

# GLOSSARY OF TERMS

<b>AUGER BORING</b>	A technique for forming a bore from a drive pit, by means of a rotating cutting head. Spoil is removed back to the drive pit by helical auger flights rotating in a steel casing. The equipment may have limited steering capability. See <i>Guided Auger Boring</i> .
<b>AUGER TBM</b>	A type of <i>Tunnel Boring Machine</i> (TBM) in which the excavated soil is removed to the drive shaft by auger flights passing through the product pipeline pushed in behind the TBM.
<b>BACK-REAMER</b>	A cutting and/or expansion tool attached to the leading end of a <i>Drill String</i> , which enlarges the <i>Pilot Bore</i> during a <i>Pull-Back</i> operation to enable the <i>Product Pipe</i> to be installed.
<b>BENT SUB</b>	An offset section of drill stem close behind the <i>Drill Head</i> that allows steering corrections to be made by rotating the <i>Drill String</i> to orientate the drill head. Frequently used in <i>Directional Drilling</i> .
<b>CAN</b>	A principal module which is part of a <i>Shield Machine</i> as in <i>Microtunnelling</i> . Two or more may be used, depending on the installation dimensions required and the presence of an articulated joint to facilitate steering.
<b>CARRIER PIPE</b>	A defective pipe to be rehabilitated by any trenchless method.
<b>CASED BORE</b>	A bore in which a pipe, normally a steel sleeve, is inserted simultaneously with the boring operation. Usually associated with <i>Auger Boring</i> .
<b>CASING</b>	A pipe to support a bore. Usually not a <i>Product Pipe</i> .
<b>CCTV</b>	Closed Circuit Television used to carry out internal inspections and surveys of pipelines
<b>CHEMICAL STABILISATION</b>	Renovation work which involves the sealing of a length of pipeline between two access points by introducing one or more compounds in solution into the pipe and surrounding ground if necessary, producing a chemical reaction. Such systems may perform a variety of functions such as the sealing of cracks and cavities, the provision of a new wall surface with improved hydraulic characteristics or ground stabilisation.
<b>CLOSE-FIT LINING</b>	A lining system in which the new pipe makes close contact with the defective pipe. Typical techniques are those in which in which the liner is temporarily reduced in size by <i>Swaging</i> or folding, and is reverted to its original size after insertion into the <i>Host Pipe</i> .
<b>CROSSING</b>	Trenchless installation in which the primary purpose is to provide one or more passages beneath an obstruction.
<b>CURED-IN-PLACE LINING</b>	A system in which a flexible, fabric tube is impregnated with resin and forced into position against the inner wall of a defective pipeline or other conduit before curing the resin to harden the material. The uncured lining may be installed by winch or inverted by water or air pressure. Linings may be structural or supplementary to the existing pipeline.

**CURED-IN-PLACE PIPE (CIPP)**

An alternative term for *Cured-in-Place Lining*, usually implying structural renovation.

**CUTTING HEAD**

Any tool or system of tools on the end of the *Drill String* which excavates at the face of a bore. Usually applies to mechanical methods of excavation. Also referred to as the *Drill Head*.

**DEFORMED AND RESHAPED LINERS**

An alternative description of liners which are temporarily reduced in overall size during insertion, and then reverted close to their original size. See *Close-Fit Lining*, *Swaged Liners* and *Fold & Form Liners*.

**DIRECTIONAL DRILLING**

A steerable system for the installation of pipes, conduits and cables in a shallow arc using a surface-launched drilling rig. Traditionally the term applies to large-scale crossings in which a fluid filled pilot bore is drilled without rotating the *Drill String*, and this is then enlarged by a *Washover Pipe* and *Back Reamer* to the size required for the *Product Pipe*. The required deviation during pilot boring is provided by the positioning of a *Bent Sub*. Tracking of the *Drill String* is achieved by the use of a downhole survey tool. The terms *Directional Drilling* and *Guided Boring* have more recently tended to overlap, the latter formerly referring to smaller-scale equipment and applications. The term Directional Boring is also used by some exponents, and it is probably unwise nowadays to infer anything about the scale of the operation from the terminology.

**DRILL HEAD**

An alternative term for *Cutting Head*.

**DRILLING FLUID/MUD**

A mixture of water and usually bentonite or polymer continuously pumped to the *Cutting Head* to facilitate the removal of excavated material, stabilise the borehole, cool the head and lubricate the installation of the *Product Pipe*. In suitable ground conditions water alone may be used.

**DRILL STRING**

The entire span of drill pipes or rods connected together between the drilling machine and the *Cutting Head*.

