Quality Protocol

Anaerobic digestate

End of waste criteria for the production and use of quality outputs from anaerobic digestion of source-segregated biodegradable waste

www.doeni.gov.uk/niea

This Quality Protocol was funded by Defra, the Welsh Government and the Northern Ireland Environment Agency (NIEA) as a business resource efficiency activity. It was developed by the Environment Agency and WRAP (Waste & Resources Action Programme) in consultation with Defra, Natural Resources Wales, NIEA, industry and other regulatory stakeholders. The Quality Protocol is applicable in England, Wales and Northern Ireland. It sets out criteria for the production and use of quality outputs from anaerobic digestion of source-segregated biodegradable waste.

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Background

Uncertainty over the point at which waste has been fully recovered and ceases to be waste within the meaning of Article 3(1) of the EU Waste Framework Directive (WFD) (2008/98/EC) has inhibited the development and marketing of materials produced from waste which could be used beneficially without damaging human health and the environment. In some cases, this uncertainty has also inhibited the recovery and recycling of waste and its diversion from landfill.

Interpretation of EU legislation is ultimately a matter for the Courts and there is now a substantial body of case law on the interpretation of the definition of waste in Article 1(1) of the Waste Framework Directive. Drawing on the principles established in this case law, it is possible to identify the point at which certain wastes cease to be waste and thus when the Waste Framework Directive's waste management controls no longer apply.

What is a Quality Protocol?

A Quality Protocol sets out criteria for the production of a product from a specific waste type. Compliance with these criteria is considered sufficient to ensure that the fully recovered product may be used without undermining the effectiveness of the Waste Framework Directive and therefore without the need for waste management controls. In addition, the Quality Protocol indicates how compliance may be demonstrated and points to best practice for the use of the fully recovered product. The Quality Protocol and good practice will ensure that the aims of the Waste Framework Directive are not undermined.

A Quality Protocol further aims to provide increased market confidence in the quality of products made from waste and so encourage greater recovery and recycling.

1. Introduction

1.1 What is this Quality Protocol?

Definitions of terms that appear in italics when they are first used in this Quality Protocol are given in Appendix A.

1.1.1 This Quality Protocol has been developed by the Environment Agency and WRAP (Waste & Resources Action Programme) in consultation with industry and other regulatory stakeholders. It is applicable in England, Wales and Northern Ireland.

1.1.2 The Quality Protocol sets out criteria for the production of *quality digestate from anaerobic digestion* of source-segregated biodegradable waste *(biowaste)*. Quality digestate from *anaerobic digestion* include the *whole digestate*, in addition to any subsequently separated fibre or liquor fractions. If these criteria are met, quality outputs from anaerobic digestion will normally be regarded as having been fully recovered and to have ceased to be waste.

1.1.3 *Producers and users* are not obliged to comply with the Quality Protocol. If they do not, the outputs from anaerobic digestion will normally be considered to be waste and *waste management controls* will apply to their handling, transport and application[1].

1.2 The purpose of the Quality Protocol

1.2.1 This Quality Protocol has three main purposes:

i. to clarify the point at which waste management controls are no longer required;

ii. to provide users with confidence that the quality digestate they purchase conforms to an *approved standard*; and

iii. to protect human health and the environment (including soil) by describing acceptable good practice for the use of quality digestate in *agriculture, forestry,* soil/field-grown *horticulture* and in *land restoration*.

1.3 Complying with the Quality Protocol

1.3.1 The outputs from anaerobic digestion will normally be regarded as having ceased to be waste, and therefore no longer subject to waste management controls, provided they:

- has been produced using only those source-segregated *input materials* listed in Appendix B subject to any **restrictions** stated;
- meets the requirements of an approved standard (described in Section 3);
- is destined for appropriate use in one of the *designated market* sectors (Section 4)
- requires no further processing including maturation or re-screening for use in the designated market sector for which it is destined; and
- meets any additional customer specifications, as agreed between the supplier and the customer.

Quality digestate must not be used in such a way as to adversely affect human health or the environment.

[1] Where the only waste feedstock to an anaerobic digestion plant is agricultural manure and slurry or where non-waste feedstocks such as crops grown specifically for anaerobic digestion are used with the manure or slurry, the digestate output is not waste if it is used in the same way that undigested manure and slurry would normally be used i.e. spread as a fertiliser on agricultural land.

1.3.2 Producers must demonstrate that these criteria have been met. They must do this in the ways set out in Section 3.

1.3.3 Producers should note that, regardless of whether the criteria set out in 1.3.1 are met, the anaerobic digestion of waste materials (or a mixture containing any waste materials) and the burning of the resulting biogas as a fuel will normally continue to be covered by an *environmental permit* (or in Northern Ireland a *waste management licence* or exemption).

1.3.4 If digestate which is compliant with this Quality Protocol is mixed with non-waste materials the blend will not, as a result of that, be waste.

1.3.5 If digestate, which is compliant with this Quality Protocol, is mixed with a waste, the resulting blend will all be waste.

1.4 Failure to comply with the Quality Protocol

1.4.1 Where this Quality Protocol is not complied with, for example the digestate does not meet an approved standard or the producer cannot demonstrate evidence of compliance, the digestate produced will normally be considered to be waste. In such circumstances, the producer/user must comply with the appropriate waste management controls[2] for the transportation, storage and use of the digestate and will be committing an offence if they do not do so.

1.4.2 Detailed guidance on waste management controls can be obtained from the Environment Agency's National Customer Contact Centre on 08708 506 506 or from its website www.environment-agency.gov.uk/subjects/waste or from Natural Resources Wales website enquiries@naturalresourceswales.gov.uk In Northern Ireland guidance can be obtained from NIEA's website (http://www.ni-environment.gov.uk/waste-home.htm) or by phoning 0845 302 0008.

1.4.3 Producers and users of digestate should note that, even if the Quality Protocol is complied with, the material will become waste again and subject to waste management controls if the holder discards, intends or is required to discard; for example if at any stage the digestate is:

- disposed of; or
- stored indefinitely with little or no prospect of being used.

1.5 Updating the Quality Protocol

1.5.1 We will review and update this document as we consider appropriate.

1.5.2 Triggers for a review could include pollution incidents, a change in the market or a change in legislation or case law.

1.5.3 This Quality Protocol may be withdrawn if it becomes apparent that it is generally being misapplied and/or misused.

[2] For example, in compliance with Article 11 of the WFD the user might need to register an exemption/apply for a permit with the Environment Agency or Natural Resources Wales. In Northern Ireland the user might need to apply to NIEA for a Waste Management License or exemption from waste management licensing.

