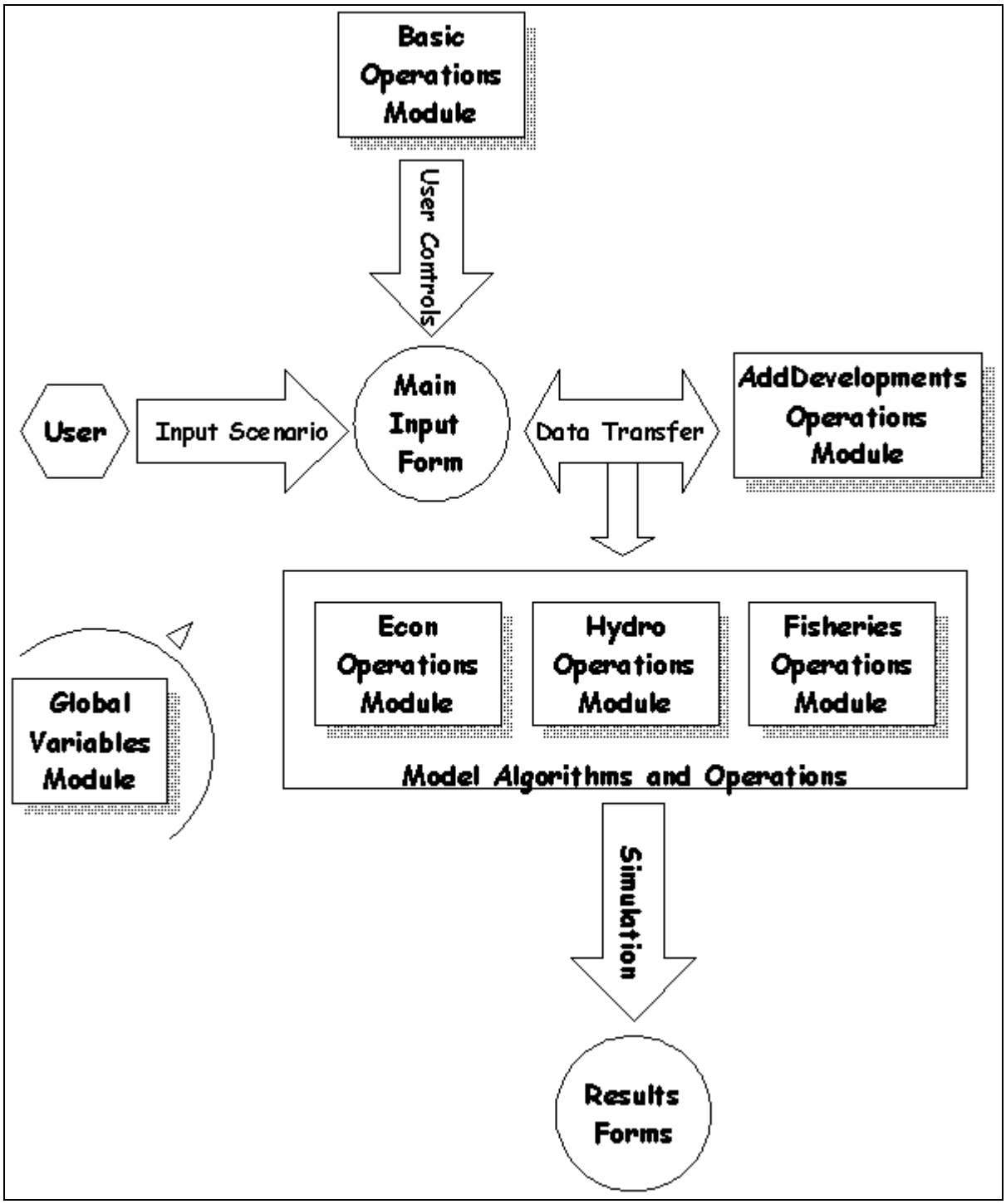
APPENDIX B. SOURCE CODE FOR DESKTOPL2W

Note: The programming environment is Visual Basic Version 6.0.



Schematic of Software Design

GlobalVariables Module

```
Option Explicit
Option Base 0
' ************************************************************************
' * The GlobalVariables module simply dimensions variables that are used       *
' * throughout the project.                                                    *
' * Created February 4, 1999                                                   *
' ************************************************************************

'Define a special variable type for spatial data layers and their properties
Type typLayer
    Name As String      'The name of the layer as defined by the shape filename
    SymbolColor As MapObjects2.ColorConstants    'Color to be used for all the shapes
    FillStyle As MapObjects2.FillStyleConstants  'Allows fill styles for polygons
    OutlineColor As MapObjects2.ColorConstants   'Color to be used for outline of
shapes
    Renderer As Boolean        'True if layer is to be classified
    PointStyle As String  'Type of symbol to be applied for point themes
End Type

'Define a special variable type to hold all necessary information from the grid
pattern
Type typAttributeHolder
  develop As Long  '1 means developable, and 0 means undevelopable
  CenterX As Double   'Centroid X coordinate
  CenterY As Double   'Centroid Y coordinate
  oldForest As Double   'Current land use that is forest
  oldHerbAg As Double    'Current land use that is herbaceous/ag
  oldWater As Double    'Current land use that is open water
  oldDisturb As Double 'Current land use that is disturbed
  oldMixed As Double 'Current land use that is mixed -- Edge Forest/HerbAg
  LandSeg As Integer 'Land segment to which the grid square belongs
  LogPVHec As Double 'Log of partial land value per hectare
  BlParcVal As Double 'Baseline parcel(s) value
End Type

'Define a special variable type to hold data about each kind of development tract
'for the economics model
Type typEconTractDataHolder
  Low As Variant       'Holds values for low density tracts
  MidConv As Variant   'Holds values for mid density standard tracts
  MidClus As Variant   'Holds values for mid density cluster tracts
  High As Variant      'Holds values for high density tracts
  Comm As Variant      'Holds values for commercial tracts
  Agg As Variant 'Holds values for all types of tracts aggregated
End Type

'Sets the maximum number of layers that can appear on the map
Global Const glbMaxNumLayers As Integer = 20

'Sets the radius (half the length or width) of input development squares in meters
Public glbSquareSize As Integer

'Stores the min and max x and y coordinates for the input grid pattern
Public glbGridMaxX As Double, glbGridMinX As Double
Public glbGridMaxY As Double, glbGridMinY As Double

'Used to define spatial data layers
Public glbLayers(glbMaxNumLayers) As typLayer
Public glbLayersNewData(glbMaxNumLayers) As typLayer

'Stores the number of layers on the map
```

```
Public glbLayersCount As Integer
Public glbLayersCountNewData As Integer

'Collection of polygons to hold user-clicked development squares
Public colStoredPolys As New Collection
Public colDevelSquaresL As New Collection
Public colDevelSquaresMC As New Collection
Public colDevelSquaresMCL As New Collection
Public colDevelSquaresH As New Collection
Public colDevelSquaresC As New Collection

'This array is used to check whether a user has already added a particular
'data set -- does not allow the user to add it again.
'Used in frmMoreData where the user adds extra data
Public glbAddedPreviously(50) As Boolean


'Define the names of the development square shapefiles
'Low Density Residential
Public glbDevLayerFilenameL As String
'Mid Density Conventional Residential
Public glbDevLayerFilenameMC As String
'Mid Density Cluster Residential
Public glbDevLayerFilenameMCL As String
'High Density Residential
Public glbDevLayerFilenameH As String
'Commercial
Public glbDevLayerFilenameC As String
'Combined
Public glbCombinedDevLayerFilename As String


'The following variables are for storing land use information for the _
land segments or subwatersheds

  'Determine the number of land segments
  Global Const numLandSegs As Integer = 10  'This value must be a constant for it to
work in _
  dimensioning arrays.  It is equal to the Subwatersheds.records.count

 'Find out the original composition of land uses for each land segment, i.e., before
 'the user adds any developments
  Public glbTotOldForest(numLandSegs) As Double
  Public glbTotOldHerbAg(numLandSegs) As Double
  Public glbTotOldWater(numLandSegs) As Double
  Public glbTotOldDisturb(numLandSegs) As Double
  Public glbTotOldMixed(numLandSegs) As Double
  Public glbTotAllLandUses(numLandSegs) As Double

  Public glbPctOldForest(numLandSegs) As Single
  Public glbPctOldHerbAg(numLandSegs) As Single
  Public glbPctOldWater(numLandSegs) As Single
  Public glbPctOldDisturb(numLandSegs) As Single
  Public glbPctOldMixed(numLandSegs) As Single
  Public glbPctAllLandUses(numLandSegs) As Single

  'the composition of land uses for each land segment after the user has
  'added developments
  Public glbTotNewForest(numLandSegs) As Double
  Public glbTotNewHerbAg(numLandSegs) As Double
  Public glbTotNewWater(numLandSegs) As Double
  Public glbTotNewDisturb(numLandSegs) As Double
  Public glbTotNewMixed(numLandSegs) As Double
```

```
  Public glbPctNewForest(numLandSegs) As Single
  Public glbPctNewHerbAg(numLandSegs) As Single
  Public glbPctNewWater(numLandSegs) As Single
  Public glbPctNewDisturb(numLandSegs) As Single
  Public glbPctNewMixed(numLandSegs) As Single



'The following variables are for storing the amount of each type of land use a
'particular development type has.  For example, low density developments have
'10% disturbed area or 9000 square meters out of a 300x300 meter square
'These are for low density res development squares
Public glbForestTractL As Double
Public glbHerbAgTractL As Double
Public glbDisturbTractL As Double
Public glbMixedTractL As Double
'These are for mid density conv res development squares
Public glbForestTractMC As Double
Public glbHerbAgTractMC As Double
Public glbDisturbTractMC As Double
Public glbMixedTractMC As Double
'These are for mid density cluster res development squares
Public glbForestTractMCL As Double
Public glbHerbAgTractMCL As Double
Public glbDisturbTractMCL As Double
Public glbMixedTractMCL As Double
'These are for high density res development squares
Public glbForestTractH As Double
Public glbHerbAgTractH As Double
Public glbDisturbTractH As Double
Public glbMixedTractH As Double
'These are for commercial development squares
Public glbForestTractC As Double
Public glbHerbAgTractC As Double
Public glbDisturbTractC As Double
Public glbMixedTractC As Double


'The following variables count the number of tracts, parcels, and people in a scenario
Public glbTotNumberOfTracts As Integer
Public glbTotNumberOfParcels As Double
Public glbTotNumberOfPeople As Double
Public glbTotNumberOfParcelsL As Double
Public glbTotNumberOfPeopleL As Double
Public glbTotNumberOfParcelsMC As Double
Public glbTotNumberOfPeopleMC As Double
Public glbTotNumberOfParcelsMCL As Double
Public glbTotNumberOfPeopleMCL As Double
Public glbTotNumberOfParcelsH As Double
Public glbTotNumberOfPeopleH As Double
Public glbTotNumberOfParcelsC As Double
Public glbTotNumberOfPeopleC As Double
```

BasicOperations Module

```
Option Explicit
Option Base 0
' ************************************************************************
' * The BasicOperations module contains a collection of subroutines/functions  *
```

```
' * that provide general services that are typically used throughout           *
' * a program run (e.g., file management, and legend linking)                  *
' * Created February 4, 1999                                                   *
' ****************************************************************************

'Link Legend control to the Map control
Public Sub LinkLegend()
    frmMain.legMapDisplay.setMapSource frmMain.mapDisplay
    frmMain.legMapDisplay.LoadLegend True
    frmMain.legMapDisplay.ShowAllLegend
    frmMain.legMapDisplay.Active(0) = True
End Sub

'Exit the program
Public Sub QuitProgram()
    'Delete Development Square Files that have been created
    Dim dataconnector As New MapObjects2.DataConnection

    dataconnector.Database = App.Path & "\BC_Data"

    'Note -- in order to delete a shapefile, you have to FIND it first!
    dataconnector.FindGeoDataset (glbDevLayerFilenameL)
    dataconnector.DeleteGeoDataset (glbDevLayerFilenameL)
    dataconnector.FindGeoDataset (glbDevLayerFilenameMC)
    dataconnector.DeleteGeoDataset (glbDevLayerFilenameMC)
    dataconnector.FindGeoDataset (glbDevLayerFilenameMCL)
    dataconnector.DeleteGeoDataset (glbDevLayerFilenameMCL)
    dataconnector.FindGeoDataset (glbDevLayerFilenameH)
    dataconnector.DeleteGeoDataset (glbDevLayerFilenameH)
    dataconnector.FindGeoDataset (glbDevLayerFilenameC)
    dataconnector.DeleteGeoDataset (glbDevLayerFilenameC)

    dataconnector.Disconnect



    End
End Sub

'Set the mouse pointer and do the action if it does not require a mouse operation
'on the map
Public Sub MapToolbarTask(ButtonKey As String)
    Select Case ButtonKey
      Case "ZoomIn"
        frmMain.mapDisplay.MousePointer = moZoomIn
      Case "ZoomOut"
        frmMain.mapDisplay.MousePointer = moZoomOut
      Case "Pan"
        frmMain.mapDisplay.MousePointer = moPan
      Case "ZoomFullExtent"
        frmMain.mapDisplay.MousePointer = moDefault
        frmMain.mapDisplay.Extent = frmMain.mapDisplay.FullExtent
      Case Else
        frmMain.mapDisplay.MousePointer = moDefault
    End Select

    'Print button was pushed
    If ButtonKey = "Print" Then
      frmMain.mapDisplay.PrintMap "Back Creek", "", True
      MsgBox "Your map is being printed on your Windows Default Printer."
    End If

    'AddData button was pushed
```

```
    If ButtonKey = "AddData" Then frmMoreData.Show

    'Clear-All-Developments button was pushed
    If ButtonKey = "ClearAll" Then
      Call ClearAllDevelopments  'In the AddDevelopmentsOperations Module
    End If

    'The Quit button was pushed
    If ButtonKey = "Quit" Then
      Call QuitProgram 'In the BasicOperations Module
    End If

End Sub

'Zooms in on the map when the user operates the zoom in tool in the map display
Public Sub ZoomIn()
    Dim curRectangle As MapObjects2.Rectangle
    Set curRectangle = frmMain.mapDisplay.TrackRectangle
    Set frmMain.mapDisplay.Extent = curRectangle
End Sub

'Zooms out on the map by a factor of 2 when the user operates the zoom out tool
'Can only occur when not zoomed to full extent
Public Sub ZoomOut()
    Dim curRectangle As MapObjects2.Rectangle
    Dim Loc As New MapObjects2.Point
    Dim X As Double, Y As Double
    Set Loc = frmMain.mapDisplay.ToMapPoint(X, Y)
    'Calculate the full width and height. Adding and substracting
    'the full values from Loc has the effect of zooming out by a factor of 2.
    Dim MapWidth As Double, MapHeight As Double
    Set curRectangle = frmMain.mapDisplay.Extent
    MapWidth = frmMain.mapDisplay.Extent.Width
    MapHeight = frmMain.mapDisplay.Extent.Height
    curRectangle.Right = Loc.X + MapWidth
    curRectangle.Left = Loc.X - MapWidth
    curRectangle.Top = Loc.Y + MapHeight
    curRectangle.Bottom = Loc.Y - MapHeight
    Set frmMain.mapDisplay.Extent = curRectangle
End Sub

'Pans the map when the user operates the pan tool
'Can only occur when not zoomed to full extent
Public Sub Pan()
    frmMain.mapDisplay.Pan
End Sub


' Automatically loads selected pre-prepared spatial data layers into
' map control (frmMain.mapDisplay) from a data directory
Public Sub AutoLoadDataLayer()

    Dim i As Integer
    i = 0

'*************************************************************************************
    'Define spatial data layer names and other properties and put them in an array
'*************************************************************************************
  'Note that the following layers will be placed on the map in order --
  'The first layer listed is at the bottom of the map and the last is on top
  'The same goes for the legend
```

```
    'Define properties for grid pattern
    glbLayers(i).Name = "grid_pattern"
    glbLayers(i).Renderer = True
    i = i + 1

    'Define properties for subwatersheds/land segments
    glbLayers(i).Name = "subwatersheds"
    glbLayers(i).OutlineColor = moRed
    glbLayers(i).FillStyle = moTransparentFill
    i = i + 1

    'Define properties for streams
    glbLayers(i).Name = "streams"
    glbLayers(i).SymbolColor = moBlue
    i = i + 1

    glbLayersCount = i

'*******************************************************************************
    'Draw the layers defined above on the map by adding layers to the
    'MapObjects Layers collection
'*******************************************************************************

  Dim dataConnect As New MapObjects2.DataConnection
  Dim geoSet As MapObjects2.GeoDataset
  Dim newAutoLayer As New MapObjects2.MapLayer
  Dim j As Integer
  Dim k As Integer
  Dim MapRenderer As New MapObjects2.ValueMapRenderer

  dataConnect.Database = App.Path & "\BC_Data"   'Tells where to look for data
  If dataConnect.Connect = True Then  'If the data connection path is ok
    For j = 0 To glbLayersCount - 1  'Loop through all auto layers
      Set geoSet = dataConnect.FindGeoDataset(glbLayers(j).Name) 'Find shapefile as
GeoDataset in DataConnection
      newAutoLayer.GeoDataset = geoSet 'Set GeoDataset property of new MapLayer
      newAutoLayer.Name = glbLayers(j).Name  'Set Name property of new MapLayer
      newAutoLayer.Symbol.Color = glbLayers(j).SymbolColor  'Set symbol color of new
MapLayer
      If newAutoLayer.Symbol.SymbolType = moFillSymbol Then 'Fill style only applies
to polygons
        newAutoLayer.Symbol.Style = glbLayers(j).FillStyle  'Set fill of new MapLayer
      End If
      If newAutoLayer.Symbol.SymbolType <> moLineSymbol Then 'Outline color does not
apply to lines
        newAutoLayer.Symbol.OutlineColor = glbLayers(j).OutlineColor  'Set outline
color of new MapLayer
      End If
      If glbLayers(j).Renderer = True Then  'If the layer is the grid pattern
        Set newAutoLayer.Renderer = MapRenderer
        With newAutoLayer.Renderer
          .ValueCount = 2
          .Field = "Develop"

          .Value(0) = "No Develop"
          .Symbol(0).OutlineColor = moLimeGreen
          .Symbol(0).Style = moLightGrayFill
          .Symbol(0).Color = moCyan

          .Value(1) = "Yes Develop"
          .Symbol(1).OutlineColor = moLimeGreen
          .Symbol(1).Style = moTransparentFill
        End With
```

```
      End If
      frmMain.mapDisplay.Layers.Add newAutoLayer   'Add MapLayer to Layers collection
      Set newAutoLayer = Nothing  'Reset newAutoLayer to add the next file
    Next j

      Else  'geoSet Is Nothing
        MsgBox "Error connecting to data", vbCritical
        Exit Sub
  End If

  'Zoom the Map Display to the full extent
  frmMain.mapDisplay.Extent = frmMain.mapDisplay.FullExtent

  dataConnect.Disconnect

End Sub
```

