
Build-Over Applications

A Guide to Utility Locating of Gravity Sewer Mains for Build-Over Applications

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Locating Sewers for Build Over Asset Applications

Why sewer mains and property connections are the hardest assets to locate, and what it takes to get a result

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DATE	August 2026
REVISION	Rev.1
AUDIENCE	Designers, builders, pool builders, private building certifiers, RPEQ engineers, and project managers
APPLICATION	Residential and commercial sites in the Urban Utilities service area, and in other South-East Queensland asset owner areas where equivalent requirements apply

WHY THIS GUIDE EXISTS

A build-over asset referral turns on a small number of details: where the sewer main runs, where the property connection leaves it, where the connection point sits, how deep each is, and how far each is from a boundary. On a drawing, those numbers look trivial. Obtaining them is the most access-dependent task in utility locating and the one most likely to fail on the day.

Almost every dispute we have on a sewer job comes back to the same thing: the attendance was scoped as though the sewer were a cable, when a gravity sewer is not a cable and cannot be traced like one. There is no signal on the pipe. There is nothing to connect to. Everything depends on whether we can physically get inside the line, and that depends on what the property has, and on what has been built over it since.

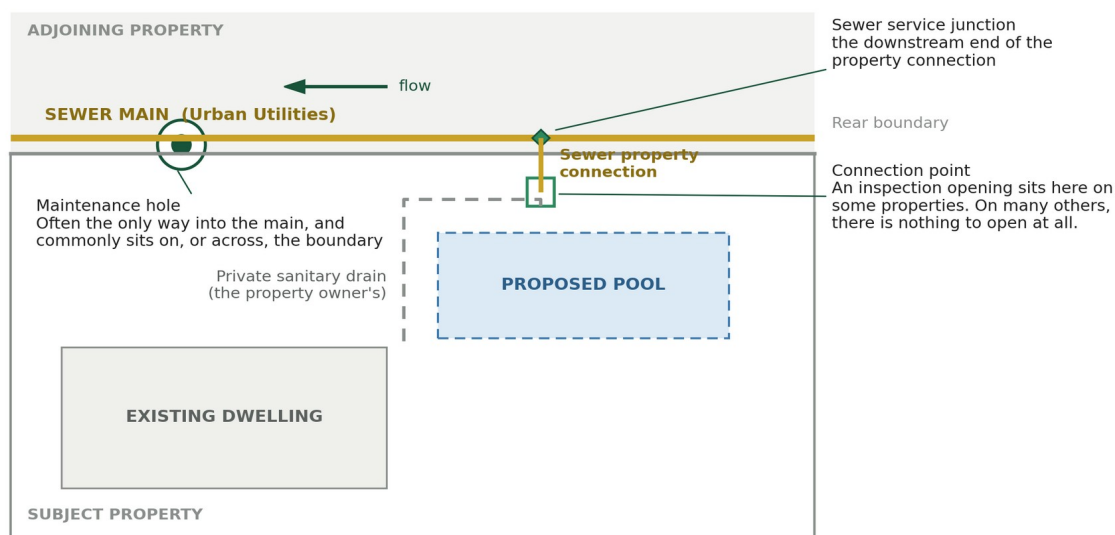
This guide sets out what a gravity sewer offers a locator, what it does not, and what has to be true on site before an attendance can produce a design-grade result. Used as intended, it should let a locate be scoped once, attended once, and reported once.

1. Four assets, and the words that separate them

Most of the confusion about these jobs begins with vocabulary. Urban Utilities defines the following terms, and a referral is assessed against them, so it is worth being precise.

Term	What it means
Sewer main	The reticulation pipe owned and maintained by the asset owner. In established Brisbane suburbs it commonly runs through rear yards rather than the street.

