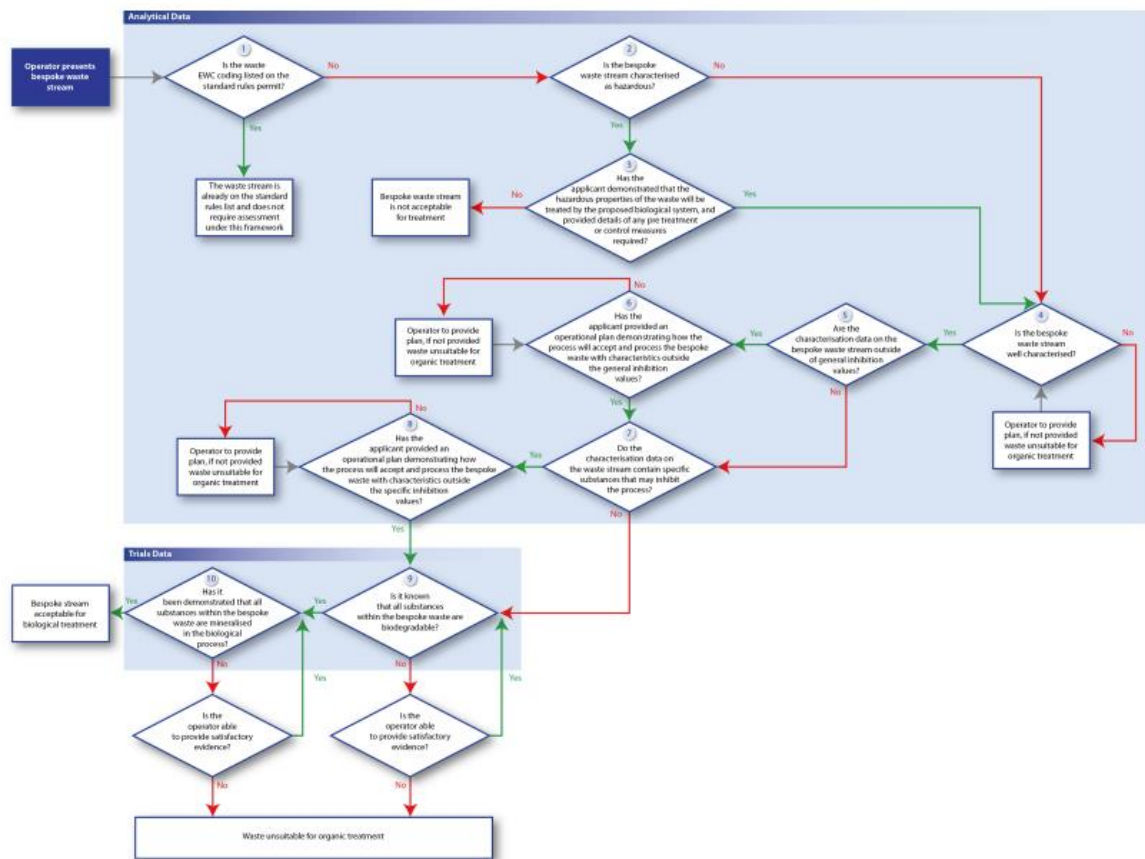


## Jacob's Assessment of Landfill Leachate

Classified as 19 07 03

The Jacob's assessment is a Technical Guidance report working with the Environment Agency (and the implementation of WM3) to determine the suitability of waste streams for Anaerobic Digestion and provides a Decision Framework to be applied to individual waste streams.



### Question 1: Is the waste EWC coding listed on the standard rules permit?

Answer: No. The EWC coding for the waste is 19 07 03, 'Landfill Leachate'. The waste originates from water that has percolated through waste landfills and has 'leached' a number of the constituents, producing an effluent water primarily containing ammonia, sulphide and some trace metals. The waste typically has a fairly low COD, but this does vary seasonally, with the level of rainfall.

### Question 2: Is the bespoke waste stream characterised as hazardous?

Answer: No, waste is non-hazardous. The waste has been classified under WM3 and found to be non-hazardous.



**Question 3: Has the applicant demonstrated the hazardous properties of the waste will be treated by the proposed biological system, and provided details of any pre-treatment or control measures required?**

Answer: Waste not classified as hazardous.

**Question 4: Is the bespoke waste stream well characterised?**

Answer: Yes, the waste has been well characterised, and rigorously tested to ensure compliance with both our pre-acceptance & acceptance parameters but also ensure compliance of our trade effluent consent. Sampling has been undertaken at a number of different landfill sites, over a significant number of samples across a considerable time frame. Waste4Generation originally began investigating leachates in 2015, and work has continued up until this submission in Spring 2023.

**Question 5: Are the characterisation data on the bespoke waste stream outside of general inhibitions levels?**

Answer: No, the characteristic data of the waste is not outside of inhibitory values set out within the Jacob's report. We found that many of the nutrients present in the waste stream, in particular the nitrogen and phosphorus, and many of the metals had a beneficial effect as many of the waste streams into site are deficient and there is sometimes a requirement to dose trace nutrients to meet the requirements of the bacteria. Excess metals from those utilised by the bacteria react with any sulphide present within the reactors and are precipitated to form a sludge within the reactors. Over time this may require de-sludging. Waste4Generation has strict pre-acceptance and acceptance parameters to protect the plant and process.

*As Question 5 demonstrates Waste4Generation will only be accepting waste streams below potential inhibitory limits, the assessment moves directly onto Question 7.*

**Question 7: Do the characterisation data on the waste stream contain specific substances that may inhibit the process?**

Answer: No, the characterisation of the waste shows that the waste is not inhibitory with the levels documented within Appendix D of the Jacob's Assessment. Concentrations of each potential inhibitor were found to be either below or within threshold limits, but not exceeding. The comprehensive digestibility and functionality studies undertaken on this waste showed no sign of inhibition. The waste does contain substances that in elevated levels could cause potential inhibition, however acceptance procedures are in place to highlight any potential variances observed with the feedstock, where the waste can and will be rejected should it not meet the required specification.

**Question 8: How has the applicant provided an operational plan demonstrating how the process will accept and process the bespoke waste with characteristics outside the specific inhibition values?**

Answer: Yes, whilst the waste stream does not have characteristics outside of specific inhibition values, Waste4Generation has demonstrated mineralised and we achieved constant methane concentrations above 80% methane. Methane at such concentration has a value as a fuel, as



documented in the Jacobs report. An operational plan specific to the leachate waste stream has been provided and is included within our updated Environmental Management System.

**Question 9: Is it known that all substances within the bespoke waste are biodegradable?**

Answer: From the analysis undertaken, there was complete mineralisation of the waste stream during the digestibility studies. Any coarse solids will be screened out prior to the AD process, and the waste will also be processed on to the AD plant via the DAF system to remove fine solids, any silts or fractions which are not readily digestible. Following the AD process, the treated effluent is subjected to aeration polishing to remove any residual COD present and oxidise any residual components. There is a final chemical treatment stage as well as methane scrubber before the treated effluent is discharged to sewer. There is also nano-bubble & oxyfusion tertiary polishing of the effluent to ensure consent compliance.

**Question 10: Has it been demonstrated that all substances within the bespoke waste are mineralised in the biological process?**

Answer: As above, the leachate is fully mineralised by pre-treatment & AD process. Between the AD plant, screening, aeration and chemical correction, any residual component which has not been biologically treated within the AD process, will be chemically & physically treated.