederick	1.2%	0.9%	0.6%	0.5%	0.5%	0.5%	n/a	n/a
Montgomery	1.3%	1.6%	1.4%	1.4%	0.9%	0.6%	n/a	n/a
Prince George's	0.6%	0.7%	0.8%	1.0%	1.1%	1.3%	n/a	n/a
Alexandria	1.6%	1.1%	1.8%	1.0%	1.5%	0.9%	n/a	n/a
Arlington	1.2%	2.2%	1.5%	0.5%	0.7%	0.2%	n/a	n/a
Fairfax	1.3%	1.7%	1.0%	0.8%	0.6%	0.6%	n/a	n/a
Loudoun	3.1%	4.3%	2.7%	1.7%	1.1%	1.0%	n/a	n/a
Prince William	2.9%	2.5%	2.1%	2.1%	1.9%	1.9%	n/a	n/a
TOTALS	1.3%	1.6%	1.2%	1.0%	0.9%	0.7%	n/a	n/a

Figure 41 – Table of Adjusted Compound Annual Growth Rates for Macroeconomic Employment Forecasts

	2010-2015	2015-2020	2020-2025	2025-2030	2030-2035	2035-2040	2040-2045	2045-2050
District of Columbia	0.9%	0.4%	0.5%	0.5%	0.6%	0.6%	0.6%	0.6%
Frederick	1.2%	0.9%	0.6%	0.5%	0.5%	0.5%	0.5%	0.5%
Montgomery	1.3%	1.6%	1.4%	1.4%	0.9%	0.6%	0.7%	0.7%
Prince George's	0.6%	0.7%	0.8%	1.0%	1.1%	1.3%	1.2%	1.2%
Alexandria	1.6%	1.1%	1.8%	1.0%	1.5%	0.9%	1.2%	1.2%
Arlington	1.2%	2.2%	1.5%	0.5%	0.7%	0.2%	0.5%	0.5%
Fairfax	1.3%	1.7%	1.4%	1.0%	1.0%	0.6%	0.9%	0.9%
Loudoun	3.1%	4.3%	3.0%	2.5%	2.0%	1.5%	1.8%	1.8%
Prince William	2.9%	2.5%	2.1%	2.1%	1.9%	1.9%	1.9%	1.9%
TOTALS	1.3%	1.4%	1.3%	1.1%	1.0%	0.8%	0.9%	0.9%

Macroeconomic Forecast

The jurisdiction level macroeconomic population and employment forecasts can be seen in the tables in Step 9.

Step 7: Parcel Level Supply Side Analysis

A supply side analysis of land use in the Primary Market Area was conducted to understand the existing conditions for residential and non-residential development and availability of developable land by TAZ. This analysis identified land that is currently developed and land that has market viability for residential and commercial development. The socio-economic projections for each TAZ were then evaluated in the context of the supply of developable land to provide a TAZ level 'reasonableness check' for the study area. In addition, there were other land use statistics available from this analysis that was inserted into the overall study area evaluation tool.

To conduct the supply side analysis, real estate assessor data were obtained, associated with parcels, and analyzed using GIS. The parcel-level attributes studied were existing property use code classifications, zoning, building (improvement) value and land values. These attributes were queried to determine each parcel's development status, and whether that land was primarily in residential, or employment. Potentially developable lands are areas that are determined to be either vacant or under-utilized. Vacant lands have minimal or no building-to-land value ratio. Underutilized or redevelopable parcels have below average building-to-land value ratio for a jurisdiction. Developed lands are areas that currently have higher than average levels of improvement investment, indicating they are less likely to redevelop or intensify within the project time horizon. Land in public rights-of-way, utilities, in easement, or under some form of protection were considered undevelopable and were netted out of the supply side totals. Parcels were associated with TAZs in order to be able to summarize variables by the model's geography. The land supply side analysis yields the following statistics by TAZ:

- Existing developed land (residential, employment);
- Existing developable land, including;
- Vacant (residential, employment);
- Under-utilized/redevelopable (residential and employment);
- Unbuildable land (right-of-way, utilities, easement, federal park, etc.);
- Existing net residential households per acre by TAZ;
- Existing net employees per acre by TAZ;
- Future net residential households per acre by TAZ;
- Future net employees per acre by TAZ;
- Total existing investment (building + land value) of land per acre by TAZ; and
- Land available in existing and planned rail transit station areas.

The results of the supply side analysis provided valuable inputs to the overall study area evaluation. For example, comparison of present to future projected densities allows for a quick reasonableness check. It was also used to identify hot spots and illuminate discrepancies or areas that needed adjustment or additional validation. Figure 42 through Figure 48 show a number of the factors in the jurisdictions that are all or part of the Primary Market Area.