AddDevelopmentsOperations Module

```
Option Explicit
Option Base 0
' ************************************************************************
' * The AddDevelopments Operations module contains a collection of subroutines *
' * that allow the user to enter various development types in the watershed    *
' * Created February 7, 1999                                                 *
' ************************************************************************

'This subroutine adds user-placed, low-density development squares to a database
'It makes sure that the user doesn't try to add the same square more than once.
'The input UserPt is the point that the user clicked on the map

Public Sub AddDevelopmentSquareL(UserPtL As MapObjects2.Point)

    'Points of a square, which is the shape of development blocks
    'point1 - point4 are vertices of development square
    Dim point1L As New MapObjects2.Point, point2L As New MapObjects2.Point
    Dim point3L As New MapObjects2.Point, point4L As New MapObjects2.Point
    Dim colPointsL As New MapObjects2.Points
    Dim polyL As New MapObjects2.Polygon

    'These variables (along with colStoredPolys) are designed
    'to make sure the user doesn't keep clicking the same square
    Dim StorePolyL As New MapObjects2.Polygon
    Dim CountDuplicateL As Integer
    CountDuplicateL = 0

    'Get 4 points of a square based on userpt and add the points to a collection
    'upper left (northwest) vertex
    point1L.X = UserPtL.X - glbSquareSize
    point1L.Y = UserPtL.Y + glbSquareSize
    colPointsL.Add point1L

    'upper right (northeast) vertex
    point2L.X = UserPtL.X + glbSquareSize
    point2L.Y = UserPtL.Y + glbSquareSize
    colPointsL.Add point2L

    'lower right (southeast) vertex
    point3L.X = UserPtL.X + glbSquareSize
    point3L.Y = UserPtL.Y - glbSquareSize
```

```
    colPointsL.Add point3L

    'lower left (southwest) vertex
    point4L.X = UserPtL.X - glbSquareSize
    point4L.Y = UserPtL.Y - glbSquareSize
    colPointsL.Add point4L

    ' Create a polygon (square) based on the 4 derived points
    Set polyL = CreateObject("MapObjects2.Polygon")
    Set StorePolyL = CreateObject("MapObjects2.Polygon")
    polyL.Parts.Add colPointsL

    'Prevent the user from making duplicate squares
    If colStoredPolys.Count <> 0 Then  'If the user has already made some squares
      For Each StorePolyL In colStoredPolys
        'If the centroid of current clicked square matches any stored squares
        'then increment a duplicate counter
        If polyL.Centroid.X = StorePolyL.Centroid.X And polyL.Centroid.Y =
StorePolyL.Centroid.Y Then CountDuplicateL = CountDuplicateL + 1
      Next StorePolyL

      'If there were no duplicates then accept the current square and draw it
      If CountDuplicateL = 0 Then
        colDevelSquaresL.Add polyL  'add the square to the collection of input
development squares
        frmMain.mapDisplay.TrackingLayer.Refresh True 'This sends the program to the
subroutine _
        mapDisplay_afterTrackingLayerDraw to draw the clicked square on the map.
      End If


    Else  'The user has not yet clicked any squares on the map
      colDevelSquaresL.Add polyL  'add the square to the collection of input
development squares
      frmMain.mapDisplay.TrackingLayer.Refresh True 'This sends the program to the
subroutine _
      mapDisplay_afterTrackingLayerDraw to draw the clicked square on the map.
    End If

    'Add all clicked squares to the collection of stored polygons
    StorePolyL.Parts.Add colPointsL
    colStoredPolys.Add polyL

End Sub

'This subroutine adds user-placed, mid-density-conv development squares to a database
'It makes sure that the user doesn't try to add the same square more than once.
'The input UserPt is the point that the user clicked on the map

Public Sub AddDevelopmentSquareMC(UserPtmc As MapObjects2.Point)

    'Points of a square, which is the shape of development blocks
    'point1 - point4 are vertices of development square
    Dim point1MC As New MapObjects2.Point, point2MC As New MapObjects2.Point
    Dim point3MC As New MapObjects2.Point, point4MC As New MapObjects2.Point
    Dim colPointsMC As New MapObjects2.Points
    Dim polyMC As New MapObjects2.Polygon


    'These variables (along with colStoredPolys) are designed
    'to make sure the user doesn't keep clicking the same square
    Dim StorePolyMC As New MapObjects2.Polygon
    Dim CountDuplicateMC As Integer
```

```
    CountDuplicateMC = 0

    'Get 4 points of a square based on userpt and add the points to a collection
    'upper left (northwest) vertex
    point1MC.X = UserPtmc.X - glbSquareSize
    point1MC.Y = UserPtmc.Y + glbSquareSize
    colPointsMC.Add point1MC

    'upper right (northeast) vertex
    point2MC.X = UserPtmc.X + glbSquareSize
    point2MC.Y = UserPtmc.Y + glbSquareSize
    colPointsMC.Add point2MC

    'lower right (southeast) vertex
    point3MC.X = UserPtmc.X + glbSquareSize
    point3MC.Y = UserPtmc.Y - glbSquareSize
    colPointsMC.Add point3MC

    'lower left (southwest) vertex
    point4MC.X = UserPtmc.X - glbSquareSize
    point4MC.Y = UserPtmc.Y - glbSquareSize
    colPointsMC.Add point4MC

    ' Create a polygon (square) based on the 4 derived points
    Set polyMC = CreateObject("MapObjects2.Polygon")
    Set StorePolyMC = CreateObject("MapObjects2.Polygon")
    polyMC.Parts.Add colPointsMC

    'Prevent the user from making duplicate squares
    If colStoredPolys.Count <> 0 Then  'If the user has already made some squares
      For Each StorePolyMC In colStoredPolys
        'If the centroid of current clicked square matches any stored squares
        'then increment a duplicate counter
        If polyMC.Centroid.X = StorePolyMC.Centroid.X And polyMC.Centroid.Y =
StorePolyMC.Centroid.Y Then CountDuplicateMC = CountDuplicateMC + 1
      Next StorePolyMC

      'If there were no duplicates then accept the current square and draw it
      If CountDuplicateMC = 0 Then
        colDevelSquaresMC.Add polyMC  'add the square to the collection of input
development squares
        frmMain.mapDisplay.TrackingLayer.Refresh True 'This sends the program to the
subroutine _
        mapDisplay_afterTrackingLayerDraw to draw the clicked square on the map.
      End If


    Else  'The user has not yet clicked any squares on the map
      colDevelSquaresMC.Add polyMC  'add the square to the collection of input
development squares
      frmMain.mapDisplay.TrackingLayer.Refresh True 'This sends the program to the
subroutine _
      mapDisplay_afterTrackingLayerDraw to draw the clicked square on the map.
    End If

    'Add all clicked squares to the collection of stored polygons
    StorePolyMC.Parts.Add colPointsMC
    colStoredPolys.Add polyMC

End Sub

'This subroutine adds user-placed, mid-density-cluster development squares to a
database
```

```
'It makes sure that the user doesn't try to add the same square more than once.
'The input UserPt is the point that the user clicked on the map

Public Sub AddDevelopmentSquareMCL(UserPtMCL As MapObjects2.Point)

    'Points of a square, which is the shape of development blocks
    'point1 - point4 are vertices of development square
    Dim point1MCL As New MapObjects2.Point, point2MCL As New MapObjects2.Point
    Dim point3MCL As New MapObjects2.Point, point4MCL As New MapObjects2.Point
    Dim colPointsMCL As New MapObjects2.Points
    Dim polyMCL As New MapObjects2.Polygon


    'These variables (along with colStoredPolys) are designed
    'to make sure the user doesn't keep clicking the same square
    Dim StorePolyMCL As New MapObjects2.Polygon
    Dim CountDuplicateMCL As Integer
    CountDuplicateMCL = 0

    'Get 4 points of a square based on userpt and add the points to a collection
    'upper left (northwest) vertex
    point1MCL.X = UserPtMCL.X - glbSquareSize
    point1MCL.Y = UserPtMCL.Y + glbSquareSize
    colPointsMCL.Add point1MCL

    'upper right (northeast) vertex
    point2MCL.X = UserPtMCL.X + glbSquareSize
    point2MCL.Y = UserPtMCL.Y + glbSquareSize
    colPointsMCL.Add point2MCL

    'lower right (southeast) vertex
    point3MCL.X = UserPtMCL.X + glbSquareSize
    point3MCL.Y = UserPtMCL.Y - glbSquareSize
    colPointsMCL.Add point3MCL

    'lower left (southwest) vertex
    point4MCL.X = UserPtMCL.X - glbSquareSize
    point4MCL.Y = UserPtMCL.Y - glbSquareSize
    colPointsMCL.Add point4MCL

    ' Create a polygon (square) based on the 4 derived points
    Set polyMCL = CreateObject("MapObjects2.Polygon")
    Set StorePolyMCL = CreateObject("MapObjects2.Polygon")
    polyMCL.Parts.Add colPointsMCL

    'Prevent the user from making duplicate squares
    If colStoredPolys.Count <> 0 Then  'If the user has already made some squares
      For Each StorePolyMCL In colStoredPolys
        'If the centroid of current clicked square matches any stored squares
        'then increment a duplicate counter
        If polyMCL.Centroid.X = StorePolyMCL.Centroid.X And polyMCL.Centroid.Y =
StorePolyMCL.Centroid.Y Then CountDuplicateMCL = CountDuplicateMCL + 1
      Next StorePolyMCL

      'If there were no duplicates then accept the current square and draw it
      If CountDuplicateMCL = 0 Then
        colDevelSquaresMCL.Add polyMCL  'add the square to the collection of input
development squares
        frmMain.mapDisplay.TrackingLayer.Refresh True 'This sends the program to the
subroutine _
        mapDisplay_afterTrackingLayerDraw to draw the clicked square on the map.
      End If
```

```
    Else  'The user has not yet clicked any squares on the map
      colDevelSquaresMCL.Add polyMCL  'add the square to the collection of input
development squares
      frmMain.mapDisplay.TrackingLayer.Refresh True 'This sends the program to the
subroutine _
      mapDisplay_afterTrackingLayerDraw to draw the clicked square on the map.
    End If

    'Add all clicked squares to the collection of stored polygons
    StorePolyMCL.Parts.Add colPointsMCL
    colStoredPolys.Add polyMCL

End Sub

'This subroutine adds user-placed, high-density development squares to a database
'It makes sure that the user doesn't try to add the same square more than once.
'The input UserPt is the point that the user clicked on the map
Public Sub AddDevelopmentSquareH(UserPtH As MapObjects2.Point)

    'Points of a square, which is the shape of development blocks
    'point1 - point4 are vertices of development square
    Dim point1H As New MapObjects2.Point, point2H As New MapObjects2.Point
    Dim point3H As New MapObjects2.Point, point4H As New MapObjects2.Point
    Dim colPointsH As New MapObjects2.Points
    Dim polyH As New MapObjects2.Polygon

    'These variables (along with colStoredPolys) are designed
    'to make sure the user doesn't keep clicking the same square
    Dim StorePolyH As New MapObjects2.Polygon
    Dim CountDuplicateH As Integer
    CountDuplicateH = 0

    'Get 4 points of a square based on userpt and add the points to a collection
    'upper left (northwest) vertex
    point1H.X = UserPtH.X - glbSquareSize
    point1H.Y = UserPtH.Y + glbSquareSize
    colPointsH.Add point1H

    'upper right (northeast) vertex
    point2H.X = UserPtH.X + glbSquareSize
    point2H.Y = UserPtH.Y + glbSquareSize
    colPointsH.Add point2H

    'lower right (southeast) vertex
    point3H.X = UserPtH.X + glbSquareSize
    point3H.Y = UserPtH.Y - glbSquareSize
    colPointsH.Add point3H

    'lower left (southwest) vertex
    point4H.X = UserPtH.X - glbSquareSize
    point4H.Y = UserPtH.Y - glbSquareSize
    colPointsH.Add point4H

    ' Create a polygon (square) based on the 4 derived points
    Set polyH = CreateObject("MapObjects2.Polygon")
    Set StorePolyH = CreateObject("MapObjects2.Polygon")
    polyH.Parts.Add colPointsH

    'Prevent the user from making duplicate squares
    If colStoredPolys.Count <> 0 Then  'If the user has already made some squares
      For Each StorePolyH In colStoredPolys
        'If the centroid of current clicked square matches any stored squares
```

```
        'then increment a duplicate counter
        If polyH.Centroid.X = StorePolyH.Centroid.X And polyH.Centroid.Y =
StorePolyH.Centroid.Y Then CountDuplicateH = CountDuplicateH + 1
      Next StorePolyH

      'If there were no duplicates then accept the current square and draw it
      If CountDuplicateH = 0 Then
        colDevelSquaresH.Add polyH  'add the square to the collection of input
development squares
        frmMain.mapDisplay.TrackingLayer.Refresh True 'This sends the program to the
subroutine _
        mapDisplay_afterTrackingLayerDraw to draw the clicked square on the map.
      End If


    Else  'The user has not yet clicked any squares on the map
      colDevelSquaresH.Add polyH  'add the square to the collection of input
development squares
      frmMain.mapDisplay.TrackingLayer.Refresh True 'This sends the program to the
subroutine _
      mapDisplay_afterTrackingLayerDraw to draw the clicked square on the map.
    End If

    'Add all clicked squares to the collection of stored polygons
    StorePolyH.Parts.Add colPointsH
    colStoredPolys.Add polyH

End Sub

'This subroutine adds user-placed, commercial development squares to a database
'It makes sure that the user doesn't try to add the same square more than once.
'The input UserPt is the point that the user clicked on the map
Public Sub AddDevelopmentSquareC(UserPtC As MapObjects2.Point)

    'Points of a square, which is the shape of development blocks
    'point1 - point4 are vertices of development square
    Dim point1C As New MapObjects2.Point, point2C As New MapObjects2.Point
    Dim point3C As New MapObjects2.Point, point4C As New MapObjects2.Point
    Dim colPointsC As New MapObjects2.Points
    Dim polyC As New MapObjects2.Polygon

    'These variables (along with colStoredPolys) are designed
    'to make sure the user doesn't keep clicking the same square
    Dim StorePolyC As New MapObjects2.Polygon
    Dim CountDuplicateC As Integer
    CountDuplicateC = 0

    'Get 4 points of a square based on userpt and add the points to a collection
    'upper left (northwest) vertex
    point1C.X = UserPtC.X - glbSquareSize
    point1C.Y = UserPtC.Y + glbSquareSize
    colPointsC.Add point1C

    'upper right (northeast) vertex
    point2C.X = UserPtC.X + glbSquareSize
    point2C.Y = UserPtC.Y + glbSquareSize
    colPointsC.Add point2C

    'lower right (southeast) vertex
    point3C.X = UserPtC.X + glbSquareSize
    point3C.Y = UserPtC.Y - glbSquareSize
    colPointsC.Add point3C
```

```
    'lower left (southwest) vertex
    point4C.X = UserPtC.X - glbSquareSize
    point4C.Y = UserPtC.Y - glbSquareSize
    colPointsC.Add point4C

    ' Create a polygon (square) based on the 4 derived points
    Set polyC = CreateObject("MapObjects2.Polygon")
    Set StorePolyC = CreateObject("MapObjects2.Polygon")
    polyC.Parts.Add colPointsC

    'Prevent the user from making duplicate squares
    If colStoredPolys.Count <> 0 Then  'If the user has already made some squares
      For Each StorePolyC In colStoredPolys
        'If the centroid of current clicked square matches any stored squares
        'then increment a duplicate counter
        If polyC.Centroid.X = StorePolyC.Centroid.X And polyC.Centroid.Y =
StorePolyC.Centroid.Y Then CountDuplicateC = CountDuplicateC + 1
      Next StorePolyC

      'If there were no duplicates then accept the current square and draw it
      If CountDuplicateC = 0 Then
        colDevelSquaresC.Add polyC  'add the square to the collection of input
development squares
        frmMain.mapDisplay.TrackingLayer.Refresh True 'This sends the program to the
subroutine _
        mapDisplay_afterTrackingLayerDraw to draw the clicked square on the map.
      End If


    Else  'The user has not yet clicked any squares on the map
      colDevelSquaresC.Add polyC  'add the square to the collection of input
development squares
      frmMain.mapDisplay.TrackingLayer.Refresh True 'This sends the program to the
subroutine _
      mapDisplay_afterTrackingLayerDraw to draw the clicked square on the map.
    End If

    'Add all clicked squares to the collection of stored polygons
    StorePolyC.Parts.Add colPointsC
    colStoredPolys.Add polyC

End Sub



'This subroutine saves user-clicked squares as a shapefile complete with attribute
data
Public Sub SaveSquaresAsDatabase()
    'Establish a connection to the folder that holds shapefiles
    Dim dc As New MapObjects2.DataConnection
    dc.Database = App.Path & "\BC_Data"
    If (Not dc.Connect) Then
      MsgBox "Could not connect to database!"
      Exit Sub  'bad dataConnection
    End If

    'Set the names of the shapefiles and set up data fields
    'Low Density Residential
    glbDevLayerFilenameL = "aaLowPolys"
    'Mid Density Conventional Residential
    glbDevLayerFilenameMC = "aaMidConvPolys"
    'Mid Density Cluster Residential
    glbDevLayerFilenameMCL = "aaMidClusterPolys"
```

```
  'High Density Residential
  glbDevLayerFilenameH = "aaHighPolys"
  'Commercial
  glbDevLayerFilenameC = "aaCommercialPolys"

  Dim tDesc As New TableDesc

'Define additional fields
'First set the number of fields (besides the shape field)
tDesc.FieldCount = 22

'Set the field names
tDesc.FieldName(0) = "Name"
tDesc.FieldName(1) = "Area"
tDesc.FieldName(2) = "SewDist"
tDesc.FieldName(3) = "Develop"
tDesc.FieldName(4) = "DevType"
tDesc.FieldName(5) = "oldForest"
tDesc.FieldName(6) = "oldHerbAg"
tDesc.FieldName(7) = "oldWater"
tDesc.FieldName(8) = "oldDisturb"
tDesc.FieldName(9) = "oldMixed"
tDesc.FieldName(10) = "newForest"
tDesc.FieldName(11) = "newHerbAg"
tDesc.FieldName(12) = "newWater"
tDesc.FieldName(13) = "newDisturb"
tDesc.FieldName(14) = "newMixed"
tDesc.FieldName(15) = "LandSeg"
tDesc.FieldName(16) = "LogPVHec"
tDesc.FieldName(17) = "BlParcVal"
tDesc.FieldName(18) = "WatDist"
tDesc.FieldName(19) = "SuperGrp"
tDesc.FieldName(20) = "CenterX"
tDesc.FieldName(21) = "CenterY"


'Set the type of field
tDesc.FieldType(0) = moString
tDesc.FieldType(1) = moDouble
tDesc.FieldType(2) = moDouble
tDesc.FieldType(3) = moDouble
tDesc.FieldType(4) = moString
tDesc.FieldType(5) = moDouble
tDesc.FieldType(6) = moDouble
tDesc.FieldType(7) = moDouble
tDesc.FieldType(8) = moDouble
tDesc.FieldType(9) = moDouble
tDesc.FieldType(10) = moDouble
tDesc.FieldType(11) = moDouble
tDesc.FieldType(12) = moDouble
tDesc.FieldType(13) = moDouble
tDesc.FieldType(14) = moDouble
tDesc.FieldType(15) = moLong
tDesc.FieldType(16) = moDouble
tDesc.FieldType(17) = moDouble
tDesc.FieldType(18) = moDouble
tDesc.FieldType(19) = moLong
tDesc.FieldType(20) = moDouble
tDesc.FieldType(21) = moDouble

'Set the length of the string fields
tDesc.FieldLength(0) = 20
tDesc.FieldLength(4) = 10
```

```
'Set the number of digits used in the numeric fields
tDesc.FieldPrecision(1) = 15
tDesc.FieldPrecision(2) = 15
tDesc.FieldPrecision(3) = 1
tDesc.FieldPrecision(4) = 10
tDesc.FieldPrecision(5) = 10
tDesc.FieldPrecision(6) = 10
tDesc.FieldPrecision(7) = 10
tDesc.FieldPrecision(8) = 10
tDesc.FieldPrecision(9) = 10
tDesc.FieldPrecision(10) = 10
tDesc.FieldPrecision(11) = 10
tDesc.FieldPrecision(12) = 10
tDesc.FieldPrecision(13) = 10
tDesc.FieldPrecision(14) = 10
tDesc.FieldPrecision(15) = 2
tDesc.FieldPrecision(16) = 10
tDesc.FieldPrecision(17) = 10
tDesc.FieldPrecision(18) = 15
tDesc.FieldPrecision(19) = 5
tDesc.FieldPrecision(20) = 13
tDesc.FieldPrecision(21) = 13

'Set the number of digits to the right of the decimal point
tDesc.FieldScale(1) = 3
tDesc.FieldScale(2) = 3
tDesc.FieldScale(3) = 0
tDesc.FieldScale(5) = 3
tDesc.FieldScale(6) = 3
tDesc.FieldScale(7) = 3
tDesc.FieldScale(8) = 3
tDesc.FieldScale(9) = 3
tDesc.FieldScale(10) = 3
tDesc.FieldScale(11) = 3
tDesc.FieldScale(12) = 3
tDesc.FieldScale(13) = 3
tDesc.FieldScale(14) = 3
tDesc.FieldScale(15) = 0
tDesc.FieldScale(16) = 4
tDesc.FieldScale(17) = 0
tDesc.FieldScale(18) = 3
tDesc.FieldScale(19) = 0
tDesc.FieldScale(20) = 6
tDesc.FieldScale(21) = 6


'This defines the geodataset, layer, and records for the grid pattern.
'The newly created layer of development squares needs to extract data
'from the grid pattern.
Dim gridGd As MapObjects2.GeoDataset
Dim gridLyr As New MapObjects2.MapLayer
Dim gridRecs As New MapObjects2.Recordset
Set gridLyr.GeoDataset = dc.FindGeoDataset("grid_pattern")
Set gridRecs = gridLyr.Records

Dim Counter As Long
Dim GridAttribute As typAttributeHolder
Dim finished1 As Boolean
Dim i As Integer

'Set the values of land use amounts for each development type
'Percentages based on Schuler (1998) and Arendt (1994)
```

```
  glbForestTractL = ((glbSquareSize * 2) ^ 2) * 0.05
  glbHerbAgTractL = ((glbSquareSize * 2) ^ 2) * 0.15
  glbDisturbTractL = ((glbSquareSize * 2) ^ 2) * 0.1
  glbMixedTractL = ((glbSquareSize * 2) ^ 2) * 0.7
  'These are for mid density conv res development squares
  'Percentages based on Schuler (1998) and Arendt (1994)
  glbForestTractMC = ((glbSquareSize * 2) ^ 2) * 0
  glbHerbAgTractMC = ((glbSquareSize * 2) ^ 2) * 0.5
  glbDisturbTractMC = ((glbSquareSize * 2) ^ 2) * 0.27
  glbMixedTractMC = ((glbSquareSize * 2) ^ 2) * 0.23
  'These are for mid density cluster res development squares
  'Percentages based on Schuler (1998) and Arendt (1994)
  glbForestTractMCL = ((glbSquareSize * 2) ^ 2) * 0
  glbHerbAgTractMCL = ((glbSquareSize * 2) ^ 2) * 0.35
  glbDisturbTractMCL = ((glbSquareSize * 2) ^ 2) * 0.2
  glbMixedTractMCL = ((glbSquareSize * 2) ^ 2) * 0.45
  'These are for high density res development squares
  'Percentages based on Schuler (1998) and Arendt (1994)
  glbForestTractH = ((glbSquareSize * 2) ^ 2) * 0.05
  glbHerbAgTractH = ((glbSquareSize * 2) ^ 2) * 0.6
  glbDisturbTractH = ((glbSquareSize * 2) ^ 2) * 0.35
  glbMixedTractH = ((glbSquareSize * 2) ^ 2) * 0
  'These are for commercial development squares
  'Percentages from GIS calculations on University City commercial area
  glbForestTractC = ((glbSquareSize * 2) ^ 2) * 0
  glbHerbAgTractC = ((glbSquareSize * 2) ^ 2) * 0
  glbDisturbTractC = ((glbSquareSize * 2) ^ 2) * 0.6
  glbMixedTractC = ((glbSquareSize * 2) ^ 2) * 0.4


  'This adds fields to the database of low density res development squares and
populates those fields
  Dim gdL As MapObjects2.GeoDataset
  Set gdL = dc.AddGeoDataset(glbDevLayerFilenameL, moPolygon, tDesc)
  If gdL Is Nothing Then Exit Sub  'invalid file
  Dim lyrL As New MapObjects2.MapLayer
  Set lyrL.GeoDataset = gdL

  If colDevelSquaresL.Count <> 0 Then
  For Counter = 1 To colDevelSquaresL.Count
    finished1 = False

    With lyrL.Records
      .AddNew  'Adds a new record to the development squares database

      'The following block of code (the do loop and the .fields().value assignments)
      'is used to grab attribute data from the grid pattern
      gridRecs.MoveFirst  'Go to the first record in the grid pattern database
      Do While Not gridRecs.EOF And finished1 = False 'Loop thru the records
        'If the centroid of a square in the grid pattern matches the centroid of
        'the development square, then store the data from the grid square
        If Fix(colDevelSquaresL(Counter).Centroid.X) =
Fix(gridRecs.Fields("centerx").Value) _
       And Fix(colDevelSquaresL(Counter).Centroid.Y) =
Fix(gridRecs.Fields("centery").Value) Then
          GridAttribute.develop = gridRecs.Fields("devel").Value
          GridAttribute.CenterX = gridRecs.Fields("CenterX").Value
          GridAttribute.CenterY = gridRecs.Fields("CenterY").Value
          GridAttribute.oldForest = gridRecs.Fields("oldForest").Value
          GridAttribute.oldHerbAg = gridRecs.Fields("oldHerbAg").Value
          GridAttribute.oldWater = gridRecs.Fields("oldWater").Value
          GridAttribute.oldDisturb = gridRecs.Fields("oldDisturb").Value
          GridAttribute.oldMixed = gridRecs.Fields("oldMixed").Value
```

```
          GridAttribute.LandSeg = gridRecs.Fields("landseg").Value
          GridAttribute.LogPVHec = gridRecs.Fields("LogPVHec").Value
          GridAttribute.BlParcVal = gridRecs.Fields("BlParcVal").Value
          finished1 = True
        End If
        gridRecs.MoveNext
      Loop

      'Set the values of the development square's fields
      .Fields("Shape").Value = colDevelSquaresL(Counter)
      .Fields("Name").Value = "Low Density " & Str(Counter)
      .Fields("Area").Value = colDevelSquaresL(Counter).Area
      .Fields("develop").Value = GridAttribute.develop
      .Fields("CenterX").Value = GridAttribute.CenterX
      .Fields("CenterY").Value = GridAttribute.CenterY
      .Fields("oldForest").Value = GridAttribute.oldForest
      .Fields("oldHerbAg").Value = GridAttribute.oldHerbAg
      .Fields("oldWater").Value = GridAttribute.oldWater
      .Fields("oldDisturb").Value = GridAttribute.oldDisturb
      .Fields("oldMixed").Value = GridAttribute.oldMixed
      .Fields("LandSeg").Value = GridAttribute.LandSeg
      .Fields("DevType").Value = "LDR"
      .Fields("LogPVHec").Value = GridAttribute.LogPVHec
      .Fields("BlParcVal").Value = GridAttribute.BlParcVal
      .Fields("newForest").Value = glbForestTractL
      .Fields("newHerbAg").Value = glbHerbAgTractL
      .Fields("newWater").Value = 0 'If developed, assumed to have no water
      .Fields("newDisturb").Value = glbDisturbTractL
      .Fields("newMixed").Value = glbMixedTractL
      .Update
    End With


  Next Counter
  lyrL.Records.StopEditing
  End If


  'This block adds fields to the database of mid density conv res development squares
and populates those fields
  'This sets up the geodataset and layer to save mid density conventional residential
polygons
  Dim gdMC As MapObjects2.GeoDataset
  Set gdMC = dc.AddGeoDataset(glbDevLayerFilenameMC, moPolygon, tDesc)
  If gdMC Is Nothing Then Exit Sub  'invalid file
  Dim lyrMC As New MapObjects2.MapLayer
  Set lyrMC.GeoDataset = gdMC

  If colDevelSquaresMC.Count <> 0 Then
  For Counter = 1 To colDevelSquaresMC.Count
    finished1 = False

    With lyrMC.Records
      .AddNew  'Adds a new record to the development squares database

      'The following block of code (the do loop and the .fields().value assignments)
      'is used to grab attribute data from the grid pattern
      gridRecs.MoveFirst  'Go to the first record in the grid pattern database
      Do While Not gridRecs.EOF And finished1 = False 'Loop thru the records
        'If the centroid of a square in the grid pattern matches the centroid of
        'the development square, then store the data from the grid square
        If Fix(colDevelSquaresMC(Counter).Centroid.X) =
Fix(gridRecs.Fields("centerx").Value) _
```

```
        And Fix(colDevelSquaresMC(Counter).Centroid.Y) =
Fix(gridRecs.Fields("centery").Value) Then
          GridAttribute.develop = gridRecs.Fields("devel").Value
          GridAttribute.CenterX = gridRecs.Fields("CenterX").Value
          GridAttribute.CenterY = gridRecs.Fields("CenterY").Value
          GridAttribute.oldForest = gridRecs.Fields("oldForest").Value
          GridAttribute.oldHerbAg = gridRecs.Fields("oldHerbAg").Value
          GridAttribute.oldWater = gridRecs.Fields("oldWater").Value
          GridAttribute.oldDisturb = gridRecs.Fields("oldDisturb").Value
          GridAttribute.oldMixed = gridRecs.Fields("oldMixed").Value
          GridAttribute.LandSeg = gridRecs.Fields("landseg").Value
          GridAttribute.LogPVHec = gridRecs.Fields("LogPVHec").Value
          GridAttribute.BlParcVal = gridRecs.Fields("BlParcVal").Value
          finished1 = True
        End If
        gridRecs.MoveNext
      Loop

      'Set the values of the development square's fields
      .Fields("Shape").Value = colDevelSquaresMC(Counter)
      .Fields("Name").Value = "Mid Standard " & Str(Counter)
      .Fields("Area").Value = colDevelSquaresMC(Counter).Area
      .Fields("develop").Value = GridAttribute.develop
      .Fields("CenterX").Value = GridAttribute.CenterX
      .Fields("CenterY").Value = GridAttribute.CenterY
      .Fields("oldForest").Value = GridAttribute.oldForest
      .Fields("oldHerbAg").Value = GridAttribute.oldHerbAg
      .Fields("oldWater").Value = GridAttribute.oldWater
      .Fields("oldDisturb").Value = GridAttribute.oldDisturb
      .Fields("oldMixed").Value = GridAttribute.oldMixed
      .Fields("LandSeg").Value = GridAttribute.LandSeg
      .Fields("DevType").Value = "MDRConv"
      .Fields("LogPVHec").Value = GridAttribute.LogPVHec
      .Fields("BlParcVal").Value = GridAttribute.BlParcVal
      .Fields("newForest").Value = glbForestTractMC
      .Fields("newHerbAg").Value = glbHerbAgTractMC
      .Fields("newWater").Value = 0 'If developed, assumed to have no water
      .Fields("newDisturb").Value = glbDisturbTractMC
      .Fields("newMixed").Value = glbMixedTractMC
      .Update
    End With

  Next Counter
  lyrMC.Records.StopEditing
  End If


  'This block adds fields to the database of mid density cluster res development
squares and populates those fields
  Dim gdMCL As MapObjects2.GeoDataset
  Set gdMCL = dc.AddGeoDataset(glbDevLayerFilenameMCL, moPolygon, tDesc)
  If gdMCL Is Nothing Then Exit Sub  'invalid file
  Dim lyrMCL As New MapObjects2.MapLayer
  Set lyrMCL.GeoDataset = gdMCL

  If colDevelSquaresMCL.Count <> 0 Then
  For Counter = 1 To colDevelSquaresMCL.Count
    finished1 = False

    With lyrMCL.Records
      .AddNew  'Adds a new record to the development squares database

      'The following block of code (the do loop and the .fields().value assignments)
```

```
      'is used to grab attribute data from the grid pattern
      gridRecs.MoveFirst  'Go to the first record in the grid pattern database
      Do While Not gridRecs.EOF And finished1 = False 'Loop thru the records
        'If the centroid of a square in the grid pattern matches the centroid of
        'the development square, then store the data from the grid square
        If Fix(colDevelSquaresMCL(Counter).Centroid.X) =
Fix(gridRecs.Fields("centerx").Value) _
       And Fix(colDevelSquaresMCL(Counter).Centroid.Y) =
Fix(gridRecs.Fields("centery").Value) Then
          GridAttribute.develop = gridRecs.Fields("devel").Value
          GridAttribute.CenterX = gridRecs.Fields("CenterX").Value
          GridAttribute.CenterY = gridRecs.Fields("CenterY").Value
          GridAttribute.oldForest = gridRecs.Fields("oldForest").Value
          GridAttribute.oldHerbAg = gridRecs.Fields("oldHerbAg").Value
          GridAttribute.oldWater = gridRecs.Fields("oldWater").Value
          GridAttribute.oldDisturb = gridRecs.Fields("oldDisturb").Value
          GridAttribute.oldMixed = gridRecs.Fields("oldMixed").Value
          GridAttribute.LandSeg = gridRecs.Fields("landseg").Value
          GridAttribute.LogPVHec = gridRecs.Fields("LogPVHec").Value
          GridAttribute.BlParcVal = gridRecs.Fields("BlParcVal").Value
          finished1 = True
        End If
        gridRecs.MoveNext
      Loop

      'Set the values of the development square's fields
      .Fields("Shape").Value = colDevelSquaresMCL(Counter)
      .Fields("Name").Value = "Mid Cluster " & Str(Counter)
      .Fields("Area").Value = colDevelSquaresMCL(Counter).Area
      .Fields("develop").Value = GridAttribute.develop
      .Fields("CenterX").Value = GridAttribute.CenterX
      .Fields("CenterY").Value = GridAttribute.CenterY
      .Fields("oldForest").Value = GridAttribute.oldForest
      .Fields("oldHerbAg").Value = GridAttribute.oldHerbAg
      .Fields("oldWater").Value = GridAttribute.oldWater
      .Fields("oldDisturb").Value = GridAttribute.oldDisturb
      .Fields("oldMixed").Value = GridAttribute.oldMixed
      .Fields("LandSeg").Value = GridAttribute.LandSeg
      .Fields("DevType").Value = "MDRClus"
      .Fields("LogPVHec").Value = GridAttribute.LogPVHec
      .Fields("BlParcVal").Value = GridAttribute.BlParcVal
      .Fields("newForest").Value = glbForestTractMCL
      .Fields("newHerbAg").Value = glbHerbAgTractMCL
      .Fields("newWater").Value = 0 'If developed, assumed to have no water
      .Fields("newDisturb").Value = glbDisturbTractMCL
      .Fields("newMixed").Value = glbMixedTractMCL
      .Update
    End With

  Next Counter
  lyrMCL.Records.StopEditing
  End If

  'This block adds fields to the database of high density res development squares and
populates those fields
  Dim gdH As MapObjects2.GeoDataset
  Set gdH = dc.AddGeoDataset(glbDevLayerFilenameH, moPolygon, tDesc)
  If gdH Is Nothing Then Exit Sub  'invalid file
  Dim lyrH As New MapObjects2.MapLayer
  Set lyrH.GeoDataset = gdH

  If colDevelSquaresH.Count <> 0 Then
  For Counter = 1 To colDevelSquaresH.Count
```

```
    finished1 = False

    With lyrH.Records
      .AddNew  'Adds a new record to the development squares database

      'The following block of code (the do loop and the .fields().value assignments)
      'is used to grab attribute data from the grid pattern
      gridRecs.MoveFirst  'Go to the first record in the grid pattern database
      Do While Not gridRecs.EOF And finished1 = False 'Loop thru the records
        'If the centroid of a square in the grid pattern matches the centroid of
        'the development square, then store the data from the grid square
        If Fix(colDevelSquaresH(Counter).Centroid.X) =
Fix(gridRecs.Fields("centerx").Value) _
        And Fix(colDevelSquaresH(Counter).Centroid.Y) =
Fix(gridRecs.Fields("centery").Value) Then
          GridAttribute.develop = gridRecs.Fields("devel").Value
          GridAttribute.CenterX = gridRecs.Fields("CenterX").Value
          GridAttribute.CenterY = gridRecs.Fields("CenterY").Value
          GridAttribute.oldForest = gridRecs.Fields("oldForest").Value
          GridAttribute.oldHerbAg = gridRecs.Fields("oldHerbAg").Value
          GridAttribute.oldWater = gridRecs.Fields("oldWater").Value
          GridAttribute.oldDisturb = gridRecs.Fields("oldDisturb").Value
          GridAttribute.oldMixed = gridRecs.Fields("oldMixed").Value
          GridAttribute.LandSeg = gridRecs.Fields("landseg").Value
          GridAttribute.LogPVHec = gridRecs.Fields("LogPVHec").Value
          GridAttribute.BlParcVal = gridRecs.Fields("BlParcVal").Value
          finished1 = True
        End If
        gridRecs.MoveNext
      Loop

      'Set the values of the development square's fields
      .Fields("Shape").Value = colDevelSquaresH(Counter)
      .Fields("Name").Value = "High Density " & Str(Counter)
      .Fields("Area").Value = colDevelSquaresH(Counter).Area
      .Fields("develop").Value = GridAttribute.develop
      .Fields("CenterX").Value = GridAttribute.CenterX
      .Fields("CenterY").Value = GridAttribute.CenterY
      .Fields("oldForest").Value = GridAttribute.oldForest
      .Fields("oldHerbAg").Value = GridAttribute.oldHerbAg
      .Fields("oldWater").Value = GridAttribute.oldWater
      .Fields("oldDisturb").Value = GridAttribute.oldDisturb
      .Fields("oldMixed").Value = GridAttribute.oldMixed
      .Fields("LandSeg").Value = GridAttribute.LandSeg
      .Fields("DevType").Value = "HDR"
      .Fields("LogPVHec").Value = GridAttribute.LogPVHec
      .Fields("BlParcVal").Value = GridAttribute.BlParcVal
      .Fields("newForest").Value = glbForestTractH
      .Fields("newHerbAg").Value = glbHerbAgTractH
      .Fields("newWater").Value = 0 'If developed, assumed to have no water
      .Fields("newDisturb").Value = glbDisturbTractH
      .Fields("newMixed").Value = glbMixedTractH
      .Update
    End With

  Next Counter
  lyrH.Records.StopEditing
  End If


  'This block adds fields to the database of commercial development squares and
populates those fields
  Dim gdC As MapObjects2.GeoDataset
```

```
  Set gdC = dc.AddGeoDataset(glbDevLayerFilenameC, moPolygon, tDesc)
  If gdC Is Nothing Then Exit Sub  'invalid file
  Dim lyrC As New MapObjects2.MapLayer
  Set lyrC.GeoDataset = gdC

  If colDevelSquaresC.Count <> 0 Then
  For Counter = 1 To colDevelSquaresC.Count
    finished1 = False

    With lyrC.Records
      .AddNew  'Adds a new record to the development squares database

      'The following block of code (the do loop and the .fields().value assignments)
      'is used to grab attribute data from the grid pattern
      gridRecs.MoveFirst  'Go to the first record in the grid pattern database
      Do While Not gridRecs.EOF And finished1 = False 'Loop thru the records
        'If the centroid of a square in the grid pattern matches the centroid of
        'the development square, then store the data from the grid square
        If Fix(colDevelSquaresC(Counter).Centroid.X) =
Fix(gridRecs.Fields("centerx").Value) _
