



ARP GEOTECHNICAL
CHARTERED CONSULTING ENGINEERS

S9C/01

CHARLTON PARK BIOGAS

Viable Source - Pathway - Receptor Matrix (Finished Development)

1. A viable source - pathway - receptor matrix is presented for the finished development at Charlton Park Biogas. This addresses the environmental risk.
2. Part II A of the Environmental Protection Act (EPA) 1990 became effective from 1st April 2000. The Regime was introduced by the Contaminated Land (England) Regulations 2000 (SI 2000, No. 227) along with the associated DEFRA Circular February 2000. The objectives of the regime are to ensure that risks associated with contaminated land are reduced to an acceptable level, having regard to the costs of doing so. The costs should be proportionate, manageable and economically sustainable.
3. In assessing risk, it is necessary to consider the probability, or frequency, of occurrence of the hazard and the magnitude/seriousness of the consequences. Consequently, for land to be classified as contaminated, it must have, or be very likely to have, a detrimental effect on humans or the environment before it can be classified as contaminated land.
4. The Environment Agency has published guidance on contaminated land, in the form of online documents referred to as LCRM "Land Contamination Risk Management". The documents are intended to provide the technical framework for structured decision making about land contamination, and to assist all those involved in "managing" the land, in particular landowners, developers, financial service providers, planners and regulators. As the documents currently provide the framework for best practice, the general principles are, therefore, followed in conducting the assessment below.
5. The categorisations of risk adopted in this report are adapted from CIRIA Report C552 (Contaminated Land Risk Assessment: A Guide to Good Practice, 2001). This approach assesses the potential severity of any pollution event and the probability of the event occurring, to arrive at a risk category, for the various potential source - pathway - receptor linkages.

6. It is known that the site is proposed for an Anaerobic Digestion Facility. A Stage 2 Ground Investigation has been consulted for key facts.

Charlton Park Farm, Malmesbury Geo-environmental Report 2018, Report by Enzygo Geoenvironmental Ltd.

The ground conditions on site are Topsoil and Made Ground to 0.30mbgl, over firm (locally soft) clay and medium dense (locally loose) clayey gravelly sands and clayey sands, underlain by firm to stiff clays interpreted in the report as weathered Kellaway Mudstone formation. The site is located within an inner Source Protection Zone associated with a confined aquifer within the Cornbrash Formation. This is confined by the Kellaways Mudstone Formation.

7. Pertinent environmental factors from the geo-environmental investigation are included below:

- No significant mining activities (coal or other) have been identified within 1,000m of the site.
- A limestone quarry is located 494m to the north of the site. This was deemed to be not at risk from, or not a risk to, the site.
- The closest open watercourse is a Tertiary River 105m south of the site, which flows south into the River Avon. This was deemed to not be at risk from the site due to its distance.
- There are no surface water abstractions within 1,000m of the site.
- There are no licensed groundwater abstractions within 500m of the site.
- There are no oil or gas pipelines within 500m of the site. There are no fuel station entries within 250m of the site.

8. The most likely sources of potential contamination generated by the facility are:

- Possible contamination from a leak, spill or deliberate discharge of material from digesters.
- Possible air pollution including odor generation from the various facilities on site.
- Possible contamination from the silage areas on site.

9. The conceptual model needs to consider sources of contamination, pathways along which contaminants could migrate and the receptors, which may become exposed. Guidance published by the Environment Agency has been consulted with regard to pathways and receptors. The potential sources, pathways, and receptors, applicable to the proposed development are identified on the table below. Any pathways in italics are deemed not to be viable, and the reason given.

Contamination Sources	Pathways	Receptors	Severity of Consequence	Probability of Event	Risk
Possible contamination from a leak, spill or deliberate discharge of material from digesters	<ul style="list-style-type: none"> Inhalation, ingestion and dermal contact with soil and dust 	Humans:- <ul style="list-style-type: none"> Maintenance workers Adjacent residents and general public 	Medium	Low Likelihood	Moderate/ Low
	<ul style="list-style-type: none"> Fruit and vegetable intake, with soil (agricultural crops) 	Humans (as above)	Medium	Low Likelihood	Moderate/ Low
	<ul style="list-style-type: none"> Vapour inhalation outdoor 	Humans (as above)	Medium	Unlikely	Low
	<ul style="list-style-type: none"> Migration in surface water 	Surface water (nearest 105m to south. There are no abstractions within 1km)	Mild	Unlikely	Very Low
	<ul style="list-style-type: none"> Migration in groundwater 	<ul style="list-style-type: none"> Groundwater (Confined aquifer well beneath site, reduced permeability, no abstractions within 1km) 	Mild	Unlikely	Very Low
	<ul style="list-style-type: none"> Root uptake 	Vegetation:- <ul style="list-style-type: none"> Agricultural fields 	Medium	Low Likelihood	Moderate/ Low
	<ul style="list-style-type: none"> Migration 	Services/Utilities:- <ul style="list-style-type: none"> Potable water supply 	Mild	Unlikely	Very Low
Silage stores	<ul style="list-style-type: none"> Explosive risk 	<ul style="list-style-type: none"> Construction/demolition workers Buildings 	Medium	Low Likelihood	Moderate/ Low
Possible air pollution and odour generation from liquid holding tanks (Receiver tanks)	<ul style="list-style-type: none"> Migration into atmosphere 	Humans:- <ul style="list-style-type: none"> Maintenance workers Adjacent residents and general public 	Mild	Unlikely	Very Low
	<ul style="list-style-type: none"> Explosive risk 	<ul style="list-style-type: none"> Construction/demolition workers Buildings 	Mild	Unlikely	Very Low
Possible air pollution from a gas leak from the Digester Tanks and associated pipe works.	<ul style="list-style-type: none"> Explosive risk 	<ul style="list-style-type: none"> Construction/demolition workers Buildings 	Medium	Unlikely	Low
	<ul style="list-style-type: none"> Vapour inhalation outdoor 	Humans (as above)	Medium	Unlikely	Low
	<ul style="list-style-type: none"> Migration in surface water 	Surface water (nearest 105m to south. There are no abstractions within 1km)	Mild	Unlikely	Very Low
	<ul style="list-style-type: none"> Migration in groundwater 	<ul style="list-style-type: none"> Groundwater (Confined aquifer well beneath site, reduced permeability, no abstractions within 1km) 	Mild	Unlikely	Very Low
Waste storage bags/lagoons	<ul style="list-style-type: none"> Migration in surface water 	Surface water (nearest 105m to south. There are no abstractions within 1km)	Mild	Unlikely	Very Low
	<ul style="list-style-type: none"> Migration in groundwater 	<ul style="list-style-type: none"> Groundwater (Confined aquifer well beneath site, reduced permeability, no abstractions within 1km) 	Mild	Unlikely	Very Low