**Green Livelihood System Proposal Documentation (Project Greenscapes)**

**Introduction**

The Green Livelihood System is a comprehensive solution designed to assess the environmental health and sustainability of cities. By deploying sensors in various urban locations, the system collects data on carbon monoxide (CO) and Nitrogen oxide (NOx) levels. Leveraging AI/ML algorithms and Microsoft data analytics tools, the system analyses this data to predict future scenarios, recommend sustainable solutions, and provide insights aimed at achieving carbon neutrality or net-zero carbon emissions. This aligns with Microsoft's commitment to environmental impact reduction, focusing on carbon, water, waste, and ecosystems.

**Key Components**

1. **Sensors**: The system utilizes the Aeroqual Series 500 Portable Monitor. With different sensor heads that can be swapped, this monitor can measure various air pollutants in different settings. It is ideal for urban air quality monitoring and can adapt to different environments. The Series 500 Portable Air Quality Monitor supports up to thirty different sensor heads, covering a range of pollutants (such as PM2.5. PM10, CO, CO2, NO2, VOC, O3, SO2, H2S and more.)
2. **Data Collection and Transmission:**

* Data Storage on Single-board computer: Python scripts on the Single-board computer collect and store data from the Aeroqual Series 500 via USB cables.
* Transmission to Microsoft Azure: Utilizing Azure IoT Hub or Azure IoT Edge, the Single-board computer securely transmits collected data to Microsoft Azure cloud services.

1. **Data Processing and Storage on Azure:**

* Data Storage: Azure SQL Database stores the collected environmental data.
* Real-time Processing: Azure Functions or Azure Stream Analytics process data for real-time insights and analysis.

1. **Data Presentation with Power BI:**

* Connectivity: Power BI connects to Azure data storage to access environmental data.
* Visualization: Power BI dashboards and reports visualize and analyse data trends, anomalies, and insights.

1. **Scaling for Multiple Devices:**

* Device Management: Each Single-board computer-Aeroqual Series 500 combination will be configured with unique identifiers for tracking and management.
* Error Handling: Robust error handling and logging mechanisms ensure data integrity and reliability across multiple devices.

1. **Monitoring and Maintenance:**

* Health Monitoring: Monitoring solutions track the health and performance of Single-board computer devices and Azure services.
* Alerts and Notifications: Alerts notify stakeholders of potential issues or anomalies in data transmission or processing.
* Software Updates: Regular updates and maintenance of software and firmware ensure security and efficiency.

1. **AI/ML Integration**:

* Leverages Microsoft's Azure AI Services for training and deploying AI/ML models.
* Utilizes advanced AI/ML algorithms to process and analyse data collected from the sensors.
* Predicts future scenarios based on historical data and current trends.
* Recommends sustainable solutions such as afforestation, urban area forestry, and transportation infrastructure improvements.

**Benefits**

1. **Environmental Impact**: Helps cities monitor and reduce carbon emissions, contributing to environmental sustainability and climate change mitigation efforts.
2. **Data-Driven Decision-Making**: Empowers stakeholders with actionable insights to make informed decisions about urban planning and environmental management.
3. **Scalability and Flexibility**: Designed for scalability, the system can be deployed in cities of varying sizes and adapted to evolving environmental challenges.
4. **Integration with Microsoft Azure**: Leverages Microsoft Azure's robust cloud infrastructure and AI/ML capabilities for efficient data management and analysis.

**Conclusion**

This Green Livelihood System represents an initiative-taking approach to addressing environmental challenges in urban areas. By combining sensor technology, AI/ML algorithms, and cloud computing resources, the system offers a comprehensive solution for cities striving to achieve carbon neutrality and promote sustainable development.