THC CONSULTING

VENTURE ASSESSMENT & DIAGNOSTIC SPRINT

D4 — Unit Economics & Financial Model

Full Model — Day 9 Evidence Zone

NorthBridge Freight Solutions

MODEL SHEETS
5
All bias-adjusted

PHASE 2 EXTERNAL SAAS
NO GO — TWO GROUNDS
LTV:CAC 0.78:1 optimistic (gate: 3:1)
Market ~10× too small for Stage 2

PHASE 1 INTERNAL PLATFORM
CONDITIONAL GO
Optimistic misses gate by 3 months
Base/Bear fail structurally

PREPARED FOR	NorthBridge Freight Solutions · CEO, CFO, VP Business Development
SPRINT DAY	Day 9 — Evidence Zone · Full Model
STATUS	Complete — inputs sourced, bias-adjusted, all scenarios modelled
DATE	March 2026 · Confidential
PRACTITIONER	Thomas Calvert, Managing Director · THC Consulting

Model Purpose and Construction Rules

The D4 Unit Economics & Financial Model translates bias-adjusted sprint evidence into a structured financial picture across five integrated sheets. Every input carries a source citation traceable to primary interviews or the D6-T5 Optimism Quantification output. The VP Business Development's pre-sprint figures are preserved as a reference column but are not used as model inputs. The model produces two distinct verdicts: Phase 1 (internal efficiency platform) and Phase 2 (external SaaS for regional freight brokers).

Sheet	Purpose	Verdict Output
1 — Assumptions	Master input table — all bias-adjusted inputs with sources	Feeds all downstream sheets
2 — LTV:CAC Gate Check	Phase 2 unit economics — mandatory methodology gate	Phase 2 NO GO confirmed
3 — Reverse P&L;	Market size sufficiency — required ARR vs. achievable SOM	Market 10× too small confirmed
4 — Three-Scenario Summary	Side-by-side Phase 1 and Phase 2 across three scenarios	Both phases — full verdict
5 — Payback Bridge	Phase 1 month-by-month payback vs. CFO threshold	Payback gate — all scenarios fail

D4 construction rule: Every input in this model shows (a) the source or evidence citation, (b) where applicable the D6-T5 adjustment factor applied, and (c) the bias-adjusted figure used in calculations. Pre-sprint draft figures from the VP Business Development are not usable as D4 inputs and are shown for reference only where relevant to demonstrate the magnitude of required adjustment.

1 Assumptions

Master input table · All figures bias-adjusted · Sources cited per D6-T5 protocol

Customer Acquisition Cost (CAC) — Phase 2 External SaaS

Assumption / Input	Optimistic	Base Case	Bear Case	Source
Sales cycle (months)	6	9	12	Sales lead: 8–12 months to competitor buyer; methodology floor 6 months
Fully-loaded sales rep annual cost ($)	$150,000	$150,000	$150,000	PNW SaaS market benchmark; base + benefits + overhead
Marketing / travel / tools annual ($)	$20,000	$30,000	$30,000	Early-stage SaaS budget estimate
Expected annual closes per rep	2	1.5	1	Derived from sales cycle: 6mo→2 closes/yr, 9mo→1.5, 12mo→1
CAC — used in model ($)	**$100,000**	**$150,000**	**$200,000**	D6-T5 confirmed; rounded to nearest $50K for model clarity

Lifetime Value (LTV) — Phase 2 External SaaS

Assumption / Input	Optimistic	Base Case	Bear Case	Source
Annual Contract Value — ACV ($)	$18,000	$14,000	$12,000	GLG expert (Day 6): $12K–$18K/yr for mid-market. Opt = upper; Base = midpoint; Bear = floor
Annual churn rate	15%	20%	25%	Methodology: 15–25% for Base Case. Elevated vs. SaaS median given competitive sensitivity (CU-01)
Average customer lifetime (years)	6.7	5.0	4.0	Derived: 1 ÷ churn rate
Gross margin	65%	60%	55%	Early-stage SaaS with implementation support. Declines in bear scenario.
LTV ($) — formula: (ACV × GM) ÷ Churn	**$78,000**	**$42,000**	**$26,400**	Standard LTV formula. Churn-adjusted, gross margin applied

