

Cambridge Waste Water Treatment Plant Relocation Project
Anglian Water Services Limited

Appendix 16.1: Material Resources Requirements and Waste Estimates

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Abbreviations

| Abbreviation | |
|--------------|---------------------------------------|
| CHP | Combined heat and power |
| ES | Environmental Statement |
| FE | Final effluent |
| FRC | Formed reinforced concrete |
| FST | Final settlement tanks |
| ha | Hectare |
| HPH | Heating pasteurisation and hydrolysis |
| HV | High voltage |
| LSI | Liquid sludge import |
| MaBR | Membrane batch reactor |
| PS | Primary settlement |
| PST | Primary settlement tanks |
| STC | Sludge treatment centre |
| TTP | Tertiary treatment plant |
| WRC | Water recycling centre |
| WWTP | Waste water treatment plant |

1 Introduction

- 1.1.1 Resources required to construct the proposed WWTP include raw materials such as aggregate and minerals from primary, secondary and recycled sources, and manufactured products.
- 1.1.2 Manufactured products include the materials required for the construction of the buildings, road surface, car parks, pre-cast elements for structures such as tanks, gantries, lighting and fencing.
- 1.1.3 This appendix sets out the estimates for material resource requirements and waste estimates associated with the Proposed Development referred to in the Chapter 16: Material Resources and Waste.

1.2 Assumptions and limitations relating to material resources

- 1.2.1 It is assumed that not all materials will be sourced regionally (within East of England) and that some of the material will be sourced nationally (outside of East of England, within the UK and from Europe). This will represent the (environmentally) worst-case scenario.
- 1.2.2 The likely procurement source for the raw materials required for the Proposed Development is given below:
 - aggregates – UK;
 - concrete – UK/ Ireland;
 - timber – UK; and
 - steel – UK and Europe.
- 1.2.3 It is assumed that all aggregate material sourced either regionally or nationally will meet the regional target plan based on the UK Government's National and Regional guidelines for aggregates 2005-2020, for the recycled and secondary aggregate where technically appropriate and economically feasible.
- 1.2.4 For the purpose of the assessment, the density of cement is 1,440kg/m³, density of reinforced cement concrete (RCC) is 2,500kg/m³, density of aggregate is 2,900kg/m³ and density of steel is 8,050kg/m³ (Civiconcept, 2022).
- 1.2.5 Specification for aquaspire composite steel pipes of nominal bore 1500mm of pipe length 2780mm and weighing 200 tonnes has been used to estimate the weight of composite steel pipes and their fittings (aquaspira, n.d.).
- 1.2.6 This EIA has not assessed the impact of material use and waste associated with the manufactured goods required by the Proposed Development as these will be subject to their own separate consenting and regulatory controls at the place of production.

- 1.2.7 It is assumed the excavated material from Waterbeach transfer pipeline construction will be suitable for backfill without need to import material for this purpose.
- 1.2.8 It is assumed that all material excavated from the tunnelling works will be passed through the dewatering process. It is also assumed that the dewatering process plant will make the material suitable for reuse as backfill without the need to import material for this purpose.
- 1.2.9 An assessment of resources related to the operation of the proposed WWTP is scoped out of the assessment. The types of resources used in operation are described in Section 1.8, *Estimated water consumption* and *Site wide chemical consumption and location*, Chapter 2: Project Description (App Doc Ref 5.2.2).

1.3 Assumption and limitations for waste estimates

- 1.3.1 Although the estimates for waste arisings from general clearance of agricultural land is unavailable, it is assumed that all vegetation waste from general site clearance, including agricultural land, will be composted.
- 1.3.2 Allowable wastage from reinforcement steel is 3.5 to 5.5% and that of structural steel is 10 to 15% (Civil Planets, 2022). However, it is assumed that all steel waste would be recycled and not landfilled.
- 1.3.3 Waste arising from packaging material, off-cuts from metals/ plastics and site office has not been quantified. It is assumed that the majority of these wastes would be recycled and not landfilled.
- 1.3.4 It is assumed that all construction materials used for temporary construction works (such as for construction access roads and site offices) would be re-used and recycled after the construction of the Proposed Development and would not generate waste.
- 1.3.5 Unless otherwise stated, it is assumed that all site-won material will be suitable for use within the Proposed Development or on projects locally. However, for the worst-case scenario, it has been assumed that all waste identified for disposal will be sent to landfill. In addition, it is assumed that all made ground waste will be sent to local waste infrastructure for treatment and reuse would not be landfilled.
- 1.3.6 It is assumed that any material used for the covering and protection of excavated topsoil during storage would be reused and not landfilled.
- 1.3.7 It is assumed the excavated material from the Waterbeach transfer pipelines will be suitable for backfill without the need to import material for this purpose
- 1.3.8 It is assumed that all material excavated from the tunnelling works will be passed through the dewatering process. It is also assumed that the dewatering process plant will make the material suitable for reuse within the Scheme Order Limits to construct the earth bank within the landscape masterplan.

