

CHAPTER 17 – WASTE

17.1 Introduction and Key Issues

- 17.1.1 This chapter of the ES describes the likely impacts of waste arisings generated during the construction phase of the Upgrade.
- 17.1.2 The key issues considered in this chapter are:
- Management and disposal of wastes arising from demolition, excavation and construction of the Upgrade;
 - management and disposal of operational wastes arising from the Upgrade;
 - identifying opportunities for waste minimisation and reuse and recycling of materials and waste;
 - identifying opportunities for use of recycled materials in construction (e.g. the use of recycled aggregates); and
 - achieving compliance with waste legislation.
- 17.1.3 The principal waste streams assessed in the EIA process are demolition, excavation and construction waste arisings.
- 17.1.4 Treated sewage sludge arisings during the operational phase of the development and domestic and commercial waste arisings from the on site office and workshop accommodation are not expected to change significantly as a result of the Upgrade. It was therefore concluded in the Scoping Report that impacts of these arisings would be scoped out of the assessment. However, LBE asked for further information to support this conclusion and this is provided below.

17.2 Consultation

- 17.2.1 The principal consultation with the local authority has been through the EIA scoping process.
- 17.2.2 It was originally proposed in the Scoping Report to scope out operational waste impacts from the assessment. The main operational wastes from the site were identified as commercial wastes from offices and workshops, which were not expected to change as a result of the upgrade as the number of staff and the general maintenance and support operations would stay the same, and sewage sludge arisings, which were also not expected to change significantly.
- 17.2.3 In their Scoping Opinion, LBE commented that there may be an increase in sludge arisings resulting from the upgrade and an assessment of the magnitude of change would be required to inform a decision to scope out the impacts. An assessment of the impact of the upgrade on operational sludge arisings is therefore provided in section 17.6. Current baseline and future projected sewage sludge arisings figures without the upgrade are presented in Section 17.5.

17.3 Legislation and Planning Policy

International / European

- 17.3.1 Government policy on waste is driven by a number of European Union Directives of which the most significant are the Waste Framework Directives of 2006 and 2008. The 2006 Directive aims to protect human health and the environment against the negative effects of collection, treatment, storage and disposal of waste. It encourages European Union (EU) member states to apply the waste hierarchy in

managing their waste.

17.3.2 The 2008 Directive re-affirms the basic concepts and definitions related to waste management, such as definitions of waste, recycling, recovery. It explains when waste ceases to be waste and becomes a secondary raw material (so called end-of-waste criteria), and how to distinguish between waste and by-products. The Directive lays down some basic waste management principles: it requires that waste be managed without endangering human health and harming the environment, and in particular without risk to water, air, soil, plants or animals, without causing a nuisance through noise or odours, and without adversely affecting the countryside or places of special interest. Waste legislation and policy of the EU Member States shall apply as a priority order the following waste management hierarchy:

- Prevention;
- preparing for reuse;
- recycling;
- recovery; and
- disposal.

National

17.3.3 The reduced amount of landfill capacity has necessitated a rethink of how waste is dealt with throughout the UK. Waste must be dealt with in a more sustainable way, and in 2002 the Government re-introduced the 'Waste not, Want not' strategy which put forward the waste hierarchy. The waste hierarchy prioritises:

- Reduction of waste;
- reuse of waste;
- recycling of waste;
- recovery of energy from waste; and
- waste disposal.

17.3.4 The Waste (England and Wales) Regulations 2011 implement the revised Waste Framework Directive 2008 and in summary:

- Require businesses to confirm that they have applied the waste management hierarchy when transferring waste and to include a declaration on their waste transfer note or consignment note;
- require a new waste hierarchy permit condition and where appropriate a condition relating to mixing of hazardous waste;
- introduce a two-tier system for waste carrier and broker registration, which includes those who carry their own waste, and introduces a new concept of a waste dealer;
- make amendments to hazardous waste controls and definition; and
- exclude some categories of waste from waste controls, notably animal by-products whilst include (sic.) a small number of radioactive waste materials.

17.3.5 The NPPF was published and became immediately effective on 27 March 2012. It sets out the Government's economic, environmental and social planning policies for England.

