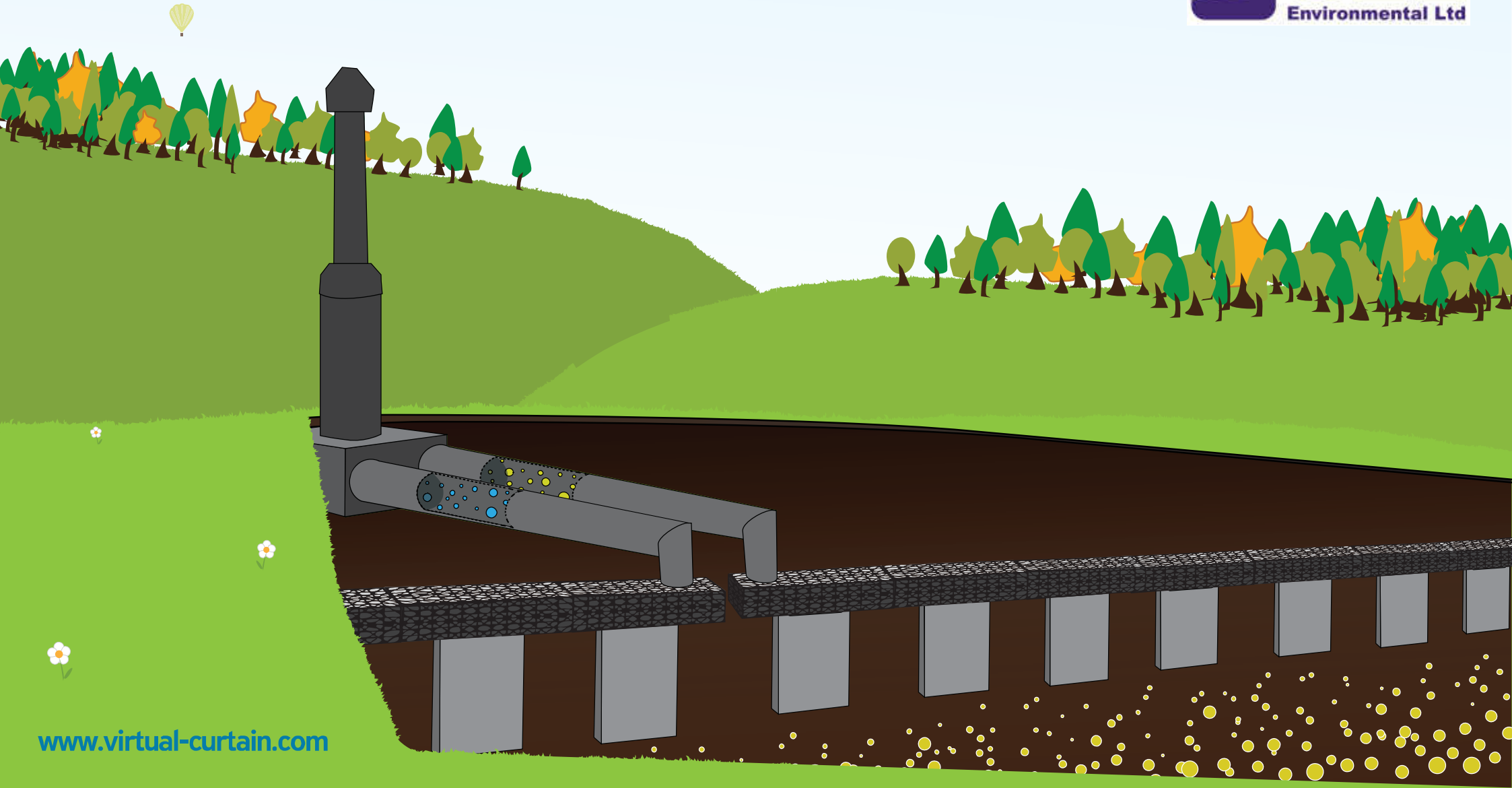


# THE VIRTUAL CURTAIN

## GAS MIGRATION BARRIER

**VIRTUAL  
CURTAIN**  
gas migration solutions



# THE VIRTUAL CURTAIN

## INTRODUCTION

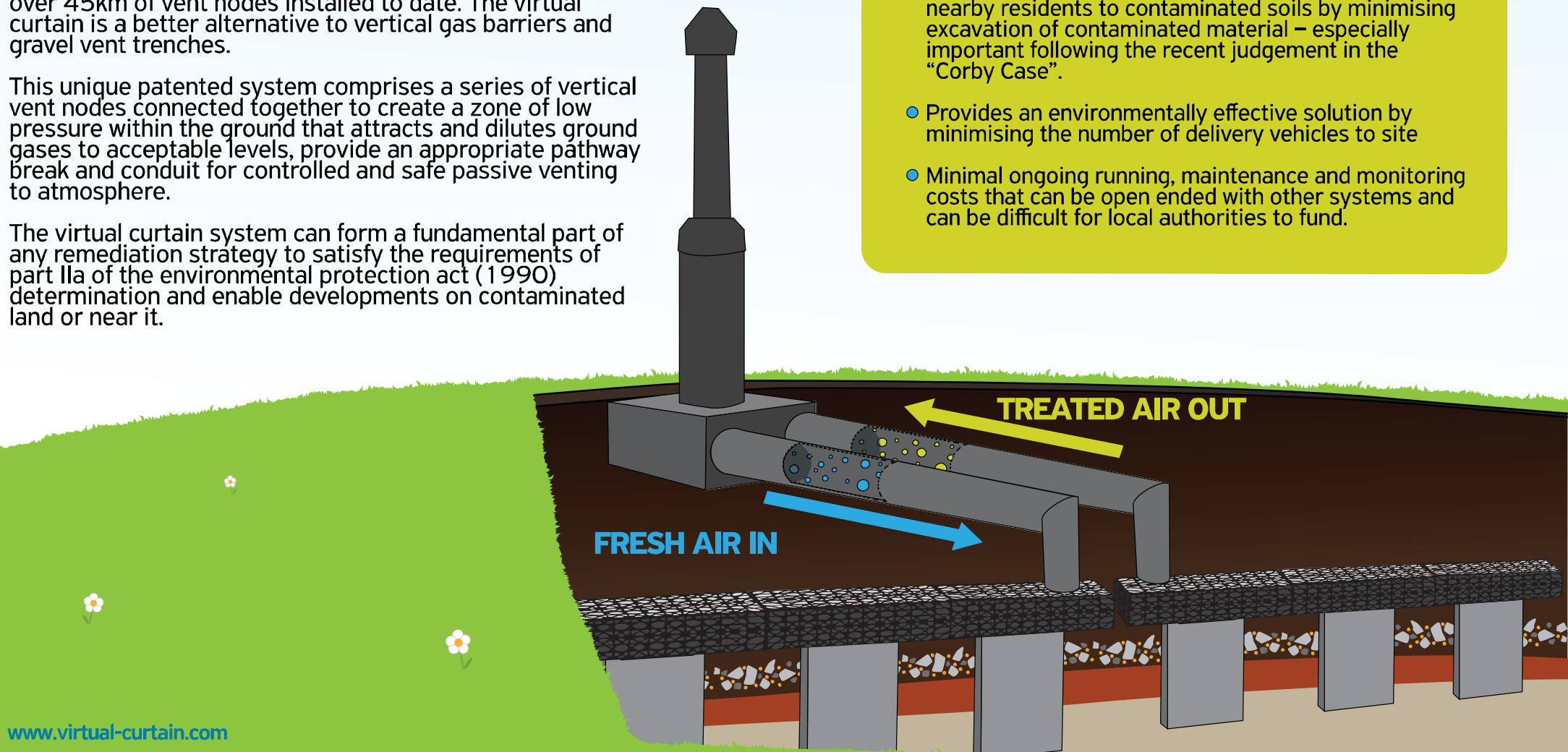
The SEL Virtual Curtain Gas Migration system is the ideal solution to intercept, treat and control lateral migrating ground gases. The system has been used on numerous commercial and residential projects, on or near brownfield development sites over the last 20 years with over 45km of vent nodes installed to date. The virtual curtain is a better alternative to vertical gas barriers and gravel vent trenches.

This unique patented system comprises a series of vertical vent nodes connected together to create a zone of low pressure within the ground that attracts and dilutes ground gases to acceptable levels, provide an appropriate pathway break and conduit for controlled and safe passive venting to atmosphere.

The virtual curtain system can form a fundamental part of any remediation strategy to satisfy the requirements of part IIa of the environmental protection act (1990) determination and enable developments on contaminated land or near it.