Reverse P&L Inputs — Stage 2 Justification

Assumption / Input	Value	Source
Phase 2 incremental build cost ($)	$1,000,000	Engineering Lead Day 3: "+another $1M and 12 months on top of Phase 1". External technical validator independently corroborates.
Investment horizon (months)	36	Methodology standard for SaaS venture justification
Cost of capital	15%	Internal hurdle rate — mid-single-digit net margin business; 15% reflects venture risk premium
3-year annuity PV factor at 15%	2.283	Standard finance: PV annuity factor, 3yr, 15%
D3 SOM — Year 3 optimistic ($)	$45,000	D3 Market Intelligence Brief: 15–24 PNW brokers × mid-market ACV; Year 3 realistic capture

2 LTV:CAC Gate Check

Mandatory methodology gate: LTV:CAC > 3:1 required in Base Case for GO-permissible verdict

The LTV:CAC ratio is the primary unit economics gate for any external commercial venture. The VAD methodology requires LTV:CAC > 3:1 in the Base Case for a verdict of GO or CONDITIONAL GO. A ratio below 3:1 in the Base Case produces a mandatory NO GO on Phase 2, independent of any other findings. All inputs are sourced from the Assumptions sheet and reflect bias-adjusted figures only.

Metric	Optimistic	Base Case	Bear Case	Source / Note
CAC — used in model ($)	$100,000	$150,000	$200,000	D6-T5; see Assumptions sheet
ACV ($)	$18,000	$14,000	$12,000	GLG expert validation; bias-adjusted

Metric	Optimistic	Base Case	Bear Case	Source / Note
Gross margin	65%	60%	55%	Benchmark; see Assumptions
Annual churn rate	15%	20%	25%	Methodology 15–25% range
LTV ($)	$78,000	$42,000	$26,400	Derived: (ACV × GM) ÷ Churn
LTV:CAC Ratio	**0.78:1**	**0.28:1**	**0.13:1**	GATE: must exceed 3:1 in Base Case
Methodology threshold	**3:1**	**3:1**	**3:1**	VAD mandatory gate — GO not permissible below 3:1
Gate result	**FAIL**	**FAIL**	**FAIL**	All three scenarios fail. Phase 2 NO GO confirmed on unit economics grounds independently of CU-01.

GATE CHECK RESULT — CONFIRMED AGAINST LTV:CAC does not reach 3:1 in any scenario. Optimistic Case: 0.78:1. Base Case: 0.28:1. Bear Case: 0.13:1. The external SaaS business model fails the mandatory unit economics gate under every set of modelled assumptions. This finding is independent of CU-01 (competitive channel conflict, confirmed negative). Even if CU-01 were resolved, the unit economics would not support a GO verdict without a fundamental rethink of ACV, pricing model, or cost structure. CU-01 makes CAC effectively infinite under current positioning — this model represents the theoretical best case if channel access were somehow obtained.

3 Reverse P&L

What external ARR is required to justify Stage 2 investment?

The Reverse P&L; answers a single question: given Stage 2 build cost and the cost of capital, what annual ARR must the external market generate to justify the investment? The answer is compared against the D3 Market Intelligence Brief's achievable Year 3 SOM. The gap between required and achievable constitutes the second independent structural ground for the Phase 2 NO GO verdict.

Input	Value	Note
Phase 2 incremental build cost ($)	$1,000,000	Engineering Lead confirmed; external technical validator corroborated
Investment horizon (months)	36	Methodology standard
Cost of capital (annual)	15%	Internal hurdle rate with venture risk premium
3-year annuity PV factor at 15%	2.283	Standard PV annuity factor: 3yr, 15%
D3 SOM — Year 3 achievable ARR ($)	$45,000	D3 Market Intelligence Brief; 15–24 PNW brokers Year 3 optimistic

Required ARR Calculation

Item	Amount	Method
Required ARR — simple payback ($/year)	$333,333	Stage 2 cost ÷ horizon in years (no TVM)
Required ARR — NPV-adjusted ($/year)	$438,020	Stage 2 cost ÷ 3yr annuity PV factor at 15% — NPV-correct operative figure
D3 SOM Year 3 — achievable ARR ($)	$45,000	From D3; optimistic Year 3 scenario
Gap: Required ARR minus achievable SOM ($)	**$393,020**	NPV-adjusted required ARR minus achievable SOM
SOM as % of required ARR	10.3%	Achievable SOM as fraction of what is required to justify Stage 2
How many times too small is the SOM?	**~10×**	Required ARR ÷ SOM — how far does the market fall short?

