Intrax
LAND

# Land-Lease Communities

## How early ground truth delivers staging certainty, cost control and faster delivery

A market outlook and capability paper for land-lease operators (east coast Australia)



**PREPARED BY INTRAX**

**Site Due Diligence, Survey, Geotechnical, Civil, Structural and Construction QA**

**20 November 2026**

# Contents


| Section | Page |
|---|---|
| Executive summary | 4 |
| 1 Market context | 5 |
| 2 LLC delivery reality | 10 |
| 3 Risk stack for operators | 16 |
| 4 The Intrax capability proposition | 18 |
| 5 Case studies | 23 |
| 6 Operator playbook | 35 |
| 7 Conclusion | 38 |
| Contact | 40 |
| 8 Selected sources | 41 |




# Executive Summary

Early investigation and coordinated earthworks and foundation design can reduce avoidable cost and give developers a stronger basis for contingency.



# Executive Summary

The highest-leverage financial control points in a land-lease community (LLC) program are early in the project lifecycle, well before bulk earthworks and foundation packages are committed. LLCs are scaling rapidly as affordability pressures and demographic tailwinds drive demand for lower-entry-price downsizer housing, and institutional capital is following.

For developers and operators, repeatable delivery depends on ground conditions as much as home construction. A builder pricing Class M who is delivered Class H1 commonly absorbs a further $8,000 to $18,000 per slab, which can easily cost $1m over a modest 100-site stage.

This paper argues for optimising ground conditions rather than accepting them: target a realistic AS 2870 classification at due diligence, then implement a designed earthworks strategy estate-wide, verified at defined hold points.

For Client B, a 213-lot estate in Victoria, testing structural options before slab footing design yielded $678,000 (15.6%) savings from a $4.3M construction cost base, over $3,000 per lot. For Client C, a 106-site community in South-east Queensland, a stage-wide investigation cut design surface movement by approximately 45% and moved seven of the 12 lots assessed to an H2 base classification.

The Productivity Commission (2025) found Australia completes half as many homes per construction hour as in 1995, pointing to a fragmented industry that treats each project as a one-off. One consistent ground model, a target classification and verified hold points mean each stage inherits proven inputs and rework falls. Section 6 sets out six steps operators can take now.

The concepts also apply to individually titled land development: this paper is about better outcomes where cost variations are anticipated and controlled through agreed engineering pathways.



1

# Market context: why LLC is scaling now

1.1 DEMAND TAILWINDS: AFFORDABILITY + DEMOGRAPHICS
1.2 INSTITUTIONALISATION AND CONSOLIDATION
1.3 BENCHMARKING AND DATA-DRIVEN FEASIBILITY

1.1

# Demand tailwinds: Affordability + demographics

Land Lease Communities (LLCs), also described as lifestyle communities, residential parks or manufactured home estates, are increasingly positioned as a housing solution for “rightsizers” and downsizers who want a modern home without purchasing the underlying land.

Market research highlights strong demographic drivers and growing penetration expectations for LLC living compared with other seniors housing formats, underpinned by growth in the 65+ cohort and the need for lower-cost housing choices.

Future iterations of these typologies may extend to a wider demographic, ultimately assisting affordable housing opportunities. This is subject to a traditionally slow-moving regulatory and legislative framework.

**65+**

A growing demographic driving demand



Sources: Property Australia (2026); CBRE (2025); NSW Government (2025).

1.2

# Institutionalisation and consolidation

The sector is attracting institutional and JV capital and is becoming more operationally sophisticated. Boards and investment committees are demanding tighter evidence on cost, schedule, compliance and consumer protections, and are increasingly sensitive to reputational risk. Operators that can demonstrate repeatable delivery and defensible governance are best placed to scale.

The Productivity Commission found Australia is completing half as many homes per hour worked as it did in 1995, with housing construction labour productivity down 12% while the broader economy rose 49%. This points to a fragmented industry that treats each project as a one-off.

McKinsey & Company reports modular programs accelerating timelines by 20–50%, with construction-cost savings above 20% available to developers that achieve scale and repeatability, while German analysis of repeatable residential development found savings of 10–30% and 56% of institutional investors surveyed in 2025 expected higher returns from serial and modular projects. Standardised workflows and QA are also associated with lower defect rates and warranty provisions. The gains are not automatic: off-site manufacturing is not universally cheaper and state-by-state approvals still add duplication, but a repeatable product is easier to underwrite, build and operate.

For LLC operators, the home is only half of the repeatable product. Standardised home designs deliver these gains only when the ground beneath them is equally predictable: consistent site classification, standard pad and footing details, and an estate-wide earthworks strategy that holds across every stage.

**20–50%**
Potential modular schedule reduction

**20%+**
Potential modular cost saving

**12%**
Housing productivity decline

**49%**
Wider-economy productivity growth

Sources: Productivity Commission (2025); Bertram et al., McKinsey & Company (2019); Patel (2026); Australian Building Codes Board (2024).

1.3

# Benchmarking and data-driven feasibility

As LLC programs scale, benchmarking of development costs reinforces the importance of early, site-specific data. The feasibility delta is most influenced by earthworks balancing, services complexity, ground treatment assumptions and staging/mobilisation efficiency. These drivers are heavily determined by early survey control, geotechnical understanding and integrated civil/structural decision-making.

The goal is a target AS 2870 site classification outcome: an estate-wide earthworks strategy that turns problem sites into a known entity, buildable at Class M to H2 conditions, so foundation costs are designed once rather than discovered and managed lot by lot.

