A630 Deephams Sewage Works Upgrade

Assessment Methodology

Public consultation version

Deephams
Sewage Works Upgrade
Creating a cleaner, healthier River Lee

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		Name	AB	PH/NF/LG
		Signature		

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1 Executive Summary

1.1.1 Deephams Sewage Works, located in Enfield in north east London, is the ninth largest sewage works in England. It treats sewage collected from within its catchment and discharges treated effluent that flows into the Salmon's Brook, a tributary of the River Lee, in accordance with a discharge consent set by the Environment Agency.

1.1.2 The Environment Agency has issued a new discharge consent that requires us to make improvements to the quality of the discharge. The Deephams Sewage Works Upgrade (the upgrade) will improve the quality of effluent (treated wastewater) discharged from the Deephams Sewage Works into the Salmon's Brook. It will accommodate growth within the catchment to at least 2031, and improve infrastructure at the sewage works, much of which is now over 50 years old.

1.1.3 This report documents the methodology for the assessment of options for delivering the upgrade.

1.1.4 The methodology is a multi-stage process that firstly allows an initial review of strategic options for meeting the need for the upgrade to be undertaken. From this, an assessment of treatment options is undertaken, alongside an assessment of potential development sites.

1.1.5 A more detailed assessment of a shortlist of sites is then undertaken to enable a preferred site to be identified. The preferred site is then published for a period of consultation and stakeholder engagement, alongside and following on from which we will undertake design development work and further work on treatment options.

1.1.6 This process will confirm the feasibility of our preferred site and treatment technology options for delivering the upgrade. A second phase of public consultation will then be held on our proposals and designs for the upgrade and information on the potential environmental impacts of the upgrade and our plans for mitigating them.

1.1.7 An application for permission to build the upgrade will then be submitted.

2 Introduction

2.1 Section objectives

2.1.1 This introduction explains the background to the Deephams Sewage Works and the need for the upgrade, and provides an overview of the assessment methodology process and the approach to consultation and stakeholder engagement.

2.2 Background to Deephams Sewage Works

2.2.1 Deephams Sewage Works is one of our six main sewage works that serve London. It is located off Picketts Lock Lane in Edmonton, as shown in Figure 1 below. It is the ninth largest sewage works in England and serves a population equivalent of 885,000 people (as of 2010). The catchment that Deephams Sewage Works serves extends over large parts of north east London, and northwards beyond the M25.

Figure 1: Plan showing location of Deephams Sewage Works

2.2.2 Sewage treatment has been undertaken in this part of Edmonton since the 1870s when the first Edmonton sewage farm was developed on adjoining land. The sewage treatment works was largely constructed on the current site in the 1950s and 1960s.

2.2.3 Despite the various improvements over the last 30 to 40 years, and those under construction, the current sewage works is predominately the works that was first constructed in the 1950s and 1960s. The ageing plant is under increasing pressure to meet and maintain treatment standards.

2.3 Summary of the need for the upgrade

2.3.1 The need for the upgrade is set out in the National Policy Statement for Waste Water, and can be summarised as the requirement to respond to:

- an increase in the discharge consent requirements
- an increase in flow to the works:
    - a requirement to provide sufficient treatment capacity to meet population growth within the catchment already served by the works.
    - a requirement to respond and adapt to the challenges of climate change.
- ageing infrastructure under pressure to meet and maintain treatment standards

2.3.2 The upgrade will also deliver wider social or environmental benefits, for example reduced odour emissions and, depending on the option selected for implementation, increased renewable energy generation.

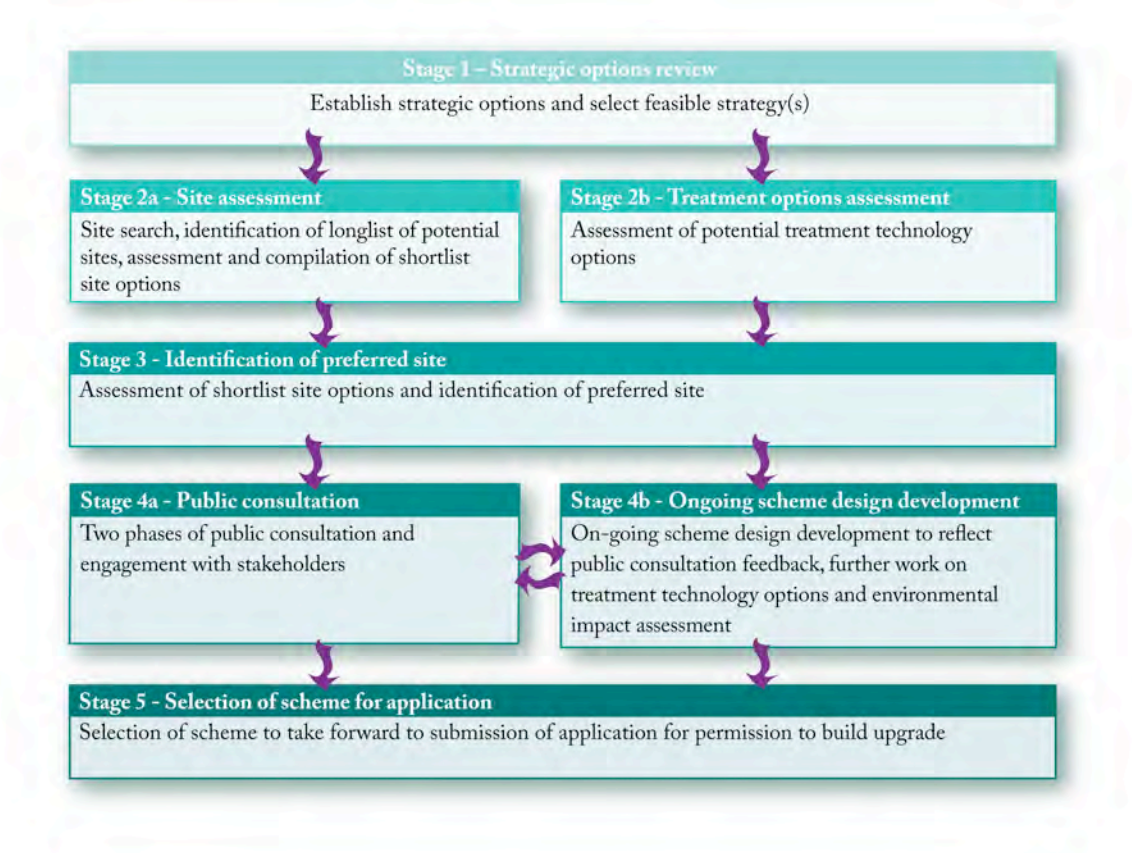
2.4 Summary of the Assessment Methodology