REVERSE P&L; VERDICT — MARKET IS STRUCTURALLY UNDERSIZED FOR STAGE 2 To justify a $1M Stage 2 investment at a 15% cost of capital over 36 months, the venture requires approximately $438K in annual external ARR. The D3 Market Intelligence Brief puts the Year 3 optimistic SOM at ~$45K annually — roughly one-tenth of what is required. The market is approximately 10× too small to justify Stage 2 under any reasonable return threshold. This is the second independent structural failure of the Phase 2 thesis: (1) CU-01 confirms no channel access. (2) Reverse P&L; confirms the market cannot generate sufficient ARR even if channel access were obtained. Both failures are structural, not executional.

4 Three-Scenario Summary

Phase 1 and Phase 2 unit economics side-by-side across Optimistic, Base Case, and Bear Case

The Three-Scenario Summary consolidates all model outputs into a single decision-ready view. Phase 1 and Phase 2 verdicts are presented in parallel. The scenario columns reflect Optimistic (best-case assumptions), Base Case (Engineering Lead's honest estimate), and Bear Case (ML hire slips, adoption resisted). All inputs sourced from the Assumptions sheet.

Phase 1 — Internal Efficiency Platform

Metric	Optimistic	Base Case	Bear Case	Verdict Implication
Build cost ($)	$2.0M	$2.25M	$2.5M	Engineering Lead revised estimate; external validator 30–40% bias adjustment applied
Build duration (months)	12	18	24	Honest estimate: 18mo. 12mo requires all preconditions met simultaneously.
Annual savings at full adoption ($)	$1.95M	$1.30M	$0.975M	Bias-adjusted: 1.0× / 1.5× / 2.0× per methodology
Adoption ramp to full savings	6mo linear	12mo S-curve	12mo+ S-curve	External validator: adoption is an identity problem, not a training problem. 6mo assumption is optimistic floor.
Net position at Month 24 (CFO gate)	**-$456K**	**-$2.18M**	**-$2.5M**	Payback Bridge — no scenario meets the 24-month threshold
Actual payback month	Month 27	Not by Month 36	Not by Month 36	Optimistic misses by 3 months. Base/Bear fail structurally.
Phase 1 verdict	**CONDITIONAL**	**CONDITIONAL**	**CONDITIONAL**	GO requires CFO threshold flexibility OR CEO override. Three governance conditions must carry named owners.

Phase 2 — External Broker SaaS

Metric	Optimistic	Base Case	Bear Case	Verdict Implication
CAC ($)	$100K	$150K	$200K	D6-T5 Optimism Quantification; methodology 2–3× client estimate
ACV — annual contract value ($)	$18K	$14K	$12K	GLG expert validation (Day 6): $12K–$18K/yr for mid-market broker
Annual churn rate	15%	20%	25%	Methodology: 15–25% for Base Case. Elevated given competitive sensitivity.
Gross margin	65%	60%	55%	Early-stage SaaS with implementation support
LTV ($)	$78K	$42K	$26K	Formula: (ACV × GM) ÷ Churn
LTV:CAC ratio	**0.78:1**	**0.28:1**	**0.13:1**	GATE: must exceed 3:1 in Base Case for GO-permissible verdict

Metric	Optimistic	Base Case	Bear Case	Verdict Implication
Gate threshold	**3:1**	**3:1**	**3:1**	VAD mandatory methodology gate
Gate result	**FAIL**	**FAIL**	**FAIL**	All scenarios fail. Phase 2 NO GO confirmed on unit economics grounds.
Required ARR to justify Stage 2 ($)	~$438K/yr	~$438K/yr	~$438K/yr	NPV-adjusted at 15% cost of capital; see Reverse P&L; sheet
D3 SOM Year 3 achievable ARR ($)	~$45K/yr	~$45K/yr	~$45K/yr	15–24 PNW brokers at mid-market ACV — optimistic Year 3
Market sufficiency gap	**~10×**	**~10×**	**~10×**	Required ARR ÷ SOM. Market cannot generate required return.
Phase 2 verdict	**NO GO**	**NO GO**	**NO GO**	Two independent structural failures: (1) CU-01 channel conflict. (2) Market too small.

One-Sentence Economics Verdict by Scenario

Scenario	Verdict
Optimistic Case	Phase 1 internal platform misses the CFO's 24-month payback gate by 3 months under best-case assumptions; Phase 2 external SaaS LTV:CAC of 0.78:1 fails the unit economics gate on every input, and the market is 10× too small to justify Stage 2 investment.
Base Case (Engineering Lead's honest estimate)	Phase 1 payback fails structurally — $2.18M negative at Month 24 with savings not meaningfully realized until Month 20+; Phase 2 LTV:CAC of 0.28:1 confirms the external thesis is economically inviable independent of channel access.
Bear Case (ML hire slips)	Zero internal savings realized at Month 24 — build not complete; Phase 2 LTV:CAC of 0.13:1 represents a near-total destruction of invested capital on the external thesis; the venture should not proceed without threshold changes from the CFO or a fundamental pivot.