17.3.6 The NPPF effectively consolidates previous national planning policy advice and does not introduce new technical guidance. It does not contain specific waste policies, since it was intended that national planning policy would be published alongside the National Waste Management Plan for England.

17.3.7 The National Waste Strategy for England describes the Government's vision for managing waste and resources in accordance with the Waste Framework Directive.

- The strategy recognises the waste hierarchy and that the demolition and construction sector have the potential to significantly reduce the quantity of waste sent to landfill. The waste strategy established a target of reducing by half the quantity of demolition, excavation and construction waste sent to landfill by 2012 in partnership with the industry.
- 17.3.8 National targets were set for recycling and composting of household waste of at least 40% by 2010, 45% by 2015 and 50% by 2020. Similarly recovery targets for municipal waste were set at 53% by 2010, 67% by 2015 and 75% by 2020.
- 17.3.9 The Government completed a Waste Review in June 2011 and published an Action Plan which includes various waste-related targets.
- 17.3.10 The Waste Management Plan for England was published in December 2013. This is a high level document which is non-site specific. It provides an analysis of the current waste management situation in England, and evaluates how it will support implementation of the objectives and provisions of the revised 2008 Waste Framework Directive. National planning policy on waste is currently set out in Planning Policy Statement 10 'Planning for Sustainable Waste Management. It provides the planning framework to enable local authorities to put forward, through local waste management plans, strategies that identify sites and areas suitable for new or enhanced facilities to meet the waste management needs of their areas. This policy is currently being updated and has been subject to public consultation. Once it has been finalised, the updated policy will replace Planning Policy Statement 10 as the national planning policy for sustainable waste management.
- 17.3.11 According to the Waste Management Plan England and the UK are already achieving an estimated 93% recovery rate of construction and demolition waste. This already exceeds the 2020 target of recovering at least 70% by weight, of non-hazardous construction and demolition waste.
- 17.3.12 The Site Waste Management Regulations 2008 required that all construction projects with a value over £300,000 had a Site Waste Management Plan (SWMP) in place. The Regulations were repealed in 2013 and SWMPs are no longer a statutory requirement. However, they are still produced for many construction projects as they are seen to be the best way of keeping records of quantities and types of waste generated and how they were managed/disposed of during demolition and construction. A SWMP will be implemented for the Upgrade.
- 17.3.13 The National Policy Statement for Waste Water (NPS) published in 2012 sets out Government policies for waste water infrastructure developments. It also provides guidance on how environmental topics should be addressed in environmental statements.
- 17.3.14 The NPS states at paragraph 4.14.5 that the applicant should set out the arrangements that are proposed for managing any waste produced and prepare a Site Waste Management Plan. The arrangements described and the Management Plan should include information on the proposed waste recovery and disposal system for all waste generated by the development, and an assessment of the impact of the waste arising from development on the capacity of waste management facilities to deal with other waste arising in the area for at least five years of operation. The applicant should seek to minimise the volume of waste produced and the volume of waste sent for disposal unless it can be demonstrated that this is the best overall environmental outcome. The applicant must demonstrate that all waste produced by the facility will be managed in accordance with the waste hierarchy and that during construction, excavated soils and subsoils will, where possible, be re-used on site e.g. for the balancing of cut and fill.

Local

17.3.15 The London Plan¹ sets out policy on planning for waste as follows.

17.3.16 Policy 5.16 on Waste Self-Sufficiency states that “The Mayor will work with London boroughs and waste authorities, the London Waste and Recycling Board (LWaRB), the Environment Agency, the private sector, voluntary and community sector groups, and neighbouring regions and authorities to:

- manage as much of London’s waste within London as practicable, working towards managing the equivalent of 100 per cent of London’s waste within London by 2031;
- create positive environmental and economic impacts from waste processing; and
- work towards zero biodegradable or recyclable waste to landfill by 2031.

17.3.17 This will be achieved by:

- minimising waste;
- encouraging the reuse of and reduction in the use of materials;
- exceeding recycling/composting levels in municipal solid waste (MSW) of 45 per cent by 2015, 50 per cent by 2020 and aspiring to achieve 60 per cent by 2031;
- exceeding recycling/composting levels in commercial and industrial waste of 70 per cent by 2020;
- exceeding recycling and reuse levels in construction, excavation and demolition (CE&D) waste of 95 per cent by 2020;
- improving London’s net self-sufficiency through reducing the proportion of waste exported from the capital over time;
- working with neighbouring regional and district authorities to co-ordinate strategic waste management across the greater south-east of England.