2.4.1 We have developed an assessment methodology for selecting the most appropriate option for delivering the upgrade, including the assessment of site and treatment technology options.

2.4.2 The methodology allows for the assessment of a range of strategies for meeting the need for the upgrade. It allows for the consideration of potential locations for new sewage treatment infrastructure. The construction of the upgrade could be on the existing site, although the site would have to remain operational throughout the upgrade, or it could be on a new site nearby. A suitable treatment technology option has to be selected, to meet the treatment requirements of the new discharge consent within funding, programme, treatment technology and physical site constraints.

2.4.3 The proposed methodology is a multi-stage process, with stages undertaken both in parallel and sequentially. Figure 2 below illustrates this process diagrammatically.

Figure 2: The assessment methodology



2.4.4 The assessment process firstly allows an initial review of strategic options for meeting the need for the upgrade to be undertaken. From this, an assessment of treatment options is undertaken, alongside an assessment of potential development sites. A more detailed assessment of a shortlist of sites is then undertaken to enable a preferred site to be identified.

2.4.5 The preferred site is then published for a first phase of public consultation and stakeholder engagement.

2.4.6 Alongside, and following on from, the first phase of consultation we will undertake scheme design development work and further work on treatment options. This will confirm the feasibility of our preferred site and treatment technology options for delivering the upgrade. A second phase of public consultation will then be held on our proposals and designs for the upgrade and information on the potential environmental impacts of the upgrade and our plans for mitigating them. An application for permission to build the upgrade will then be submitted.

2.4.7 An essential part of the methodology is an ongoing process of review and checking the validity of previous assessments through feedback loops at all stages of the process. This enables the assessment of sites and options to remain valid as information changes and new information is obtained. Thus, where necessary, stages in the process may be repeated (or 'back-checked') in order to take account of new information or other changes of circumstance.

2.5 Approach to consultation and stakeholder engagement

2.5.1 It is important that stakeholders, individuals and organisations within potentially affected communities have the opportunity to engage with the process of identifying and assessing potential options and sites for the upgrade. We want to ensure that, wherever practicable and reasonable, their views on potential treatment options and sites are reflected in the assessment process.

2.5.2 A Statement of Community Consultation and a Consultation Strategy for the upgrade have been prepared. These set out the detailed proposals for consultation and stakeholder engagement throughout the project. The approach during the assessment process is summarised below.

2.5.3 Meetings have been and will be held to discuss the assessment process and upgrade project with key local and London wide stakeholders, including the relevant London boroughs, the Greater London Authority (GLA) and the Lee Valley Regional Park Authority (LVRPA), and with the Environment Agency (EA), Natural England, English Heritage, the Department for Environment, Food and Rural Affairs (Defra) and other regulatory stakeholders. Meetings will also take place with the National Infrastructure Directorate of the Planning Inspectorate (NID) (formerly the Infrastructure Planning Commission) as appropriate.

2.5.4 A Stakeholder Forum has been established, the first meeting of which took place in July 2011 with subsequent meetings at approximately 3 month intervals. The Forum has also set up working groups to review aspects of the upgrade, including the approaches to consultation, the assessment methodology, odour and transport.

2.5.5 Informal discussion of the Assessment Methodology took place with stakeholders through the Forum and further face to face meetings. Informal feedback was sought on the proposed approach to assessing options and sites, including the assessment criteria, and on the range of options and sites to be assessed. Stakeholders' views have been incorporated into the criteria set out in this Assessment Methodology.

2.5.6 Following completion of stage 3 of the assessment process (identification of preferred site), a first phase of formal public consultation and engagement with stakeholders will take place. This will provide the opportunity for comments to be made on the methodology process, options and sites assessed and our preferred site. We will then consider the comments received during the consultation as part of our work to confirm our preferred option.

2.5.7 A second stage of consultation will then take place prior to the submission of any application for the upgrade, providing the opportunity to comment on any detailed proposals, their potential impacts and mitigation proposals.

