Beyond 34
Task 1.1:
System Flow
Map Template

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BEYOND 34

PROCESS OVERVIEW

The System Flow Map accumulates the detailed tonnage amounts for material types in the waste and recycling streams for use in the Current State Assessment (CSA). A waste characterization study performed for the municipality would provide the data for the CSA. This task is supported by an Excel System Flow Map Tool, which analyzes the entered tonnage of each specific material category in the waste and recycling material streams. (See B34 System Flow Map Tool provided).

This task aims to detail the physical material flow in the waste and recycling streams and identify the streams that present an opportunity for increased diversion. Upon completing this task, the users will have a tool that will support evaluating their current waste and recycling streams and assessing future opportunities. Figure 1 presents inputs and outputs for this task.
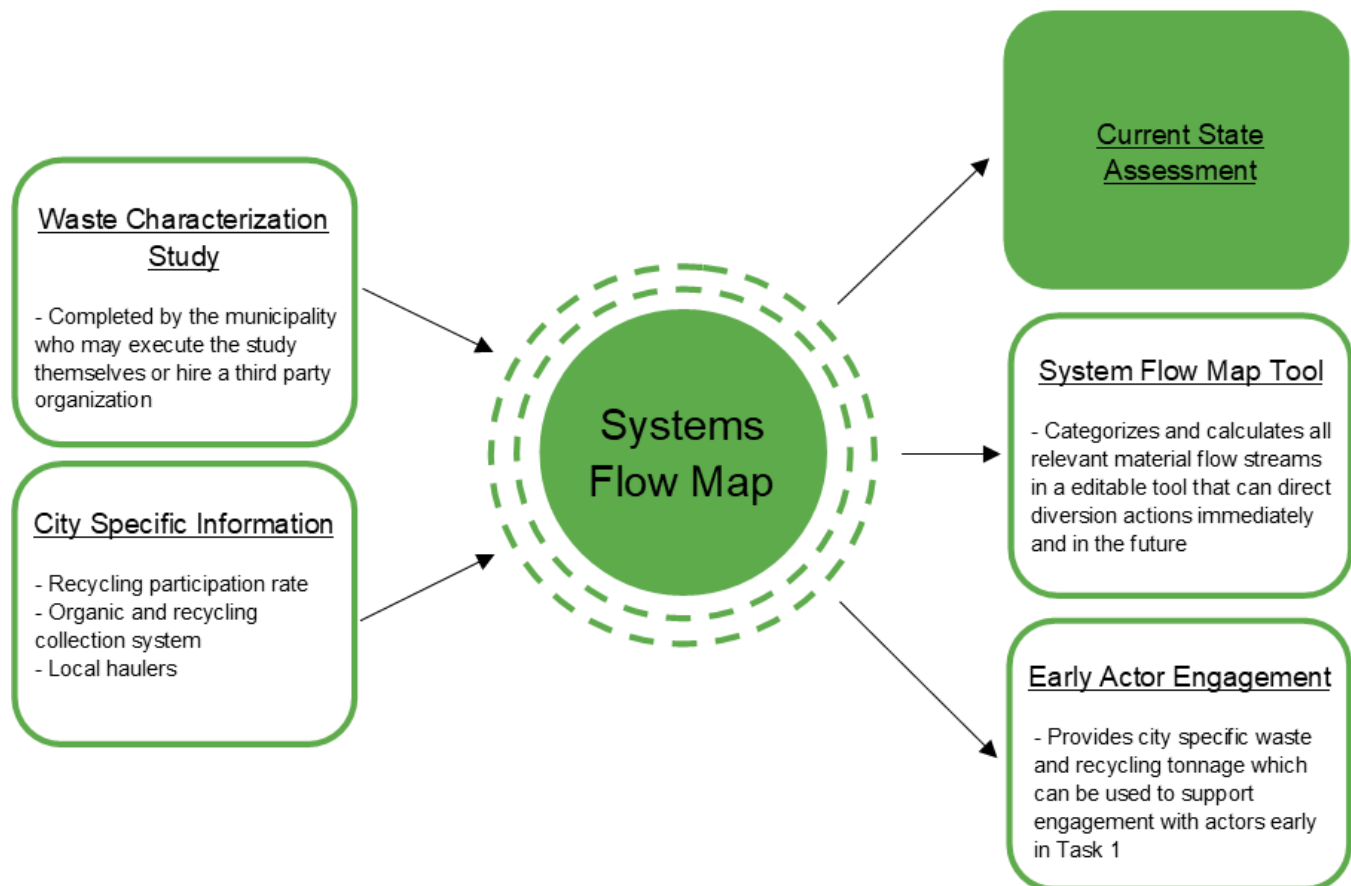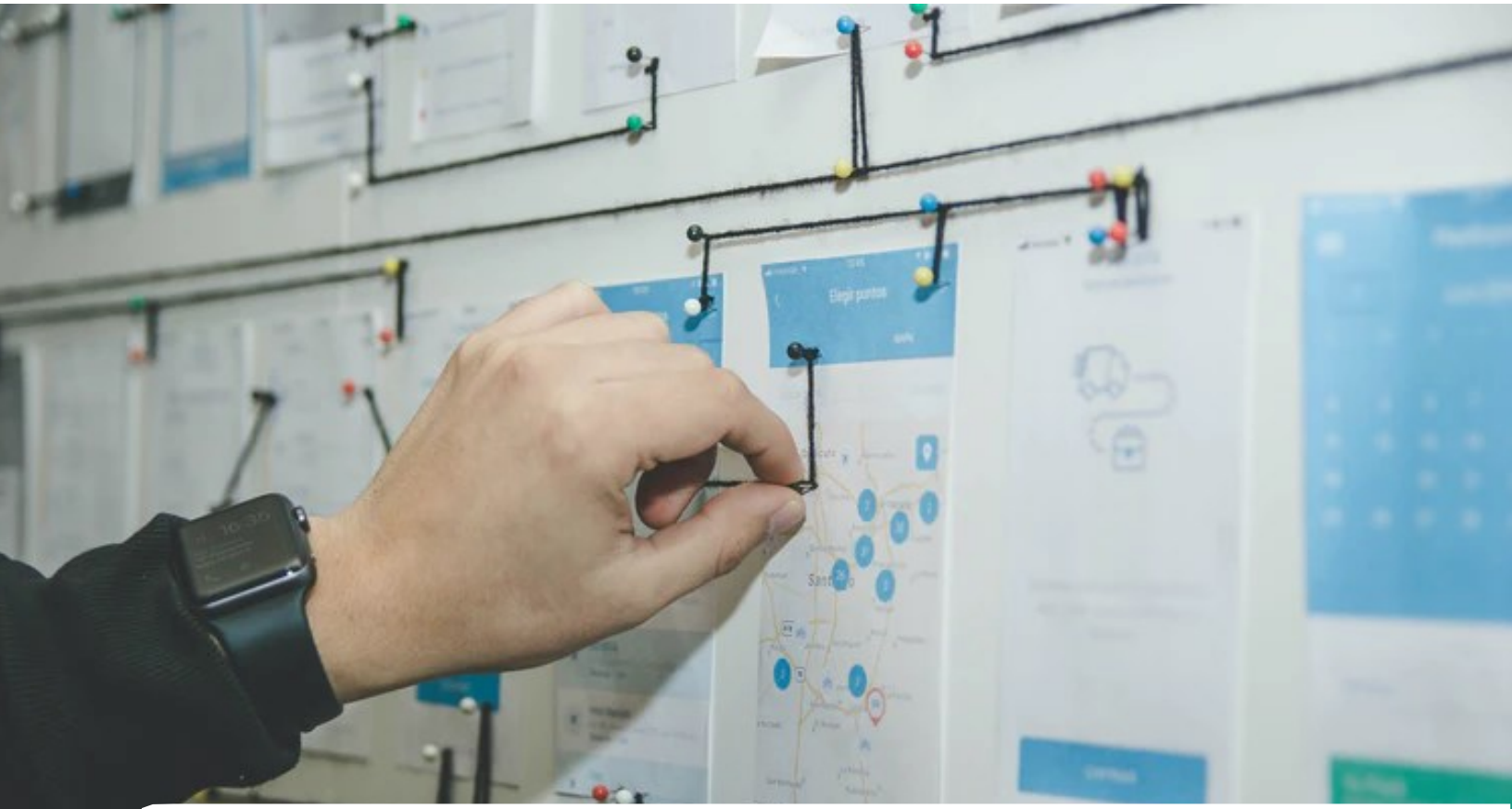