AS 2870 site classification is one of the biggest single drivers of foundation cost, because it sets both the slab system and whether engineered design is needed. Class S, M and lower-end sites can use the prescriptive designs in the ABCB Housing Provisions. Class H1, H2, E and P sites fall outside those standardised design tables and require a footing system designed by a structural engineer, with edge beams on H2 stiffened rafts commonly deeper than 600 mm.

Peer-reviewed Australian research using Rawlinsons cost data also confirms that the cost and performance advantages of lighter slab systems narrow on highly reactive sites.

Source: Teodosio et al. (2023), Journal of Building Engineering.



1.3 (continued)

# The contingency risk

Indicative 2026 industry pricing (slab only, ex-GST) reflects the step change in design. Each step up the reactivity scale typically adds 10–25%, and a Class H site commonly adds 15–30% more than an equivalent Class M design.

The contingency risk sits in the gap between assumed and actual classification. Builders pricing against Class M who later find Class H1 commonly absorb an additional $8,000–$18,000 per slab, after margins are set. Across a 100-site LLC stage that is $0.8M–$1.8M of exposure.

Intrax's own 213-lot assessment (Section 5.1) shows a similar fiscal impact from the other direction: foundation cost fell from about $15,900 per lot at Class E to about $9,100 per lot once controlled fill lifted the ground to H1/H2. Fixing the target classification at due diligence, and designing earthworks to deliver it, is what turns this variable into a controlled cost.

This is not the fault of any one party in the process, but rather the structure of AS 2870, which allows a moving soil classification over the lifecycle of any one land development.

**$65–$90**
per m², conventional slab on a Class S site

**$90–$180**
per m², waffle or stiffened raft on Class M

**$150–$240**
per m², slab on a Class H1/H2 site

**$0.8M–$1.8M**
exposure across a 100-site LLC stage

# 2

# LLC delivery reality: why early ground truth matters

2.1 LONG-LIFE ESTATES AMPLIFY EARLY DECISIONS
2.2 THE “POINT OF NO RETURN” FOR EARTHWORKS AND FOUNDATION COSTS
2.3 CONSUMER TRUST AND REGULATORY EXPECTATIONS

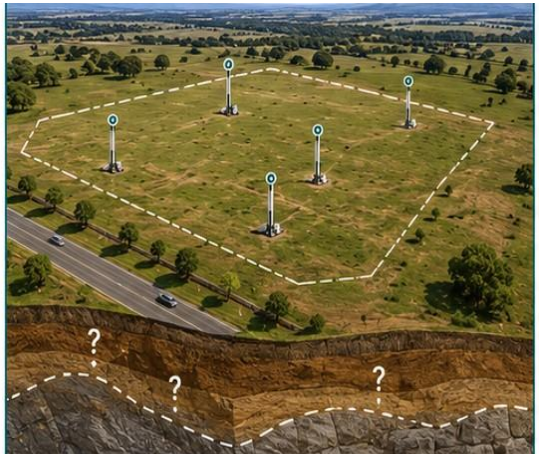
2.1

# Long-life estates amplify early decisions

Unlike single-stage subdivisions, LLCs are delivered across multiple stages and years. Early assumptions are often carried forward, reused and relied upon across successive releases.

Where early ground models are incomplete or conservative, operators can inadvertently lock in unnecessary excavation, treatment and remobilisation that can compound across stages. The result is compounding earthworks and foundation cost, eroded contingency, escalating preliminaries and avoidable program volatility.

## The right investigation at the right time




**Acquisition and due diligence**

Identify ground risks and earthworks feasibility. Scope the investigations needed for the investment decision.



**Civil design**

Confirm levels, cut and fill, drainage and foundation assumptions before construction commitments.



**Construction**

Verify delivered conditions through inspections, testing and defined hold points.

*Figure 1: Investigation and verification through the development lifecycle*

2.2

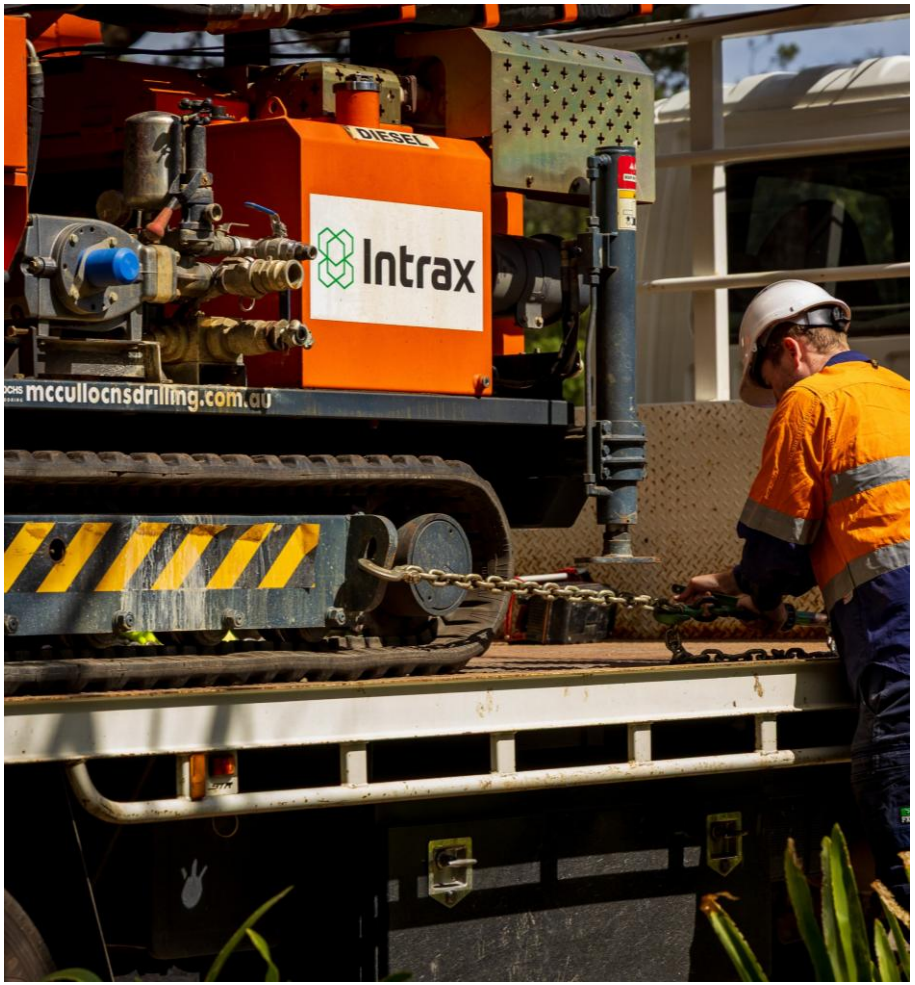
# The “point of no return” for earthworks and foundation costs