**DRIVE SHAFT/PIT**

Chamber or excavation from which trenchless equipment is launched for the installation or renovation of a pipeline, conduit or cable. It may incorporate a *Thrust Wall* to spread reaction loads to the ground. Also known as *Entry Shaft/Pit* or *Launch Shaft/Pit*.

**DRY BORING**

Any drilling system not employing *Drilling Fluid*. Usually associated with guided *Impact Molding*, but also with some rotary methods.

**EARTH PIERCING**

An alternative term for *Impact Molding*.

**EARTH PRESSURE BALANCE (EPB) MACHINE**

Type of *Microtunnelling* or tunnelling machine in which mechanical pressure is applied to the material at the face and controlled to provide the correct counterbalance to earth pressure in order to prevent heave or subsidence. The term is usually not applied to those machines where the pressure originates from the main *Pipe Jacking* rig in the *Drive Shaft/Pit* or to systems in which the primary counterbalance of earth pressures is supplied by pressurised *Drilling Fluid* or slurry.

<b>ENTRY/EXIT ANGLE</b>	In a <i>Directional Drilling</i> or <i>Guided Boring</i> system, the angle to the ground surface at which the <i>Drill String</i> enters and exits in forming the pilot bore.
<b>ENTRY SHAFT/PIT</b>	An alternative term for <i>Drive Shaft/Pit</i> .
<b>EXIT SHAFT/PIT</b>	Chamber or excavation into which trenchless technology equipment is driven and recovered following the installation or renovation of the <i>Product Pipe</i> , conduit or cable. Also known as <i>Reception Shaft/Pit</i> .
<b>EXPANDER</b>	A tool which enlarges a bore during a <i>Pull-Back</i> operation by compression of the surrounding ground rather than by excavation. Sometimes used during a thrusting process as well as during pull-back. The term may also be applied to a bursting head used to break out an existing pipe during <i>On-Line Replacement</i> .
<b>FERROCEMENT</b>	Materials comprising cementitious and steel elements either placed in situ by <i>Man-Entry</i> work to form a structural lining, or pre-formed into segments for later installation.
<b>FLUID ASSISTED BORING/DRILLING</b>	A type of <i>Guided Boring</i> technique using a combination of mechanical drilling and pressurised fluid jets to provide the soil cutting action.
<b>FLUID JET CUT</b>	See <i>Jet Cutting</i> .
<b>FOLD &amp; FORM LINERS</b>	A term used to describe some systems in which the liner is folded to reduce its size during insertion, and then reverted to its original shape by the application of pressure and/or heat. See <i>Close-Fit Lining</i> .
<b>FREE BORING</b>	<i>Auger Boring</i> without a <i>Casing</i> .
<b>GPR</b>	Ground Penetrating Radar, used to locate sub-surface discontinuities from ground level or from within a pipeline.
<b>GROUTING</b>	Filling of the annular space between the <i>Host Pipe</i> and the new <i>Product Pipe</i> . Grouting is also used to fill the space around the laterals and between the new pipe and manholes. Other uses of grouting are for <i>Localised Repairs</i> of defective pipes and ground improvement prior to excavation during new installations.
<b>GUIDED AUGER BORING</b>	A term applied to <i>Auger Boring</i> systems which are similar to <i>Microtunnelling</i> , but with the guidance mechanism actuator sited in the <i>Drive Shaft</i> (e.g. a hydraulic wrench which turns a steel casing with an asymmetric face at the cutting head). The term may also be applied to those auger boring systems with rudimentary articulation of the casing near the head activated by rods from the drive pit.
<b>GUIDED BORING</b>	A steerable system for the installation of pipes, conduits and cables using a surface- or pit-launched drilling rig. A <i>Pilot Bore</i> is drilled by a rotating <i>Drill String</i> and is then enlarged by a <i>Back Reamer</i> to the size required for the <i>Product Pipe</i> . The necessary deviation during the pilot boring is provided by an asymmetric drill head, eccentric fluid jets or a combination of both, usually in conjunction with a <i>Locator</i> . Although originally referring to different ends of the market, the terms <i>Guided Boring</i> and <i>Directional Drilling</i> are nowadays often treated as interchangeable.