2.6 Structure of this report

2.6.1 This report documents the methodology for the assessment of options for delivering the Deephams Sewage Works Upgrade (the upgrade). Section 3 of this paper describes each stage of the assessment methodology in more detail. Section 4 then explains how the assessment outcomes will be taken forward.

3 Description of assessment methodology stages

3.1 Section objectives

3.1.1 This section provides a description of the assessment methodology to be adopted by the project. It works sequentially through the process as we have developed our concept.

3.2 Stage 1 – Strategic options review

3.2.1 In Stage 1, a list of strategies that have the potential to meet the need for the upgrade is established through discussion within the project team and with stakeholders. The following strategies are to be reviewed:

- Strategy 1: reduce or remove enough of the incoming flow to Deephams Sewage Works to permit each of the existing three treatment streams to be turned off and upgraded in turn.
- Strategy 2: combining various options from Strategy 1 to reduce or remove incoming flow to Deephams Sewage Works.
- Strategy 3: build part of a new sewage works on another site and transfer flow between the new plant and the existing Deephams Sewage Works for treatment.
- Strategy 4: construct on Deephams Sewage Works.

3.2.2 These strategies would involve; removing enough of the sewage flows into Deephams Sewage Works (165Ml/d) to allow one of the three existing treatment streams to be turned off and upgraded at a time; building new treatment plant on another site; or reconfiguring the existing site and building a new plant to treat part of the flow before upgrading the other treatment streams in turn. Each of the strategies has to ensure that treatment of the sewage flows from the Deephams catchment is maintained throughout.

3.2.3 These strategies are reviewed in consultation with the Stakeholder Forum, to identify those potentially viable options that meet the need for the upgrade. This assesses the opportunities, risks and uncertainties associated with each strategic option, concluding whether each option should go forward for further consideration in the appraisal process.

3.2.4 The outcome of stage 1 is a list of potential options to be taken forward for more detailed assessment.

3.3 Stage 2a – Site assessment

Context

3.3.1 It should be noted that the outcome of the Stage 1 Strategic Options Review was a conclusion that only Strategies 3 and 4 were potentially viable. This conclusion meant that a physical upgrade of the sewage treatment infrastructure could only be undertaken at the existing Deephams Sewage Works site, or at a new site.

3.3.2 The purpose of Stage 2a of the assessment methodology is therefore to assess the merits of a longlist of potential sites for the upgrade, including the Deephams Sewage Works site, and to identify a shortlist of sites for further consideration.

3.3.3 It is necessary for the existing sewage works to continue to operate throughout any construction programme to ensure that the treated effluent meets the current discharge consent. It may not therefore be possible to upgrade large parts of the existing sewage works without first constructing and commissioning new treatment facilities. This means that redevelopment options on the existing Deephams Sewage Works site are constrained by the very limited unused space available.

3.3.4 Assessment of potential "on-site" redevelopment options at the existing Deephams Sewage Works site is undertaken as part of the Stage 2a process. Alongside this, an essential part of the appraisal process is the identification of a longlist of sites that could potentially accommodate the new treatment infrastructure, should it prove necessary to develop treatment processes on a new site.

Site size (off-site)

3.3.5 The area required to construct a new treatment works is dependent on the choice of treatment technology, and the differences in area requirements can be considerable. The assessment of treatment options (Stage 2b of the methodology) is a parallel activity with the site assessment (Stage 2a).

3.3.6 Having regard to the range of potential treatment technologies, a minimum site size of 8 hectares is used as the basis for identifying possible new sites.

3.3.7 This size mirrors the area taken by the existing Deephams Sewage Works 'A Stream' and its immediate surroundings. 'A stream' currently treats approximately 33 per cent of the current works total flow.

3.3.8 A site of 8 hectares is also considered to be about the minimum area needed for the more compact potential treatment technologies to treat 100 per cent of the future flows, allowing for some flexibility for future growth and for on-site landscaping or mitigation measures.

3.3.9 It is not considered necessary to search for sites below 8 hectares in size, as it is estimated that sufficient parcels of land/disused plant could be made available within the existing Deephams Sewage Works site boundary to accommodate an initial first build phase of compact treatment technologies. This would be followed by a multi-phased redevelopment of the works. Sites that are less than 8ha in area would therefore deliver no significant benefits compared to construction on site.

3.3.10 The treatment options assessment (Stage 2b) will quantify specific area requirements for differing treatment technologies, allowing the 8 hectares minimum site area to be tested and verified. This will include consideration of space to provide flexibility to accommodate future treatment consents and future growth beyond that currently being planned for.

Site search area

3.3.11 All the sewage in the Deephams catchment currently drains to Deephams Sewage Works via a series of interconnecting sewers that culminate in three trunk sewers, which enter the site from the north, south and west. At the end of the treatment processes, the consented discharge point for the treated effluent is at the Salmon's Brook. The treated effluent contributes significantly to the flows in the Salmon's Brook and other watercourses downstream.

3.3.12 It has been assumed that irrespective of where the upgrade is developed, the main inlet pumping stations that deliver flows from the sewers feeding the Deephams Sewage Works, and the preliminary treatment works (inlet screens and screenings handling plant, grit removal and storm tanks), will remain on the existing Deephams Sewage Works site, together with the existing sludge treatment facilities. This is because these elements of the works do not require any significant upgrading to meet the new discharge consent. It is also assumed that the consented discharge point for treated effluent will continue as existing into the culvert leading into the Salmon's Brook.