1.5.4 This Quality Protocol will be adopted as a technical regulation under *Technical Standards and Regulations Directive 98/34/EC* as amended[3]. We recognise that there may be codes of practice or standards which apply in *European Economic Area* (EEA) States other than the UK setting out requirements for the production and use of quality digestate. We accept that quality digestate may cease to be waste provided it has been produced in compliance with:

- a relevant standard or code of practice of a national standards body or equivalent body of any EEA State; or
- any relevant international standard recognised for use in any EEA State; or
- any relevant technical regulation with mandatory or de facto mandatory application for marketing or use in any EEA State.

These must give levels of product performance, protection of human health and the environment equivalent to those required to ensure compliance with this Quality Protocol.

1.5.5 An outline of the main stages and control mechanisms of the Quality Protocol is presented in Figure 1. These are described further in Sections 2 and 3.

1.6 Importing and exporting Quality Protocol compliant material

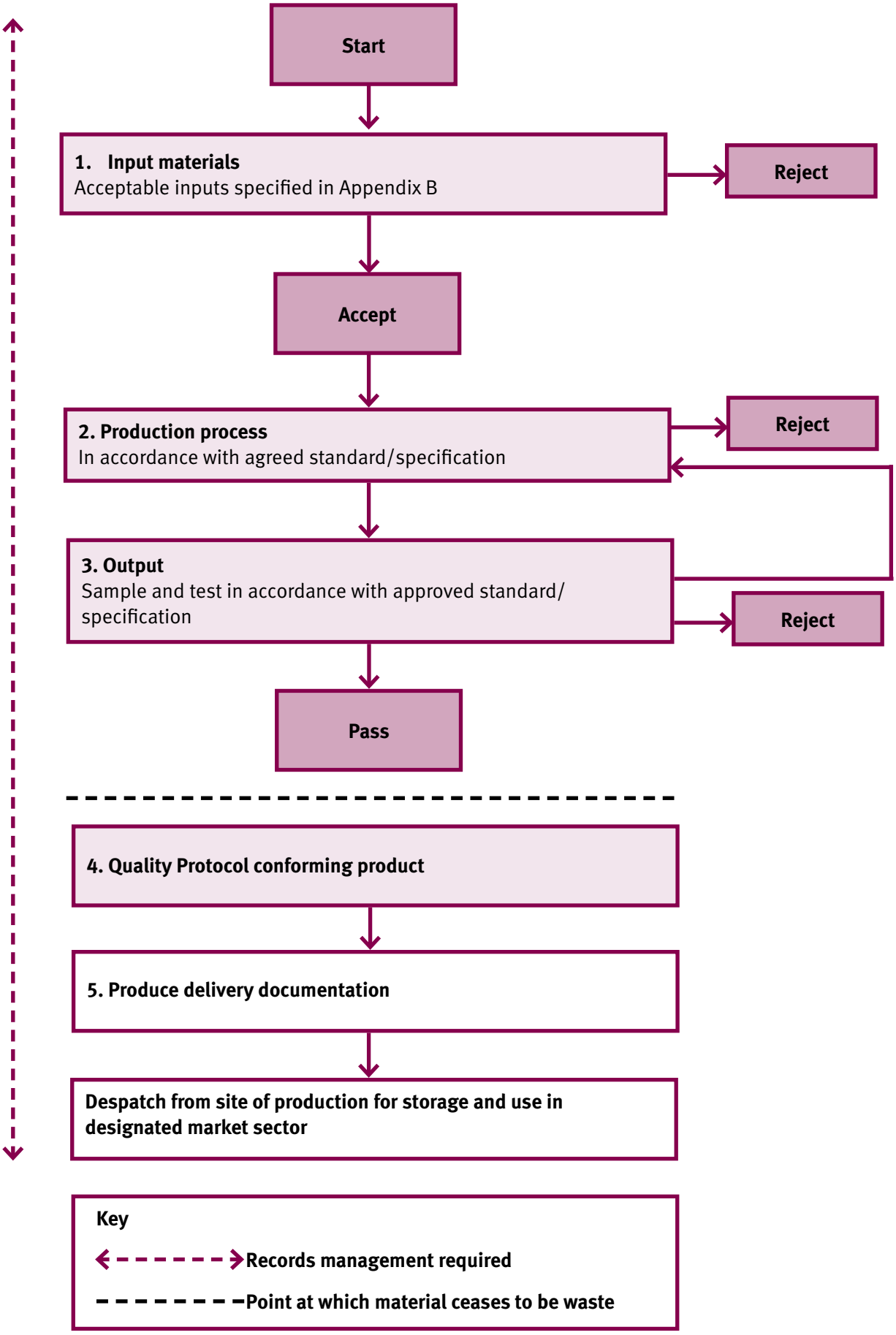
1.6.1 Producers intending to export material that complies with this Quality Protocol should be aware that, although the material may cease to be waste in England, Wales and Northern Ireland, the country of destination may take a different view. If the competent authority in the country of destination considers the material to be waste, the shipment will be subject to the controls set out in the Waste Shipment Regulation (EC No. 1013/2006).

1.6.2 Those intending to import Quality Protocol compliant material into England, Wales and Northern Ireland should be aware that, if the country of despatch regards the material as waste, the controls set out in the Waste Shipment Regulation will apply to the shipment. This is the case even though the material may be regarded as having ceased to be waste in England, Wales and Northern Ireland.

1.6.3 Before importing or exporting such material it is prudent to check with the competent authority for the country of despatch or destination. A list of the competent authorities can be found at: http://ec.europa.eu/environment/waste/shipments/pdf/list_competent_authorities.pdf

[3] The Technical Standards and Regulations Directive 98/34/EC seeks to ensure the transparency of technical regulations and is intended to help avoid the creation of new technical barriers to trade within the European Community.

Figure 1: Main stages and control mechanisms of the Quality Protocol



2. Producing quality digestate from anaerobic digestion of source-segregated biodegradable materials

2.1 Regulating the anaerobic digestion process

2.1.1 The process of turning waste into quality digestate is classified as a waste recovery operation and is subject to the waste management controls . This Quality Protocol does not affect the obligation to producers to comply with all the conditions of the environmental permit that applies to the anaerobic digestion of the waste. Similarly, in Wales and Northern Ireland the Quality Protocol does not affect the obligation to producers to comply with all the conditions of the PPC permit or waste management licence or exemption.

2.2 Criteria for producing quality digestate that has ceased to be waste

2.2.1 The following criteria must be met in order to produce quality digestate.

2.2.2 Restriction on input materials:

i. A digester operator may accept non-waste biodegradable materials e.g. crops grown specifically as a feed for anaerobic digestion. These are not listed separately in this Quality Protocol.
ii. Where a digester operator accepts waste materials, they may accept only those waste types listed in Appendix B and they must be source-segregated, i.e. they must have been kept separate from any other wastes and non-biodegradable materials. The conditions of the environmental permit (or in Northern Ireland the waste management licence or exemption) under which the anaerobic digestion process is carried out, or the approved standard, may further restrict the waste types that can be used.
iii. The transformation of any waste types listed in Appendix B that are classified as *animal by-products* must be carried out in accordance with animal by-products controls[4].