17.3.18 Policy 15.8 on Construction, Excavation and Demolition Waste states that, ‘*major development sites are required to recycle CE&D waste onsite, wherever practicable, supported through planning conditions*’ and that ‘*Waste should be removed from construction sites, and materials brought to the site, by water or rail transport wherever that is practicable*’.

17.3.19 The supporting text notes that re-use and recycling rates for construction, excavation and demolition (CE&D) waste in London are already high with an estimated rate of 82% in 2008. The Mayor supports further improvement and Policy 5.20 sets a target of 95 per cent for recycling/reuse of CE&D waste by 2020.

17.3.20 Policy 5.20 on Aggregates sets out the following targets in relation to the use of recycled aggregates.

17.3.21 The Mayor will work with strategic partners to achieve targets of:

- i) 95 per cent recycling/re-use of construction, demolition and excavation waste by 2020
- ii) 80 per cent recycling of that waste as aggregates by 2020.

17.3.22 The GLA’s Supplementary Planning Guidance on Sustainable Design and Construction (SPG) of April 2014 outlines the Mayor’s priorities and best practice for various aspects of development which provide further detail on the practical implementation of relevant policies in the 2011 London Plan. Table 1.1 of the

¹ The London Plan Spatial Development Strategy for Greater London, July 2011 and Revised Early Minor Amendments, October 2013

Mayor's SPG on Sustainable Design and Construction summarises the priorities for waste which are relevant to the Upgrade:

- Design of development should prioritise materials that have low embodied energy, are sustainably sourced, are durable and do not release toxins;
- Developers should maximise the use of existing resources and materials and minimise waste generated during the demolition and construction process through the implementation of the waste hierarchy.

17.3.23 The SPG identifies best practice as design of developments which maximises the potential to use pre-fabrication elements.

17.3.24 The LBE 2011 Core Strategy reflects the London Plan in Core Policy 22 by '*encouraging the inclusion of re-used and recycled materials and encouraging on-site reuse and recycling of construction, demolition and excavation waste*' in new developments.

17.3.25 DMD 57 of the 2013 Proposed Submission Development Management Document states that 'A Site Waste Management Plan will be required for all Major Developments (and those defined under the Clean Neighbourhoods and Environment Act 2005) to demonstrate procedures for the minimisation of construction waste consistent with the principles of the waste hierarchy: reduce; reuse; recycle; recover. As a minimum, development will be required to divert at least 85% of non-hazardous waste by weight or volume from landfill with a strategic objective to divert a minimum of 95% of waste by weight or volume by 2020.

17.4 Assessment Methodology

Impact Evaluation

17.4.1 For the Upgrade, compliance with relevant waste management legislation will serve to minimise many potential environmental impacts and the application of good practice will reduce any residual impacts. Key legislation includes the following:

- Duty of Care imposed by Section 34 of the Environmental Protection Act 1990;
- Environmental Permitting Regulations (England and Wales) Regulations 2010, as amended particularly provisions relating to registered exemptions from permitting; and
- Hazardous Waste Regulations 2005.

17.4.2 Current Defra guidance in the Code of Construction Practice for the Sustainable Use of Soils on Construction Sites² and the CL:AIRE Definition of Waste guidance³ relating to waste management on development sites will also be followed as a means to maximise reuse of excavation waste and minimise the quantities of soil requiring disposal off site. The protocols which will be followed to implement this guidance are set out in a series of documents. The Construction Environmental Management Plan provides high level information on waste management. This is supported by a Construction Waste Management Plan which provides further details of individual waste management protocols. The draft Construction Waste Management Plan is provided in **Appendix 17.1**. In addition, the contractor will use the BRE SMARTWASTE online tool to meet the contractual requirements to

² Defra (2009) Code of Construction Practice for the Sustainable Use of Soils on Construction Sites. Accessed at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69308/pb13298-code-of-practice-090910.pdf

³ Contaminated Land: Applications in Real Environments (2011) The Definition of Waste: Development Industry Code of practice. Version 2. London: CL:AIRE.

implement a SWMP and to record waste data on a day to day basis. The online SWMP will also contain all of the documentation required to demonstrate compliance with statutory requirements, including waste carriers' licences, waste transfer notes and details of permits for off-site waste transfer, treatment and disposal sites used. The SWMP is a live document subject to frequent amendment and updating. **Appendix 17.2** provides a "snapshot" of the current version of the SWMP.