        And Fix(colDevelSquaresC(Counter).Centroid.Y) =
Fix(gridRecs.Fields("centery").Value) Then
          GridAttribute.develop = gridRecs.Fields("devel").Value
          GridAttribute.CenterX = gridRecs.Fields("CenterX").Value
          GridAttribute.CenterY = gridRecs.Fields("CenterY").Value
          GridAttribute.oldForest = gridRecs.Fields("oldForest").Value
          GridAttribute.oldHerbAg = gridRecs.Fields("oldHerbAg").Value
          GridAttribute.oldWater = gridRecs.Fields("oldWater").Value
          GridAttribute.oldDisturb = gridRecs.Fields("oldDisturb").Value
          GridAttribute.oldMixed = gridRecs.Fields("oldMixed").Value
          GridAttribute.LandSeg = gridRecs.Fields("landseg").Value
          GridAttribute.LogPVHec = gridRecs.Fields("LogPVHec").Value
          GridAttribute.BlParcVal = gridRecs.Fields("BlParcVal").Value
          finished1 = True
        End If
        gridRecs.MoveNext
      Loop

      'Set the values of the development square's fields
      .Fields("Shape").Value = colDevelSquaresC(Counter)
      .Fields("Name").Value = "Commercial " & Str(Counter)
      .Fields("Area").Value = colDevelSquaresC(Counter).Area
      .Fields("develop").Value = GridAttribute.develop
      .Fields("CenterX").Value = GridAttribute.CenterX
      .Fields("CenterY").Value = GridAttribute.CenterY
      .Fields("oldForest").Value = GridAttribute.oldForest
      .Fields("oldHerbAg").Value = GridAttribute.oldHerbAg
      .Fields("oldWater").Value = GridAttribute.oldWater
      .Fields("oldDisturb").Value = GridAttribute.oldDisturb
      .Fields("oldMixed").Value = GridAttribute.oldMixed
      .Fields("LandSeg").Value = GridAttribute.LandSeg
      .Fields("DevType").Value = "COM"
      .Fields("LogPVHec").Value = GridAttribute.LogPVHec
      .Fields("BlParcVal").Value = GridAttribute.BlParcVal
      .Fields("newForest").Value = glbForestTractC
      .Fields("newHerbAg").Value = glbHerbAgTractC
      .Fields("newWater").Value = 0 'If developed, assumed to have no water
      .Fields("newDisturb").Value = glbDisturbTractC
      .Fields("newMixed").Value = glbMixedTractC
      .Update
    End With

  Next Counter
```

```
  lyrC.Records.StopEditing
  End If

'This block takes the individual development square shapefiles (up to 5 types)
'and combines them into a single shapefile

  'Set up the shapefile that combines all of the individual shapefiles
  Dim GDCombined As New MapObjects2.GeoDataset
  glbCombinedDevLayerFilename = "aaCombined"
  Set GDCombined = dc.AddGeoDataset(glbCombinedDevLayerFilename, moPolygon, tDesc)
  Dim LyrCombined As New MapObjects2.MapLayer
  Set LyrCombined.GeoDataset = GDCombined

  'Define the recordsets for each individual shapefile
  Dim LowRecSet As MapObjects2.Recordset
  Set LowRecSet = lyrL.Records
  Dim MidConvRecSet As MapObjects2.Recordset
  Set MidConvRecSet = lyrMC.Records
  Dim MidClusRecSet As MapObjects2.Recordset
  Set MidClusRecSet = lyrMCL.Records
  Dim HighRecSet As MapObjects2.Recordset
  Set HighRecSet = lyrH.Records
  Dim ComRecSet As MapObjects2.Recordset
  Set ComRecSet = lyrC.Records


  'Add records from the low density layer
  LowRecSet.MoveFirst
  Do While Not LowRecSet.EOF
    With LyrCombined.Records
      .AddNew
      .Fields("Shape").Value = LowRecSet.Fields("Shape").Value
      .Fields("Name").Value = LowRecSet.Fields("Name").Value
      .Fields("Area").Value = LowRecSet.Fields("Area").Value
      .Fields("develop").Value = LowRecSet.Fields("develop").Value
      .Fields("CenterX").Value = LowRecSet.Fields("CenterX").Value
      .Fields("CenterY").Value = LowRecSet.Fields("CenterY").Value
      .Fields("oldForest").Value = LowRecSet.Fields("oldForest").Value
      .Fields("oldHerbAg").Value = LowRecSet.Fields("oldHerbAg").Value
      .Fields("oldWater").Value = LowRecSet.Fields("oldWater").Value
      .Fields("oldDisturb").Value = LowRecSet.Fields("oldDisturb").Value
      .Fields("oldMixed").Value = LowRecSet.Fields("oldMixed").Value
      .Fields("LandSeg").Value = LowRecSet.Fields("LandSeg").Value
      .Fields("DevType").Value = LowRecSet.Fields("DevType").Value
      .Fields("LogPVHec").Value = LowRecSet.Fields("LogPVHec").Value
      .Fields("BlParcVal").Value = LowRecSet.Fields("BlParcVal").Value
      .Fields("SewDist").Value = LowRecSet.Fields("SewDist").Value
      .Fields("newForest").Value = LowRecSet.Fields("newForest").Value
      .Fields("newHerbAg").Value = LowRecSet.Fields("newHerbAg").Value
      .Fields("newWater").Value = LowRecSet.Fields("newWater").Value
      .Fields("newDisturb").Value = LowRecSet.Fields("newDisturb").Value
      .Fields("newMixed").Value = LowRecSet.Fields("newMixed").Value
      .Update
    End With
    LowRecSet.MoveNext
  Loop

  'Add records from the mid density conventional layer
  MidConvRecSet.MoveFirst
  Do While Not MidConvRecSet.EOF
    With LyrCombined.Records
      .AddNew
      .Fields("Shape").Value = MidConvRecSet.Fields("Shape").Value
```

```
    .Fields("Name").Value = MidConvRecSet.Fields("Name").Value
    .Fields("Area").Value = MidConvRecSet.Fields("Area").Value
    .Fields("develop").Value = MidConvRecSet.Fields("develop").Value
    .Fields("CenterX").Value = MidConvRecSet.Fields("CenterX").Value
    .Fields("CenterY").Value = MidConvRecSet.Fields("CenterY").Value
    .Fields("oldForest").Value = MidConvRecSet.Fields("oldForest").Value
    .Fields("oldHerbAg").Value = MidConvRecSet.Fields("oldHerbAg").Value
    .Fields("oldWater").Value = MidConvRecSet.Fields("oldWater").Value
    .Fields("oldDisturb").Value = MidConvRecSet.Fields("oldDisturb").Value
    .Fields("oldMixed").Value = MidConvRecSet.Fields("oldMixed").Value
    .Fields("LandSeg").Value = MidConvRecSet.Fields("LandSeg").Value
    .Fields("DevType").Value = MidConvRecSet.Fields("DevType").Value
    .Fields("LogPVHec").Value = MidConvRecSet.Fields("LogPVHec").Value
    .Fields("BlParcVal").Value = MidConvRecSet.Fields("BlParcVal").Value
    .Fields("SewDist").Value = MidConvRecSet.Fields("SewDist").Value
    .Fields("newForest").Value = MidConvRecSet.Fields("newForest").Value
    .Fields("newHerbAg").Value = MidConvRecSet.Fields("newHerbAg").Value
    .Fields("newWater").Value = MidConvRecSet.Fields("newWater").Value
    .Fields("newDisturb").Value = MidConvRecSet.Fields("newDisturb").Value
    .Fields("newMixed").Value = MidConvRecSet.Fields("newMixed").Value
    .Update
  End With
  MidConvRecSet.MoveNext
Loop

'Add records from the mid density cluster layer
MidClusRecSet.MoveFirst
Do While Not MidClusRecSet.EOF
  With LyrCombined.Records
    .AddNew
    .Fields("Shape").Value = MidClusRecSet.Fields("Shape").Value
    .Fields("Name").Value = MidClusRecSet.Fields("Name").Value
    .Fields("Area").Value = MidClusRecSet.Fields("Area").Value
    .Fields("develop").Value = MidClusRecSet.Fields("develop").Value
    .Fields("CenterX").Value = MidClusRecSet.Fields("CenterX").Value
    .Fields("CenterY").Value = MidClusRecSet.Fields("CenterY").Value
    .Fields("oldForest").Value = MidClusRecSet.Fields("oldForest").Value
    .Fields("oldHerbAg").Value = MidClusRecSet.Fields("oldHerbAg").Value
    .Fields("oldWater").Value = MidClusRecSet.Fields("oldWater").Value
    .Fields("oldDisturb").Value = MidClusRecSet.Fields("oldDisturb").Value
    .Fields("oldMixed").Value = MidClusRecSet.Fields("oldMixed").Value
    .Fields("LandSeg").Value = MidClusRecSet.Fields("LandSeg").Value
    .Fields("DevType").Value = MidClusRecSet.Fields("DevType").Value
    .Fields("LogPVHec").Value = MidClusRecSet.Fields("LogPVHec").Value
    .Fields("BlParcVal").Value = MidClusRecSet.Fields("BlParcVal").Value
    .Fields("SewDist").Value = MidClusRecSet.Fields("SewDist").Value
    .Fields("newForest").Value = MidClusRecSet.Fields("newForest").Value
    .Fields("newHerbAg").Value = MidClusRecSet.Fields("newHerbAg").Value
    .Fields("newWater").Value = MidClusRecSet.Fields("newWater").Value
    .Fields("newDisturb").Value = MidClusRecSet.Fields("newDisturb").Value
    .Fields("newMixed").Value = MidClusRecSet.Fields("newMixed").Value
    .Update
  End With
  MidClusRecSet.MoveNext
Loop

'Add records from the high density layer
HighRecSet.MoveFirst
Do While Not HighRecSet.EOF
  With LyrCombined.Records
    .AddNew
    .Fields("Shape").Value = HighRecSet.Fields("Shape").Value
    .Fields("Name").Value = HighRecSet.Fields("Name").Value
```

```
      .Fields("Area").Value = HighRecSet.Fields("Area").Value
      .Fields("develop").Value = HighRecSet.Fields("develop").Value
      .Fields("CenterX").Value = HighRecSet.Fields("CenterX").Value
      .Fields("CenterY").Value = HighRecSet.Fields("CenterY").Value
      .Fields("oldForest").Value = HighRecSet.Fields("oldForest").Value
      .Fields("oldHerbAg").Value = HighRecSet.Fields("oldHerbAg").Value
      .Fields("oldWater").Value = HighRecSet.Fields("oldWater").Value
      .Fields("oldDisturb").Value = HighRecSet.Fields("oldDisturb").Value
      .Fields("oldMixed").Value = HighRecSet.Fields("oldMixed").Value
      .Fields("LandSeg").Value = HighRecSet.Fields("LandSeg").Value
      .Fields("DevType").Value = HighRecSet.Fields("DevType").Value
      .Fields("LogPVHec").Value = HighRecSet.Fields("LogPVHec").Value
      .Fields("BlParcVal").Value = HighRecSet.Fields("BlParcVal").Value
      .Fields("SewDist").Value = HighRecSet.Fields("SewDist").Value
      .Fields("newForest").Value = HighRecSet.Fields("newForest").Value
      .Fields("newHerbAg").Value = HighRecSet.Fields("newHerbAg").Value
      .Fields("newWater").Value = HighRecSet.Fields("newWater").Value
      .Fields("newDisturb").Value = HighRecSet.Fields("newDisturb").Value
      .Fields("newMixed").Value = HighRecSet.Fields("newMixed").Value
      .Update
    End With
    HighRecSet.MoveNext
  Loop


  'Add records from the commercial layer
  ComRecSet.MoveFirst
  Do While Not ComRecSet.EOF
    With LyrCombined.Records
      .AddNew
      .Fields("Shape").Value = ComRecSet.Fields("Shape").Value
      .Fields("Name").Value = ComRecSet.Fields("Name").Value
      .Fields("Area").Value = ComRecSet.Fields("Area").Value
      .Fields("develop").Value = ComRecSet.Fields("develop").Value
      .Fields("CenterX").Value = ComRecSet.Fields("CenterX").Value
      .Fields("CenterY").Value = ComRecSet.Fields("CenterY").Value
      .Fields("oldForest").Value = ComRecSet.Fields("oldForest").Value
      .Fields("oldHerbAg").Value = ComRecSet.Fields("oldHerbAg").Value
      .Fields("oldWater").Value = ComRecSet.Fields("oldWater").Value
      .Fields("oldDisturb").Value = ComRecSet.Fields("oldDisturb").Value
      .Fields("oldMixed").Value = ComRecSet.Fields("oldMixed").Value
      .Fields("LandSeg").Value = ComRecSet.Fields("LandSeg").Value
      .Fields("DevType").Value = ComRecSet.Fields("DevType").Value
      .Fields("LogPVHec").Value = ComRecSet.Fields("LogPVHec").Value
      .Fields("BlParcVal").Value = ComRecSet.Fields("BlParcVal").Value
      .Fields("SewDist").Value = ComRecSet.Fields("SewDist").Value
      .Fields("newForest").Value = ComRecSet.Fields("newForest").Value
      .Fields("newHerbAg").Value = ComRecSet.Fields("newHerbAg").Value
      .Fields("newWater").Value = ComRecSet.Fields("newWater").Value
      .Fields("newDisturb").Value = ComRecSet.Fields("newDisturb").Value
      .Fields("newMixed").Value = ComRecSet.Fields("newMixed").Value
      .Update
    End With
    ComRecSet.MoveNext
  Loop

  LyrCombined.Records.StopEditing
  dc.Disconnect

End Sub


'This function takes the x coordinate from a user-clicked point and
```

```
'makes it snap to the grid pattern.  The idea is to compare the user-
'clicked point's x coordinate to the set of possible x coordinates from
'the grid.  The program will then reassign the user-clicked x coordinate
'to the grid value
Public Function SnapXToGrid(ClickedX As Double) As Double

  Dim ComparisonX As Double
  Dim AbsDiff As Double, MinAbsDiff As Double

  MinAbsDiff = 999999999999#
  For ComparisonX = glbGridMinX To glbGridMaxX Step (glbSquareSize * 2)  'The loop
runs from the minimum grid X to the maximum grid X, stepping by the size of the grid
squares
    AbsDiff = Abs(ComparisonX - ClickedX)  'Calculate the absolute value of the
difference between the clicked X and the grid X
    If AbsDiff < MinAbsDiff Then  'Keep track of the minimum absolute difference
      MinAbsDiff = AbsDiff
      SnapXToGrid = ComparisonX  'Keep the X coordinate with the minimum abs
difference
    End If
  Next ComparisonX
End Function

'This function takes the y coordinate from a user-clicked point and
'makes it snap to the grid pattern.  This is exactly like SnapXtoGrid
Public Function SnapYToGrid(ClickedY As Double) As Double

  Dim ComparisonY As Double
  Dim AbsDiff As Double, MinAbsDiff As Double

  MinAbsDiff = 999999999999#
  For ComparisonY = glbGridMinY To glbGridMaxY Step (glbSquareSize * 2)
    AbsDiff = Abs(ComparisonY - ClickedY)
    If AbsDiff < MinAbsDiff Then
      MinAbsDiff = AbsDiff
      SnapYToGrid = ComparisonY
    End If
  Next ComparisonY
End Function

'This function checks to see if a user-clicked square is inside the grid that is
'provided for them.  If it is, then this function returns a value of 1.  If it
'is not then this function returns a value of 0.
Public Function SeeThatSquareIsInGrid(UserPt As MapObjects2.Point) As Integer
    Dim dataConn As New MapObjects2.DataConnection
    dataConn.Database = App.Path & "\BC_Data"
    If (Not dataConn.Connect) Then
      MsgBox "Could not connect to database!"
      Exit Function 'bad dataConnection
    End If

    SeeThatSquareIsInGrid = 0
  'This defines the geodataset, layer, and records for the grid pattern.
  'The newly created layer of development squares needs to draw out data
  'from the grid pattern.
  Dim gridGeoSet As MapObjects2.GeoDataset
  Dim gridLayer As New MapObjects2.MapLayer
  Dim gridRecords As New MapObjects2.Recordset
  Set gridLayer.GeoDataset = dataConn.FindGeoDataset("grid_pattern")
  Set gridRecords = gridLayer.Records

  Dim finished2 As Boolean
  finished2 = False
```

```
      gridRecords.MoveFirst  'Go to the first record in the grid pattern database
      Do While Not gridRecords.EOF And finished2 = False 'Loop thru the records
        'If the centroid of a square in the grid pattern matches the centroid of
        'the development square, then keep it.  Otherwise, throw it out
        If Fix(UserPt.X) = Fix(gridRecords.Fields("centerx").Value) _
        And Fix(UserPt.Y) = Fix(gridRecords.Fields("centery").Value) Then
          SeeThatSquareIsInGrid = 1
          finished2 = True
        End If
        gridRecords.MoveNext
      Loop

   dataConn.Disconnect

End Function

'This subroutine allows the user to remove a development square from the map
'by clicking on the square when the proper tool is selected
Public Sub RemoveSingleSquare(RemovePt As MapObjects2.Point)

    Dim RemoveClickX As Double, RemoveClickY As Double
    Dim DevSquareIterator As Integer

    RemoveClickX = RemovePt.X
    RemoveClickY = RemovePt.Y
    RemovePt.X = SnapXToGrid(RemoveClickX) 'In the AddDevelopmentsOperations module --
changes x coordinate to fit the grid
    RemovePt.Y = SnapYToGrid(RemoveClickY) 'In the AddDevelopmentsOperations module --
changes y coordinate to fit the grid

    'Get rid of a low density square
    DevSquareIterator = 1  'Start with the first development square
    'As long as the development square's position in the collection is less than
    'or equal to the total count of development squares, check to see if the user
    'clicked it.  If so, then remove it from the collection
    Do While DevSquareIterator <= colDevelSquaresL.Count
      'Check to see if the clicked point is a development square
      If Fix(colDevelSquaresL(DevSquareIterator).Centroid.X) = Fix(RemovePt.X) And _
        Fix(colDevelSquaresL(DevSquareIterator).Centroid.Y) = Fix(RemovePt.Y) Then
        colDevelSquaresL.Remove (DevSquareIterator) 'if it is, then remove it
      End If
      DevSquareIterator = DevSquareIterator + 1 'move on to the next devSquare in the
collection

      frmMain.mapDisplay.TrackingLayer.Refresh True 'This sends the program to the
subroutine _
      that draws the map
    Loop

    'Also need to remove the development square from the collection of stored squares
    'so that a user can put a new development square on a vacated spot
    DevSquareIterator = 1
    Do While DevSquareIterator <= colStoredPolys.Count
      'Check to see if the clicked point is in the collection of stored development
squares
      If Fix(colStoredPolys(DevSquareIterator).Centroid.X) = Fix(RemovePt.X) And _
        Fix(colStoredPolys(DevSquareIterator).Centroid.Y) = Fix(RemovePt.Y) Then
        colStoredPolys.Remove (DevSquareIterator) 'if it is, then remove it
      End If
      DevSquareIterator = DevSquareIterator + 1 'move on to the next devSquare in the
collection
    Loop
```

```
    'Get rid of a mid density conventional square
    DevSquareIterator = 1  'Start with the first development square
    'As long as the development square's position in the collection is less than
    'or equal to the total count of development squares, check to see if the user
    'clicked it.  If so, then remove it from the collection
    Do While DevSquareIterator <= colDevelSquaresMC.Count
      'Check to see if the clicked point is a development square
      If Fix(colDevelSquaresMC(DevSquareIterator).Centroid.X) = Fix(RemovePt.X) And _
        Fix(colDevelSquaresMC(DevSquareIterator).Centroid.Y) = Fix(RemovePt.Y) Then
        colDevelSquaresMC.Remove (DevSquareIterator) 'if it is, then remove it
      End If
      DevSquareIterator = DevSquareIterator + 1 'move on to the next devSquare in the
collection

      frmMain.mapDisplay.TrackingLayer.Refresh True 'This sends the program to the
subroutine _
      that draws the map
    Loop

    'Also need to remove the development square from the collection of stored squares
    'so that a user can put a new development square on a vacated spot
    DevSquareIterator = 1
    Do While DevSquareIterator <= colStoredPolys.Count
      'Check to see if the clicked point is in the collection of stored development
squares
      If Fix(colStoredPolys(DevSquareIterator).Centroid.X) = Fix(RemovePt.X) And _
        Fix(colStoredPolys(DevSquareIterator).Centroid.Y) = Fix(RemovePt.Y) Then
        colStoredPolys.Remove (DevSquareIterator) 'if it is, then remove it
      End If
      DevSquareIterator = DevSquareIterator + 1 'move on to the next devSquare in the
collection
    Loop


    'Get rid of a mid density cluster square
    DevSquareIterator = 1  'Start with the first development square
    'As long as the development square's position in the collection is less than
    'or equal to the total count of development squares, check to see if the user
    'clicked it.  If so, then remove it from the collection
    Do While DevSquareIterator <= colDevelSquaresMCL.Count
      'Check to see if the clicked point is a development square
      If Fix(colDevelSquaresMCL(DevSquareIterator).Centroid.X) = Fix(RemovePt.X) And _
        Fix(colDevelSquaresMCL(DevSquareIterator).Centroid.Y) = Fix(RemovePt.Y) Then
        colDevelSquaresMCL.Remove (DevSquareIterator) 'if it is, then remove it
      End If
      DevSquareIterator = DevSquareIterator + 1 'move on to the next devSquare in the
collection

      frmMain.mapDisplay.TrackingLayer.Refresh True 'This sends the program to the
subroutine _
      that draws the map
    Loop

    'Also need to remove the development square from the collection of stored squares
    'so that a user can put a new development square on a vacated spot
    DevSquareIterator = 1
    Do While DevSquareIterator <= colStoredPolys.Count
      'Check to see if the clicked point is in the collection of stored development
squares
      If Fix(colStoredPolys(DevSquareIterator).Centroid.X) = Fix(RemovePt.X) And _
        Fix(colStoredPolys(DevSquareIterator).Centroid.Y) = Fix(RemovePt.Y) Then
        colStoredPolys.Remove (DevSquareIterator) 'if it is, then remove it
```

```
      End If
      DevSquareIterator = DevSquareIterator + 1 'move on to the next devSquare in the
collection
    Loop


    'Get rid of a high density square
    DevSquareIterator = 1  'Start with the first development square
    'As long as the development square's position in the collection is less than
    'or equal to the total count of development squares, check to see if the user
    'clicked it.  If so, then remove it from the collection
    Do While DevSquareIterator <= colDevelSquaresH.Count
      'Check to see if the clicked point is a development square
      If Fix(colDevelSquaresH(DevSquareIterator).Centroid.X) = Fix(RemovePt.X) And _
        Fix(colDevelSquaresH(DevSquareIterator).Centroid.Y) = Fix(RemovePt.Y) Then
        colDevelSquaresH.Remove (DevSquareIterator) 'if it is, then remove it
      End If
      DevSquareIterator = DevSquareIterator + 1 'move on to the next devSquare in the
collection

      frmMain.mapDisplay.TrackingLayer.Refresh True 'This sends the program to the
subroutine _
      that draws the map
    Loop

    'Also need to remove the development square from the collection of stored squares
    'so that a user can put a new development square on a vacated spot
    DevSquareIterator = 1
    Do While DevSquareIterator <= colStoredPolys.Count
      'Check to see if the clicked point is in the collection of stored development
squares
      If Fix(colStoredPolys(DevSquareIterator).Centroid.X) = Fix(RemovePt.X) And _
        Fix(colStoredPolys(DevSquareIterator).Centroid.Y) = Fix(RemovePt.Y) Then
        colStoredPolys.Remove (DevSquareIterator) 'if it is, then remove it
      End If
      DevSquareIterator = DevSquareIterator + 1 'move on to the next devSquare in the
collection
    Loop


    'Get rid of a commercial square
    DevSquareIterator = 1  'Start with the first development square
    'As long as the development square's position in the collection is less than
    'or equal to the total count of development squares, check to see if the user
    'clicked it.  If so, then remove it from the collection
    Do While DevSquareIterator <= colDevelSquaresC.Count
      'Check to see if the clicked point is a development square
      If Fix(colDevelSquaresC(DevSquareIterator).Centroid.X) = Fix(RemovePt.X) And _
        Fix(colDevelSquaresC(DevSquareIterator).Centroid.Y) = Fix(RemovePt.Y) Then
        colDevelSquaresC.Remove (DevSquareIterator) 'if it is, then remove it
      End If
      DevSquareIterator = DevSquareIterator + 1 'move on to the next devSquare in the
collection

      frmMain.mapDisplay.TrackingLayer.Refresh True 'This sends the program to the
subroutine _
      that draws the map
    Loop

    'Also need to remove the development square from the collection of stored squares
    'so that a user can put a new development square on a vacated spot
    DevSquareIterator = 1
    Do While DevSquareIterator <= colStoredPolys.Count
```

```
      'Check to see if the clicked point is in the collection of stored development
squares
      If Fix(colStoredPolys(DevSquareIterator).Centroid.X) = Fix(RemovePt.X) And _
        Fix(colStoredPolys(DevSquareIterator).Centroid.Y) = Fix(RemovePt.Y) Then
        colStoredPolys.Remove (DevSquareIterator) 'if it is, then remove it
      End If
      DevSquareIterator = DevSquareIterator + 1 'move on to the next devSquare in the
collection
    Loop

End Sub

'This subroutine clears all developments off the map by removing squares from the
'collections of development squares

Public Sub ClearAllDevelopments()

  'Get rid of low density squares
  Do While colDevelSquaresL.Count <> 0
    colDevelSquaresL.Remove (1)
  Loop

  Do While colDevelSquaresMC.Count <> 0
    colDevelSquaresMC.Remove (1)
  Loop

  'Get rid of mid density cluster squares
  Do While colDevelSquaresMCL.Count <> 0
    colDevelSquaresMCL.Remove (1)
  Loop

  'Get rid of high density squares
  Do While colDevelSquaresH.Count <> 0
    colDevelSquaresH.Remove (1)
  Loop

  'Get rid of commercial squares
  Do While colDevelSquaresC.Count <> 0
    colDevelSquaresC.Remove (1)
  Loop

  frmMain.mapDisplay.TrackingLayer.Refresh True 'This sends the program to the
subroutine _
  that draws the map

  'Clear the collection of stored development squares so that the user can put
  'development squares down in spots that have been cleared
  Do While colStoredPolys.Count <> 0
    colStoredPolys.Remove (1)
  Loop

  'Reenable the map display and input button (if they have been disabled), so the
  'user can add new developments
  frmMain.mapDisplay.Enabled = True
  frmMain.cmdInputComplete.Enabled = True

  'Clean up any report forms that are open
  If frmHydroReport.Visible Then Unload frmHydroReport
  If frmEconExcelView.Visible Then Unload frmEconExcelView
  If FrmEconInput.Visible Then Unload FrmEconInput
  If frmFishReport.Visible Then Unload frmFishReport
  If frmHelp.Visible Then Unload frmHelp
```

```
  'Hide the status message if it is visible
  frmMain.fraStatusMessage.Visible = False

End Sub

'This subroutine looks for "super groups" of development squares, so they
'can be considered as one development.  A single square is part of a
'super group if it shares a point with any other square.
Public Sub FindSuperGroupsOfSquares()

  'Set up data connection
  Dim dcSquares As New MapObjects2.DataConnection
  dcSquares.Database = App.Path & "\BC_Data"
  If (Not dcSquares.Connect) Then
    MsgBox "Could not connect to database!"
    Exit Sub  'bad dataConnection
  End If

  'Set up connection to development squares
  Dim gdSquares As MapObjects2.GeoDataset
  Dim lyrSquares As New MapObjects2.MapLayer
  Dim rsSquares As New MapObjects2.Recordset
  Set lyrSquares.GeoDataset = dcSquares.FindGeoDataset(glbCombinedDevLayerFilename)
  Set rsSquares = lyrSquares.Records

  'The field SuperGrp will be used to store whether a square is part of
  'a super group -- 0 means it is not, and a number above 0 means it is.
  'Squares in a particular super group have the same number in the SuperGrp field

  Dim BaseX As Double, BaseY As Double, CompareX As Double, CompareY As Double
  Dim CompareGrpNum As Integer
  Dim BaseGrpNum As Integer
  Dim i As Integer, j As Integer, k As Integer, recCount As Integer
  Dim SuperGrpNum As Integer, SuperGrpNumHolder As Integer
  Dim FoundAdjacent As Boolean
  Dim OutRecCount As Integer, InRecCount As Integer
  Dim NumBaseAdjacent As Integer, NumExtraAdjacent As Integer
  Dim Xdiff As Double, Ydiff As Double


  'Initialize all squares as not being part of a super group.
  ' Edit values in the database
  ' Update method causes a jump back to the first record in the recordset
  ' Use a loop to move back down again to the appropriate record
  rsSquares.MoveFirst
  recCount = 0
  Do While Not rsSquares.EOF
    recCount = recCount + 1
    With lyrSquares.Records
      .MoveFirst
      For j = 2 To recCount
       .MoveNext
      Next j
      .Edit
      .Fields("SuperGrp").Value = 0
      .Update
    End With
    rsSquares.MoveNext
  Loop

  'Now look for squares that are adjacent to others
  SuperGrpNumHolder = 1
```

```
'Make a loop that will go through each square.  Each of the squares of this outer
'loop are considered to be the "base" square.
For OutRecCount = 1 To rsSquares.Count
  FoundAdjacent = False
  rsSquares.MoveFirst
  'Step down in the recordset to the base square in the loop
  For k = 2 To OutRecCount
    rsSquares.MoveNext
  Next k

  'Get the base x and y coordinates
  BaseX = rsSquares.Fields("CenterX").Value
  BaseY = rsSquares.Fields("CenterY").Value

  'Get the base supergroup number
  BaseGrpNum = rsSquares.Fields("SuperGrp").Value

  'Make a loop to run through each of the squares.  The squares in this loop
  'are the comparison squares which get compared to the base for adjacency
  rsSquares.MoveFirst
  InRecCount = 0
  'Run loop thru each development square until an adjacent one is found
  Do While Not rsSquares.EOF And FoundAdjacent = False
    'Track which record the loop is on
    InRecCount = InRecCount + 1

    'Get the comparison x and y coordinates
    CompareX = rsSquares.Fields("CenterX").Value
    CompareY = rsSquares.Fields("CenterY").Value

    'Get the comparison square's supergroup number
    CompareGrpNum = rsSquares.Fields("SuperGrp").Value

    'Calculate the difference between coordinates of the base square and the
    'comparison square
    Xdiff = BaseX - CompareX
    Ydiff = BaseY - CompareY

    'Send the difference in coordinate values to functions that test for
    'adjacency.  If any of the functions show adjacency then adjust the
    'supergroup number for the base and comparison squares.
    If NorthAdjacent(Xdiff, Ydiff) = True Or _
       SouthAdjacent(Xdiff, Ydiff) = True Or _
       EastAdjacent(Xdiff, Ydiff) = True Or _
       WestAdjacent(Xdiff, Ydiff) = True Or _
       NEAdjacent(Xdiff, Ydiff) = True Or _
       NWAdjacent(Xdiff, Ydiff) = True Or _
       SEAdjacent(Xdiff, Ydiff) = True Or _
       SWAdjacent(Xdiff, Ydiff) = True Then

      'If the groupnumber on either square has already been changed from 0
      'then set the supergrp number to the number of the comparison square.
      'Otherwise, set the supergrp number equal to the holder value.
      If CompareGrpNum > 0 Or BaseGrpNum > 0 Then
        SuperGrpNum = CompareGrpNum
        Else: SuperGrpNum = SuperGrpNumHolder
          SuperGrpNumHolder = SuperGrpNumHolder + 1
      End If
        'Edit the base square in the database
        With lyrSquares.Records
          .MoveFirst
          For j = 2 To OutRecCount
            .MoveNext
```

```
            Next j
            .Edit
            .Fields("SuperGrp").Value = SuperGrpNum
            .Update

            'Edit the comparison square in the database
            .MoveFirst
            For j = 2 To InRecCount
              .MoveNext
            Next j
            .Edit
            .Fields("SuperGrp").Value = SuperGrpNum
            .Update

            FoundAdjacent = True
          End With
      End If

      rsSquares.MoveNext
    Loop
  Next OutRecCount


'Because the SuperGroupHolder value may have been incremented too
'many times depending on how the user laid down squares on the map, the
'supergroup values in the database need to be readjusted.

  'Run an outer loop that will comb through all the squares to make sure the group
  'numbering correction hits every tract
  Dim catchallsquares As Integer
  For catchallsquares = 1 To rsSquares.Count
    'Run an outer loop for the base square
    For OutRecCount = 1 To rsSquares.Count
      rsSquares.MoveFirst
        For k = 2 To OutRecCount
          rsSquares.MoveNext
        Next k

      'Get the x and y coordinates
      BaseX = rsSquares.Fields("CenterX").Value
      BaseY = rsSquares.Fields("CenterY").Value

      'Get the supergrp number for the base square
      BaseGrpNum = rsSquares.Fields("SuperGrp").Value

      'Run an inner loop for the comparison square
      rsSquares.MoveFirst
      InRecCount = 0
      Do While Not rsSquares.EOF
        InRecCount = InRecCount + 1

        'Get the x and y coordinates
        CompareX = rsSquares.Fields("CenterX").Value
        CompareY = rsSquares.Fields("CenterY").Value

        'Calculate the difference between base and comparison coordinates
        Xdiff = BaseX - CompareX
        Ydiff = BaseY - CompareY

        'Get the supergrp number for the comparison square
        CompareGrpNum = rsSquares.Fields("SuperGrp").Value

        'Use functions to check for adjacency
```

```
        If NorthAdjacent(Xdiff, Ydiff) = True Or _
          SouthAdjacent(Xdiff, Ydiff) = True Or _
          EastAdjacent(Xdiff, Ydiff) = True Or _
          WestAdjacent(Xdiff, Ydiff) = True Or _
          NEAdjacent(Xdiff, Ydiff) = True Or _
          NWAdjacent(Xdiff, Ydiff) = True Or _
          SEAdjacent(Xdiff, Ydiff) = True Or _
          SWAdjacent(Xdiff, Ydiff) = True Then

          'if squares are adjacent and the comparison supergrp number is higher than
          'a non-zero base group number then set the supergrp number = to the base
          'supergrp number
          If CompareGrpNum > BaseGrpNum And BaseGrpNum > 0 Then
            SuperGrpNum = BaseGrpNum
            With lyrSquares.Records
              .MoveFirst
              For j = 2 To InRecCount
                .MoveNext
              Next j
              .Edit
              .Fields("SuperGrp").Value = SuperGrpNum
              .Update
            End With

          End If

          'if squares are adjacent and the base supergrp number is higher than
          'a non-zero comparison group number then set the supergrp number = to the
          'comparison supergrp number
          If BaseGrpNum > CompareGrpNum And CompareGrpNum > 0 Then
            SuperGrpNum = CompareGrpNum
            With lyrSquares.Records
              .MoveFirst
              For j = 2 To OutRecCount
                .MoveNext
              Next j
              .Edit
              .Fields("SuperGrp").Value = SuperGrpNum
              .Update
            End With
          End If

        End If
        rsSquares.MoveNext
      Loop
    Next OutRecCount
  Next catchallsquares

End Sub

'This function tells whether a development square in a particular direction
'is adjacent to the square of interest.  Xdiff and Ydiff are the differences in the
'two squares' centroid coordinates
Public Function EastAdjacent(Xdiff, Ydiff As Double) As Boolean
  If Xdiff = 2 * glbSquareSize And Ydiff = 0 Then
      EastAdjacent = True
        Else
          EastAdjacent = False
  End If
End Function
'This function tells whether a development square in a particular direction
'is adjacent to the square of interest.  Xdiff and Ydiff are the differences in the
'two squares' centroid coordinates
```

```
Public Function WestAdjacent(Xdiff, Ydiff As Double) As Boolean
  If Xdiff = -(2 * glbSquareSize) And Ydiff = 0 Then
      WestAdjacent = True
        Else
          WestAdjacent = False
  End If
End Function
'This function tells whether a development square in a particular direction
'is adjacent to the square of interest.  Xdiff and Ydiff are the differences in the
'two squares' centroid coordinates
Public Function NorthAdjacent(Xdiff, Ydiff As Double) As Boolean
  If Xdiff = 0 And Ydiff = 2 * glbSquareSize Then
      NorthAdjacent = True
        Else
          NorthAdjacent = False
  End If
End Function
'This function tells whether a development square in a particular direction
'is adjacent to the square of interest.  Xdiff and Ydiff are the differences in the
'two squares' centroid coordinates
Public Function SouthAdjacent(Xdiff, Ydiff As Double) As Boolean
  If Xdiff = 0 And Ydiff = -(2 * glbSquareSize) Then
      SouthAdjacent = True
        Else
          SouthAdjacent = False
  End If
End Function
'This function tells whether a development square in a particular direction
'is adjacent to the square of interest.  Xdiff and Ydiff are the differences in the
'two squares' centroid coordinates
Public Function NEAdjacent(Xdiff, Ydiff As Double) As Boolean
  If Xdiff = 2 * glbSquareSize And Ydiff = 2 * glbSquareSize Then
      NEAdjacent = True
        Else
          NEAdjacent = False
  End If
End Function
'This function tells whether a development square in a particular direction
'is adjacent to the square of interest.  Xdiff and Ydiff are the differences in the
'two squares' centroid coordinates
Public Function NWAdjacent(Xdiff, Ydiff As Double) As Boolean
  If Xdiff = -(2 * glbSquareSize) And Ydiff = 2 * glbSquareSize Then
      NWAdjacent = True
        Else
          NWAdjacent = False
  End If
End Function
'This function tells whether a development square in a particular direction
'is adjacent to the square of interest.  Xdiff and Ydiff are the differences in the
'two squares' centroid coordinates
Public Function SEAdjacent(Xdiff, Ydiff As Double) As Boolean
  If Xdiff = 2 * glbSquareSize And Ydiff = -(2 * glbSquareSize) Then
      SEAdjacent = True
        Else
          SEAdjacent = False
  End If
End Function
'This function tells whether a development square in a particular direction
'is adjacent to the square of interest.  Xdiff and Ydiff are the differences in the
'two squares' centroid coordinates
Public Function SWAdjacent(Xdiff, Ydiff As Double) As Boolean
  If Xdiff = -(2 * glbSquareSize) And Ydiff = -(2 * glbSquareSize) Then
      SWAdjacent = True
```

```
        Else
          SWAdjacent = False
  End If
End Function
```