Term	What it means
Sewer service junction	The downstream end of a property connection, where that connection meets the main. It is a fitting on the main, and it is not visible from the surface.
Sewer property connection	All pipes and fittings between the junction on the main and the property service, up to and including the connection point. It is asset-owner infrastructure, even though it sits within the lot.
Sewer connection point	The upstream end of the property connection, where the private house drainage connects to it. This is the point a referral most often asks for, and it is the point most often impossible to reach.
Private sanitary drain	Everything upstream of the connection point. It belongs to the property owner, not the asset owner, and it is not what the referral is asking about.
Maintenance structure	A chamber through which a person, machine, or device can gain access to the infrastructure. In common speech, a maintenance hole or manhole. Access to the network is limited to these, and to any inspection openings on the property connection.



Four separate assets, and four separate locating problems. Access to one does not give access to another.

Figure 1 | The assets on a typical Brisbane residential lot, and where each one begins and ends.

THE MOST COMMON MISUNDERSTANDING

A locate on the main does not give you the property connection, and a locate on the private drain does not give you the connection point. They are three separate exercises, each needing its own point of entry.

Where a report shows a long private line running to the house and nothing else, the connection point has not been located. It has been assumed. An assessor will notice.

2. What a referral actually asks of a locate

Urban Utilities' Build Over Asset Referral Guidelines set out what must be uploaded before an application is treated as properly referred. The items that bear directly on locating work are these.

- A pipe location report containing a site plan that shows the location of the infrastructure within the site, and the dimensions to that infrastructure from the property boundaries.
- Where retaining walls are involved, the reduced level at the top of the sewer main in Australian Height Datum at each retaining wall location.
- Photographs of every sewer maintenance cover located within the site.
- An architectural site plan showing the asset owner's infrastructure within or adjacent to the site, including all maintenance structures and all property connections, correctly represented spatially against the boundaries and the proposed works.
- Structural drawings demonstrating that suitable access will be provided and maintained to any sewer maintenance covers on the site, and to the junction of any sewer property connections on the site.
- A clear statement that a report consisting only of general photographs of the infrastructure will not be accepted.

Beyond the lodgement checklist, information requests issued during assessment routinely add a further set of conditions on the locating deliverable itself: that the position was determined by a Quality Level B method rather than by survey, that the associated level of accuracy is stated, that both invert level and top of pipe are given, that side and front or rear boundary offsets are shown, and that location and depth details obtained solely from ground penetrating radar are not accepted.

TWO CONSEQUENCES FOLLOW

First, the deliverable must include offsets, levels, a stated tolerance, and a stated quality level. Marks on the ground and a set of photographs will not satisfy the requirement, however good the field work was.

Second, radar on its own cannot satisfy the requirement, whatever it finds. The asset must be traced. That is a documentation constraint sitting on top of a physical one, and both point the same way.

A note on Australian Height Datum

A locate gives depth below the surface at the point of measurement. A referral asks for levels in Australian Height Datum, tied to the boundaries and reflected on the architectural and structural drawings. Those are different things. We can undertake the locate, mark the alignment, and provide depths, diameters, and offsets, and a surveyor then picks up our marks and converts them to datum. On most build-over jobs, the locator and the surveyor both attend, and sequencing them the right way round- locator first- saves a second survey visit.

3. QL-B and QL-C: the distinction the whole job turns on

AS5488 classifies how a position was obtained, and therefore what it may be relied upon for. Two of the four levels matter here.

Level	How it is derived	What it supports	What it requires on a gravity sewer
QL-C	Visible surface features correlated with asset owner records.	Preliminary layout and scoping. No guaranteed positional tolerance.	Surface features visible on site. No entry into the pipe is needed.
QL-B	Geophysical location, with the asset detected and traced.	Design and build over or build adjacent submissions.	A signal inside the pipe, which means an open and serviceable access point, or a tracer wire.

A QL-C ATTENDANCE DOES NOT BECOME QL-B LATER

Re-issuing the report does not change the level, nor does adding annotations to it. The evidence was either collected on the day, or it was not. If a dimension is going to an engineer or to a referral, access must be in place before the technician arrives.

This is the single most useful thing to carry into a design meeting. It is also the reason we now ask, at quoting, what the locate is for.