- 17.4.3 It is intended to work in accordance with the CL:AIRE Code of Practice to handle excavation and demolition materials arising as a resource so that these materials would not be classified as waste.

17.5 Baseline

Introduction

- 17.5.1 This assessment considers waste which arises only within the boundary of the Deephams Sewage Works site. Imported aggregate (including secondary aggregate and other fill material) is not classified as waste.
- 17.5.2 At present there are no construction works ongoing at the Site. Therefore the baseline construction waste arisings are effectively zero.
- 17.5.3 As outlined in Chapter 2 – Approach to Assessment, a number of projects will be completed on the Site during 2014 and 2015. Construction of these projects is expected to be complete by summer 2015, when the Upgrade is anticipated to start.
- 17.5.4 Immediately prior to the commencement of demolition and construction works for the Upgrade there are not expected to be any significant demolition and construction waste arisings at the Site in connection with other ongoing works, therefore.
- 17.5.5 Surplus materials from the AMP5 works, which are expected to be complete before the upgrade commences, will be stockpiled on site for reuse in the Upgrade. Where these materials are suitable for use they will be used to make up part of the shortfall in aggregate and fill requirements for the Upgrade as set out in **Table 17.1**.
- 17.5.6 The current sewage sludge treatment capacity at Deephams is 80 tonnes of dry solids per day (tds). Theoretical process calculations suggest that current average sludge production is about 76 tds and that this will grow gradually, only reaching capacity in about 2024. Furthermore, current actual sludge production is less than the predicted theoretical quantities, so there will be additional headroom in these estimates.
- 17.5.7 Sludge production varies in the short term, the current maximum daily production of the sludge treatment plant being around 84 tds. However, this level of production will be sustained only for a period of a few weeks at most. Where the daily sludge production exceeds the capacity of the plant in the short term (or when there is a short term shortfall in capacity resulting from maintenance) excess sludge can be tankered off site. In terms of transport impacts, the number of vehicles will be small, amounting to a maximum during excess production periods of five per day in 2020 rising to 7.5 per day by 2031 as a worst case.

17.6 Impact Assessment

Site Enabling, Demolition and Construction

Introduction

- 17.6.1 This section identifies waste arisings from site enabling, demolition of existing structures and construction of the Upgrade and indicates how they will be managed. Opportunities to reduce, reuse and recycle wastes are identified so that the residual quantities of waste requiring disposal off site at licensed or permitted waste disposal facilities are minimised.