<b>HORIZONTAL DIRECTIONAL DRILLING (HDD)</b>	See <i>Directional Drilling</i> .
<b>HOST PIPE</b>	The original pipe into which a liner is installed. Also sometimes known as <i>Carrier Pipe</i> .
<b>IMPACT MOLING</b>	The use of a tool which comprises a percussive hammer within a suitable casing, generally of torpedo shape. The hammer may be pneumatic or hydraulic. The term is usually associated with no-steered or limited steering devices without rigid attachment to the launch pit, relying upon the resistance (friction) of the ground for forward movement. During operation the soil is displaced, not removed. An unsupported bore may be formed in suitable ground, or a pipe drawn or pushed in, behind the impact moling tool. Cables may also be drawn in. The term <i>Earth Piercing</i> is commonly used in North America as an alternative to Impact Moling.
<b>IMPACT RAMMING</b>	Alternative term to <i>Pipe Ramming</i> .
<b>INFILTRATION</b>	Water from the surrounding ground which enters through cracks or defective joints in a pipeline or its lateral connections and chambers.
<b>INFILTRATION/ INFLOW (I/I)</b>	The total quantity of water from infiltration and inflow without distinguishing the source.
<b>INTERJACK PIPES</b>	Pipes specially designed for use with an <i>Intermediate Jacking Station</i> .
<b>INTERMEDIATE JACKING STATION</b>	A fabricated steel shield incorporating hydraulic jacks designed to operate between <i>Interjack Pipes</i> to provide incremental thrust on long drives.
<b>INTERNAL INSPECTION</b>	Means of ascertaining the condition of pipelines, either by <i>Man-Entry</i> visual inspection or by the use of remote-control equipment such as CCTV.
<b>JACKING FORCE</b>	Force applied to pipes in a <i>Pipe Jacking</i> operation.
<b>JACKING PIPES</b>	Pipes designed to be installed using Pipe Jacking techniques.
<b>JACKING SHIELD</b>	A fabricated steel cylinder from within which the excavation is carried out either by hand or machine. Incorporated within the shield are facilities which allow it to be adjusted to control line and level.
<b>JET CUTTING</b>	A type of <i>Guided Boring</i> technique using pressurised fluid jets to provide the soil cutting action.
<b>LAUNCH SHAFT/PIT</b>	An alternative term for <i>Drive Shaft/Pit</i> .
<b>LEAD PIPE</b>	The leading pipe manufactured to fit the rear of a <i>Jacking Shield</i> and over which the trailing end of the shield is fitted.
<b>LINING</b>	An internal coating or tube used to rehabilitate a pipeline without excavation.
<b>LIVE INSERTION</b>	Installation of a liner, usually into a gas pipeline, whilst the <i>Host Pipe</i> remains in service. Also referred to as On-Line Renovation.
<b>LOCALISED REPAIR</b>	Repair work on a pipe, particularly a sewer, for lengths less than the distance between two access points.

<b>LOCATOR</b>	An electronic instrument used to determine the position and strength of electromagnetic signals emitted from a transmitter sonde fitted behind the <i>Cutting Head</i> of a boring system, in an <i>Impact Molding</i> tool or from existing underground services. Sometimes referred to as a <i>Walkover System</i> .
<b>MAN-ACCESSIBLE</b>	Description of a pipe, chamber or excavation which can be entered by an operative, subject to legal and regulatory constraints. If the size is below the minimum required for <i>Man-Entry</i> , regulations may define limitations such as the maximum distance from a safe access point, the time for which access is permitted and the number and location of trained operatives in the support team.
<b>MAN-ENTRY</b>	Description applied to any trenchless process which requires an operative to enter a pipeline, duct or bore. The minimum size for which this is permissible may be defined by local legislation. See also <i>Man-Accessible</i> .
<b>MICROTUNNELLING</b>	Steerable, remote control <i>Pipe Jacking</i> to install pipes of internal diameter less than that permissible for <i>Man-Entry</i> .
<b>MEASUREMENT WHILE DRILLING (MWD)</b>	Borehole survey instrumentation that provides continuous information simultaneously with drilling operations, usually transmitting to a display at or near the drilling rig.
<b>MIDI-RIG</b>	Intermediate sized, steerable, surface-launched drilling equipment for the installation of pipes, conduits and cables. Tracking of the <i>Drill String</i> may be achieved by either a downhole <i>Survey Tool or Locator</i> .
<b>MODIFIED SLIPLINING</b>	An alternative term for <i>Close Fit Lining</i> .
<b>MOLE</b>	See <i>Impact Molding</i> .
<b>MOLE PLOUGHING</b>	Laying a pipeline by pulling a plough through the ground whilst a continuous length of pipe is fed into the top of the plough and buried from the tail.
<b>ON LINE RENOVATION</b>	See <i>Live Insertion</i> .
<b>ON-LINE REPLACEMENT</b>	The breaking out of an existing pipeline and the installation of a new pipeline on the same line.
<b>OPEN CUT</b>	The method by which access is gained by excavation from ground level to the required level underground for the installation, maintenance or inspection of a pipe, conduit or cable. The excavation is then backfilled and the surface reinstated.
<b>OVALITY</b>	The difference between the maximum and minimum diameter divided by the mean diameter at any cross section of a pipeline, generally expressed as a percentage.
<b>PATCH REPAIR</b>	A type of <i>Localised Repair</i> in which a short sleeve of resin-impregnated material is positioned within the <i>Host Pipe</i> and cured.
<b>PERCUSSIVE MOLING</b>	See <i>Impact Molding</i> .