4. Why we cannot simply scan the sewer with radar

This is the question we are asked most often, usually in the form: "You have radar, so why can't you just find it?" The honest answer has five parts, and only the last of them is administrative.

Depth and attenuation. Radar energy is absorbed by conductive ground. Brisbane's reactive clay soils are about as unhelpful as radar ground gets, and they are frequently wet. A sewer main in a rear yard typically sits between 1.5 and 3 metres deep, and a property connection is usually shallower, though not always. Reaching those depths requires a low-frequency antenna, which trades resolution for penetration. In good sandy ground, that trade can work. In wet Brisbane clay, the useful signal is often gone well before the pipe.

Contrast. Radar detects boundaries between materials of differing dielectric properties. A vitrified clay pipe, surrounded by damp clay, partly filled with water, contrasts poorly with its surroundings. The pipe is there, and the radar simply has very little to reflect off.

Detection is not identification. Suppose we do get a response at 2.2 metres. That response could be the sewer. It could equally be a stormwater line, an old trench, a rock, a root mass, or a former service. Radar shows a signal response, not an object identity, and the deeper and weaker the response, the less distinguishable it is.

A crossing is not an alignment. Even a strong, unambiguous response tells you that something crosses a scan line at a point. It does not give you the run of the pipe, the fall, the position of the junction, or the connection point, which are the things a referral asks for.

The asset owner's position. Urban Utilities does not accept location and depth details obtained solely from ground-penetrating radar. Even where radar produces a good result, it cannot stand alone in the submission.

WHERE RADAR DOES EARN ITS PLACE

Radar is genuinely useful on these jobs, provided it is used as a corroborating method rather than the primary one. It resolves trench lines and disturbed ground that indicate a likely alignment; it picks up shallow private drainage that carries no signal; it confirms that a pit is where it appears to be; and it supports and cross-checks an electromagnetic trace.

What it cannot do is replace the trace. On a gravity sewer, the trace is the job.

5. How a gravity sewer is actually located

A gravity sewer is a non-conductive pipe carrying no signal. Electromagnetic locating, the workhorse of QL-B for power, comms, and metallic water, requires a conductor, and there is none here. The method is therefore to put a signal inside the pipe and follow it from the surface.

Traceable rodding

A traceable rod is a fibreglass rod with a copper conductor running through it, wound on a drum and fed into the pipe from an access point. A transmitter energises the conductor, and the technician follows the signal along the surface with a receiver, marking position and reading depth at intervals. A variant uses an inert rod with a sonde, a small self-contained transmitter, at the tip; the sonde is located as a point rather than a line, so the technician advances it in stages and marks each position.



Figure 2 | A traceable rodder. The rod is the only practical way to get a signal into a non-conductive gravity line.

Rodding is effective, but it has real limits. Realistic push distances are much shorter than the length on the drum. Every bend costs distance, silt and root mass resist the rod, and a rod that has been forced becomes a blockage of its own. A rodding attendance is a physical negotiation with the pipe, and it does not always win.

Sonde in a camera head, and CCTV

A CCTV crawler or push camera with a sonde in the head does everything a rod does and adds the thing a rod cannot give: sight. The footage shows where the junctions are, whether a connection exists at all, whether it enters at the invert or above it, and the condition of the line. Distances are read off the counter, and the camera is then parked at the features that matter so the sonde can be located and marked from the surface.



Figure 3 | Deploying a camera into a maintenance hole. Access is still the precondition; the camera does not create an entry point.



Figure 4 | A crawler unit in the line. Internal inspection converts guesswork about junctions and connections into measured fact.

