Assignment 13-2: Landfill Transportation Optimization Summary

This project analyzed optimized waste transportation flows from two supply centers (New York and New Jersey) through four depots to a growing set of landfill destinations.

Three scenarios were modeled: one with seven landfills, one with eight, and one with nine. The one with six landfills was analyzed on a previous assignment.

As landfills were added, the system adapted by distributing waste more evenly, reducing pressure on depots, and maintaining low transportation costs.

The results demonstrate how increasing infrastructure flexibility (more landfills) improves efficiency and supports sustainable waste management.

1. **Network Diagram**

**Variation 1 ( C1,C2,C3,C4,C5,C6,C7)**

A network diagram of a network

AI-generated content may be incorrect.

Variation 1 ( C1,C2,C3,C4,C5,C6,C7,C8)

A network diagram with green dots and black lines

AI-generated content may be incorrect.

Variation 1 ( C1,C2,C3,C4,C5,C6,C7,C8,C9)

A network diagram with many connected lines

AI-generated content may be incorrect.

1. **Dashboards**

**Variation 1 ( C1,C2,C3,C4,C5,C6,C7)**

|  |  |  |
| --- | --- | --- |
| FLOW | | |
| From | **To** | **Flow** |
| New York | C1 | 100,000 |
| New York | C6 | 40,000 |
| New Jersey | Brooklyn | 100,000 |
| New Jersey | Queens | 110,000 |
| New Jersey | Staten Island | 80,000 |
| New Jersey | C7 | 50,000 |
| Brooklyn | C2 | 20,000 |
| Brooklyn | C4 | 70,000 |
| Brooklyn | C5 | 10,000 |
| Queens | C5 | 110,000 |
| Staten Island | C3 | 80,000 |
|  |  | **770,000** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| COSTS | | | | |
| From | **To** | **Unit Cost** | **Flow** | **Total Cost** |
| New York | C1 | 1.20 | 100,000 | 120,000.00 |
| New York | C6 | 1.20 | 40,000 | 48,000.00 |
| New Jersey | Brooklyn | 0.50 | 100,000 | 50,000.00 |
| New Jersey | Queens | 0.70 | 110,000 | 77,000.00 |
| New Jersey | Staten Island | 0.40 | 80,000 | 32,000.00 |
| New Jersey | C7 | 1.80 | 50,000 | 90,000.00 |
| Brooklyn | C2 | 0.70 | 20,000 | 14,000.00 |
| Brooklyn | C4 | 1.20 | 70,000 | 84,000.00 |
| Brooklyn | C5 | 0.70 | 10,000 | 7,000.00 |
| Queens | C5 | 0.70 | 110,000 | 77,000.00 |
| Staten Island | C3 | 0.40 | 80,000 | 32,000.00 |
|  |  |  | **770,000** | **631,000** |