3.3.13 If the upgrade treatment processes are developed on a new site away from the existing Deephams Sewage Works site, there will be a need for energy to pump preliminary treated sewage from the existing site to the new site for full treatment, and the return of treated effluent and sludge to the existing Deephams Sewage Works. This energy is additional to the energy necessary for the sewage treatment processes themselves.

3.3.14 This additional energy is wasted – in that aside from transferring the raw sewage, treated effluent and sludge, it has no beneficial treatment purpose. In addition to the financial cost to our customers, this energy use involves significant CO2 emissions. The further the new site is from the existing sewage works, the greater the need to pump and the greater the energy use. The energy required for pumping increases both with distance from the Deephams Sewage Works and with increases in elevation from the existing site.

3.3.15 Government planning policy and London Plan policy encourage the reduction of CO2 emissions in new development proposals. The additional energy use and pumping would run contrary to these objectives. Our company climate change policy identifies a number of measures to reduce the company's contribution to the causes of climate change. This includes working towards reducing greenhouse gas emissions by 20 per cent on 1990 levels by 2015. Adding significant additional energy burden to the upgrade would not be compatible with this policy, and would not represent the most sustainable solution.

3.3.16 In line with Government policy on sustainable development, we believe that the boundary of the search area should be defined considering the additional energy requirements associated with pumping preliminary screened sewage from the existing Deephams Sewage Works site to the new site for treatment, and the return of treated effluent and sludge to Deephams.

3.3.17 The greater the distance from Deephams, the greater the ongoing energy use and financial cost of pumping. In addition, the greater the distance from Deephams, the longer the tunnel or transfer pipeline required, and so the greater the construction and maintenance costs. The estimated cost of a transfer tunnel is £30m per km, with the cost of trenched pipeline estimated at £19m per km. Environmental effects associated with long tunnel or transfer pipeline construction are also likely to be greater as more material will need to be excavated and disposed of, and more people or areas may be disturbed by construction traffic and noise.

3.3.18 A threshold is proposed as the cut-off boundary for the site search area that takes account of the combination of these factors. The precise boundary is established through the detailed Stage 2a site search work. However, the working assumption was that a threshold point where the required energy for the transfer of flows is greater than 20 per cent of the existing mains energy requirement for the current Deephams Sewage Works treatment processes, would be a reasonable and appropriate threshold to be adopted.

3.3.19 Adopting a 20 per cent threshold would effectively limit the search area radius to an approximate maximum of 3km from the existing Deephams Sewage Works site. Stage 2 of the assessment process will test and verify these assumptions.

3.3.20 It is recognised that some could argue that a 20 per cent limit is itself too high for what is effectively wasted energy use. A 20 per cent figure represents an additional 3.5 million kilowatt hours of energy per year, equivalent to an additional 1,800 tonnes per year of CO2 equivalent. However, using this figure provides a margin to ensure that potential alternative sites are considered.

3.3.21 It is inevitable that, all other considerations being equal, the site assessment process would favour sites nearer to the existing site rather than towards the outer edge of the search area as they would involve lower energy use and financial cost.

Identification of potential sites

3.3.22 Using the site search area, a desktop exercise, supported by site visits, is undertaken to identify potential sites within the site search area, mainly by examining aerial photographs, Ordnance Survey maps, and atlases.

3.3.23 Existing waste, business and employment sites, allocated strategic industrial sites, allocated place shaping priority areas and area action plans identified in the relevant adopted Unitary Development Plans, Core Strategies and other Development Plan Documents are examined to identify potential sites.

3.3.24 We consider that there should be only limited exclusionary criteria that are applied when seeking to identify potential sites, so as to ensure that an appropriately wide list of potential sites are available for assessment at the longlist assessment stage. Sites in residential use, cemeteries, schools and hospitals are all excluded from the site search, and this list of exclusionary criteria was reviewed with the Stakeholder Forum.

3.3.25 For the purpose of the site identification process, ‘a site’ is generally defined as an area for which boundaries can be readily distinguished and defined. In certain instances, this definition encompasses sites that are located on employment land, parkland or open spaces, undeveloped land or previously developed land, including defined brownfield sites.

3.3.26 Discussions have been held through the Stakeholder Forum and associated workshops during the site assessment process, to ensure that the approach being taken to site identification is appropriate and consistent, and that the search area is reasonable and justifiably based upon identified parameters.

Sensitivity testing

3.3.27 Sensitivity testing is undertaken as part of the site identification process to ensure that the process is robust to testing and scrutiny. A review of sites outside the site search area is undertaken to ensure that potential alternative sites are reviewed. The views of stakeholders are sought through the option assessment process to ensure that our project team captures and assesses any potential sites identified by third parties.

Assessment of potential sites

3.3.28 Potential sites within the site search area are assessed against defined property/legal, planning and environmental, and engineering criteria. The criteria are intended to ensure that a sufficiently broad base of information on the potential sites is collected and assessed to enable a shortlist of sites to be robustly formed. Key issues that could constrain or affect the development of treatment infrastructure on the sites are identified through this process.

3.3.29 At this stage of the process, no design work is undertaken on potential sites.

3.3.30 Amber, yellow and green classifications are used to highlight the potential significance of the different assessment criteria for each site. It is important to note that none of them are exclusionary – i.e. amber does not indicate that a site should be excluded from further consideration, but indicates significant constraints and/or project risks. The criteria are set out in Table 1 below.