Once bulk earthworks, pavements and major services packages commence, earthworks and foundation costs (and the contingency needed to cover them) are largely locked in, along with any plant mobilisation inefficiency. The highest-leverage intervention is earlier, at due diligence, master planning and civil concept design, when options are still flexible and generally low-cost to change. Early ground truth is best understood as a program control mechanism, not a compliance step.

Site classification is not only something a site has; within limits, it is something an estate can be designed to achieve. The Australian Geomechanics Society notes that earthworks may alter a site’s classification, and AS 3798 (earthworks for residential and commercial developments) applies from single lots through to broadacre subdivision. Master-planned estates routinely rely on this, placing controlled fill under AS 3798.

AS 3798 is a guideline standard for the preparation of a specification that governs the supervision and placement of earthworks during subdivision construction. However, the outcome is only as good as the operational delivery of the works.

Intrax’s 213-lot assessment (Section 5.1) shows the financial outcome of sound management and thorough supervision, where controlled, non-reactive fill was deployed to elevate the estate from a problematic Class E to a desirable and achievable H1/H2, removing the requirement for slab piering altogether.



# Lessons from Jordan Springs East

**800+**

Properties given notations by Penrith City Council

**50+**

Homes bought back by the developer, some demolished

**A well-known case of poor geotechnical outcomes is Jordan Springs East in western Sydney, where parts of the estate were found to be sinking from poor compaction earthworks, causing major cracks and defects in homes.**

Penrith City Council determined the developer had not established that certain lots contained controlled fill, and earthworks in substantial parts of the precinct were not undertaken to the requirements guided by AS 3798. Under AS 2870, lots with more than 400 mm of fill default to Class P (problem sites).

The classification should have been determined and engineered at the earthworks stage instead of managed at construction. The lesson is not that fill fails, but that fill can fail when the developer and consultant team do not carefully supervise and manage classification delivery, from specification through to certification.

Sources: ABC News (29 Jan 2024), Owners fear more damage to homes over bulldozing fix at "sinking" western Sydney suburb; Penrith City Council (2021), Jordan Springs East.

## Setting a target classification at due diligence takes three parties working together.

**Geotechnical engineer and civil designer:** specify fill material, reactivity limits and moisture conditioning, and carry out Level 1 supervision. Compaction certification assures density, not reactivity.

**Structural engineer:** confirms the footing system and standard required to suit the target class.

**Builder or home manufacturer:** applies base slab pricing, typically set by standard classifications. A Class M waffle pod is the standard product in many growth corridors, so deviation exposes the builder to unforeseen costs.

Aligning class expectations before bulk earthworks lets the team agree a buildable classification per lot or precinct, fix pricing upfront and hold it through later stages.

**Three Parties**






2.3

# Consumer trust and regulatory expectations

LLC delivery is not only influenced by engineering decisions but by State-based regulations and requirements that may impose disclosure and consumer protection obligations.

Operators benefit when project teams integrate technical evidence with documentation readiness, so that what is promised at sales and disclosure is deliverable on the ground and defensible under scrutiny.

Source: Consumer Affairs Victoria (2020), Residential parks.



3

# Risk stack for operators what typically disrupts delivery



3.1

# Risk stack for operators what typically disrupts delivery

**The following points outline the primary risks for operators, with descriptions of what typically disrupts delivery.**

**Ground uncertainty:** insufficient geotechnical definition leading to conservative assumptions, rework, latent conditions claims and inconsistent standards across stages.

**Earthworks and balance risk:** stage-by-stage balancing without estate-wide optimisation causing double handling, import/export costs and unnecessary plant hours.

**Services complexity:** electrical, communications, water and sewer constraints that vary by jurisdiction creating late redesign, approvals friction and staged delivery bottlenecks.

**Compliance and reputational risk:** misalignment between disclosed product/amenity promises and what site conditions or approvals realistically allow, increasing dispute and reputational exposure.



