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## **APPENDIX B**

### **STUDENT ENROLLMENT & HOUSING DATA**

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- Enrollment Forecast Methodology
  - Analysis of Student Information
  - Analysis of Housing Unit Information
  - Preparation of Student Enrollment Forecasts
- Alternative Solutions to Overcrowding
- Student Enrollment Data: Current and Projected Enrollment
  - by School (Elementary, Middle and High), School Years 2007-2017
- Housing Units in Residential Development
  - by School (Elementary, Middle and High)
- Historical and Projected Enrollment Data – *Prince William County Schools*
- Student Membership Projections - Error Rate Analysis
- Student Generation Factors

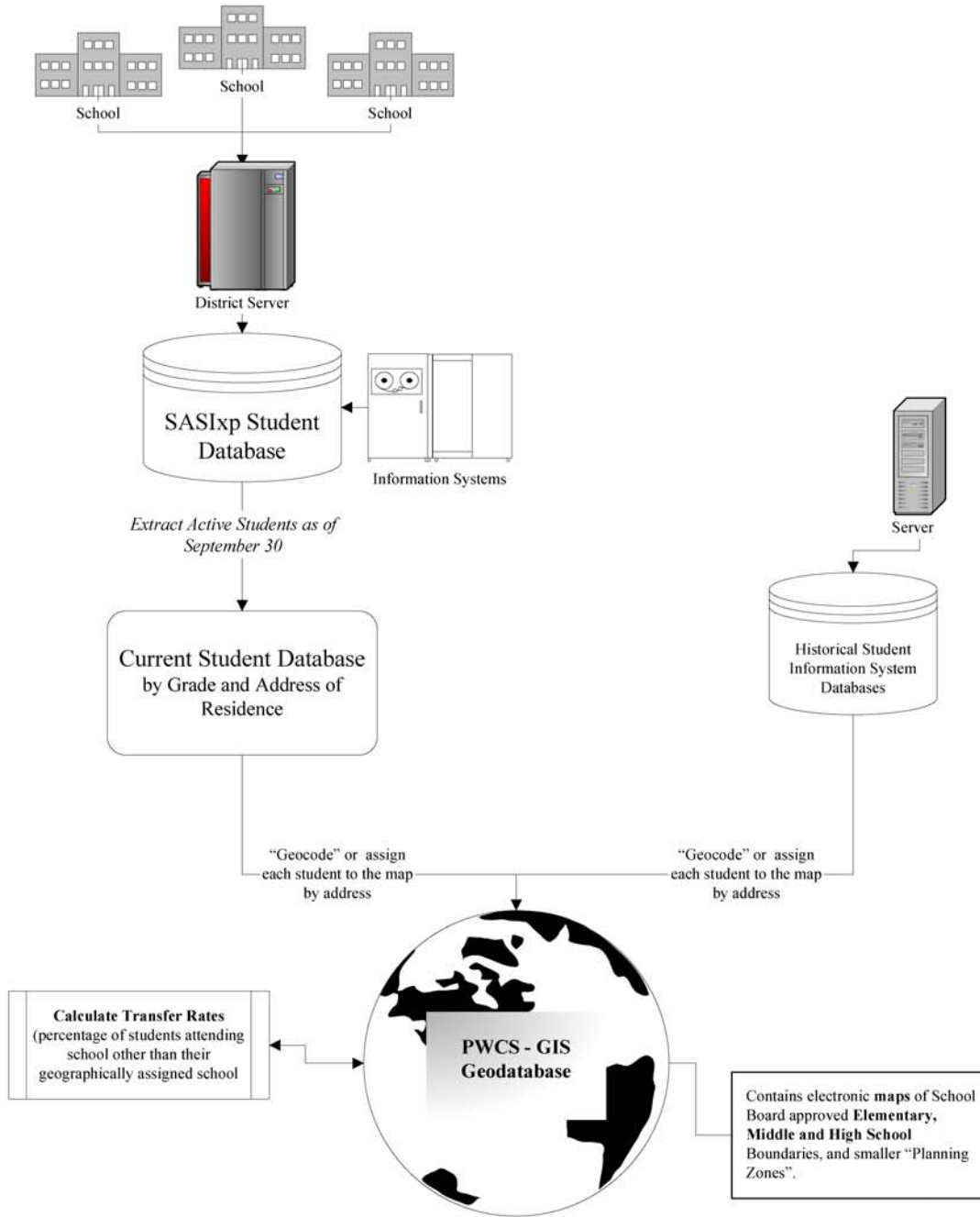
#### **Enrollment Forecast Methodology**

All forecasts have several things in common; all are an extrapolation of the past, all involve some level of judgment, and all forecasts are wrong. This is why judgment is so important when creating and evaluating the forecast. The real goal in the forecasting process is to reduce the range of error and monitor the process over time so it can continually be improved.