2.2.3 Requirements of the approved standard to be observed:

i. The producer must also comply with all the requirements of an approved standard. Appendix C lists the only approved standard at the time of publishing this Quality Protocol. Additional standards may be approved by the Environment Agency for inclusion in this Quality Protocol when it is next reviewed. Standards will be approved only if they contain the important elements set out in Appendix D.
ii. Producers should be aware that standards are subject to regular periodic review and must ensure they comply with the latest version.

2.2.4 Designated market sectors:

Digestate must be destined for appropriate use within one or more of the following market sectors:

- agriculture, forestry and soil/field-grown horticulture; and
- land restoration (where only separated fibre can be used).

[4] Animal by-products are subject to the requirements and controls in Regulation (EC) 1069/2009 and its corresponding implementing Regulation (EC) 142/2011 (as amended). These are enforced through The Animal By-Products (Enforcement) (England) Regulations 2013 No. 881, The Animal By-Products (Enforcement) (No2) (Wales) Regulations 2011 No. 600 (W.88) and The Animal By-Products Regulations (Northern Ireland) 2011 No. 124. Further information on the controls relating to animal by-products can be found on Defra's website http://www.defra.gov.uk/food-farm/byproducts and Animal Health and Veterinary Laboratories Agency's (AHVLA) website http://www.defra.gov.uk/ahvla-en / or for Northern Ireland on the DARD Veterinary Service website http://www.dardni.gov.uk/index/animal-health/animal-by-products.htm

3. Providing evidence that quality digestate has been produced

3.1 Certification

3.1.1 Producers must demonstrate compliance with the requirements of this Quality Protocol including the approved standard. Producers must retain records of all inspections and testing carried out including test results in accordance with the standards and specifications in Appendix C.

3.1.2 Compliance must also be demonstrated by an approved certification body operating according to scheme rules agreed with the Environment Agency, Natural Resources Wales and NIEA. The approved certification body must also obtain *accreditation* on an annual basis from the United Kingdom Accreditation Service (UKAS) to BS EN 45011: 1998 *General requirements for bodies operating certification systems* (or any subsequent amendments). The certification and accreditation process is illustrated in Appendix E.

3.1.2 As part of the certification process, the producer will be required to:

- keep and retain specified records for a minimum of four years; and
- make them available to the certification body for certification purposes.

Details of the records to be kept are given in Appendix F.

3.1.3 These requirements are additional to any statutory record-keeping requirements under regulatory controls. However, operators should note that some records may be used to fulfil both a regulatory and certification function.

3.1.4 Scheme rules will not be agreed by the Environment Agency, Natural Resources Wales and NIEA unless they make provision to ensure that:

- the method of certification demonstrates that users have met both the requirements of the approved standard and those of the Quality Protocol;
- compliance with both the standard and the Quality Protocol are certified annually by an independent certification body accredited by UKAS to BS EN 45011: 1998 (or any subsequent updates) to relevant scopes;
- certification verifies source documentation, evidence of site management procedures (including compliance with the *quality management system*) and laboratory test results;
- the certification body or its authorised contractor carries out at least one site inspection per year to verify on site documentation; and
- certification is overseen by an impartial committee.

3.2 Supply documentation

3.2.1 Producers must demonstrate that digestate is destined for appropriate use in a designated market sector by providing the customer with supply documentation for each sale or supply of quality digestate and keeping a copy of this documentation[5]. Records must be retained for a minimum of 4 years; and made available for inspection by the regulator (if requested).

3.2.2 A producer is not expected to make or retain supply documentation when quality digestate is intended for their own use.

3.2.3 Details of supply documentation requirements are given in Appendix G.

[5] Supply documentation is not required for each delivery, only for each application/project.

4. Application and use of quality digestate

4.1 Designated market sectors

4.1.1 This section provides further detail on the designated market sectors, that is:

- agriculture, forestry and soil/field-grown horticulture; and
- land restoration.

4.1.2 If good practice is followed, the Environment Agency, Natural Resources Wales and NIEA consider that quality digestate will not pose a risk to human health or the environment in the quantities and frequencies at which they are likely to be applied in these sectors. Good practice means that anyone who uses the quality digestate takes account of all potential environmental issues such as application rates, impacts on soil function, potential for water pollution, etc (full details are contained in Appendix H).

4.2 Agriculture, forestry and soil/field grown horticulture

4.2.1 Under this Quality Protocol, quality digestate (whole digestate, separated fibre or separated liquor) can be used in agriculture and forestry and soil/field-grown horticulture as a fertiliser or *soil improver* provided it is used in such a way that:

- it does not pose a risk to the environment; and
- its use does not compromise the future sustainable use of the soil to which it is applied.

4.2.2 Use of digestate as a growing medium and for amateur or hobby gardening and similar uses is specifically excluded.

4.3 Land restoration

4.3.1 Quality separated fibre only may be used for land restoration. Examples of use in this sector are:

- soil manufacture and/or blending operations; and
- *land reclamation*.

Appendix A Definitions

In this Quality Protocol, the words and phrases below have the following meanings:

Term	Description
Accreditation	Third-party attestation related to a conformity assessment body conveying formal demonstration of its competence to carry out specific conformity assessment tasks. *Note: In the context of this Quality Protocol, this means approval from UKAS that a certification body's certification scheme for whole digestate, separated fibre and separated liquor is a thorough, fair and documented evaluation of whether the requirements have been met.*
Agriculture	Includes: fruit growing; seed growing; livestock farming; the use of land as grazing land, meadowland, osier land (osier land is excluded from this definition in Northern Ireland), for growing arable crops (e.g. cereals, oil seed rape and some types of vegetables) and biomass grown for non-food purposes; market gardens and nursery grounds; and woodlands where the land use is ancillary to the farming of land for other agricultural purposes.
Anaerobic digestion (AD)	A process of controlled decomposition of biodegradable materials under managed conditions where free oxygen is absent, at temperatures suitable for naturally occurring mesophilic or thermophilic anaerobe and facultative anaerobe bacteria species, which convert the inputs to a methane-rich biogas and whole digestate. *Note: Whole digestate can confer benefits to soils to which it is applied and the plants these soils support.*
Animal by-products	Animal by-products are defined in Article 3 of Regulation (EC) 1069/2009 as 'entire bodies or parts of animals, products of animal origin or other products obtained from animals that are not intended for human consumption'. This includes catering waste (including used cooking oil when intended for composting), former foodstuffs, butcher and slaughterhouse waste, blood, feathers, wool, hides and skins, fallen stock, pet animals, zoo and circus animals, hunt trophies, manure, ova, embryos and semen not intended for breeding purposes.

