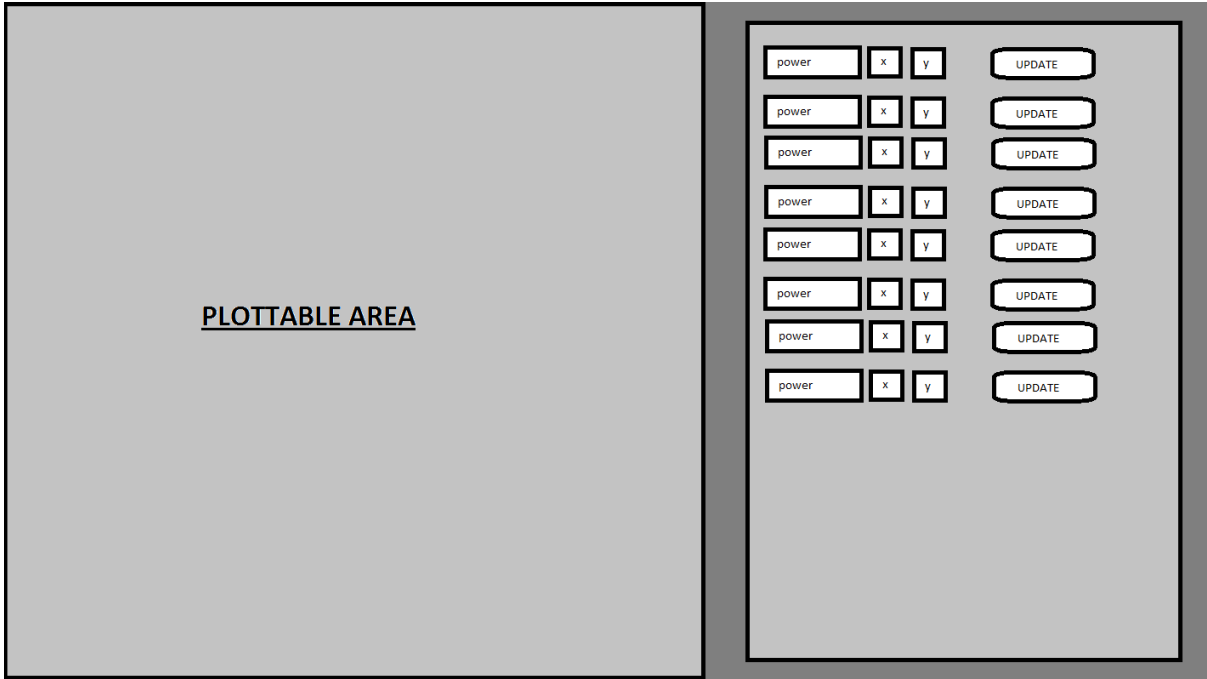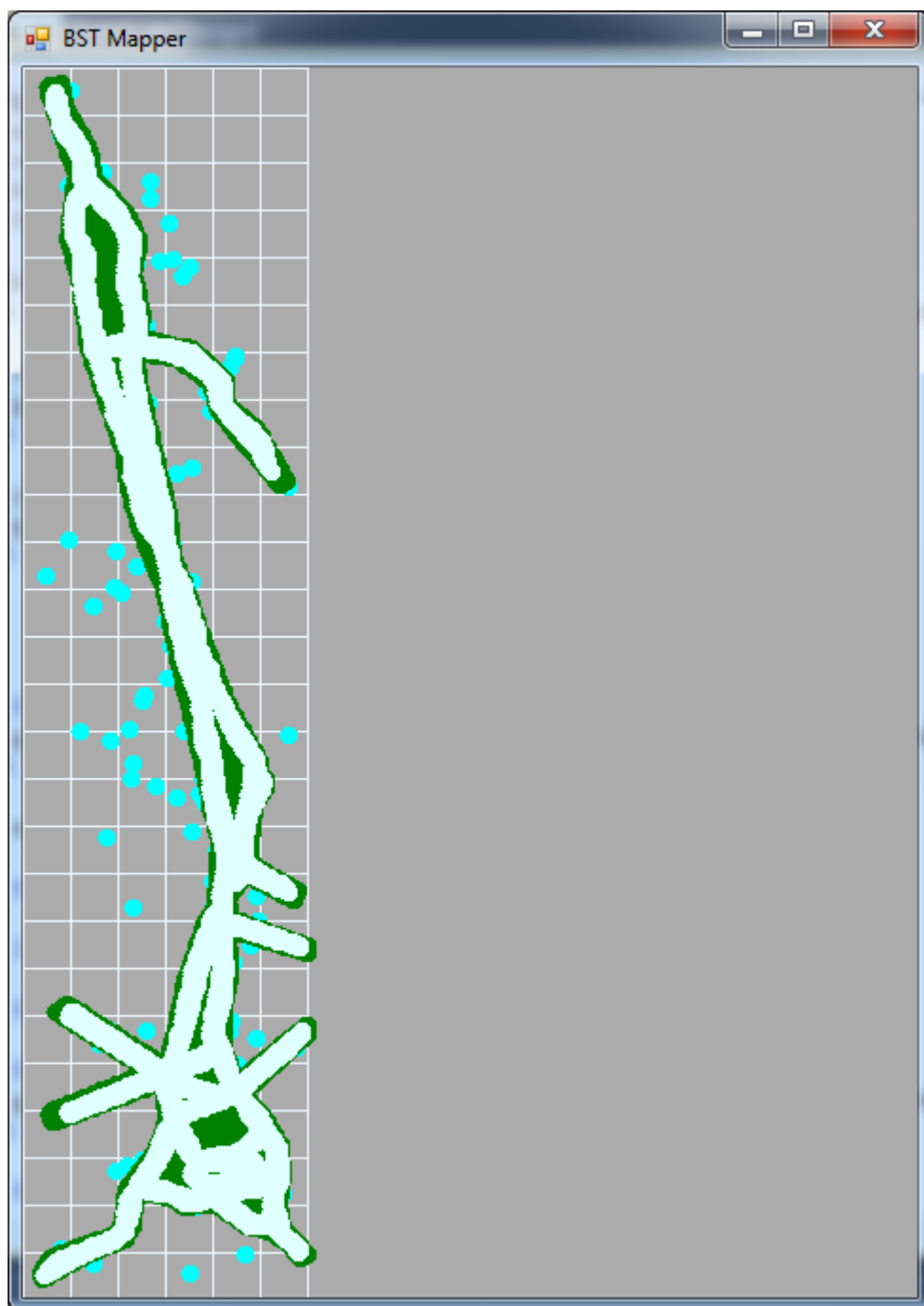# Appendices