- 1.3.9 The volume of excavated material that may be hazardous is unknown. For the purpose of assessment, it is conservatively assumed that 5% of the excavated material identified for disposal is hazardous. For excavated material for the tunnel and shafts, it is assumed that 35% of the pipeline route is within the footprint of the existing Cambridge WWTP. For the excavation of the trenches for the Waterbeach Pipeline, it is assumed that material from excavation over a 1.3km section within 500m of historic landfill with a width is 6m to an average depth of 5m could be contaminated. In both cases, it is assumed that 5% of the excavated volume is potentially hazardous.
- 1.3.10 For the excavation of the treated effluent pipeline it is assumed there are no contaminant sources and none of the material would be hazardous.
- 1.3.11 The volumes of drilling substances (such as bentonite) required for tunnel works/trenchless construction are not quantified at present.
- 1.3.12 Research shows that 13% of products delivered to construction sites are sent directly to landfill without having been used (Construction waste, 2022). However, as Anglian Water has a net zero strategy to 2030 for capital carbon reduction, it is therefore assumed that a small element of waste will be generated from the imported aggregated being not used/unsuitable for reuse within the Proposed Development.
- 1.3.13 Research has identified that allowable wastage for cement is 2% to 3.5%, for concrete is 1% to 5% and that of aggregate is 5% to 8% (Civil Planets, 2022). It is assumed that 2% of the cement and concrete and 5% of aggregate based material brought on-site may not be suitable for construction and would require removal off-site.
- 1.3.14 As a worst case it is assumed all waste identified in the "Bill of Quantities" for disposal during the construction phase would be landfilled.
- 1.3.15 It is assumed that all material removed for from the river bed and bank for the construction of the outfall would be landfilled.
- 1.3.16 It is assumed that all grit, screenings and rag waste arising from the operational phase of the proposed WWTP and from the decommissioning of the existing Cambridge WWTP would be landfilled.
- 1.3.17 The estimate of the quantities of waste generated in relation to resource and material usage and the volume of site won soils and sub-soils is based on detailed estimates provided within the design bill of quantities (BoQ). Although disposal volumes are indicated in the design BoQ it is the intent that all non-contaminated soil and sub-soil would be re-used within the Proposed Development.
- 1.3.18 It is assumed that disposal of excavated material other than topsoil, rock or artificial hard material refers to substances such as litter/rubbish, large rocks, redundant pipework, land drain debris etc.
- 1.3.19 It is assumed that all fencing used for Waterbeach transfer pipeline construction is temporary and of a type that it is portable/reusable.

- 1.3.20 There is no assessment of the volume of waste that might as a result of the full decommissioning (including demolition) of the existing Cambridge WWTP or the existing Waterbeach Water Recycling Centre (WRC) which are not part of the application. The effect of waste associated with the demolition of the existing Cambridge WWTP and the existing Waterbeach Water Recycling Centre (WRC) is considered within section 3.9 of Chapter 21: Cumulative Effects Assessment.
- 1.3.21 In operation the sludge treatment process will produce an enhanced treated sludge product, referred to as biosolids, suitable for use as bio-fertiliser for land application. The STC will produce an 'Enhanced Treated Biosolids' product (not considered as waste) for spreading on agricultural land, anticipated to be 80,391 wet tonnes/annum or 40,196 m³/annum diverting it from landfill.

2 Proposed WWTP

2.1.1 The materials and waste estimates in relation to the proposed WWTP are detailed below. These relate to the proposed WWTP, and all associated treatment works, landscaping proposals, the final effluent pipeline and storm pipeline, outfall, transfer tunnel and new access connection connecting with Horningsea Road.