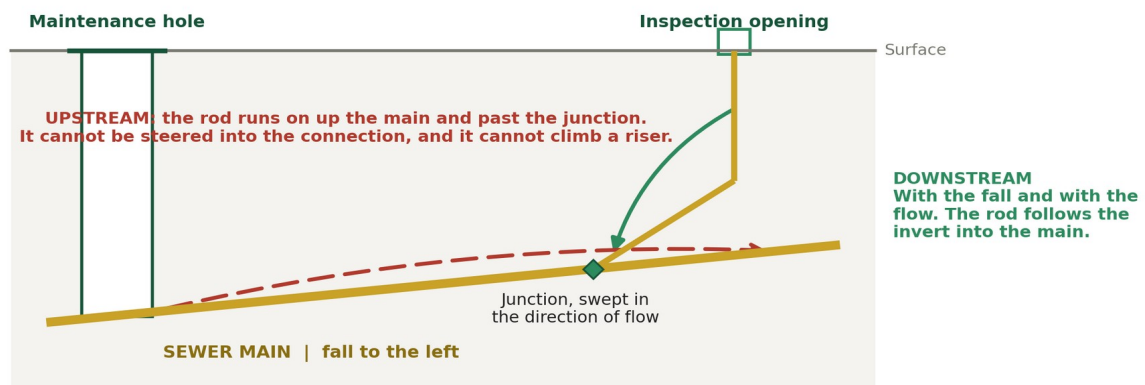
THE ONE THING EVERY METHOD NEEDS

Rodding needs an opening. A sonde needs an opening. CCTV needs an opening. A tracer wire is the only method that does not, and, as section 9 explains, most of Brisbane does not have one.

Everything in this guide reduces to a single question: is there a way into this pipe today, and can it be opened?

6. Upstream, downstream, and why direction decides the outcome

A gravity sewer is built to carry flow in one direction, and every fitting in it is shaped accordingly. That geometry, which is exactly what makes the network work, is what makes it awkward to trace.



An attendance at the maintenance hole will usually give you the main. It will not usually give you the property connection.

Figure 5 | The same junction, approached from two directions, with two very different results.

Downstream is straightforward. Fed in at an inspection opening on the property connection and pushed with the fall, the rod sits in the invert, gravity and any flow assist it, and junctions present as swept entries in the direction of travel. The rod arrives at the main, and the run between the two is traced and marked.

Upstream is the difficult direction. Fed in at a maintenance hole and pushed against the grade, the rod meets every fitting the wrong way round. Junctions are swept downstream, so a rod pushed up the main runs straight past a property connection rather than turning into it, and there is no way to steer it. Where a connection enters above the invert, on a riser or a drop, the rod cannot climb into it at all. Benching in the chamber, silt, root intrusion, and offset joints all add resistance, and the further upstream the rod goes, the less control the operator has over the tip's position.

THE PRACTICAL RULE

Attending the maintenance hole will usually give you the sewer main. It usually won't give you the property connection or the connection point.

Those require an opening on the property connection itself, or CCTV from an access point that reaches them, or physical exposure. If a referral needs the connection point, that needs to be scoped before the technician is booked, not discovered on the day.

7. Brisbane backyards, where access is the whole problem

Much of Brisbane's sewer reticulation was laid through rear yards rather than along the street, in some suburbs following the rear boundaries of an entire block. It was a sensible design when the land was open and the houses were new. Ninety years of decks, sheds, pergolas, pools, retaining walls, paving, garden beds, and mature trees later, it is the reason this work is hard.

