Energy from Waste Incinerator (EFW) including Infrastructure plus that for Combined Heat and Power (CHP), Incinerator Bottom Ash (IBA) Processing Plant with Outside Storage Area, and Air Pollution Control Residue (APCR) Treatment and Disposal Facility , Visitor & Office Accommodation and Landscaping within the Sutton Courtenay Resource Recovery Park

Sutton Courtenay Resource Recovery Park, Oxfordshire

Waste Recycling Group Limited

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10 Hydrology and Flood Risk

10.1 Introduction

10.1.1 This chapter assesses the hydrology and flood risk effects associated with the proposed development of an Energy from Waste Incinerator (EFW) including Infrastructure for Combined Heat and Power (CHP), Incinerator Bottom Ash (IBA) Processing Plant with Outside Storage Area, and Air Pollution Control Residue (APCR) Treatment and Disposal Facility, Visitor & Office Accommodation and Landscaping, within the Sutton Courtenay Resource Recovery Park, Oxfordshire.

10.1.2 The overall aim of this assessment is to determine whether the proposed development may affect the hydrology, surface water drainage, flooding and water quality of the site and surrounds, or whether these factors may affect the development and surrounds and, if necessary, to propose suitable mitigation. Key aims are described in section 10.1.15, below.

10.1.3 This chapter describes the policy context, input data and methods used to assess the development. It reviews the baseline hydrology, flood risk and water quality at the site and assesses the potential effects of the development taking into account the measures which have been adopted to prevent, reduce, mitigate or offset the identified effects. Potential effects are likely to relate primarily to flood risk and contamination issues, which may give rise to significant environmental or financial liability.

10.1.4 This chapter contains the following sections:

- Methodology – describes the process used to produce this assessment and outlines the legislation and guidance referred to;
- Baseline Description - a description of the hydrological and hydrogeological conditions of the assessment area based on the site visits, desk information and consultations;
- Assessment of Effects - identifying the ways in which the hydrology and hydrogeology of the assessment area could be affected by the proposed wind farm;
- Mitigation - a description of measures that will be implemented to mitigate the identified potential effects;
- Residual Effects - an assessment of the significance of the effects of the development, after mitigation measures have been implemented;
- Summary of Effects;
- Statement of Significance.

10.1.5 Current guidance on development and flood risk identifies several key aims for a development to ensure that it is sustainable in flood risk terms. These aims are as follows:

- the development should not be at a significant risk of flooding and should not be susceptible to damage due to flooding;
- the development should not be exposed to flood risk such that the health, safety and welfare of the users of the development, or the population elsewhere, is threatened;

- normal operation of the development should not be susceptible to disruption as a result of flooding;
- safe access to and from the development should be possible during flood events;
- the development should not increase flood risk elsewhere;
- the development should not prevent safe maintenance of watercourses or maintenance and operation of flood defences;
- the development should not be associated with an onerous or difficult operation and maintenance regime to manage flood risk. The responsibility for any operation and maintenance required should be clearly defined;
- future users of the development should be made aware of any flood risk issues relating to the development;
- the development design should be such that future users will not have difficulty obtaining insurance or mortgage finance, or in selling all or part of the development, as a result of flood risk issues;
- the development should not lead to degradation of the environment; and
- the development should meet all of the above criteria for its entire lifetime, including consideration of the potential effects of climate change.

10.1.6 The EIA is undertaken with due consideration of these sustainability aims. The key objectives of the EIA are:-

- to assess the flood risk to the proposed development and to demonstrate the feasibility of appropriately designing the development such that any residual flood risk to the development and its users would be acceptable;
- to assess the potential effect of the proposed development on flood risk elsewhere and to demonstrate the feasibility of appropriately designing the development such that the development would not increase flood risk elsewhere; and
- to assess the potential effect of the proposed development on water quality and groundwater conditions.

10.2 Legislation and Planning Context

10.2.1 A detailed review of the development plan documents and planning context in relation to the development proposals is provided in Chapter 3.

10.2.2 This section summarises those policies that are directly relevant to hydrology and flood risk issues.

National Policy & Legislation

10.2.3 The study has been produced with reference to the following policies, legislation and guidance:

10.2.4 At a national level, the central government strategy document 'A Better Quality of Life – A Strategy for Sustainable Development for the United Kingdom' recognises the fundamental importance of good water quality to health and the environment and identifies the major challenges to water

quality which it states are; growing demand for water supplies, pollution pressures from the new development, diffuse pollution inputs, changed weather patterns and loss of habitats. Relevant planning policy documents include PPS25 (Development and Flood Risk, 2006), and PPS23 (Planning and Pollution Control, 2004). These have been taken into consideration in assessing the hydrological and hydrogeological effects of the proposed development.