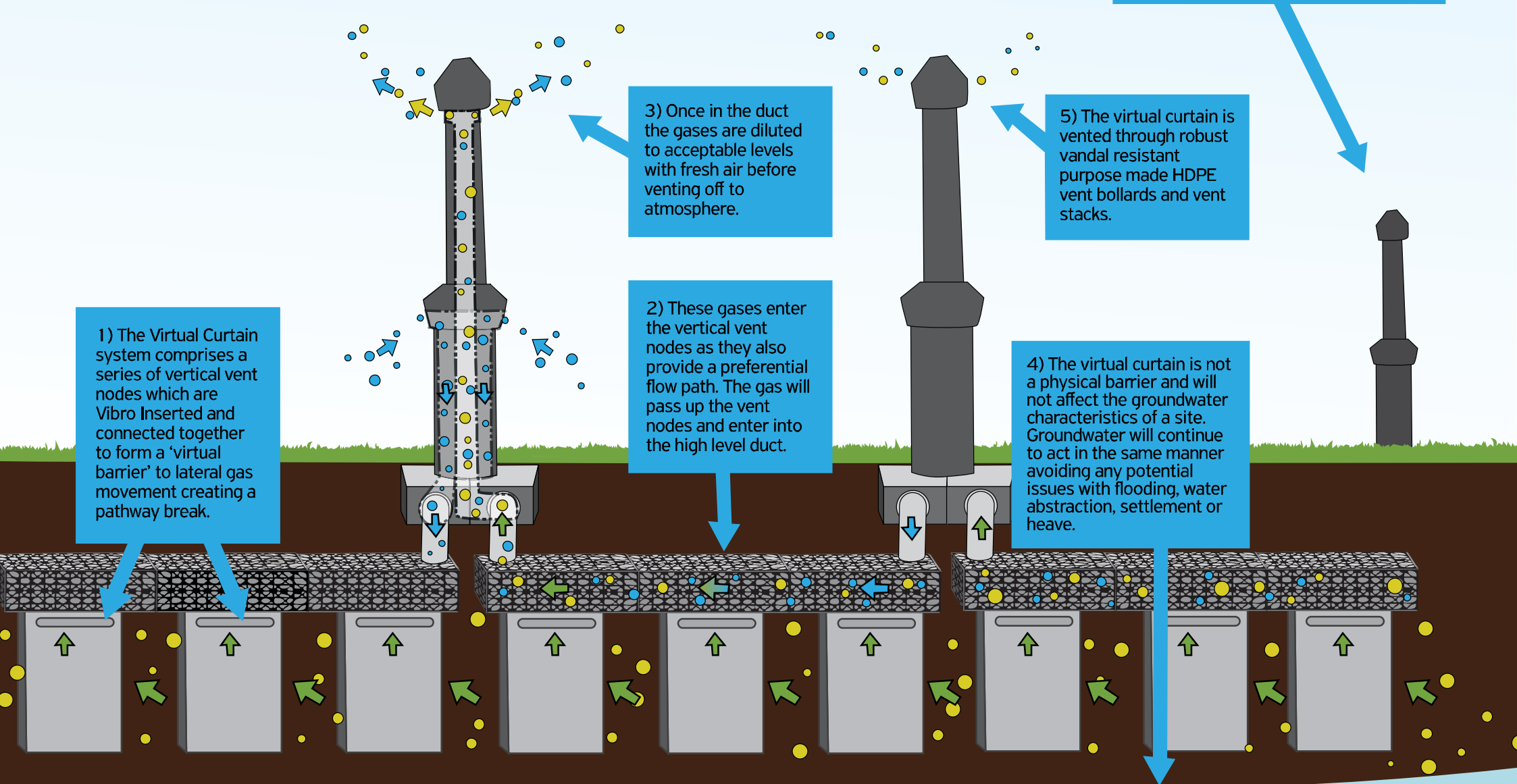
## WHY CHOOSE THE VIRTUAL CURTAIN GAS MIGRATION BARRIER?

- It's a proven and well established method for constructing gas migration barriers.
- It can be designed in accordance with the Local Authority Guide to Ground Gas that will dilute any gas emissions to acceptable levels before leaving the system, thus minimising exposure to nearby residents or users of the site.
- The installation method will minimise exposure of nearby residents to contaminated soils by minimising excavation of contaminated material – especially important following the recent judgement in the “Corby Case”.
- Provides an environmentally effective solution by minimising the number of delivery vehicles to site
- Minimal ongoing running, maintenance and monitoring costs that can be open ended with other systems and can be difficult for local authorities to fund.



# FUNCTION - HOW DOES IT WORK?

THE VIRTUAL CURTAIN USES THE **FORCED DILUTION PRINCIPLE**. USING PASSIVE VENTILATION TECHNIQUES TO CREATE A ZONE OF LOW PRESSURE WITHIN THE GROUND, THE SYSTEM ATTRACTS GASES TOWARDS IT.



# TYPICAL LONG SECTION

High-level gas collection and dilution duct, 354mm x 150mm, length to suit installation. This is formed using a high strength plastic void former which even allows it to be installed directly below roads, access ways or car parks.

The gas collection pipework from duct to vent is connected using a socket box in the high-level duct to provide a secure robust connection.