Appendix I

Appendix II

Appendix III

<u>Drawing Function</u>

Declare graphics object

Declare pen object

Declare xAxis and yAxis as integers

Declare N as our chosen graph size (in pixels)

Set our pixel offset mode to high speed (to enable faster rendering)

Set spaceCounter for X to 0

Increase spaceCounter by 25 in each iteration stopping at our maxmimum (n)

  Draw lines after each space

Next

Set spaceCounter for y to 0

Increase spaceCounter by 25 in each iteration stopping at our maxmimum (n)

  Draw lines after each space

Next

```
For each basestation item in basestation list
      Draw an ellipse representing basestations
Next

Declare myColour as a brush of any colour

For each servicethreshold item in the servicethreshold list
      If the threshold < -90 then
            Change brush to red
      Else if the threshold >= -90 then
            Change the brush to green
      End if

      Draw an ellipse representing servicethreshold
Next

For each capacity item in capacity list
      Draw an ellipse representing the capacity
Next
```

Appendix IV

```vbnet
Protected Overrides Sub OnPaint(ByVal paintEvent As PaintEventArgs)

    Dim g As Graphics = paintEvent.Graphics
    Dim pen As Pen = New Pen(Color.AliceBlue)
    Dim xAxis, yAxis As Integer
    Dim N As Integer = 150
    Dim ratioY As Integer

    'attempt to optimise painting by adjusting offset mode.
    g.PixelOffsetMode = PixelOffsetMode.HighSpeed

    'calculate y axis relative to x to provide correct aspect ratio
    ratioY = (BaseStation.maximumY - BaseStation.minimumY) / (BaseStation.maximumX - BaseStation.minimumX) * N

    'draw x axis
    For xAxis = 0 To N Step 25
        g.DrawLine(pen, xAxis, 0, xAxis, ratioY)
    Next

    'draw y axis
    For yAxis = 0 To ratioY Step 25
        g.DrawLine(pen, 0, yAxis, N, yAxis)
    Next

    'plot the bast stations
    For Each base_station As baseStationInfo In BaseStation.bstList
        g.FillEllipse(Brushes.Cyan, CInt(base_station.X * N), CInt(base_station.Y * ratioY), 10, 10)
    Next

    'change brush to black
    Dim myColor As Brush = Brushes.Black

    'plot service threshold
    For Each service_threshold As serviceThreshold In BaseStation.sthldList

        If service_threshold.threshold < -90 Then
            myColor = Brushes.Red
        ElseIf service_threshold.threshold >= -90 Then
            myColor = Brushes.Green
        End If
        g.FillEllipse(myColor, CInt(service_threshold.X * N), CInt(service_threshold.Y * ratioY), 10, 10)
    Next

    'plot capacity
    For Each capacity_erlang As capacityErlang In BaseStation.capacList
        g.FillEllipse(Brushes.LightCyan, CInt(capacity_erlang.X * N), CInt(capacity_erlang.Y * ratioY), 10, 10)
    Next

End Sub
```