Figure 42 - Map of Existing Residential Development

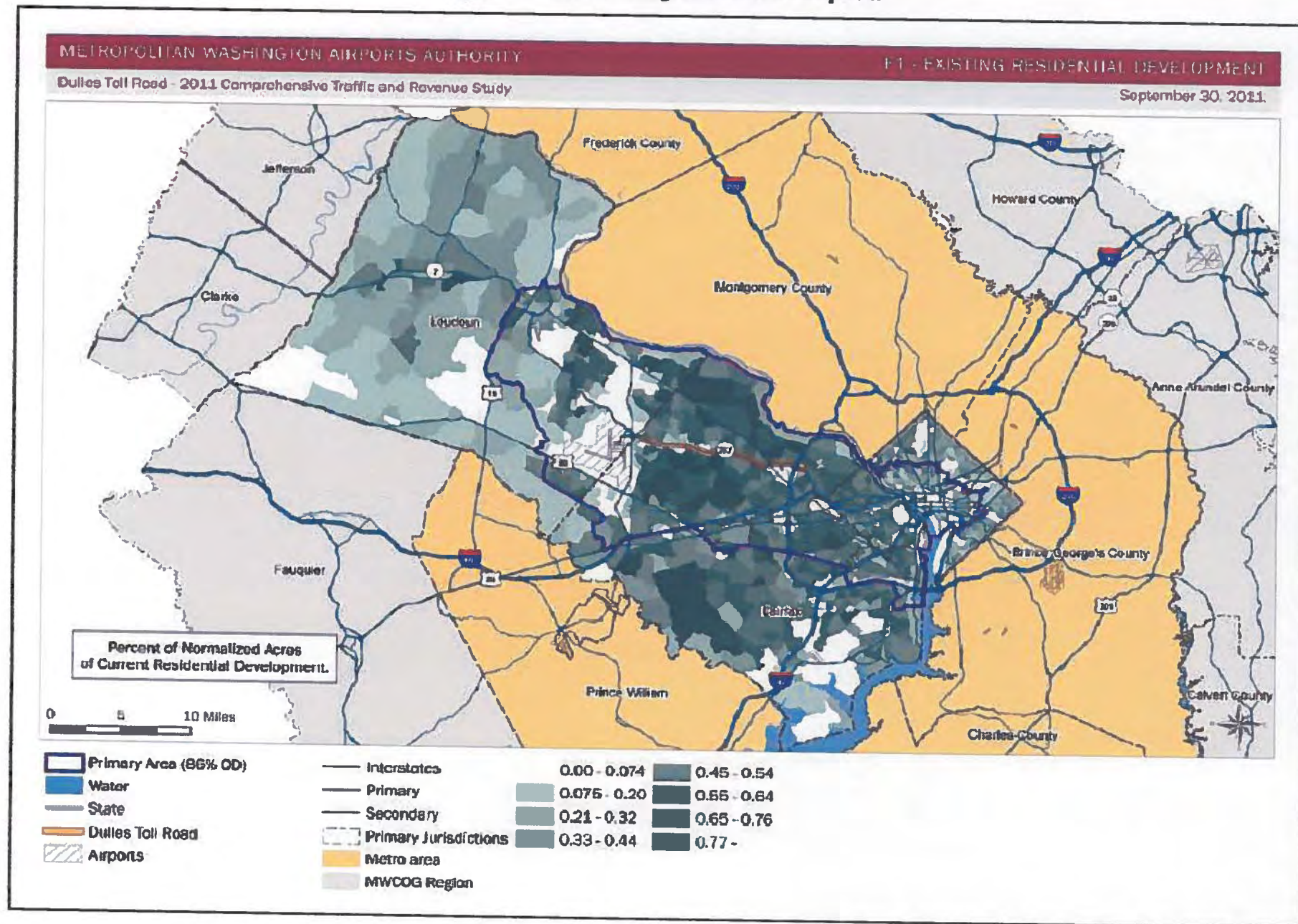


Figure 43 - Map of Existing Mixed Use Development

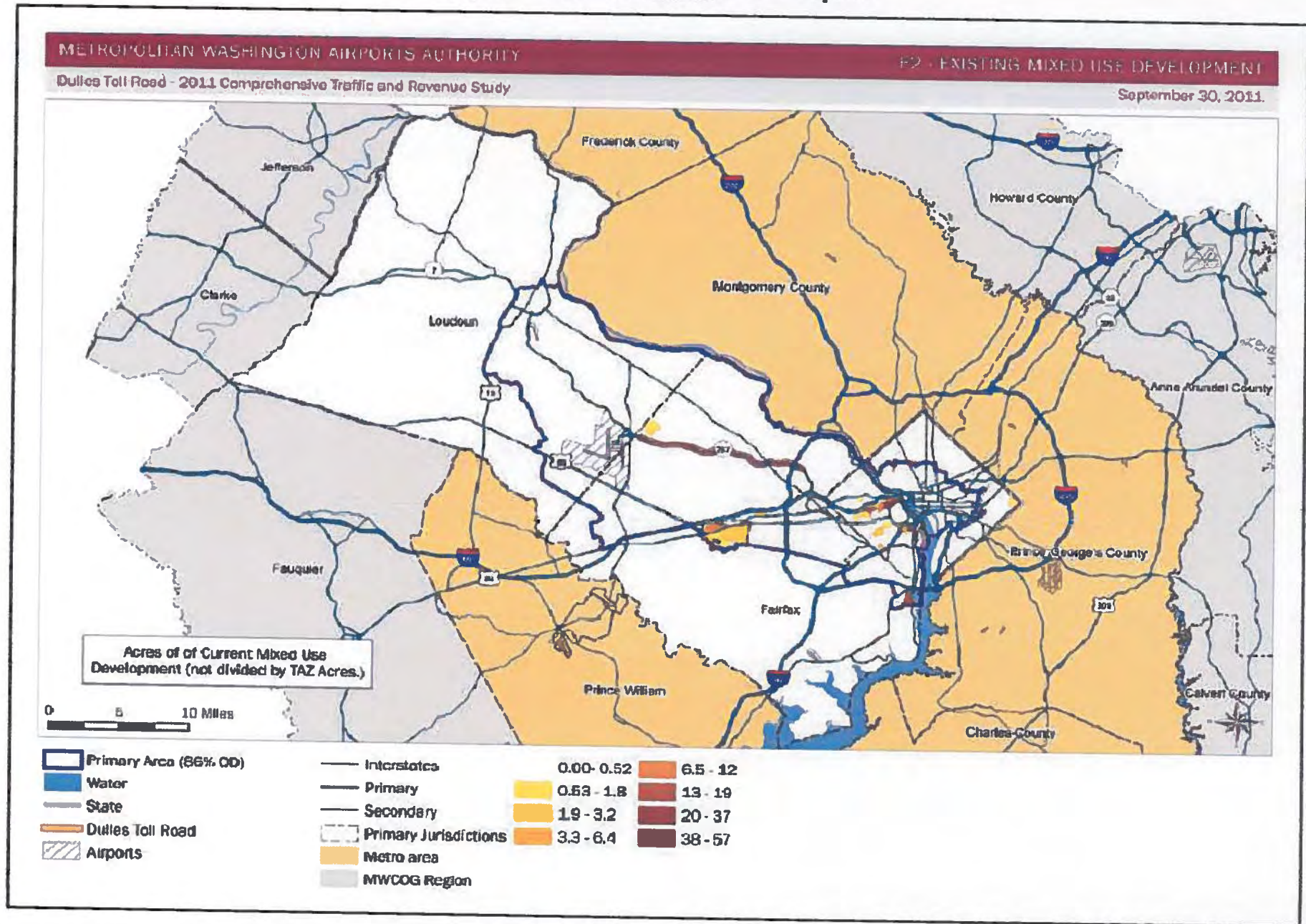


Figure 44 - Map of Total Value of Developed Land Per Acre

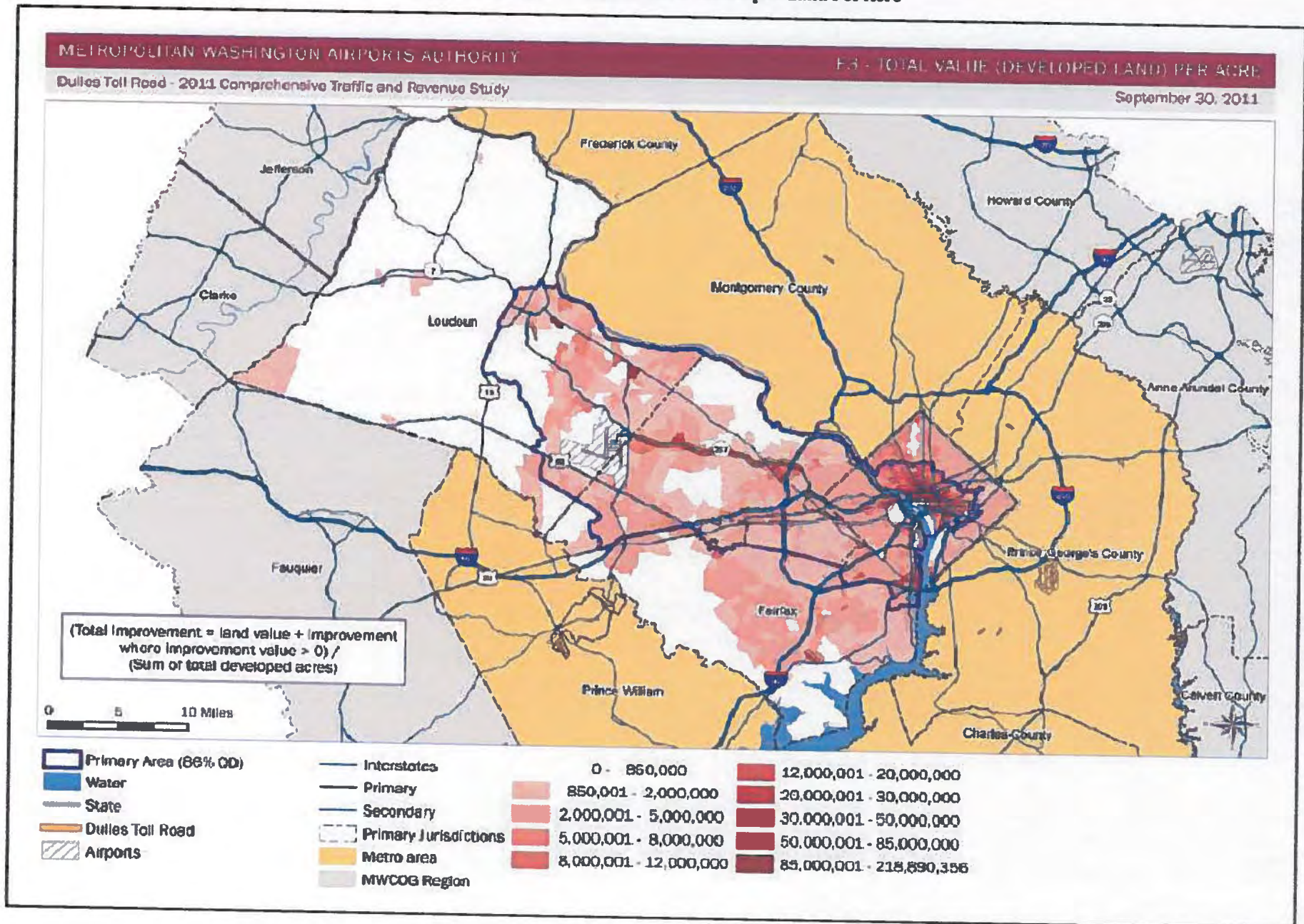


Figure 45 - Map of Percent Vacant and Underutilized Land

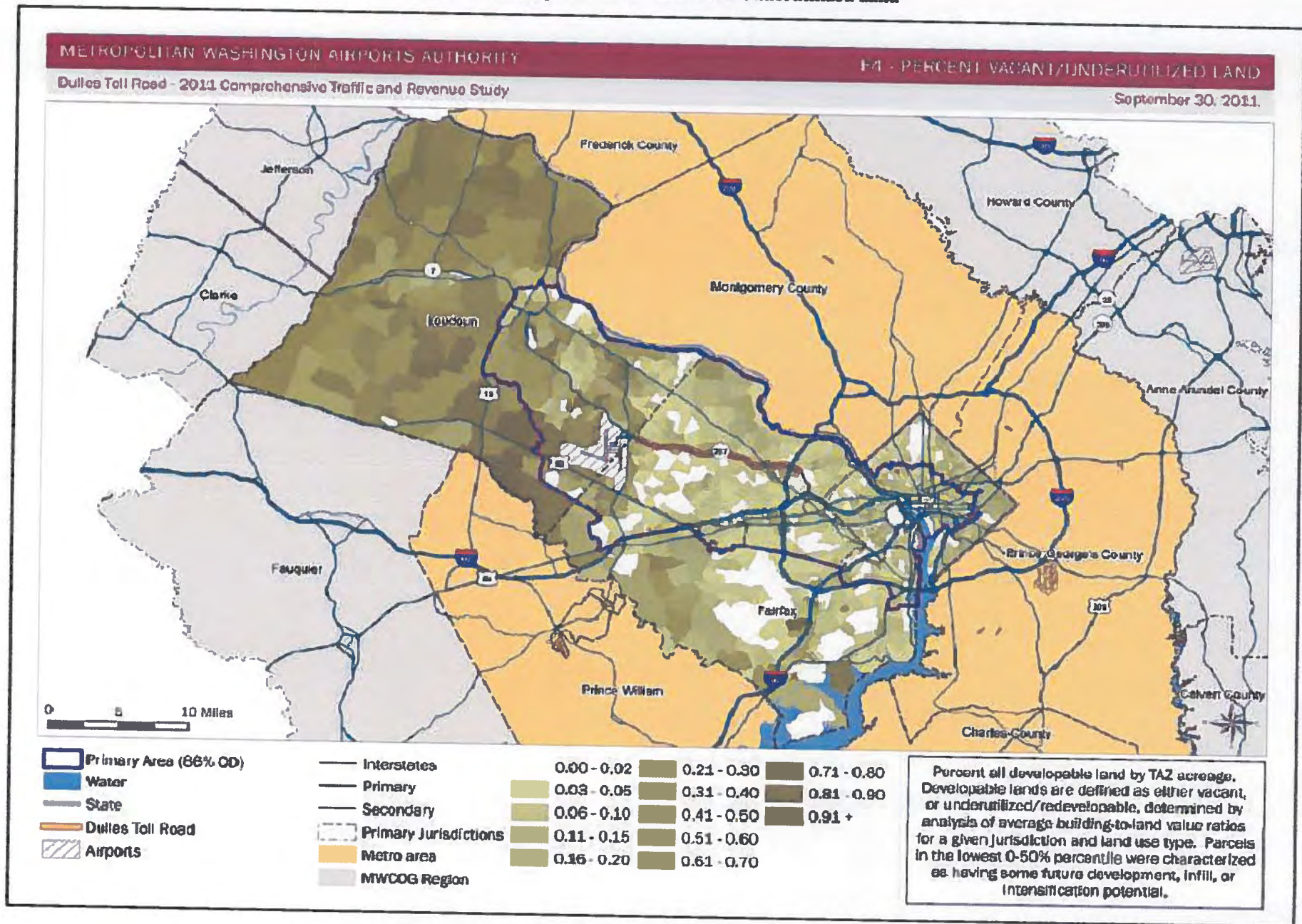


Figure 46 - Map of Employment Growth Suitability

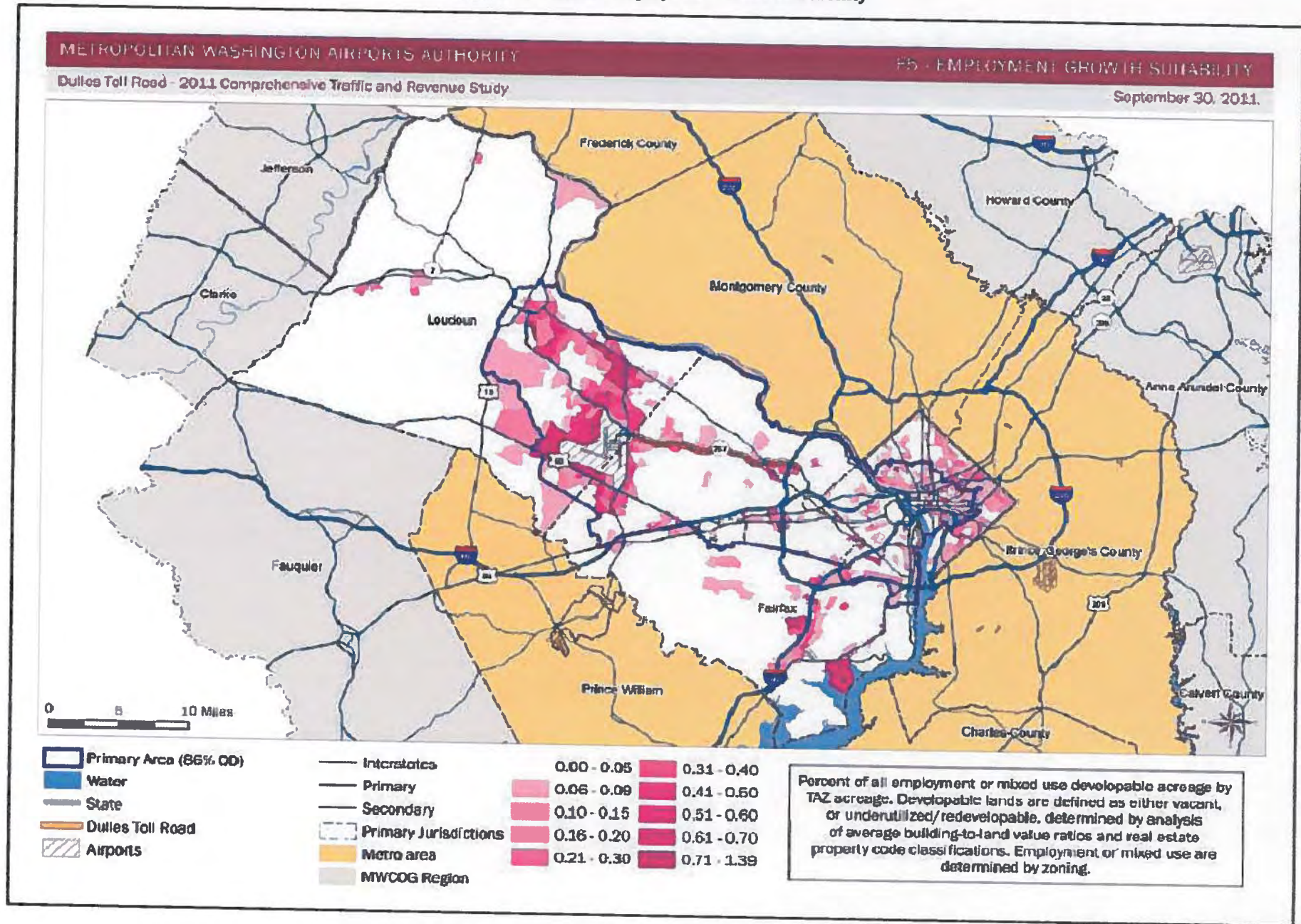


Figure 47 - Map of Existing and Planned Metrorail Station Area Half Mile Buffers

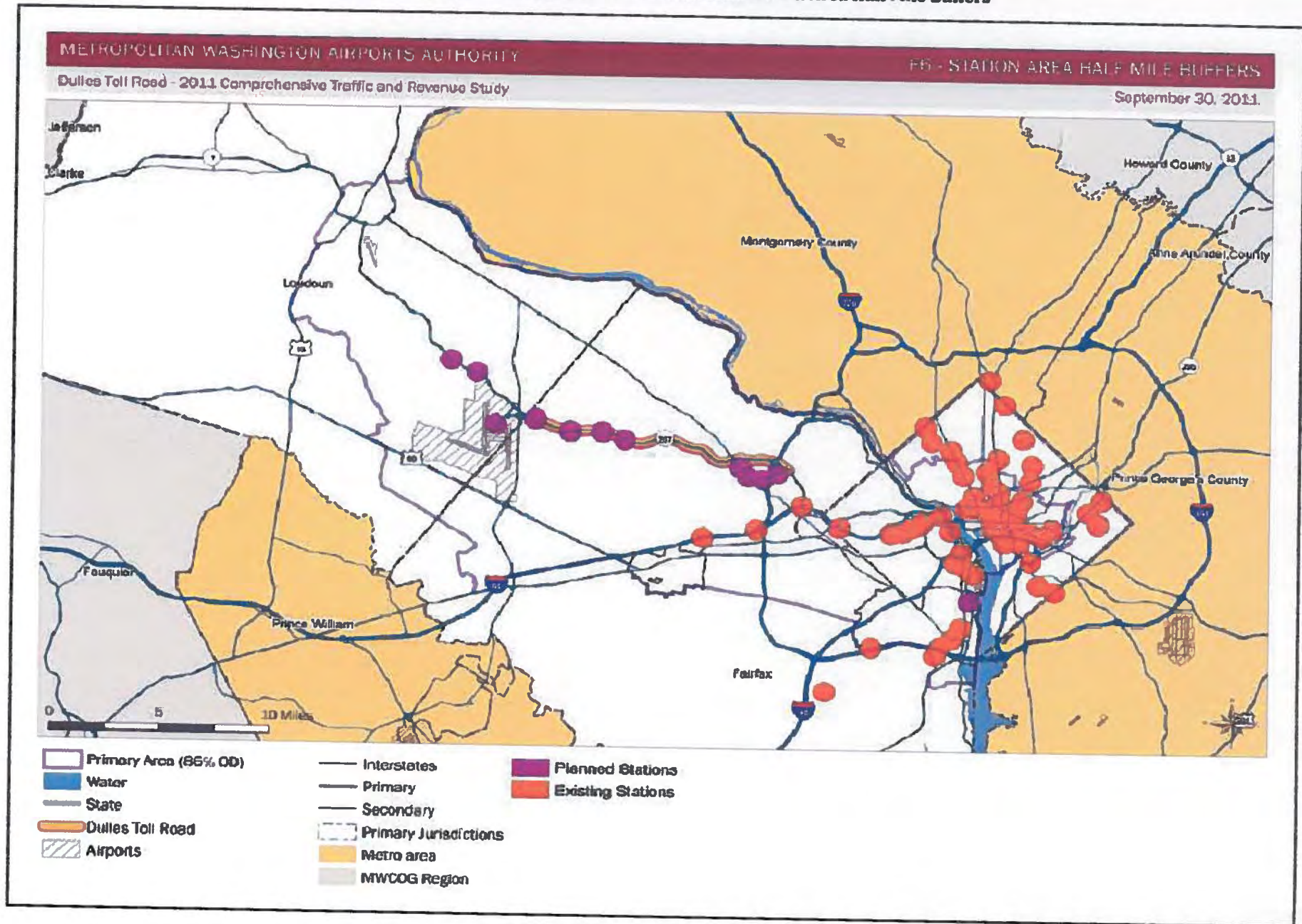
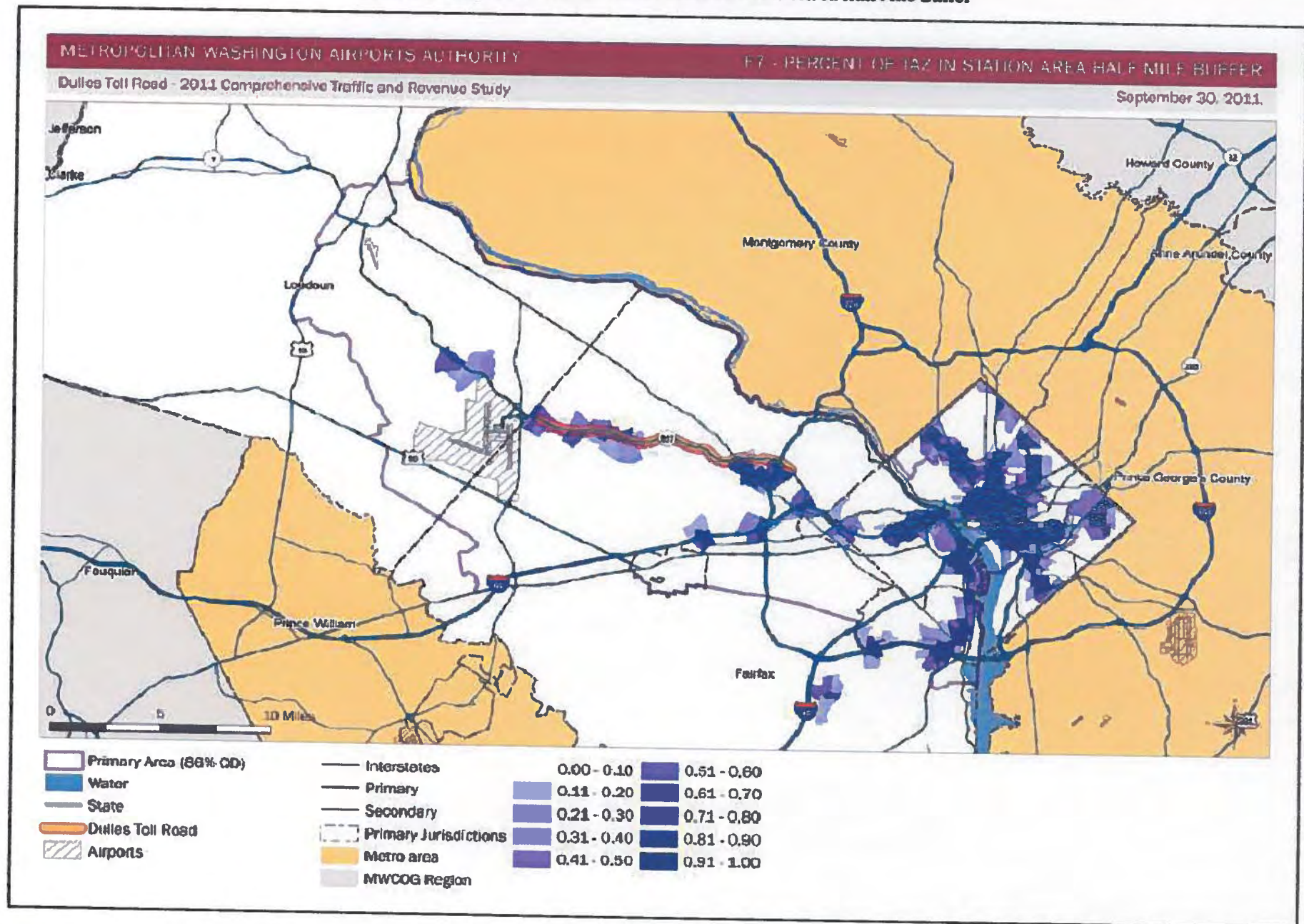


Figure 48 - Map of Percent of TAZ in Metrorail Station Area Half Mile Buffer



Step 8: Methodology and Tool for Testing MWCOG Forecasts

Land use development patterns and absorption rates are influenced by a wide range of independent policy and market variables. Policy variables include federal agency employment decisions such as the Base Realignment and Closure (BRAC) initiative; local jurisdiction master plans, zoning, and subdivision regulations. Market variables include regional econometric trends, local property characteristics, and the specific interests of individual property owners. The Renaissance approach to the independent economic assessment was to identify the relative effect of those variables.