Planning Policy Statement 25 (PPS25) – Development and Flood Risk

10.2.5 PPS25 Development and Flood Risk, 2006 explains how flood risk should be considered at all stages of the planning and development process in order to reduce future damage to property and loss of life. It describes the importance the Government attaches to the management and reduction of flood risk in the land-use planning process, acting on a precautionary basis and taking account of climate change.

Water Framework Directive (2000/60/EC)

10.2.6 The Water Framework Directive (WFD) establishes a framework for the protection, improvement and sustainable use of all water environments. It provides for the creation of river basin district structures containing environmental objectives. The aim of the legislation is to prevent deterioration and enhance the status of aquatic ecosystems, promote sustainable use of water resources, reduce pollution and its effect on the water environment and contribute to mitigating against flooding and droughts. The Department for Environment, Food and Rural Affairs (DEFRA) transposed the WFD into domestic law in December 2003 through the enactment of The Water Environment (Water Framework Directive) Regulations 2004 in January 2004. In December 2003 the Environment Agency became the competent authority responsible for the implementation of the WFD in England and Wales.

Environmental Protection Act (1990)

10.2.7 This Act provides for the integration of pollution control to protect the air, land and water environments from contamination.

Water Resources Act (1991)

10.2.8 This Act regulates discharges to controlled water and groundwater and provides legislation on the definition of controlled waters. The Act enforces offences of polluting controlled water and the polluter pays principle placing the financial costs of the results of a water pollution incident on the polluter.

Land Drainage Act (1991, and 1994 amendments)

10.2.9 This Act emphasises the need to consider environmental and conservation issues when carrying out land drainage or flood defence works. Under the conditions of this Act the prior written consent of the Environment Agency is required for any proposals to divert, culvert or otherwise obstruct the flow in any watercourse.

Groundwater Regulations (1999)

10.2.10 These control the use and disposal of substances (list I and II substances) on land which have the potential to pollute groundwater either directly or indirectly.

PPS23: Planning and Pollution Control

10.2.11 Planning Policy Statement 23 emphasises the role of the planning system in contributing to improving water quality. PPS23 recommends the integration of land use planning with other plans

and strategies to achieve control, mitigation and removal of pollution. Annex I Pollution Control, Air and Water Quality provides guidance specific to water quality.

CIRIA Environmental Good Practice on Site (C502) (1999)

10.2.12 C502 provides guidance on how to avoid causing environmental damage when on a construction site.

CIRIA Control of Water Pollution from Construction Sites (C532) (2001)

10.2.13 C532 provides guidance on how to plan and manage construction projects to control water pollution.

Pollution Prevention Guidelines

10.2.14 Produced by the Environment Agency Pollution Prevention Guidelines (PPGs) give advice on statutory responsibilities and good environmental practice. Each PPG addresses a specific industrial sector or activity. Those of relevance to this assessment are listed below:-

- PPG01General guide to the prevention of water pollution
- PPG05 Works in, near or liable to affect watercourses
- PPG06 Working at construction and demolition sites
- PPG07 Pollution prevention guidelines refuelling facilities
- PPG08 Storage and disposal of used oils
- PPG13 High pressure water and steam cleaners
- PPG18 Control of spillages and fire fighting run-off
- PPG21 Pollution incident response planning
- PPG26 Storage and handling of drums and intermediate bulk containers

Regional Policy

The Draft South east Plan – A Clear vision for the South East (March 2006)

10.2.15 The key policy relevant to hydrology is:

- Policy D5 Sustainable Natural Resource Management, NRM 3 Sustainable Flood Risk Management.

Local Policy

The Oxfordshire Structure Plan, 2005

10.2.16 The key policy relevant to hydrology is:

- Policy EN9: Flood Risk and Surface Water Drainage.

- Policy EN10: Water resources and waste water infrastructure

The Vale of White Horse Local Plan

10.2.17 The key policies relevant to hydrology are:

- Policy DC13, 14: Flood Risk and Water Run-off

10.3 Methodology

Relevant Guidance

10.3.1 As a matter of best practice, this assessment has been undertaken based on the relevant guidance on hydrology and flood risk assessment. This includes:

- Planning Policy Statement 25 (PPS25): Development and Flood Risk

Consultations

- As detailed in Chapter 1, a formal scoping exercise has been undertaken to inform the scope of the Environmental Assessment.

10.3.2 In addition to the formal Scoping exercise, the following informal consultations and discussions have informed this chapter:

- The Environment Agency, January 2008.