HydroOperations Module

```
Option Explicit
' ************************************************************************
' * The HydroOperations module contains a collection of subroutines      *
' * that provide modeling steps for hydrology                            *
' * Created February 29, 1999                                            *
' ************************************************************************

'This subroutine creates files to pass land use information to HSPF
'and shows the user the values in the two files. The file of original
'land use values is OldLandUse.prn, and the file of scenario values
'is NewLandUse.prn
Public Sub MakeHSPFFile()
  Dim dcHydro As New MapObjects2.DataConnection
  dcHydro.Database = App.Path & "\BC_Data"

  'Set up the dataset information for the grid squares
  Dim gdGrid As MapObjects2.GeoDataset
  Set gdGrid = dcHydro.FindGeoDataset("grid_pattern")
    If gdGrid Is Nothing Then 'invalid file
      MsgBox "Couldn't find the data.  Please try again."
      Exit Sub
    End If
  Dim lyrGrid As New MapObjects2.MapLayer
  Set lyrGrid.GeoDataset = gdGrid
  Dim rsGrid As New MapObjects2.Recordset
  Set rsGrid = lyrGrid.Records

  'Set up the dataset information for the combined types of development squares
  Dim gdDevels As MapObjects2.GeoDataset
  Set gdDevels = dcHydro.FindGeoDataset(glbCombinedDevLayerFilename)
    If gdDevels Is Nothing Then  'invalid file
      MsgBox "Couldn't find the data.  Please try again."
      Exit Sub
    End If
  Dim lyrDevels As New MapObjects2.MapLayer
  Set lyrDevels.GeoDataset = gdDevels
  Dim rsDevels As New MapObjects2.Recordset
  Set rsDevels = lyrDevels.Records

  'Initialize the total amount of land use for each land segement to 0
  Dim i As Integer
  For i = 1 To numLandSegs
    glbTotOldForest(i) = 0
    glbTotOldHerbAg(i) = 0
    glbTotOldWater(i) = 0
    glbTotOldDisturb(i) = 0
    glbTotOldMixed(i) = 0
    glbTotAllLandUses(i) = 0
  Next i

  'This variable is the land segment for the current shape
  Dim LandSegID As Integer

  'Loop through all the records in the grid pattern to add up the amount
```

```
  'of area for each land segment and land use type
  rsGrid.MoveFirst
  Do While Not rsGrid.EOF
    LandSegID = rsGrid.Fields("Landseg").Value 'Set the land segment id
    glbTotOldForest(LandSegID) = glbTotOldForest(LandSegID) +
rsGrid.Fields("Oldforest").Value
    glbTotOldHerbAg(LandSegID) = glbTotOldHerbAg(LandSegID) +
rsGrid.Fields("Oldherbag").Value
    glbTotOldWater(LandSegID) = glbTotOldWater(LandSegID) +
rsGrid.Fields("Oldwater").Value
    glbTotOldDisturb(LandSegID) = glbTotOldDisturb(LandSegID) +
rsGrid.Fields("Olddisturb").Value
    glbTotOldMixed(LandSegID) = glbTotOldMixed(LandSegID) +
rsGrid.Fields("Oldmixed").Value
    rsGrid.MoveNext 'Move on to the next record
  Loop

  'Set up output file information for storing data to pass to HSPF
  Dim FreeFileNum, oldHSPFFileNum, newHSPFFileNum As Integer
  FreeFileNum = 1
  Dim oldHSPFFileName, newHSPFFileName As String

  oldHSPFFileNum = FreeFileNum
  Open App.Path & "\OutputFiles\OrigLandUse.prn" For Output As #oldHSPFFileNum

  'Loop through each land segment
  For i = 1 To numLandSegs
   'Add up the total area of all land uses for each land segment
    glbTotAllLandUses(i) = glbTotAllLandUses(i) + glbTotOldForest(i) + _
      glbTotOldHerbAg(i) + glbTotOldWater(i) + glbTotOldDisturb(i) + glbTotOldMixed(i)
   'Calculate percentage of each land segment that is a particular land use
    glbPctOldForest(i) = glbTotOldForest(i) / glbTotAllLandUses(i)
    glbPctOldHerbAg(i) = glbTotOldHerbAg(i) / glbTotAllLandUses(i)
    glbPctOldWater(i) = glbTotOldWater(i) / glbTotAllLandUses(i)
    glbPctOldDisturb(i) = glbTotOldDisturb(i) / glbTotAllLandUses(i)
    glbPctOldMixed(i) = glbTotOldMixed(i) / glbTotAllLandUses(i)

    'Print the percentage values to a file that can be used by HSPF
    'Note -- Ignoring water as a land use because it is insignificant
    'Rounding values to 2 decimal places to avoid false precision
     Print #oldHSPFFileNum, Tab(0); i; Tab(7); _
                            Round(glbPctOldForest(i), 2); Tab(21); _
                            Round(glbPctOldHerbAg(i), 2); Tab(35); _
                            Round(glbPctOldDisturb(i), 2); Tab(49); _
                            Round(glbPctOldMixed(i), 2)

  Next i

  'Close the file that was just written and increment the free file number
  Close #oldHSPFFileNum
  FreeFileNum = FreeFileNum + 1


  'Initialize the values of land use areas to old values
  For i = 1 To numLandSegs
    glbTotNewForest(i) = glbTotOldForest(i)
    glbTotNewHerbAg(i) = glbTotOldHerbAg(i)
    glbTotNewWater(i) = glbTotOldWater(i)
    glbTotNewDisturb(i) = glbTotOldDisturb(i)
    glbTotNewMixed(i) = glbTotOldMixed(i)
  Next i

  'Loop through all the records in the developments and add up the amount of
```

```
'area for each land segment and land use type.  do this by adding the new land use
'areas and subtracting the old areas.
Do While Not rsDevels.EOF
  LandSegID = rsDevels.Fields("Landseg").Value 'Set the land segment id
  glbTotNewForest(LandSegID) = glbTotNewForest(LandSegID) + _
    rsDevels.Fields("Newforest").Value - rsDevels.Fields("Oldforest").Value
  glbTotNewHerbAg(LandSegID) = glbTotNewHerbAg(LandSegID) + _
    rsDevels.Fields("Newherbag").Value - rsDevels.Fields("Oldherbag").Value
  glbTotNewWater(LandSegID) = glbTotNewWater(LandSegID) + _
    rsDevels.Fields("Newwater").Value - rsDevels.Fields("Oldwater").Value
  glbTotNewDisturb(LandSegID) = glbTotNewDisturb(LandSegID) + _
    rsDevels.Fields("Newdisturb").Value - rsDevels.Fields("Olddisturb").Value
  glbTotNewMixed(LandSegID) = glbTotNewMixed(LandSegID) + _
    rsDevels.Fields("Newmixed").Value - rsDevels.Fields("Oldmixed").Value
  rsDevels.MoveNext 'Move on to the next record
Loop

'Set up output file information for storing data to pass to HSPF
newHSPFFileNum = FreeFileNum
Open App.Path & "\OutputFiles\NewLandUse.prn" For Output As #newHSPFFileNum

'Present the form that shows the user the values stored in the two output files
frmHydroReport.Show

'Add labels for the user to see original land use values
frmHydroReport.lstOldLandSeg.AddItem ("Land Seg")
frmHydroReport.lstOldLandSeg.AddItem ("------------------")
frmHydroReport.lstOldForest.AddItem ("   Forest")
frmHydroReport.lstOldForest.AddItem ("------------------")
frmHydroReport.lstOldHerbAg.AddItem (" Herb/Ag")
frmHydroReport.lstOldHerbAg.AddItem ("------------------")
frmHydroReport.lstOldDisturb.AddItem (" Disturbed")
frmHydroReport.lstOldDisturb.AddItem ("------------------")
frmHydroReport.lstOldMixed.AddItem ("   Mixed")
frmHydroReport.lstOldMixed.AddItem ("------------------")

'Add labels for the user to see scenario land use values
frmHydroReport.lstNewLandSeg.AddItem ("Land Seg")
frmHydroReport.lstNewLandSeg.AddItem ("------------------")
frmHydroReport.lstNewForest.AddItem ("   Forest")
frmHydroReport.lstNewForest.AddItem ("------------------")
frmHydroReport.lstNewHerbAg.AddItem (" Herb/Ag")
frmHydroReport.lstNewHerbAg.AddItem ("------------------")
frmHydroReport.lstNewDisturb.AddItem (" Disturbed")
frmHydroReport.lstNewDisturb.AddItem ("------------------")
frmHydroReport.lstNewMixed.AddItem ("   Mixed")
frmHydroReport.lstNewMixed.AddItem ("------------------")

'Loop through each land segment
For i = 1 To numLandSegs
 'Calculate percentage of each land segment that is a particular land use
  glbPctNewForest(i) = glbTotNewForest(i) / glbTotAllLandUses(i)
  glbPctNewHerbAg(i) = glbTotNewHerbAg(i) / glbTotAllLandUses(i)
  glbPctNewWater(i) = glbTotNewWater(i) / glbTotAllLandUses(i)
  glbPctNewDisturb(i) = glbTotNewDisturb(i) / glbTotAllLandUses(i)
  glbPctNewMixed(i) = glbTotNewMixed(i) / glbTotAllLandUses(i)

  'Print the percentage values to a file that can be used by HSPF
  'Note -- Ignoring water as a land use because it is insignificant
  'Rounding values to 2 decimal places to avoid false precision
   Print #newHSPFFileNum, Tab(0); i; Tab(7); _
                          Round(glbPctNewForest(i), 2); Tab(21); _
                          Round(glbPctNewHerbAg(i), 2); Tab(35); _
```

```
                            Round(glbPctNewDisturb(i), 2); Tab(49); _
                            Round(glbPctNewMixed(i), 2)

    'Put the values in a list box for the user to see
    frmHydroReport.lstOldLandSeg.AddItem ("       " & i)
    frmHydroReport.lstOldForest.AddItem ("     " & Round(glbPctOldForest(i), 2))
    frmHydroReport.lstOldHerbAg.AddItem ("     " & Round(glbPctOldHerbAg(i), 2))
    frmHydroReport.lstOldDisturb.AddItem ("     " & Round(glbPctOldDisturb(i), 2))
    frmHydroReport.lstOldMixed.AddItem ("     " & Round(glbPctOldMixed(i), 2))

    frmHydroReport.lstNewLandSeg.AddItem ("       " & i)
    frmHydroReport.lstNewForest.AddItem ("     " & Round(glbPctNewForest(i), 2))
    frmHydroReport.lstNewHerbAg.AddItem ("     " & Round(glbPctNewHerbAg(i), 2))
    frmHydroReport.lstNewDisturb.AddItem ("     " & Round(glbPctNewDisturb(i), 2))
    frmHydroReport.lstNewMixed.AddItem ("     " & Round(glbPctNewMixed(i), 2))

  Next i

  'Close the file that was just written
  Close #newHSPFFileNum

  dcHydro.Disconnect

End Sub
```