The approach combines systematic application of independent variables with site-specific local knowledge to derive TAZ-specific forecasts that pivot from the Round 8.0 forecasts to reflect both macroeconomic trends and assumptions regarding site-specific development activity. The forecasting process includes three basic components:

- A top-down analysis of macroeconomic trends used to identify trends at the jurisdictional level
- A bottom-up regression analysis of current property attributes, aggregated at the TAZ level, that explains the growth rates observed in the Round 8.0 forecasts
- Submarket analysis that considers updated base year (2010) conditions, macroeconomic forecasts, and recent or anticipated policy changes to guide the TAZ-level forecasts toward the macroeconomic trends.

The basic unit of the forecasting process is TAZ-level density. In other words, the process forecasts the total number of jobs per TAZ-acre and the total population per TAZ-acre. Development of the forecasting process included three steps. First, Renaissance explored relationships between current parcel data availability, suitability, and value and the growth forecast in Round 8.0 in the 2010 to 2040 timeframe to identify characteristics that were indicators of population or employment growth. Second, we established two user-identified variables to account for local conditions not readily observable from the parcel data. These variables are identified in Figure 49 and Figure 50 for population and employment, respectively.

Figure 49- Independent Variables for Forecasting Population Density

Independent Variable	Description	Relevance
Existing Residential or Mixed-use Development (Figure 42 and Figure 43)	Percent of TAZ acreage currently developed as residential	In most locations in the primary market area, new residential growth is expected to occur in TAZs that already contain a high amount of existing residential or mixed-use development.
Transit Availability (Figures Figure 47 and Figure 48)	Percent of TAZ acreage within a half-mile radius of a Metrorail station, planned densities supportive of fixed-route bus service, and with independent consideration of stations added to the original 103-mile system.	Both employment and residential density increases are linked by both policy and market considerations to locations with good transit access, particularly to the Metrorail system. Growth will be greater at Metrorail stations newest to the system where both policies and the market are still in a reactive mode.
Land development efficiency	User assigned factor based on reflecting efficiency of certain TAZs to calibrate estimated yields based on policy variables such as significant property ownership by government or institutions and policies such as agricultural easements.	Government and institutional properties typically have growth rates that are unrelated to parcel data. Low density zoning and easement programs will continue to protect the more rural wedges of Loudoun and Fairfax Counties
Local market factor	User assigned factor reflecting local market conditions not observable in parcel level data. This factor reflects the incorporation of specific approved or pending projects in the Round 8.0 forecasts	Approximately 7% of the TAZs in the Primary Market Area have targeted Round 8.0 forecast increases in population densities that are substantially different than would otherwise be expected.

Figure 50 - Independent Variables for Forecasting Increases in Employment Density

Independent Variable	Description	Relevance
Land Value (Figure 44)	Average per-acre value of land and improvements for all developed properties (with a nonzero improvement value)	Generally, land available and suitable for commercial development in the primary market area is becoming scarce. New development is therefore likely to occur in locations where a critical mass of investment (both public and private) has already occurred.
Percent Vacant / Redevelopable Land (Figure 45)	Percent of TAZ acreage identified as consisting of vacant or underutilized parcels. Underutilized parcels are identified by the ratio of improvement value to land value.	Much of the forecast growth in the primary market area is occurring as part of infill and redevelopment. New development is likely to occur in areas that have a high proportion of properties with low improvement-to-land ratios (either vacant or already developed).
Employment Growth Suitability (Figure 46)	Percent of TAZ acreage consisting of parcels with employment or mixed-use developable acreage	Employment growth is expected to be generally limited to parcels with commercial, industrial, or mixed use zoning.
Transit Availability (Figures Figure 47 and Figure 48)	Percent of TAZ acreage within a half-mile radius of a Metrorail station, planned densities supportive of fixed-route bus service, and with independent consideration of stations added to the original 103-mile system.	Both employment and residential density increases are linked by both policy and market considerations to locations with good transit access, particularly to the Metrorail system. Growth will be greater at Metrorail stations newest to the system where both policies and the market are still in a reactive mode.
Land development efficiency	User assigned factor based on reflecting efficiency of certain TAZs to calibrate estimated yields based on policy variables such as significant property ownership by government or institutions and policies such as agricultural easements.	Government and institutional properties typically have growth rates that are unrelated to parcel data. Low density zoning and easement programs will continue to protect the more rural wedges of Loudoun and Fairfax Counties
Local market factor	User assigned factor reflecting local market conditions not observable in parcel level data. This factor reflects the incorporation of specific approved or pending projects in the Round 8.0 forecasts	Approximately 6% of the TAZs in the Primary Market Area have targeted Round 8.0 forecast increases in employment densities that are substantially different than would otherwise be expected.

These relationships provide a rough correlation between certain market and policy indicators of growth and the increases in density by TAZ contained in the Round 8.0 forecasts. It is important to note that while these relationships are numerical, they reflect a combination of art and science. The regression analysis provided a useful quick-response tool to aid in the forecasting process, but the approach is not intended to serve as an independent land use model or replacement for the more detailed and time-intensive approach taken by the local jurisdictions in coordination with MWCOG.

Step 9: Assumptions, Forecast Comparisons and Final Adjusted Forecast

The Renaissance forecasts pivot from the Round 8.0 forecasts considering three types of independent information sources: updated base year (2010) conditions, recent or anticipated policy changes such as master plan or zoning changes, and macroeconomic source guidance. First, the forecasts reflect 2010 census population and housing numbers, with multiplicative factors developed at the TAD level to adjust each TAZ's 2010 population and housing totals. The forecasts also reflect an adjustment of 2010 employment estimates, with multiplicative factors developed at the jurisdictional level for total jobs by employment category type, to calibrate to the 2007 estimates developed by MWCOG for purposes of Version 2.3 travel forecast model development and validation (and described as "pseudo Round 8" for model validation purposes). The reassessment of 2010 employment conditions also contained a correction factor for Frederick County's current jobs total to better align with at-place employment estimates, a correction process the Frederick County staff is currently engaging in with MWCOG staff. For both the population and employment forecasts, we believe that these correction factors reflect recessionary trends that will return to the prior MWCOG trend line over time, with the expectation that economic slowdown exists through 2017 and another 10-13 years of recovery will be required to regain forecast trends:

Second, the forecasts reflect changes to the local market expected to be prompted by master plan and zoning amendments in the primary market area, most notably those recently completed or underway in the Silver Line corridor Metrorail station areas. We applied the forecasting tool as a dashboard to adjust jobs and population densities based on assumed changes to the local market factor described above. And finally, the forecasts are guided by the macroeconomic trends so that the local forecasting tool results generally follow the blended jurisdictional control totals.

The National Capital Region Transportation Planning Board includes only the St. Charles urbanized area of Charles County. Charles County is the most geographically distant jurisdiction from the Primary Market Area. For these reasons, the forecast adjustments made for Census and Pseudo Round 8 forecasts at the jurisdictional level for the remaining TPB member jurisdictions were not applied to Charles County either in whole or in part.

The following sections describe the detailed interventions made inside the Primary Market Area, present the forecasts at the jurisdictional level, show the overall jobs to population balance within the region and each jurisdiction over time, and indicate the effect of population and employment adjustments in the Primary Market Area. These sections are followed by a number of maps that represent the forecasts and their differences at the TAZ level. Figure 73 through Figure 80 show maps comparing the original MWCOG 2010 to 2040 employment and population densities by TAZ. Figure 81 through Figure 86 show the incremental change by TAZ between 2010 and 2040 for MWCOG forecasts and the final Renaissance forecast. They also compare the incremental change for population and employment across forecasts.

Primary Market Area Adjustments

In general, each of the jurisdictions in the Primary Market Area continues to pursue planning and zoning opportunities that direct economic growth towards transit areas, particularly existing and new Metrorail stations. This trend is strongest in the Silver Line / Dulles Toll Road corridor, with master plans for each of the transit station areas along the Dulles Toll Road either adopted (Tysons Corner, 2010; Route 28 Corridor Plan, 2011) since the Round 8.0 forecasts were developed, or underway (Reston Master Plan, Route 28 Station South study). Notable revisions to the Round 8.0 forecasts regarding local development, beyond the adjustments attributed to systematic adjustments of 2010 estimates to account for Census population or Pseudo Round 8 employment estimates, are summarized in Figure 51.

Figure 51 – Sub-market Changes in Primary Market Area

Geographic area	TADs	Notable changes from Round 8.0
New York Avenue Gateway	20, 30	Redevelopment of Washington DC will be strongest adjacent to Metrorail station areas and along the emerging streetcar corridors. Development will be more oriented toward the New York Avenue and Rhode Island Avenue Metrorail stations. Conversely, redevelopment of the Brentwood yards, Langdon, and Gateway neighborhoods will occur at a slower pace.
Rosslyn-Ballston Corridor	247, 253	The Rosslyn Renaissance program will build on the confluence of Metrorail lines to produce an increase in both residential and commercial development. Growth will be slower at the Virginia Square station and more focused on the Metrorail station areas
Alexandria Old Town / Potomac Yards	266-267 (plus TAZs 1573, 1577, 1578 1591, 1592, and 1606)	Commercial and mixed-use redevelopment opportunities will increase in North Old Town including the redevelopment of the Mirant plant site. Phased development at the Potomac Yard station will occur at a slower pace than indicated in the Round 8.0 forecasts. Commercial development at the King Street and Eisenhower Avenue Metrorail stations will be higher than previously forecast, particularly in the earlier horizon years.
Tysons Corner	292 (plus TAZs 1860, 1864-1867, and 1869)	The mixed use, transit-oriented, zoning established in the 2010 Tysons Corner Master Plan will facilitate a substantial increase in both residential and commercial development. Growth will be focused around the four new Metrorail stations. By 2050, slightly more than half of the proposed end-state residential and three-quarters of the end-state commercial development will have been absorbed, with the jobs/housing ratio decreasing from 5.6 to 2.9.
Fort Belvoir	295-296	The BRAC relocation will generate additional supporting commercial development in the vicinity of the Fort Belvoir North Area due to its proximity to transportation (both I-95 and the Franconia-Springfield Metrorail station) and relatively underutilized commercial and industrial land.
Reston/Herndon	lic sectThe	The pending master plan amendments will increase mixed use development adjacent to the four new Silver Line stations in the Reston/Herndon submarket of Fairfax County. Additional residential development at these locations will be driven in part by unsatisfied demand in Loudoun County. Growth rates will be highest at the Reston Town Center and Route 28/CIT stations, where employment growth suitability and developed land values are highest. Growth rates will be slightly lower at the Reston East and Herndon/Monroe stations where established adjacent communities are the most proximate.
Route 28 Corridor, Loudoun County	323-324	The focus of mixed use development, particularly in the Route 28 Core will help the corridor respond to both the sub-regional market need for residential development and the local desire for business access to Dulles Airport. Growth in the Route 28 corridor by 2040 will generally occur at a greater rate (about 48% for residential and 36% for commercial) than previously forecast, although certain landmark sites such as Kincora will be delayed through the first decade.
Ashburn and Vicinity	328	The westernmost stations on the Silver Line have remaining land availability and suitability to accommodate an increased amount of both residential and commercial development. Forecast growth rates for both population and jobs are 75% higher than assumed in Round 8. Additional commercial growth will occur around the airport's western perimeter.

Comparison of Population Forecasts

Figure 52 through Figure 57 present the MWCOG Round 8.0, Macroeconomic and final Renaissance population forecasts. The Macroeconomic forecast was used as guidance in generating the final shown in Figure 55. Values in tables are in thousands.