<b>PILOT BORE</b>	The action of creating the first (usually steerable) pass of any boring process which later requires enlarging with a <i>Back-Reamer</i> or similar tool. Most commonly applied to <i>Guided Boring</i> , <i>Directional Drilling</i> and two-pass <i>Microtunnelling</i> systems.
<b>PIPEBURSTING</b>	A technique for breaking the existing pipe by brittle fracture, using mechanical force from within, the remains being forced into the surrounding ground. At the same time a new pipe, of the same or larger diameter, is drawn in behind the bursting tool. The pipebursting device may be based on a pneumatic <i>Impact Molding</i> tool which converts forward thrust into a radial bursting force, or by a hydraulic device inserted into the pipe and expanded to exert direct radial force. See also <i>Pipe Splitting</i> .
<b>PIPE CRACKING</b>	An alternative term for <i>Pipebursting</i> .
<b>PIPE DISPLACEMENT</b>	An alternative term for <i>Pipebursting</i> .
<b>PIPE EATING</b>	A technique, based on <i>Microtunnelling</i> , in which a defective pipe is excavated together with the surrounding ground as for a new installation. The microtunnelling shield machine will usually need some crushing capability to perform effectively. The defective pipe may be filled with grout to improve steering performance. Alternatively, some systems employ a proboscis device to seal the pipe in front of the shield.
<b>PIPE JACKING</b>	A system of directly installing pipes behind a <i>Shield Machine</i> by hydraulic jacking from a <i>Drive Shaft</i> such that the pipes form a continuous string in the ground.
<b>PIPE RAMMING</b>	A non-steerable system of forming a bore by driving a steel <i>Casing</i> , usually open-ended, using a percussive hammer from a <i>Drive Pit</i> . The soil may be removed from an open-ended casing by augering, jetting or compressed air. In appropriate ground conditions a closed casing may be used.
<b>PIPE SPLITTING</b>	Technique for breaking an existing pipe by longitudinal splitting. At the same time a new pipe of the same or larger diameter is drawn in behind the splitting tool.
<b>POINT REPAIR</b>	An alternative term for <i>Localised Repair</i> .
<b>PRECONDITIONING WORK</b>	That part of a project, usually before renovation work, which includes <i>Preparatory Cleaning</i> and <i>Internal Inspection</i> .
<b>PREPARATORY CLEANING</b>	Internal cleaning of pipelines, particularly sewers, prior to inspection, usually with <i>Water Jetting</i> and removal of material where appropriate.
<b>PRODUCT PIPE</b>	Permanent pipeline for operational use.
<b>PULL-BACK</b>	That part of a <i>Guided Boring</i> or <i>Directional Drilling</i> process in which the <i>Drill String</i> is pulled back through the bore to the starting point, usually installing the <i>Product Pipe</i> at the same time.
<b>PULL-BACK FORCE</b>	The tensile load applied to a <i>Drill String</i> during the <i>Pull-Back</i> process. <i>Guided Boring</i> and <i>Directional Drilling</i> rigs are generally rated by their maximum pull-back force.
<b>RECEPTION SHAFT/PIT</b>	An alternative term for <i>Exit Shaft/Pit</i>