EconOperations Module

```
Option Explicit
Option Base 0
' ************************************************************************
' * The EconOperations module contains a collection of subroutines       *
' * that provide modeling procedures for calculating changes in          *
' * local government tax revenues and expenditures.                      *
' * Created March 7, 1999                                                *
' ************************************************************************


'This subroutine writes out changes from baseline gov't revs and expenditures
'to an excel spreadsheet
Public Sub MakeEconExcelFile()

'************************************************************************
'This part calculates values that will be put in the spreadsheet
  Dim DatConnect As New MapObjects2.DataConnection
  DatConnect.Database = App.Path & "\BC_Data"

  'These are variables for the development squares data
  Dim developGD As MapObjects2.GeoDataset
  Set developGD = DatConnect.FindGeoDataset(glbCombinedDevLayerFilename)
    If developGD Is Nothing Then
      MsgBox "Couldn't find data for your development scenario!"
      Exit Sub
    End If
  Dim lyrDevelop As New MapObjects2.MapLayer
  Set lyrDevelop.GeoDataset = developGD
  Dim developRecSet As MapObjects2.Recordset  'This is the set of records for the
developments
  Set developRecSet = lyrDevelop.Records

  'Note:  Variables of type typEconTractDataHolder hold values for each
  'kind of development tract.
```

```
  'Variables to calculate regression results
  Dim RegressPart1 As Double, RegressPart2 As Double, RegressPart3 As Double
  Dim TypeOfDevelop As String 'Identifies kind of tract
  Dim ParcSizeHec As typEconTractDataHolder 'Parcel size in hectares
  Dim NumberOfParcelsPerTract As typEconTractDataHolder
  Dim NumberOfPeoplePerTract As typEconTractDataHolder
  Dim TotNumberOfParcels As typEconTractDataHolder
  Dim TotNumberOfPeople As typEconTractDataHolder
  'Estimated value (from regression) of individual parcel
  Dim NewIndividParcelValue As typEconTractDataHolder
  'Estimated value (from adding up individual parcels) of all parcels of tract type
  Dim NewAggParcelValue As typEconTractDataHolder
  'Holds fraction of open space for each kind of tract
  Dim OpenSpaceFraction As typEconTractDataHolder
    'Fractions come from Stephenson report -- only mid density tracts provide open
space
    OpenSpaceFraction.Low = 0
    OpenSpaceFraction.MidConv = 0.23
    OpenSpaceFraction.MidClus = 0.45
    OpenSpaceFraction.High = 0
    OpenSpaceFraction.Comm = 0
  'Fractions come from Stephenson report -- Fraction of land occupied by
infrastructure
  Dim InfrastructureFraction As typEconTractDataHolder
    InfrastructureFraction.Low = 0.08
    InfrastructureFraction.MidConv = 0.11
    InfrastructureFraction.MidClus = 0.07
    InfrastructureFraction.High = 0.17
    InfrastructureFraction.Comm = 0.17 'assumed to be the same as high density
  'Fractions come from Stephenson report -- Fraction of land occupied by privately
owned parcels
  Dim PrivateSpaceFraction As typEconTractDataHolder
    PrivateSpaceFraction.Low = 1 - (OpenSpaceFraction.Low +
InfrastructureFraction.Low)
    PrivateSpaceFraction.MidConv = 1 - (OpenSpaceFraction.MidConv +
InfrastructureFraction.MidConv)
    PrivateSpaceFraction.MidClus = 1 - (OpenSpaceFraction.MidClus +
InfrastructureFraction.MidClus)
    PrivateSpaceFraction.High = 1 - (OpenSpaceFraction.High +
InfrastructureFraction.High)
    PrivateSpaceFraction.Comm = 1 - (OpenSpaceFraction.Comm +
InfrastructureFraction.Comm)
  Dim NumberOfTracts As typEconTractDataHolder
  Dim TractSizeHec As Integer 'Tract size in hectares
  'Tract size in hectares = square meters * a conversion factor of 0.0001
  TractSizeHec = ((glbSquareSize * 2) ^ 2) * 0.0001
  Dim BaselineTractValue As typEconTractDataHolder 'Baseline value of tract
  Dim AggBaselineTractValue As typEconTractDataHolder 'Baseline value of all tracts of
each type
  Dim difBareLandValue As typEconTractDataHolder 'land value difference between new
and baseline
  Dim IndividHouseCost As typEconTractDataHolder 'Construction cost for houses on each
type of tract
    IndividHouseCost.Low = 215355.8 'Given in Speir report as custom 2.5 story Roanoke
    IndividHouseCost.MidConv = 161200.8 'Given in Speir report as custom 1 story
Roanoke
    IndividHouseCost.MidClus = 161200.8 'Given in Speir report as custom 1 story
Roanoke
    IndividHouseCost.High = 161200.8 'Given in Speir report as custom 1 story Roanoke
    'No information for commercial buildings
  Dim AggHouseCost As typEconTractDataHolder 'Aggregated construction cost for houses
  'Road, sidewalk, and storm drain construction cost for each kind of tract (Roanoke)
  'From Speir report
```

```
  Dim IndividRoadCost As typEconTractDataHolder
    IndividRoadCost.Low = 13828.5 + 2933.52 + 598.4448
    IndividRoadCost.MidConv = 3802.838 + 806.443 + 1346.501
    IndividRoadCost.MidClus = 2854.598 + 659.817 + 807.9005
    IndividRoadCost.High = 2854.598 + 659.817 + 987.4339
  Dim AggRoadCost As typEconTractDataHolder 'Aggregated construciton cost for roads,
etc.
  'Sewer construction cost for each kind of tract (Roanoke)
  'From Speir report
  Dim IndividSewerCost As typEconTractDataHolder
    IndividSewerCost.Low = 0
    IndividSewerCost.MidConv = 829.1393
    IndividSewerCost.MidClus = 678.3867
    IndividSewerCost.High = 678.3867
  Dim AggSewerCost As typEconTractDataHolder 'Aggregated construction cost for
sewer/septic
  'Water supply construction cost for each kind of tract (Roanoke)
  'From Speir report
  Dim IndividWaterCost As typEconTractDataHolder
    IndividWaterCost.Low = 0
    IndividWaterCost.MidConv = 1466.567
    IndividWaterCost.MidClus = 1199.919
    IndividWaterCost.High = 1199.919
  Dim AggWaterCost As typEconTractDataHolder 'Aggregated construction cost for water
  Dim TotDevelopmentCost As typEconTractDataHolder 'sum of house, road, sewer, and
water
  Dim TotTractCost As typEconTractDataHolder 'Sum of bare land value and development
costs

'These variables grab information from the econ user input form
  Dim UseAssessRateAg As Double 'The rate ($/hec) at which ag land is assessed
    UseAssessRateAg = Val(FrmEconInput.txtUseAssessAg)
  Dim UseAssessRateFor As Double 'The rate ($/hec) at which forest land is assessed
    UseAssessRateFor = Val(FrmEconInput.txtUseAssessFor)
  Dim UseAssessRateOS As Double 'The rate ($/hec) at which land in open space is
assessed
    UseAssessRateOS = Val(FrmEconInput.txtUseAssessOS)
  Dim MktAssessRate As Double 'Percentage multiplied by market value of land to
calculate assessed value of land
    MktAssessRate = Val(FrmEconInput.txtMktAssess) / 100
  Dim TaxRate As Double 'Rate at which assessed values are taxed
    TaxRate = Val(FrmEconInput.txtTaxRate) / 100
  Dim PortionUseValBaseline As Double 'The portion of baseline land that is assessed
at use value
    PortionUseValBaseline = Val(FrmEconInput.txtPortionUseBL) / 100

  'Amount of predevelopment land in various land use types
  Dim AgLandArea As typEconTractDataHolder
  Dim ForLandArea As typEconTractDataHolder
  Dim WaterLandArea As typEconTractDataHolder
  Dim DistLandArea As typEconTractDataHolder
  Dim MixedLandArea As typEconTractDataHolder

  'Baseline use assessment values for individual development squares
  Dim IndividUseAssessBL As typEconTractDataHolder
  Dim IndividUseAssessBLAg As typEconTractDataHolder
  Dim IndividUseAssessBLFor As typEconTractDataHolder
  Dim AggUseAssessBL As typEconTractDataHolder

  'Aggregate use assessment for new development squares
  Dim UseAssessNew As typEconTractDataHolder
```

```
  'Difference between use assesment for new development vs. baseline
  Dim difUseAssessment As typEconTractDataHolder

  'Baseline mkt assessment values for individual development squares
  Dim IndividMktAssessBL As typEconTractDataHolder
  Dim AggMktAssessBL As typEconTractDataHolder

  'Aggregate mkt assessment for new development squares
  Dim MktAssessNew As typEconTractDataHolder

  'Difference between mkt assessment for new development vs. baseline
  Dim difMktAssessment As typEconTractDataHolder

  Dim difTotAssessedValue As typEconTractDataHolder 'difference in total assessed
value (mkt + use)

  Dim SewerConstructCostPerFoot As Double
    '$25.66 per footfor materials, labor, equipment, excavation, and bedding.
    'Cost for a 15" reinforced concrete culvert
    '$1545 per manhole.  Manholes are laid every 400 feet.
    SewerConstructCostPerFoot = 25.66 + (1545 / 400)
  Dim SewerConstructCostPerMeter As Double 'convert to meters to work with GIS data
    SewerConstructCostPerMeter = SewerConstructCostPerFoot / 0.3048
  Dim IndividSewerConnectCost As typEconTractDataHolder 'Connection cost for each
tract
  Dim AggSewerConnectCost As typEconTractDataHolder 'Aggregate cost for tracts of each
type

  Dim WaterConstructCostPerFoot As Double
    '$31.45 per foot for materials, labor, equipment, excavation, and bedding.
    'Cost for a 12" ductile iron pipe
    '$2.52 per foot for valve and $3.76 per foot for hydrants.
    WaterConstructCostPerFoot = 31.45 + 2.52 + 3.76
  Dim WaterConstructCostPerMeter As Double 'convert to meters to work with GIS data
    WaterConstructCostPerMeter = WaterConstructCostPerFoot / 0.3048
  Dim IndividWaterConnectCost As typEconTractDataHolder 'Connection cost for each
tract
  Dim AggWaterConnectCost As typEconTractDataHolder 'Aggregate cost for tracts of each
type

  Dim i As Integer
  Dim RecordNumber As Integer
  RecordNumber = 0

  'Loop thru the set of development squares to calculate the land value for each
square
  developRecSet.MoveFirst
  Do While Not developRecSet.EOF
    'Log of Land Value price per hectare is equal to the sum of 3 components: _
     1.  log of partial value price per hectare _
     2.  (-0.527739 * log of parcel size in hectares) _
     3.  (-0.023488 * log of parcel size squared in hectares)

     'Count which record the loop is on
     RecordNumber = RecordNumber + 1

     'Set up the first component
     RegressPart1 = developRecSet.Fields("LogPVHec").Value

     'The second and third component depend on what type of development square is
clicked
     TypeOfDevelop = developRecSet.Fields("DevType").Value
```

```
     Select Case TypeOfDevelop
       'Note: square feet given by Kurt Stephenson report, based on Schuler (1998) _
       and Arendt (1994).  0.404687 is a factor to convert acres to hectares. _
       The square footages are for 50 dwelling units and 125 people.    There are _
       9 hec in a development square.

       Case "LDR"
         'For low density, 50 parcels and 125 people fit on 150 acres or 60.70305 hec
         NumberOfParcelsPerTract.Low = 50 * 9 / 60.70305
         NumberOfPeoplePerTract.Low = 125 * 9 / 60.70305
         '3 acres * conversion factor
         ParcSizeHec.Low = 3 * 0.404687

         'Calculate the total number of low parcels and people
         TotNumberOfParcels.Low = TotNumberOfParcels.Low +
Round(NumberOfParcelsPerTract.Low, 2)
         TotNumberOfPeople.Low = TotNumberOfPeople.Low +
Round(NumberOfPeoplePerTract.Low, 2)

         'Add low density values to the aggregate
         TotNumberOfParcels.Agg = TotNumberOfParcels.Agg +
Round(NumberOfParcelsPerTract.Low, 2)
         TotNumberOfPeople.Agg = TotNumberOfPeople.Agg +
Round(NumberOfPeoplePerTract.Low, 2)

         'Log in VB means natural log, so need to convert to base 10 log
         RegressPart2 = -0.527739 * (Log(ParcSizeHec.Low) / Log(10))
         RegressPart3 = -0.023488 * ((Log(ParcSizeHec.Low) / Log(10)) ^ 2)

         'The regression value is a log of price, so take the antilog to get back to
dollars.
         NewIndividParcelValue.Low = 10 ^ (RegressPart1 + RegressPart2 + RegressPart3)

         'Count number of low density tracts
         NumberOfTracts.Low = NumberOfTracts.Low + 1

         'Get baseline tract value from the database
         BaselineTractValue.Low = developRecSet.Fields("BlParcVal").Value

         'Get the predevelopment land use areas (square meters)
         AgLandArea.Low = developRecSet.Fields("OldHerbAg").Value
         ForLandArea.Low = developRecSet.Fields("OldForest").Value
         WaterLandArea.Low = developRecSet.Fields("OldWater").Value
         DistLandArea.Low = developRecSet.Fields("OldDisturb").Value
         MixedLandArea.Low = developRecSet.Fields("OldMixed").Value

         'The ag baseline use assessment value for a development square is equal to
         'the amount of area in ag, water, and disturbed + half of the mixed
         'times the ag use assessment rate, the portion of predevelopment land
         'that is assessed at use value, and a conversion to hectares
         IndividUseAssessBLAg.Low = (AgLandArea.Low + WaterLandArea.Low + _
           DistLandArea.Low + (0.5 * MixedLandArea.Low)) * (0.0001) * _
           UseAssessRateAg * PortionUseValBaseline

         'The forest baseline use assessment value for a development square is equal
to
         'the amount of area in forest + half of the mixed
         'times the forest use assessment rate, the portion of predevelopment land
         'that is assessed at use value, and a conversion to hectares
         IndividUseAssessBLFor.Low = (ForLandArea.Low + (0.5 * MixedLandArea.Low)) _
           * 0.0001 * UseAssessRateFor * PortionUseValBaseline
```

```
         'Add up the ag and forest baseline use assessments to get total use
assessment
         IndividUseAssessBL.Low = IndividUseAssessBLAg.Low + IndividUseAssessBLFor.Low

         'Calculate the baseline market assessment -- Multiply the market baseline
value of
         'the tract (note:  this includes no house or other development costs --
assuming land
         'was bare before development) by the portion that the user wants to assess at
market value.
         IndividMktAssessBL.Low = (1 - PortionUseValBaseline) * BaselineTractValue.Low

         'Calculate the cost of the sewer hook up
         IndividSewerConnectCost.Low = developRecSet.Fields("SewDist").Value *
SewerConstructCostPerMeter

         'Calculate the cost of the Water hook up
         IndividWaterConnectCost.Low = developRecSet.Fields("WatDist").Value *
WaterConstructCostPerMeter


       Case "MDRConv"
         'For MidConv density, 50 parcels and 125 people fit on 21 acres or _
          8.498427 hec
         NumberOfParcelsPerTract.MidConv = 50 * 9 / 8.498427
         NumberOfPeoplePerTract.MidConv = 125 * 9 / 8.498427
         '1/5 of an acre * conversion to hec
         ParcSizeHec.MidConv = (1 / 5) * 0.404687

         'Calculate the total number of midConv parcels and people
         TotNumberOfParcels.MidConv = TotNumberOfParcels.MidConv +
Round(NumberOfParcelsPerTract.MidConv, 2)
         TotNumberOfPeople.MidConv = TotNumberOfPeople.MidConv +
Round(NumberOfPeoplePerTract.MidConv, 2)

         'Add midConv density values to the aggregate
         TotNumberOfParcels.Agg = TotNumberOfParcels.Agg +
Round(NumberOfParcelsPerTract.MidConv, 2)
         TotNumberOfPeople.Agg = TotNumberOfPeople.Agg +
Round(NumberOfPeoplePerTract.MidConv, 2)

         'Log in VB means natural log, so need to convert to base 10 log
         RegressPart2 = -0.527739 * (Log(ParcSizeHec.MidConv) / Log(10))
         RegressPart3 = -0.023488 * ((Log(ParcSizeHec.MidConv) / Log(10)) ^ 2)

         'The regression value is a log of price, so take the antilog to get back to
dollars.
         NewIndividParcelValue.MidConv = 10 ^ (RegressPart1 + RegressPart2 +
RegressPart3)

         'Count number of midConv tracts
         NumberOfTracts.MidConv = NumberOfTracts.MidConv + 1

         'Get baseline tract value from the database
         BaselineTractValue.MidConv = developRecSet.Fields("BlParcVal").Value

         'Get the predevelopment land use areas (square meters)
         AgLandArea.MidConv = developRecSet.Fields("OldHerbAg").Value
         ForLandArea.MidConv = developRecSet.Fields("OldForest").Value
         WaterLandArea.MidConv = developRecSet.Fields("OldWater").Value
         DistLandArea.MidConv = developRecSet.Fields("OldDisturb").Value
         MixedLandArea.MidConv = developRecSet.Fields("OldMixed").Value
```

```
          'The ag baseline use assessment value for a development square is equal to
          'the amount of area in ag, water, and disturbed + half of the mixed
          'times the ag use assessment rate, the portion of predevelopment land
          'that is assessed at use value, and a conversion to hectares
          IndividUseAssessBLAg.MidConv = (AgLandArea.MidConv + WaterLandArea.MidConv +
_
            DistLandArea.MidConv + (0.5 * MixedLandArea.MidConv)) * (0.0001) _
            * UseAssessRateAg * PortionUseValBaseline

          'The forest baseline use assessment value for a development square is equal
to
          'the amount of area in forest + half of the mixed
          'times the forest use assessment rate, the portion of predevelopment land
          'that is assessed at use value, and a conversion to hectares
          IndividUseAssessBLFor.MidConv = (ForLandArea.MidConv + (0.5 *
MixedLandArea.MidConv)) _
            * 0.0001 * UseAssessRateFor * PortionUseValBaseline

          'Add up the ag and forest baseline use assessments to get total use
assessment
          IndividUseAssessBL.MidConv = IndividUseAssessBLAg.MidConv +
IndividUseAssessBLFor.MidConv

          'Calculate the baseline market assessment -- Multiply the market baseline
value of
          'the tract (note:  this includes no house or other development costs --
assuming land
          'was bare before development) by the portion that the user wants to assess at
market value.
          IndividMktAssessBL.MidConv = (1 - PortionUseValBaseline) *
BaselineTractValue.MidConv

          'Calculate the cost of the sewer hook up
          IndividSewerConnectCost.MidConv = developRecSet.Fields("SewDist").Value *
SewerConstructCostPerMeter

          'Calculate the cost of the Water hook up
          IndividWaterConnectCost.MidConv = developRecSet.Fields("WatDist").Value *
WaterConstructCostPerMeter

        Case "MDRClus"
          'For MidClus density, 50 parcels and 125 people fit on 21 acres _
           or 8.498427 hec
          NumberOfParcelsPerTract.MidClus = 50 * 9 / 8.498427
          NumberOfPeoplePerTract.MidClus = 125 * 9 / 8.498427
          '1/7 of an acre * conversion to hec
          ParcSizeHec.MidClus = (1 / 7) * 0.404687

          'Calculate the total number of MidClus parcels and people
          TotNumberOfParcels.MidClus = TotNumberOfParcels.MidClus +
Round(NumberOfParcelsPerTract.MidClus, 2)
          TotNumberOfPeople.MidClus = TotNumberOfPeople.MidClus +
Round(NumberOfPeoplePerTract.MidClus, 2)

          'Add midClus density values to the aggregate
          TotNumberOfParcels.Agg = TotNumberOfParcels.Agg +
Round(NumberOfParcelsPerTract.MidClus, 2)
          TotNumberOfPeople.Agg = TotNumberOfPeople.Agg +
Round(NumberOfPeoplePerTract.MidClus, 2)

          'Log in VB means natural log, so need to convert to base 10 log
          RegressPart2 = -0.527739 * (Log(ParcSizeHec.MidClus) / Log(10))
          RegressPart3 = -0.023488 * ((Log(ParcSizeHec.MidClus) / Log(10)) ^ 2)
```

```
         'The regression value is a log of price, so take the antilog to get back to
dollars.
         NewIndividParcelValue.MidClus = 10 ^ (RegressPart1 + RegressPart2 +
RegressPart3)

        'Count number of midClus tracts
         NumberOfTracts.MidClus = NumberOfTracts.MidClus + 1

         'Get baseline tract value from the database
         BaselineTractValue.MidClus = developRecSet.Fields("BlParcVal").Value

         'Get the predevelopment land use areas (square meters)
         AgLandArea.MidClus = developRecSet.Fields("OldHerbAg").Value
         ForLandArea.MidClus = developRecSet.Fields("OldForest").Value
         WaterLandArea.MidClus = developRecSet.Fields("OldWater").Value
         DistLandArea.MidClus = developRecSet.Fields("OldDisturb").Value
         MixedLandArea.MidClus = developRecSet.Fields("OldMixed").Value

         'The ag baseline use assessment value for a development square is equal to
         'the amount of area in ag, water, and disturbed + half of the mixed
         'times the ag use assessment rate, the portion of predevelopment land
         'that is assessed at use value, and a conversion to hectares
         IndividUseAssessBLAg.MidClus = (AgLandArea.MidClus + WaterLandArea.MidClus +
_
           DistLandArea.MidClus + (0.5 * MixedLandArea.MidClus)) * (0.0001) * _
           UseAssessRateAg * PortionUseValBaseline

         'The forest baseline use assessment value for a development square is equal
to
         'the amount of area in forest + half of the mixed
         'times the forest use assessment rate, the portion of predevelopment land
         'that is assessed at use value, and a conversion to hectares
         IndividUseAssessBLFor.MidClus = (ForLandArea.MidClus + (0.5 *
MixedLandArea.MidClus)) _
           * 0.0001 * UseAssessRateFor * PortionUseValBaseline

         'Add up the ag and forest baseline use assessments to get total use
assessment
         IndividUseAssessBL.MidClus = IndividUseAssessBLAg.MidClus + _
           IndividUseAssessBLFor.MidClus

         'Calculate the baseline market assessment -- Multiply the market baseline
value of
         'the tract (note:  this includes no house or other development costs --
assuming land
         'was bare before development) by the portion that the user wants to assess at
market value.
         IndividMktAssessBL.MidClus = (1 - PortionUseValBaseline) *
BaselineTractValue.MidClus

         'Calculate the cost of the sewer hook up
         IndividSewerConnectCost.MidClus = developRecSet.Fields("SewDist").Value *
SewerConstructCostPerMeter

         'Calculate the cost of the Water hook up
         IndividWaterConnectCost.MidClus = developRecSet.Fields("WatDist").Value *
WaterConstructCostPerMeter

       Case "HDR"
         'For high density, 50 parcels and 125 people fit on 12 acres or 4.856244 hec
         NumberOfParcelsPerTract.High = 50 * 9 / 4.856244
         NumberOfPeoplePerTract.High = 125 * 9 / 4.856244
```

```
         '1/7 of an acre * conversion to hec
         ParcSizeHec.High = (1 / 7) * 0.404687

         'Calculate the total number of High parcels and people
         TotNumberOfParcels.High = TotNumberOfParcels.High +
Round(NumberOfParcelsPerTract.High, 2)
         TotNumberOfPeople.High = TotNumberOfPeople.High +
Round(NumberOfPeoplePerTract.High, 2)

         'Add high density values to the aggregate
         TotNumberOfParcels.Agg = TotNumberOfParcels.Agg +
Round(NumberOfParcelsPerTract.High, 2)
         TotNumberOfPeople.Agg = TotNumberOfPeople.Agg +
Round(NumberOfPeoplePerTract.High, 2)

         'Log in VB means natural log, so need to convert to base 10 log
         RegressPart2 = -0.527739 * (Log(ParcSizeHec.High) / Log(10))
         RegressPart3 = -0.023488 * ((Log(ParcSizeHec.High) / Log(10)) ^ 2)

         'The regression value is a log of price, so take the antilog to get back to
dollars.
         NewIndividParcelValue.High = 10 ^ (RegressPart1 + RegressPart2 +
RegressPart3)

         'Count number of high tracts
         NumberOfTracts.High = NumberOfTracts.High + 1

         'Get baseline tract value from the database
         BaselineTractValue.High = developRecSet.Fields("BlParcVal").Value

         'Get the predevelopment land use areas (square meters)
         AgLandArea.High = developRecSet.Fields("OldHerbAg").Value
         ForLandArea.High = developRecSet.Fields("OldForest").Value
         WaterLandArea.High = developRecSet.Fields("OldWater").Value
         DistLandArea.High = developRecSet.Fields("OldDisturb").Value
         MixedLandArea.High = developRecSet.Fields("OldMixed").Value

         'The ag baseline use assessment value for a development square is equal to
         'the amount of area in ag, water, and disturbed + half of the mixed
         'times the ag use assessment rate, the portion of predevelopment land
         'that is assessed at use value, and a conversion to hectares
         IndividUseAssessBLAg.High = (AgLandArea.High + WaterLandArea.High + _
           DistLandArea.High + (0.5 * MixedLandArea.High)) * (0.0001) * _
           UseAssessRateAg * PortionUseValBaseline

         'The forest baseline use assessment value for a development square is equal
to
         'the amount of area in forest + half of the mixed
         'times the forest use assessment rate, the portion of predevelopment land
         'that is assessed at use value, and a conversion to hectares
         IndividUseAssessBLFor.High = (ForLandArea.High + (0.5 * MixedLandArea.High))
_
           * 0.0001 * UseAssessRateFor * PortionUseValBaseline

         'Add up the ag and forest baseline use assessments to get total use
assessment
         IndividUseAssessBL.High = IndividUseAssessBLAg.High +
IndividUseAssessBLFor.High

         'Calculate the baseline market assessment -- Multiply the market baseline
value of
         'the tract (note:  this includes no house or other development costs --
assuming land
```

```
        'was bare before development) by the portion that the user wants to assess at
market value.
        IndividMktAssessBL.High = (1 - PortionUseValBaseline) *
BaselineTractValue.High

        'Calculate the cost of the sewer hook up
        IndividSewerConnectCost.High = developRecSet.Fields("SewDist").Value *
SewerConstructCostPerMeter

        'Calculate the cost of the Water hook up
        IndividWaterConnectCost.High = developRecSet.Fields("WatDist").Value *
WaterConstructCostPerMeter

      Case "COM"
        'For commercial, the number and size of parcels is assumed to be the same as
_
        high density, and the number of people is assumed to be 0.
        NumberOfParcelsPerTract.Comm = 50 * 9 / 4.856244
        NumberOfPeoplePerTract.Comm = 0
        '1/7 of an acre * conversion to hec
        ParcSizeHec.Comm = (1 / 7) * 0.404687

        'Calculate the total number of commercial parcels and people
        TotNumberOfParcels.Comm = TotNumberOfParcels.Comm +
Round(NumberOfParcelsPerTract.Comm, 2)
        TotNumberOfPeople.Comm = TotNumberOfPeople.Comm +
Round(NumberOfPeoplePerTract.Comm, 2)

        'Add commercial values to the aggregate
        TotNumberOfParcels.Agg = TotNumberOfParcels.Agg +
Round(NumberOfParcelsPerTract.Comm, 2)
        TotNumberOfPeople.Agg = TotNumberOfPeople.Agg +
Round(NumberOfPeoplePerTract.Comm, 2)

        'Log in VB means natural log, so need to convert to base 10 log
        RegressPart2 = -0.527739 * (Log(ParcSizeHec.Comm) / Log(10))
        RegressPart3 = -0.023488 * ((Log(ParcSizeHec.Comm) / Log(10)) ^ 2)

        'The regression value is a log of price, so take the antilog to get back to
dollars.
        NewIndividParcelValue.Comm = 10 ^ (RegressPart1 + RegressPart2 +
RegressPart3)

        'Count number of midConv tracts
        NumberOfTracts.Comm = NumberOfTracts.Comm + 1

        'Get baseline tract value from the database
        BaselineTractValue.Comm = developRecSet.Fields("BlParcVal").Value

        'Get the predevelopment land use areas (square meters)
        AgLandArea.Comm = developRecSet.Fields("OldHerbAg").Value
        ForLandArea.Comm = developRecSet.Fields("OldForest").Value
        WaterLandArea.Comm = developRecSet.Fields("OldWater").Value
        DistLandArea.Comm = developRecSet.Fields("OldDisturb").Value
        MixedLandArea.Comm = developRecSet.Fields("OldMixed").Value

        'The ag baseline use assessment value for a development square is equal to
        'the amount of area in ag, water, and disturbed + half of the mixed
        'times the ag use assessment rate, the portion of predevelopment land
        'that is assessed at use value, and a conversion to hectares
        IndividUseAssessBLAg.Comm = (AgLandArea.Comm + WaterLandArea.Comm + _
          DistLandArea.Comm + (0.5 * MixedLandArea.Comm)) * (0.0001) * _
          UseAssessRateAg * PortionUseValBaseline
```

```
         'The forest baseline use assessment value for a development square is equal
to
         'the amount of area in forest + half of the mixed
         'times the forest use assessment rate, the portion of predevelopment land
         'that is assessed at use value, and a conversion to hectares
         IndividUseAssessBLFor.Comm = (ForLandArea.Comm + (0.5 * MixedLandArea.Comm))
_
           * 0.0001 * UseAssessRateFor * PortionUseValBaseline

         'Add up the ag and forest baseline use assessments to get total use
assessment
         IndividUseAssessBL.Comm = IndividUseAssessBLAg.Comm +
IndividUseAssessBLFor.Comm

         'Calculate the baseline market assessment -- Multiply the market baseline
value of
         'the tract (note:  this includes no house or other development costs --
assuming land
         'was bare before development) by the portion that the user wants to assess at
market value.
         IndividMktAssessBL.Comm = (1 - PortionUseValBaseline) *
BaselineTractValue.Comm

         'Calculate the cost of the sewer hook up
         IndividSewerConnectCost.Comm = developRecSet.Fields("SewDist").Value *
SewerConstructCostPerMeter

         'Calculate the cost of the Water hook up
         IndividWaterConnectCost.Comm = developRecSet.Fields("WatDist").Value *
WaterConstructCostPerMeter

     End Select


     'Add up the total value of all parcels of each kind of tract
     NewAggParcelValue.Low = NewAggParcelValue.Low + (NewIndividParcelValue.Low *
NumberOfParcelsPerTract.Low)
     NewAggParcelValue.MidConv = NewAggParcelValue.MidConv +
(NewIndividParcelValue.MidConv * NumberOfParcelsPerTract.MidConv)
     NewAggParcelValue.MidClus = NewAggParcelValue.MidClus +
(NewIndividParcelValue.MidClus * NumberOfParcelsPerTract.MidClus)
     NewAggParcelValue.High = NewAggParcelValue.High + (NewIndividParcelValue.High *
NumberOfParcelsPerTract.High)
     NewAggParcelValue.Comm = NewAggParcelValue.Comm + (NewIndividParcelValue.Comm *
NumberOfParcelsPerTract.Comm)

     'Add up the total baseline value of all tracts of each type
     AggBaselineTractValue.Low = AggBaselineTractValue.Low + BaselineTractValue.Low
     AggBaselineTractValue.MidConv = AggBaselineTractValue.MidConv +
BaselineTractValue.MidConv
     AggBaselineTractValue.MidClus = AggBaselineTractValue.MidClus +
BaselineTractValue.MidClus
     AggBaselineTractValue.High = AggBaselineTractValue.High + BaselineTractValue.High
     AggBaselineTractValue.Comm = AggBaselineTractValue.Comm + BaselineTractValue.Comm

     'Add up the total baseline use value assessments
     AggUseAssessBL.Low = AggUseAssessBL.Low + IndividUseAssessBL.Low
     AggUseAssessBL.MidConv = AggUseAssessBL.MidConv + IndividUseAssessBL.MidConv
     AggUseAssessBL.MidClus = AggUseAssessBL.MidClus + IndividUseAssessBL.MidClus
     AggUseAssessBL.High = AggUseAssessBL.High + IndividUseAssessBL.High
     AggUseAssessBL.Comm = AggUseAssessBL.Comm + IndividUseAssessBL.Comm
     'Reset inividuseassessBL to 0
```

```
    IndividUseAssessBL.Low = 0
    IndividUseAssessBL.MidConv = 0
    IndividUseAssessBL.MidClus = 0
    IndividUseAssessBL.High = 0
    IndividUseAssessBL.Comm = 0

    'Add up the total baseline mkt value assessments
    AggMktAssessBL.Low = AggMktAssessBL.Low + IndividMktAssessBL.Low
    AggMktAssessBL.MidConv = AggMktAssessBL.MidConv + IndividMktAssessBL.MidConv
    AggMktAssessBL.MidClus = AggMktAssessBL.MidClus + IndividMktAssessBL.MidClus
    AggMktAssessBL.High = AggMktAssessBL.High + IndividMktAssessBL.High
    AggMktAssessBL.Comm = AggMktAssessBL.Comm + IndividMktAssessBL.Comm
    'Reset inividMktassessBL to 0
    IndividMktAssessBL.Low = 0
    IndividMktAssessBL.MidConv = 0
    IndividMktAssessBL.MidClus = 0
    IndividMktAssessBL.High = 0
    IndividMktAssessBL.Comm = 0


    'Add up the sewer connection costs of all tracts of each type
    AggSewerConnectCost.Low = AggSewerConnectCost.Low + IndividSewerConnectCost.Low
    AggSewerConnectCost.MidConv = AggSewerConnectCost.MidConv +
IndividSewerConnectCost.MidConv
    AggSewerConnectCost.MidClus = AggSewerConnectCost.MidClus +
IndividSewerConnectCost.MidClus
    AggSewerConnectCost.High = AggSewerConnectCost.High +
IndividSewerConnectCost.High
    AggSewerConnectCost.Comm = AggSewerConnectCost.Comm +
IndividSewerConnectCost.Comm
    'Reset IndividSewerConnectCost to 0
    IndividSewerConnectCost.Low = 0
    IndividSewerConnectCost.MidConv = 0
    IndividSewerConnectCost.MidClus = 0
    IndividSewerConnectCost.High = 0
    IndividSewerConnectCost.Comm = 0

    'Add up the Water connection costs of all tracts of each type
    AggWaterConnectCost.Low = AggWaterConnectCost.Low + IndividWaterConnectCost.Low
    AggWaterConnectCost.MidConv = AggWaterConnectCost.MidConv +
IndividWaterConnectCost.MidConv
    AggWaterConnectCost.MidClus = AggWaterConnectCost.MidClus +
IndividWaterConnectCost.MidClus
    AggWaterConnectCost.High = AggWaterConnectCost.High +
IndividWaterConnectCost.High
    AggWaterConnectCost.Comm = AggWaterConnectCost.Comm +
IndividWaterConnectCost.Comm
    'Reset IndividWaterConnectCost to 0
    IndividWaterConnectCost.Low = 0
    IndividWaterConnectCost.MidConv = 0
    IndividWaterConnectCost.MidClus = 0
    IndividWaterConnectCost.High = 0
    IndividWaterConnectCost.Comm = 0

   developRecSet.MoveNext
 Loop

 'Count total number of tracts
 NumberOfTracts.Agg = RecordNumber

 'Find the change in bare land value (value of new development - baseline value)
 difBareLandValue.Low = NewAggParcelValue.Low - AggBaselineTractValue.Low
 difBareLandValue.MidConv = NewAggParcelValue.MidConv - AggBaselineTractValue.MidConv
```

```
  difBareLandValue.MidClus = NewAggParcelValue.MidClus - AggBaselineTractValue.MidClus
  difBareLandValue.High = NewAggParcelValue.High - AggBaselineTractValue.High
  difBareLandValue.Comm = NewAggParcelValue.Comm - AggBaselineTractValue.Comm

  'Add up the cost of all houses for each type of tract - no commercial info
  AggHouseCost.Low = IndividHouseCost.Low * TotNumberOfParcels.Low
  AggHouseCost.MidConv = IndividHouseCost.MidConv * TotNumberOfParcels.MidConv
  AggHouseCost.MidClus = IndividHouseCost.MidClus * TotNumberOfParcels.MidClus
  AggHouseCost.High = IndividHouseCost.High * TotNumberOfParcels.High

  'Add up the cost of all roads, sidewalks, and storm drains for each _
   type of tract -- no commercial info
  AggRoadCost.Low = IndividRoadCost.Low * TotNumberOfParcels.Low
  AggRoadCost.MidConv = IndividRoadCost.MidConv * TotNumberOfParcels.MidConv
  AggRoadCost.MidClus = IndividRoadCost.MidClus * TotNumberOfParcels.MidClus
  AggRoadCost.High = IndividRoadCost.High * TotNumberOfParcels.High

  'Add up the cost of all inside-tract sewer for each type of tract - no commercial
info
  AggSewerCost.Low = IndividSewerCost.Low * TotNumberOfParcels.Low
  AggSewerCost.MidConv = IndividSewerCost.MidConv * TotNumberOfParcels.MidConv
  AggSewerCost.MidClus = IndividSewerCost.MidClus * TotNumberOfParcels.MidClus
  AggSewerCost.High = IndividSewerCost.High * TotNumberOfParcels.High

  'Add up the cost of all water supply for each type of tract - no commercial info
  AggWaterCost.Low = IndividWaterCost.Low * TotNumberOfParcels.Low
  AggWaterCost.MidConv = IndividWaterCost.MidConv * TotNumberOfParcels.MidConv
  AggWaterCost.MidClus = IndividWaterCost.MidClus * TotNumberOfParcels.MidClus
  AggWaterCost.High = IndividWaterCost.High * TotNumberOfParcels.High

  'Add up all tract development costs
  TotDevelopmentCost.Low = AggHouseCost.Low + AggRoadCost.Low _
    + AggSewerCost.Low + AggWaterCost.Low
  TotDevelopmentCost.MidConv = AggHouseCost.MidConv + AggRoadCost.MidConv _
    + AggSewerCost.MidConv + AggWaterCost.MidConv
  TotDevelopmentCost.MidClus = AggHouseCost.MidClus + AggRoadCost.MidClus _
    + AggSewerCost.MidClus + AggWaterCost.MidClus
  TotDevelopmentCost.High = AggHouseCost.High + AggRoadCost.High _
    + AggSewerCost.High + AggWaterCost.High

  'Add up change in total tract cost
  TotTractCost.Low = difBareLandValue.Low + TotDevelopmentCost.Low
  TotTractCost.MidConv = difBareLandValue.MidConv + TotDevelopmentCost.MidConv
  TotTractCost.MidClus = difBareLandValue.MidClus + TotDevelopmentCost.MidClus
  TotTractCost.High = difBareLandValue.High + TotDevelopmentCost.High

  'Calculate the use value assessment for new development squares
  'equal to fraction of openspace * tract area * assessment rate
  UseAssessNew.Low = OpenSpaceFraction.Low * TractSizeHec * NumberOfTracts.Low *
UseAssessRateOS
  UseAssessNew.MidConv = OpenSpaceFraction.MidConv * TractSizeHec *
NumberOfTracts.MidConv * UseAssessRateOS
  UseAssessNew.MidClus = OpenSpaceFraction.MidClus * TractSizeHec *
NumberOfTracts.MidClus * UseAssessRateOS
  UseAssessNew.High = OpenSpaceFraction.High * TractSizeHec * NumberOfTracts.High *
UseAssessRateOS
  UseAssessNew.Comm = OpenSpaceFraction.Comm * TractSizeHec * NumberOfTracts.Comm *
UseAssessRateOS

  'Calculate the change in use value assessment from the baseline to new development
  difUseAssessment.Low = UseAssessNew.Low - AggUseAssessBL.Low
  difUseAssessment.MidConv = UseAssessNew.MidConv - AggUseAssessBL.MidConv
  difUseAssessment.MidClus = UseAssessNew.MidClus - AggUseAssessBL.MidClus
```

```
  difUseAssessment.High = UseAssessNew.High - AggUseAssessBL.High
  difUseAssessment.Comm = UseAssessNew.Comm - AggUseAssessBL.Comm

  'Calculate the mkt value assessment for new development squares
  'equal to total tract value times the % of the tract that is private space times _
  'the mkt assessment rate
  MktAssessNew.Low = PrivateSpaceFraction.Low * TotTractCost.Low * MktAssessRate
  MktAssessNew.MidConv = PrivateSpaceFraction.MidConv * TotTractCost.MidConv *
MktAssessRate
  MktAssessNew.MidClus = PrivateSpaceFraction.MidClus * TotTractCost.MidClus *
MktAssessRate
  MktAssessNew.High = PrivateSpaceFraction.High * TotTractCost.High * MktAssessRate
  MktAssessNew.Comm = PrivateSpaceFraction.Comm * TotTractCost.Comm * MktAssessRate

  'Calculate the change in mkt value assessment from the baseline to new development
  difMktAssessment.Low = MktAssessNew.Low - AggMktAssessBL.Low
  difMktAssessment.MidConv = MktAssessNew.MidConv - AggMktAssessBL.MidConv
  difMktAssessment.MidClus = MktAssessNew.MidClus - AggMktAssessBL.MidClus
  difMktAssessment.High = MktAssessNew.High - AggMktAssessBL.High
  difMktAssessment.Comm = MktAssessNew.Comm - AggMktAssessBL.Comm

  'Calculate the overall change in assessment (both market and use)
  difTotAssessedValue.Low = difUseAssessment.Low + difMktAssessment.Low
  difTotAssessedValue.MidConv = difUseAssessment.MidConv + difMktAssessment.MidConv
  difTotAssessedValue.MidClus = difUseAssessment.MidClus + difMktAssessment.MidClus
  difTotAssessedValue.High = difUseAssessment.High + difMktAssessment.High
  difTotAssessedValue.Comm = difUseAssessment.Comm + difMktAssessment.Comm

  DatConnect.Disconnect

'*************************************************************************
'This part populates the spreadsheet

   'Declare object variables for Microsoft Excel,
   'application workbook, and worksheet objects.
   Dim xlApp As Excel.Application
   Dim xlBook As Excel.Workbook
   Dim xlSheet As Excel.Worksheet

   'Assign object references to the variables. Use
   'Add methods to create new workbook and worksheet objects.
   Set xlApp = New Excel.Application
   Set xlBook = xlApp.Workbooks.Add
   Set xlSheet = xlBook.Worksheets.Add

   'This with block puts all the textual items into the spreadsheet
   With xlSheet
     'Make font Times New Roman
     .Cells.Font.Name = "Times New Roman"
     .Cells.Font.Size = 10

     'Put a table name in the first Excel cell.
     .Cells(1, 1).Value = "Tax Revenue and Fiscal Costs (" & App.Path &
"\OutputFiles\GovtRevsExps.xls)"
     .Cells(1, 1).Font.Bold = True
     .Cells(1, 1).Font.Size = 14
     .Range("A1:F1").Merge
     .Range("A1:F1").HorizontalAlignment = xlCenter

     'Set the column widths of the spreadsheet
     .Columns("A:A").ColumnWidth = 36
     .Columns("B:F").ColumnWidth = 17
     'Add and format row and column headings
```

```
'Columns
.Cells(2, 1).Value = "Development Tract Type:"
.Cells(2, 1).Font.Bold = True
.Cells(2, 1).Font.Italic = True
.Cells(2, 1).HorizontalAlignment = xlRight

.Cells(2, 2).Value = "Low Density"
.Cells(2, 3).Value = "Mid Standard"
.Cells(2, 4).Value = "Mid Cluster"
.Cells(2, 5).Value = "High Density"
.Cells(2, 6).Value = "Commercial"
.Range("B2:G2").Font.Bold = True
.Range("B2:G2").Font.Italic = True
.Range("B2:G2").HorizontalAlignment = xlCenter
.Cells(3, 2).Value = "Development Land Uses"
.Cells(3, 2).Font.Bold = True
.Range("A3:F3").Merge
.Range("A3:F3").Interior.ColorIndex = 6
.Range("A3:F3").Interior.Pattern = xlSolid
.Range("A3:F3").HorizontalAlignment = xlCenter

.Cells(10, 2).Value = "Dollar Change Relative to Predevelopment Baseline"
.Cells(10, 2).Font.Bold = True
.Range("A10:F10").Merge
.Range("A10:F10").Interior.ColorIndex = 6
.Range("A10:F10").Interior.Pattern = xlSolid
.Range("A10:F10").HorizontalAlignment = xlCenter


'Rows
.Cells(4, 1).Value = "Land reserved for open space (hectares)"
.Cells(5, 1).Value = "Land occupied by housing/commer. lots (hectares)"
.Cells(6, 1).Value = "Land occupied by infrastructure (hectares)"
.Cells(7, 1).Value = "Total land (hectares)"
.Cells(8, 1).Value = "Total number of housing/commercial lots"
.Cells(9, 1).Value = "Total number of people living on the lots"
.Cells(11, 1).Value = "A. Bare land value"
.Cells(11, 1).Font.Bold = True
.Cells(13, 1).Value = "Development cost"
.Cells(13, 1).Font.Bold = True
.Cells(14, 1).Value = "  1. New house construction cost"
.Cells(15, 1).Value = "  2. Road/sidewalk/drain cost (within tract)"
.Cells(16, 1).Value = "  3. Sewer cost (within tract)"
.Cells(17, 1).Value = "  4. Water cost (within tract)"
.Cells(19, 1).Value = "B. Total tract development cost (1+2+3+4)"
.Cells(19, 1).Font.Bold = True
.Cells(21, 1).Value = "C. Estimated total tract value (A+B)"
.Cells(21, 1).Font.Bold = True
.Cells(23, 1).Value = "Assessed value"
.Cells(23, 1).Font.Bold = True
.Cells(24, 1).Value = "  3. Use value assessment"
.Cells(25, 1).Value = "  4. Market value assessment"
.Cells(27, 1).Value = "D. Total value of assessed property (3+4)"
.Cells(27, 1).Font.Bold = True
.Cells(29, 1).Value = "E. Tax revenue (D*Tax Rate)"
.Cells(29, 1).Font.Bold = True
.Cells(31, 1).Value = "Cost to local government"
.Cells(31, 1).Font.Bold = True
.Cells(32, 1).Value = "  1. Total Sewer connection cost"
.Cells(33, 1).Value = "  2. Total Water connection cost"
.Cells(35, 1).Value = "Total sewer and water cost to localities (1+2)"
.Cells(35, 1).Font.Bold = True
.Cells(36, 1).Value = "Annualized sewer and water cost to localities"
```

```
     .Cells(37, 1).Font.Bold = True

     'Set decimal places for cells
     .Range("B4:F9").Style = "Comma"
     .Range("B4:F9").NumberFormat = "_(* #,##0.00_);_(* (#,##0.00);_(* ""-
""??_);_(@_)"
     .Range("B11:F36").Style = "Comma"
     .Range("B11:F36").NumberFormat = "_(* #,##0_);_(* (#,##0);_(* ""-""??_);_(@_)"

     'Set Cell Alignment
     .Range("F4:F36").HorizontalAlignment = xlRight
   End With

   Dim row As Integer
   row = 4
   'This with block puts the data into the spreadsheet
   With xlSheet
     'Calculate open space for each kind of tract
     .Cells(row, 2).Value = OpenSpaceFraction.Low * NumberOfTracts.Low * TractSizeHec
     .Cells(row, 3).Value = OpenSpaceFraction.MidConv * NumberOfTracts.MidConv *
TractSizeHec
     .Cells(row, 4).Value = OpenSpaceFraction.MidClus * NumberOfTracts.MidClus *
TractSizeHec
     .Cells(row, 5).Value = OpenSpaceFraction.High * NumberOfTracts.High *
TractSizeHec
     .Cells(row, 6).Value = OpenSpaceFraction.Comm * NumberOfTracts.Comm *
TractSizeHec
     row = row + 1

     'Calculate land occupied by privately owned parcels for each kind of tract
     .Cells(row, 2).Value = PrivateSpaceFraction.Low * NumberOfTracts.Low *
TractSizeHec
     .Cells(row, 3).Value = PrivateSpaceFraction.MidConv * NumberOfTracts.MidConv *
TractSizeHec
     .Cells(row, 4).Value = PrivateSpaceFraction.MidClus * NumberOfTracts.MidClus *
TractSizeHec
     .Cells(row, 5).Value = PrivateSpaceFraction.High * NumberOfTracts.High *
TractSizeHec
     .Cells(row, 6).Value = PrivateSpaceFraction.Comm * NumberOfTracts.Comm *
TractSizeHec
     row = row + 1

     'Calculate infrastructure space for each kind of tract
     .Cells(row, 2).Value = InfrastructureFraction.Low * NumberOfTracts.Low *
TractSizeHec
     .Cells(row, 3).Value = InfrastructureFraction.MidConv * NumberOfTracts.MidConv *
TractSizeHec
     .Cells(row, 4).Value = InfrastructureFraction.MidClus * NumberOfTracts.MidClus *
TractSizeHec
     .Cells(row, 5).Value = InfrastructureFraction.High * NumberOfTracts.High *
TractSizeHec
     .Cells(row, 6).Value = InfrastructureFraction.Comm * NumberOfTracts.Comm *
TractSizeHec
     row = row + 1

     'Sum land in open space, land in parcels, and infra. land for each kind of tract
     .Cells(row, 2).Formula = "=B4+B5+B6"
     .Cells(row, 3).Formula = "=C4+C5+C6"
     .Cells(row, 4).Formula = "=D4+D5+D6"
     .Cells(row, 5).Formula = "=E4+E5+E6"
     .Cells(row, 6).Formula = "=F4+F5+F6"
     row = row + 1
```

```
'Insert number of housing/commercial lots
.Cells(row, 2).Value = TotNumberOfParcels.Low
.Cells(row, 3).Value = TotNumberOfParcels.MidConv
.Cells(row, 4).Value = TotNumberOfParcels.MidClus
.Cells(row, 5).Value = TotNumberOfParcels.High
.Cells(row, 6).Value = TotNumberOfParcels.Comm
row = row + 1

'Insert number of people
.Cells(row, 2).Value = TotNumberOfPeople.Low
.Cells(row, 3).Value = TotNumberOfPeople.MidConv
.Cells(row, 4).Value = TotNumberOfPeople.MidClus
.Cells(row, 5).Value = TotNumberOfPeople.High
.Cells(row, 6).Value = TotNumberOfPeople.Comm
row = row + 2

'Insert bare land values (Estimated new land values - estimated _
 baseline values)
.Cells(row, 2).Value = difBareLandValue.Low
.Cells(row, 3).Value = difBareLandValue.MidConv
.Cells(row, 4).Value = difBareLandValue.MidClus
.Cells(row, 5).Value = difBareLandValue.High
.Cells(row, 6).Value = difBareLandValue.Comm
row = row + 3

'Insert house construction cost
.Cells(row, 2).Value = AggHouseCost.Low
.Cells(row, 3).Value = AggHouseCost.MidConv
.Cells(row, 4).Value = AggHouseCost.MidClus
.Cells(row, 5).Value = AggHouseCost.High
.Cells(row, 6).Value = "N/A" 'no info on commercial buildings
row = row + 1

'Insert Road/sidewalk/storm drain cost
.Cells(row, 2).Value = AggRoadCost.Low
.Cells(row, 3).Value = AggRoadCost.MidConv
.Cells(row, 4).Value = AggRoadCost.MidClus
.Cells(row, 5).Value = AggRoadCost.High
.Cells(row, 6).Value = "N/A" 'no info on commercial
row = row + 1

'Insert sewer pipe cost
.Cells(row, 2).Value = AggSewerCost.Low
.Cells(row, 3).Value = AggSewerCost.MidConv
.Cells(row, 4).Value = AggSewerCost.MidClus
.Cells(row, 5).Value = AggSewerCost.High
.Cells(row, 6).Value = "N/A" 'no info on commercial
row = row + 1

'Insert water pipe cost
.Cells(row, 2).Value = AggWaterCost.Low
.Cells(row, 3).Value = AggWaterCost.MidConv
.Cells(row, 4).Value = AggWaterCost.MidClus
.Cells(row, 5).Value = AggWaterCost.High
.Cells(row, 6).Value = "N/A" 'no info on commercial
row = row + 2

'Sum up inside-the-tract development costs
.Cells(row, 2).Formula = "=B14+B15+B16+B17"
.Cells(row, 3).Formula = "=C14+C15+C16+C17"
.Cells(row, 4).Formula = "=D14+D15+D16+D17"
.Cells(row, 5).Formula = "=E14+E15+E16+E17"
.Cells(row, 6).Value = "N/A" 'no commercial information
```

```
row = row + 2

'Sum up the total tract value
.Cells(row, 2).Formula = "=B11+B19"
.Cells(row, 3).Formula = "=C11+C19"
.Cells(row, 4).Formula = "=D11+D19"
.Cells(row, 5).Formula = "=E11+E19"
.Cells(row, 6).Value = "N/A" 'no commercial information
row = row + 3

'Insert the use value assessment
.Cells(row, 2).Value = difUseAssessment.Low
.Cells(row, 3).Value = difUseAssessment.MidConv
.Cells(row, 4).Value = difUseAssessment.MidClus
.Cells(row, 5).Value = difUseAssessment.High
.Cells(row, 6).Value = "N/A" 'no commercial information
row = row + 1

'Insert the mkt value assessment
.Cells(row, 2).Value = difMktAssessment.Low
.Cells(row, 3).Value = difMktAssessment.MidConv
.Cells(row, 4).Value = difMktAssessment.MidClus
.Cells(row, 5).Value = difMktAssessment.High
.Cells(row, 6).Value = "N/A" 'no commercial information\
row = row + 2

'Insert the total value of assessed property
.Cells(row, 2).Value = difTotAssessedValue.Low
.Cells(row, 3).Value = difTotAssessedValue.MidConv
.Cells(row, 4).Value = difTotAssessedValue.MidClus
.Cells(row, 5).Value = difTotAssessedValue.High
.Cells(row, 6).Value = "N/A" 'no commercial information
row = row + 2

'Insert the Tax revenue
.Cells(row, 2).Value = difTotAssessedValue.Low * TaxRate
.Cells(row, 3).Value = difTotAssessedValue.MidConv * TaxRate
.Cells(row, 4).Value = difTotAssessedValue.MidClus * TaxRate
.Cells(row, 5).Value = difTotAssessedValue.High * TaxRate
.Cells(row, 6).Value = "N/A" 'no commercial information
row = row + 3

'Insert the Sewer Connection cost
.Cells(row, 2).Value = AggSewerConnectCost.Low
.Cells(row, 3).Value = AggSewerConnectCost.MidConv
.Cells(row, 4).Value = AggSewerConnectCost.MidClus
.Cells(row, 5).Value = AggSewerConnectCost.High
.Cells(row, 6).Value = AggSewerConnectCost.Comm
row = row + 1

'Insert the Water Connection cost
.Cells(row, 2).Value = AggWaterConnectCost.Low
.Cells(row, 3).Value = AggWaterConnectCost.MidConv
.Cells(row, 4).Value = AggWaterConnectCost.MidClus
.Cells(row, 5).Value = AggWaterConnectCost.High
.Cells(row, 6).Value = AggWaterConnectCost.Comm
row = row + 2

'Insert the Total of Sewer and Water combined
.Cells(row, 2).Formula = "=B32+B33"
.Cells(row, 3).Formula = "=C32+C33"
.Cells(row, 4).Formula = "=D32+D33"
.Cells(row, 5).Formula = "=E32+E33"
```

```
     .Cells(row, 6).Formula = "=F32+F33"
     row = row + 1

    'Annualize the total sewer and water costs at a 7% rate over 30 years.
    .Cells(row, 2).Formula = "=-PMT(0.07,30,B32+B33)"
    .Cells(row, 3).Formula = "=-PMT(0.07,30,C32+C33)"
    .Cells(row, 4).Formula = "=-PMT(0.07,30,D32+D33)"
    .Cells(row, 5).Formula = "=-PMT(0.07,30,E32+E33)"
    .Cells(row, 6).Formula = "=-PMT(0.07,30,F32+F33)"

   End With


   'Remove pre-existing copy of the spreadsheet before saving a new one
   On Error Resume Next
     Kill App.Path & "\OutputFiles\GovtRevsExps.xls"
   On Error GoTo 0

   'xlSheet.Application.AlertBeforeOverwriting = False
   xlSheet.SaveAs App.Path & "\OutputFiles\GovtRevsExps.xls"

   ' Close the Workbook
   xlBook.Close
   ' Close Microsoft Excel with the Quit method.
   xlApp.Quit


End Sub


'This subroutine calculates and stores the distance from a neighborhood to a sewer
'Note:  Current sewer line layer is for test purposes only -- it is not a real layer
Public Sub CalcSewerDist()

  Dim DatConn As New MapObjects2.DataConnection
  DatConn.Database = App.Path & "\BC_Data"

  'These are variables for the development squares data
  Dim develGD As MapObjects2.GeoDataset
  Set develGD = DatConn.FindGeoDataset(glbCombinedDevLayerFilename)
    If develGD Is Nothing Then
      MsgBox "Couldn't find data for your development scenario!"
      Exit Sub
    End If
  Dim lyrDevel As New MapObjects2.MapLayer
  Set lyrDevel.GeoDataset = develGD
  Dim develRecSet As MapObjects2.Recordset  'This is the set of records for the
developments
  Set develRecSet = lyrDevel.Records
  Dim develField As MapObjects2.Field
  Dim develPoly As MapObjects2.Polygon

  'These are variables for the sewer data
  Dim sewGD As MapObjects2.GeoDataset
  Set sewGD = DatConn.FindGeoDataset("sewertest")
    If sewGD Is Nothing Then
      MsgBox "Couldn't find data for the sewer lines!"
      Exit Sub
    End If
  Dim lyrSew As New MapObjects2.MapLayer
  Set lyrSew.GeoDataset = sewGD
  Dim sewRecSet As MapObjects2.Recordset   'This is the set of records for the sewer
layer
```

```
  Set sewRecSet = lyrSew.Records
  Dim sewField As MapObjects2.Field
  Dim SewLine As MapObjects2.Line
  Dim MinDist As Double
  Dim distance As Double

  'CountNumber is used to figure out which of the development square records needs to
  'be edited
  Dim CountNumber As Integer
  Dim j As Integer

  If develRecSet.Count <> 0 Then  'Make sure records exist in the set of developments
    develRecSet.MoveFirst
    CountNumber = 0

    Do While Not develRecSet.EOF 'Loop thru each of the development polygons
      CountNumber = CountNumber + 1 'Count which record the loop is on
      MinDist = 999999999999# 'set an impossibly high min. sewer distance for
initialization
      Set develField = develRecSet.Fields("shape")
      Set develPoly = develField.Value

     'This section finds the distance to sewers
     'Loop thru each line in the sewer layer
     sewRecSet.MoveFirst
     Do While Not sewRecSet.EOF
       Set sewField = sewRecSet.Fields("shape")
       Set SewLine = sewField.Value
       distance = develPoly.DistanceTo(SewLine) 'The DistanceTo functions works
between 2 shapes
       If distance < MinDist Then MinDist = distance 'Track the minimum distance
       sewRecSet.MoveNext
     Loop

     ' Edit values in the development layer's SewDist field
     ' Update method causes a jump back to the first record in the recordset
     ' Use a loop to move back down again to the appropriate record
     With lyrDevel.Records
       .MoveFirst

       For j = 2 To CountNumber
        .MoveNext
       Next j

       .Edit
       .Fields("SewDist").Value = MinDist
       .Update
      End With

     develRecSet.MoveNext
    Loop
  End If


  'Readjust sewer distance data to account for supergroups of development squares --
  'If a square is in a cluster, distance to the sewer only needs to be measured from
  'the nearest of those squares -- other squares in the cluster store 0 as a distance.

  'Run a loop from 1 to the number of development squares to cover all the potential
  'supergrp numbers that have been assigned (the number of supergrps must be lower
  'than the number of squares)
  Dim i As Integer
  Dim MinAdjustDistance As Double, AdjustDistance As Double
```

```
For i = 1 To develRecSet.Count
  'Set an incredibly high minimum distance initially
  MinAdjustDistance = 1E+19
  develRecSet.MoveFirst
  Do While Not develRecSet.EOF 'loop thru each of the development squares
    'If the development square belongs to supergroup(i) then keep only the
    'minimum distance in the database for the minimum-distance tract.  Set
    'the distance of all other tracts in the supergrp to 0
    If develRecSet.Fields("SuperGrp").Value = i Then
      AdjustDistance = develRecSet.Fields("SewDist").Value
      'If the distance for a square is less than the minimum, then reset the min.
      If AdjustDistance < MinAdjustDistance Then MinAdjustDistance = AdjustDistance
    End If
    develRecSet.MoveNext
  Loop

  'loop thru the development squares a second time to actually write the values
  develRecSet.MoveFirst
  CountNumber = 0
  Do While Not develRecSet.EOF 'loop thru each of the development squares
    CountNumber = CountNumber + 1 'Track which record the loop is on
    'For SuperGrp(i), if the distance is not equal to the minimum, then set it to 0.
    If develRecSet.Fields("SuperGrp").Value = i And _
      develRecSet.Fields("sewdist").Value <> MinAdjustDistance Then

      With lyrDevel.Records
        .MoveFirst
        For j = 2 To CountNumber
          .MoveNext
        Next j
        .Edit
        .Fields("SewDist").Value = 0
        .Update
      End With
    End If

    develRecSet.MoveNext
  Loop
Next i

'Readjust sewer distance data to account for cases where no sewer is needed
'i.e., Low density tracts use septic, so sewer distance becomes 0
develRecSet.MoveFirst
CountNumber = 0
Do While Not develRecSet.EOF 'Loop thru each of the development polygons
  CountNumber = CountNumber + 1
  If develRecSet.Fields("DevType").Value = "LDR" Then
    ' Edit values in the development layer's SewDist field
    ' Update method causes a jump back to the first record in the recordset
    ' Use a loop to move back down again to the appropriate record
    With lyrDevel.Records
      .MoveFirst

      For j = 2 To CountNumber
       .MoveNext
      Next j

      .Edit
      .Fields("SewDist").Value = 0
      .Update
     End With
   End If
```

```
     develRecSet.MoveNext
  Loop

  lyrDevel.Records.StopEditing

  DatConn.Disconnect
End Sub


'This subroutine calculates and stores the distance from a neighborhood to a water
line
'Note:  Current water line layer is for test purposes only -- it is not a real layer
Public Sub CalcWaterDist()

  Dim dcWater As New MapObjects2.DataConnection
  dcWater.Database = App.Path & "\BC_Data"

  'These are variables for the development squares data
  Dim develsGD As MapObjects2.GeoDataset
  Set develsGD = dcWater.FindGeoDataset(glbCombinedDevLayerFilename)
    If develsGD Is Nothing Then
      MsgBox "Couldn't find data for your development scenario!"
      Exit Sub
    End If
  Dim lyrDevels As New MapObjects2.MapLayer
  Set lyrDevels.GeoDataset = develsGD
  Dim develsRecSet As MapObjects2.Recordset  'This is the set of records for the
developments
  Set develsRecSet = lyrDevels.Records
  Dim develsField As MapObjects2.Field
  Dim develsPoly As MapObjects2.Polygon

  'These are variables for the water data
  Dim watGD As MapObjects2.GeoDataset
  Set watGD = dcWater.FindGeoDataset("watertest")
    If watGD Is Nothing Then
      MsgBox "Couldn't find data for the water lines!"
      Exit Sub
    End If
  Dim lyrWat As New MapObjects2.MapLayer
  Set lyrWat.GeoDataset = watGD
  Dim watRecSet As MapObjects2.Recordset   'This is the set of records for the water
layer
  Set watRecSet = lyrWat.Records
  Dim watField As MapObjects2.Field
  Dim watLine As MapObjects2.Line
  Dim MinDist As Double
  Dim distance As Double

  'CountNumber is used to figure out which of the development square records needs to
  'be edited
  Dim CountNumber As Integer
  Dim j As Integer

  If develsRecSet.Count <> 0 Then  'Make sure records exist in the set of developments
    develsRecSet.MoveFirst
    CountNumber = 0

    Do While Not develsRecSet.EOF 'Loop thru each of the development polygons
      CountNumber = CountNumber + 1 'Count which record the loop is on
      MinDist = 999999999999# 'set an impossibly high min. water distance for
initialization
      Set develsField = develsRecSet.Fields("shape")
```

```
      Set develsPoly = develsField.Value

     'This section finds the distance to waters
     'Loop thru each line in the water layer
     watRecSet.MoveFirst
     Do While Not watRecSet.EOF
       Set watField = watRecSet.Fields("shape")
       Set watLine = watField.Value
       distance = develsPoly.DistanceTo(watLine) 'The DistanceTo functions works
between 2 shapes
       If distance < MinDist Then MinDist = distance 'Track the minimum distance
       watRecSet.MoveNext
     Loop

     ' Edit values in the development layer's watDist field
     ' Update method causes a jump back to the first record in the recordset
     ' Use a loop to move back down again to the appropriate record
     With lyrDevels.Records
       .MoveFirst

       For j = 2 To CountNumber
        .MoveNext
       Next j

       .Edit
       .Fields("WatDist").Value = MinDist
       .Update
      End With

      develsRecSet.MoveNext
    Loop
    lyrDevels.Records.StopEditing

  End If


  'Readjust water distance data to account for supergroups of development squares --
  'If a square is in a cluster, distance to water line only needs to be measured from
  'the nearest of those squares -- other squares in the cluster store 0 as a distance.

  'Run a loop from 1 to the number of development squares to cover all the potential
  'supergrp numbers that have been assigned (the number of supergrps must be lower
  'than the number of squares)
  Dim i As Integer
  Dim MinAdjustDistance As Double, AdjustDistance As Double
  For i = 1 To develsRecSet.Count
    'Set an incredibly high minimum distance initially
    MinAdjustDistance = 1E+19
    develsRecSet.MoveFirst
    Do While Not develsRecSet.EOF 'loop thru each of the development squares
      'If the development square belongs to supergroup(i) then keep only the
      'minimum distance in the database for the minimum-distance tract.  Set
      'the distance of all other tracts in the supergrp to 0
      If develsRecSet.Fields("SuperGrp").Value = i Then
        AdjustDistance = develsRecSet.Fields("WatDist").Value
        'If the distance for a square is less than the minimum, then reset the min.
        If AdjustDistance < MinAdjustDistance Then MinAdjustDistance = AdjustDistance
      End If
      develsRecSet.MoveNext
    Loop

    'loop thru the development squares a second time to actually write the values
    develsRecSet.MoveFirst
```

```
    CountNumber = 0
    Do While Not develsRecSet.EOF 'loop thru each of the development squares
      CountNumber = CountNumber + 1 'Track which record the loop is on
      'For SuperGrp(i), if the distance is not equal to the minimum, then set it to 0.
      If develsRecSet.Fields("SuperGrp").Value = i And _
        develsRecSet.Fields("Watdist").Value <> MinAdjustDistance Then

        With lyrDevels.Records
          .MoveFirst
          For j = 2 To CountNumber
            .MoveNext
          Next j
          .Edit
          .Fields("WatDist").Value = 0
          .Update
        End With
      End If

      develsRecSet.MoveNext
    Loop
  Next i

  'Readjust water distance data to account for cases where no water is needed
  'i.e., Low density tracts use wells, so water distance becomes 0
  develsRecSet.MoveFirst
  CountNumber = 0
  Do While Not develsRecSet.EOF 'Loop thru each of the development polygons
    CountNumber = CountNumber + 1
    If develsRecSet.Fields("DevType").Value = "LDR" Then
      ' Edit values in the development layer's watDist field
      ' Update method causes a jump back to the first record in the recordset
      ' Use a loop to move back down again to the appropriate record
      With lyrDevels.Records
        .MoveFirst

        For j = 2 To CountNumber
         .MoveNext
        Next j

        .Edit
        .Fields("WatDist").Value = 0
        .Update
       End With
     End If

     develsRecSet.MoveNext
  Loop

  lyrDevels.Records.StopEditing

  dcWater.Disconnect
End Sub
```