Figure 52 – Table of Round 8.0 Population Forecasts by Jurisdiction

	2010	2015	2020	2025	2030	2035	2040	2045	2050
District of Columbia	605.5	651.5	669.8	693.8	711.9	730.4	760.5	n/a	n/a
Montgomery	980.0	1017.0	1065.0	1109.0	1152.0	1182.0	1199.0	n/a	n/a
Prince George's	846.2	873.1	895.7	913.4	928.3	939.0	950.1	n/a	n/a
Arlington	212.3	224.8	235.5	241.4	247.3	249.6	252.0	n/a	n/a
Alexandria	145.0	149.1	158.5	166.9	173.3	180.9	188.3	n/a	n/a
Fairfax	1091.6	1132.6	1187.9	1237.0	1274.8	1307.3	1326.1	n/a	n/a
Loudoun	290.0	318.7	357.7	397.1	419.0	431.2	439.7	n/a	n/a
Prince William	451.9	501.1	539.3	571.8	598.9	621.2	639.2	n/a	n/a
Frederick	243.2	265.6	287.9	311.1	340.0	371.7	406.4	n/a	n/a
TOTALS	4865.7	5133.5	5397.3	5641.5	5845.5	6013.3	6161.3	n/a	n/a

Figure 53 – Table of Macroeconomic Population Forecasts by Jurisdiction

	2010	2015	2020	2025	2030	2035	2040	2045	2050
District of Columbia	601.7	620.0	637.4	656.8	673.9	691.4	708.9	727.0	745.7
Montgomery	971.8	1008.5	1056.1	1099.7	1142.3	1172.1	1188.9	1213.0	1237.5
Prince George's	863.4	890.9	913.9	932.0	947.2	958.1	969.4	980.8	992.2
Arlington	207.6	219.9	230.3	236.1	241.9	244.1	246.5	248.8	251.1
Alexandria	140.0	143.9	153.0	161.1	167.3	174.6	181.8	189.5	197.5
Fairfax	1116.6	1156.3	1212.7	1262.0	1300.3	1333.5	1352.6	1379.6	1407.1
Loudoun	312.3	370.9	434.2	500.9	566.7	631.9	694.2	768.4	850.4
Prince William	454.1	503.5	541.9	583.8	625.8	664.3	698.2	737.4	778.9
Frederick	233.4	254.9	276.3	298.5	320.0	339.7	357.0	377.1	398.3
TOTALS	4900.9	5168.7	5455.8	5730.9	5985.5	6209.7	6397.5	6621.5	6858.7

Figure 54 – Table of Difference between Macroeconomic and Round 8.0 Population Forecasts

	2010	2015	2020	2025	2030	2035	2040	2045	2050
District of Columbia	-3.8	-31.5	-32.4	-37.0	-38.0	-39.0	-51.6	n/a	n/a
Montgomery	-8.2	-8.5	-8.9	-9.3	-9.7	-9.9	-10.1	n/a	n/a
Prince George's	17.2	17.8	18.2	18.6	18.9	19.1	19.3	n/a	n/a
Arlington	-4.7	-4.9	-5.2	-5.3	-5.4	-5.5	-5.5	n/a	n/a
Alexandria	-5.0	-5.2	-5.5	-5.8	-6.0	-6.3	-6.5	n/a	n/a
Fairfax	25.0	23.7	24.8	25.0	25.5	26.2	26.5	n/a	n/a
Loudoun	22.3	52.2	76.5	103.8	147.7	200.7	254.5	n/a	n/a
Prince William	2.2	2.4	2.6	12.0	26.9	43.1	59.0	n/a	n/a
Frederick	-9.8	-10.7	-11.6	-12.6	-20.0	-32.0	-49.4	n/a	n/a
TOTALS	35.2	35.2	58.5	89.4	140.0	196.4	236.2	n/a	n/a

Figure 55 – Table of Renaissance Population Forecasts by Jurisdiction

	2010	2015	2020	2025	2030	2035	2040	2045	2050
District of Columbia	601.7	626.3	661.5	682.9	703.1	719.8	745.8	767.3	788.6
Montgomery	971.8	1008.5	1056.1	1099.7	1142.3	1172.1	1188.9	1213.0	1237.5
Prince George's	863.4	890.9	913.9	932.0	947.2	958.1	969.4	980.8	992.2
Arlington	207.6	216.0	231.1	238.7	246.6	248.5	250.4	252.3	254.2
Alexandria	140.0	143.6	153.7	161.4	167.8	173.7	180.1	186.2	192.3
Fairfax	1116.6	1147.9	1221.3	1274.8	1318.8	1355.7	1377.2	1404.6	1431.8
Loudoun	312.3	330.3	387.5	428.2	449.1	464.3	473.3	484.4	495.4
Prince William	454.1	503.5	541.9	583.8	625.8	664.3	698.2	737.4	778.9
Frederick	233.4	254.9	276.3	298.5	320.0	339.7	357.0	377.1	398.3
TOTALS	4900.9	5121.8	5443.2	5700.1	5920.8	6096.3	6240.4	6403.0	6569.2

Figure 56 – Table of Difference between Renaissance and Round 8.0 Population Forecasts

	2010	2015	2020	2025	2030	2035	2040	2045	2050
District of Columbia	-3.8	-25.2	-8.3	-10.9	-8.8	-10.6	-14.7	n/a	n/a
Montgomery	-8.2	-8.5	-8.9	-9.3	-9.7	-9.9	-10.1	n/a	n/a
Prince George's	17.2	17.8	18.2	18.6	18.9	19.1	19.3	n/a	n/a
Arlington	-4.7	-8.8	-4.4	-2.7	-0.7	-1.1	-1.6	n/a	n/a
Alexandria	-5.0	-5.5	-4.8	-5.5	-5.5	-7.2	-8.2	n/a	n/a
Fairfax	25.0	15.3	33.4	37.8	44.0	48.4	51.1	n/a	n/a
Loudoun	22.3	11.6	29.8	31.1	30.1	33.1	33.6	n/a	n/a
Prince William	2.2	2.4	2.6	12.0	26.9	43.1	59.0	n/a	n/a
Frederick	-9.8	-10.7	-11.6	-12.6	-20.0	-32.0	-49.4	n/a	n/a
TOTALS	35.2	-11.7	45.9	58.6	75.3	83.0	79.1	n/a	n/a

Figure 57 – Table of Difference between Renaissance and Macroeconomic Population Forecasts

	2010	2015	2020	2025	2030	2035	2040	2045	2050
District of Columbia	0.0	6.3	24.1	26.1	29.2	28.4	37.0	40.3	43.0
Montgomery	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Prince George's	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Arlington	0.0	-3.9	0.8	2.6	4.7	4.4	3.9	3.5	3.0
Alexandria	0.0	-0.3	0.7	0.3	0.5	-0.9	-1.7	-3.3	-5.2
Fairfax	0.0	-8.3	8.6	12.8	18.5	22.2	24.5	25.0	24.7
Loudoun	0.0	-40.6	-46.7	-72.7	-117.6	-167.5	-220.9	-284.0	-355.0
Prince William	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Frederick	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
TOTALS	0.0	-46.9	-12.6	-30.8	-64.7	-113.4	-157.2	-218.5	-289.5

Comparison of Employment Forecasts

Figure 58 through Figure 63 present the MWCOG Round 8.0, Macroeconomic and final Renaissance employment forecasts. The Macroeconomic forecast was used as guidance in generating the final shown in Figure 61. Values in tables are in thousands.

Figure 58 – Table of Round 8.0 Employment Forecasts by Jurisdiction

	2010	2015	2020	2025	2030	2035	2040	2045	2050
District of Columbia	786.0	822.9	868.3	897.9	924.0	950.1	977.2	n/a	n/a
Montgomery	506.0	540.0	585.0	628.0	673.0	703.0	723.0	n/a	n/a
Prince George's	358.4	370.1	383.6	399.6	419.6	444.1	474.6	n/a	n/a
Arlington	205.2	218.2	243.8	262.4	268.6	278.5	281.1	n/a	n/a
Alexandria	108.9	117.7	124.1	135.4	142.3	153.6	160.4	n/a	n/a
Fairfax	680.0	725.5	788.5	830.0	863.8	891.3	917.5	n/a	n/a
Loudoun	143.7	167.6	206.5	236.3	257.2	271.5	285.4	n/a	n/a
Prince William	144.5	166.7	188.8	209.9	232.6	256.1	280.7	n/a	n/a
Frederick	142.4	151.5	158.3	163.5	167.3	171.1	175.1	n/a	n/a
TOTALS	3075.1	3280.2	3546.9	3763.0	3948.4	4119.3	4275.0	n/a	n/a

Figure 59 – Table of Macroeconomic Employment Forecasts by Jurisdiction

	2010	2015	2020	2025	2030	2035	2040	2045	2050
District of Columbia	786.0	822.9	839.5	860.7	882.4	907.3	933.2	959.7	987.0
Montgomery	506.0	540.0	585.0	628.0	673.0	703.0	723.0	749.4	776.7
Prince George's	358.4	370.1	383.6	399.6	419.6	444.1	474.6	504.7	536.8
Arlington	205.2	218.2	243.8	262.4	268.6	278.5	281.1	287.6	294.2
Alexandria	108.9	117.7	124.1	135.4	142.3	153.6	160.4	170.3	180.8
Fairfax	680.0	725.5	788.5	845.3	888.4	933.7	971.6	1016.2	1062.7
Loudoun	143.7	167.6	206.5	239.4	270.8	299.0	322.1	351.3	383.2
Prince William	144.5	166.7	188.8	209.9	232.6	256.1	280.7	308.4	338.7
Frederick	112.1	119.2	124.6	128.7	131.7	134.7	137.8	141.0	144.2
TOTALS	3044.8	3247.9	3484.4	3709.3	3909.4	4110.0	4284.6	4488.6	4704.4

Figure 60 – Table of Difference between Macroeconomic and Round 8.0 Employment Forecasts

	2010	2015	2020	2025	2030	2035	2040	2045	2050
District of Columbia	0.0	0.0	-28.8	-37.2	-41.6	-42.8	-44.0	n/a	n/a
Montgomery	0.0	0.0	0.0	0.0	0.0	0.0	0.0	n/a	n/a
Prince George's	0.0	0.0	0.0	0.0	0.0	0.0	0.0	n/a	n/a
Arlington	0.0	0.0	0.0	0.0	0.0	0.0	0.0	n/a	n/a
Alexandria	0.0	0.0	0.0	0.0	0.0	0.0	0.0	n/a	n/a
Fairfax	0.0	0.0	0.0	15.3	24.6	42.4	54.1	n/a	n/a
Loudoun	0.0	0.0	0.0	3.1	13.6	27.5	36.7	n/a	n/a
Prince William	0.0	0.0	0.0	0.0	0.0	0.0	0.0	n/a	n/a
Frederick	-30.3	-32.3	-33.7	-34.8	-35.6	-36.4	-37.3	n/a	n/a
TOTALS	-30.3	-32.3	-62.5	-53.7	-39.0	-9.3	9.6	n/a	n/a

Figure 61 – Table of Renaissance Employment Forecasts by Jurisdiction

	2010	2015	2020	2025	2030	2035	2040	2045	2050
District of Columbia	784.3	806.0	853.5	878.0	899.4	920.3	945.3	968.7	991.3
Montgomery	506.0	540.0	585.0	628.0	673.0	703.0	723.0	749.4	776.7
Prince George's	358.4	370.1	383.6	399.6	419.6	444.1	474.6	504.7	536.8
Arlington	198.8	203.8	239.7	259.9	268.1	278.4	281.0	287.5	293.9
Alexandria	119.1	124.6	135.9	144.5	147.6	157.7	163.5	171.6	179.7
Fairfax	678.7	719.0	810.9	858.8	899.0	931.3	961.6	993.4	1024.2
Loudoun	150.9	173.2	233.5	266.0	285.2	303.1	321.4	340.1	358.8
Prince William	144.5	166.7	188.8	209.9	232.6	256.1	280.7	308.4	338.7
Frederick	112.1	119.2	124.6	128.7	131.7	134.7	137.8	141.0	144.2
TOTALS	3052.8	3222.6	3555.5	3773.4	3956.1	4128.8	4288.9	4464.8	4644.4

Figure 62 – Table of Difference between Renaissance and Round 8.0 Employment Forecasts

	2010	2015	2020	2025	2030	2035	2040	2045	2050
District of Columbia	-1.7	-16.9	-14.8	-19.9	-24.6	-29.8	-31.9	n/a	n/a
Montgomery	0.0	0.0	0.0	0.0	0.0	0.0	0.0	n/a	n/a
Prince George's	0.0	0.0	0.0	0.0	0.0	0.0	0.0	n/a	n/a
Arlington	-6.4	-14.4	-4.1	-2.5	-0.5	-0.1	-0.1	n/a	n/a
Alexandria	10.2	6.9	11.8	9.1	5.3	4.1	3.1	n/a	n/a
Fairfax	-1.3	-6.5	22.4	28.8	35.2	40.0	44.1	n/a	n/a
Loudoun	7.2	5.6	27.0	29.7	28.0	31.6	36.0	n/a	n/a
Prince William	0.0	0.0	0.0	0.0	0.0	0.0	0.0	n/a	n/a
Frederick	-30.3	-32.3	-33.7	-34.8	-35.6	-36.4	-37.3	n/a	n/a
TOTALS	-22.3	-57.6	8.6	10.4	7.7	9.5	13.9	n/a	n/a

Figure 63 – Table of Difference between Renaissance and Macroeconomic Employment Forecasts

	2010	2015	2020	2025	2030	2035	2040	2045	2050
District of Columbia	-1.7	-16.9	14.0	17.3	16.9	13.0	12.1	9.0	4.3
Montgomery	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Prince George's	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Arlington	-6.4	-14.4	-4.1	-2.5	-0.5	-0.1	-0.1	-0.1	-0.3
Alexandria	10.2	6.9	11.8	9.1	5.3	4.1	3.1	1.3	-1.1
Fairfax	-1.3	-6.5	22.4	13.5	10.6	-2.4	-10.0	-22.7	-38.5
Loudoun	7.2	5.6	27.0	26.6	14.4	4.1	-0.8	-11.2	-24.4
Prince William	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Frederick	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
TOTALS	8.0	-25.3	71.1	64.0	46.7	18.7	4.3	-23.7	-60.0

Jobs to Population Ratio Reasonableness Check

The jobs to population ratio calculation was used to determine the success of capturing market assumptions at the jurisdictional level in the final adjustments and the reasonableness of the overall jobs to population ratio in the region. All three sources (the MWCOG forecast, the macroeconomic forecast, and the Renaissance forecast) provide essentially the same message; the region will grow slightly more jobs heavy and will continue to need to import workers. In general, the totals indicate the macroeconomic factors (Figure 65) suggest population growth relative to job growth would be relatively, but only slightly, stronger than the MWCOG forecast while the Renaissance final forecast shows a jobs to population ratio returning to something similar to the existing MWCOG forecast by 2040 (Figure 66). The macroeconomic forecast has a slightly lower jobs-to-housing ratio but this is predicated in large part on the presumption that Loudoun County's population will grow to nearly 700,000 by 2040, whereas the Renaissance forecast indicates the County will not exceed 500,000 people by 2050.

The Renaissance forecast anticipates the Primary Market Area (and the region) will absorb both additional jobs and additional housing by 2040 as compared to the MWCOG forecast and that capacity exists for continued growth between 2040 and 2050. The mix of this accelerated growth is due in part to policy changes along the Silver Line corridor, such as the Tysons Corner master plan, that are designed to promote mixed use on properties currently zoned for commercial use only. However, we find that the long term economic prospects for jobs in the region are strong enough that the market will continue to draw jobs and housing in relatively proportional amounts in these newer mixed use communities. In summary, the creation of mixed use zoning is a needed and desired trend for a variety of placemaking perspectives but the desired mixed use flexibility will ultimately result in accommodation of additional demand for jobs and housing more so than measurably shifting the regional jobs to population balance.

