Designed for Efficiency, Locked Into Constraints

A whole-of-life challenge to direct-to-bin transfer station design

Peter Windley | Senior Waste Consultant

talis consultants

ASSETS | ENGINEERING | ENVIRONMENT | NOISE | SPATIAL | WASTE

Why Sawtooth Makes Sense

Why It Is Attractive

- Simple Customer Action
- Reduced Initial Handling
- Familiar Bin + Fleet System
- Can Suit Small/ Separated Streams

What Still Needs To Be Tested

- Fall + Interface Risk
- Actual Payload/Movements
- Recovery Opportunity
- Whole-Of-Life Cost + Flexibility



A simple first handling step can still create a complex 30-year operating model.

The Design Trap: An Operating Choice Becomes Concrete



Bin Choice



Level Change



Retaining Wall



Bay Geometry



Traffic + Changeover



30 Year Operating Model



Operating-Model Learning

Once active loading or consolidation is required, the need to permanently couple receival, storage and transport should be tested.

De-coupling these functions can open more operating scenarios.

Safety: Design It Out, Or Manage It Forever?

Elevated Public Interface

- Fall exposure
- Awkward bulky items
- Barriers/ wheel stops
- Hook lift bin changeover nearby



Controlled Ground-Level Receival

- Customer unloading separated from plant, processing and Hook lift bin changeover



Design Priority:
Eliminate avoidable fall exposure where reasonably practicable.

The Key Design Feature Is An Intervention Point

Direct to Bin

CUSTOMER LOAD → HOOKLIFT BIN (RORO) → RESIDUAL TRANSPORT → LANDFILL / PROCESSOR

Controlled Receival

RECEIVE → INSPECT → RECOVER → QUARANTINE → CONSOLIDATE → LOAD

Receive + Inspect



See the load • identify risk • intercept value

Consolidate + Load



Control loading • improve payload • separate plant activity

Safety — remove elevated edge

Visibility — see batteries / hazards

Recovery — capture value

Payload — consolidate bulky waste

Know Your Waste Before You Design The Concrete



Waste Composition

- Density
- Recoverables
- Contamination

Customer Profile

- Utes & Trailers
- Commercial Loads

Bulky Material

- Void Creation
- Breakdown Potential

Evidence-Based Design Brief

Customer Interface → Storage/ Sorting → Plant

Loading → Transport → Recovery Markets

Batteries + Hazards

- Frequency
- Interception Needs

Recovery Markets

- What is actually viable

Transport Distance

- Payload
- Haulage
- Logistics Value

Are We Transporting Waste – Or Air?

30m^3 Hook lift Bin – General Waste Examples

1.8 t

No loading

556 Hook lift Bin Movements per 1,000 t



4.5 t

Backhoe

222 Hook lift Bin Movements per 1,000 t



6.5 t

Excavator/ Material Handler

154 Hook lift Bin Movements per 1,000 t

The Value Of A Recovered Tonne Is Bigger Than The Sale Price

- Waste Levy Avoided/Deducted
- Landfill Operating Cost
- Airspace + Deferred Cell Capital
- Transport Benefit
- Reuse/Commodity/CDS

Additional Recovery Cost

- Staff
- Plant
- Storage
- Processing
- Transport
- Rejects

2026-27 Waste Levy

QLD



$135/t metro
$100/t regional

NSW



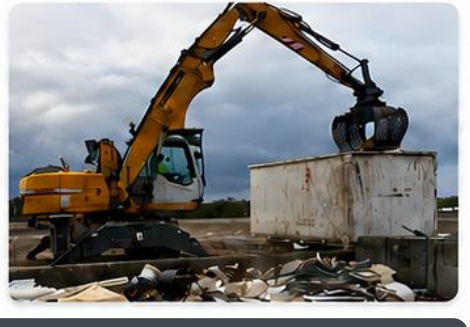
$180.20/t metro
$103.80/t regional

1,000 t Recovery = Gross levy component of $135,000 in metro QLD or, $180,200 in metro NSW

Flat Floor Changes What Becomes Operationally Possible







The important change is not the machine.
It is creating an intervention point.