FisheriesOperations Module

```
Option Explicit

'*************************************************************************
' * The FisheriesOperations module contains a collection of subroutines     *
' * that provide modeling of fish health                                    *
' * Created March 24, 1999                                                  *
```

```
'*************************************************************************

'This subroutine calculates mean metric scores for fish health and reports them
'to the user in a table and on the map.
Public Sub EstimateFishHealth()

  'Set up dataset/layer variables
  Dim dcFish As New MapObjects2.DataConnection
    dcFish.Database = App.Path & "\BC_Data"   'Tells where to look for data
  Dim gdFish As MapObjects2.GeoDataset
    Set gdFish = dcFish.FindGeoDataset("fish_outlets") 'Find outlet points shapefile
  Dim lyrFish As New MapObjects2.MapLayer
    lyrFish.GeoDataset = gdFish
  Dim rsFish As New MapObjects2.Recordset
    Set rsFish = lyrFish.Records


  'Set up variables related to the mean metric score for fish health
  'MMS before the user adds a scenario
  Dim BaseMMS(numLandSegs) As Double
  'MMS after the user runs a scenario
  Dim NewMMS(numLandSegs) As Double
  'Constant in the MMS regression equation
  Dim MMSRegressConst As Double
      MMSRegressConst = 0.3158
  'Coeffeicient for the fraction of disturbed land
  Dim MMSCoeff As Double
      MMSCoeff = -0.0426
  Dim i As Integer
  Dim j As Integer
  Dim aggBaseDisturbedArea(numLandSegs) As Double
  Dim aggNewDisturbedArea(numLandSegs) As Double
  Dim aggBaseDisturbedPct(numLandSegs) As Double
  Dim aggNewDisturbedPct(numLandSegs) As Double
  Dim aggAllArea(numLandSegs) As Double
  Dim MMSUpper As Double, MMSLower As Double
    MMSUpper = 0.569
    MMSLower = 0.4
  Dim MMSBaseCategory(numLandSegs) As String
  Dim MMSNewCategory(numLandSegs) As String

  'Initialize aggregation variables to 0
  For i = 1 To numLandSegs
    aggBaseDisturbedArea(i) = 0
    aggNewDisturbedArea(i) = 0
    aggAllArea(i) = 0
  Next i

  'Determine the baseline and new mean metric scores (MMS) for each land segment.
  'MMS is based on a regression from the 43 fish sampling sites
  'throughout the Upper Roanoke River Watershed.  The simple regression equation is
  'MMS = -0.0426Ln(FractionDisturbed) + 0.3158
  For i = 1 To numLandSegs  'Loop through each subwatershed
    'The first two subwatersheds have no upstream subwatersheds, so their
    'land areas do not need to be aggregated -- their mean metric scores
    'can be calculated directly
    If i = 1 Or i = 2 Then
      'Calculate the regression equation (baseline and with scenario)
      BaseMMS(i) = MMSCoeff * Log(glbPctOldDisturb(i)) + MMSRegressConst
      NewMMS(i) = MMSCoeff * Log(glbPctNewDisturb(i)) + MMSRegressConst
      'The remaining subwatersheds (3-10) have upstream subwatersheds,
      'so their land areas need to be aggregated.
      Else
```

```
        For j = 1 To numLandSegs 'Loop thru subwatersheds
          'If the inner loop (j) subwatershed is upstream of the outer loop (i)
          'subwatershed or the loops are on the same subwatershed,
          'then add its disturbed land area to the total.  Also add up the
          'total area
          If j <= i Then
            aggBaseDisturbedArea(i) = aggBaseDisturbedArea(i) + glbTotOldDisturb(j)
            aggNewDisturbedArea(i) = aggNewDisturbedArea(i) + glbTotNewDisturb(j)
            aggAllArea(i) = aggAllArea(i) + glbTotAllLandUses(j)
          End If
        Next j

        'Calculate proportions of disturbed area to plug into the regression
        aggBaseDisturbedPct(i) = aggBaseDisturbedArea(i) / aggAllArea(i)
        aggNewDisturbedPct(i) = aggNewDisturbedArea(i) / aggAllArea(i)

        'Calculate the regression equation (baseline and with scenario)
        BaseMMS(i) = MMSCoeff * Log(aggBaseDisturbedPct(i)) + MMSRegressConst
        NewMMS(i) = MMSCoeff * Log(aggNewDisturbedPct(i)) + MMSRegressConst
    End If

    'Determine the MMS category of the base mean metric score
    If BaseMMS(i) > MMSUpper Then
      MMSBaseCategory(i) = "Green" 'high integrity sites
      frmFishReport.picBaseMMS(i - 1).BackColor = RGB(0, 255, 0) 'Color a box green
        ElseIf BaseMMS(i) < MMSLower Then
          MMSBaseCategory(i) = "Red" 'low integrity sites
          frmFishReport.picBaseMMS(i - 1).BackColor = RGB(255, 0, 0) 'Color a box red
            Else: MMSBaseCategory(i) = "Yellow" 'mid integrity sites
            frmFishReport.picBaseMMS(i - 1).BackColor = RGB(255, 255, 0) 'Color a box
yellow
    End If

    'Determine the MMS category of the new mean metric score
    If NewMMS(i) > MMSUpper Then
      MMSNewCategory(i) = "Green" 'high integrity sites
      frmFishReport.picNewMMS(i - 1).BackColor = RGB(0, 255, 0) 'Color a box green
        ElseIf NewMMS(i) < MMSLower Then
          MMSNewCategory(i) = "Red" 'low integrity sites
          frmFishReport.picNewMMS(i - 1).BackColor = RGB(255, 0, 0) 'Color a box red
            Else: MMSNewCategory(i) = "Yellow" 'mid integrity sites
            frmFishReport.picNewMMS(i - 1).BackColor = RGB(255, 255, 0) 'Color a box
yellow
    End If
  Next i

  'Write the base and new MMS Categories in the outlet point shapefiles' databases
  'Remember to scroll through the recordset to the correct record
  Dim recCount, k As Integer
    recCount = 0

  Do While Not rsFish.EOF
    recCount = recCount + 1
    With lyrFish.Records
      .MoveFirst
      For k = 2 To recCount
        .MoveNext
      Next k
      .Edit
      .Fields("MMSCat").Value = MMSBaseCategory(recCount)
      .Update
    End With
    rsFish.MoveNext
```

```
  Loop

  Set rsFish = Nothing
  'lyrFish.Records.StopEditing


  'Put the results in a table and show them on a map
  frmFishReport.Show
  'insert titles for list boxes
  With frmFishReport
    .lstBaseSubwat.AddItem ("Watershed")
    .lstBaseSubwat.AddItem ("-------------------------")
    .lstNewSubwat.AddItem ("Watershed")
    .lstNewSubwat.AddItem ("-------------------------")
    .lstBaseDist.AddItem ("Portion Disturbed")
    .lstBaseDist.AddItem ("--------------------------------")
    .lstNewDist.AddItem ("Portion Disturbed")
    .lstNewDist.AddItem ("--------------------------------")
    .lstBaseMMS.AddItem ("Mean Met. Score")

    .lstBaseMMS.AddItem ("--------------------------------")
    .lstNewMMS.AddItem ("Mean Met. Score")
    .lstNewMMS.AddItem ("--------------------------------")
  End With

  For i = 1 To numLandSegs
    With frmFishReport
      'insert subwatershed numbers in list boxes
      .lstBaseSubwat.AddItem ("       " & i)
      .lstNewSubwat.AddItem ("       " & i)

      'insert fraction of disturbed area in list boxes
      If i = 1 Or i = 2 Then
        .lstBaseDist.AddItem ("        " & Round(glbPctOldDisturb(i), 4))
        .lstNewDist.AddItem ("        " & Round(glbPctNewDisturb(i), 4))
          Else
            .lstBaseDist.AddItem ("        " & Round(aggBaseDisturbedPct(i), 4))
            .lstNewDist.AddItem ("        " & Round(aggNewDisturbedPct(i), 4))
      End If

      'insert mean metric score in list boxes
      .lstBaseMMS.AddItem ("        " & Round(BaseMMS(i), 4))
      .lstNewMMS.AddItem ("        " & Round(NewMMS(i), 4))
    End With
  Next i

'Draw results on the two maps
  'Set up rendering variables
  Dim rndFishOutlet As New MapObjects2.ValueMapRenderer
  Dim rndSubwat As New MapObjects2.LabelRenderer

  'Set up the Base Fish Outlets (circle polygons) Layer with symbol styles and colors
  With lyrFish
    .Name = "Fish Outlets"  'Set Name property of new MapLayer
    .Symbol.Style = moSolidFill 'Set fill style
    .Symbol.OutlineColor = moBlack 'set outline color
  End With

  Set lyrFish.Renderer = rndFishOutlet  'Set the renderer for the layer to code sites
  'as red, yellow, or green

  'Set up the renderer for the fish outlet sites
  With lyrFish.Renderer
```

```
    .ValueCount = 3 '3 possibilities -- red, yellow, or green
    .Field = "MMSCat" 'Use the BaseMMS field to choose the appropriate color

    .Value(0) = "Green"
    .Symbol(0).Color = moGreen

    .Value(1) = "Yellow"
    .Symbol(1).Color = moYellow

    .Value(2) = "Red"
    .Symbol(2).Color = moRed
  End With

  frmFishReport.mapFishBase.Layers.Add lyrFish   'Add subwatersheds to base map layer
collection

  Set lyrFish = Nothing 'Reset layer to add the next file

  'Set up the New Fish Outlets (circle polygons) Layer
  Set gdFish = dcFish.FindGeoDataset("New_Fish_Outlets") 'Find subwatershed shapefile
  lyrFish.GeoDataset = gdFish
  Set rsFish = lyrFish.Records

  'Write values in the shapefile
  recCount = 0
  Do While Not rsFish.EOF
    recCount = recCount + 1
    With lyrFish.Records
      .MoveFirst
      For k = 2 To recCount
        .MoveNext
      Next k
      .Edit
      .Fields("MMSCat").Value = MMSNewCategory(recCount)
      .Update
    End With
    rsFish.MoveNext
  Loop

  With lyrFish
    .GeoDataset = gdFish 'Set GeoDataset property of new map layer
    .Name = "New Fish Outlets"  'Set Name property of new MapLayer
    .Symbol.Style = moSolidFill 'Set fill style
    .Symbol.OutlineColor = moBlack 'set outline color
  End With

  Set lyrFish.Renderer = rndFishOutlet 'Apply the renderer to the outlets
  frmFishReport.mapFishNew.Layers.Add lyrFish   'Add subwatersheds to new map layer
collection

  Set lyrFish = Nothing  'Reset layer to add the next file

  'Set up the Subwatersheds Layer with symbol styles, colors, and labels
  Set gdFish = dcFish.FindGeoDataset("subwatersheds") 'Find subwatershed shapefile
  With lyrFish
    .GeoDataset = gdFish 'Set GeoDataset property of new map layer
    .Name = "Subwatersheds"  'Set Name property of new MapLayer
    .Symbol.OutlineColor = moBlack
    .Symbol.SymbolType = moFillSymbol
    .Symbol.Style = moTransparentFill
  End With

  Set lyrFish.Renderer = rndSubwat
```

```
  lyrFish.Renderer.Field = "Wshid" 'Label the watersheds with their id numbers


  frmFishReport.mapFishBase.Layers.Add lyrFish   'Add subwatersheds to base map layer
collection
  frmFishReport.mapFishNew.Layers.Add lyrFish   'Add subwatersheds to new map layer
collection

  Set lyrFish = Nothing  'Reset layer to add the next file

  'Set up the Stream Reaches Layer with symbol styles and colors
  Set gdFish = dcFish.FindGeoDataset("reaches") 'Find the shapefile of stream reaches
  With lyrFish
    .GeoDataset = gdFish 'Set GeoDataset property of new map layer
    .Name = "Stream Reaches"  'Set Name property of new MapLayer
    .Symbol.Color = moBlue
    .Symbol.SymbolType = moLineSymbol
  End With

  frmFishReport.mapFishBase.Layers.Add lyrFish   'Add subwatersheds to base map layer
collection
  frmFishReport.mapFishNew.Layers.Add lyrFish   'Add subwatersheds to new map layer
collection

  'Zoom the maps to the full extent
  frmFishReport.mapFishBase.Extent = frmFishReport.mapFishBase.FullExtent
  frmFishReport.mapFishNew.Extent = frmFishReport.mapFishNew.FullExtent

  dcFish.Disconnect

End Sub
```