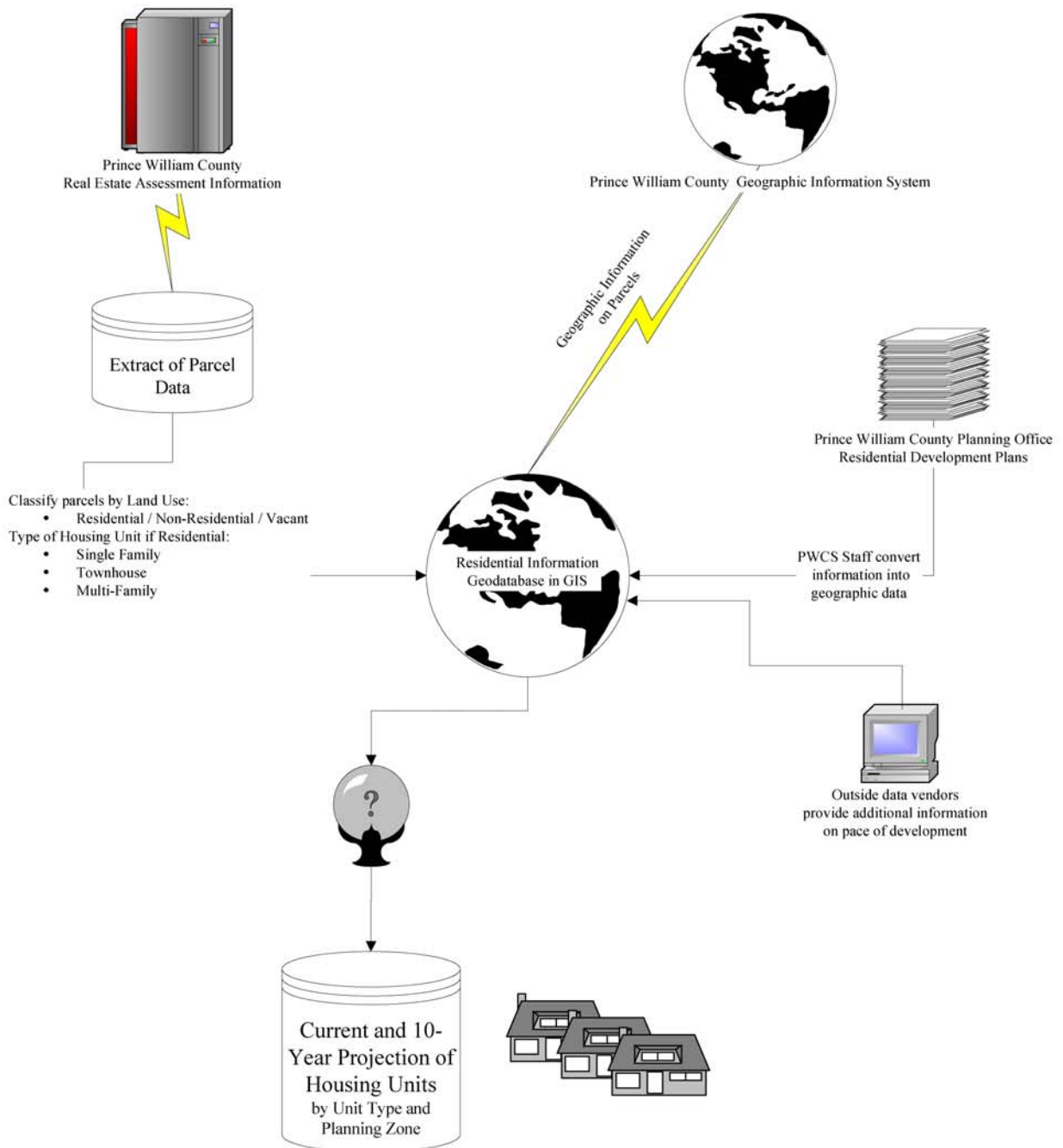
The forecasting methodology used to predict the number of students who will be enrolling in Prince William County Schools for the next 10 years is a combination of cohort progression method and student generation factors method, along with judgmental adjustment to fine-tune the forecasts. This combination of methods was chosen because it provides for very accurate forecasts and at the same time is relatively inexpensive to produce. The process is data intensive and involves the extensive use of Geographic Information System (GIS) to analyze the many geographic data involved.