Staff-Led

Inspect • Recover • Educate

Plant-Assisted

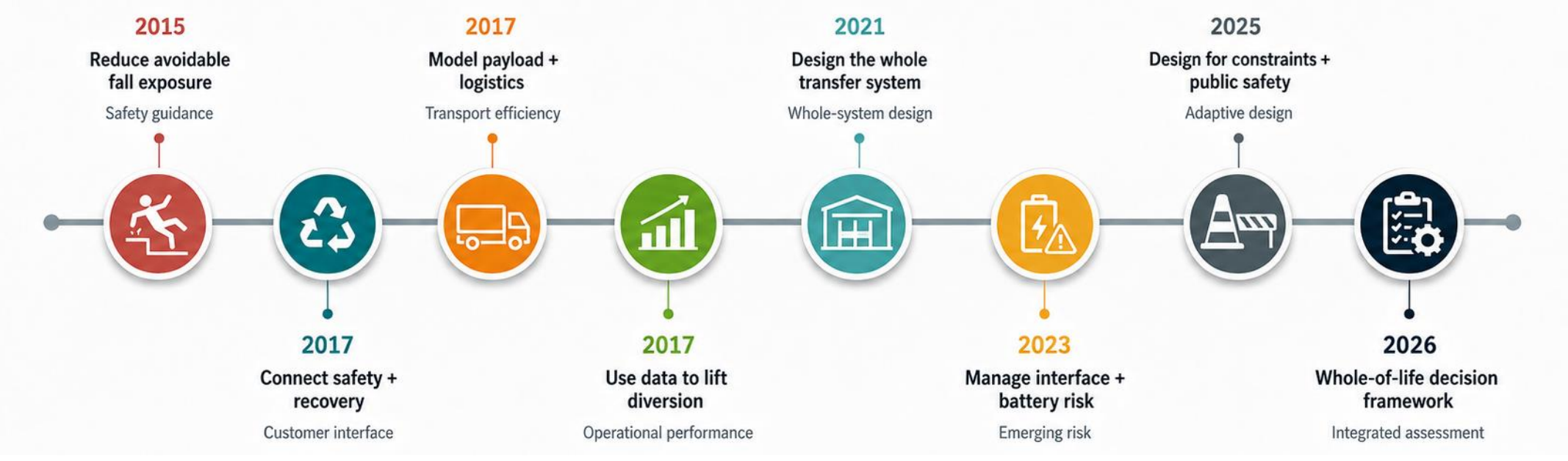
Sort • Consolidate • Load

Hybrid

Modular Receival + Selective Plant

23%	+40%	No Extra
Less Transferred Waste	Tip Shop Recovery	Staff/Hours

What Australian Experience Has Been Telling Us



Capex is Visible. Whole-of-Life Cost is Where the Asset Lives.

Traditional Saw-Tooth



$2-4m
CAPEX Range

$9.6m
Lifecycle Transport

$11.6m
Illustrative Whole-of-life Example at $2m CAPEX

De-Coupled Flat Floor Model



$2-4m
CAPEX Range

$1.8m
Lifecycle Transport

$3.8m
Illustrative Whole-of-life Example at $2m CAPEX

When Direct-To-Bin May Still Be The Right Answer

Direct-to-Bin May Fit



- Low throughput
- Separated/ Controlled streams
- Short Haul
- Good measured payload
- Strong engineered fall control
- Low incremental recovery value

Active Flat-Floor May Fit



- Mixed residual waste
- Meaningful recovery/levy value
- Long haul/poor payload
- Need for inspection/quarantine
- High airspace value
- Ability to isolate public from plant

Modular/ Hybrid May Fit



- Small staged facility
- Need to change gradually
- Variable seasonal demand
- Existing infrastructure constraints
- Selective recovery needs
- Trial before major CAPEX

Talis' Practical Whole-of-Life Decision Framework

Best Practice connects design with how the asset will actually operate for decades

1 RISK + DUTIES



Eliminate What Can be Designed Out.

2 KNOW THE WASTE



Composition, Customers, Hazards, Markets.

3 TEST THE INTERFACE



Customer Unloading, Visibility, Plant Separation.

4 MODEL PAYLOAD + TRANSPORT



Tonnes/ Load, Movement, Kilometers, Costs.

5 VALUE RECOVERY + DISPOSAL



Levy, Airspace, Landfill OPEX, Commodity/ Reuse.

6 PRICE LIFE + FUTURE



CAPEX, OPEX, Flexibility, Stress-Test, Change.

DO NOT DESIGN THE FACILITY AROUND THE BIN



SAFETY
Design out foreseeable hazards

VALUE
Capture the full owner value

FLEXIBILITY
Keep options open for 20-30 years

DESIGN IT AROUND THE WASTE MANAGEMENT OUTCOME.



QUESTIONS

References

Safety + Regulatory

- SafeWork NSW safety alert (2015)
- Fall exposure/safe-design principles

Australian Case Studies

- Toowoomba Regional Council transfer-station case (2017)
- Shoalhaven/Ulladulla Trial material (2017, site-specific)
- Australian council case material

Industry Programs

- WMRR ALTS programs 2021 & 2023
- Later ALTS program material and conference discussion

Levy + Economic Data

- NSW EPA waste levy rates 2026-2027
- Queensland Government waste levy rates 2026-2027
- Historical payload/transport modelling

Operational Evidence

- Operational presentation evidence
- Australian case modelling
- Site-based layout and operating observations

Project Development Inputs

- ALTS 2026 scoping document
- Presentation review and development opportunities
- Research workbook and working notes