Methodology

10.3.3 The hydrological site conditions, flooding and water quality were determined by consulting maps and published information regarding the topography, geology, and hydrology of the area. Much of the information was obtained from an Envirocheck report. In addition, the Environment Agency (EA) was consulted regarding the existing water quality of watercourses around the site and an agreed methodology for the Flood Risk Assessment (FRA). A site walkover and site investigation works were also undertaken to ascertain the current site conditions.

10.3.4 The information sources used to compile this section include:

- Landmark Envirocheck Report, Reference 24004370_1_1, 11th January 2008;
- Site Survey;
- Environment Agency Flood Maps;
- Site walkover surveys undertaken by RPS Group Plc on 23rd January 2008;

Full details of these sources of information are provided in Technical Appendix 10.1.

Water Quality Assessment

10.3.5 A qualitative assessment of potential effects on local surface water quality has been undertaken and relates primarily to the proposed changes to the surface water drainage regime. The potential effect of soil contaminants on local watercourses is considered in Chapter 11.

Flood Risk Assessment

10.3.6 A detailed Flood Risk Assessment has been undertaken for the application site and is located in the Technical Appendix. The FRA scope was agreed with the EA and meets the intent of PPS25. The key components of the FRA were as follows:

- Confirmation of modelled flood level for the site including potential effects of climate change, and comparison of these flood levels against topographic levels over the site and surrounds
- Identification of any hydrological constraints to the proposed development
- Assessment of the existing surface-water runoff regime at the site, and determination of the potential effects of the development on peak runoff rates and flow directions
- Development of a conceptual mitigation strategy for the proposed development, including an outline for an appropriate surface-water SUDS
- Consideration of flood storage compensation measures.

Analysis

10.3.7 The significance of effects on surface water hydrology, surface water runoff, flooding and water quality have been categorised using the criteria contained within Table 10.1.

Table 10.1 – Significance Criteria

Significance Criteria	Description of Criteria
Substantial adverse	Severe detrimental affect to local watercourses. Permanent flooding or change to flow characteristics of watercourses. Permanent reduction in the quality of the surface water resource. Permanent adverse effect on aquatic flora or fauna.
Moderate adverse	Moderate detrimental effect to local watercourses. Severe temporary flooding or change to flow characteristics of watercourses. Severe temporary reduction in the quality of surface water resources. Severe temporary effect on aquatic flora and fauna.
Minor adverse	Temporary and minor detrimental effect to local watercourses. Moderate local flooding adjacent. Moderate local scale reduction in surface water quality, reversible with time. Reversible detrimental effects on aquatic flora or fauna.
Negligible	No appreciable effect on humans, aquatic flora and fauna, or surface water resources. Any minor effects are reversible.
Minor beneficial	Minor reduction in risk to humans, animals or plant health. Minor localised improvement to the quality of surface water resources or minor reduction in flood risk.
Moderate beneficial	Moderate reduction in risk to humans or aquatic fauna and flora. Moderate localised improvement to the quality of surface water resources or minor reduction in flood risk.
Substantial beneficial	Major reduction in risk to humans or aquatic fauna and flora. Significant localised / moderate to significant regionalised improvement to the quality of surface water resources. Moderate to significant localised/regionalised reduction in flood risk.

Cumulative Effects

10.3.8 Cumulative effects in relation to hydrology and flooding may result from changes to local drainage characteristics, flood risk, or water quality. Receptors will include the on-site ponds and watercourses.

10.4 Baseline Conditions

Hydrology

10.4.1 The Scheme is located in relatively flat land surrounded by man-made and natural watercourses and water bodies of varying sizes. The natural watercourses are Mill Brook to the west and Moor Ditch to the east. Drainage is to the north and northeast, towards the River Thames approximately 1.5km north of the site. The southern edge of the Thames Valley is marked by an Upper Greensand scarp to the south of the application site.

10.4.2 A review of the Environment Agency's flood maps indicates that the site lies within Flood Zone 1 and therefore has a 'low probability', that is less than 1 in 1000 annual probability, of flooding in any one year. A very small part of the area of site designated for the hazardous waste cells falls into Flood Zone 2, and therefore has an annual probability of flooding between 1 in 1000 and 1 in 100. Drawing 10.1 shows the Environment Agency flood map for the area.

10.4.3 The Environment Agency Flood Zones and acceptable development types are explained in Table D1 of PPS25. According to this, water-compatible, less vulnerable and more vulnerable uses of land and essential infrastructure in Table D.2 of PPS25 are appropriate in this zone, while highly vulnerable uses of land are only appropriate subject to the Sequential Test being applied. The Flood Risk Vulnerability Classification in Table D2 of PPS25 shows that the proposed development is landfill and therefore classified as 'more vulnerable' (table 4.4). Therefore a sequential test is not required.