4

# The Intrax capability proposition for LLC operators


4.1 ESTATE-SCALE DUE DILIGENCE (PRE-ACQUISITION TO FEASIBILITY)
4.2 SURVEY AND DIGITAL GROUND MODEL (SINGLE SOURCE OF TRUTH)
4.3 GEOTECHNICAL CLARITY THAT UNLOCKS COST AND CERTAINTY
4.4 CIVIL AND STRUCTURAL INTEGRATION (AMENITIES + HOMES + SERVICES)
4.5 CONSTRUCTION QA (PROTECTING BRAND AND RESIDENT EXPERIENCE)

Intrax supports LLC operators with an integrated, multi-discipline service scope spanning site due diligence, survey, geotechnical, civil, structural and construction QA.

The core proposition is to provide holistic quantifiable data for both above and below ground conditions to facilitate better outcomes. Through early action we reduce earthworks risk, enable downstream design consistency and accuracy, and ultimately improve delivery certainty.



4.1

## Estate-scale due diligence

(pre-acquisition to feasibility)

**What we do**

- Rapid constraints investigation: feature survey of topography, drainage, access, services corridors, geohazards and contamination flags.
- Targeted geotechnical strategy to de-risk any high-cost unknowns early, including opportunities to de-risk soil reactivity.
- Feasibility-grade civil/structural concepts to test earthworks balance, pad strategy, optimised pavements and utilities interfaces.

**What this enables**

**Clearer cost benefit analysis, faster investment decisions and fewer late surprises.**

4.2

## Survey and digital ground model

(single source of truth)

**What we do**

- Survey control and digital terrain model aligned to estate staging and design needs.
- Integrated data workflows so civil, structural and geotechnical assumptions use consistent references and surfaces.
- Early identification of buildability and access constraints affecting clubhouse/amenity positioning and construction logistics.

**What this enables**

**Repeatable staging and reduced design churn caused by inconsistent base data.**

4.3

# Geotechnical clarity that unlocks cost and certainty

### What we do

Design-purpose parameters linked to constructability (pad, pavements, retaining, drainage, treatment).

- Options analysis to avoid conservative over-excavation and unnecessary treatment layers.
- Optimise the ground model: group lower-reactive materials together and limit large cuts and associated crack-zone influences.
- De-optimise early.
- Where reactivity conditions cannot be controlled, adopt an early piling strategy and optimise or reduce costly earthworks in lieu of speed to development.
- Staging-ready ground treatment strategies so later stages are not forced into costly “one size fits all” solutions.



### What this enables

**Firmer contingency and lower long-term foundation costs across later stages, through reduced earthworks volumes and fewer remobilisations.**

4.4

## Civil and structural integration

(amenities + homes + services)

### What we do

- Civil design that is staging-optimised and services-aware.
- Structural inputs for clubhouse and amenity buildings integrated with ground conditions, drainage and access.
- Coordination interfaces for modular/prefab delivery where relevant (tolerances, pad/footing design, transport and cranage access).

### What this enables

**Fewer late design changes, faster construction starts and a consistent resident experience.**

4.5

## Construction QA

(protecting brand and resident experience)

### What we do

- Construction phase verification aligned to design intent and staging.
- Documentation of compliance and quality for operator assurance and stakeholder confidence.
- Rapid issue resolution support to avoid program delays and defects that erode developer / resident satisfaction.

5

# Case studies: What early intervention is worth to a client


5.1 CLIENT B, VIC – HOW A $4.3M COST BASE MOVED BY TESTING THE GROUND EARLIER

5.2 WHY IT WORKED: THE METHOD, NOT JUST THE MODEL

5.3 A SECOND EXAMPLE: REPLACING INHERITED CONSERVATISM WITH ESTATE-WIDE CONTROL (CLIENT C, SOUTH-EAST QLD)

5.4 THE PATTERN IS SYSTEMIC, NOT A ONE-OFF: INDEPENDENT AUSTRALIAN EVIDENCE

5.5 TRANSLATING THIS INTO LLC-SCALE VALUE

## 5.1

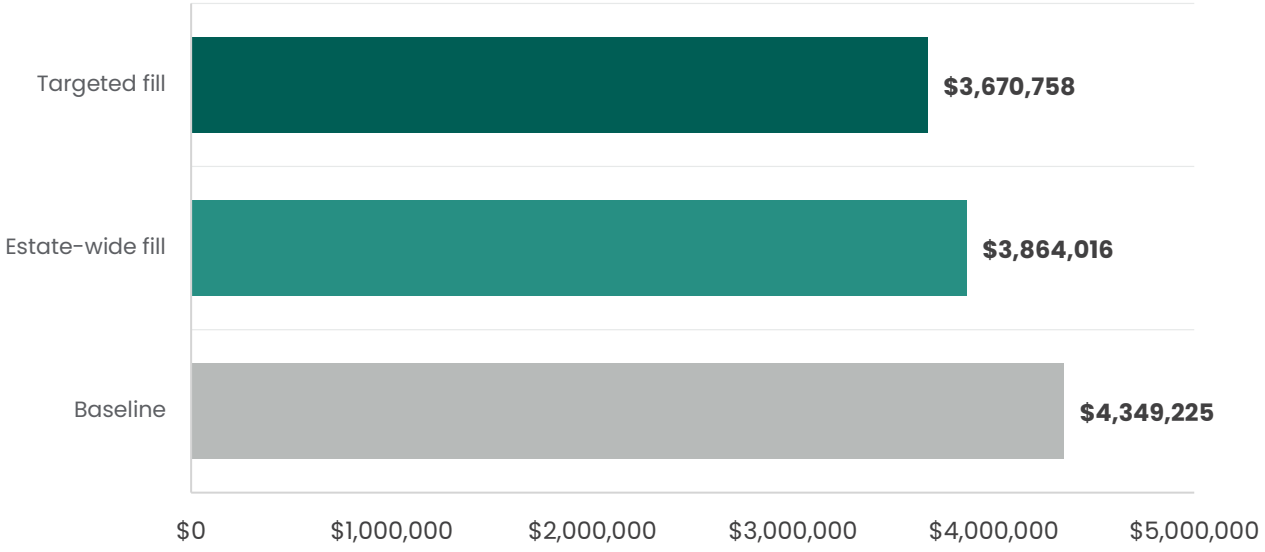
**Client B engaged Intrax to review a 213-lot townhouse subdivision in Melbourne's West after receiving geotechnical reporting and remedial specifications that classified the entire site as Class E: highly reactive clay, requiring bored pier or screw-pile footings under all 213 dwellings. Civil plans and the site masterplan were still live at this point; nothing had been locked in.**