<b>REHABILITATION</b>	The improvement or restoration of a pipeline by any means, trenchless or otherwise, which incorporates the fabric of that pipeline and is aimed at enhancing its performance and extending its life. Rehabilitation may address structural and/or hydraulic weakness.
<b>REINSTATEMENT</b>	The backfilling, compaction and re-surfacing of any excavation in order to restore the surface and underlying structure to enable it to perform its original function.
<b>RENOVATION</b>	The <i>Rehabilitation</i> of a pipeline by trenchless methods.
<b>RE-ROUNDING</b>	A preparatory process which involves the insertion of an expansion device into a distorted pipe to return it to a circular cross-section. This is usually carried out prior to the insertion of a permanent liner or supporting band.
<b>RESIN INJECTION</b>	The <i>Localised Repair</i> of pipes, usually sewers, by injection of a resin formulation into cracks or cavities, which subsequently cures to prevent leakage and further deterioration. It may also increase the structural strength of the pipeline.
<b>ROBOT</b>	A remote control device with closed circuit television ( <i>CCTV</i> ) monitoring, used mainly for <i>Localised Repair</i> work such as cutting away obstructions, reopening lateral connections, injecting resin into cracks and cavities, grinding and re-filling.
<b>ROD PUSHING</b>	See <i>Thrust Boring</i> .
<b>SEGMENTAL LINING</b>	The use of prefabricated segments in <i>Man-Entry</i> work to form a new lining within a defective pipe. The segments are usually sealed at the joints and the annulus grout-filled to bond with the defective pipe.
<b>SLEEVE PIPE</b>	A pipe installed as external protection to a <i>Product Pipe</i> .
<b>SLIPLINING</b>	Insertion of a new pipe by pulling or pushing it into the existing pipe, usually followed by grouting the annular space. The pipe used may be continuous or a string of discrete pipes. This latter is also referred to as segmental sliplining.
<b>SOFT LINING</b>	An alternative term for <i>Cured-In-Place Lining</i> .
<b>SONAR</b>	A pipeline survey technique using high frequency sound to establish the internal profile of a pipe. Most sonar systems are designed to work underwater rather than in air.
<b>SPIRAL LINING</b>	A technique in which a ribbed plastic strip is spirally (or helically) wound by a winding machine to form a liner which travels up the <i>Host Pipe</i> as further turns of the helix are added. The annular space may be grouted or the spiral liner expanded to reduce the annulus and form a <i>Close-Fit Liner</i> . In larger diameters the liner may be produced from within the host pipe by manually forming the plastic strip into a helix.
<b>SPRAY LINING</b>	A technique for applying a lining of cement mortar or resin by rotating a spray head which is winched through the existing pipeline.
<b>SSES</b>	Sewer System Evaluation Survey of tributary sewer systems with levels of <i>Infiltration and Inflow</i> .
<b>SURVEY TOOLS</b>	Downhole equipment and instruments used to determine the position of a bore in <i>Directional Drilling</i> or site investigation.

<b>SWAGED LINERS</b>	Polyethylene liners whose diameter is reduced prior to insertion by passing them through dies or rollers. This may be carried out in a factory or on site as part of the installation process. Once installed, the liner is reverted to its original size by internal pressure. See <i>Close-Fit Lining</i> .
<b>TARGET SHAFT/PIT</b>	An alternative term for <i>Exit Shaft/Pit</i> .
<b>THRUST BORING</b>	A method of forming a <i>Pilot Bore</i> by driving a closed pipe or head from a <i>Thrust Pit</i> into the soil which is displaced. Some small diameter models have steering capability achieved by a slanted pilot-head face and electronic monitoring, generally in conjunction with a Locator. Back reaming may be used to enlarge the pilot bore.
<b>THRUST PIT</b>	An alternative term for <i>Drive Pit</i> .
<b>TRENCHING</b>	An alternative term for <i>Open Cut</i> .
<b>TRENCHLESS TECHNOLOGY</b>	Techniques for the installation, replacement, renovation and repair of pipes, ducts, cables and other underground apparatus with minimum excavation from the ground surface. May also include associated techniques such as leak detection, inspection and location of existing infrastructure.
<b>TUNNEL BORING MACHINE (TBM)</b>	A full-face circular mechanised shield machine, usually of <i>Man-Entry</i> diameter, steerable and with a rotary cutting head. For pipe installation it leads a string of jacked pipes. It may be controlled from within the shield or remotely.
<b>UNCASED BORE</b>	Any bore without a lining or pipe inserted, i.e, self-supporting, whether temporary or permanent.
<b>UPSIZING</b>	Any method which increases the cross-sectional area of an existing pipeline by replacing with a larger diameter pipe.
<b>WALKOVER SYSTEM</b>	See <i>Locator</i> .
<b>WASHOVER PIPE</b>	A rotating drill pipe of larger diameter than the pilot drill and placed around it with its leading edge less far advanced. Its purpose is to provide stiffness to the drilling pipe in order to maintain steering control over long bores, to reduce friction between the <i>Drill String</i> and the soil and to facilitate mud circulation. See <i>Directional Drilling</i> .
<b>WATER JETTING</b>	Internal cleansing of pipelines using jets of water at high pressure.