2.2 Material resource requirements

2.2.1 The construction of the following components of the proposed WWTP have been taken into account:

- civil works for:
 - final effluent (FE) main and inlet works;
 - the inlet works formed reinforced concrete (FRC);
 - the primary settlement tanks (PST);
 - the membrane batch reactor (MABR) including formed reinforced concrete works;
 - the final settlement tanks (FST) including formed reinforced concrete works;
 - the storm pipeline, final effluent pipeline and outfall
 - the ferric dosing structures;
 - interstage primary settlement (PS) structures;
 - the tertiary treatment plant (TTP);
 - the sludge treatment centre (STC) including liquid sludge import (LSI) and sludge thickening structures and the heating pasteurisation and hydrolysis (HPH) facility;
 - structures for sludge dewatering;
 - structures for digestion and post digestion;
 - structures for Combined Heat and Power (CHP) gas holder;
 - high voltage (HV) power; and
 - roads and drainage works.
- the earthworks required for the landscape masterplan and proposed WWTP; and
- construction of the Combined Heat and Power (CHP) Gas Holder.

2.2.2 The estimated resource requirements for construction of the proposed WWTP are listed in Table 2-1.

- 2.2.3 The estimated volume of aggregates/aggregate-based material required for the proposed WWTP is listed within Table 2-3.
- 2.2.4 The estimated volume of steel/ steel-based material required for the construction of the proposed WWTP are detailed within Table 2-4.

Table 2-1: Estimated material requirement for the proposed WWTP – Part 1

| Type | Units | Project component | | | | | | | | | | | | |
|--|----------------|----------------------|------------------------|------------------|-------------|----------|---------------|------------|-------------|----------|--------------|----------------------|-----------------------|-------------|
| | | Final Effluent Mains | Main Inlet works Civil | Inlet works *FRC | *PST, Civil | *PST FRC | *MABR, Civils | *MABR, FRC | *FST Civils | *FST FRC | Storm Civils | Ferric Dosing Civils | *Interstage PS Civils | *TTP Civils |
| Aggregate | m ³ | | | 91 | | 91 | 59 | 57 | 59 | 59 | | | | |
| Cement, various grades and aggregate | m ³ | 207 | 765 | 765 | 967 | 929 | 9,467 | 9,467 | 4,699 | 11,82 | 5,598 | 171 | 429 | 1,589 |
| Concrete: mass/reinforced | m ³ | 345 | 949 | 846 | 1,058 | 1,378 | 9,583 | 9,590 | 1,608 | 1,573 | 5,327 | 171 | 429 | 1,589 |
| Granular material | m ³ | 2,111 | 641 | | 408 | | 257 | | 539 | | 257 | 40 | | |
| Geotextiles | m ² | 2,870 | 3,982 | | 12,364 | | 8,926 | 22,541 | 22,541 | | 8,436 | | | 54 |
| Bitumen, road bases and surfacing | m ³ | 60 | | | | | | | | | | | | |
| Stones for temporary works access roads: | m | 1,200 | | | | | | | | | | | | |
| Composite steel Pipes | t | 268 | | | | | | | | | 6.5 | | | |
| Composite Steel reinforced pipe fittings | nr | 42 = 3.8t | | | | | | | | | 8 | | | |
| Iron pipes, various nominal bores | m | | | | 1,671 | | | | 2,746 | | 291 | | | 61 |

| Type | Units | Project component | | | | | | | | | | | | |
|--|----------------|----------------------|------------------------|------------------|-------------|----------|---------------|------------|-------------|----------|--------------|----------------------|-----------------------|-------------|
| | | Final Effluent Mains | Main Inlet works Civil | Inlet works *FRC | *PST, Civil | *PST FRC | *MABR, Civils | *MABR, FRC | *FST Civils | *FST FRC | Storm Civils | Ferric Dosing Civils | *Interstage PS Civils | *TTP Civils |
| Steel reinforcement fabric | t | | 26 | | 0.32 | | 14.84 | 21.4 | | 14.84 | 1.85 | | | |
| Steel bars | t | 31.04 | 103.38 | 114.58 | 126.71 | 126.71 | 1,387.05 | 1,387.05 | 234.89 | 234.14 | 826.26 | 23.85 | 61.66 | 258.66 |
| Other – volumes not quantifiable /prefabricated items | | | | | | | | | | | | | | |
| Stairways and landings | nr | 1 | 3 | | 1 | | 9 | | | | 3 | 2 | 1 | |
| Walkways | m | 28 | | | | | | | | | | 39 | | |
| Ladders | m | 5 | | | | | | 37 | | | | | | 4 |
| Handrails | m | 26 | 146 | | 25 | | 880 | | 126 | | 589 | 65 | 66 | 29 |
| Open grid flooring | m ² | | 203 | | 27 | | 911 | | 303 | | 690 | | | 48 |
| HDPE/ PVC/ plastic pipes | m | | | | 457 | | | | 302 | | 279 | | | |
| Timber post for fencing | m | 3,799 | | | | | | | | | | | | |
| Timber field gates | nr | 6 | | | | | | | | | | | | |