Figure 64 – Jobs to Population Ratio Round 8.0

	2010	2015	2020	2025	2030	2035	2040	2045	2050
District of Columbia	1.30	1.26	1.30	1.29	1.30	1.30	1.28	n/a	n/a
Montgomery	0.52	0.53	0.55	0.57	0.58	0.59	0.60	n/a	n/a
Prince George's	0.42	0.42	0.43	0.44	0.45	0.47	0.50	n/a	n/a
Arlington	0.97	0.97	1.04	1.09	1.09	1.12	1.12	n/a	n/a
Alexandria	0.75	0.79	0.78	0.81	0.82	0.85	0.85	n/a	n/a
Fairfax	0.62	0.64	0.66	0.67	0.68	0.68	0.69	n/a	n/a
Loudoun	0.50	0.53	0.58	0.60	0.61	0.63	0.65	n/a	n/a
Prince William	0.32	0.33	0.35	0.37	0.39	0.41	0.44	n/a	n/a
Frederick	0.59	0.57	0.55	0.53	0.49	0.46	0.43	n/a	n/a
TOTALS	0.63	0.64	0.66	0.67	0.68	0.69	0.69	n/a	n/a

Figure 65 – Jobs to Population Ratio Macroeconomic Forecast

	2010	2015	2020	2025	2030	2035	2040	2045	2050
District of Columbia	1.31	1.33	1.32	1.31	1.31	1.31	1.32	1.32	1.32
Montgomery	0.52	0.54	0.55	0.57	0.59	0.60	0.61	0.62	0.63
Prince George's	0.42	0.42	0.42	0.43	0.44	0.46	0.49	0.51	0.54
Arlington	0.99	0.99	1.06	1.11	1.11	1.14	1.14	1.16	1.17
Alexandria	0.78	0.82	0.81	0.84	0.85	0.88	0.88	0.90	0.92
Fairfax	0.61	0.63	0.65	0.67	0.68	0.70	0.72	0.74	0.76
Loudoun	0.46	0.45	0.48	0.48	0.48	0.47	0.46	0.46	0.45
Prince William	0.32	0.33	0.35	0.36	0.37	0.39	0.40	0.42	0.43
Frederick	0.48	0.47	0.45	0.43	0.41	0.40	0.39	0.37	0.36
TOTALS	0.62	0.63	0.64	0.65	0.65	0.66	0.67	0.68	0.69

Figure 66 – Jobs to Population Ratio Renaissance Forecast

	2010	2015	2020	2025	2030	2035	2040	2045	2050
District of Columbia	1.30	1.29	1.29	1.29	1.28	1.28	1.27	1.26	1.26
Montgomery	0.52	0.54	0.55	0.57	0.59	0.60	0.61	0.62	0.63
Prince George's	0.42	0.42	0.42	0.43	0.44	0.46	0.49	0.51	0.54
Arlington	0.96	0.94	1.04	1.09	1.09	1.12	1.12	1.14	1.16
Alexandria	0.85	0.87	0.88	0.90	0.88	0.91	0.91	0.92	0.93
Fairfax	0.61	0.63	0.66	0.67	0.68	0.69	0.70	0.71	0.72
Loudoun	0.48	0.52	0.60	0.62	0.64	0.65	0.68	0.70	0.72
Prince William	0.32	0.33	0.35	0.36	0.37	0.39	0.40	0.42	0.43
Frederick	0.48	0.47	0.45	0.43	0.41	0.40	0.39	0.37	0.36
TOTALS	0.62	0.63	0.65	0.66	0.67	0.68	0.69	0.70	0.71

Primary Market Area Population Forecasts³³

Figure 67 – Table of Renaissance Primary Market Area Population Totals by Jurisdiction

	2010	2015	2020	2025	2030	2035	2040	2045	2050
District of Columbia	288.7	304.7	325.7	340.5	351.7	358.6	371.6	381.6	391.5
Arlington	207.6	216.0	231.1	238.7	246.6	248.5	250.4	252.3	254.2
Alexandria	140.0	143.6	153.7	161.4	167.8	173.7	180.1	186.2	192.3
Fairfax	604.7	628.9	683.0	721.7	755.4	782.0	796.5	816.0	835.3
Loudoun	252.9	264.7	305.7	328.9	338.9	347.5	351.7	357.0	362.3
TOTALS	1493.9	1557.9	1699.2	1791.2	1860.4	1910.3	1950.3	1993.1	2035.6

Figure 68 – Table of Round 8.0 Primary Market Area Population Totals by Jurisdiction

	2010	2015	2020	2025	2030	2035	2040	2045	2050
District of Columbia	296.7	325.7	337.6	352.9	360.6	368.6	384.3	n/a	n/a
Arlington	212.3	224.8	235.5	241.4	247.3	249.6	252.0	n/a	n/a
Alexandria	145.0	149.1	158.5	166.9	173.3	180.9	188.3	n/a	n/a
Fairfax	600.2	630.6	666.9	699.0	723.9	745.7	758.5	n/a	n/a
Loudoun	231.0	251.1	276.6	298.5	309.1	314.7	318.4	n/a	n/a
TOTALS	1485.2	1581.3	1675.1	1758.7	1814.2	1859.5	1901.5	n/a	n/a

Figure 69 – Table of Difference between Round 8.0 and Renaissance Primary Market Area Population Totals

	2010	2015	2020	2025	2030	2035	2040	2045	2050
District of Columbia	-8.0	-21.0	-11.9	-12.4	-8.9	-10.0	-12.7	n/a	n/a
Arlington	-4.7	-8.8	-4.4	-2.7	-0.7	-1.1	-1.6	n/a	n/a
Alexandria	-5.0	-5.5	-4.8	-5.5	-5.5	-7.2	-8.2	n/a	n/a
Fairfax	4.5	-1.7	16.1	22.7	31.5	36.3	38.0	n/a	n/a
Loudoun	21.9	13.6	29.1	30.4	29.8	32.8	33.3	n/a	n/a
TOTALS	8.7	-23.4	24.1	32.5	46.2	50.8	48.8	n/a	n/a

³³ Values in tables are in thousands.

Primary Market Area Employment Forecasts³⁴

Figure 70 – Table of Renaissance Primary Market Area Employment Totals by Jurisdiction

	2010	2015	2020	2025	2030	2035	2040	2045	2050
District of Columbia	652.2	667.9	706.7	724.3	735.1	745.4	766.2	781.9	797.2
Arlington	198.8	203.8	239.7	259.9	268.1	278.4	281.0	287.5	293.9
Alexandria	119.1	124.6	135.9	144.5	147.6	157.7	163.5	171.6	179.7
Fairfax	507.0	530.4	599.1	639.0	671.4	697.8	722.5	748.5	773.6
Loudoun	136.4	155.8	212.9	243.0	260.8	277.6	295.0	312.9	330.7
TOTALS	1613.5	1682.5	1894.3	2010.7	2083.0	2156.9	2228.2	2302.4	2375.1

Figure 71 – Table of Round 8.0 Primary Market Area Employment Totals by Jurisdiction

	2010	2015	2020	2025	2030	2035	2040	2045	2050
District of Columbia	654.9	680.5	720.8	743.4	757.2	771.0	793.7	n/a	n/a
Arlington	205.2	218.2	243.8	262.4	268.6	278.5	281.1	n/a	n/a
Alexandria	108.9	117.7	124.1	135.4	142.3	153.6	160.4	n/a	n/a
Fairfax	507.9	535.0	587.2	621.4	649.3	671.9	693.3	n/a	n/a
Loudoun	130.0	150.4	186.8	214.1	233.4	246.7	259.9	n/a	n/a
TOTALS	1606.9	1701.8	1862.7	1976.7	2050.8	2121.7	2188.4	n/a	n/a

Figure 72 – Table of Difference between Round 8.0 and Renaissance Primary Market Area Employment Totals

	2010	2015	2020	2025	2030	2035	2040	2045	2050
District of Columbia	-2.7	-12.6	-14.1	-19.1	-22.1	-25.6	-27.5	n/a	n/a
Arlington	-6.4	-14.4	-4.1	-2.5	-0.5	-0.1	-0.1	n/a	n/a
Alexandria	10.2	6.9	11.8	9.1	5.3	4.1	3.1	n/a	n/a
Fairfax	-0.9	-4.6	11.9	17.6	22.1	25.9	29.2	n/a	n/a
Loudoun	6.4	5.4	26.1	28.9	27.4	30.9	35.1	n/a	n/a
TOTALS	6.6	-19.3	31.6	34.0	32.2	35.2	39.8	n/a	n/a

³⁴ Values in tables are in thousands.