Table 1: Stage 2a Criteria to inform the assessment of sites

CRITERION	Basis for assessment		
	Amber	Yellow	Green
Property/legal criteria			
Are there risks relating to acquisition of land?	Site assessed as having complex land acquisition issues which may have a significant impact on the delivery of the upgrade (e.g. land owned/held by statutory bodies for their statutory purposes, or sites having greater than 20 freehold/ leasehold interests).	Site assessed as having land acquisition issues which are complex or likely to have an impact on the delivery of the upgrade (e.g. sites having multiple freehold/ leasehold interests).	Site assessed as not likely to have complex land acquisition issues or where land acquisitions issues are not likely to impact on the delivery of the upgrade.
Are land acquisition costs likely to be reasonable?	Land acquisition costs likely to be relatively high.	Land acquisition costs likely to be moderate.	Land acquisition costs likely to be relatively low.

CRITERION	Basis for assessment		
	Amber	Yellow	Green
Is the site located in the Lee Valley Regional Park and therefore subject to the Lee Valley Regional Park (LVRP) Act 1966?	Site located within LVRP.	Site adjacent to LVRP.	Site not located in proximity to LVRP.
Planning and environmental criteria			
Is current site use or designation of the site compatible with sewage works use?	Existing or designated land use of site could preclude development.	Existing or designated land use of site presents potential planning policy objections to proposed development.	Existing or designated land use of site would not conflict with development.
Is Green Belt/Metropolitan Open Land affected?	The site is wholly located within the Green Belt/Metropolitan Open Land.	The site is partially located within, or within 100m of the Green Belt/Metropolitan Open Land.	The site is located more than 100m outside the Green Belt/Metropolitan Open Land.
Are neighbouring land uses considered sensitive to change resulting from sewage works development, or do the uses potentially conflict with proposed sewage works?	Nature of local land uses considered to be very sensitive to development of a sewage works, or have the potential to conflict with a sewage works on the site.	Nature of local land uses considered sensitive to change resulting from development of a sewage works. They could constrain the nature and layout of a sewage works use, but are not incompatible with a sewage works on the site.	Nature of local land uses not considered likely to constrain the nature and layout of a sewage works.
Are there potential impacts on local employment opportunities?	Use of the site would involve the re-development of Strategic Industrial Land, considered to be regionally important for employment opportunities.	Use of the site would involve the re-development of a Designated Employment Site, considered to be locally important for employment opportunities.	Development of the site would not involve the re-development of designated employment land.
Are any heritage designations within 1km radius of site affected?	Designation of national importance likely to be adversely affected.	Designation of regional or local importance likely to be adversely affected.	No designations likely to be adversely affected, or effect is likely to be positive.

CRITERION	Basis for assessment		
	Amber	Yellow	Green
Are any nature conservation designations within 1km radius of site affected?	Designation of international or national importance likely to be adversely affected.	Designation of regional or local importance likely to be adversely affected.	No designations likely to be adversely affected, or effect is likely to be positive.
Are any landscape/townscape designations affected?	Designation of national importance likely to be adversely affected.	Designation of regional or local importance likely to be adversely affected.	No designations likely to be adversely affected, or effect is likely to be positive.
Are recreational sites or rights of way affected?	Recreational resource/right of way of regional importance disrupted or affected.	Recreational resource/right of way of local importance disrupted or affected.	No recreational resource/right of way disrupted or affected.
Are important clean water resources affected?	Surface or groundwater resource likely to be affected.	Mitigation/compromise needed to avoid effect on surface or groundwater resource.	Surface or groundwater resources not likely to be affected.
Would use of the site result in increased carbon emissions?	Large increase in carbon emissions from materials and power used for transfer (greater than 50,000 tonnes/CO2e over the life of the scheme).	Some increase in carbon emissions from materials and power used for transfer (between 0 and 50,000 tonnes/CO2e over the life of the scheme).	No increase in carbon emissions as no transfer required.
Engineering criteria			
Is there sufficient space required to build new works, including flexibility to accommodate future growth and consent changes?	Site area sufficient to accommodate at least one identified treatment technology, but site lacks flexibility for future growth, or consent changes, or mitigation.	Site area sufficient to accommodate all identified treatment technologies, but site could lack flexibility for future growth, or consent changes, or mitigation, depending on treatment technology choice.	Site area sufficient to accommodate all identified treatment technology with flexibility for future growth, or consent changes, or mitigation.
Do existing site features affect potential use?	Site features have potential to prohibit development of site, regardless of treatment technology.	Site features will require compromise/significant mitigation.	No or limited constraints.
Are the means of access suitable, both for construction and	Significant difficulties anticipated to achieve suitable road, rail or	Road, rail or water	Good means of suitable road, rail or

CRITERION	Basis for assessment		
	Amber	Yellow	Green
operation?	water freight access.	freight access can be achieved but compromise or significant mitigation required.	water freight access.
What is the assessed fluvial/tidal/surface water flood risk?	High – in or affecting flood zone 3, or site is identified as susceptible to surface water flooding.	Medium – in or affecting flood zone 2, or site is adjoining land susceptible to surface water flooding.	Low/None – Not in flood zone 2 or 3, nor susceptible to surface water flooding.
What are the likely energy requirements to pump transfer flows to and from the site?	Transfer energy requirements for transfer system considered excessive, i.e. equivalent to greater than 20 per cent of the existing mains energy demand required to treat the sewage.	Significant additional energy requirement for transfer system, i.e. equivalent to between 5 - 20 per cent of the energy demand required to treat the sewage.	Small additional energy requirement for transfer system i.e. equivalent to less than 5 per cent of the energy demand required to treat the sewage.