The duct is normally installed with only 500mm of cover. The duct has a bulk head or break at predetermined centres along it's entire length in accordance with the site specific design. This is the location where the vents are installed.

The vent bollards and vent stacks are installed on lightweight vent bases. The vent bases enhance the performance of the bollard and stacks.

Due to their lightweight, the bases are easily carried by hand which is ideal where site conditions could hinder the access to form a concrete foundation.

The virtual curtain is vented using purpose made vandal resistant 1m high vent bollards or 3m high vent stacks. The vents have been specifically designed and developed for gas venting systems. They are rotationally moulded from HDPE which gives them excellent resistance from corrosion in this harsh environment. The vents are positioned at centres to suit the site specific design.

Vibro Installed vertical vent node driven to depths to suit site specific design. Depths up to 10m from ground level are achievable. The spacings between the vent nodes are determined at the design stage. The vent node spacing can vary from zero and upwards. A 1m spacing is typical.

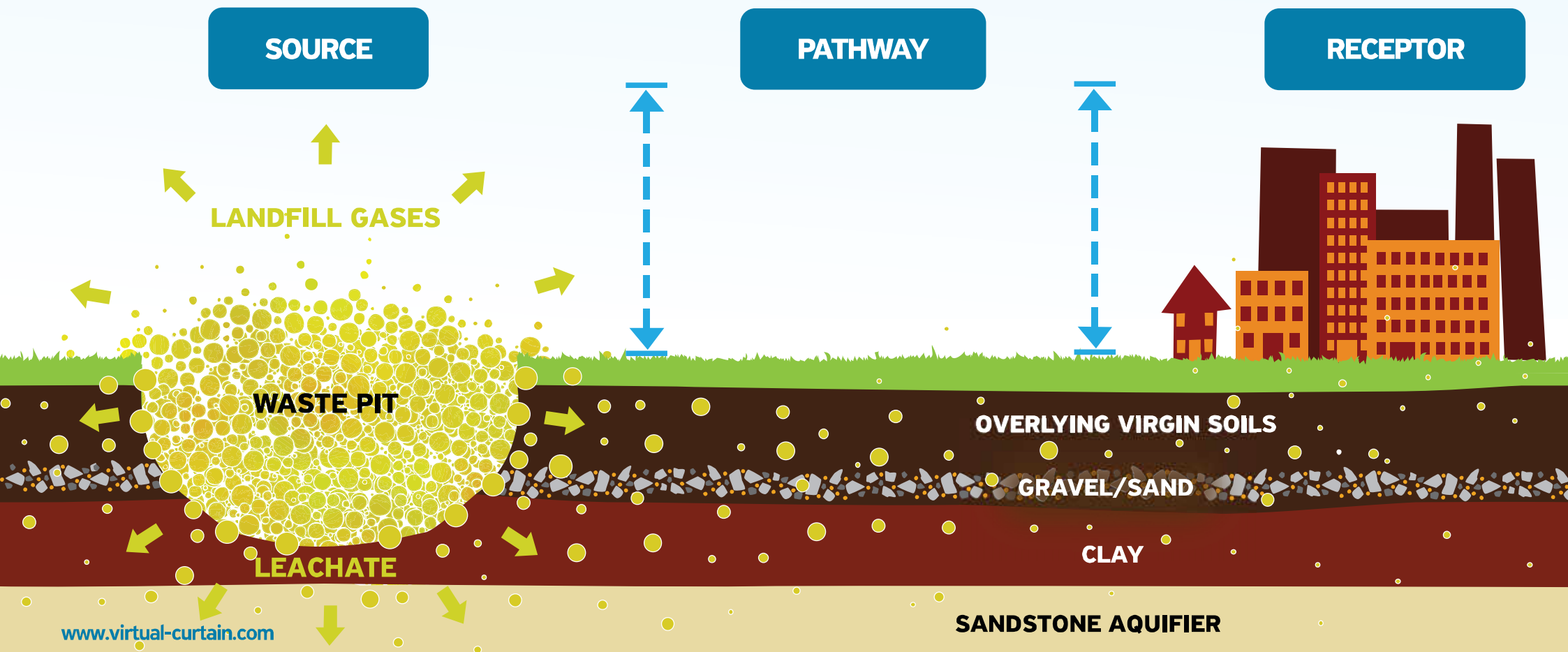


# THE GASSING PROBLEM

## RISK MANAGEMENT CONCEPT SOURCE PATHWAY RECEPTOR

The graphic below illustrates the principle source / pathway / receptor and why the virtual curtain system would be required. Gas is emitted from a source, which could be man-made e.g. A landfill or natural e.g. Peat or Coal measures. The gas will follow a pathway of least resistance to atmosphere, generally pathways are naturally occurring permeable strata, in this example it is sand/gravel. Any new development local to the pathway will be at risk; this is known as the receptor. The receptor could be any development, a house, school, office block or warehouse.