Approved certification body	A third party, independent of any producer of digested materials, accredited by the United Kingdom Accreditation Service for operating a product certification scheme aligned to the requirements of this Quality Protocol. *Note: These requirements include conformance to a standard/specification approved by the Environment Agency for inclusion in this Quality Protocol.*
Approved standard	Any standard or specification included in Appendix C and any other standard approved by the Environment Agency for inclusion in this Quality Protocol.
Assessment/certification code	A unique assessment (before certification) or certification code specific to the type of output from a specific process, awarded by the certification body to the producer of that output. *Note: The whole digestate from a specific anaerobic digestion process, and any separated fibre or separated liquor fractions derived from that whole digestate, must each have a unique assessment/certification code.*
Biowaste	Discarded material that is biodegradable. *Note: In the context of this Quality Protocol, biowastes are those listed within Appendix B.*
Certification	Third-party attestation related to products, processes, systems or persons[6]. *Note: In the context of this Quality Protocol, the scope of assessment by the certification body must cover a producer's outputs from the anaerobic digestion of source segregated biowaste, the AD process, the producing organisation's quality management system and training of those persons who affect digestate quality. Certification provides verification that the product meets the approved standards and the requirements of the Quality Protocol.*
Designated market	A market into which digested material, that complies with all the requirements of the Quality Protocol, can be supplied for storage and use without waste management controls being applied. *Note: the designated market sectors that apply are listed in paragraph 2.2.4.*

[6] EN ISO/IEC 17000: 2004 Conformity assessment. Vocabulary and general principles.

European Economic Area (EEA)	The EEA States consist of the members of the EU (Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the UK) together with Iceland, Liechtenstein and Norway. The crown dependencies of Jersey, Guernsey and the Isle of Man are not part of the UK or EU and businesses registered there are subject to different licensing legislation.
Environmental Permit	Environmental permit issued or exemption registered under the Environmental Permitting (England and Wales) Regulations 2010 No. 675 or, in Northern Ireland, a waste management licence or exemption under the Waste Management Licensing Regulations (Northern Ireland) (as amended) 2003 SR493 or a Pollution Prevention and Control permit under the Pollution Prevention and Control Regulations (Northern Ireland) 2003 SR46.
Forestry	The art and science of controlling the establishment, growth, composition, health, and quality of forests. *Note: The definition includes plantations and systems other than 'forests' for cultivating trees, timber and biomass crops.*
Hazard Analysis and Critical Control Point (HACCP)	A system used for the identification, evaluation and control of hazards that are significant for safety. *Note: In this case, the production of whole digestate, separated liquor and separated fibre that can be used without harm.*
Horticulture	The raising of plants in soil in situ, in a field or under protective cover. *Note: This includes the soil grown commercial raising of plants referred to in the definition of 'agriculture' and vegetables, fruit, flowers and bulbs, hardy and other nursery stock, turf and herbs as well as protected crops grown in soil in situ. This excludes the use of digestate as a growing medium or for hobby gardening and similar uses because digestate may not be suitable for potentially high rate applications in these markets.*
Input material	Biodegradable material intended for feeding, or fed, into an anaerobic digestion process. *Note: See Appendix B for the List of European Waste Catalogue input material types acceptable under the Quality Protocol.*

Land manager if in England and Wales or controller if in Northern Ireland	The person responsible for the exploitation of the agricultural land concerned, on his or her account, directly and/or through the use of agents or contractors.
Land reclamation	See land restoration
Land restoration	This includes: land reclamation (the recovery of land from a brownfield or underutilised state to make it suitable for reuse achieved through the stabilisation, contouring, maintenance, conditioning, reconstruction and re-vegetation of the land) and land remediation (the process of making a site fit for purpose through the destruction, removal or containment of contaminants) and soil conditioning (see below).
Potentially Toxic Element (PTE)	Chemical element that has potential to have toxic effects on humans, flora or fauna. *Note: Some PTEs are also known as 'heavy metals' or 'transition metals' (e.g. lead, cadmium, chromium, mercury, copper, zinc and nickel).*
PPC Permit (Northern Ireland)	A permit issued under the Pollution Prevention and Control Regulations (Northern Ireland) 2003 SR 46. Establishes a pollution control regime for certain installations or mobile plants and includes combustion activities.
Producer	Business enterprise, organisation, community initiative or person(s) responsible for the production of digested materials.
Quality digestate	Whole digestate resulting from an anaerobic digestion process, and any subsequently separated fibre or liquor, which conforms to the requirements of this Quality Protocol. Quality digestate is normally regarded as having ceased to be waste when it has met the requirements of this Quality Protocol, which include meeting an approved standard. *Note: Includes any separated fibre that undergoes a subsequent aerobic stabilisation phase without addition of further materials.*

Quality control (QC)	Part of quality management focused on fulfilling quality requirements. *Note: Implemented through a series of systems and activities, which are integrated in daily work and which enable frequent or continuous verification of product quality. Examples are checks on process conditions throughout every stage of processing, digestate sample test results and the effects of any corrective actions taken.*
Quality management system (QMS)	A system used to direct and control an organisation with regard to quality. *Note: In the context of anaerobic digestion, it is a system for planning, achieving and demonstrating effective control of all operations and associated quality management activities necessary to achieve digested materials that are fit-for-purpose. Where specific controls are applied, they must be monitored and recorded, and their efficacy evaluated both during and after process validation. Corrective actions must be defined.*
Soil improver/soil conditioner	Material added to soil in situ primarily to maintain or improve its physical properties, and which may improve its chemical or biological properties or activity [7].
Technical Standards and Regulations Directive 98/34/EC	Seeks to ensure the transparency of technical regulations and is intended to help avoid the creation of new technical barriers to trade within the European Community.
User(s)	Individuals or organisations that obtain whole digestate, separated liquor or separated fibre from a producer or third party with the intention of using it.
Validation	Obtaining and evaluating evidence that the elements of the HACCP plan and operation of the quality management system are effective for producing digested materials of the quality to which the producer has committed in the Quality Protocol. *Note: See PAS 110 or other approved standard for validation requirements. It will take time to generate evidence of consistently sufficient digested material quality.*
Waste management controls	Controls under legislation that govern the treatment, handling, containment, transportation and storage of waste.

[7] PD CR 13456: 1999 Soil improvers and growing media. Labelling, specifications and product schedules.

