**High Level Life-Cycle Analysis of a Variable Message Sign from design to final disposal.**

| **Life-Cycle Stage** | **Activity** | **Aspects** | **Impacts** | **Control or Influence** | **Risks** | **Opportunities** | **Operation Control** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Life-cycle stage** | **Example activity** | **Example aspect(s)** | **Example impact(s)** | **Possible considerations for control or influence?** | **Example risks to the organisation** | **Example opportunities for the organisation** | **Examples of actions including operational control or influence** |
| Design Stage | Choice of Materials -  Raw material extraction | Discharges from mining, fuel combustion. [Pollution] | Resource depletion, surface and ground water quality, climate change, air quality | Limited influence form INFRATEC on suppliers’ processes | Unavailability of raw materials and parts due to depletion of natural resources | Securing a source of strategically important materials to ensure business continuity. | Establish environmental requirements in the design process, relating to material use |
| Supply chain | Material/component processing. VMS Enclosure | Material waste,  energy use  Discharges from mining,  fuel combustion, waste generation | Resource depletion  Human toxicity, landfill use, climate change, air quality | Limited influence of suppliers’ processes  Can influence through supplier selection | Cost of part increases  Unavailability of raw materials and parts due to depletion of natural resources | Securing a source of strategically important materials to ensure business continuity | Review resource scarcity vulnerability of supply chain.  Suppliers/contractors preferred to be ISO 14001 certified |
| Supply chain | Part supplier PCB’s LED’s etc | Material waste,  energy use  Filtration of heavy metals, fuel consumption, air emissions, water discharges, water consumption | Resource depletion, air quality, water quality, climate change | No control or influence over design or supplier’s manufacturing methods.  Can influence through supplier selection | Cost of part increases | Reduced cost of part due to more efficient logistics/manufacturing methods | Improved stock control and ordering (reduce occurrence of redundant stock)  Suppliers/contractors preferred to be ISO 14001 certified |
| Assembly /Manufacturing | Waste metal and energy use | Use of resources and climate change | Air quality, climate change, landfill use | Control over Assembly / manufacturing methods. | Reduce resource costs.  Improve production efficiencies | Reduce errors and scrappage | Assembly /Manufacturing control. |
| Transport and delivery | Shipped Road | Combustion of fuel in vehicle, energy use National Highways distribution centres, and disposal of packaging required for shipping | Air quality, climate change, landfill use | Control shipment method through operational controls, transport euro 60 wagons, design of packaging recyclable / re-usable. | Disruption from extreme weather  Increased transport costs from rising fuel costs | Reduce transport costs through efficient ordering.  Positive publicity associated with innovative approach | Work with customers to invest in reusable packaging.  Specify the use of more efficient vehicles and plan for efficient routing |
| End-of-life treatment | Disassembly National Highways Stores | Recycling of metal  components recyclable / re-usable. | Reduction in virgin resource use and contribution to climate change | No control (unless undertaking activity)  Influence through design and information on recyclable / re-usable Metal components | Difficult to recycle composite materials | Increased revenue from being able to offer innovative recycling approach | Re-design parts to allow separation of materials |
| Electrical components held as spares by National Highways and are Re-usable.  Defective Electrical Components are disposed of in compliance with WEEE. | Reduction in virgin resource use and contribution to climate change | No control (unless undertaking activity)  Influence through design and information on recyclable / re-usable Metal components | Difficult to recycle composite materials.  Product unavailable due to non-compliance with WEE legislation. Cost increases | Increased revenue from being able to offer innovative recycling approach | Redesign parts to allow separation of materials |
| Final disposal | Disposal of parts | Landfill of plastic | Loss of finite resources  Impacts from landfill, water pollution, climate change | Influence through design, and information on recycling and reuse.  Influence through design and information | Increased costs associated with landfill.  Restrictions on waste that can be sent to landfill | Increased revenue from being able to offer innovative waste recovery and recycling approaches | Participate in initiatives to increase recyclability.  Implement programme to reuse or recycle individual parts |