Predicted Impacts

- 17.6.2 Some of the proposed upgrade works involves construction of structures above ground, so that excavation works and therefore excavation waste arisings are minimised. Some of the works involve reuse of existing structures, particularly the concrete bases of the primary settlement tanks and the secondary aeration lanes, so that complete demolition of all of these structures is not required and therefore demolition waste is reduced compared to a design involving complete demolition and replacement of existing structures.
- 17.6.3 The metal scraper bridges will be removed from all of the primary and final settlement tanks. There are sixteen bridges to be removed from the primary settlement tanks, each weighing approximately 10 tonnes, and 48 to be removed from the final settlement tanks, each weighing about 5 tonnes, making a total of about 400 tonnes of metals to be taken off site and recycled. A further 50 tonnes of redundant predominantly metal penstocks, valves and pipework will also require removal. None of this material can be reused directly in the works, nor is it feasible to employ a metals recovery process on site. All metals will therefore be recovered and sent for recycling off site.
- 17.6.4 Very small amounts of timber arising from the demolition will also be recovered and recycled or disposed of at a licensed or permitted facility.
- 17.6.5 Following removal of mechanical plant the internal walls and most of the external walls of the existing primary settlement tanks will be demolished down to the base slab level. The final settlement tanks will also be demolished entirely. This will generate 12,730 m³ (*in situ* volume⁴) of recoverable concrete, all of which will be crushed on site to produce a recovered secondary aggregate material that will be used in the construction works. This is equivalent to 30,552 tonnes of aggregate assuming an *in situ* density of 2.4 tonnes per m³. None of this material will be taken off site for recycling or disposal as waste.
- 17.6.6 The demolition of existing structures as well as construction of some new elements of the works require excavation of the existing ground, particularly in the area of the primary settlement tanks and the final settlement tanks.. Maximum excavation depths are up to 8 m below ground level. Total estimated excavation material arisings will be 187,781 m³ (*in situ* volume) of soil and clay. This figure includes excavated material that will arise from the excavation of pipe runs.
- 17.6.7 Nearly all of the excavated waste will be suitable for reuse on site either as structural fill, general fill or in landscaping. However, a small amount may be unsuitable for these purposes due to potential contamination. The total estimated amount of such unsuitable material is likely to be no more than 500 m³ (*in situ* volume) in the worst case and is therefore much less than 0.5% of the total. The

⁴ When soil and clay is excavated and solid structures are demolished and crushed to bulk volume of the excavated or crushed material increases. All volumes are therefore expressed as *in situ* volumes, i.e. prior to excavation or demolition, for comparative purposes.

management of unsuitable contaminated excavation material is addressed in Chapter 8 - Contaminated Land.

- 17.6.8 A cut/fill balance for all works involving excavation and re-use of excavated material in construction below existing ground level has been calculated by the contractor with the objective of maximising reuse of material on site and minimising both the export of excavation waste for disposal and the requirement for importing clean fill. The relevant quantities are summarised in **Table 17.1**. They are expressed in cubic metres *in situ* volume for comparative purposes, except for recovered metals, expressed in tonnes.
- 17.6.9 Assuming a density *in situ* of 2 tonnes per m³ of soil, clay and concrete, the total bulk material arisings during the demolition and construction works is 401,484 tonnes of which only 450 tonnes of recovered metal for recycling (0.1% of the total) and up to approximately 1,000 tonnes of unsuitable material (0.2% of the total) for disposal will be transported off site. The reuse and recycling rate therefore exceeds the targets set out in Greater London Authority and LBE planning policy.

Table 17.1: Summary of Waste Quantities and Cut/Fill Balance for Excavated Material

Predicted Waste Generation		Required in Construction	Net Waste for recycling/disposal off site
Material	Quantity	Quantity	
Mechanical plant (metals)	450 tonnes	0	450 tonnes
Excavated Soil and Clay	187,781 m ³	214,731 m ³	(26,950) m ³ ^a

Note: a. This total is negative, i.e. there is a net import requirement for fill which will need to be met by importing material. None of the secondary aggregate or excavated soil and clay produced at the Site will be sent off site for treatment or disposal elsewhere except as described in paragraph 17.6.7.

- 17.6.10 There is a net fill requirement of about 26,950 m³. This arises primarily because only two of the three process streams are being re-provisioned in the Upgrade, leaving a void in the area of Stream C to be filled. Also, the new process streams occupy a smaller footprint, generating a requirement for additional fill. This will be met by importing predominantly secondary, recovered or recycled materials arising at other development sites in the local area, or from recycling facilities, thereby promoting the achievement of waste recovery, reuse and recycling at those sites and reducing overall impacts of all demolition and construction waste impacts.
- 17.6.11 The direct environmental effects of bulk demolition and construction wastes are therefore considered to be **negligible**.
- 17.6.12 In addition to the waste arisings from excavation and demolition, there will be arisings associated with construction, including packaging, damaged or broken materials and surplus materials. Such arisings will be minimised for the major construction elements of the Upgrade by using materials pre-fabricated off site as far as possible which are then brought to site and assembled.
- 17.6.13 Potential indirect environmental effects of waste and waste management operations during the enabling, demolition and construction phase include:
- Noise, vibration and dust associated with waste handling plant;
 - air quality nuisance impacts from waste handling and storage (odour, dust);

- surface water quality impacts from stormwater runoff and waste soil stockpiles and other waste storage areas; and
- soil and groundwater impacts from waste storage.