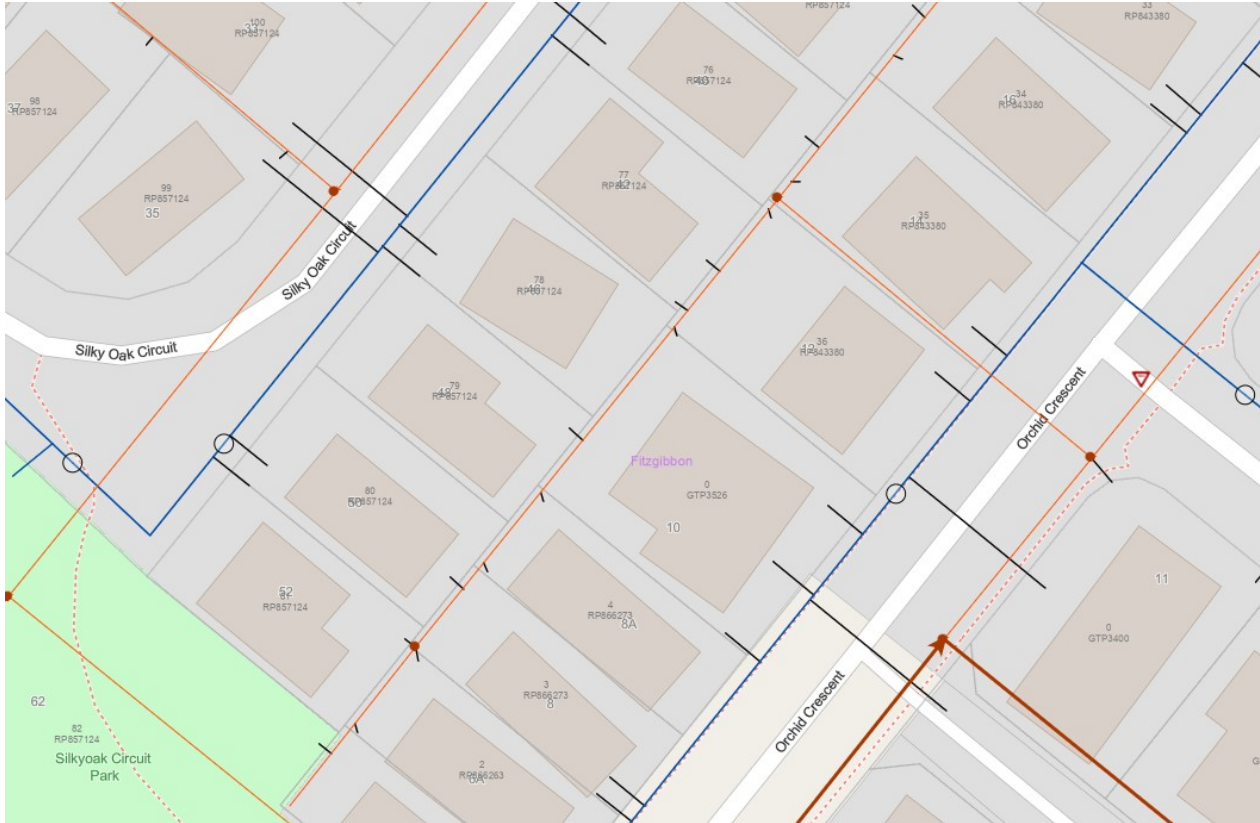


Figure 6 | Asset owner mapping, showing mains running through the rear of allotments rather than along the road reserve. Note that this kind of mapping is QL-D: records only, unverified on-site.

What limits access, in the order we encounter it

Structures that have been covered over. Maintenance holes and inspection openings disappear under mulch, turf, pavers, concrete, decking, planters, and stored material within a few years of anyone even thinking about them. A structure that is not visible at a design visit is very often still there, and finding it is part of the attendance rather than a given.

Lids that will not come off. Corroded lids, seized or missing bolts, cracked rims, lids that have been tiled, rendered, or concreted in. Our technicians carry Gatic lifters, leverage tools, and hydraulic tools, and we open the large majority of pits we attend. We stop at the point where further force would risk breaking the lid or the rim. If we force a compromised lid and it fails, we bear the repair cost, the client bears the delay, and the asset owner still has to attend. Rectification at that point is properly the asset owner's responsibility, and the return attendance once the pit is serviceable is a separate visit.

Structures on the neighbouring property. On a rear-boundary sewer, the maintenance hole commonly sits on or across the boundary and is sometimes wholly within the adjoining lot. Where it is the only viable entry point, attendance depends entirely on a neighbour with whom we have no relationship. That access needs to be arranged, in writing, before the job is booked.

Properties with no inspection opening at all. Some houses have an inspection opening, an inspection shaft, or a boundary trap riser at or near the connection point. Many, particularly older ones, have nothing. Where the private drain runs fully buried to a connection point with no opening, there is no access to the

property connection, and no rod or camera can be introduced into it. This is not a shortcoming of the equipment or the technician. There is simply no door.