Source: Cambridge Waste Water Treatment Plant Relocation Project, Cambridge Bill of Quantities, dated 30/5/2022

*Note: The details for the acronyms that define the various Civil units of the proposed WWTP are listed in Section 2.2.1

Table 2-2: Estimated material requirement for the proposed WWTP – Part 2

| Type | Unit | Project component | | | | | | | | | | | |
|-----------------------------------|----------------|------------------------------|-----------------|--------------------------|--------------|---------------------------------|------------------|-----------------------|-----------------|--------------------------------|------------|------------------------|----------------|
| | | *Storm & FE Discharge Civils | *STC LSI Civils | Sludge Thickening Civils | *HP H Civils | Sludge Dewatering & Cake Civils | Digestion Civils | Post Digestion Civils | *CHP Gas Civils | Wash and Portable Water Civils | *HV Civils | Road & Drainage Civils | Earthworks BOQ |
| Aggregate | m ³ | | 109 | | 99 | | | 99 | | | 85 | | |
| Cement, various grades | m ³ | 427 | 898 | 997 | 263 | 1,687 | 65 | 325 | 258 | 283 | | | |
| Concrete | m ³ | | | | | | 504 | | | | | | |
| Concrete: mass/reinforced | m ³ | 427 | 1,010 | 426 | 362 | 1,104 | 540 | 424 | 246 | 275 | 85 | 5,044 | |
| Granular material | m ³ | | 316 | 230 | | 195 | | 28 | | | | 5,044 | 1,500 |
| Gravel | m ³ | | | | | | | | | | | 15,00 | |
| Geotextiles | m ² | 54 | 319 | 2,370 | | 2,411 | | 113 | | | | 42,742 | 9,142 |
| HDPE/ PVC pipes | m | | | 251 | 139 | 61 | | 139 | | 2,420 | | | |
| Iron pipes, various nominal bores | m | 61 | 45 | 7 | 23 | | 36 | 14 | | 5 | | | |
| Steel reinforcement fabric | t | | 7 | 8.54 | 8 | 17.6 | | 8 | 0.73 | 0.15 | | 353 | |
| Steel bars | t | 59.7 | 123.33 | 684.78 | 24.25 | 60.9 | 73.65 | 31.85 | 124.58 | 12.2 | | | |

| Type | Unit | Project component | | | | | | | | | | | | |
|--|----------------|------------------------------|-----------------|--------------------------|-------------|---------------------------------|------------------|-----------------------|-----------------|--------------------------------|------------|------------------------|----------------|--|
| | | *Storm & FE Discharge Civils | *STC LSI Civils | Sludge Thickening Civils | *HPH Civils | Sludge Dewatering & Cake Civils | Digestion Civils | Post Digestion Civils | *CHP Gas Civils | Wash and Portable Water Civils | *HV Civils | Road & Drainage Civils | Earthworks BOQ | |
| Structural metalworks | tonnes | | | 50 | | | | | | | | | | |
| Other – volumes not quantifiable /prefabricated items | | | | | | | | | | | | | | |
| Stairways and landings | nr | 4 | 5 | 2 | 4 | 2 | 1 | 2 | | | | | | |
| Walkways | m | | | | | | 1 | | | | | | | |
| Handrails | m | 106 | | | | | 61 | | | 22 | | | | |
| Open grid flooring | m ² | 100 | | | | | | | | 29 | | | | |
| HPDF/PVC pipes | m | | 411 | | | | | | | | | | | |
| Clay pipes | m | | | | | | | | | 4,000 | | | | |
| Covered tank exceeding 1000m ³ | nr | | | 1 | 1 | | | | | | | | | |
| Covered tank, volume 250-500m ³ | | | | | 3 | | | | | | | | | |
| Metal/ steel fabric | m ² | | | 1,633 | 1,132 | 2,517 | | 1,132 | 105 | 50 | 50,440 | | | |
| Steel tanks | | | | | | | | 2 | | | | | | |