The Virtual Curtain System can provide the perfect solution for this gas migration situation.

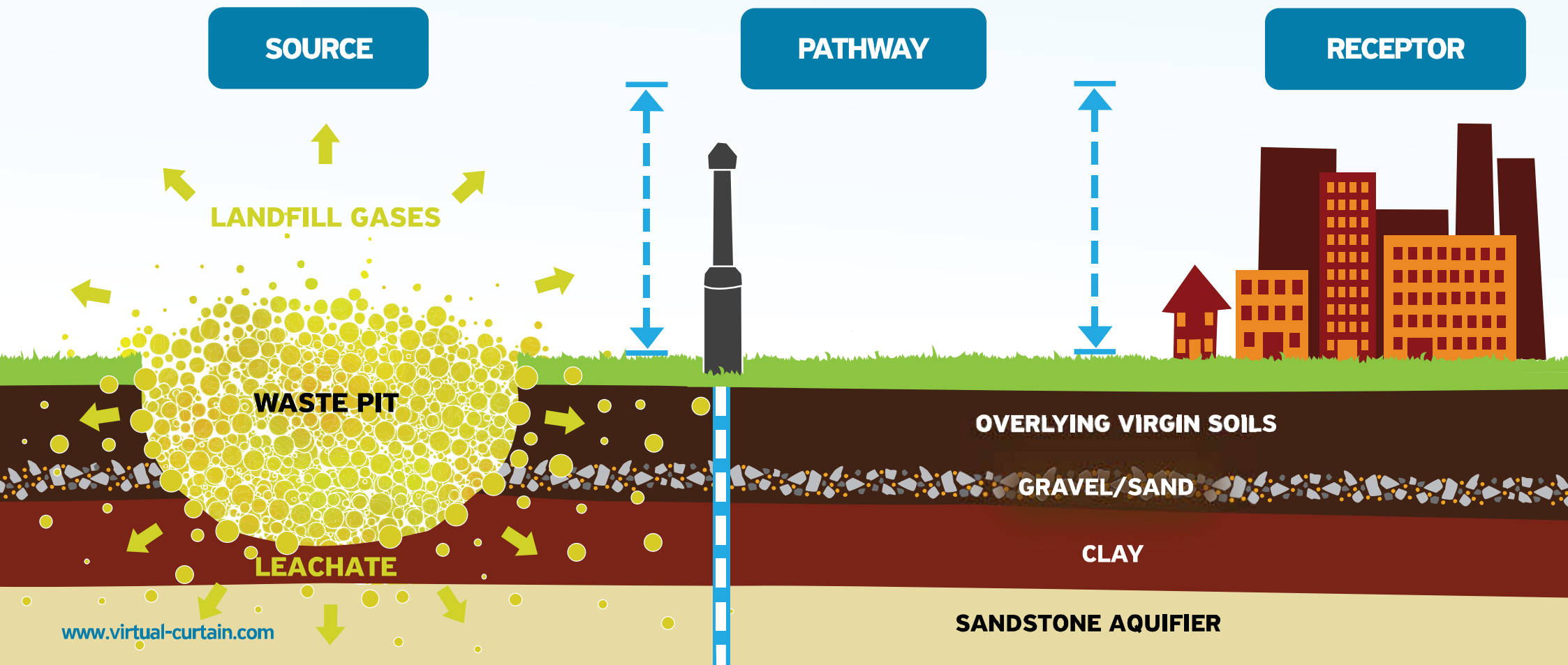


The Virtual Curtain System is installed to intercept the pathway and provide a new preferential pathway (route of least resistance) to atmosphere. The gas emitting from the source will follow the natural pathway to the virtual curtain where it will be intercepted and follow a new pathway (vent node) of lesser resistance than the natural path. The gas will follow the pathway of lesser resistance and the receptor will no longer be at risk.

It is vital that the migration of these gases is managed effectively; failure to do so carries the risk of prosecution and can render some sites uninsurable. A further problem is the high cost of managing gas migration using conventional barriers such as gravel filled trenches and bentonite walls which require the excavation and disposal of large volumes of material that is often contaminated to hazardous waste landfill sites.