Figure 1: System Flow Map Potential Inputs and Outputs

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SYSTEM FLOW MAP
PROCESS FLOW

✓ Gather necessary data from recent waste characterization, organics diversions, and other diverted streams

✓ Enter data into the Excel B34 System Flow Map Tool

✓ Data analysis based on Current Diversion Rate and the Landfill Capture Rate and the Potential Amount to be Captured for each material category

✓ In the Excel tool, determine Projected Increase in Landfill Capture Rate and validate the Is This Material Divertible? (Y/N) flag for each material category

The System Flow Map Tool is designed to allow basic data entry and material stream analysis. However, it is recommended that someone with a strong knowledge of Excel manage the process as data collection and waste characterizations vary across municipalities, and some manipulation of the Excel spreadsheet may be necessary. If the waste characterization data is not available from local haulers or other sources, a waste characterization will need to be completed.

A methodology for completing a waste characterization study for municipal solid waste has been published by ASTM International in [ASTM D5231-92.3](#)*.*

DATA COLLECTION

Recent waste characterization is necessary along with annual tonnage on any existing organic or other diversion processes. A waste characterization study will generally provide the required detail for this analysis. The waste and recycling streams should be broken down into distinct material categories with consideration given to the necessary level of source separation required for the diversion of each material category.

The B34 System Flow Map tool provides a breakdown of waste and recycling streams and material categories.

EXAMPLES OF MATERIAL CATEGORIES

✓ Cardboard   ✓ Plastic Film

✓ Mixed Paper   ✓ #1 PET Plastic

✓ Textiles   ✓ Ferrous Metals

✓ Food Waste   ✓ Aluminum

✓ Yard Trimmings

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The System Flow Map Tool collects Black (Waste) Bin and Blue (Recycle) Bin data. Diversion of organic material streams is done outside of Black (Waste) Bin and Blue (Recycle) Bin collection systems and are generally not included in a municipal solid waste characterization. If systems exist for organic diversion, diverted volumes for each material stream will need to be included as Amount Diverted for the organic Material Category(s) in the B34 System Flow Map Tool, see Figure 2.
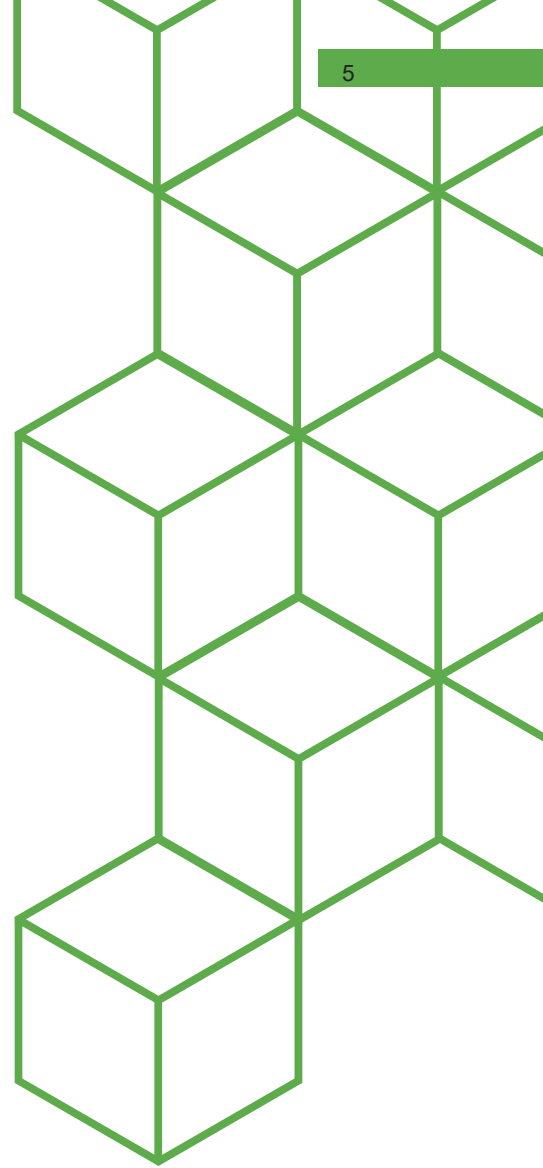
Waste and Recycle Streams	Material Categories	Black (Waste) Bin Data		Blue (Recycle) Bin Data	
		Amount in Landfill	% of LF Material	Amount Diverted	Landfill Capture Rate

Figure 2: Material Category Data Entry

The System Flow Map Tool provides users the ability to enter 'Other Annual Diversion Tons' which is used for other diversion programs tracked outside the waste, recycling, and organic streams, see Figure 3.