10.4.4 There are no licensed surface water abstractions within 1km of the application site, and one discharge consent within the application site boundary and a further four within 250m.

10.4.5 Water quality details of the surface watercourses in the vicinity of the application site are detailed in Table 10.1 below.

River name	River stretch name	Report year	River quality objective	Compliance with target	Biological Grade	Chemistry Grade
Moor Ditch	Didcot Sewage Treatment Works to Thames	2006	5	Compliant	C	B
Moor Ditch	Didcot Sewage Treatment Works to Thames	2005	5	Compliant	-	B
Moor Ditch	Didcot Sewage Treatment Works to Thames	2004	5	Compliant	-	B
Ginge Brook	Lydebank Brook to Odhay Hill Ditches	2006	2	Compliant	B	B
Ginge Brook	Lydebank Brook to Odhay Hill Ditches	2005	2	Compliant	-	B

Ginge Brook	Lydebank Brook to Odhay Hill Ditches	2004	2	Compliant	-	A
Moor Ditch	Milton Hill to Didcot Sewage Treatment Works	2006	3	Compliant	D	B
Moor Ditch	Milton Hill to Didcot Sewage Treatment Works	2005	3	Compliant	-	B
Moor Ditch	Milton Hill to Didcot Sewage Treatment Works	2004	3	Compliant	-	B
River Thames	Ock to Sutton Bridge Culham	2006	2	Compliant	B	A
River Thames	Ock to Sutton Bridge Culham	2005	2	Compliant	-	B
River Thames	Ock to Sutton Bridge Culham	2004	2	Compliant	-	B
Ginge Brook	Odhay Hill Ditches to Thames	2006	3	Compliant	-	B
Ginge Brook	Odhay Hill Ditches to Thames	2005	3	Compliant	-	B
Ginge Brook	Odhay Hill Ditches to Thames	2004	3	Compliant	-	B

10.4.6 A river quality objective, or RQO, is a target used to help protect and improve the quality of the surface water. A target is set for a stretch of river, which, if met, means that the river will reliably support the type of fishery that the EA would like to see maintained. If a river achieves this target the EA feels confident that it will also nearly always meet requirements for wildlife and conservation, for recreation, and for abstraction for irrigation and for domestic water supplies following treatment.

10.4.7 Each stretch of river is provided with a classified by the EA utilising their river ecosystem classification:

- RE1: very good quality (suitable for all fish species)
- RE2: good quality (suitable for all fish species)
- RE3: fairly good quality (suitable for high-class coarse fisheries)
- RE4: fair quality (suitable for course fisheries)
- RE5: poor quality (likely to limit fish populations)

The classes include sets of water quality standards.

10.4.8 Surface water quality in the watercourses around the application site is considered to be very good to fair. Those locations close to sewage treatment facilities are of a poorer quality than the other monitoring locations.

Hydrogeology

10.4.9 The site is not located in an EA-designated groundwater Source Protection Zone. The Environment Agency Groundwater Vulnerability Sheet 38 (Upper Thames and Berkshire Downs) indicates that the site is underlain by the minor aquifer of Quaternary deposits (sands and gravels). The application site is located on the Gault Clay that is considered by the Environment Agency to be a non-aquifer.

10.4.10 The hydrogeology of the region can be split into locally important shallow groundwater of the Terrace deposits (Drift) and deep groundwater of the solid geology aquifers. The Terrace deposits support a number of licensed abstractions locally. The deeper aquifers are Lower Greensand and Corallian Limestone. Two groundwater abstractions recorded within 1km of the application site relate to dust suppression, mineral washing and process water for quarry activities.

10.4.11 The sand and gravel aquifer has been shown to be unconfined and permeable and the water table lies 1 – 3 m below ground level in this area.

10.4.12 The hydrogeology of the site is discussed in greater detail in Chapter 11.

10.5 Identification and Evaluation of Key Effects

10.5.1 The potential effects of the proposed development on the surface water, flood risk, existing flood defences and water quality have been assessed for the construction and operational phases of the development. These account for the measures incorporated within the design of the development in consideration to the environmental risks highlighted by the baseline assessment.

Description of the development

10.5.2 The proposed development covers an area of approximately 50.3Ha. The site has been divided into six distinct parcels of land containing the following key components:

- Area A: Incinerator bottom ash (IBA) plant, including weighbridge, hardstanding and IBA stockpiling area.
- Area B: Energy from Waste (EfW) Incinerator, APC process and associated access and exit arrangements.
- Area C: Combined Heat and Power (CHP) and Thermal Store, Operations Car Park, Maintenance Portakabins and Managed Landscape Features.
- Area D: Main Access Point for Vehicles, Weighbridges for EfW and Admin/Visitor Centre/Car Park.
- Area E: Future Industrial Development Site and Water Feature.
- Area F: Hazardous Waste Cell area to the north of the site.

