Appendix 4.1

Western landfill extension. Standoff design principles.

Figures 4.1A and 4.1B (drawings referenced AU/KCW/09-20/21996 and AU/KCW/09-20/21997) have been created to show the derivation of the standoff distances for the development of the landfill design. The distances are based on the following:

1. *Root protection area*

The extent of the root protection area (RPA) shown as a solid pink line on the drawings was derived by the ecological specialists. Where there are no trees or hedgerows adjacent to the boundary for which an RPA needs to be specified, the boundary line is shown as a dashed pink line along the boundary of the area of land under the control of Augean.

2. *Extent of restoration*

The extent of the restoration (shown in light blue on the drawings) follows the line of the proposed ecological protection fence provided by the ecological specialists, with the exception (as detailed further below) of:

a. the southern boundary where it follows the boundary of the land under the control of Augean,
b. the eastern boundary of the southern field where it follows a 5m standoff from the farm track as detailed in section 0 below,
c. the pipeline areas where it follows the extent of the easements as explained in sections 4 and 5 below,
d. the doline area where for Options 1B and 2B it follows the 10m standoff and for Options 1C and 2C it follows the 75m standoff, and
e. the eastern boundary where it abuts the current site where the restoration profile will extend across the boundary and tie in to the current site restoration.

3. *Extent of excavation*

The extent of the excavation area (shown in green on the attached drawings) follows a 2.5m operational standoff (to allow access for the excavation and engineering of the site from the extent of the restoration (as detailed in section 2 as being based on the protection fence, land control areas and easements, and shown in light blue on the attached drawings) with the exception (as detailed below) of:

a. the eastern boundary of the southern field where it follows the extent of the restoration,
b. the doline area where it follows the extent of the restoration, and
c. the eastern boundary where it abuts the current site where the excavation and phase design will extend through the boundary and tie in to the current site design.

4. *Gas Pipeline*

The location of the gas pipeline has been taken from the topographical survey of the permanent marker posts at the site and a series of temporary marker pegs placed between the permanent marker posts which were placed by National Grid when they visited the site.

A 6m easement has been allowed from the centre of the gas pipe. This is based on discussions with National Grid. A document entitled "Specification " provided by National Grid in March 2020 states that: "*The easement strip should be clearly marked by a suitable permanent boundary such as a post and wire fence, and where appropriate, slope indicator markers shall be erected to facilitate the verification of the recommended slope angle as the slope is formed, by the third party.*" As a result it is assumed that the restoration can extend to the easement boundary, but that an operational standoff (assumed 2.5m) is needed from the edge of the easement to allow access for the excavation and engineering of the site. This easement and standoff will be subject to the results of the stability risk assessment for the site and agreement with National Grid.

5. *Water Pipelines*

The locations of the water pipelines through the western extension area have been plotted using the water pipeline route recorded during the geophysical investigation of the field in May 2020. As the line of the water pipelines recorded during the geophysical investigation does not extend to the existing field boundary pipeline markers located at the western extent of the site, the western extent the pipeline has been based on the services plan and the surveyed marker posts. If the water pipelines are not diverted then the location of the pipelines will need to be confirmed prior to the commencement of excavation works.

A 7m easement has been allowed from the centre of each of the two water pipelines. This is based on discussions with Anglian Water in March 2020. Consistent with the easement for the gas pipeline it is assumed that the restoration can extend to the easement boundary, but that an operational standoff (assumed 2.5m) is needed from the edge of the easement to allow access for the excavation and engineering of the site. This easement and standoff will be subject to the results of the stability risk assessment for the site and agreement with Anglian Water. If the pipeline is diverted then it is assumed that no excavation works will take place to the west of the diverted water pipelines due to the small area available.

6. *Doline Area*

A swallow holes and area of potential dolines is located in the central area of the shallow valley which crosses the western extension area at the southern end of the northern field. Site investigation data to date has confirmed the presence of some features and the possibility of additional buried features underlying this area of the site. In addition it will be necessary to convey surface water from west to east in this general area of the site. As a result it is uncertain at this stage of the design whether this area of the site will be excavated and developed for landfill. Accordingly three options for excavation and restoration profiles have been developed for this area consisting of:

a. the extraction and restoration of the whole site area with no break or standoff from the doline area,
b. the excavation and restoration breaking at the doline area with a 10m standoff from an approximate centre line of the valley and doline area,
c. the excavation and restoration breaking at the doline area with a 75m standoff from an approximate centre line of the valley and doline area.

7. *Farm Track*

A 5m standoff to the excavation and restoration boundary from the western edge of the farm track on the eastern boundary of the southern field to allow for future hedge or tree planting.

8. *Tie in to existing site*

It is assumed that extraction will proceed through the existing western boundary of the ENRMF landfill site and that the western extension will not be worked as a separate site to the existing landfill. The proposed working extents for the western extension area have been tied in to the existing newt exclusion fence to the north of Phase 11 and the proposed extraction model for the southern boundary of the Phase 7 working area.