Claims

[Claim 1] A method of extracting water from a wick drain embedded in soil and at least partially below the water table, comprising: allowing the water to enter the wick drain through a filter along at least part of its length and to flow downwards within the wick drain to an extraction point near the bottom end thereof; forcing a pressurized gas into a gas carrying conduit which passes down the wick drain to enter into a water carrying conduit at a location below the water level therein and above its bottom end; and

whereby the pressurized gas forms bubbles in said water within the water carrying conduit and causes the water to rise to an outlet of said water carrying conduit, thereby extracting the water from the wick drain by gas lifting the water in said water carrying conduit and without forcing the pressurized gas into the water located between the filter and said water carrying conduit.

[Claim 2] The method of claim 1, further including using a connector block for joining the water carrying conduit to the gas carrying conduit, where two ends of a severed water carrying conduit are inserted into respective holes of the connector block and one end of the gas carrying conduit is inserted into the connector block, and using an internal bore of the connector block to connect the gas conduit to the severed water conduit.

[Claim 3] The method of claim 1, further including using a gas carrying conduit installed within the water carrying conduit and forcing gas from the end of the gas carrying conduit at a level some distance above the lower end of the water carrying conduit so as to cause an air lift of water to take place within the carrying water conduit.

[Claim 4] The method of claim 1, further including cojoined conduits, one to carry gas and one to carry water which are linked by a cross hole at some distance above their base so that air from the air carrying conduit may exit into the water carrying conduit and cause air lift pumping to take place therein.

[Claim 5] The method of claim 3 and claim 4 where the outer surface of the conduit(s) are either ribbed or covered with a spacer so as to support a filter sheath over the length of the wick drain and to permit the downward flow of water within the wick drain between the conduit(s) and the filter.

[Claim 6] The method of claim 1, further including consolidating the ground surrounding the wick drain by utilizing the wick drain and air lift pumping to speed the rate of water drainage and to lower the water pressure within the wick drain, and in particular to lower the water pressure within the wick drain to below a hydrostatic pressure existing below the ground surface.

[Claim 7] The method of claim 1, further including incorporating the gas carrying conduit and the water carrying conduit of the air lift system into the wick drain prior to installation of the wick drain into the ground.

[Claim 8] The method of claim 2, further including a connector block which is included within the wick drain which connects an upper and lower portion of the water carrying conduit to a gas carrying conduit thus diverting compressed air to the water carrying conduit to form an air lift pump.

[Claim 9] The method of claim 2, including cutting filter fabric which defines a filter sheath covering the wick drain and covering the cut made in the filter sheath of the wick drain so that soil does not enter beneath the filter sheath.

[Claim 10] The method of claim 9, whereby the cover of the cut in the filter sheath is made using adhesive tape.

[Claim 11] The method of claim 4, where one of a screwed or glued plug is used to seal the gas carrying conduit to prevent gas release outside of the wick drain.

[Claim 12] The method claim 1, further including installing the wick drain in the ground by;
feeding the wick drain through a mandrel and attaching the wick drain to an anchor plate;
inserting the mandrel into the soil; and withdrawing the mandrel from the soil, while leaving the wick drain inserted in the soil and held thereto by the anchor plate.

[Claim 13] A wick drain incorporating an air-lift system therein, comprising:
a liquid-carrying conduit having a liquid inlet and
a liquid outlet, said liquid inlet for insertion into a liquid to be extracted from said wick drain;
a gas-carrying conduit having a gas inlet and a gas outlet;
a connection means for connecting said gas-carrying conduit to said liquid-carrying conduit to permit gas to pass from the gas-carrying conduit to the said liquid-

carrying conduit;

a filter fabric housing, said liquid-carrying conduit and said gas-carrying conduit connected thereto; and

wherein a gas supplied into the gas-carrying conduit passes from said gas outlet through the connection means into the liquid-carrying conduit and injected into the liquid carried by said liquid-carrying conduit, thereby causing liquid to be drawn into the liquid inlet of said liquid-carrying conduit and carried upwardly to the liquid outlet, whereby the liquid in the wick drain is extracted therefrom.

[Claim 14] The wick drain of claim 13, further including a flow control and overflow shut off system between the compressed air line and the gas inlet, said flow control configured to control the flow of compressed air into the gas inlet of said gas-carrying conduit.

[Claim 15] Use of a plurality of wick drains to carry out the method of any one of claims 1 to 12 to dewater and consolidate a broad area of ground.