Figure 73 - Map of Round 8.0 Population Density Per Acre 2010

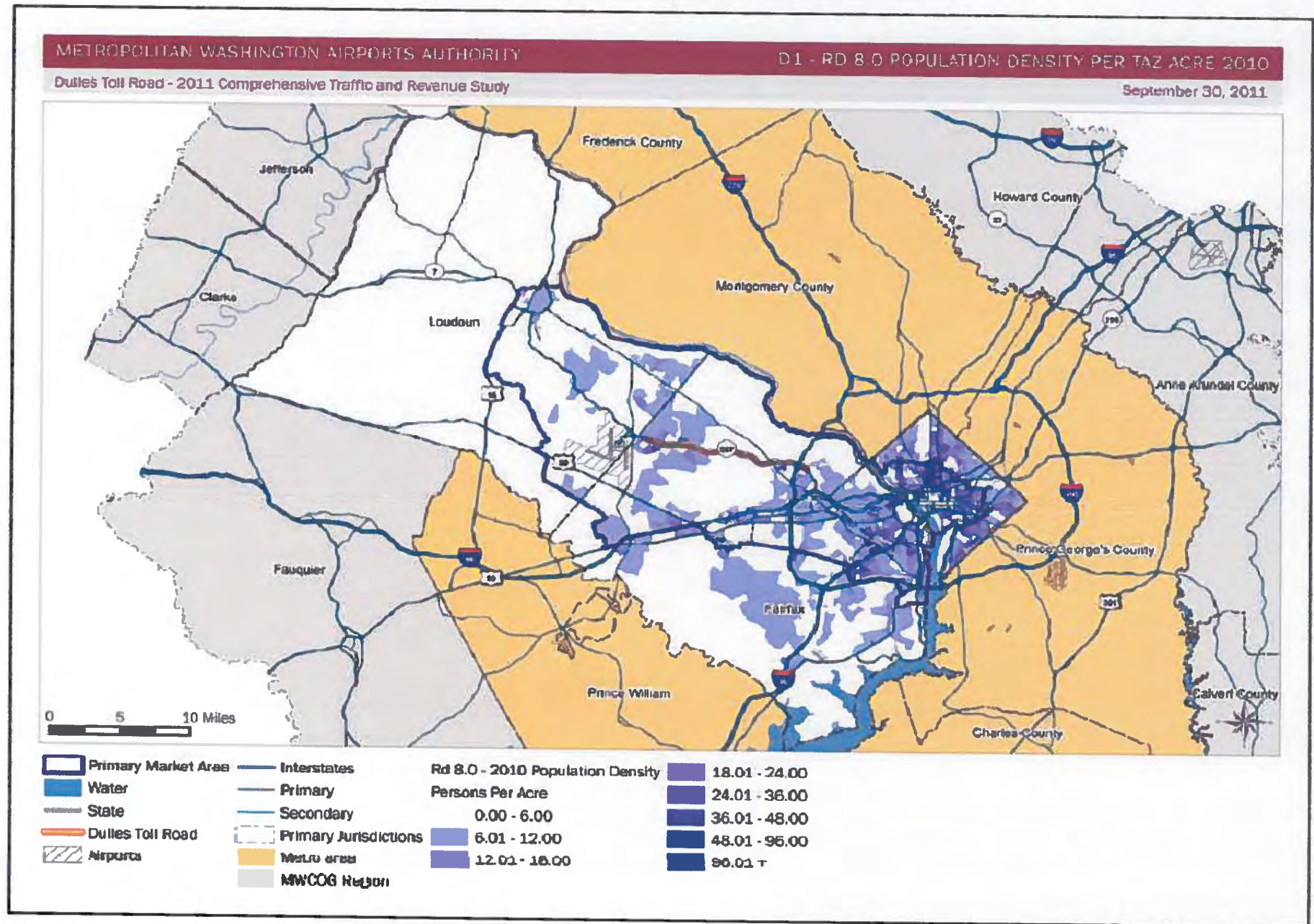


Figure 74 - Map of Round 8.0 Population Density Per Acre 2040

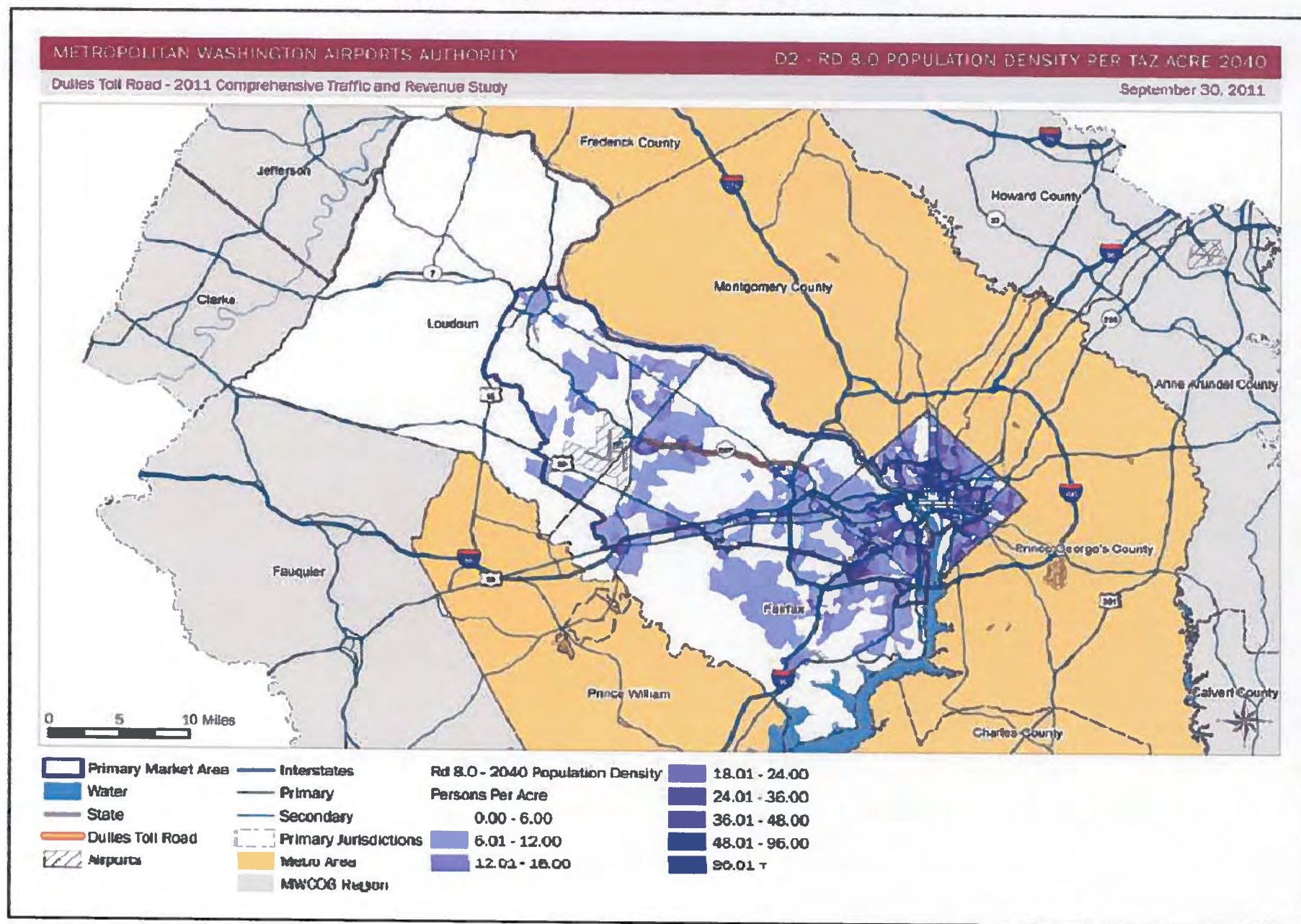


Figure 75 – Map of Round 8.0 Employment Density Per Acre 2010

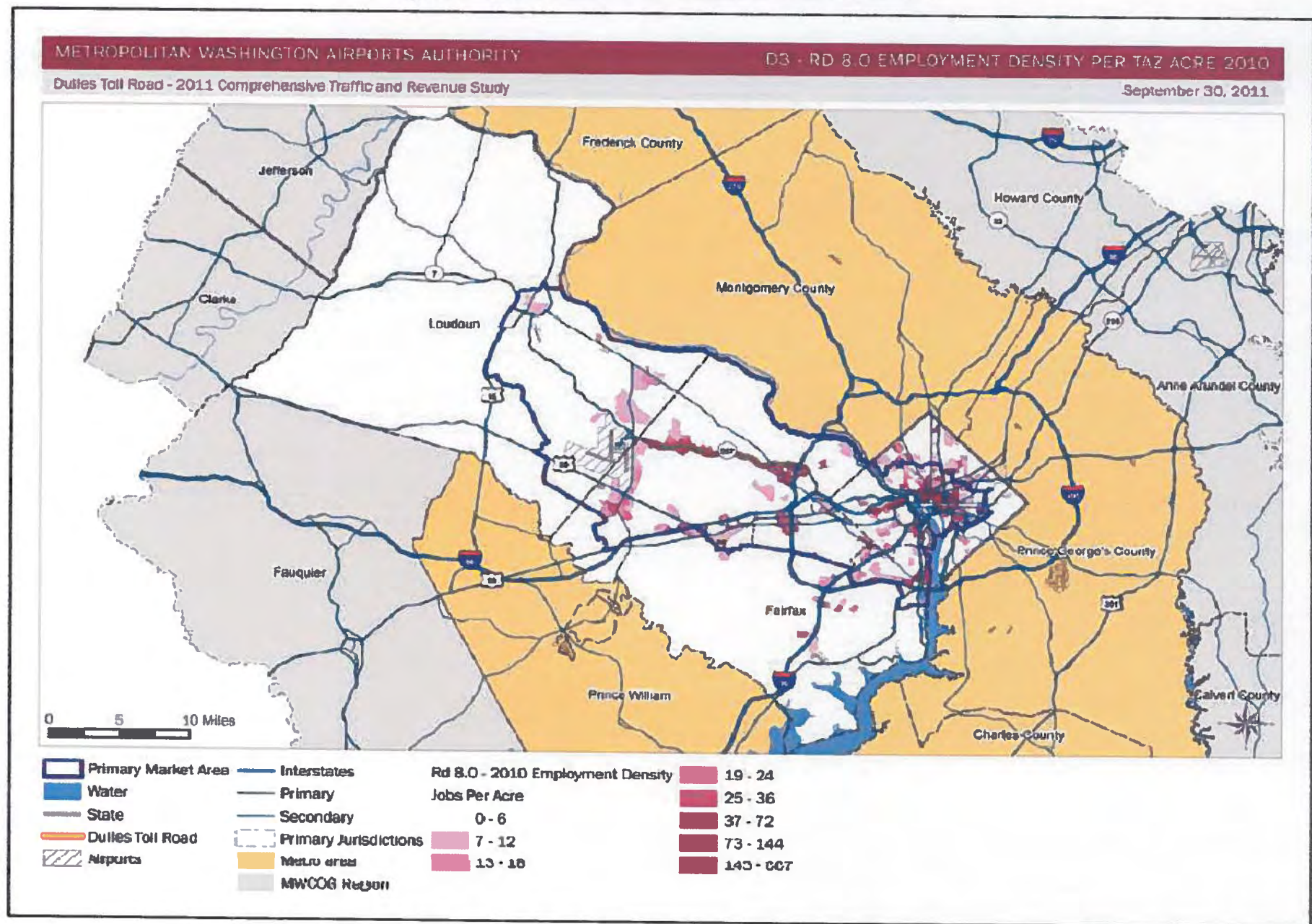


Figure 76 - Map of Round 8.0 Employment Density Per Acre 2040

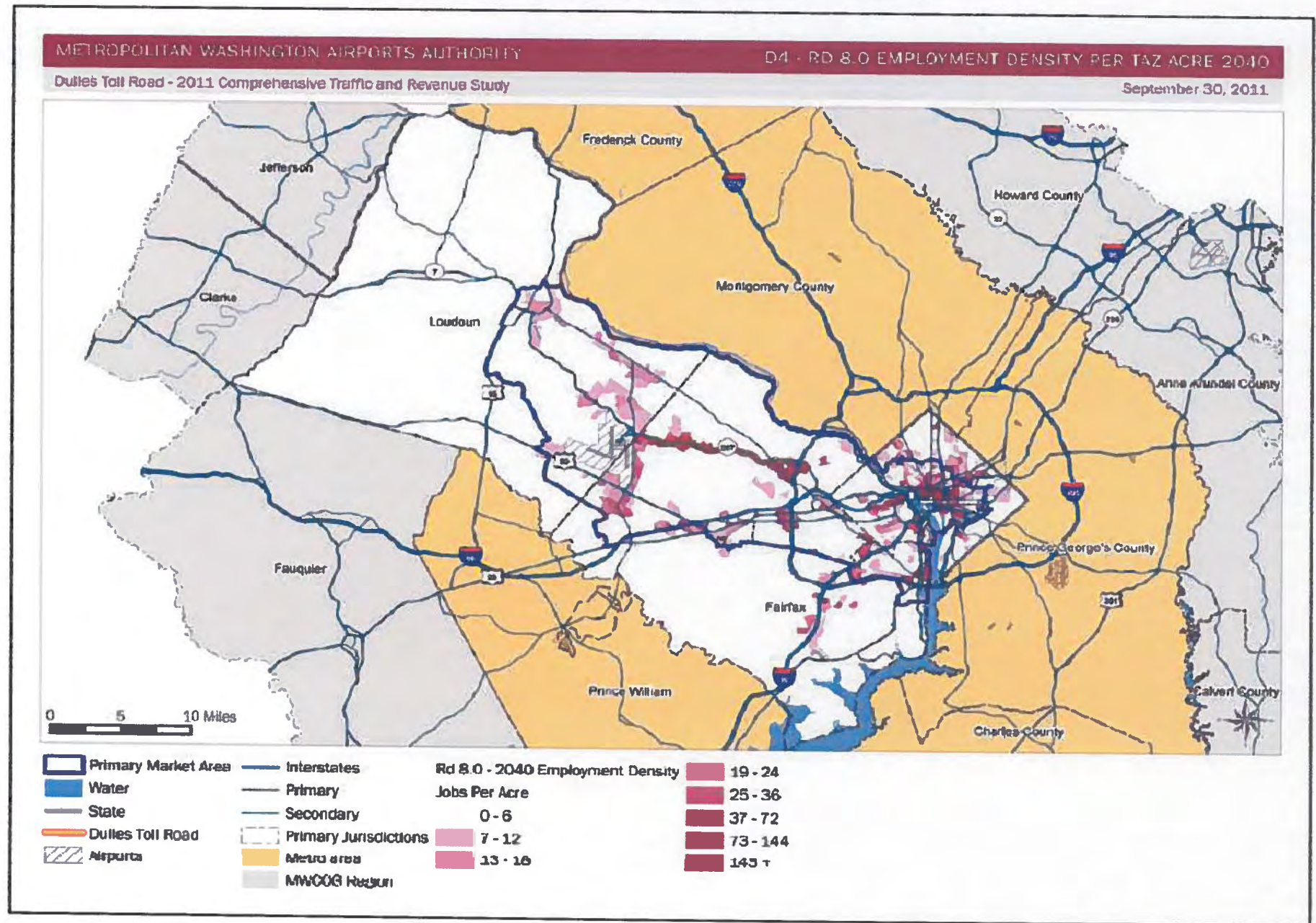


Figure 77 - Map of Renaissance Population Density Per Acre 2010

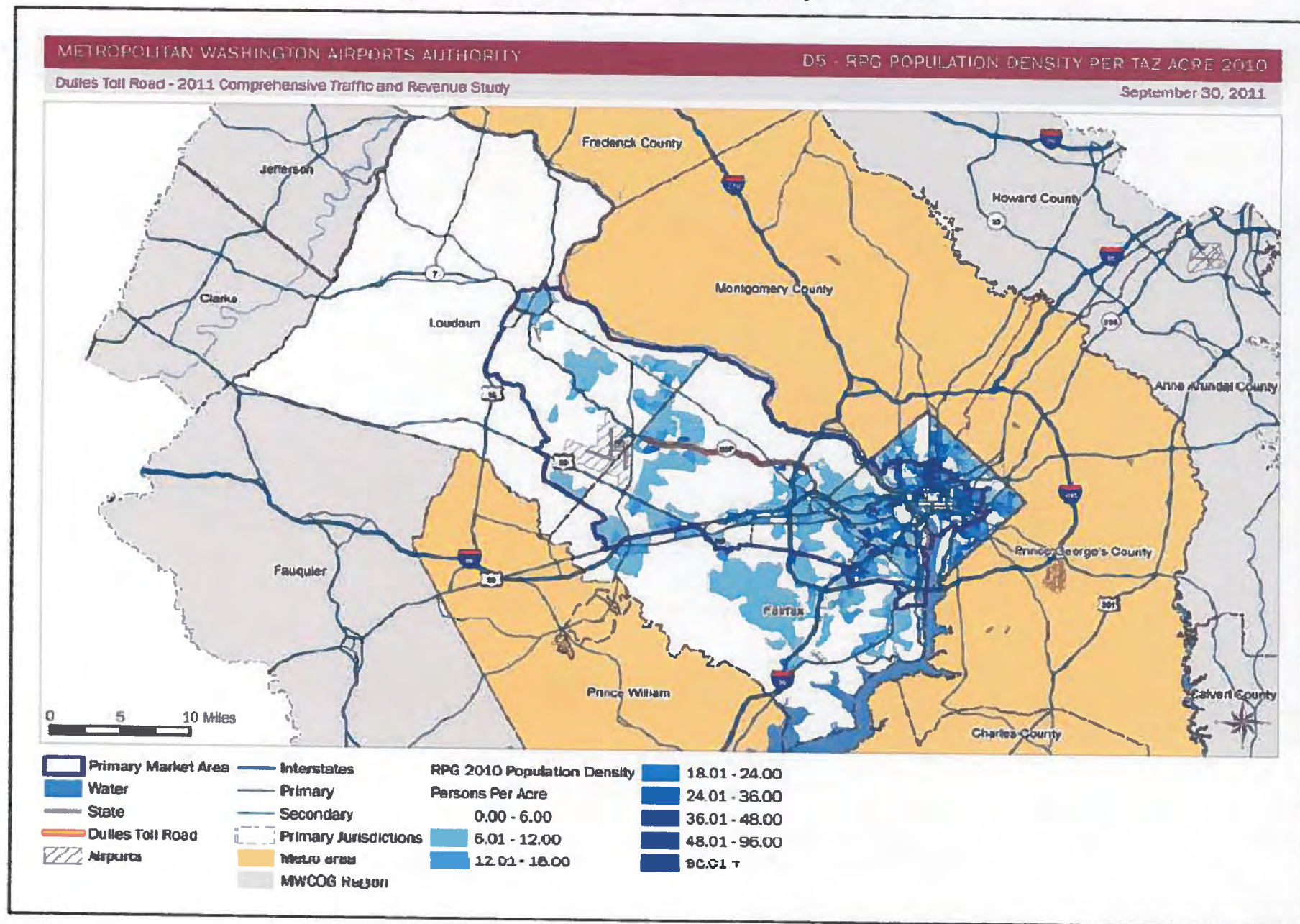


Figure 78 - Map of Renaissance Population Density Per Acre 2040