Waste management licence or exemption	An authorisation issued in Northern Ireland under the Waste Management Licensing Regulations (Northern Ireland) 2003 (as amended)No. 493 for the storage, treatment or disposal of waste.
Waste Management Licensing Regulations (Northern Ireland) 2003 (as amended) No. 493	Provides for applications in Northern Ireland for waste management licences, which authorise the deposit, disposal and treatment of controlled waste. Includes exemptions from waste management licensing.
Whole digestate	Material resulting from an anaerobic digestion process that has not undergone a post-digestion separation step to derive liquor or fibre fractions.

Appendix B Biowaste types acceptable for the production of quality digestate

B.1 Input materials shall be biodegradable and may include non-waste biodegradable materials. Non waste biodegradable materials are not listed in this Quality Protocol. Waste input materials may only be accepted if:

- they are listed under a 6 digit code in Table B1 below, meeting any additional requirements and **restrictions** specified in this table
- have been source-segregated (kept separate from any other wastes)
- have not been mixed, combined or contaminated with other potentially polluting wastes, products or materials.

B.2 Biodegradable plastic packaging that is independently certified to BS EN 13432 or either of the similar standards DIN V 54900 or ASTM D6400 that is used to collect food waste shall be permitted. It must, however, be removed either prior to or after the digestion process to meet the physical contaminant limit in BSI PAS 110 or other approved standard.

B.3 Animal by-products – some inputs listed in Appendix B are animal by-products. The handling and treatment of animal by-products in anaerobic digestion is subject to both environmental permitting controls and animal by-products controls[8]. Not all animal by-products can be used as a feedstock for anaerobic digestion plants. Anaerobic digestion plants can treat category 3 animal by-products and category 2 animal by-products provided they have been pressure rendered. Some category 2 materials such as manure, digestive tract contents, milk and milk products, eggs and egg products can be used as feedstock for anaerobic digestion plants without prior treatment unless there is a risk of spreading any serious transmissible disease[9].

B.4 Only untreated wood is allowed. Wood and wood-derived wastes impregnated with preservatives, painted, or with any non-biodegradable layer shall not be permitted.

B.5 If producers have any doubt over whether an input material is compliant, they should discuss the issue with the certification body.

[7] Animal by-products are subject to the requirements and controls in Regulation (EC) 1069/2009 and its corresponding implementing Regulation (EC) 142/2011 (as amended). These are enforced through The Animal By-Products (Enforcement) (England) Regulations 2013, The Animal By-Proucts (Enforcement) (No2) (Wales) Regulations 2011 and The Animal By-Products Regulations (Northern Ireland) 2011.

[8] Further information on the controls relating to animal by-products can be found on Defra's website and Animal Health and Veterinary Laboratories Agency's (AHVLA) website or for Northern Ireland on the DARD Veterinary Service website http://www.dardni.gov.uk/index/animal-health/animal-by-products.htm

Table B1 Permitted waste input materials

Type	EWC code[10]
Wastes from agriculture, horticulture, hunting, fishing and aquaculture primary production, food preparation and processing	**Specific sub codes permitted**
Wastes from agriculture, horticulture, aquaculture, forestry, hunting and fishing	**02 01**
Sludges from washing and cleaning	*02 01 01*
Restriction: Food processing waste and food washing waste only.	
Animal tissue waste	*02 01 02*
Plant tissue waste	*02 01 03*
Including husks, cereal dust, waste animal feeds, off-cuts from vegetable and fruit and other vegetation waste.	
Animal faeces, urine and manure (including spoiled straw[11]),effluent, collected separately and treated off site[12]	*02 01 06*
Wastes from forestry	*02 01 07*
Restriction: Plant tissue waste only.	
Wastes not otherwise specified	02 01 *99*
Restriction: Spent mushroom compost or discarded mushrooms from commercial mushroom cultivation only	
Wastes from preparation and processing of meat, fish and other foods of animal origin	**02 02**
Sludges from washing and cleaning	*02 02 01*
Restriction: Process water and food washing waste only	
Animal tissue waste	*02 02 02*
Including blood, animal flesh, fish processing waste, fish carcasses and poultry waste.	
Materials unsuitable for consumption or processing	*02 02 03*
Sludges from on-site effluent treatment	*02 02 04*
Wastes not otherwise specified	*02 02 99*
Restriction: Sludges from gelatine production and animal gut contents only.	
Wastes from fruit, vegetables, cereals, edible oils, cocoa, coffee, tea and tobacco preparation and processing; conserve production, yeast and yeast extract production, molasses preparation and fermentation	***02 03***
Sludges from washing, cleaning, peeling, centrifuging and separation	*02 03 01*
Materials unsuitable for consumption or processing	*02 03 04*
Sludges from on-site effluent treatment	*02 03 05*
Wastes not otherwise specified	*02 03 99*
Restriction – Only: – Sludge from production of edible fats and oils – Seasoning residues – Molasses residues – Residues from production of potato, corn or rice starch	

[10] European Waste Catalogue code.
[11] Including poultry litter
[12] Animal faeces, urine and manure (including spoiled straw),effluent, collected separately can also be treated on site for purposes of this document.

Wastes from sugar processing	**02 04**
Sludges from on-site effluent treatment	*02 04 03*
Restriction: Biological sludge only	
Other biodegradable wastes	*02 04 99*
Wastes from dairy products industry	**02 05**
Materials unsuitable for consumption or processing	*02 05 01*
Including solid and liquid dairy products, milk, food processing wastes, yoghurt, and whey.	
Sludges from on-site effluent treatment *Restriction: Biological sludge only*	*02 05 02*
Wastes from the baking and confectionary industry	**02 06**
Materials unsuitable for consumption or processing	*02 06 01*
Including condemned food, food processing wastes, biscuits, chocolate, yeast, bread, bakery wastes.	
Sludges from on-site effluent treatment *Restriction: Biological sludge only*	*02 06 03*
Wastes from production of alcoholic and non-alcoholic beverages (except tea, coffee and cocoa)	**02 07**
Wastes from washing, cleaning and mechanical reduction of raw materials	*02 07 01*
– Including brewing waste, food processing waste, fermentation waste	
Wastes from spirits distillation	*02 07 02*
Restriction only: – Spent grains, fruit and potato pulp – Sludge from distilleries	
Materials unsuitable for consumption or processing	*02 07 04*
Including brewing waste, food processing waste, fermentation waste, beer, alcoholic drinks and fruit juice	
Wastes not otherwise specified	*02 07 99*
Restriction Only: – Malt husks, malt sprouts, malt dust – Spent grains – Hops – Yeast and yeast like residues – Sludges from the production process	

Type	EWC
Wastes from wood processing and the production of paper, cardboard, pulp, panels and furniture, pulp, paper and cardboard	**Specific sub codes permitted**
Wastes from wood processing and the production of panels and furniture	**03 01**
Waste bark and cork Restriction: Untreated only	*03 01 01*
Sawdust, shavings, cuttings, wood, particle board and veneer other than those mentioned in 03 01 04	*03 01 05*
Restriction: Untreated wood only.	