5 Payback Bridge

Phase 1 build cost vs. savings — month-by-month · CFO 24-month payback gate analysis

The Payback Bridge tests the Phase 1 investment case against the CFO's stated 24-month payback threshold. The bridge carries confirmed findings from the Day 5 preliminary model, updated with Engineering Lead revised cost inputs and the D6-T5 bias-adjusted savings figures. Assumption A051 — that the 24-month gate is achievable — is tested and closed here.

Carried from Day 5 Preliminary Model — confirmed findings. No scenario meets the CFO's 24-month payback threshold. A051 CONFIRMED NEGATIVE — CLOSED. All inputs from Assumptions sheet.

Scenario	Build Cost	Net Position — Month 24	Payback Month
Optimistic (12mo build, no bias adj., 6mo linear adoption)	$2.0M	**-$456,250**	Month 27 — misses by 3 months
Base Case (18mo build, 1.5× bias adj., 12mo S-curve adoption)	$2.25M	**-$2,181,539**	Not reached by Month 36
Bear Case (24mo build, 2× bias adj.)	$2.5M	**-$2,500,000**	Not reached by Month 36 — build not complete

Phase Decomposition — Build Timeline and Savings Ramp

Phase	Duration	Savings Generated	Notes
Phase 1A — Data engineering + normalization	9–15 months	$0	Critical path prerequisite; no platform running; no savings possible
Phase 1B — ML build + model training	6–9 months	$0	Requires Phase 1A completion; sequential not parallel
Phase 1C — Deployment + dispatcher adoption	3–6 months	Ramping	Adoption ramp begins; savings start accruing; adoption pace determines Year 1 actual
Post-deployment — full operation	Ongoing	Full run-rate	Full savings realized only after adoption ramp completes (6–12+ months)

Payback Timeline — Visual Summary

Month Range	Optimistic	Base Case	Bear Case
Months 1–12	Phase 1A/1B build $0 savings	Phase 1A build $0 savings	Phase 1A build $0 savings
Months 13–18	Phase 1C deploy Ramp begins	Phase 1B build $0 savings	Phase 1A continues $0 savings

Month Range	Optimistic	Base Case	Bear Case
Months 19–24	Full operation Savings accruing	Phase 1C deploy Ramp begins	Phase 1B build $0 savings
Month 24 status	**-$456K vs. gate**	**-$2.18M vs. gate**	**-$2.5M vs. gate**
Payback achieved	Month 27 (3 months late)	Not by Month 36	Not by Month 36

STRUCTURAL FINDING — A051 CONFIRMED NEGATIVE The 24-month payback threshold is structurally unachievable under any modelled scenario. This is a function of timeline × adoption ramp × CFO gate — not executional failure. Meeting the CFO's threshold requires: build cost ≤$1.5M AND build duration ≤10 months AND immediate full adoption from Month 1. None of these conditions are supported by evidence. The Phase 1 CONDITIONAL GO verdict is not a payback verdict — it is a strategic sufficiency verdict. The investment case survives the evidence test on the grounds that (a) the internal use case is real and independently validated, (b) the data moat is genuine and unreplicable by external competitors, and (c) savings are real but back-loaded beyond the CFO's stated gate. Whether the CFO adjusts her threshold or the CEO overrides on strategic sufficiency grounds is the operative decision at Day 14.

D4 Model — Verdict Summary

Phase	Verdict	Grounds
Phase 1 — Internal Efficiency Platform	**CONDITIONAL GO**	Investment case survives on strategic sufficiency. Payback misses CFO gate under all scenarios. GO requires three governance conditions to carry named owners and written commitments by Day 14. If any condition cannot be met, verdict moves to NO GO.
Phase 2 — External Broker SaaS	**NO GO**	Two independent structural grounds, either sufficient alone: (1) LTV:CAC fails 3:1 gate in all three scenarios — 0.78:1 optimistic, 0.28:1 base, 0.13:1 bear. (2) Market is ~10× too small to justify Stage 2 investment — $45K achievable SOM vs. $438K required ARR.

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