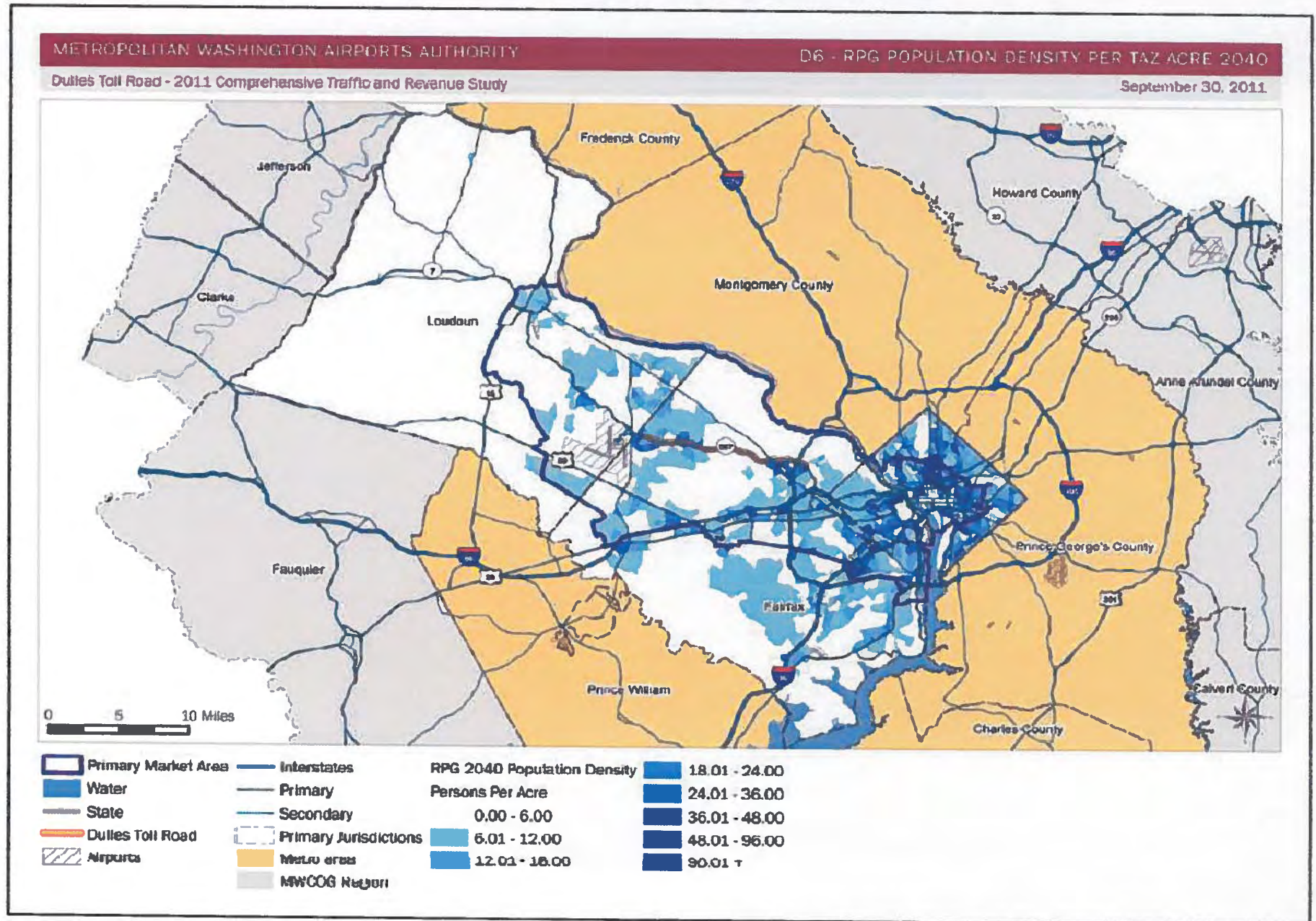


Figure 79 – Map of Renaissance Employment Density Per Acre 2010

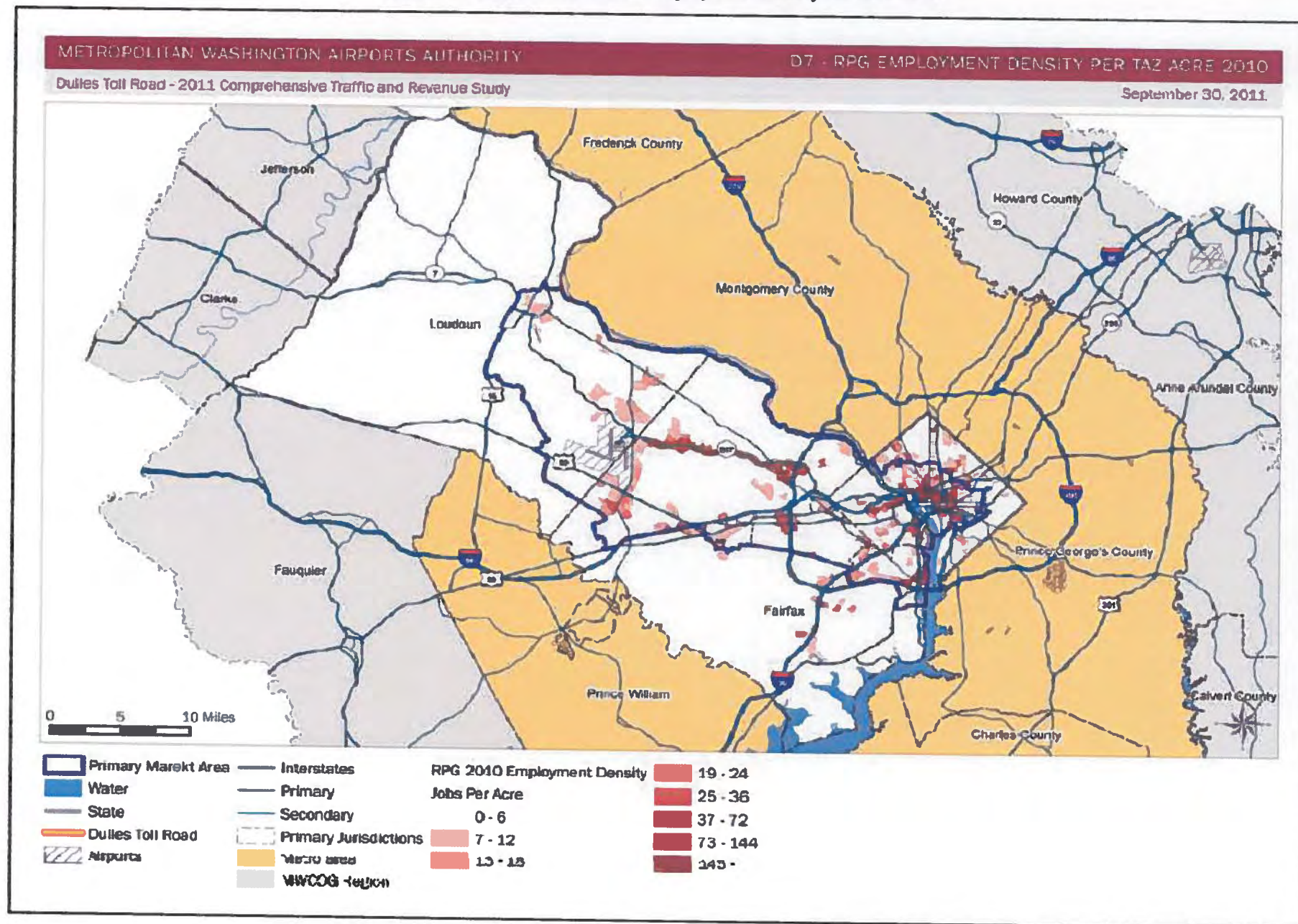


Figure 80 - Map of Renaissance Employment Density Per Acre 2040

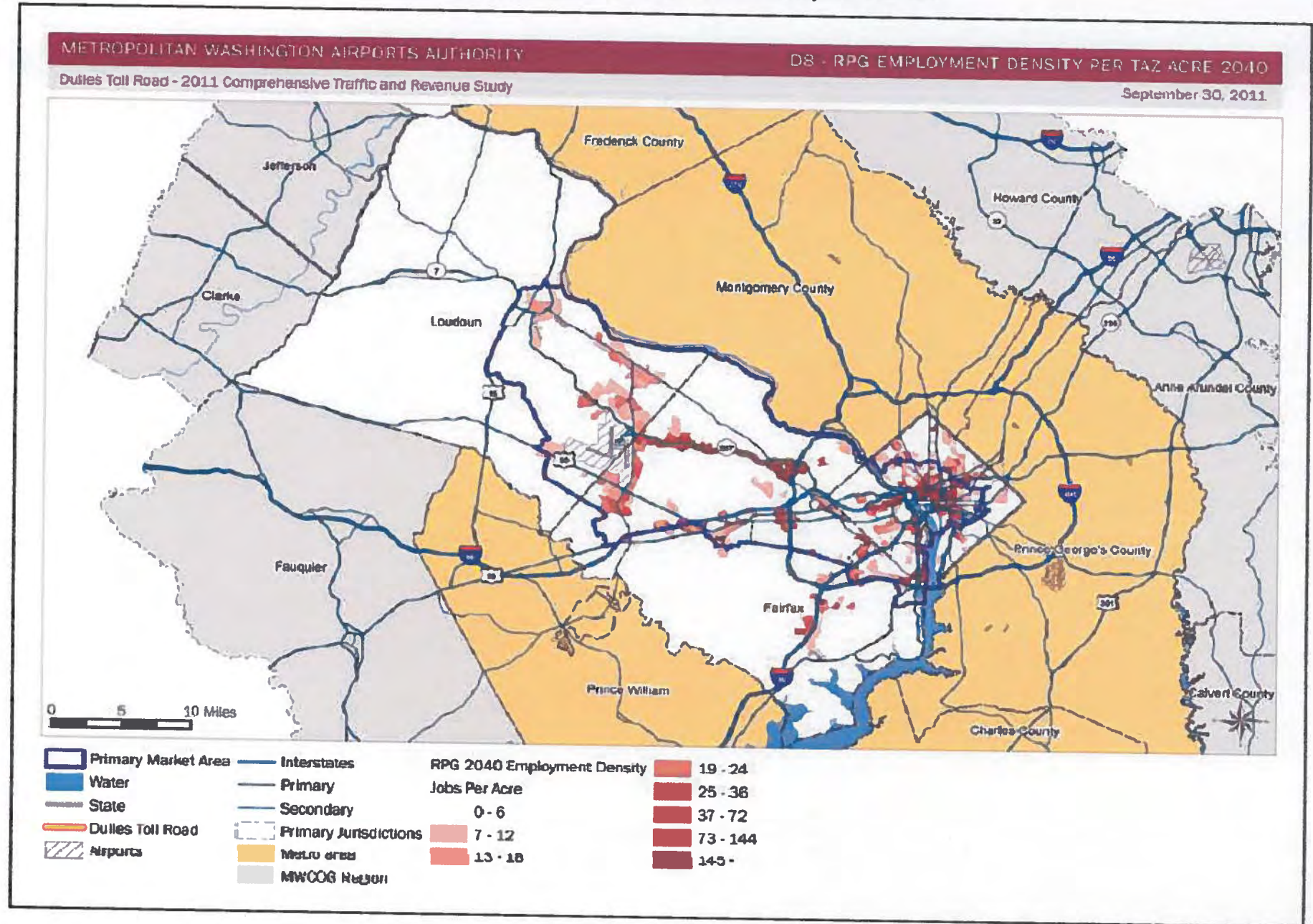


Figure 81 - Map of Round 8.0 2010-2040 Population Increment

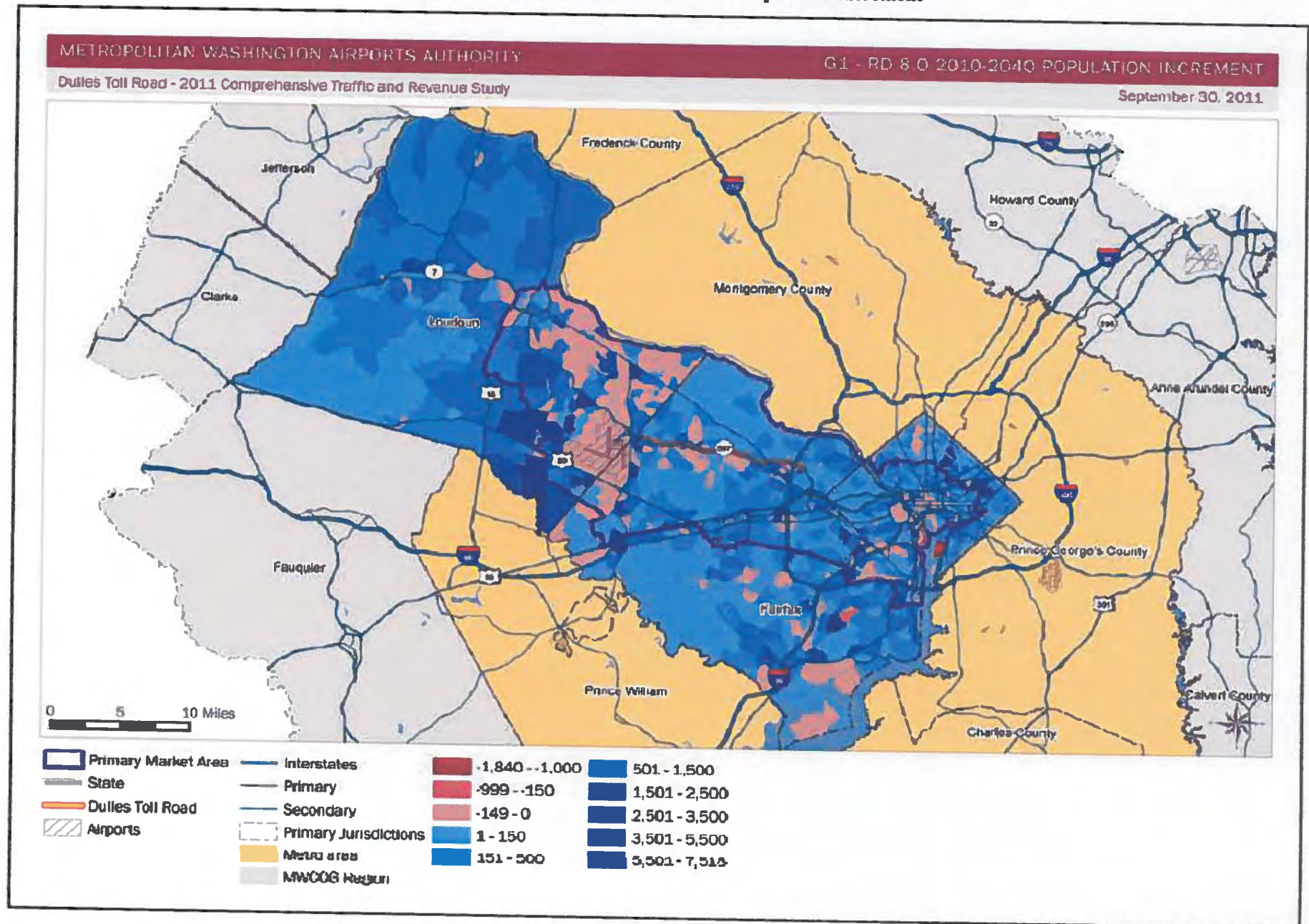


Figure 82 - Map of Renaissance 2010-2040 Population Increment

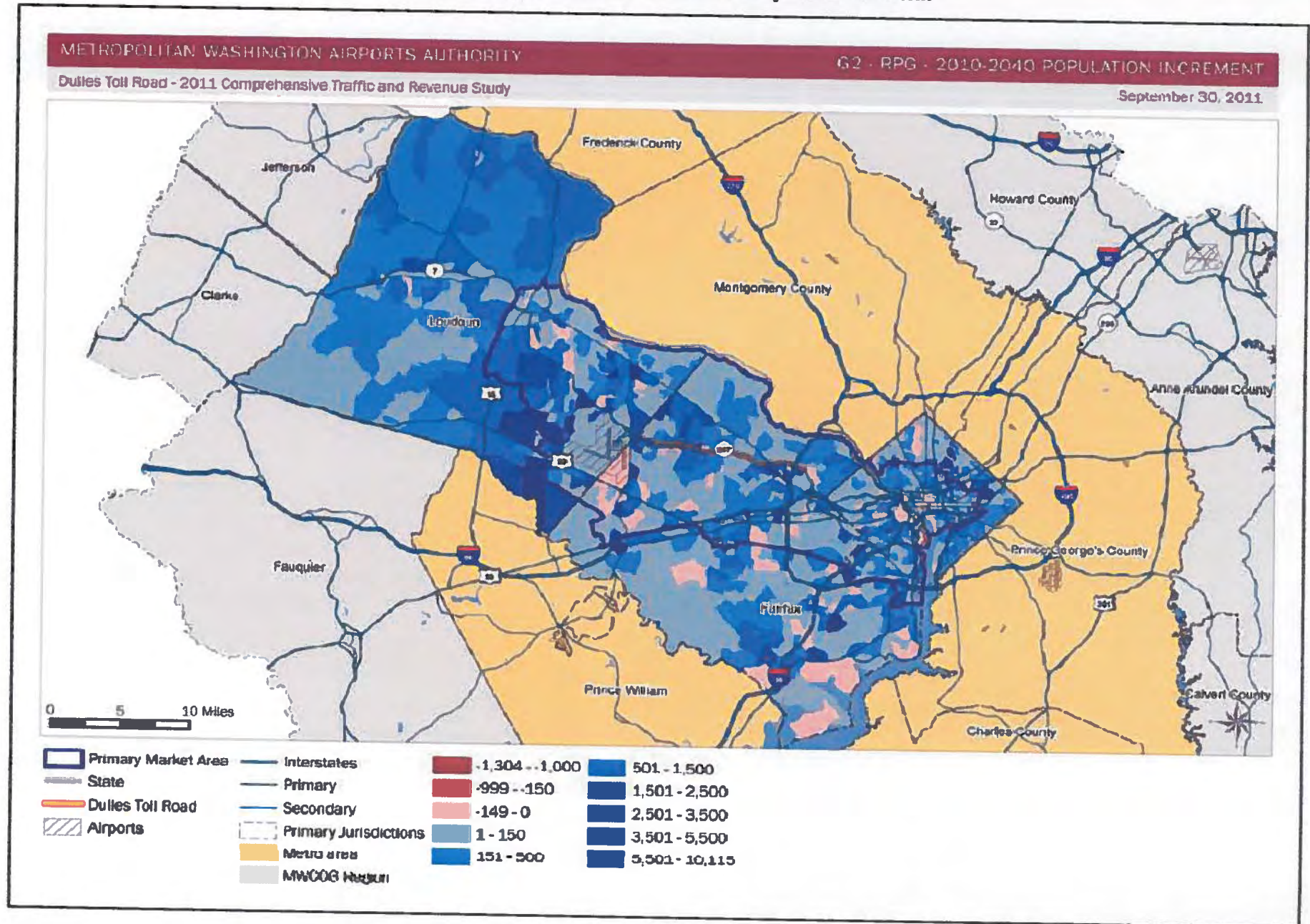


Figure 83 - Map of Population 2010 to 2040 Difference between Round 8.0 and Renaissance