17.6.14 The potential indirect impacts arising from the management of wastes identified above are considered in other chapters of this ES which deal with noise and vibration (Chapter 14), air quality (Chapter 7), water resources (Chapter 18), contaminated land (Chapter 8) and transport (Chapter 16).

Mitigation Measures

17.6.15 Mitigation measures to minimise environmental impacts from the storage, transportation and disposal of wastes will include:

- Careful location of stockpiles and other storage areas;
- segregation of waste streams to maximise opportunities for reuse and recycling;
- use of on site recycling plant, such as concrete crushing;
- use of good practice in the design of waste storage areas and the use of suitable waste containers;
- use of sheeting, screening, damping and seeding of stockpiles where appropriate and practicable;
- control and treatment of runoff from soil and waste soil stockpiles;
- minimising storage periods;
- minimising haulage distances; and
- sheeting of vehicles.

17.6.16 Such measures would help to mitigate the potential impacts remaining after waste minimisation, recycling and reuse have been optimised.

17.6.17 Details of the waste management and mitigation measures are provided in the contractor's Construction Waste Management Plan (**Appendix 17.1**) and SWMP (**Appendix 17.2**). The implementation of the Construction Waste Management Plan and SWMP, will be monitored and enforced as part of the Construction Environmental Management Plan (CEMP).

17.6.18 The SWMP will ensure compliance with the statutory waste management Duty of Care, which requires that waste is stored and handled in a manner that prevents its escape. Waste producer records will be kept which cover the transfer of waste to registered waste carriers and its management and disposal at a permitted facility, or at a site with a suitable registered exemption from permitting.

17.6.19 The Upgrade project is additionally being entered for a CEEQUAL award, which is intended to further drive good performance, particularly in relation to waste management.

17.6.20 The Construction Waste Management Plan is based on implementing the following waste hierarchy throughout the project:

- Avoid the generation of waste;
- minimise the generation of waste;
- reuse and/or recycle materials within the Project or Programme;
- reuse and/or recycle materials for beneficial use on other projects; and
- dispose of material at permitted sites.

17.6.21 In accordance with this hierarchy the contractor aims to meet the following targets:

- Reuse and recycle at least 95% of clean excavated 'waste', and aim to achieve 100%;

- reuse and recycle at least 90% of demolition waste and aim to exceed 95%; and
- reuse and recycle at least 90% of construction waste and aim to exceed 95%.

17.6.22 The following measures will be taken to minimise the production and avoid disposal of waste:

- 'Just-in-time' procurement to minimise the chance of damage to materials;
- storage in an appropriately dedicated area to prevent spoilage, damage and contamination;
- training of construction teams on the importance of correct ordering of materials so as to avoid excess materials;
- use of standard materials where possible that can be used elsewhere if necessary;
- ensuring that deliveries are correct before accepting them on site;
- review of packaging requirements where possible to avoid, reduce and reuse;
- maximising use of offsite manufacturing;
- development of a materials inventory of construction material, equipment and plant for the purposes of identifying reuse options across the project;
- upon completion of the project the materials inventory will be completed and handed to Thames Water to facilitate recycling during post construction; and
- general training of site personnel on waste issues.

17.6.23 The Construction Waste Management Plan identifies key roles and responsibility within the project team, measures for minimising waste, waste storage, transport and disposal, measures for dealing with potentially hazardous waste, monitoring, reporting and record keeping, training and periodic review.

17.6.24 When fully developed, the plan will also include Key Performance Indicators (KPIs) for waste.

17.6.25 As a result of the above, limited additional mitigation is expected to be required.

Residual impacts

17.6.26 There are not expected to be any significant residual impacts of demolition, excavation and construction wastes with the adoption of the SWMP, CEMP and specific mitigation measures described above, and as such the predicted impacts are **negligible**.

Monitoring

17.6.27 Monitoring of impacts associated with waste management on site, including dust and noise and vibration is described in the relevant chapters of the ES and set out in the CEMP.

17.6.28 Record keeping under the provisions of the SWMP and to meet the statutory Duty of Care requirements will be consolidated within the SWMP.