Wastes from pulp, paper and cardboard production and processing	**03 03**
Fibre rejects, fibre-, filler- and coating-sludges from mechanical separation	*03 03 10*
Restriction: Only allowed if not mixed with, or does not contain, de-inking sludge.	
Sludges from on-site effluent treatment other than those mentioned in 03 03 10	*03 03 11*
Restriction: Only allowed if not mixed with, or does not contain, de-inking sludge.	

Type	EWC
Wastes from leather, fur and textile industry	**Specific sub codes permitted**
Wastes from the leather and fur industry	**04 01**
Wastes from leather industry	*04 01 01*
Fleshings may also be described as leather shavings. Restriction: Allowed only if hides and skins, or parts of them, originating from animals that did not show clinical signs of any disease communicable through that product to humans or animals.	
Wastes from the textiles industry	**04 02**
Organic matter from natural products (for example grease, wax)	*04 02 10*

Type	EWC
Waste from organic chemical processes	**Specific sub codes permitted**
Wastes from the manufacture, formulation, supply and use (MFSU) of basic organic chemicals	**07 01**
Other still bottoms and reaction residues	*07 01 08**
Restriction: Glycerol residue from biodiesel manufacture from non-waste vegetable oils only	

Type	EWC
Wastes packaging; absorbents, wiping cloths, filter materials and protective clothing not otherwise specified	**Specific sub codes permitted**
Packaging (including separately collected municipal packaging waste)	**15 01**
Paper and cardboard packaging	*15 01 01*
Restriction: Not allowed if any non-biodegradable coating or preserving substance present.	
Wooden packaging	*15 01 03*
Restriction: Untreated wood only.	
Composite packaging	*15 01 05*
Restriction: Only allowed if comprised of packaging material otherwise allowed by this Quality Protocol.	

Type	EWC
Wastes not otherwise specified in the list	**Specific sub codes permitted**
Aqueous liquid wastes destined for off-site treatment	**16 01**
Aqueous liquid wastes other than those mentioned in 16 10 01	*16 10 02*
Restriction: Allowed only if digestate from an aerobic digestion process that accepts only the waste input types allowed by this Quality Protocol.	

Type	EWC
Wastes from waste management facilities, off-site waste water treatment plants and the preparation of water intended for human consumption and water for industrial use	**Specific sub codes permitted**
Wastes from physico/chemical treatments of waste	**19 02**
Premixed wastes composed only of non-hazardous wastes	*19 02 03*
Restriction: Acceptable only if derived solely from input types allowed by this Quality Protocol and remains segregated from, and uncontaminated by, any other waste type.	
Sludges from physico/chemical treatment other than those mentioned in 19 02 05	*19 02 06*
Restriction: Acceptable only if derived solely from physical treatment and/or pH adjustment of input types allowed by this Quality Protocol and remains segregated from, and uncontaminated by, any other waste type.	
Combustible wastes other than those mentioned in 19 02 08 and 19 02 09	*19 02 10*
Restriction: Glycerol only.	
Wastes from the aerobic treatments of wastes	**19 05**
Non-composted fraction of municipal and similar wastes	*19 05 01*
Restriction: Acceptable only if derived solely from input types allowed by this Quality Protocol and remains segregated from, and uncontaminated by, any other waste type.	
Non-composted fraction of animal and vegetable waste	*19 05 02*
Restriction: Acceptable only if derived solely from input types allowed by this Quality Protocol and remains segregated from, and uncontaminated by, any other waste type.	
Off-specification compost	*19 05 03*
Restriction: Acceptable only if derived solely from input types allowed by this Quality Protocol and remains segregated from, and uncontaminated by, any other waste type.	
Wastes not otherwise specified	*19 05 99*
Restriction: Allowed only if: – liquor/leachate from a composting process that accepts only the waste input types allowed by this Quality Protocol; or – digestate from an aerobic digestion process that accepts only the waste input types allowed by this Quality Protocol.	

Wastes from the anaerobic treatment of wastes	**19 06**
Liquor from anaerobic treatment of municipal waste	*19 06 03*
Restriction: Acceptable only if derived solely from input types allowed by this Quality Protocol and remains segregated from, and uncontaminated by, any other waste type.	
Digestate from anaerobic treatment of municipal waste	*19 06 04*
Restriction: Acceptable only if derived solely from input types allowed by this Quality Protocol and remains segregated from, and uncontaminated by, any other waste type.	
Liquor from anaerobic treatment of animal and vegetable waste	*19 06 05*
Restriction: Acceptable only if derived solely from input types allowed by this Quality Protocol and remains segregated from, and uncontaminated by, any other waste type.	
Digestate from anaerobic treatment of animal and vegetable waste	*19 06 06*
Restriction: Acceptable only if derived solely from input types allowed by this Quality Protocol and remains segregated from, and uncontaminated by, any other waste type.	
Wastes from waste water treatment plants not otherwise specified	**19 08**
Grease and oil mixture from oil/water separation containing edible oils and fats	*19 08 09*
Restriction: Grease and oil mixture containing only edible oils and fats only.	
Sludges from biological treatment of industrial waste water other than those mentioned in 19 08 11	*19 08 12*
Restriction: Allowed only if uncontaminated by potentially polluting materials or substances harmful to anaerobic bacteria.	
Wastes from the mechanical treatment of waste (for example sorting, crushing, compacting, pelletising) not otherwise specified	**19 12**
Other wastes (including mixtures of materials) from mechanical treatment of wastes other than those mentioned in 19 12 11	19 12 12
Restriction: Acceptable only if derived solely from input types allowed by this Quality Protocol and remains segregated from, and uncontaminated by, any other waste type.	

Type	EWC
Municipal wastes and similar commercial, industrial and institutional wastes including separately collected fractions	**Specific sub codes permitted**
Separately collected fractions	**20 01**
Paper and cardboard	*20 01 01*
Restriction: Not allowed if any non-biodegradable coating or preserving substance present.	
Biodegradable kitchen and canteen waste	*20 01 08*
Edible oil and fat	*20 01 25*
Wood other than that mentioned in 20 01 37	*20 01 38*
Restriction: Untreated wood only. Not allowed if any non-biodegradable coating or preserving substance present.	
Garden and park wastes (including cemetery waste)	**20 02**
Biodegradable waste	*20 02 01*
Including animal faeces, manure, garden waste, green waste, horticulture waste, plant tissue, parks and garden waste, hedge and tree trimmings, grass cuttings and leafy materials.	
Other municipal wastes	**20 03**
Mixed municipal waste	*20 03 01*
Restriction: Allowed only if separately collected biodegradable wastes otherwise allowed by this Quality Protocol. If former foodstuffs are packaged, the restrictions given above on packaging wastes apply.	
Waste from markets	*20 03 02*
– Restriction: Allowed only if source segregated biodegradable fractions. Examples are plant material, fruit and vegetables – Restriction: Packaging waste from a market source is allowed only if it is otherwise allowed by this Quality Protocol.	