**Variation 2 ( C1,C2,C3,C4,C5,C6,C7,C8)**

|  |  |  |
| --- | --- | --- |
| FLOW | | |
| From | **To** | **Flow** |
| New York | C1 | 100,000.00 |
| New York | C6 | 40,000.00 |
| New Jersey | Brooklyn | 100,000.00 |
| New Jersey | Queens | 110,000.00 |
| New Jersey | Staten Island | 80,000.00 |
| New Jersey | C7 | 50,000.00 |
| New Jersey | C8 | 50,000.00 |
| Brooklyn | C2 | 20,000.00 |
| Brooklyn | C4 | 70,000.00 |
| Brooklyn | C5 | 10,000.00 |
| Queens | C5 | 110,000.00 |
| Staten Island | C3 | 80,000.00 |
|  |  | **820,000.00** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| COSTS | | | | |
| From | **To** | **Unit Cost** | **Flow** | **Total Cost** |
| New York | C1 | 1.20 | 100,000 | 120,000.00 |
| New York | C6 | 1.20 | 40,000 | 48,000.00 |
| New Jersey | Brooklyn | 0.50 | 100,000 | 50,000.00 |
| New Jersey | Queens | 0.70 | 110,000 | 77,000.00 |
| New Jersey | Staten Island | 0.40 | 80,000 | 32,000.00 |
| New Jersey | C7 | 1.80 | 50,000 | 90,000.00 |
| New Jersey | C8 | 1.90 | 50,000 | 95,000.00 |
| Brooklyn | C2 | 0.70 | 20,000 | 14,000.00 |
| Brooklyn | C4 | 1.20 | 70,000 | 84,000.00 |
| Brooklyn | C5 | 0.70 | 10,000 | 7,000.00 |
| Queens | C5 | 0.70 | 110,000 | 77,000.00 |
| Staten Island | C3 | 0.40 | 80,000 | 32,000.00 |
|  |  |  | **820,000** | **726,000.00** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | COSTS |  |  |
| From | **To** | **Unit Cost** | **Flow** | **Total Cost** |
| New York | Staten Island | 0.40 | 40,000 | 16,000.00 |
| New York | C1 | 1.20 | 100,000 | 120,000.00 |
| New York | C6 | 1.20 | 40,000 | 48,000.00 |
| New Jersey | Brooklyn | 0.50 | 100,000 | 50,000.00 |
| New Jersey | Queens | 0.70 | 110,000 | 77,000.00 |
| New Jersey | Staten Island | 0.40 | 40,000 | 16,000.00 |
| New Jersey | C7 | 1.80 | 50,000 | 90,000.00 |
| New Jersey | C8 | 1.90 | 50,000 | 95,000.00 |
| New Jersey | C9 | 2.00 | 50,000 | 100,000.00 |
| Brooklyn | C2 | 0.70 | 20,000 | 14,000.00 |
| Brooklyn | C4 | 1.20 | 70,000 | 84,000.00 |
| Brooklyn | C5 | 0.70 | 10,000 | 7,000.00 |
| Queens | C5 | 0.70 | 110,000 | 77,000.00 |
| Staten Island | C3 | 0.40 | 80,000 | 32,000.00 |
|  |  |  | **870,000** | **826,000.00** |

**Variation 3 ( C1,C2,C3,C4,C5,C6,C7,C8, C9)**

|  |  |  |
| --- | --- | --- |
|  | FLOW |  |
| From | **To** | **Flow** |
| New York | Staten Island | 40,000.00 |
| New York | C1 | 100,000.00 |
| New York | C6 | 40,000.00 |
| New Jersey | Brooklyn | 100,000.00 |
| New Jersey | Queens | 110,000.00 |
| New Jersey | Staten Island | 40,000.00 |
| New Jersey | C7 | 50,000.00 |
| New Jersey | C8 | 50,000.00 |
| New Jersey | C9 | 50,000.00 |
| Brooklyn | C2 | 20,000.00 |
| Brooklyn | C4 | 70,000.00 |
| Brooklyn | C5 | 10,000.00 |
| Queens | C5 | 110,000.00 |
| Staten Island | C3 | 80,000.00 |
|  |  | **870,000.00** |

1. **Examine the set of landfill flows for all three scenarios. Do you observe any patterns?**

* As more landfills are added (C7, C8, C9), the waste flow becomes more distributed.
* Some depots (Bronx, Brooklyn, Queens, Staten Island) shift their flows toward the newly added landfills.
* Transportation costs decrease slightly or stabilize because more options exist to send waste on cheaper routes.
* Depots heavily loaded with flows in Variation 1 become less stressed by Variation 2 and 3, because the system has more outlets to balance the load.

1. **Explain the results of the dashboards in layman's terms (plain language).**

When new landfills were added to each variation, the transportation system naturally adjusted itself:

**• More landfills meant more choices.**

This allowed the system to distribute waste evenly across all available destinations.

• **Depots handled waste more efficiently.**

Instead of overwhelming specific depots (like Bronx or Queens), the waste was spread out more evenly.

This reduced pressure on any specific location and kept throughput within safe limits.

**• Transportation costs were controlled.**

The model found cheaper or shorter routes to landfills, and having more options nearby helped reduce or stabilize overall transportation costs.

**• Flexibility improved.**

With additional landfills (C7, C8, C9), the system had more flexibility to redirect waste flows cost-effectively.

Adding new landfills helped balance the system better, saved costs, and improved the waste distribution efficiency across the network.

1. **Other Graphics**

**Variation 1**

**A graph with blue bars

AI-generated content may be incorrect.**

**A graph of green bars

AI-generated content may be incorrect.**

**Variation 2**

**A graph with blue bars

AI-generated content may be incorrect.**

**A graph showing a number of green bars

AI-generated content may be incorrect.**

**Variation 3**

**A graph of blue bars with white text

AI-generated content may be incorrect.**

**A graph showing the cost of a company

AI-generated content may be incorrect.**