Rather than price the footings that the existing reports implied, Intrax's structural, geotechnical and civil team tested the ground scenarios and what was worth changing. Four ground-treatment strategies were costed side by side, from minimal fill (leaving the site as Class E and fully piered) through to importing 0.8–1.0 m of controlled, non-reactive fill across the estate to lift the classification to H1/H2 and remove piering altogether in favour of slab-on-ground construction. Three are shown in Table 1, and Figure 2 summarises the outcome.

| Ground treatment strategy | Site classification | Foundation cost (213 lots) | Earthworks & fill cost | Saving per lot vs baseline |
|---|---|---|---|---|
| Baseline – "as is", minimal fill only | E – all lots | $3,381,375 | $967,850 | — |
| Estate-wide fill – 0.8–1.0 m imported controlled fill, all lots | H1/H2 – all lots | $1,938,726 | $1,925,290 | $2,278 |
| Targeted fill – 0.8 m to interior lots; perimeter lots unchanged | E (54 lots) / H1-H2 (159 lots) | $2,304,468 | $1,366,290 | $3,186 |

*Table 1: Client B – cost outcome by ground treatment strategy (213 lots)*

*Figure 2: Total construction cost (foundations + earthworks & fill) by strategy*




### Advisory and Strategy Workshop

Intrax provided a workshop, led by senior staff across each engineering discipline, to convert the analysis into a delivery plan covering ground and program risks, mitigation strategies, and efficiency and design innovation opportunities.

Moving to estate-wide fill cut total construction cost by $485,209 (11.2%) against the baseline; targeting fill to the interior lots cut it by $678,467 (15.6%), equating to $2,278 and $3,186 per lot respectively, on a $4.35M baseline.

Both fill options need roughly three weeks of civil works to place and compact fill, and improved imported materials add a sourcing delay. Rather than leave this as an unpriced risk, Intrax built the cost into the per-slab pricing, using the client's own settlement and finance assumptions ($700,000 average lot price, 70% settled on handover). A week of estate-wide delay carries an opportunity cost of $240,854, so three weeks costs $722,562 in each scenario. Fully priced, the baseline totals $5,071,787 against $4,586,578 (estate-wide fill) and $4,393,320 (targeted fill), leaving the savings at $485,209 and $678,467. The saving was never a trade-off against speed: both savings were made and the timeline was unaffected.

None of this was available after the fact. Once footing packages are documented and the default decision to pile a site is adopted, there is no opportunity to recover this decision; the 11.2%–15.6% was only recoverable because it was tested at site-assessment stage.

*Source: Intrax Site Assessment & Construction Cost Evaluation Report – Client B (19 November 2018, Rev 2).*

5.2

# The assessment method

**The saving came from a sequence of decisions that Intrax makes as a standard part of early engagement, and which map directly onto the capability set in Section 4.**

### 1. Site classification is not static

There are options and strategies to enable a design choice. The existing reports described the ground as it was, not what was worth changing.

### 2. Cost every credible option side by side

In the same units: earthworks and foundations are normally scoped, quoted and managed by different teams; Intrax priced them as one trade-off, so the cheaper combined path was visible.

### 3. Monetise the program impact

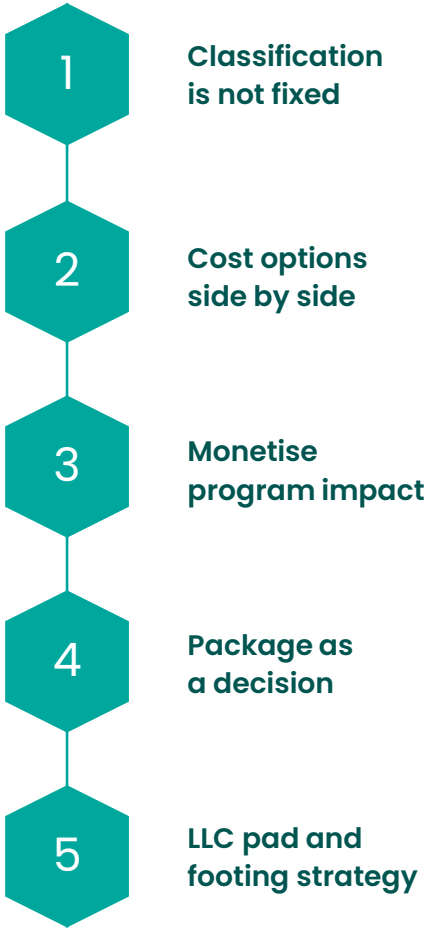
In the client's own capital terms: a three-week delay means nothing to a board until it is priced against settlement value and the finance hurdle rate.