Appendix V

```vb
Public Shared Sub readNET()
    Dim name, x1, y1 As String
    Dim x, y As Double

    Try
        ' Create an instance of StreamReader to read from a file.
        Dim sr As StreamReader = New
StreamReader(System.AppDomain.CurrentDomain.BaseDirectory & "\network1_0_adam.NET")
        Dim line As String

        ' Read and display the lines from the file until the end
        ' of the file is reached.
        Do
            line = sr.ReadLine()
            'if the line contains NOM, take the first 8 characters and trim from
char ";"
            If line.Contains("NOM = ") Then
                name = line.Substring(8)
                name = name.Trim(";", """")
            End If
            'if line contains x=, store x value in same way
            If line.Contains("X = ") Then
                x1 = line.Substring(5)
                x1 = x1.Trim(";", """")
                x = CDbl(x1)
            End If
            'if line contains y=, store y value in same way
            If line.Contains("Y = ") Then
                y1 = line.Substring(5)
                y1 = y1.Trim(";", """")
                y = CDbl(y1)
                'once y is calculated, we have all the required information we
need.
                'calculate x values relative to data size
                x = ((x - BaseStation.minimumX) / (BaseStation.maximumX -
BaseStation.minimumX))
                y = ((y - BaseStation.minimumY) / (BaseStation.maximumY -
BaseStation.minimumY))
                'add data to base station object
                BaseStation.addBST(name, x, y)
            End If
        Loop Until line Is Nothing
        sr.Close()
    Catch E As Exception
        ' Let the user know what went wrong.
        Console.WriteLine("The file could not be read:")
        Console.WriteLine(E.Message)
    End Try
    BaseStation.printBST()
End Sub
```

Appendix VI

Work Plan

Week 11 12/12/12

1. Finalise PLM file reading.
2. Complete interim report.
o **16/12/2011: Submit interim report for project 87: "Network design"**

Week 12 19/12/12

1. Work on completing the GUI to permit user interaction with sites relating to power.

Week 13 26/12/12

Week 14 02/01/12

1. Finalise GUI.
2. Research algorithms- specifically Simulated Annealing.

Week 15 09/01/12

Exams

Week 16 16/01/12

Exams

Week 17 23/01/12

Exams

Week 18 30/01/12

1. Discuss algorithm and its implementation with supervisor.
   a. Discuss NPM.

Week 19 06/02/12

1. Implement algorithm.

Week 20 13/02/12

1. Test algorithm and ensure it works effectively.
2. Meet with supervisor to demonstrate and obtain opinion.

Week 21 20/02/12

1. Work on GUI once algorithm completed to see if it needs changing/improving.
2. Create testing schedule.

Week 22 27/02/12

1. Test data and document results.
2. Assess if any optimisations are required.

Week 23 5/03/12

1. Optimise application if required.
2. Arrange to meet with supervisor.
3. Meet with supervisor.

Week 24 12/03/12

1. Begin writing final report.
2. Write report.

Week 25 19/03/12

1. Write report.

Week 26 26/03/12

1. Write report.

Week 27 2/04/12

1. Submit draft copy of report.
2. Arrange to meet with supervisor.
3. Meet with supervisor.

Week 28 9/04/12

1. Amend report
2. Resubmit report.

Week 29 16/04/12

1. Arrange to meet with supervisor.
2. Meet with supervisor.
3. Make report changes.

Week 30 22/04/12

1. Finalise report and additional documents.

Week 31 30/04/12

1. Submit report.
   - **4/5/2012: Submit final report for project 87: "Network design"**

Appendix VII