3.3.31 The assessment enables conclusions to be drawn on each site and a shortlist of sites to be devised. The conclusions are reported to the Stakeholder Forum. The shortlist site options are then taken forward to Stage 3 of the assessment process (see section 3.5 below).

3.4 Stage 2b – Treatment options assessment

3.4.1 As a parallel activity to the site assessment process, an assessment of potential treatment technology options is undertaken. The purpose of the assessment is to consider potentially viable sewage treatment technology options, testing their suitability for use as part of a sewage works upgrade of the size of Deephams. To inform this assessment, an understanding of the broad characteristics of the different treatment options will be gained from existing operational treatment sites in the UK and worldwide.

3.4.2 Following a preliminary assessment of potential treatment technology options, the relevant advantages and disadvantages of secondary treatment technology options are assessed against criteria, enabling comparative assessments to be undertaken. Amber, yellow and green classifications are used to highlight the potential significance of the different assessment criteria for each site. As before it is important to note that none of them are exclusionary – i.e. amber does not indicate that a site should be excluded from further consideration.

3.4.3 The criteria are set out in Table 2 below. They are tested and verified as part of the Stage 2b assessment process.

Table 2: Stage 2b Criteria to inform treatment options assessment

CRITERION	Basis for assessment		
	Amber	Yellow	Green
Engineering criteria			
Technology appropriate for consent Review of experience in meeting Deephams equivalent consent limits reliably.	Poor confidence – Technology not appropriate for future effluent quality consent or unacceptable risk retained.	Some confidence – Technology could meet future effluent quality consent but some limited risk retained.	Good confidence – Technology proven to meet future effluent quality consent, no residual process risk.
Technology applied on Deephams scale Number of reference sites at comparable scale and discharge consent to Deephams (able to treat the sewage from 500.000 – 900,000 people) operating for a minimum of two years.	No or very limited experience Less than two examples in use elsewhere.	Limited experience Two to five examples in use elsewhere.	Good Experience More than five examples in use elsewhere.
Speed of construction Build duration for each process option (off site build).	Long More than four years.	Medium Three to four years.	Short Less than three years
High level whole life cost evaluation Relative whole life cost compared to conventional activated sludge baseline cost previously accepted by Ofwat in 2005-2010 period.	High Whole life cost greater than 110 per cent of the baseline.	Medium Whole life cost between 90 per cent and 110 per cent of the baseline.	Low Whole life cost less than 90 per cent of the baseline.
Sewage treatment works sustainability Power consumption (kWh/m^3) relative to conventional activated sludge baseline (that estimated for Ofwat in 2005-2010 period).	Low Power greater than 110 per cent of the baseline.	Medium Power between 90 per cent and 110 per cent of the baseline.	High Power less than 90 per cent of the baseline.
Competition Evaluation of how competitive any tender process would be. Value for money for our customers.	Poor Highly supplier patented specific technology in solution. Likely only single practical tenderer.	Acceptable Some supplier patented specific technology in solution. Likely multiple (more than three) tenderers.	Good Little supplier patented specific technology in solution. Multiple tenderers (more than three).

CRITERION	Basis for assessment		
	Amber	Yellow	Green
Odour Odour generation potential and ease of mitigation.	High odour generation and/or poor mitigation.	Medium odour generation, mitigation possible.	Low odour generation, mitigation possible.

3.4.4 The treatment options assessment enables preliminary conclusions to be drawn on potential treatment options. The conclusions are subject to later testing and verification in Stage 4 of the assessment process. Where there are as yet unquantifiable uncertainties or risks associated with a specific treatment option, these are recorded. The conclusions are reported to the Stakeholder Forum.

3.4.5 The outcomes from the treatment options assessment are taken forward to inform the Stage 3 assessment of the shortlist site options (see section 3.5 below).

3.5 Stage 3 – Identification of preferred site

3.5.1 Utilising the outcomes from Stages 2a and 2b, an assessment is undertaken of the shortlist sites, having regard to the initial assessment of treatment technology options. Some of the shortlist sites may be capable of only accommodating a single treatment technology option, whereas others may be capable of accommodating a number of options.

3.5.2 Preliminary design work is undertaken on each of the shortlist sites to enable the assessment work to be undertaken. This work includes preparation of preliminary layouts showing the footprint of built development, and the preparation of potential construction programmes.

3.5.3 The number of preliminary layouts that are prepared for each site option will be determined as part of the Stage 3 process, having regard to the extent to which different treatment options may give rise to different assessment results on the shortlist sites. Assessments are then undertaken to enable conclusions to be drawn on the potential impacts arising from the development of the upgrade on each of the shortlist sites.

3.5.4 These assessments are undertaken utilising criteria intended to ensure that key issues that could constrain or affect the implementation of the upgrade on a shortlisted site (identified in Stage 2) are reviewed in more detail. At this stage we also test and verify the conclusions of the Stage 2 assessment.