### 4. Package the analysis as a decision, not a report

The workshop offer converted a cost comparison into risks, mitigations and an efficiency agenda the client's delivery team could implement immediately.

### 5. The LLC equivalent

For an LLC operator, the equivalent decision sits in pad and footing strategy, staged earthworks balance, and treatment triggers across a multi-stage rollout.



5.3

# Queensland LLC: Stage-wide investigation

Client C is a land-lease operator delivering a 106-site community across ten stages on a 5.5 ha site in South-east Queensland, on high-plasticity alluvial clay over sedimentary rock capped by a thin layer of fill.

On an earlier stage, a previous consultant's lot-by-lot reports (boreholes drilled to 1.5 m) classified every lot Class E, with a characteristic surface movement (Ys) above 130 mm. Intrax questioned the crack-zone allowance, the treatment of roughly 150 mm of fill as a cracked surface layer, and boreholes that stopped well short of the 2.3 m design suction depth. The previous consultant declined to revise, although its own sensitivity check showed Ys falling to 98 mm under an alternative crack-zone assumption, a third lower than reported, from inputs alone.

For the next stage, Intrax measured the ground: 44 boreholes to 3.0 m (two per lot), a dynamic cone penetrometer test at every borehole and 22 shrink-swell index tests, building one consistent ground model. The additional drilling was absorbed into the engineering fee.

| Reported measure | Previous consultant (earlier stage) | Intrax (stage-wide) |
|---|---|---|
| Approach | Individual lot reports | One ground model for the stage |
| Borehole depth | 1.5 m | 3.0 m (full suction zone) |
| Test density | Lot-by-lot | 44 boreholes (2 per lot), DCP at every borehole, 22 shrink-swell tests |
| Characteristic surface movement (Ys) | Above 130 mm | 62–93 mm (average ~74 mm) |
| Base classification | Class E, all lots | H2 on 7 of 12 lots; low-end E (80–93 mm) on the remaining 5 |
| Design outputs | Classification only | Classification, ground model, material parameters, bearing capacities, pile design parameters, construction hold points |

*Source: Intrax Geotechnical Investigation Report – Client C, Southeast QLD (Nov 2024, Rev 1)*

5.3 (continued)

# Client C: the value of measuring the ground properly

Design Ys fell by roughly 40–50%. Seven of the twelve lots assessed moved down to an H2 base classification; the rest sit at the bottom of Class E rather than well above it. Same soil, same standard; the difference was data.

Where uncontrolled fill depth still triggers Class P on some lots, the report sets out a defined path back: if earthworks placement records confirm the fill as controlled, those lots can be reclassified under AS 2870 Cl 2.5.3. A footing redesign becomes a records exercise.

The stage now carries one parameter set (bearing capacities, pile parameters and founding depths) that designers can apply consistently across releases, rather than re-deriving the inputs lot by lot.

Intrax played no part in the footing or slab design at this site, so the slab cost delta is back-calculated rather than quoted. Class E to H2 is one step down the reactivity scale, and Section 1.3 prices each step up at 10–25%. Client B's foundations cost about $15,900 per lot at Class E, which implies $12,700–$14,500 per lot at H2: a saving of $1,450–$3,200 per slab on the seven lots that changed class, or $840–$1,860 per lot averaged across the twelve assessed.

The value is in the compounding. Left unchallenged, the inherited classification would have been carried into every remaining stage (around 90 sites) and priced into every slab. On the same indicative basis, that is $75,000–$165,000 of avoidable cost across about 52 lots, assuming the seven-in-twelve rate seen in this stage remains consistent. Client B shows classification can be changed by engineering the ground; Client C shows it can often be improved simply by measuring the ground properly. Both point to the same control point: invest in ground data while it can still shape the design, not after the footings are priced.

**40–50%**
fall in design surface movement (Ys)

**7 of 12**
lots moved from Class E to H2

**$1,450–$3,200**
back-calculated saving per slab (7 lots)

**$75,000–$165,000**
avoidable cost across about 52 lots

5.4

# The pattern is systemic, not a one-off: independent Australian evidence

**20–30%**

Estimated share of Australian surface soils that are reactive or expansive

**$1.5 billion**

Structural damage attributed to shrinkage-crack movement in South Australian homes built before 1981

**Client B and Client C are not outliers. Independent data, none of it produced by Intrax, shows the same asymmetry recurring across Australian ground conditions and project types.**

Reactive soil is a national-scale exposure, not a one-off site condition. CSIRO and University of Adelaide research (2026) estimates 20–30% of Australian surface soils are reactive or expansive, and South Australian data alone attributes $1.5 billion in structural damage to shrinkage-crack movement in homes built before 1981.

This is the same soil behaviour the Client B fill decision was designed against.

Source: Devkota et al. (2026), Shrinkage cracks in expansive soils: field observations, numerical modelling, and design implications for residential structures. Journal of Rock Mechanics and Geotechnical Engineering.