Source: Cambridge Waste Water Treatment Plant Relocation Project, Cambridge Bill of Quantities, dated 30/5/2022

*Note: The details for the acronyms that define the various Civil units of the proposed WWTP are listed in Section 2.2.1

Table 2-3: Total aggregate/aggregate – based material required for the proposed WWTP

| Material | Unit | Quantities |
|--|----------------|------------|
| Aggregate | m ³ | 808 |
| Granular materials | m ³ | 14,891 |
| Gravel | m ³ | 1,500 |
| Bitumen | m ³ | 60 |
| Total volume of aggregate and aggregate based material | m ³ | 17,259 |
| Cement, various grades | m ³ | 40,256 |
| Concrete, mass/ reinforced | m ³ | 39,345 |

Source: Cambridge Waste Water Treatment Plant Relocation Project, Cambridge Bill of Quantities, dated 30/5/2022

Table 2-4: Total steel/ steel-based material required for the proposed WWTP

| Description of works | Unit | Quantities |
|---|---------------|--------------|
| Steel fabric | tonnes | 460 |
| Composite steel pipes | tonnes | 275 |
| Steel bars (reinforcing) | tonnes | 6,111 |
| Steel reinforced pipe fittings | tonnes | 4 |
| Total | tonnes | 6,850 |
| Other – not quantified in volume | | |
| Steel tank, prefabricated | number | 2 |

Source: Cambridge Waste Water Treatment Plant Relocation Project, Cambridge Bill of Quantities, dated 30/5/2022

Excavated material (site won material)

- 2.2.5 The construction of the proposed WWTP involves excavation of a large transfer tunnel which will generate approximately 18,700m³ of material. In addition to the transfer tunnel there are other excavations required for the construction of the proposed WWTP structures within the earth bank, landscaping works associated with the landscape masterplan and work for the installation of the final effluent pipeline.
- 2.2.6 The estimates of excavated material from tunnelling and earthworks are provided in Table 2-5 and Table 2-6. The excavated material from the tunnel will be passed through a dewatering process to remove water and the water will be re-used in the tunnelling process. The forecast levels of fill required for the proposed WWTP will be dependent on the detailed foundation design, which will determine the earthworks requirements. The estimated volume of fill material required for the proposed earth bank is 265,000m³.

Table 2-5: Source of excavated materials volumes that will be used for proposed earth bank and landscaping works

| Description of works | Excavated volume (m ³) |
|--|------------------------------------|
| Excavation of the transfer tunnel and shafts | 18,752 |
| Excavation of trenches associated with the treated effluent pipeline | 10,969 |

| Description of works | Excavated volume (m ³) |
|---|------------------------------------|
| Access road and embankment | 1,432 |
| 100mm topsoil removal from the area of land required for the landscape masterplan | 21,943 |
| Additional excavation of up to 100mm below proposed site finish ground level | 68,592 |
| Excavation for site roads to sub-base level | 28,702 |
| Proposed WWTP structures (water treatment, details provided in Table 2-7) | 104,936 |
| Proposed WWTP (structures relating to the sludge treatment centre) | 5,302 |
| Total excavated volume for reuse* | 260,627 |

* The numbers provided indicate a minor shortfall in the volume required for the earth bank. As the intention is a there would be minor adjustments in earthworks to achieve this intention, as a worst case however the import of material for this shortfall is considered in the assessment.

Source: Cambridge Waste Water Treatment Plant Relocation Project, Cambridge Cut and fill calculations, dated 30/5/2022

Table 2-6: Source of excavated materials volumes from the proposed WWTP structures

| Location | Excavated volume (m ³) |
|---|------------------------------------|
| Generator area | 499 |
| Transformation slabs | 38 |
| TPS area | 12,321 |
| Inlet works area | 1,571 |
| PST area | 37,476 |
| MABR area | 8,662 |
| RAS SAS PS | 402 |
| FST area | 16,809 |
| Tertiary treatment area | 4,952 |
| Wash pump area | 263 |
| Storm tank area | 17,319 |
| Ferric dosing area | 459 |
| RES HGV area | 726 |
| Car park area | 872 |
| Storage building area | 513 |
| Maintenance building area | 2,054 |
| Total excavated volume available for reuse | 104,936 |

Source: Cambridge Waste Water Treatment Plant Relocation Project, Cambridge Cut and fill calculations, dated 30/5/2022

2.2.7 The estimated volume of excavated material from different construction activities expected to require offsite disposal, as stated in the Bill of Quantities is listed in Table 2-7.