Appendix C Standards and specifications to which this Quality Protocol applies

At present this Quality Protocol applies only to the latest version of British Standards Institution's Publicly Available Specification for whole digestate, separated liquor and separated fibre derived from source-segregated biodegradable materials (BSI PAS 110).

Copies of BSI PAS of 110 may be downloaded from the following websites:

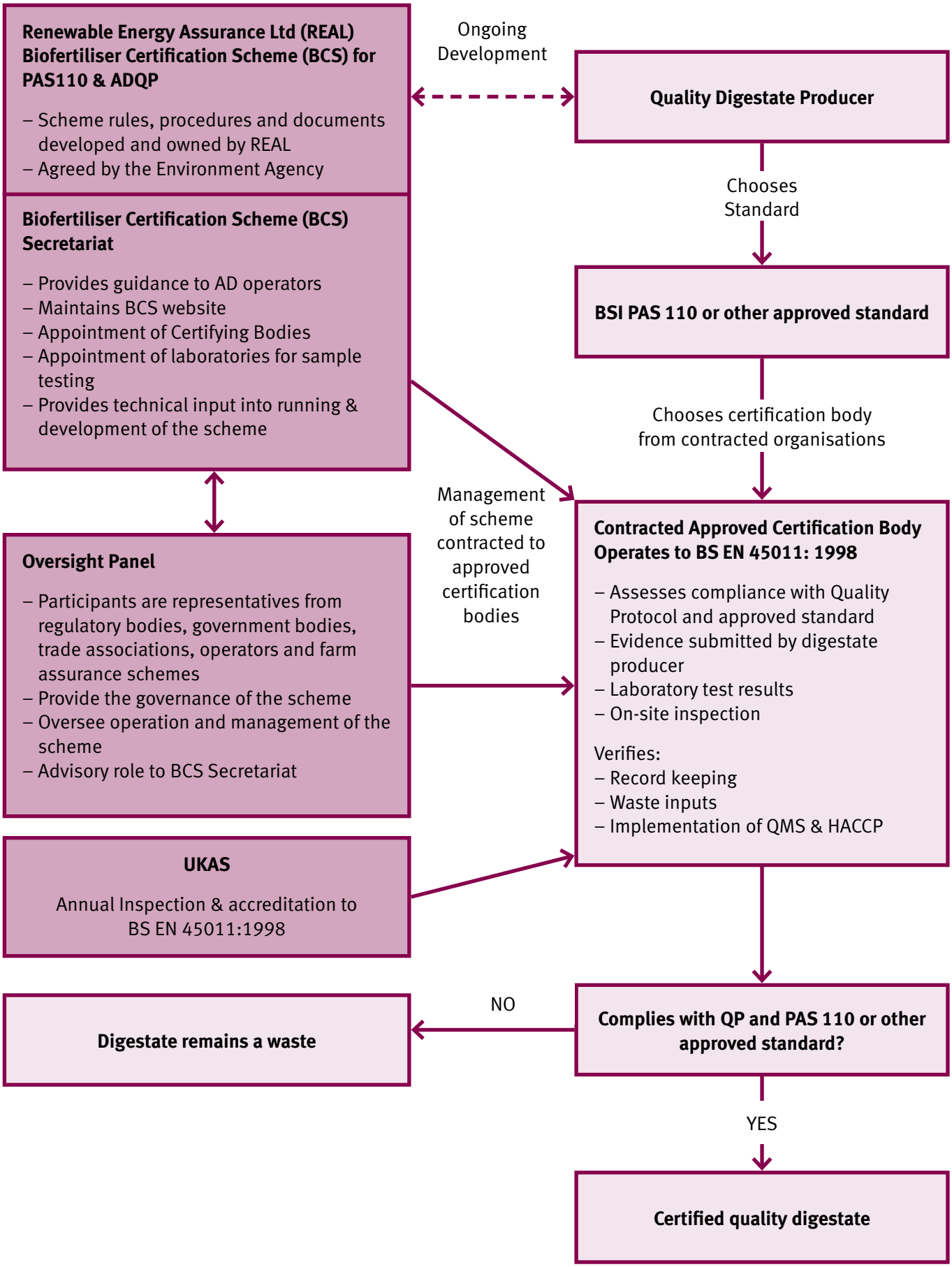
- WRAP – at www.wrap.org.uk
- Renewable Energy Association (REA) – Biofertiliser Certification Scheme www.biofertiliser.org.uk

Appendix D Important elements of a standard

The Environment Agency may approve further standards for inclusion in this Quality Protocol when it is reviewed. To be considered for inclusion, a standard must:

- be publicly available (and recognised nationally);
- be subject to independent periodic revision;
- contain a methodology detailing the waste recovery process and quality management system (QMS) procedures in place;
- specify that a quality management system be used that incorporates *Hazard Analysis and Critical Control Point* (HACCP) assessment;
- specify that all measurement and testing be carried out using recognised (national or international) test methods;
- include limit levels for a range of contaminants in digestate including *potentially toxic elements* (PTEs); and
- specify that records be kept of the *quality control* procedures implemented at the anaerobic digester site as part of the QMS, including instances of non-compliance and corrective actions undertaken.

Appendix E Certification and accreditation diagram



Appendix F Records to be kept by the quality digestate producer for certification purposes

Some of the record requirements for certification purposes may also form part of the requirements of an approved standard. Some records may also be a regulatory requirement.

- Incoming wastes
  Records must be kept for four years of all incoming wastes. The following must be recorded for each load delivered to the site:
  – date;
  – description of the waste type and EWC code;
  – place of origin;
  – quantity by weight/volume;
  – name of carrier;
  – name of supplier; and
  – whether the load (or part load) was rejected.

- Material leaving the site
  Records must be kept of all quality digestate produced using the anaerobic digester and also of all waste leaving the facility. For all quality digestate, these records must correspond to the supply documentation issued to the customer (see Appendix G).

Appendix G Supply documentation

Supply documentation must include the elements listed below relevant to the end use.