frmMain Form

```
Option Explicit
Option Base 0

Private Sub cmdInputComplete_Click()
  'Make the status frame with its message label appear to the user
  lblStatusMessage.Caption = "Compiling attributes of your scenario.  Please wait..."
  fraStatusMessage.Visible = True
  frmMain.Refresh
  'Disable the inputComplete button
  cmdInputComplete.Enabled = False
  'Disable the map, so the user can't click any more developments on it
  mapDisplay.Enabled = False

  Call SaveSquaresAsDatabase 'In the AddDevelopmentsOperations Module
  Call FindSuperGroupsOfSquares 'In the AddDevelopmentsOperations Module
  frmModel.Show
  'Provide a new message for the user in the status frame to tell him/her
  'how to input a new scenario if necessary
  lblStatusMessage.Caption = "Hitting the CLEAR ALL button will allow you to input a
new scenario."
End Sub


Private Sub Form_Load()

  fraStatusMessage.Visible = False
```

```
  'Set the position of the form on the screen
  frmMain.Left = Screen.Width / 10
  frmMain.Top = Screen.Height / 20


  'First set some variable values to define the input grid pattern (like a SimCity
grid)
  glbSquareSize = 150 'Set the development square radius (half the length or width)
size to 150 meters
  glbGridMaxX = 601260.843644
  glbGridMinX = 576060.843644
  glbGridMaxY = 4121901.383057
  glbGridMinY = 4110501.383057


  Call AutoLoadDataLayer 'In the BasicOperations Module -- Loads base data
  Call LinkLegend 'In the BasicOperations Module -- links legend control to the map

  'This block sets the addedpreviously array to false, since the user has added
  'no data to the map at this point.  This gets used in frmMoreData where the
  'user adds extra data.
  Dim n As Integer
  For n = 0 To 49
    glbAddedPreviously(n) = False
  Next n

End Sub


'Updates map when user turns layers on or off
Private Sub legMapDisplay_AfterSetLayerVisible(Index As Integer, isVisible As Boolean)
  frmMain.mapDisplay.Refresh
End Sub

'This subroutine completes actions that the user wants to do by clicking the map
Private Sub mapDisplay_MouseDown(Button As Integer, Shift As Integer, X As Single, Y
As Single)

  Dim clickedPt As New MapObjects2.Point
  Dim ClickX As Double, clickY As Double

  'Zoom in button was pushed
  If tbrMapControl.Buttons("ZoomIn").Value = 1 Then
    Call ZoomIn 'In the BasicOperations Module

  'Zoom out button was pushed
  ElseIf tbrMapControl.Buttons("ZoomOut").Value = 1 Then
    Call ZoomOut 'In the BasicOperations Module

  'Pan button was pushed
  ElseIf tbrMapControl.Buttons("Pan").Value = 1 Then
    Call Pan 'In the BasicOperations Module

  'Drop-Low-Density-Residential-Development button was pushed
  ElseIf tbrMapControl.Buttons("LowDensityRes").Value = 1 Then

      Set clickedPt = mapDisplay.ToMapPoint(X, Y)

      ClickX = clickedPt.X
      clickY = clickedPt.Y
      clickedPt.X = SnapXToGrid(ClickX)  'In the AddDevelopmentsOperations module --
changes x coordinate to fit the grid
```

```
      clickedPt.Y = SnapYToGrid(clickY)  'In the AddDevelopmentsOperations module --
changes y coordinate to fit the grid

      If SeeThatSquareIsInGrid(clickedPt) = 1 Then
        Call AddDevelopmentSquareL(clickedPt) 'In AddDevelopments Operations Module
        Else
          MsgBox "Your Development must be on the grid!"
      End If

  'Drop-Mid-Density-Residential-Conventional-Development button was pushed
  ElseIf tbrMapControl.Buttons("MidDensityResConv").Value = 1 Then

      Set clickedPt = mapDisplay.ToMapPoint(X, Y)

      ClickX = clickedPt.X
      clickY = clickedPt.Y
      clickedPt.X = SnapXToGrid(ClickX)  'In the AddDevelopmentsOperations module --
changes x coordinate to fit the grid
      clickedPt.Y = SnapYToGrid(clickY)  'In the AddDevelopmentsOperations module --
changes y coordinate to fit the grid

      If SeeThatSquareIsInGrid(clickedPt) = 1 Then
        Call AddDevelopmentSquareMC(clickedPt) 'In AddDevelopments Operations Module
        Else
          MsgBox "Your Development must be on the grid!"
      End If

  'Drop-Mid-Density-Residential-Cluster-Development button was pushed
  ElseIf tbrMapControl.Buttons("MidDensityResCluster").Value = 1 Then

      Set clickedPt = mapDisplay.ToMapPoint(X, Y)

      ClickX = clickedPt.X
      clickY = clickedPt.Y
      clickedPt.X = SnapXToGrid(ClickX)  'In the AddDevelopmentsOperations module --
changes x coordinate to fit the grid
      clickedPt.Y = SnapYToGrid(clickY)  'In the AddDevelopmentsOperations module --
changes y coordinate to fit the grid

      If SeeThatSquareIsInGrid(clickedPt) = 1 Then
        Call AddDevelopmentSquareMCL(clickedPt) 'In AddDevelopments Operations Module
        Else
          MsgBox "Your Development must be on the grid!"
      End If

  'Drop-High-Density-Residential-Development button was pushed
  ElseIf tbrMapControl.Buttons("HighDensityRes").Value = 1 Then

      Set clickedPt = mapDisplay.ToMapPoint(X, Y)

      ClickX = clickedPt.X
      clickY = clickedPt.Y
      clickedPt.X = SnapXToGrid(ClickX)  'In the AddDevelopmentsOperations module --
changes x coordinate to fit the grid
      clickedPt.Y = SnapYToGrid(clickY)  'In the AddDevelopmentsOperations module --
changes y coordinate to fit the grid

      If SeeThatSquareIsInGrid(clickedPt) = 1 Then
        Call AddDevelopmentSquareH(clickedPt) 'In AddDevelopments Operations Module
        Else
          MsgBox "Your Development must be on the grid!"
      End If
```

```
  'Drop-Commercial-Development button was pushed
  ElseIf tbrMapControl.Buttons("Commercial").Value = 1 Then

      Set clickedPt = mapDisplay.ToMapPoint(X, Y)

      ClickX = clickedPt.X
      clickY = clickedPt.Y
      clickedPt.X = SnapXToGrid(ClickX)  'In the AddDevelopmentsOperations module --
changes x coordinate to fit the grid
      clickedPt.Y = SnapYToGrid(clickY)  'In the AddDevelopmentsOperations module --
changes y coordinate to fit the grid

      If SeeThatSquareIsInGrid(clickedPt) = 1 Then
        Call AddDevelopmentSquareC(clickedPt) 'In AddDevelopments Operations Module
        Else
          MsgBox "Your Development must be on the grid!"
      End If

  'Remove-a-development-square button was pushed
  'This allows a user to remove unwanted development squares
  ElseIf tbrMapControl.Buttons("Remove").Value = 1 Then
    Dim RemoveClickedPt As New MapObjects2.Point

    Set RemoveClickedPt = mapDisplay.ToMapPoint(X, Y)
    Call RemoveSingleSquare(RemoveClickedPt) 'In the AddDevelopmentsOperations module
-- removes a clicked square

  End If

End Sub

'This subroutine draws user-clicked squares on the map
Private Sub mapDisplay_afterTrackingLayerDraw(ByVal hDC As Stdole.OLE_HANDLE)
    Dim polyL As MapObjects2.Polygon   'this is the low density development square
    Dim polyMC As MapObjects2.Polygon  'this is the mid density conv. square
    Dim polyMCL As MapObjects2.Polygon  'this is the mid density cluster square
    Dim polyH As MapObjects2.Polygon  'this is the high density square
    Dim polyC As MapObjects2.Polygon  'this is the commercial square

    Dim DevelSquareSymL As New MapObjects2.Symbol   'this is the symbol for a low
density square
    Dim DevelSquareSymMC As New MapObjects2.Symbol   'this is the symbol for the mid
conv square
    Dim DevelSquareSymMCL As New MapObjects2.Symbol   'this is the symbol for the mid
cluster square
    Dim DevelSquareSymH As New MapObjects2.Symbol   'this is the symbol for the high
density square
    Dim DevelSquareSymC As New MapObjects2.Symbol   'this is the symbol for the
commercial square

    With DevelSquareSymL   'This with block sets the symbol properties
      .SymbolType = moFillSymbol
      .Style = moSolidFill
      .Color = moRed
    End With

    With DevelSquareSymMC   'This with block sets the symbol properties
      .SymbolType = moFillSymbol
      .Style = moSolidFill
      .Color = moBlue
    End With

    With DevelSquareSymMCL   'This with block sets the symbol properties
```

```
      .SymbolType = moFillSymbol
      .Style = moSolidFill
      .Color = moGreen
    End With

    With DevelSquareSymH   'This with block sets the symbol properties
      .SymbolType = moFillSymbol
      .Style = moSolidFill
      .Color = moYellow
    End With

    With DevelSquareSymC   'This with block sets the symbol properties
      .SymbolType = moFillSymbol
      .Style = moSolidFill
      .Color = moPurple
    End With

  ' If there are polygons in the collection (colDevelSquares), then draw them on map
  ' Draw polygons in different colors depending on what type of development the user
put down
  ' Low density res
  If colDevelSquaresL.Count <> 0 Then
    For Each polyL In colDevelSquaresL
      frmMain.mapDisplay.DrawShape polyL, DevelSquareSymL
      Next polyL
  End If

  'Mid density conventional res
  If colDevelSquaresMC.Count <> 0 Then
    For Each polyMC In colDevelSquaresMC
      frmMain.mapDisplay.DrawShape polyMC, DevelSquareSymMC
    Next polyMC
  End If

  'Mid density cluster res
  If colDevelSquaresMCL.Count <> 0 Then
    For Each polyMCL In colDevelSquaresMCL
      frmMain.mapDisplay.DrawShape polyMCL, DevelSquareSymMCL
    Next polyMCL
  End If

  'High density res
  If colDevelSquaresH.Count <> 0 Then
    For Each polyH In colDevelSquaresH
      frmMain.mapDisplay.DrawShape polyH, DevelSquareSymH
    Next polyH
  End If

  'Commercial
  If colDevelSquaresC.Count <> 0 Then
    For Each polyC In colDevelSquaresC
      frmMain.mapDisplay.DrawShape polyC, DevelSquareSymC
    Next polyC
  End If


End Sub

Private Sub mnuAbout_Click()
  frmAbout.Show
End Sub

Private Sub mnuAddData_Click()
```

```
  'frmMain.tbrMapControl.Buttons(5).Value = tbrPressed
  Call tbrMapControl_ButtonClick(tbrMapControl.Buttons(5))
End Sub

Private Sub mnuFilePrint_Click()
  frmMain.mapDisplay.PrintMap "Back Creek", "", True
  MsgBox "Your map is being printed on your Windows Default Printer."
End Sub

Private Sub mnuFileQuit_Click()
  Call QuitProgram 'In the BasicOperations Module
End Sub

Private Sub mnuHelpDevCosts_Click()
  frmHelp.Show
  frmHelp.webHelp.Navigate App.Path & "\HelpFiles\DevelCostHelp.html"
End Sub

Private Sub mnuHelpEcon_Click()
  dlgDialog.ShowHelp
End Sub

Private Sub mnuHelpFish_Click()
  frmHelp.Show
  frmHelp.webHelp.Navigate App.Path & "\HelpFiles\FishHelp.html"
End Sub

Private Sub mnuHelpHSPF_Click()
  frmHelp.Show
  frmHelp.webHelp.Navigate App.Path & "\HelpFiles\HSPFHelp.html"
End Sub

Private Sub mnuHelpLandVal_Click()
  frmHelp.Show
  frmHelp.webHelp.Navigate App.Path & "\HelpFiles\LandValuesHelp.html"
End Sub

Private Sub mnuInputScenario_Click()
  frmHelp.Show
  frmHelp.webHelp.Navigate App.Path & "\HelpFiles\InputScenariosHelp.html"
End Sub

Private Sub tbrMapControl_ButtonClick(ByVal Button As MSComctlLib.Button)
  Dim ButtKey As String
  ButtKey = Button.Key
  Call MapToolbarTask(ButtKey) 'In the BasicOperations Module
End Sub
```