The accuracy of this forecasting method has been very good in the past, with an average error of approximately 0.5% countywide. Success at the school level has not been as good but the forecasts have been well within the acceptable range. Countywide forecasts have been more successful than the school level forecasts because the population being forecasted is much larger. This phenomenon is common to all forecasting methodologies and is therefore expected.

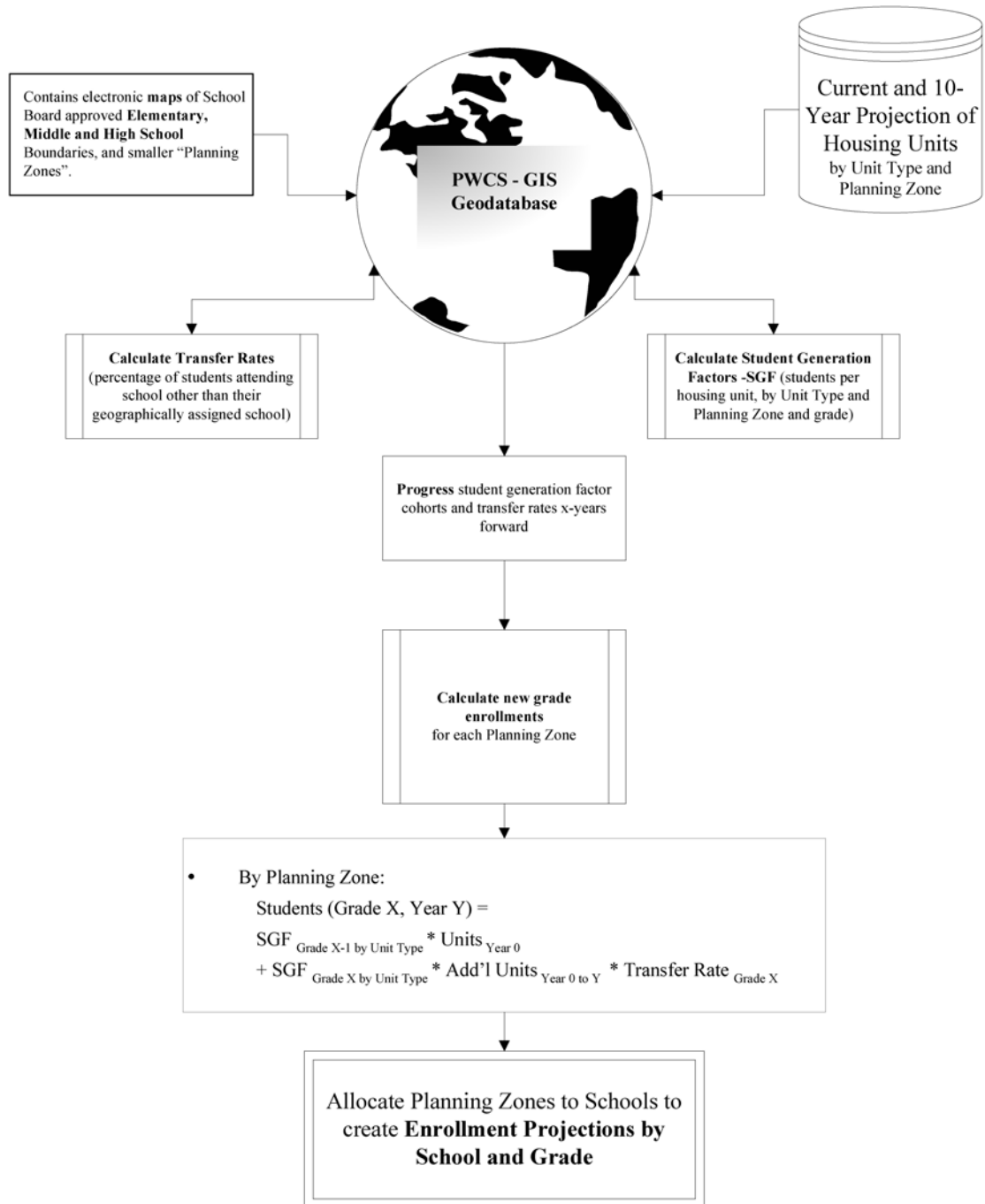
# Analysis of Student Information



# Analysis of Housing Unit Information



# Preparation of Student Enrollment Forecasts



### Student Generation Factors

The enrollment forecasts are now created using the **student generation factors** method combined with the **cohort progression method**. Together, these two means produce additional students using the current year's housing unit totals as a baseline. The process is detailed in the attached flow charts. This is an effective method that can, with accurate data, provide highly accurate forecasts of future enrollments.

Generation factors are created by calculating the number of students by housing unit type to the number of housing unit types by small "Planning Zones". The ratio is then applied to the number of predicted available units by year to produce the projections of new students in the Prince William County Schools.

In Prince William County, a year-by-year housing unit forecast is done, with a student generation factor then applied for the whole county on a grade-by-grade level to create the overall enrollment forecasts. These forecasts have been historically very accurate.

### Cohort Progression

The cohort progression method is, in basic terms, the application of an average growth rate over time to the current year's enrollment by grade level cohort. This growth rate can be taken from the previous year, or from an average of several previous years. The resulting ratio or growth rate is then applied to the current year's enrollment by grade level cohort to project the next year's enrollment.

The cohort ratio calculation in the following example describes the progression of sixth graders to seventh grade on average over 3 years. The same could be done over 2, 5, or any desired number of years. A greater number of years in the cohort calculation lessens the effects of any given year on the forecast, effectively "smoothing out" the historical data. Keeping this in mind, the forecaster can adjust the number of years used to calculate the cohort ratio to adjust for current and expected economic conditions and produce more accurate forecast results.

