IECI TECHNICAL REPORT

APPENDIX D

Methodology for Evaluation of TAZ-Level IECIs

TAZ-Level Land Use Indicators

The land use indicators assessed in each TAZ include:

- Total Land Area
- Estimated Unconstrained Buildable Land
- Growth in Households, No Build, 2000-2030
- Build-out Capacity
- Land Consumption, No Build, 2000-2030
- Acreage per Unit, No Build, Growth from 2000 to 2030

These indicators were calculated as follows:

Total land area was derived from a GIS measurement based on the boundaries of each TAZ.

Estimated Unconstrained Buildable Land was derived from the Allowable Land Use (ALU) file using the methodology outlined in Appendix B.

Growth in Households was derived from the output of the LUAM feature of the Chittenden County Transportation Model as specified for the Circ Williston EIS.

Build-out Capacity was derived from the ALU file using the methodology outlined in Appendix B.

Land Consumption was calculated by multiplying the average build-out density for the zone (Estimated Unconstrained Buildable Land / Build-Out Capacity) from the ALU by the No Build Growth in Households, 2000 – 2030.

Acreage per Unit was estimated by dividing Land Consumption by No Build Growth in Households, 2000 – 2030.

TAZ-Level Environmental Features

The environmental features assessed in each TAZ include:

- Conserved Lands
- Core Habitat
- Deer Wintering Areas
- Biological Hotspots
- Floodplains
- Forest Cover
- Hazardous Materials Sites
- Mineral Resources Sites
- Prime Agricultural Soils
- Significant Wetlands (Class I and II wetlands)
- Surface Waters
- Wildlife Linkage Habitat

The data source, data relevance and data limitations for each environmental feature are detailed in Table B.

TAZ level environmental feature areas were calculated in acres using GIS for those features that could be represented as polygons. Other features, such as mineral and hazardous material sites were described. In evaluating potential encroachment impacts in each TAZ, the distribution of all environmental features was a key consideration. Important environmental features tended to have substantial areas of overlap. For example, many floodplains contain Class I and II wetlands.

The precise location of future growth in each TAZ cannot be predicted. However, the pattern of zoning, vacant subdivided parcels, 2004 orthophotography, road networks and water and sewer service areas were considered in evaluating the probable location of future growth in relation to the environmental features in each TAZ.

- The TAZ level impact analysis was based on existing zoning. For example, floodplain and open space zoning was expected to preclude direct encroachment impacts to environmental features located within these zoning districts.

- Parcel maps were used in combination with 2004 orthophotography to identify subdivided, vacant parcels. It was anticipated that these parcels would be developed in the future.

- Orthophotography was also used to identify areas where construction was occurring in 2004. Where new roads, residential or commercial development appeared to be occurring, this was noted in the description of impacts in each TAZ. In some TAZs it was clear that mapped environmental features have already been encroached upon. For example, in TAZ 258 (Figure 4-11a and 4-11b) a loop road typically associated with residential development has been constructed in an area mapped as a forested core habitat.

- Existing road networks were considered in the evaluation of impacts, with the expectation that accessibility would make available land along roadways a priority for development.

- Water and sewer service area mapping was also used in evaluating the potential location of future growth, with the expectation that, land within water and sewer service areas would be more likely to be developed than land outside of these service areas.

TAZ-Level Travel Time Indicators

Average travel time was derived from the Chittenden County Transportation Model, No Build Model for the Circ-Williston EIS and is equal to congested travel time from the TAZ analyzed to all other TAZs weighted by the number of trips between these TAZs estimated for 2030. Travel time savings is based on the difference in average travel time between each Build Alternative and the No Build Future Condition.

Development Indicators Data

Impervious Surface Area

Increases in impervious surfaces from 2000-2030 were estimated based on the land consumed and residential density in each household growth TAZ. For TAZs experiencing the greatest employment growth, an impervious factor of 85% was applied to the acreage of land consumed. Impervious surface fractions were applied to the area of land consumed as shown in Table A.

Table A
Impervious Surface Factors*

Land Use	Percent Impervious Cover
Low Density Residential (0.5 units/acre)	12%
Low Density Residential (1 units/acre)	20%
Medium Density Residential (2 units/acre)	25%
Medium Density Residential (3 units/acre)	30%
Medium Density Residential (4 units/acre)	38%
High Density Residential (5-7 units/acre)	40%
Commercial	85%

* NOAA Coastal Services Center, 2005; Center for Watershed Protection, 1998. "Rapid Watershed Planning Handbook"

Water Usage and Wastewater Generation

The increase in water usage and wastewater generation in 2030 was calculated based on household growth. The factors applied were averages for single family detached homes and nonresidential structures from the Transportation Research Board Report "The Cost of Sprawl." The average single family detached home uses 321 gallons per day of water and generates 257 gallons per day of wastewater. For employment growth, the factors used were 49.7 gallons of water/employee/day and 48.3 gallons of wastewater/employee/day. The per employee water and wastewater factors were derived based on the average usage per 1,000 square feet of office, retail, industrial and warehouse structures and the average number of employees per 1,000 square feet for each structure type.