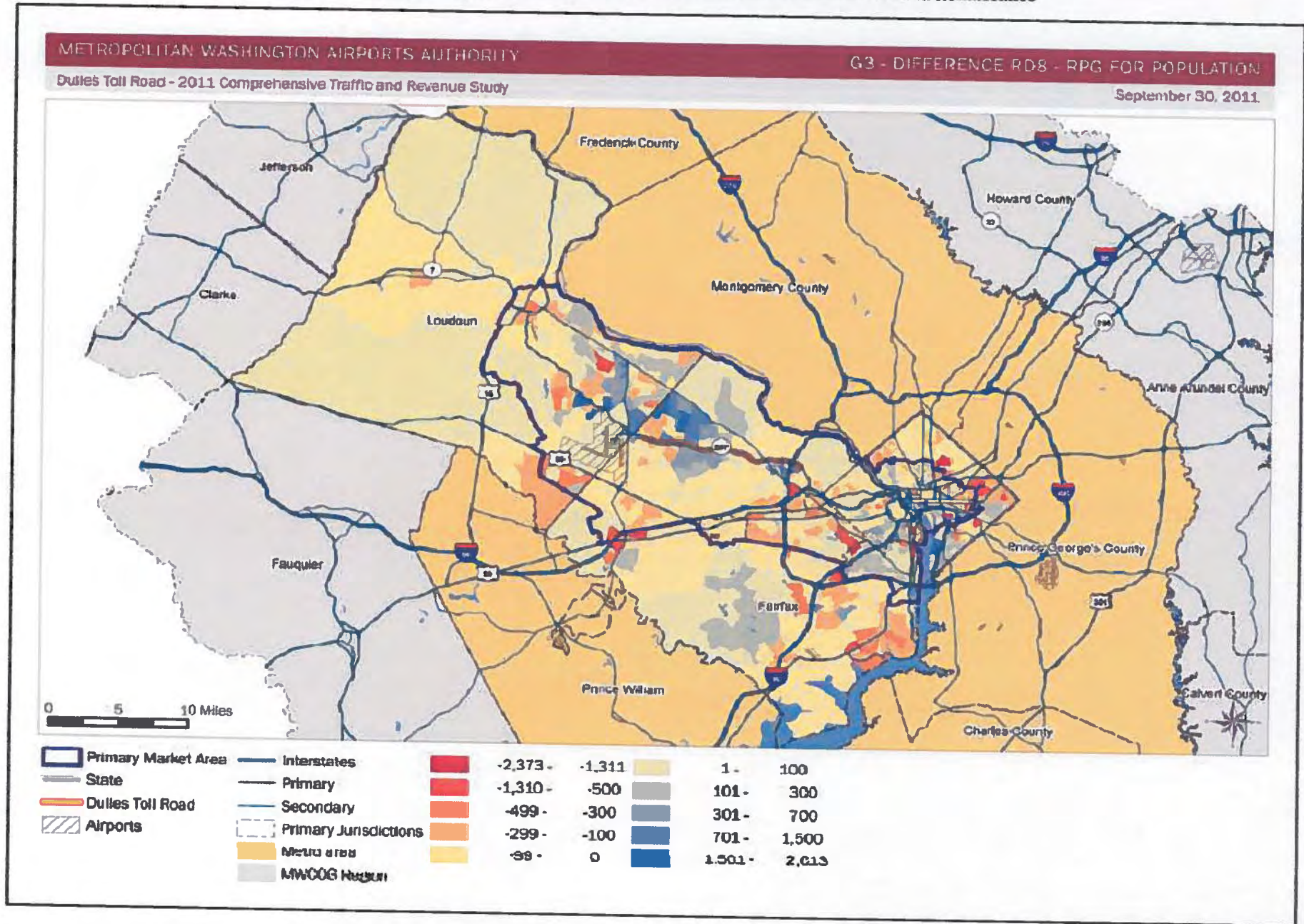


Figure 84 - Map of Round 8.0 2010-2040 Employment Increment

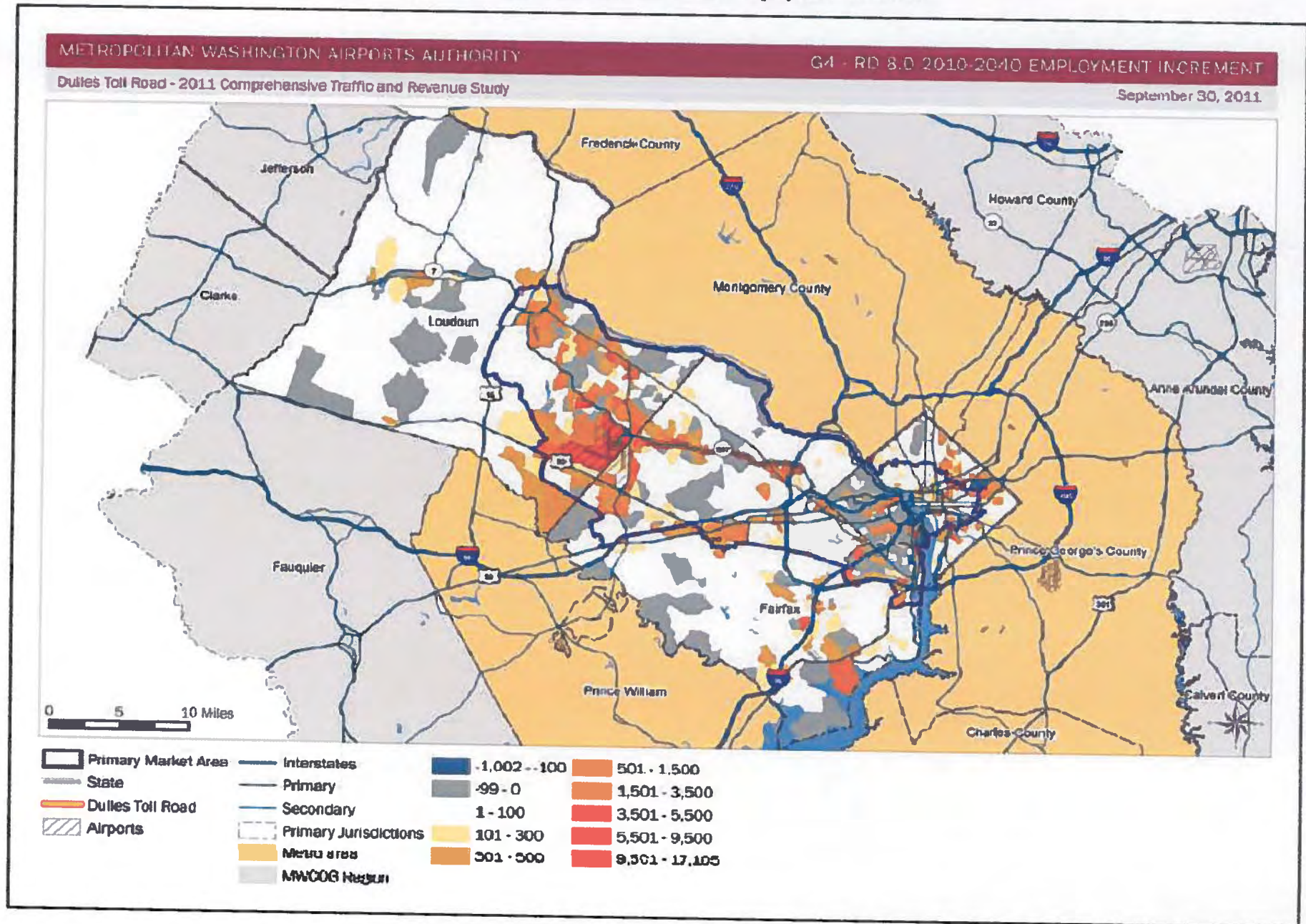


Figure 85 - Map of Renaissance 2010-2040 Employment Increment

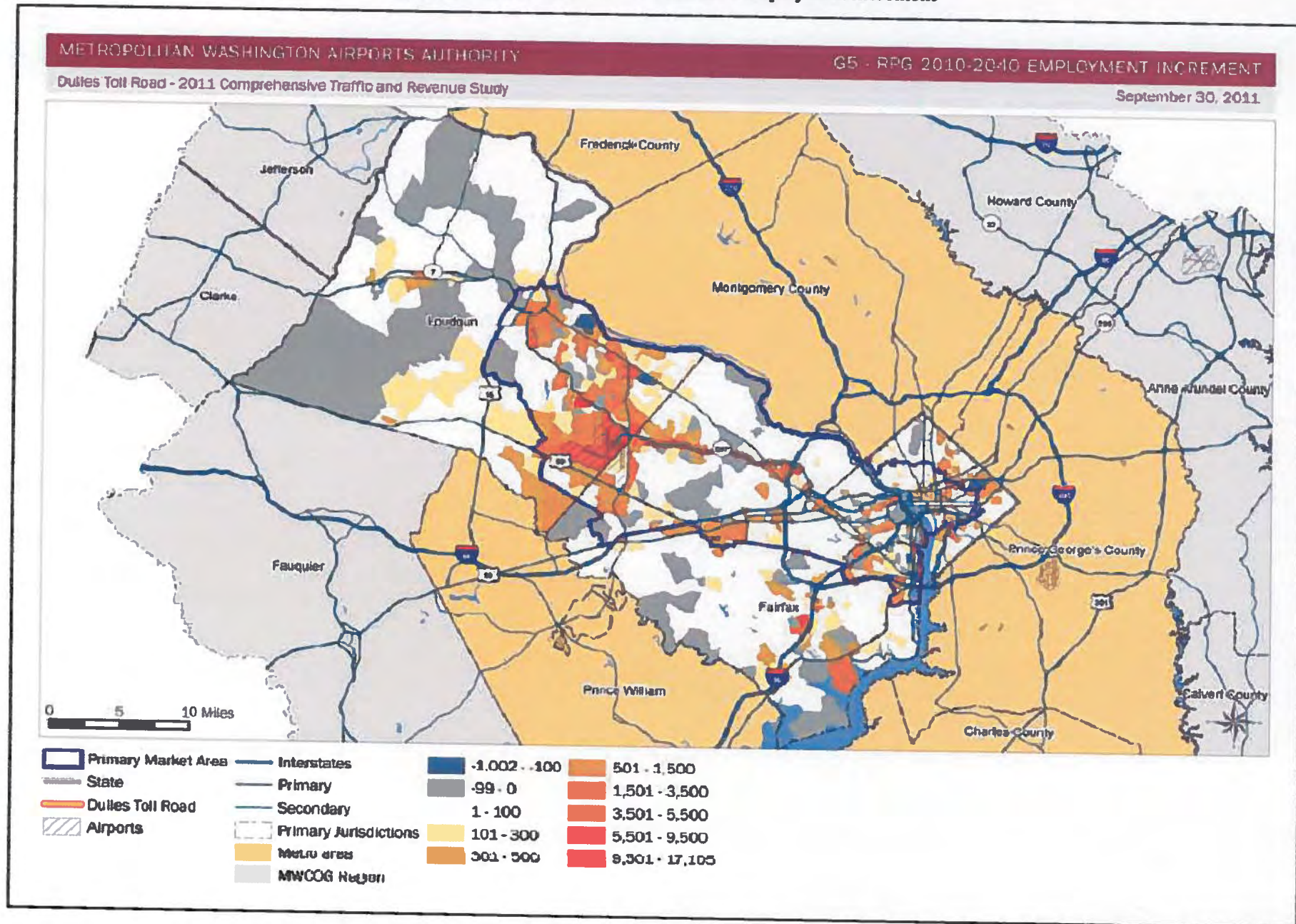
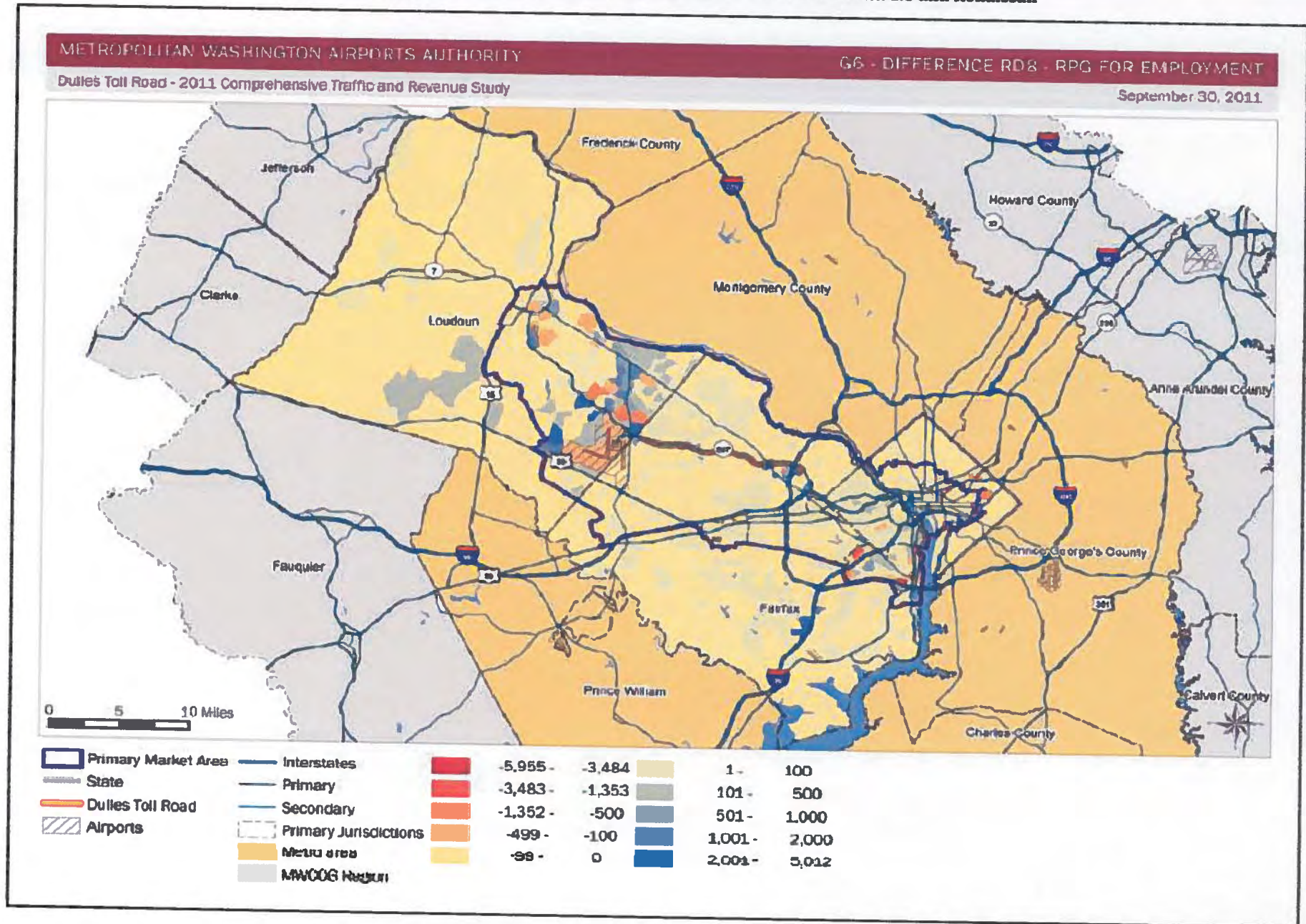


Figure 86 - Map of Employment 2010 to 2040 Difference between Round 8.0 and Renaissance



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