Figure 7 | An open, serviceable pit, with the trace marked and annotated on the surface. This is what a QL-B result looks like on the ground, and it depends entirely on the lid having come off.

THE CIRCULARITY WORTH NOTICING

A build-over asset referral is required precisely because something has been built over or near the asset. The sites that need the referral are therefore the sites where access has most often already been compromised.

It is worth saying plainly to a client at design stage: the deck that has to be assessed may well be sitting on the only access point we would have used to assess it.

8. When there is no access: CCTV and vacuum excavation

Two methods remain when the ordinary route is closed. Both cost more than a standard attendance, and both are frequently the cheapest thing a client does on the job, because they end the correspondence.

CCTV inspection

Where a single opening exists but the configuration between it and the point of interest is unknown, CCTV converts assumptions into measurements. It establishes whether a property connection exists at all and where it joins the main, provides distance along the pipe to the junction and to the connection point, indicates whether the connection enters at the invert or on a riser, and records the condition, root intrusion, offsets, and previous repairs. With a sonde in the head, each of those features can be located and marked on the surface. Some approvals also require a condition inspection of the asset before and after construction, and the same footage serves that purpose.

What CCTV does not do is create an entry point. It solves the problem of not knowing what is between here and there. It does not solve the problem of having nowhere to start.

Vacuum excavation

Non-destructive vacuum excavation physically exposes the pipe, allowing its position, depth, diameter, and material to be measured directly. It is the only route to QL-A, and there are several situations in which nothing else will do: where there is no access point anywhere on the property connection; where a footing, pier, or pool shell has to be set to a tight clearance and an estimate is not good enough; where the connection point must be proven rather than inferred; and where the asset owner has asked for exposure.

It is slower and more expensive than any other method, because it involves plant, spoil handling, traffic and pedestrian management, reinstatement, and care around a live asset. It is worth weighing that cost against the alternative, which is commonly a refused referral, a redesign, a second locate, and a delay measured in weeks.

EXCAVATION STILL FOLLOWS THE FIVE P's

Every excavation on site, including pool and pier excavations and potholing itself, sits within this sequence. Locating supports PLAN and PREPARE, and it informs POTHOLE. It does not remove the obligation to pothole before mechanical excavation near a located asset.

PLAN

PREPARE

POTHOLE

PROTECT

PROCEED

9. Tracer wire, the thing that would solve this, and mostly is not there

A tracer wire is an insulated conductor laid in the trench alongside a non-conductive pipe, terminated at an accessible point so that a signal can be applied and the pipe traced from the surface without ever going inside it. Where one exists and is intact, it turns a difficult job into a simple one.

- Sewers laid in newer subdivisions, particularly PVC and PE mains in estates developed in recent decades, are frequently laid with tracer wire, and some are terminated at accessible points.
- The great majority of Brisbane's reticulation predates the practice. Vitrified clay and early PVC mains in established suburbs have no wiring and no way to accept a signal other than through an opening.
- Where a wire is present, it is only as good as its continuity and its termination. Broken wires, unterminated ends, and wires that were never connected at the pit are all common.
- A wire traces the wire, not the pipe. It is usually laid directly over the line, but where the trench was reworked, the two can separate.

The practical point for a designer is this: if the site is in an estate developed in the last twenty years or so, say so at the time of booking. It changes the method, sometimes the price, and sometimes the achievable quality level.

10. Getting a result on a single visit

Almost every second attendance we make on a sewer job was avoidable. The items below determine the outcome. Working through them before the booking is made is the difference between one visit and three.

☐ **State at booking that the locate is for a build-over asset referral.**

This is the item that sets the required quality level, and it cannot be corrected after the fact. A locate scoped for layout is a different job to a locate scoped for a referral.

☐ **Provide the BYDA response, the sewerage service diagram, and any property connection details held by the asset owner.**

Records are QL-D and will not be relied on for position, but they tell us where to look and what to expect.

☐ **Provide the survey plan, the proposed footprint, and the proposed depth and footing type.**

The clearances that matter determine where the effort goes, and whether potholing will be needed at a specific point.