- Contacts
  – Producer's contact details, including address of anaerobic digestion site
  – Customer's contact details

- Information about the product
  – Product types (fertiliser or soil conditioner)
  – What the quality digestate has been made from (e.g. digested plant material)
  – Quality digestate type (whole digestate, separated fibre or separated liquor) and despatch dates
  – Quantity

- Certification and declaration
  – Quality digestate assessment / certification code
  – Declaration that the quality digestate meets the requirements of the approved standard and the Quality Protocol

- Guidelines and conditions for use
  The supply documentation must specify that the product / quality digestate:
  – is for use solely in designated market sector applications: 'This product / quality digestate shall only be sold or distributed for use in:
    – agriculture, forestry and soil/field-grown horticulture; and/or
    – land restoration.'
  – must comply with animal by products regulation where appropriate;
  – must be used, stored and handled in accordance with good practice guidelines, including those specified in Appendix H; and
  – must not in any circumstances be blended with any waste material. If material is blended with waste, then the mixture becomes a waste and is regulated as such.

Appendix H Good practice guidance

Storage and handling

- Quality digestate containing animal manures must be stored in facilities that meet The Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations 2010. All other quality digestate must be stored in a similar manner. All operators should follow the guidance in Guidance notes to farmers on the Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations 2011.
- All holdings storing or spreading quality digestate should prepare an Accident and Emergency Plan detailing the actions to be taken to minimise the effects of accidental spillages or equipment failure. Advice is given in:
  – Codes of Good Agricultural Practice.
  – Pollution Prevention and Guidance (PPG 21). Pollution Incident Response Planning, Environment Agency, March 2009.

Application and use of quality digestate

- Seek advice on suitable applications for quality digestate from an advisor qualified under the Fertiliser Advisers Certification and Training Scheme (FACTS)[13].
- Ensure any application of quality digestate conforms to the principles set out in *Code of Good Agricultural Practice to Protect Water, Soil and Air Quality* (CoGAP)[14] (or subsequent guidance). This covers all aspects of agricultural activities including nutrient use. In particular, do not spread digestate on frozen, snow-covered or waterlogged ground, or within 10 metres of a watercourse.
- Spreading techniques and subsequent soil management that will minimise ammonia emissions should be adopted.
- Match quality digestate applications to crop nutrient requirement, growth stage and prevailing weather conditions. Apply in accordance with a Nutrient Management Plan for the farm; see *Fertiliser Recommendations for Agricultural and Horticultural Crops* (RB209)[15] (or subsequent guidance).
- Adhere to the maximum permissible annual rate of PTE addition over a 10 year period as per the *Code of Practice for the Agricultural Use of Sewage Sludge* (the 'Sludge Code')[16] .
- Follow Animal Health and Veterinary Laboratories Agency guidance on anaerobic digestion of animal by-products[17] and the use of animal by-product derived organic fertilisers and soil improvers[18].
- Where quality digestate that includes or are derived from animal manures is applied to land on which ready-to-eat crops are to be grown, follow the Food Standards Agency (FSA) guidance given in *Managing Farm Manures for Food Safety: Guidelines for Growers to Reduce the Risks of Microbiological Contamination of Ready-to-eat Crops*[19]. In primary food production, comply with the Food Hygiene (England) Regulations 2006 (SI 2006 No. 14) and Food Hygiene Regulations (Northern Ireland) 2006 (SR 2006 No 3); while not requiring a formal HACCP assessment, these regulations place an obligation on food producers to prevent contamination of food they produce. Following the FSA guidelines will help them to achieve this.

[13] http://www.factsinfo.org.uk
[14] See England and Wales http://www.defra.gov.uk/foodfarm/landmanage/cogap/response.htm, Northern Ireland http://www.dardni.gov.uk/index/publications/pubs-dard-environmental/content-codeofgoodagripractice.htm
[15] http://www.defra.gov.uk/publications/2011/03/25/fertiliser-manual-rb209/
[16] http://www.defra.gov.uk/environment/quality/water/waterquality/sewage/documents/sludge-cop.pd
[17] http://www.animalhealth.defra.gov.uk/managing-disease/animalbyproducts/compost-biogas-manure/index.htm or for Northern Ireland on the DARD Veterinary Service website http://www.dardni.gov.uk/index/animal-health/animal-by-products.htm
[18] http://www.animalhealth.defra.gov.uk/managing-disease/animalbyproducts/compost-biogas-manure/use-of-organic-fertilisers-soil-improvers.htm
[19] http://www.food.gov.uk/multimedia/pdfs/manuresguidance.pdf

- In areas of England and Wales designated as Nitrate Vulnerable Zones (NVZs) (i.e. areas designated under legislation to implement the Nitrates Directive), applications of quality digestate must comply with the relevant mandatory Action Programme measures. These include various requirements for maximum rates of application and permitted application windows for different types of manures and quality digestate.
- In Northern Ireland, any application of quality digestate to agricultural land must comply with the crop nitrogen limits and land application restrictions set out in The Nitrates Action Programme Regulations (Northern Ireland) 2010 (NAP).

For more information about NVZs, see the Defra website http://www.defra.gov.uk/food-farm/land-manage/nitrates-watercourses/nitrates/

For more information about the Northern Ireland NAP, see the NIEA website http://www.ni-environment.gov.uk/water/agri_regs/nitrate.htm

Analysis by the quality digestate producer

- Supply the land manager if in England and Wales or controller if in Northern Ireland with analytical results that indicate the plant nutrient content of the material supplied. The analysis should include pH, total and available nitrogen, total phosphorus, potassium and sulphur.
- Supply the land manager, if in England and Wales, or controller if in Northern Ireland, with analytical results relating to the PTE content of the digestate (i.e. lead, cadmium, chromium, mercury, copper, zinc, nickel).

Soil sampling and analysis

- Ensure all chemical analysis is carried out by laboratories using appropriate methods that are accredited by UKAS to ISO/IEC 17025 for the chemical testing of soil.
- Sample soils for major nutrients regularly in accordance with RB209.
- The quality digestate producer should arrange for the digestate to be analysed, and the land manager if in England or Wales, or the controller of the land if in Northern Ireland, should arrange for the receiving soil to be analysed for PTEs (lead, cadmium, chromium, mercury, copper, zinc, nickel) to ensure that the limit values given by the Sludge Code[20] are not exceeded for the receiving soil.
- Soil analysis for PTEs should be carried out before the first application of digestate and again when any predicted soil PTE concentration becomes equal to or greater than 75 percent of its corresponding limit value set out in the Sludge Code.

[20] http://archive.defra.gov.uk/environment/quality/water/waterquality/sewage/documents/sludge-cop.pdf

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Environment Agency

www.environment-agency.gov.uk
Tel: 08708 506 506
E-mail: enquiries@environment-agency.gov.uk
LIT 5020

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