5.4.1

# Investigation scope and foundation cost

**$195,000**

Difference in assessed piling cost

| Assessment item | Initial | With coring |
|---|---|---|
| Investigation estimate | $10,000 | $15,000 |
| Piling cost | $620,000 | $425,000 |

**Approximately $5,000**

Estimated extra initial investigation scope to include rock coring

Douglas Partners' review of a NSW infrastructure project found that omitting rock coring to save roughly $5,000 on the initial geotechnical scope led to a pile design costing $620,000, against $425,000 once proper core data was obtained for about $15,000.

A $195,000 cost penalty, roughly 40 times the money "saved" upfront, and the clearest example in this section for what under-scoping early investigation actually costs.

Source: Young and Ellis (2018), Saving on the geotechnical investigation – a false economy. Douglas Partners.

5.4.2

# Fill verification and long-term performance

**1.78M m³**

Quarry backfill that performed predictably for 15–22 months of monitoring under strict control

**20–50 mm**

Differential movement at comparable sites that skipped those controls

Douglas Partners' case studies of filling under buildings across western Sydney show the same lesson as Client B from the other direction.

A 1.78 million m³ quarry backfill performed predictably for 15–22 months of monitoring under strict compaction and moisture control, while comparable sites that skipped those controls saw 20–50 mm of differential movement and consequential building damage.

Fill-based ground improvement is a proven Australian strategy; the saving only holds if the geotechnical control is specified and enforced, not treated as a formality.

Source: Young and Blinman (2025), Case Studies of Filling Movements Under Buildings. Douglas Partners.

5.4.3

# Project definition before commitment

**25,000+**

Capital projects benchmarked by Independent Project Analysis (IPA)

**30%+**

Of projects approved with a single preferred option before definition work is finished

IPA has benchmarked more than 25,000 capital projects and finds that how completely a project is defined before approval is “the single best predictor” of its safety, cost, schedule and operability outcomes.

Site conditions, soil among them, are one of the three areas IPA scores when it rates that definition.

It also reports that more than 30% of projects are approved to proceed with a single preferred option before that definition work is finished, which leads to underestimated capital costs.

Clients B and C show the same thing at estate scale: the saving came from getting ground data in while it could still shape the design, before the footings were priced.

Source: Griffith (2025), What is front-end loading (FEL) in project management? Independent Project Analysis (IPA).

5.5

# Translating this into LLC-scale value

Colliers' 2025 benchmarking puts average LLC site development cost at approximately $127,000 per site across QLD, NSW and VIC, with civil works ($52,000–$65,000 per site) and earthworks (approximately $23,000 per site) the components most exposed to ground condition assumptions.

Applying the client's per-lot saving band ($2,278–$3,186) to typical LLC release sizes is illustrative, not a forecast for any specific estate. It gives roughly $228,000–$319,000 on a single 100-site stage, or $0.9M–$1.3M compounded across a typical four-stage, 400-site program.

This is the same saving described in Section 2.1 as being "carried forward, reused and relied upon across successive releases", except, tested early, it compounds in the operator's favour instead of against it.

Sources: Horswill (2025), The Weekly Source (Colliers benchmarking); Intrax Site Assessment & Construction Cost Evaluation Report – Client B (Rev 2); Intrax analysis.

**$678,467**
saved on a $4.35M construction cost base

**15.6%**
reduction against the baseline

**$3,186**
saved per lot (213-lot estate)

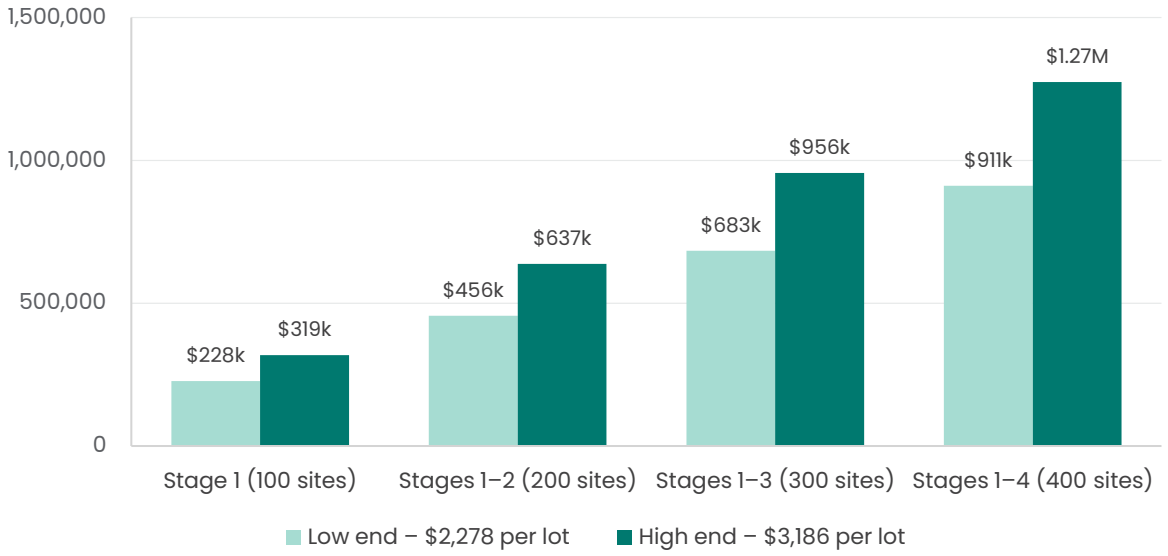



*Figure 3: Illustrative saving if the Client B per-lot band is applied across a four-stage, 400-lot program (100 sites per stage; not a forecast)*

The pattern is consistent across every example in this section: the intervention that protects margin is available for a defined and closing window, before earthworks and footing packages are committed, and it is cheapest, and most valuable, before that window shuts.