Table 2-7: Excavated material that require disposal for the proposed WWTP

| Description of works | Excavated volume, identified for disposal (m ³) |
|--|---|
| Treated effluent pipeline installation, disposal of artificial hard material | 747 |
| Construction of the inlet works and disposal of excavated material other than topsoil, rock or artificial hard material | 63 |
| Construction of the primary settlement tanks and disposal of excavated material other than topsoil, rock or artificial hard material | 4,564 |
| Construction of the MaBR and disposal of excavated material other than topsoil, rock or artificial hard material | 1,572 |
| Construction of the final settlement tank, disposal of excavated material other than topsoil, rock or artificial hard material | 3,440 |
| Construction of storm storage structures and disposal of excavated material other than topsoil, rock or artificial hard material | 1,729 |
| Construction of ferric dosing facility and disposal of excavated material other than topsoil, rock or artificial hard material | 333 |
| Construction of the interstage primary settlement structures and disposal of excavated material other than topsoil, rock or artificial hard material | 756 |
| Construction of the TTP, disposal of excavated material other than topsoil, rock or artificial hard material | 4,074 |
| Construction of the outfall and disposal of excavated material other than topsoil, rock or artificial hard material | 898 |
| Construction of the STC including the LSI and HPH facility and disposal of excavated material other than topsoil, rock or artificial hard material | 4,308 |
| Construction of the sludge dewatering and storage area and disposal of excavated material other than topsoil, rock or artificial hard material | 1,219 |
| Construction of the digester facility disposal of excavated material other than topsoil, rock or artificial hard material | 1,606 |
| Construction of the CHP and gas holder and disposal of excavated material other than topsoil, rock or artificial hard material | 318 |
| Construction of wash and potable water facilities and disposal of excavated material other than topsoil, rock or artificial hard material | 425 |
| Construction of structures relating to HV equipment, disposal of excavated material other than topsoil, rock or artificial hard material | 189 |
| Total excavated material that requires disposal | 26,241 |

Source: Cambridge Waste Water Treatment Plant Relocation Project, Cambridge Bill of Quantities, dated 30/5/2022

Note: disposal of excavated material other than topsoil, rock or artificial hard material refers to litter/rubbish, large rocks, redundant pipework, land drain debris etc.

2.3 Construction waste volume estimates

2.3.1 The estimated waste volumes from the construction of the proposed WWTP are detailed within Table 2-8.

Table 2-8: Estimated worst case waste volumes during construction of the proposed WWTP

| Activity | Waste arising from the proposed WWTP | Estimation of area/quantity waste arising | Volume estimate | Comments |
|---|--|---|---------------------|--|
| Use of primary and secondary materials | Aggregate brought to site, unfit for use | 5% of aggregate | 863m ³ | Inert waste (aggregate, cement, concrete) |
| | Cement / concrete brought to site, unfit for use | 2% of cement and concrete based material brought to site | 1,592m ³ | |
| | Steel brought to site, unfit for use | Wastage from reinforcement steel is 3.5% to 5.5% | 336 tonnes | |
| Wastage from structural steel is 10% to 15% | | | 111 tonnes | |
| Excavation of the transfer tunnel within the footprint of the existing Cambridge WWTP | Hazardous waste arising from excavated material identified for disposal. | 5% of excavated material from within the footprint of the existing Cambridge WWTP, identified for disposal is hazardous | 330 m ³ | All material suspected of being contaminated (included with hazardous materials) would be managed in accordance with the CoCP Part A (Appendix 2.1, App Doc Ref 5.4.2.1) |
| Construction of the outfall and river works | Sediments from the river bed | All excavated material from the River Cam would be landfilled | 150m ³ | |

Construction waste sources – quantity not determined

2.3.2 There are a number of activities identified as generating waste for which it is not yet possible to quantify the volumes. The types and sources are set out within Table 2-9.