3.5.5 Amber, yellow and green classifications are used to highlight the potential significance of the different assessment criteria for each site. As previously stated it is important to note that none of them are exclusionary – i.e. amber does not indicate that a site should be excluded from further consideration. The criteria are set out in Table 3 below:

Table 3: Stage 3 Criteria to inform the identification of preferred site

CRITERION	Basis for assessment
Property/legal criteria	
Ownership of site and tenancies	Assessment of ownership and tenancy constraints to development
Estimated acquisition cost	Assessment of potential acquisition costs
Crown land and special land	Assessment of any legal procedures relating to special land
Lee Valley Regional Park Authority controlled land	Assessment of any legal procedures required under the 1966 Act
Assessment of likelihood of need for Compulsory Purchase Order	Assessment of risk of needing to use a Compulsory Purchase Order to acquire land
Access and material transfer rights	Assessment of any legal issues relating to access or material transfer
Planning and environmental criteria	
Planning application and consents	Description of route to consent and consents required or the construction/operation of the option.
	Assessment of planning history of site and constraints arising from consented or current applications, including conditions and legal agreements
	Assessment of planning history of adjoining land and constraints arising from consented or current applications, including conditions and legal agreements
London Plan/Unitary Development Plans/Local Development Frameworks/Supplementary Planning Documents allocation or special policy areas	Assessment of compliance or conflict with specific land use allocations or planning objectives
Green Belt and Metropolitan Open Land	Assessment against Green Belt and Metropolitan Open Land policy and guidance
Heritage designations	Assessment of potential impacts on archaeological priority areas, Scheduled Monuments, Listed Buildings, Conservation Areas, Historic Parks and Gardens, Local Site Register
Landscape designations	Assessment of potential effects on landscape, townscape, visual, gap or open space designations
Nature conservation designations	Assessment of potential effects on European site (Special Protection Areas, Special Areas of Conservation and Ramsar sites)
	Assessment of potential effects on Sites of Special Scientific Interest
	Assessment of potential effects on local nature conservation and biodiversity designations

CRITERION	Basis for assessment
	Assessment of potential effects on nature reserves
	Assessment of potential effects on protected species
Water resources	Assessment of potential effects on groundwater source protection zones
	Assessment of potential effects on surface water resources (flow and quality)
Sustainability	Assessment of carbon emissions during construction (including embodied carbon) and operation
	Assessment of potential for renewable energy generation
	Assessment of potential for climate change adaptation
	Assessment of waste generation – opportunities for waste minimisation, reuse or recycling
	Assessment of risk of contamination and scope of mitigation
	Assessment of opportunities for reusing previously developed land
	Assessment of opportunities for recreation enhancement
	Assessment of opportunities for biodiversity enhancement
Transportation and access	Rail connection practicability: availability/location of connection and suitability of interconnecting access route
	Water freight practicability: availability/location of connection and suitability of interconnecting access route
	Suitability of road/interconnecting road access: particularly for Heavy Goods Vehicles/abnormal indivisible loads
	Sensitivity of access route
	Assessment of potential impacts associated with operational transport and access
Community and amenity effects/proximity to sensitive receptors	Assessment of potential impacts on Lee Valley Regional Park, other recreational or sports sites, navigation and recreational water use, public rights of way, permissive paths and access sites, *De facto* or non-designated open space, and allotments
	Assessment of sensitivity to noise, dust, on-site construction vehicle emissions and odour during construction
	Assessment of sensitivity to odour, dust and noise effects during operation
	Assessment of visual effects
	Assessment of socio-economic and regeneration effects
	Assessment of health considerations

CRITERION	Basis for assessment
Engineering criteria	
Site size and shape	Comparison to minimum/optimum size for the specific treatment option
	Assessment of whether the shape and layout of the site constrain the optimum layout for the treatment option
Construction duration, high level description of construction phasing,	Description of construction duration and phasing (not assessed against specific criteria)
Heavy Goods Vehicle and Large Goods Vehicle routing, and level of traffic movements	Description of routing and movements (not assessed against specific criteria)
Connection feasibility/location	Distance from Deephams/sewer interception
	Infrastructure/structures between Deephams/sewer and site, including requirements to facilitate discharge of treated effluent to the Salmon's Brook and return of sludge to Deephams Sewage Works for treatment
Site features	Above and below ground conditions (including third party assets)
	Geology
	Site levels
	Other engineering considerations
Flood risk and scope for mitigation	Assessment against technical guidance to the National Planning Policy Framework
Site efficiency	Ability to accommodate all requirements on-site (and if not describe how development can be achieved using a combination of sites)
	Ability to secure all required site services needed to facilitate the technology being assessed for development e.g. power supply/communications/other
	Potential for effects from development upon existing site or adjacent services e.g. power supply/communications/other
System engineering requirements	Process risk during construction
	Effluent quality timeline (quality improvements in discharge over time)
Odour generation during operation and scope for mitigation	Assessment of potential odour generation and costs of mitigation
Whole life cost	Assessment of whole life cost
Value for money	Availability/likelihood of competitive tenders and risk of implementation of project to customers' bills

3.5.6 The assessment enables conclusions to be drawn on each of the shortlist site options. This assessment includes consideration of treatment technology options, using the preliminary conclusions from Stage 2b of the assessment process.

3.5.7 The outcome of the assessment process is the identification of a preferred site for the upgrade. Sites are not eliminated at this stage on the basis of technology, unless there is no potential treatment option suitable for that site.

3.6 Stage 4a - Public consultation

3.6.1 In Stage 4a, information on the preferred site is published for a first phase of public consultation in accordance with the process set out within the Statement of Community Consultation and Consultation Strategy.