Operational Phase

Introduction

17.6.29 This section identifies waste arising from the operational phase of the Upgrade. As indicated in section 17.2, commercial wastes from offices and workshops were scoped out of the assessment because they were not expected to change as a result of the upgrade as the number of staff and the general maintenance and support operations would stay the same.

17.6.30 However, an assessment of the impact of the upgrade on sewage sludge arisings is included in this section.

Predicted Impacts

17.6.31 Although increased treatment efficiency to produce a better quality effluent can result in slightly increased sludge production over and above the quantities set out in Section 17.5 (baseline), this will be offset by lower secondary sludge production rates resulting from the use of Integrated Fixed Film Activated Sludge (IFAS) technology.

17.6.32 Secondary sludge production will normally increase in proportion to the additional Biochemical Oxygen Demand (BOD) removed by the upgraded plant. The current discharge consent for BOD is 10 mg/l, reducing to 5 mg/l by March 2017. The reduction in effluent BOD of 5 mg/l equates to about 2.5% of the settled sewage BOD (assuming this to be 200 mg/l). The secondary sludge production would therefore theoretically increase by 2.5%. However, with IFAS, the solids retention time (or effective sludge age) is increased, reducing the solids loading on the final settlement tanks and reducing sludge production. This effect has been noted by a number of operators^{5,6} although the extent to which it will occur depends on specific operating parameters. One IFAS plant in the USA achieved a reduction in sludge dry solids produced of 12%⁷.

17.6.33 The combined effect of increased treatment leading to more secondary sludge, offset by lower sludge production rates due to longer solids retention times resulting from use of IFAS, is therefore not expected to result in a noticeable change in overall sludge production compared to the baseline, although it could reduce secondary sludge production by a small margin. Consequently, the effect of the upgrade on sludge production is rated **negligible**.

Mitigation

17.6.34 Since sludge production rates are not expected to change materially as a result of the upgrade, no mitigation of the impacts of the upgrade on sludge production is required.

Residual Impacts

17.6.35 Since sludge production rates are not expected to change materially as a result of the upgrade, no residual impacts are expected.

17.7 Summary of Residual Impacts

17.7.1 The Upgrade will have negligible residual impacts in terms of waste.

17.8 Cumulative Effects Assessment

Assessment

Site enabling, demolition and construction

17.8.1 There are no other construction projects identified in the vicinity of the Site that could generate significant cumulative impacts in terms of management of waste.

⁵ <http://www.sswm.info/category/implementation-tools/wastewater-treatment/hardware/semi-centralised-wastewater-treatments-4>

⁶ TJohnson, M Steichen, A Shaw, J McQuarrie and G Hunter (2006) When Is IFAS The Right Choice? . Weftec 06: Water Environment Foundation pp 201 - 204.

⁷ <http://www.krugerusa.com/kruger-usa/ressources/documents/1/36859,FWRC-Final-Paper.pdf>

Any cumulative impacts of noise and vibration and air pollution from waste management with other sources are addressed in the relevant chapters of this ES.

Mitigation

17.8.2 No additional mitigation is therefore required to deal with cumulative impacts.

Residual Impacts

17.8.3 There are not expected to be any significant residual cumulative impacts of waste management.

17.9 Summary and Conclusion

17.9.1 Significant quantities of materials will arise from the enabling works, demolition of existing structures and construction of the upgrade. Much of the demolition waste will be recovered for recycling elsewhere or processed for reuse as secondary aggregate on site to minimise the net quantity requiring disposal. Similarly, materials from excavation waste will be reused as far as possible as a resource on site as general fill and in landscaping, except in respect of very small quantities which may be unsuitable for these uses due to contamination. A range of measures for minimising construction waste together with a target of reusing or recycling 95% of the waste produced will ensure very low residual waste quantities.

17.9.2 There are not therefore expected to be any significant residual impacts of demolition, excavation and construction waste management for the Upgrade.

17.9.3 The Upgrade is very unlikely to result in an increase in the quantity of secondary sludge produced compared to the baseline. There are not expected to be any significant residual impacts of waste during the operational phase.

17.9.4 There are not expected to be any significant residual cumulative impacts of waste.