Table B: Environmental Indicator Data Sources

Feature Name	Data Distributor and File Name	Data Source	Data Relevance	Data Limitations
Public Conserved Lands	Vermont Center for Geographic Information CadastralPublands_CONSPUB	University of Vermont Spatial Analysis Laboratory, 2004. Contains government owned conserved parcels and privately owned parcels with conservation easements that mandate public access.	Represents areas that are unlikely to experience land use change.	Does not include privately owned parcels with conservation easements, except for those that allow public access. Privately owned parcels with conservation easements assessed with data from CCRPC.
Core Habitat	Vermont Center for Geographic Information EcologicHabitat_COREHAB	Vermont Biodiversity Project, 2000. Generalized core habitat areas at least 100 meters from human disturbance were generated based on 1992 satellite imagery, roads, wetlands data and elevation.	Serves as an indicator of undisturbed habitat availability and integrity.	Does not take into account land use changes since 1992-1993. Different species require different types of habitat areas. Generalized nature of coverage does not represent local conditions.
Deer Wintering Areas	Vermont Center for Geographic Information EcologicHabitat_DEERWN Modified in the vicinity of the Circ A/B corridor based on a field study conducted by VTrans wildlife biologists.	Original data from Vermont Department of Fish and Wildlife, 1997. Generalized locations of deer wintering habitat based on historical maps and some limited field checking.	Represents areas of potential deer wintering habitat.	New field study conducted only for Circ A/B corridor. Generalized polygons may not represent localized habitat conditions.
Biological Hotspots	Vermont Center for Geographic Information EcologicHabitat_HOTSPOTS.shp	Vermont Biodiversity Project, 2000. Generalized polygons were drawn around concentrations of rare, threatened or endangered species and natural communities in the VANR Nongame and Natural Heritage database.	Represents areas of high biological diversity that may be sensitive to land use changes.	Generalized polygons at the landscape level do not represent localized variations in habitat availability and quality. Isolated occurrences of rare, threatened and endangered species were not included in the polygons.

Table B: Environmental Indicator Data Sources

Feature Name	Data Distributor and File Name	Data Source	Data Relevance	Data Limitations
Floodplain	Vermont Center for Geographic Information EmergencyFlood_FEMAFLCC	Chittenden County Regional Planning Commission, 1994. Floodplain mapping based on FEMA Flood Insurance Rate Maps.	Represents areas likely to be flooded—which may restrict development and provide beneficial such as habitat. Development in the 100-year floodplain is regulated by local and national statues.	Numerous problems encountered converting FEMA data to GIS. Original FEMA data is out of date and/or inaccurate. Not an official FEMA FIRM.
Forest Cover	Vermont Center for Geographic Information LandLandcov_LCLU2002	University of Vermont Spatial Analysis Laboratory, 2005. Land cover classifications based on 2002 Landsat imagery.	Indicator for forest cover.	Generalized raster (30 meter cell size), may not represent local conditions or recent changes.
Hazardous Materials Sites	Vermont Center for Geographic Information EnvironHazmat_HAZSITES	VANR DEC Waste Management Division, 2006. Hazardous materials release sites based on digitized points and GPS.	Represents hazardous materials sites and their current priority status for management action.	Does not provide detailed site specific information such as the specific hazardous materials involved.
Mineral Resources Sites	Vermont Center for Geographic Information GeologicOther_MRDSVT	USGS, 2005. Mineral Resources Data System extract for Vermont.	Represents past and present mineral resource sites, such as processing mills and mines.	Variable source data quality, due to inconsistent data collection and recording methods over several decades.
Prime Agricultural Soils	Vermont Center for Geographic Information GeologicSoils_SOAG	NRCS, 2006. Prime agricultural and soils of statewide importance extracted from SSURGO database.	Represents regulated prime agricultural soils.	For Chittenden County, the data has not had a quality assurance/quality control check and does not meet SSURGO data standards.
Significant Wetlands	Vermont Center for Geographic Information WaterWetlands_VSWI	VANR DEC, 2006. Class I and II regulated wetlands delineated based on mylar sheets and National Wetland Inventory Maps. .	Represents wetlands, which provide numerous beneficial functions and are regulated. Class I and II wetlands are defined according to the Vermont Wetland Rules	Locations are approximate within a few hundred meters. Not all wetlands are included—unmapped wetlands contiguous to mapped Class II wetlands are Class II.
Surface Waters	Vermont Center for Geographic Information WaterHydro_VHD	VCGI, 2004. 1:5,000 scale Vermont Hydrography Dataset, organized by HUC 8 subbasins.	Detailed coverage of surface water features, including small streams.	N/A
Wildlife Linkage Habitat Values	Vermont Center for Geographic Information EcologicHabitat_WLH	VANR and VTrans, 2006. Wildlife habitat linkage values generated based on satellite land cover data, core habitat data, and housing density.	Reflects the probability of suitable habitat being found in a particular 25 by 25 meter grid cell.	Generalized landscape level assessment does not reflect local conditions.