

# Mobile Vacuum Systems

## FACT SHEET RESIDENTIAL FLAT BUILDING WASTE COLLECTION INFRASTRUCTURE

### Overview

Mobile vacuum systems comprise of a network of underground pipes that transport waste at high speeds from above-ground disposal locations (known as "inlets") to vehicle docking points and then into a collection vehicle. Waste disposed of into the inlets is stored in an underground storage tank until a specialised truck connects to a vehicle docking point and generates vacuum conditions in the pipe system which empties the tanks.



Mobile Vacuum System Illustration

### Technical Information

- Inlets can be stand-alone or wall mounted, and located indoors (with garbage chutes) or outdoors
- Residential inlet chute capacity of 20 to 30 litres (and up to 120 litres for commercial uses)
- System is configurable for multiple fractions, a separate collection vehicle is used for each fraction
- Not suitable for collection of bulky cardboard boxes, other bulky wastes, or large quantities of glass
- Screw tanks are stored below disposal inlets to streamline waste transfer into the pipe system and have a capacity of approximately 200 litres
- Waste collection frequencies depend on waste generation rates, underground storage tank capacities and the collection vehicle capacity
- Vehicle driver operates the transfer of waste through the pipeline and into the truck at the docking point
- Specialised vacuum truck is required for collections. Vacuum trucks have a storage capacity of 13 cubic metres or 8.5 tonnes
- System is cleaned each time a vacuum is generated in the pipe system, with air valves and inspection manholes provided at regular intervals
- Pipes are commonly made out of carbon and steel, composite alternatives are also available
- Maximum transport distance for waste along the pipeline between disposal inlets and docking point of 300 metres
- Pipe diameter ranges from 300 to 500 millimetres and requires a trench depth of up 2.5 metres
- Pipeline can be extended in stages and has a lifetime of 30 years

### Suitable Building Types

Best suited to particular cases where alternative options are not viable and docking points can be located to minimise disruption to public spaces, narrow streets and densely populated areas. Sufficient quantities of waste are needed to ensure that the capital costs of installation and vehicle purchase are feasible relative to business as usual waste collections.

### Education Needs

Residential education to target:

- If disposal inlets are located on the ground level, disposal of smaller bags of waste as residents travel in and out of their building and past disposal inlets
- Disposal of hazardous wastes such as batteries, and bulky wastes such as cardboard boxes, via other residential collection systems
- Source separation of recyclables and disposal of recyclables as loose items (without containment in plastic bags)

Contractors engaged to implement the vacuum system should work with councils to roll out effective education.

This project is a NSW EPA Waste Less, Recycle More initiative funded from the waste levy.

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### Case Studies

This system has been installed within a residential area at **Fort Numerique, France**, in the city of Issy-les-Moulineaux. It has been operational since 2013, has 112 inlets and 54 underground storage tanks, and accepts mixed recyclables and garbage.

The city of **Stockholm in Sweden** has installed this system within a high density residential area comprising 2,050 units. The system manages about 3.5 tonnes of waste per day and collects mixed waste and food organics once a week. There are a total of 180 inlets and 8 vehicle docking points.



Outdoor Inlets in France

Source: Copyright Envac



Specialised Waste Collection Truck

Source: Copyright Envac

### Strengths

- Significantly increased collection efficiency from a centralised collection point rather than multiple collection points along urban streets
- Increased safety for the public with the reduction of stop and start waste collection vehicles given a single collection point
- Improvements to the conditions of living and the aesthetics of an area with reduced vehicle movements from narrow streets and densely populated areas, reduced noise, odour and vermin, and reduced need for bins
- Improved WHS as system operatives are not required to manually handle bins
- Inlets are robust, are unable to be moved or stolen, and are therefore less susceptible to damage than typical bins
- Blockages are not common occurrences and are easily fixed

### Weaknesses

- Mobile hybrid system requires purchase of specialised vacuum trucks, including additional backup truck
- Limited ability to manage sudden changes in waste volumes except through greater collection frequencies
- Significant civil infrastructure works and planning required (can be installed as part of wider civil engineering project)
- Installation in an existing built up area may contribute to congestion of underground utilities
- Significant upfront capital costs to install system
- Requires a power supply at vehicle docking point to operate the vacuum

### Compliance

- Suitably qualified welders are required for pipeline construction to comply with local standards for high pressure water mains and gas pipelines
- Air moved during the operation is cleaned by the specialised truck using activated charcoal filters to mitigate dust and odour nuisance
- Requires assessment against local odour and noise criteria, and local traffic regulation as the mobile truck needs to be docked for a while during collections

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