3.6.2 This first phase of consultation provides the opportunity for comments to be made on the assessment methodology, options and sites assessed, and the identification of our preferred site.

3.6.3 The first phase of consultation will take place in parallel with ongoing scheme design development work – as described in section 3.7 below.

3.6.4 As part of the consultation process, exhibitions will be held and consultation materials published and made available to stakeholders and potentially affected individuals and organisations.

3.6.5 Wherever possible, we will respond to invitations to attend and meet with groups and organisations during the consultation period. We will also arrange briefings and meetings with stakeholders during the consultation process to respond to queries on the consultation materials.

3.6.6 Members of the project team will be on hand at exhibitions to help people respond to the consultation, including assisting with completion of feedback forms, should this be requested. During the consultation, information will be published on:

- The need for the upgrade
- The assessment methodology
- The treatment options assessment process
- The process that led to the identification of the preferred site
- Proposals for the preferred site, including the timetable for the delivery of the upgrade.

3.6.7 Information will be made available as summary leaflets and more detailed documents. These will be published on a consultation website and made available as paper copies.

3.6.8 In accordance with the process set out in the Statement of Community Consultation, the results of the public consultation will be recorded and the issues that are raised will be summarised and analysed. A report on the issues will be produced, highlighting the comments that have been made. This will also identify where any changes have been made to the assessment of options as a result of the comments, and where we have amended our proposals to take account of the feedback we have received. Where detailed issues are raised that would appropriately be taken forward through the preparation of the design of the preferred option this will be clearly stated.

3.6.9 The consultation responses will be used to inform our ongoing scheme design development work in Stage 4b (see section 3.7 below). As part of that work, our proposals and designs for the upgrade will undergo environmental impact assessment (EIA).

3.6.10 A second phase of public consultation and stakeholder engagement will be held as part of the process of undertaking the EIA and the preparation of applications for permission to build the upgrade. The second phase consultation will include further detail of our proposals and designs for the upgrade, and information on the potential environmental impacts of the upgrade and our plans for mitigating them.

3.6.11 The second phase of consultation will be undertaken in accordance with the Statement of Community Consultation and our Consultation Strategy, with the publication of information and exhibitions held in a similar form as for the first phase of consultation.

3.6.12 The consultation responses from the second phase of consultation will inform our selection of the scheme for the application, in Stage 5 of the assessment process (see section 3.8 below).

3.7 Stage 4b – Ongoing scheme design development

3.7.1 In Stage 4b we will undertake further work on the design of the upgrade, including the treatment technology options that could be adopted on our preferred site. This work will be informed by feedback from the consultation process, our own design work, and input from potential contractors.

3.7.2 We will use the outcomes of the phase one public consultation (part of Stage 4a) and our ongoing scheme design development to confirm whether we intend to proceed with our preferred site, and to confirm the selection of a treatment technology option. Our on-going scheme design development will take account of the property/legal, planning and environmental, and engineering issues relating to the preferred site, taking account of consultation feedback and any potential changes of circumstance. It will also take account of the treatment technology options under consideration, including scheme design development work.

3.7.3 We will involve contractors in our work to design the upgrade scheme, including the consideration of options relating to the precise siting and design of plant, buildings and other structures.

3.7.4 We will undertake EIA as part of Stage 4b in order to identify potential impacts arising from the construction and operation of the upgrade and in order to further define design development. The EIA will also enable us to identify and incorporate mitigation measures into our design to reduce the potential impacts of the development, where appropriate. These measures could include reconsidering the siting or design of buildings or items of plant, or the specific methods of construction and demolition works proposed, if appropriate to do so. It could also involve the inclusion of measures such as landscaping, habitat creation, noise attenuation, or odour controls, as examples.

3.7.5 The EIA will be undertaken in close consultation with the relevant regulators and consultees, including the local authorities, Lee Valley Regional Park Authority, Environment Agency, Greater London Authority, Department for Transport, Natural England, English Heritage, Transport for London and others.

3.8 Stage 5 – Selection of scheme for application

3.8.1 We will select our proposed scheme for application taking into account public consultation and on-going scheme design development, including the environmental impact assessment of our proposed upgrade. We will inform the public and stakeholders of our decisions and progress with this work, including our timetable for the submission of the application.

3.8.2 We will finalise the Environmental Statement reporting our EIA of the upgrade proposals, and complete the necessary plans and other documents that need to be submitted as part of our applications.

3.8.3 An application for permission to build the upgrade will then be submitted.

3.8.4 If we propose to develop the upgrade on the existing Deephams Sewage Works site then we will make an application for planning permission to the London Borough of Enfield. If we propose to build the upgrade on another site then an application for a Development Consent Order will be made to the Planning Inspectorate.

4 Next steps

4.1 Section objectives

4.1.1 This section provides a description of the stages of the upgrade project following submission of the application for permission to build the upgrade.

4.2 Description of the next steps

4.2.1 After the applications have been submitted, there will be an opportunity for the public and others to make representations on the application to the body considering the application (either London Borough of Enfield or the Planning Inspectorate).

4.2.2 The decision maker will consider the information we submit as part of our application, and take into consideration representations on the application in coming to a decision.

4.2.3 Subject to planning and other consents being approved and conditions discharged, construction of the upgrade will then be able to start.

4.2.4 There will be regular and ongoing communication with local communities throughout the construction process as set out in our Consultation Strategy.