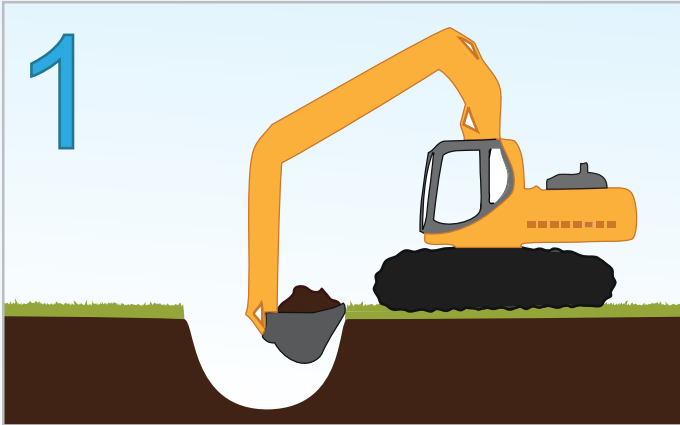
Changing waste management legislation, such as the Landfill Tax Regulations 1996 and the Landfill Regulations 2002, as well as factors such as Aggregate Tax, has increased the difficulty and cost of using such methods. The Virtual Curtain is an efficient and effective solution to lateral gas migration control offering lower costs and superior performance than conventional methods, delivering total asset protection and peace of mind.

# THE GASSING SOLUTION



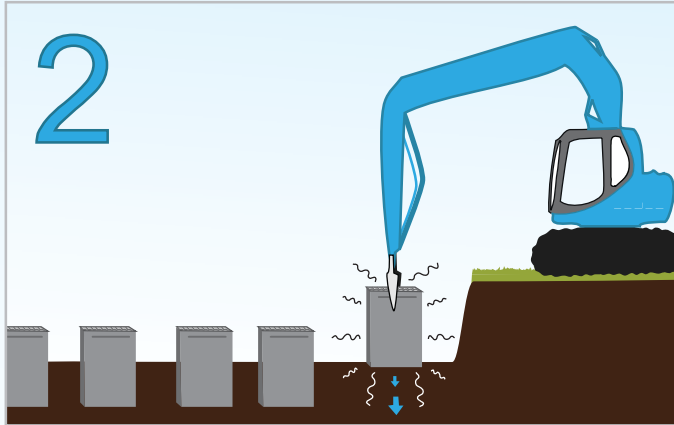
# INSTALLATION SEQUENCE

1



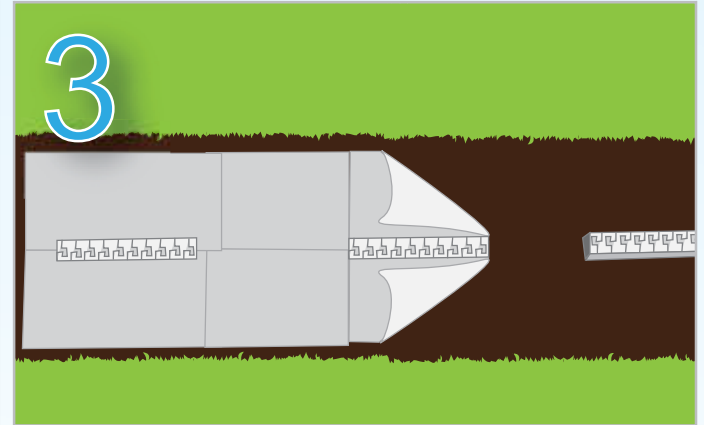
Excavate a shallow trench (650mm deep) to facilitate installation of the vent nodes and install the high-level gas collection and dilution duct.

2



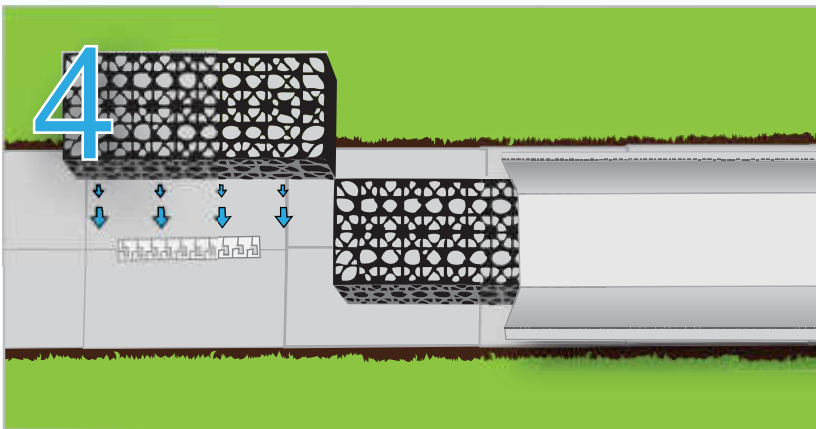
Vibro Insert the vertical vent nodes up to 10m deep.