Table 2-9: Summary waste sources not yet quantifiable in relation to construction of the proposed WWTP (including tunnel section and shafts within the existing Cambridge WWTP)

| Activity | Source / type | Estimation of area/quantity waste arising | Comments |
|--|--|---|---|
| Ground clearance | Vegetation removal (green waste) Removal of length of hedgerows and some trees from within the area of land required for the treated effluent pipeline and outfall | 130m length of hedgerows and trees | Through the application of the CoCP (Appendix 2.1, App Doc Ref 5.4.2.1) and SWMP reduction in wate generated will be sought by avoiding removal, minimising construction working area widths and translocation of hedgerow. |
| Clearance of agricultural land | General clearance of the land required for the construction of the proposed WWTP and landscape masterplan and includes removal of some vegetation, debris, rubble etc. | Maximum extent expected to be cleared up to 92ha | It is assumed green waste would be sent to be composted |
| | Clearance of land required for the construction of the treated effluent pipeline including the outfall and compound areas | Maximum extent expected to be cleared up to 10ha | |
| Construction phase – barrier / fencing use | Stock proof fence (wood) and herras fencing | Small volume of waste from defective lengths of the fencing totalling 2400m | To be used in construction of the treated effluent pipeline – assumed that all fencing sold or reused elsewhere |
| Pipeline installation – crossing provision | Crossing points in stock proof fencing | 1 set | To be used in construction of the treated effluent pipeline – assume can be re-used elsewhere |

Source: Cambridge Waste Water Treatment Plant Relocation Project, Cambridge Bill of Quantities, dated 30/5/2022

3 Waterbeach Transfer Pipeline

3.1.1 The materials and waste estimates in relation to the Waterbeach Pipeline are detailed below. These relate to materials relating to the construction of the proposed pipeline from Waterbeach to the connection within the existing Cambridge WWTP.

3.2 Material resource requirements

3.2.1 Table 3-1 details the estimate material resource required for the construction of the Waterbeach Pipeline. In addition to these materials there will be a need for materials such as water and bentonite or other drilling substances required to for HDD drilling activities. The volumes required are not quantified at present.

3.2.2 As the precise number of areas subject to horizontal directional drilling (HDD) are not yet confirmed there is no information is currently available on the quantity of materials required to support drilling activities such as drilling fluids, bentonite and polymer additives.

Table 3-1: Estimated material requirements for the Waterbeach transfer pipeline

| Materials required | Estimated quantities of materials resources required | Volume | Additional information |
|---|--|--|------------------------------------|
| Aggregates and compounds for road surfacing | Aggregate for 50m length of road, to be constructed to allow 2 way traffic movements | 135m ³ | 50m road 6m wide 0.45m depth |
| | 50m x 50m base for compound a 450mm depth | 1125m ³ | |
| Other – volumes not quantifiable/prefabricated items | | | |
| High Performance Polyethylene (HPPE) pipes | 2 x 450mm diameter pipes of 16,012m length | | |
| Concrete chambers/ pre-cast setting blocks | Will be finalised at a later stage | Dependent on the number of valves required | |
| Geotextile | Unknown, but will be limited quantities | | |
| Drilling materials i.e. bentonite | Unknown at this stage | | |

3.3 Construction waste volume estimates

3.3.1 The estimated waste volumes from the construction of the proposed WWTP are detailed within Table 3-2.

Table 3-2: Estimated worst case waste volumes arising during construction of the Waterbeach Pipeline

| Activity | Waste arising from the proposed WWTP | Estimation of area/quantity waste arising | Volume estimate | Comments |
|--|--|--|----------------------------------|--|
| Use of primary and secondary materials | Aggregate brought to site, unfit for use | 5% of aggregate | 63m ³ | Inert waste (aggregate, cement, concrete) |
| | Cement / concrete brought to site, unfit for use | 2% of cement and concrete based material brought to site | None indicated as being required | |
| | Steel brought to site, unfit for use | Wastage from reinforcement steel is 3.5% to 5.5% | None indicated as being required | |
| | | Wastage from structural steel is 10% to 15% | None indicated as being required | |
| Excavation of trenches for the installation of 2 x 450mm diameter pipelines over 1.3km (section of route within 500m of 2 identified historic landfill) 6m easement as worst case with average depth of 5m | Hazardous waste arising from excavated material identified for disposal. | 5% of excavated material for the construction of the Waterbeach Pipeline, identified for disposal is hazardous | 1950 m ³ | All material suspected of being contaminated (included with hazardous materials) would be managed in accordance with the CoCP Part A (Appendix 2.1, App Doc Ref 5.4.2.1) |

Construction waste volume quantity not determined

- 3.3.2 There are a number of activities identified as generating waste for which it is not yet possible to quantify the volumes. The types and sources are set out within Table 3-3.