Projected Increase in Landfill Capture Rate:	
Other Annual Diversion Tons:	

Figure 3: Other Diversion

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$$\frac{\partial \rho}{\partial t} + \frac{\partial}{\partial x}(\rho u) = 0$$

$$\frac{\partial u}{\partial t} + u\frac{\partial u}{\partial x} = -\frac{1}{\rho}\frac{\partial p}{\partial x}$$

$$\frac{\partial}{\partial t}\left(\frac{p}{\rho}\right) + u\frac{\partial}{\partial x}\left(\frac{p}{\rho}\right)$$

Additional data analysis is possible by entering the desired, or projected, increase in landfill capture rates and selecting which materials are divertible, see Figure 3 and Figure 4. This analysis will calculate a New Diversion Rate based on each divertible material category's potential diversion tonnage amount. It will reveal the material categories that can have the greatest potential impact on increased diversion.

NOTE: Updating the Is this Material Divertible? (Y/N) will override the formula that auto-populates the default value based on existing diversion.

Total Amount Generated	Is This Material Divertible? (Y/N)	Potential Amount to be Captured

Figure 4: Include in Diversion Potential
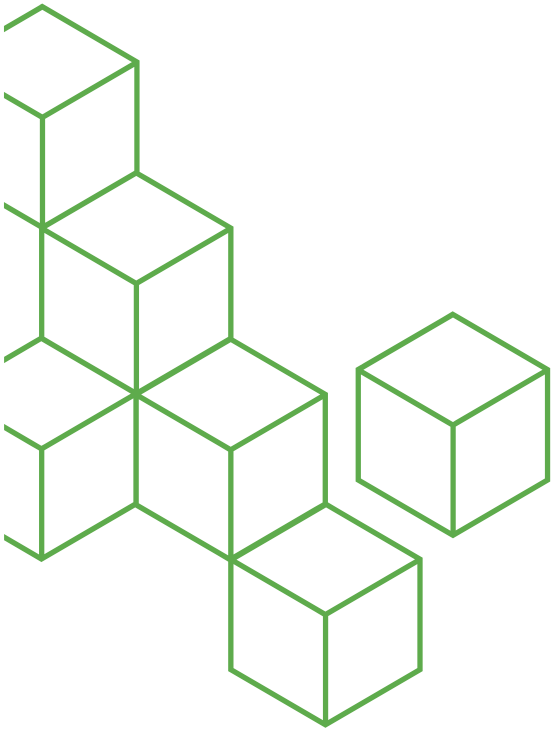
EXCEL SYSTEM FLOW MAP TOOL DATA ENTRY

Data collected will be entered and calculated in the B34 System Flow Map Tool. In general, for all relevant diversion information to be calculated, the user will have to input data into green sections of the System Flow Map Tool. Outputs calculate in the blue sections as the data is entered, showing the potential for increased diversion by material category and total impact on the diversion rate in the municipality.

USER INPUTS IN SYSTEM FLOW MAP TOOL (GREEN IN EXCEL)

- ✓ Waste and Recycling Streams
- ✓ Material Categories
- ✓ Amount of each Material Category Sent to Landfill
- ✓ Amount of each Material Category Diverted
- ✓ Other Annual Diversion Tons
- ✓ Targeted Landfill Capture Rate
- ✓ Is This Material Divertible? (Y/N)

USER OUTPUTS IN SYSTEM FLOW MAP TOOL (BLUE IN EXCEL)

- ✓ Current Diversion Rate
- ✓ Impact to Diversion by Material Category
- ✓ New Diversion Rate
- ✓ % of Landfilled Material
- ✓ Landfill Capture Rate
- ✓ Total Amount Generated
- ✓ Potential Amount to be Captured
- ✓ Impact to Tonnage
- ✓ Updated Landfill Capture Rate
- ✓ Impact to Diversion Rate

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