☐ **Walk the property and find every sewer structure, then photograph each one.**

Behind sheds, under decks and stairs, along fence lines, and through garden beds. Photograph damaged, sealed, and built-over lids as well as good ones; those are the ones that change the scope.

☐ **Expose any covered lids, and arrange rectification of anything sealed or damaged, before the attendance.**

Rectification of a compromised lid sits with the asset owner, and arranging it takes time. Starting that process after a failed attendance adds weeks.

☐ **Confirm whether there is an inspection opening on the property connection.**

If there is not, and the referral needs the connection point, expect CCTV or vacuum excavation and price for it at the outset.

☐ **Arrange access to the adjoining property, in writing, where a structure sits on or across the boundary.**

A verbal arrangement with a neighbour who is not home on the day is not access.

☐ **Confirm whether levels in Australian Height Datum are required and engage the surveyor to pick up our marks.**

Sequence the locator first, then the surveyor. Reversing that order usually costs a second survey visit.

☐ **Allow a contingency in the program and the budget for vacuum excavation.**

On a site with poor access, it is a likely outcome rather than an unlikely one, and a contingency is cheaper than a stalled referral.

☐ **Book the locate before the design is fixed.**

Where the asset turns out not to be where the record placed it, an early locate is a design input. A late one is a redesign.

11. What can realistically be delivered, by site condition

The table below is the honest version of the conversation we would otherwise have at the end of an attendance.

Condition on the day	What we can deliver	What that supports
Maintenance hole open and serviceable, and an inspection opening on the property connection open.	Main and property connection traced and marked, with depths, offsets, and a stated tolerance. QL-B.	A referral submission, subject to levels being tied to datum by a surveyor.
Maintenance hole open, no inspection opening on the property connection.	Main traced at QL-B. Junction position established by CCTV where the chamber allows. Connection point inferred at QL-C, or exposed at QL-A.	The main is design-grade. The connection point needs a further step before it is.
Maintenance hole sealed, damaged, or built over.	Surface features correlated with records. QL-C, and nothing beyond it.	Preliminary layout and scoping only. Not a referral submission.
Only viable access point is on the adjoining property, and access has not been arranged.	As above. QL-C.	Preliminary layout and scoping only.
Clearance critical at a specific footing, pier, or pool shell.	Vacuum excavation at that point, confirming position, depth, diameter, and material. QL-A at the point exposed.	The highest available confidence, at that point. The line reverts to a lower level between potholes.
Estate sewer with a terminated and continuous tracer wire.	Trace from the surface connection without internal access. QL-B.	A referral submission, on the same terms as the first row.

12. Limitations, and how to use this guide

LIMITATIONS

This document provides general guidance on locating sewer infrastructure and the constraints that apply to it. It is not a utility location, a clearance to excavate, engineering advice, or advice on the approvability of any design.

It does not substitute for a BYDA enquiry, for a utility location undertaken to the quality level appropriate to the intended use, or for the asset owner's own approval process. Requirements described here reflect Urban Utilities' published guidance as at the date of this revision and are summarised rather than reproduced; the asset owner's current requirements govern, and other South-East Queensland asset owners apply their own. Verify the current requirement for your site before relying on any statement in this guide.

Where a design encroaches on an asset or its zone of influence, assessment against the Queensland Development Code MP1.4 is a matter for a private building certifier, and the structural design is a matter for an RPEQ engineer. We can undertake the locating work that informs both, and we do not undertake either.

South-East Scanning is available to review a site's BYDA response and photographs before a locate is booked, at no charge, where doing so is likely to avoid an unproductive attendance.

Let's talk about your site

We can undertake utility location, ground penetrating radar, concrete scanning, CCTV drainage inspection, and structural diagnostics across South-East Queensland, with reporting classified to AS5488. Send through the BYDA response, the survey plan, and the proposed design, and we can advise the quality level each part of the job calls for, and what has to be true on site to achieve it.

If you have any queries about this guide or its contents, please do not hesitate to contact South-East Scanning.

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