3



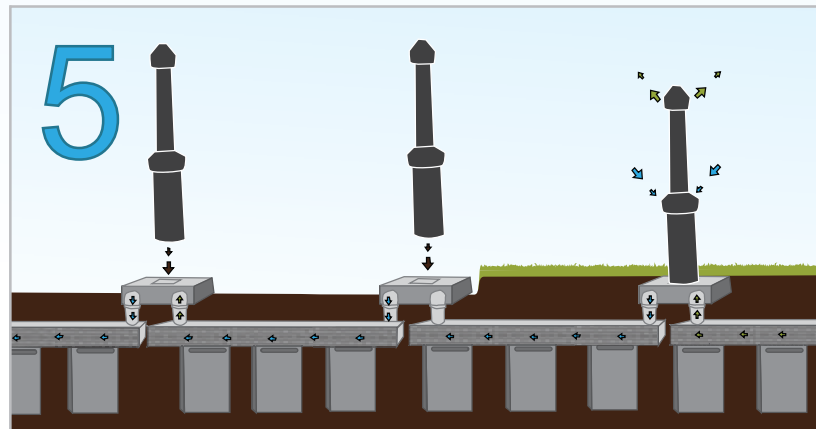
Trim the protruding vent node tails flush with the base of the trench create an interface in readiness for the high level duct.

4



Install high level gas collection, dilution and dispersal duct. This is formed using a high strength plastic void former which has bearing capacity in excess of 70 T/m<sup>2</sup>.

5

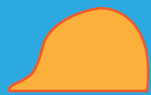


Backfill over the high level duct to original levels, installing the vent bollards / vent stacks as the backfilling progresses along the length of the virtual curtain.





# KEY BENEFITS



## HEALTH & SAFETY/CDM

Minimal exposure to contamination (e.g. Asbestos) for workforce and public.

Gas dispersal is controlled and diluted with fresh air prior to release.

Reduced risk from less vehicle movements and lower plant requirement.

Shallow excavations, less than 0.65m deep.

Minimal open trench required as the installation progresses.

Small working zone made fully secure at the end of each shift.

Robust, vandal resistant dedicated vent terminations, designed for open areas and the school environment.



## ENGINEERING & ENVIRONMENTAL

Minimal generation of excavated material-typically 0.1m<sup>3</sup> per M of installation.

Contaminated ground remains in place.

Any arisings are backfilled over the top duct and regraded to suit original ground levels.

No dewatering requirements.

No impact on site hydrogeology.

No impact on existing foundations.

Replaces the requirement for aggregate venting media.

Reduces traffic servicing the site through the use of composites void formers in lieu of gravel venting media.



## FINANCIAL

Low mobilisation and start-up costs.

Rapid installation will enhance site programme.

Negates the off-site disposal of hazardous waste to landfill.

Minimises importation of granular materials.

Low maintenance requirements post installation.

Minimal site disruption of other trades.

Can be installed while other earth-work operations take place, such as ground improvements.



## SUSTAINABILITY

Reduces the environmental impact of your development as it uses recycled and recyclable materials.

Reduces impact of quarrying through low reliance on aggregates.

Reduces impact of tipping to landfill through no-dig installation method.

Requires significantly less lorry movements to service the site than alternatives considerably reducing your carbon emissions.

Treat the collected gases with fresh air before dispersal to atmosphere.

# PRINCIPAL COMPONENTS

## VENT STACK WITH HIGH AND LOW-LEVEL VENTS



Dimensions:	225mmØ body; 150mmØ riser; 3.5m overall length; 3m installed height
Open Vent Area:	18000sq.mm per vent; upper & lower
Weight:	26.5kg
Composition:	HDPE with stainless steel riser
Product Code:	SELG01104

## VENT BOLLARD WITH HIGH AND LOW-LEVEL VENTS



Dimensions:	225mmØ body; 150mmØ riser; 1.5m overall length; 1m installed height
Open Vent Area:	18000sq.mm per vent; upper & lower
Weight:	5.5kg
Composition:	HDPE
Product Code:	SELG01205

## TOP DUCT ENCAPSULATION



Roll Size:	0.6m x 100m	0.8m x 100m
Weight:	11.7kg	15.6kg
Composition:	Polypropylene	Polypropylene
Product Code:	SELK02025	SELK02026

## VENT NODE



Dimensions:	450mm x 50mm section	354mm x 85mm section
Weight:	1.5kg/m	2.6kg/m
Composition:	HDPE	HDPE / PP
Product Code:	SELVC0202 onwards	SELVC0402 onwards

## VENT NODE DISPOSABLE SHOE



Dimensions:	600mm wide x 75mm x 75mm	354mm x 85mm section
Weight:	5kg	6.1kg
Composition:	Steel	Steel
Product Code:	SELVC0201	SELVC0401