Grade	2004	2005	2006	2007	Cohort Ratio	Forecasted 2008
6 <sup>th</sup>	3,888	4,066	4,348	4,581		
7 <sup>th</sup>	N/A	4,024	4,184	4,525	1.0350	4,741

1. **Cohort Ratio** =  $(7^{\text{th}}_{2005} + 7^{\text{th}}_{2006} + 7^{\text{th}}_{2007}) / (6^{\text{th}}_{2004} + 6^{\text{th}}_{2005} + 6^{\text{th}}_{2006})$   
*7<sup>th</sup><sub>2007</sub> indicates the 7<sup>th</sup> grade cohort of 2007.*
2. **Cohort Ratio** =  $(4,024 + 4,184 + 4,525) / (3,888 + 4,066 + 4,348) = 1.0350$
3. **Forecasted 2008 7<sup>th</sup> Grade Cohort** =  $4,581 \times 1.0350 = 4,741$

The number of years used to calculate the cohort ratio has in fact changed several times over the period starting with 1980 in Prince William County. These changes were made to help adjust for the increasing growth rates in the late 80's, and also in the last two years. The three-year cohort had been used up until 2001 to project the one-year growth in student enrollment by grade. However, due to the high growth rates experienced in Prince William County over the last several years, a two-year cohort, or combination of the two- and three-year cohort have been used to calculate the forecasts for 2008-2009. This is because it is believed that the growth pattern over the last two years is a better representation of the short-term future. In the future the use of mixed cohorts may also be employed to adjust for differing growth rates within the county.

After each of these forecasts is calculated there is a reconciliation of the two using the judgment of the forecasters. The result is a forecast that is used as a baseline for the out-year forecasts.

### *Alternative Solutions to School Overcrowding*

There are several general methods that have been considered to alleviate overcrowding in schools.

- Year Round Schooling
- Boundary changes - For the opening of new schools or to shift student populations
- Optimization of boundaries so all available space in the county will be used
- Placement of trailers
- New construction
- Freezing transfers
- Program changes – Examples:
  - Shifting eighth grade to a high school with unused space.
  - Moving PK Special Education programs
  - Increasing pupil/teacher ratio
  - Split shift.

The method chosen for relieving overcrowding at a given school is determined by several criteria. These criteria include continuity and quality of educational program; maintenance of contiguous communities; transportation considerations; using centerline on divided highways when possible; and topographical features.