frmAbout Form

```
Private Sub cmdOK_Click()
  frmAbout.Hide
End Sub

Private Sub Form_Load()
  frmAbout.Top = Screen.Height / 20
  frmAbout.Left = Screen.Width / 5
End Sub
```

frmMoreData Form

```
Option Explicit
Option Base 0


'Use the load event to populate the lists of data
Private Sub Form_Load()
  'Set the form's position on the screen
  frmMoreData.Left = frmMain.Left
  frmMoreData.Top = frmMain.Top

  'Put the names of data sets in the general data list
  With lstGeneralData
    .AddItem "Land Use", 0
  End With

  'Put the names of data sets in the hydrology data list
  With lstHydroData
    .AddItem "Rain Gages", 0
    .AddItem "Thiessen Polygons", 1
    .AddItem "Main Stem Reaches", 2
    .AddItem "Reach Outlet Points", 3
    .AddItem "Stream Gages", 4
    .AddItem "Tinker Creek WS", 5
    .AddItem "Upper Roanoke WS", 6
  End With

  'Put the names of data sets in the economics data list
  With lstEconData
    .AddItem "Roads", 0
    .AddItem "Sewer Lines", 1
    .AddItem "Water Supply Lines", 2
  End With

  'Put the names of data sets in the ecology data list
  With lstEcolData
    .AddItem "Fish Sampling Sites", 0
  End With

End Sub

'Add the data highlighted in the list boxes to the map
Private Sub cmdAddData_Click()
  Dim i As Integer

  i = 0

'Check to see what GENERAL layers the user wants to add to the map and specify
properties
  If lstGeneralData.Selected(0) = True And glbAddedPreviously(0) = False Then
    'Define properties for land use layer
    glbLayersNewData(i).Name = "land_use"
    glbLayersNewData(i).Renderer = True
    i = i + 1
    glbAddedPreviously(0) = True
  End If

'Check to see what HYDROLOGY layers the user wants to add to the map and specify
properties
  If lstHydroData.Selected(0) = True And glbAddedPreviously(10) = False Then
    'Define properties for rain gages layer
    glbLayersNewData(i).Name = "rain_gages"
```

```
  glbLayersNewData(i).SymbolColor = moDarkGreen
  glbLayersNewData(i).OutlineColor = moDarkGreen
  glbLayersNewData(i).PointStyle = moCircleMarker
  glbLayersNewData(i).Renderer = False
  i = i + 1
  glbAddedPreviously(10) = True
End If

If lstHydroData.Selected(1) = True And glbAddedPreviously(11) = False Then
  'Define properties for Thiessen Polygons layer
  glbLayersNewData(i).Name = "thiessen"
  glbLayersNewData(i).FillStyle = moTransparentFill
  glbLayersNewData(i).OutlineColor = moBlack
  glbLayersNewData(i).Renderer = False
  i = i + 1
  glbAddedPreviously(11) = True
End If

If lstHydroData.Selected(2) = True And glbAddedPreviously(12) = False Then
  'Define properties for Main Stem Reaches layer
  glbLayersNewData(i).Name = "reaches"
  glbLayersNewData(i).SymbolColor = moNavy
  glbLayersNewData(i).Renderer = False
  i = i + 1
  glbAddedPreviously(12) = True
End If

If lstHydroData.Selected(3) = True And glbAddedPreviously(13) = False Then
  'Define properties for outlet points layer
  glbLayersNewData(i).Name = "outlet_points"
  glbLayersNewData(i).SymbolColor = moMaroon
  glbLayersNewData(i).OutlineColor = moMaroon
  glbLayersNewData(i).PointStyle = moTriangleMarker
  glbLayersNewData(i).Renderer = False
  i = i + 1
  glbAddedPreviously(13) = True
End If


If lstHydroData.Selected(4) = True And glbAddedPreviously(14) = False Then
  'Define properties for stream gages layer
  glbLayersNewData(i).Name = "stream_gages"
  glbLayersNewData(i).SymbolColor = moBrown
  glbLayersNewData(i).OutlineColor = moBrown
  glbLayersNewData(i).PointStyle = moCrossMarker
  glbLayersNewData(i).Renderer = False
  i = i + 1
  glbAddedPreviously(14) = True
End If

If lstHydroData.Selected(5) = True And glbAddedPreviously(15) = False Then
  'Define properties for Tinker Creek Watershed layer
  glbLayersNewData(i).Name = "tinker_ws"
  glbLayersNewData(i).FillStyle = moTransparentFill
  glbLayersNewData(i).OutlineColor = moRed
  glbLayersNewData(i).Renderer = False
  i = i + 1
  glbAddedPreviously(15) = True
End If

If lstHydroData.Selected(6) = True And glbAddedPreviously(16) = False Then
  'Define properties for Upper Roanoke Watershed layer
  glbLayersNewData(i).Name = "up_roan_ws"
```

```
    glbLayersNewData(i).FillStyle = moTransparentFill
    glbLayersNewData(i).OutlineColor = moRed
    glbLayersNewData(i).Renderer = False
    i = i + 1
    glbAddedPreviously(16) = True
  End If

'Check to see what ECONOMICS layers the user wants to add to the map and specify
properties
  If lstEconData.Selected(0) = True And glbAddedPreviously(20) = False Then
    'Define properties for the roads
    glbLayersNewData(i).Name = "roads"
    glbLayersNewData(i).SymbolColor = moBlack
    glbLayersNewData(i).Renderer = False
    i = i + 1
    glbAddedPreviously(20) = True
  End If

  If lstEconData.Selected(1) = True And glbAddedPreviously(21) = False Then
    'Define properties for the sewer lines
    glbLayersNewData(i).Name = "SewerTest"
    glbLayersNewData(i).SymbolColor = moBrown
    glbLayersNewData(i).Renderer = False
    i = i + 1
    glbAddedPreviously(21) = True
  End If

  If lstEconData.Selected(2) = True And glbAddedPreviously(22) = False Then
    'Define properties for the water supply lines
    glbLayersNewData(i).Name = "WaterTest"
    glbLayersNewData(i).SymbolColor = moCyan
    glbLayersNewData(i).Renderer = False
    i = i + 1
    glbAddedPreviously(22) = True
  End If


'Check to see what ECOLOGY layers the user wants to add to the map and specify
properties
  If lstEcolData.Selected(0) = True And glbAddedPreviously(30) = False Then
    'Define properties for fish sampling sites
    glbLayersNewData(i).Name = "fish_sites"
    glbLayersNewData(i).SymbolColor = moNavy
    glbLayersNewData(i).PointStyle = moCircleMarker
    glbLayersNewData(i).Renderer = False
    i = i + 1
    glbAddedPreviously(30) = True
  End If


  glbLayersCountNewData = i

'*************************************************************************************
    'Draw the layers defined above on the map by adding layers to the
    'MapObjects Layers collection
'*************************************************************************************

  Dim DataConnectNewData As New MapObjects2.DataConnection
  Dim geoSetNewData As GeoDataset
  Dim newDataLayer As New MapLayer
  Dim j As Integer
  Dim k As Integer
  Dim MapRendererNewData As New MapObjects2.ValueMapRenderer
```

```
  DataConnectNewData.Database = App.Path & "\BC_Data"   'Tells where to look for data
  If DataConnectNewData.Connect = True Then  'If the data connection path is ok
    For j = 0 To glbLayersCountNewData - 1  'Loop through all new layers
      Set geoSetNewData = DataConnectNewData.FindGeoDataset(glbLayersNewData(j).Name)
'Find shapefile as GeoDataset in DataConnectNewDataion
      newDataLayer.GeoDataset = geoSetNewData 'Set GeoDataset property of new MapLayer
      newDataLayer.Name = glbLayersNewData(j).Name  'Set Name property of new MapLayer
      newDataLayer.Symbol.Color = glbLayersNewData(j).SymbolColor  'Set symbol color
of new MapLayer
      If newDataLayer.Symbol.SymbolType = moFillSymbol Then 'Fill style only applies
to polygons
        newDataLayer.Symbol.Style = glbLayersNewData(j).FillStyle  'Set fill of new
MapLayer
      End If
      If newDataLayer.Symbol.SymbolType = moPointSymbol Then 'Point style only applies
to points
        newDataLayer.Symbol.Style = glbLayersNewData(j).PointStyle 'set point style of
new MapLayer
      End If
      If newDataLayer.Symbol.SymbolType <> moLineSymbol Then 'Outline color does not
apply to lines
        newDataLayer.Symbol.OutlineColor = glbLayersNewData(j).OutlineColor  'Set
outline color of new MapLayer
      End If

      If glbLayersNewData(j).Renderer = True Then  'If the layer is land use
        Set newDataLayer.Renderer = MapRendererNewData
        With newDataLayer.Renderer
          .ValueCount = 5
          .Field = "Type"

          'Set values for forest
          .Value(0) = "Forest"
          .Symbol(0).OutlineColor = moDarkGreen
          .Symbol(0).Style = moSolidFill
          .Symbol(0).Color = moDarkGreen

          'Set values for herbaceous
          .Value(1) = "Herbaceous"
          .Symbol(1).OutlineColor = moYellow
          .Symbol(1).Style = moSolidFill
          .Symbol(1).Color = moYellow

          'Set values for open water
          .Value(2) = "Open Water"
          .Symbol(2).OutlineColor = moBlue
          .Symbol(2).Style = moSolidFill
          .Symbol(2).Color = moBlue

          'Set values for disturbed
          .Value(3) = "Disturbed"
          .Symbol(3).OutlineColor = moRed
          .Symbol(3).Style = moSolidFill
          .Symbol(3).Color = moRed

          'Set values for edge/mixed
          .Value(4) = "Edge/Mixed"
          .Symbol(4).OutlineColor = moGray
          .Symbol(4).Style = moSolidFill
          .Symbol(4).Color = moGray
        End With
      End If
```

```
      frmMain.mapDisplay.Layers.Add newDataLayer   'Add MapLayer to Layers collection
      Set newDataLayer = Nothing  'Reset newDataLayer to add the next file
    Next j

      Else  'geoSetNewData Is Nothing
        MsgBox "Error connecting to data", vbCritical
        Exit Sub
  End If


  'Refresh link with the map legend
  Call LinkLegend 'In the BasicOperations Module -- links legend control to the map

  'Zoom the Map Display to the full extent
  frmMain.mapDisplay.Extent = frmMain.mapDisplay.FullExtent

  'Get rid of the form that adds data
  frmMoreData.Hide

  'Make it so that the Add Data button is not still pressed
  frmMain.tbrMapControl.Buttons(5).Value = tbrUnpressed

  DataConnectNewData.Disconnect

End Sub
```

frmModel Form

```
Option Explicit
Option Base 0

Private Sub Form_Load()

  'Set the form's position on the screen
  frmModel.Left = frmMain.Left
  frmModel.Top = frmMain.Top

  'Set "none" as the default models selected
  chkHydroNone.Value = 1
  chkEconNone.Value = 1
  chkEcolNone.Value = 1
End Sub

'If the user selects a model, remove the check from "none"
Private Sub chkHydroHSPF_Click()
  If chkHydroHSPF.Value = 1 Or chkHydroModflow.Value = 1 Or _
  chkHydroHydraulics.Value = 1 Then
    chkHydroNone.Value = 0
  End If
End Sub

'If the user selects a model, remove the check from "none"
Private Sub chkHydroModflow_Click()
  If chkHydroHSPF.Value = 1 Or chkHydroModflow.Value = 1 Or _
  chkHydroHydraulics.Value = 1 Then
    chkHydroNone.Value = 0
  End If
End Sub

'If the user selects "none" for a model, remove checks from other models
```

```
Private Sub chkHydroNone_Click()
  If chkHydroNone.Value = 1 Then
    chkHydroHSPF.Value = 0
    chkHydroModflow.Value = 0
    chkHydroHydraulics.Value = 0
    chkHydroNone.Value = 1
  End If
End Sub

'If the user selects a model, remove the check from "none"
Private Sub chkEconTaxChg_Click()
  If chkEconTaxChg.Value = 1 Then
    chkEconNone.Value = 0
  End If
End Sub

'If the user selects a model, remove the check from "none"
Private Sub chkEconLandVal_Click()
  If chkEconTaxChg.Value = 1 Then
    chkEconNone.Value = 0
  End If
End Sub

'If the user selects "none" for a model, remove checks from other models
Private Sub chkEconNone_Click()
  If chkEconNone.Value = 1 Then
    chkEconTaxChg.Value = 0
    chkEconNone.Value = 1
  End If
End Sub

'If the user selects a model, remove the check from "none"
Private Sub chkEcolFish_Click()
  If chkEcolFish.Value = 1 Or chkEcolBugs.Value = 1 Then
    chkEcolNone.Value = 0
  End If

  'if the user selects the fish model, then select the hydro model automatically.
  If chkEcolFish.Value = 1 Then chkHydroHSPF.Value = 1
End Sub

'If the user selects a model, remove the check from "none"
Private Sub chkEcolBugs_Click()
  If chkEcolFish.Value = 1 Or chkEcolBugs.Value = 1 Then
    chkEcolNone.Value = 0
  End If
End Sub

'If the user selects "none" for a model, remove checks from other models
Private Sub chkEcolNone_Click()
  If chkEcolNone.Value = 1 Then
    chkEcolFish.Value = 0
    chkEcolBugs.Value = 0
    chkEcolNone.Value = 1
  End If
End Sub

'When the user has decided what models to run
Private Sub cmdModelingSet_Click()

  If chkHydroHSPF.Value = 1 Then
    frmModel.Hide
    Call MakeHSPFFile
```

```
  End If

  If chkEconTaxChg.Value = 1 Then
    Call CalcSewerDist
    Call CalcWaterDist
    frmModel.Hide
    FrmEconInput.Show
    'The ok button in frmEconInput calls other Econ modeling subroutines
  End If

  If chkEcolFish.Value = 1 Then
    Call EstimateFishHealth
  End If

  Unload frmModel
End Sub
```

frmHelp Form

```
Private Sub Form_Load()
  'Set the form's position on the screen
  FrmEconInput.Left = Screen.Width / 20
  FrmEconInput.Top = Screen.Height / 20
End Sub
```

frmHydroReport Form

```
Private Sub Form_Load()
  'Set the form's position on the screen
  frmHydroReport.Left = frmMain.Left
  frmHydroReport.Top = frmMain.Top
End Sub
```

frmEconInput Form

```
Option Explicit

'This subroutine sends the user out of the Econ Input form and calls subroutines _
 to produce economic results

Private Sub cmdHelp_Click()
  frmHelp.Show
  frmHelp.webHelp.Navigate App.Path & "\HelpFiles\EconInputHelp.html"
End Sub

 Private Sub cmdOK_Click()
  fraEconInputs.Visible = False
  fraMakingSpreadsheet.Visible = True
  Call MakeEconExcelFile 'In EconOperations Module
  fraMakingSpreadsheet.Visible = False
  fraEconInputs.Visible = True
  FrmEconInput.Hide
  frmEconExcelView.Show
  frmEconExcelView.webViewExcel.Navigate App.Path & "\OutputFiles\GovtRevsExps.xls"
End Sub
```

```
Private Sub Form_Load()
  'Set the form's position on the screen
  FrmEconInput.Left = frmMain.Left
  FrmEconInput.Top = frmMain.Top
  'make the status message invisible
  fraMakingSpreadsheet.Visible = False
  '$220/acre, converted to per hectare value.  Source:  Use Value Methodology (Van
Eenoo et al.)
  txtUseAssessAg.Text = Int(220 / 0.404687)
  '$120/acre, converted to per hectare value.  Source:  Use Value Methodology (Van
Eenoo et al.)
  txtUseAssessFor.Text = Int(120 / 0.404687)
  '$2500/acre, converted to per hectare value.  Source:  Use Value Methodology (Van
Eenoo et al.)
  txtUseAssessOS.Text = Int(2500 / 0.404687)
  'Roanoke County Treasurer says mkt value assessment is 100%
  txtMktAssess.Text = 100
  'Roanoke County Treasurer says tax rate is 1.13%
  txtTaxRate = 1.13
  'Default for predevelopment land is 100% assessed at use value
  txtPortionUseBL.Text = 100

End Sub
```

frmEconExcelView Form

```
Private Sub cmdHelp_Click()
  frmHelp.Show
  frmHelp.webHelp.Navigate App.Path & "\HelpFiles\EconSpreadsheetHelp.html"
End Sub

Private Sub Form_Load()
  'Set the position of the form on the screen
  frmEconExcelView.Left = Screen.Width / 60
  frmEconExcelView.Top = Screen.Height / 60
End Sub
```

frmFishReport Form

```
Private Sub cmdHelp_Click()
  frmHelp.Show
  frmHelp.webHelp.Navigate App.Path & "\HelpFiles\FishHelp.html"
End Sub

Private Sub Form_Load()
  'Set the form's position on the screen
  frmFishReport.Left = Screen.Width / 20
  frmFishReport.Top = Screen.Height / 20
End Sub
```