## LIGHTWEIGHT VENT STACK / VENT BOLLARD BASE UNIT



Dimensions:	708mm x 708mm x 300mm high
Weight:	16kg
Composition:	Polypropylene
Product Code:	SELG01402

## TOP DUCT STANDARD UNIT



Dimensions:	708mm x 354mm x 150mm high
Weight:	3kg
Composition:	Polypropylene
Product Code:	SELK01001

## TOP DUCT CONNECTOR UNIT C/W SOCKET



Dimensions:	708mm x 354mm x 150mm high
Weight:	3kg
Composition:	Polypropylene
Product Code:	SELW06407

## GAS COLLECTION 90 DEGREE BEND



Dimensions:	150mm dia x 500mm x 500mm
Weight:	1.2kg
Composition:	HDPE
Product Code:	SELG03212

## GAS COLLECTION PIPEWORK



Dimensions:	150mm dia x 6m length
Weight:	1.3kg/m
Composition:	HDPE
Product Code:	SELG03205

# DESIGN

To comply with current planning policy and the building regulations, any development proposal on or near land affected by gas emissions must be supported by a risk assessment submitted to the local planning authority by the developer (or his consultant). The assessment must include proposals for remediation strategies and show how risks will be reduced to an acceptable level by preventative measures.

In addition, stakeholders in the development need to manage other risks, such as health and safety of construction staff, gas pollution liabilities or other financial risks and a robust design advice is a cornerstone of the risk management and mitigation process. In accordance with the CDM regulations, taking the informed decision to use the virtual curtain dramatically reduces the health and safety risks associated with the traditional alternatives that use open cut trench techniques.

The virtual curtain is specifically designed for each site. Gas types, concentrations and flows are used to calculate the length and spacing of vent nodes that are inserted into the ground and the type of vents and distance between them.

The system is virtually maintenance free and has been widely accepted by regulators all over the uk.

## THE VIRTUAL CURTAIN SYSTEM IS DEvised TO MITIGATE GROUND GASES SUCH AS:

**CH<sub>4</sub>** METHANE

**CO<sub>2</sub>** CARBON DIOXIDE

**CO** CARBON MONOXIDE

**DRO** DIESEL RANGE ORGANICS

**PRO** PETROLEUM RANGE ORGANICS

**VOCs** VOLATILE ORGANIC HYDROCARBONS

## DESIGN REQUIREMENTS

IN ORDER TO DEVELOP A SITE SPECIFIC DESIGNED SOLUTION FOR YOUR PROJECT THE FOLLOWING INFORMATION WOULD BE REQUIRED:

- ⚙ All site investigation data, including historical investigations to enable us to undertake a comprehensive review and desk study.
- ⚙ All gas monitoring and groundwater monitoring information including all historical monitoring information.
- ⚙ Detailed site survey, with a preference for .DWG format to enable us to draw our proposals using CAD.
- ⚙ Details of services, drainage or any other man-made structures that exist on or beneath the site.
- ⚙ Any other relevant information, anecdotal or otherwise that may affect or influence our proposals.
- ⚙ A copy of the part 2A determination document.

## CONSULTANTS

It is important to realise that, in accordance with the CDM regulations, taking the informed decision to use the virtual curtain dramatically reduces the health and safety risks associated with the traditional alternatives that use open cut trench techniques.

The virtual curtain system is installed directly from ground level and consequently there is no requirement for personnel to work within confined spaces, dangerous excavations or to be in contact with contaminated material and leachate.

With the virtual curtain, contaminated material remains in situ eliminating the health, safety and environmental impacts of Excavation, Transportation and off site Tipping.

## SITE VENDORS

If you are considering selling a brown field site from your property portfolio, the virtual curtain system can reduce the overall remediation requirements for future development of the land and can enhance the value of a site to prospective purchasers.

The virtual curtain system is a very cost effective method of dealing with lateral gas migration issues entering and leaving the boundaries of a site.

The licensed installers of the Virtual Curtain system will be able to co-ordinate an appropriate package of mitigation measures.

## SITE PURCHASERS

If you are involved in the acquisition of brownfield sites for development purposes the virtual curtain will enhance the risk management, e.g. Site Remediation, requirements to be taken into account prior to acquisition.

To ensure that the deal is feasible from a commercial standpoint and that acquisition negotiations take account of any requirements for risk management costings for a virtual curtain system can be provided. Contact us on the number below and we will put you in touch with a licensed installer for more assistance.

The virtual curtain system is a very cost effective method of dealing with lateral gas migration issues. Your licensed installer will be able to co-ordinate an appropriate package of mitigation measures to ensure that your land is developed in accordance with regulatory requirements and best practice.



For more information, please contact:

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BB2 4DD

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E:sales@selenvironmental.com