Table 3-3: Summary waste sources not yet quantifiable in relation to construction of the proposed WWTP Waterbeach transfer pipeline

| Activity | Waste arising from the proposed WWTP | Estimated quantities of waste arising | Comments |
|-----------|--------------------------------------|---|---|
| Clearance | Vegetation removal | 7km x 30m corridor width (1km within the footprint of the existing Cambridge WWTP and 0.5km covered within the area required for the construction of the proposed WWTP) | General clearance of the agricultural land includes removal of some vegetation, debris, rubble etc. |

4 Existing Cambridge WWTP

4.1 Material resource requirements

4.1.1 Volumes of materials relating to the decommissioning activities are not yet identified. There are limited material resource demands associated with this activity and include water for tank washing, and small quantities of materials associated within fixings and electrical works associated with isolating electrical equipment.

4.2 Decommissioning waste volume estimates

4.2.1 The waste estimates in relation to the decommissioning of the existing Cambridge WWTP are detailed below. These relate to the draining and cleaning of tanks and pipework in order to surrender the existing environmental permit.

4.2.2 Estimates of the quantities of waste generated is based on the known volumes of existing tanks and professional judgement on the likely volume of grit that may have deposited at the bottom of the tanks.

4.2.3 All structures will be left on site. Demolition and removal of structures listed below in paragraphs 4.2.4 and 4.2.5 will not be undertaken. The contents of the tanks and pipelines will be removed, cleaned, power isolated from and made safe.

4.2.4 Sources of waste during decommissioning would occur from the draining and cleaning of a total of 14 tanks which would require desludging and cleaning:

- stream C and D storage tanks;
- primary settlement tanks;
- two activated sludge process (ASP) tanks;
- final settlement tanks;
- surplus activated sludge (SAS)/primary thickening building/SAS storage tank and liquor returns;
- CHP/Digester/Gas Plant/Centrifuge/Compost Plant/Monsal Plant tanks;
- sludge blending tank and drum thickeners; and
- storm tanks and storm lagoon.

4.2.5 In addition, there would be small quantities of waste from the flushing of pipework including:

- final effluent pipework;
- chemical earth bank, pumps and all chemical pipework;
- sludge blending tanks and drum pipework;

- storm tanks and storm lagoon pipework;
- flush pipes ASP;
- stream C distributor pipework;
- general site drainage;
- cleaning of screens; and
- terminal pumping station pipework.

4.2.6 Other sources of waste which would require removal off-site are:

- small quantities of ferrous dosing compounds (ferric chloride) and other unused chemicals (which would be removed by certified carrier either for re-use or disposal);
- material from the redundant sand filter;
- detritor grit; and
- media from biofilter or chemicals used for odour control.

4.2.7 Table 4-1 presents the main waste streams generated by the decommissioning of the existing Cambridge WWTP for the purpose of rescinding the permit. Hazardous waste is unlikely to be identified during the draining down of the existing tanks and if present, will be dealt with in accordance with the CoCP (Appendix 2.1, App Doc Ref 5.4.2.1) and CEMP.

Table 4-1: Estimated worst case waste arising during decommissioning of the existing Cambridge WWTP for the purpose of permit surrender

| Decommissioning activity | Waste arising from the existing Cambridge WWTP | Estimated quantities of waste arising |
|---------------------------------|--|---|
| Desludging of tanks | Liquid sludge | 5,000m ³ |
| Chemical tank (ferric chloride) | Ferric Chloride | Quantities to be identified in detailed Decommissioning Plan and will be dependent on the volume of Ferric Chloride remaining in tank at the time of decommissioning. |
| Cleaning of odour control unit | Media from biofilter/ chemicals used for odour control | Quantities to be identified in detailed Decommissioning Plan and will be dependent on volume of biofilter media extracted from the odour control unit and/ or volume of unused chemicals. |
| Cleaning of tanks | Rags and grit | Quantities to be identified in detailed Decommissioning Plan and will be dependent on volume of rags and grit that would require removal from the bottom of the STC tank. |
| Flushing of tanks and pipework | Waste water | Quantities to be identified in detailed Decommissioning Plan and will be dependent on flushing activities. |

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<https://infrastructure.planninginspectorate.gov.uk/projects/eastern/cambridge-waste-water-treatment-plant-relocation/>