Section 6 sets out how to keep that window open.



6

# Operator playbook: how to firm up contingency and improve staging certainty

6.1

# Six steps for multi-stage operator programs

1

**Decide estate-wide staging intent early**
Confirm the order stages will be released, when the clubhouse and amenities will be built, and how stages connect to roads and services, so investigations match the real delivery plan.

2

**Establish a single, consistent ground truth dataset**
Use one survey control framework and digital ground model, with disciplined versioning to prevent design drift.

3

**Target the big cost unknowns first**
Focus early geotechnical work on the zones that drive earthworks volumes, retaining, pavements and drainage, rather than uniform testing.

4

**Run options analysis before civil design is locked in**
Test earthworks balance, pad strategy, pavement thickness and treatment triggers while change is still cheap.

5

**Design for repeatability**
Standardise pad/footing and pavement responses where evidence supports it, but keep staged flexibility for constrained areas.

6

**Treat QA as brand protection**
Verify early stages rigorously to avoid repeating defects and to protect resident experience as the estate scales.

6.2

# Housing productivity: why ground truth matters

## Half as many

homes completed per hour worked than in 1995
(Productivity Commission, 2025)

## 12% vs 49%

Housing construction labour productivity decline versus broader economy growth

This way of working also speaks to Australia's wider housing productivity problem. The Productivity Commission (2025) found that the country now completes half as many homes per hour worked as it did in 1995, and points to a fragmented industry that treats each project as a one-off.

Part of the answer sits in the rework that unknown ground conditions create: reclassified lots, redesigned footings, re-sequenced earthworks and stalled stages.

Establishing one consistent ground model at the start of an estate, setting a target classification, and verifying it at defined hold points through construction replaces discovery as you go with a controlled, repeatable process. Each stage inherits proven inputs rather than re-deriving them.

Applied across an LLC program, early ground truth turns into more homes delivered per hour worked: fewer surprises, less rework, and a faster, more predictable path from land to occupied home.

Source: Productivity Commission (2025), Housing construction productivity: Can we fix it?

7

# Conclusion:
# scale with certainty



7.1

# Conclusion

**LLC operators scaling multi-stage programs need predictable delivery in a market that is becoming more regulated, more capital intensive and more sensitive to reputation.**

The highest-leverage control opportunities are early in the development cycle. At due diligence, survey, geotechnical and engineering “ground truth” can firm up development contingency, reduce downstream earthworks and foundation rework, improve cost certainty and accelerate delivery.

Intrax’s integrated capability across survey, geotechnical, civil, structural and construction QA is designed to help operators repeatably deliver communities with confidence.



# Contact

Intrax Land Development & Communities
Site Due Diligence, Survey, Geotechnical, Civil, Structural and Construction QA

Scott Emmett
Executive General Manager – Land
Email: info@intrax.com.au

intrax.com.au

Intrax
LAND

8

# Selected sources


Australian Building Codes Board (2024). Prefabricated, modular and offsite construction. (link)

Bertram, N. et al. (2019). Modular construction: From projects to products. McKinsey & Company. (link)

CBRE (2025). Land Lease Communities. (link)

Consumer Affairs Victoria (2020). Residential parks. (link)

Devkota, B. et al. (2026). Shrinkage cracks in expansive soils: Field observations, numerical modelling, and design implications for residential structures. Journal of Rock Mechanics and Geotechnical Engineering. (link)

Gerathy, S. and Vidal, P. (2024). Owners fear more damage to homes over bulldozing fix at "sinking" western Sydney suburb. ABC News, 29 Jan. (link)

Griffith, A. (2025). What is front-end loading (FEL) in project management? Independent Project Analysis (IPA). (link)

Horswill, I. (2025). Colliers: Average cost of a land lease community site in 2025 is $127,000 per site. The Weekly Source. (link)

NSW Government (2025). Residential Land Lease Communities. (link)

Patel, B.B. (2026). Why housing needs to be built like a platform, not a project. Ghc-lp.com. (link)

Penrith City Council (2021). Jordan Springs East. (link)

Productivity Commission (2025). Housing construction productivity: Can we fix it? (link)

Property Australia (2026). Land lease on the rise. Property Council Australia. (link)

Teodosio, B. et al. (2023). Environmental, economic, and serviceability attributes of residential foundation slabs: A comparison between waffle and stiffened rafts using multi-output deep learning. Journal of Building Engineering, 80, 107983. (link)

Young, G.S. and Blinman, R.C. (2025). Case Studies of Filling Movements Under Buildings. Douglas Partners. (link)

Young, G.S. and Ellis, W. (2018). Saving on the geotechnical investigation – a false economy. Douglas Partners. (link)

Intrax Site Assessment & Construction Cost Evaluation Report – Client B (19 November 2018, Rev 2).

Intrax Geotechnical Investigation Report – Client C, Southeast QLD (Nov 2024, Rev 1).

Consumer Policy Research Centre (2025). Life in residential parks. (link)

Dennert, R. (2025). The economic effects of modular construction in housing: Productivity, cost, and market dynamics. ResearchGate. (link)

Hedayati, D. et al. (2026). Industrialised housing delivery: A systematic literature review and thematic synthesis of uptake, digital integration, and P-DfMA drivers. Buildings, 16(3), p.552. (link)