Process Description

10.5.3 Waste collection vehicles will discharge their load into the storage bunker located within the tipping hall. From there it will be transferred into the furnace by hydraulic feeding units. The combustion grate consists of a series of horizontal but inclined moving bars, which move the waste slowly through the furnace where it will burn at a carefully controlled temperature to ensure

the destruction of all the biodegradable components. Hot gases from the combustion process will pass from the furnace into a boiler from which steam will be raised to drive a turbine to generate electricity. When the waste reaches the end of the combustion grate, only the inert or incombustible material remains. This material is known as 'bottom ash'.

10.5.4 Prior to being conveyed to the waste storage bunker, a vibrating grid removes the bulky items from the bottom ash. These bulky items are generally ferrous in nature and are collected into a skip container for off-site recycling or final disposal. The remaining inert bottom ash is transported by conveyor to the bottom ash recycling plant area where it will be further processed.

Water Usage, Treatment and Disposal

10.5.5 Mains (public) water will be supplied for boiler supply and top up, amenities, cleaning, and distribution in the fire-fighting network. The steam system comprising the boiler, turbine, condensers and associated pipe work will be a closed system which will require topping up only infrequently, and it is estimated therefore that water usage for the EfW facility will amount to approximately 20,000 m^3 per year.

10.5.6 Foul water from welfare facilities (e.g., toilets, mess rooms) will be discharged to the public sewer.

10.5.7 Clean water from the roofs of buildings will be directed to soakaways located on-site. Surface water from areas of external hardstanding and car parks will be similarly diverted to soakaways, but via hydrocarbon interceptor chambers to remove contaminants.

10.5.8 Waste water from boiler blow-down and the demineralisation process will be utilised to quench bottom ash. There will be no water discharge from the ash quench because water will either be absorbed by the ash or evaporated. Water from infrequent extended periods of boiler blow down will be directed to the foul sewer via a settlement tank.

10.5.9 Any drainage or spillage from the waste bunker, lime silo and fly-ash silo will be separately contained in bunded areas for treatment and re-use or disposal to sewer in accordance with the discharge consent.

10.5.10 Any effluent discharge to sewer will meet the discharge consent limits set by the local water authority and any other appropriate requirements of the Environment Agency. Sampling, as appropriate, will be undertaken in accordance with the conditions of the consent.

Air Pollution Control (APC) residues

10.5.11 As part of the treatment process, the cooled gas is passed through a lime spray absorber to neutralise the acid content. Consequently the APC residues are alkaline and therefore a hazardous waste (like cement). Therefore they will be disposed of on a suitably licensed landfill to the north of the Sutton Courtenay site. The area being considered for use as a hazardous waste cell is presently permitted for the disposal of non hazardous waste. WRG will utilise industrial re-use in preference to landfill disposal, subject to viability.

Cleaning Reagent Storage

10.5.12 Flue gas cleaning reagents will be stored in bulk silos or containers. Storage containers will be fitted with appropriate safeguards against spillage or leakage. Water treatment chemicals will similarly be stored in bulk silos or containers.

10.5.13 The EFW process is designed as a net consumer of water and therefore there is no requirement for regular disposal of any waste water from the combustion process. However waste waters are created from the process in the following areas:

- Water from the boiler drains;

- Back-flushing water from the de-mineralisation plant;
- Wash down water from surface cleaning;
- De-aerator occasional overflow; and
- Surface water on potentially contaminated areas (roads and hardstanding).

10.5.14 These will be routed to a waste water treatment plant comprised in the EfW plant and designed to allow for the waste water to be recycled within the EfW process.

Hazardous Waste Cell

10.5.15 The hazardous waste landfill occupies an area of approximately 16Ha. Therefore, at any one time part of the site would be capped and restored, part active and in use and part under construction.

10.5.16 Cell construction, filling and capping in the hazardous waste landfill would involve the following stages:

- Excavation and grading to formation level;
- Installation of groundwater management system, containment system in accordance with Landfill Regulations and leachate collection system;
- Infilling with waste;
- Installation of landfill cap, restoration of topsoil and seeding and planting.

Construction Details

10.5.17 The sequence of construction activities will begin with access arrangements such as construction of site roads. Thereafter, activities will include ground works and site preparation activities, followed by civil works, steel erection, and installation of process equipment. The programme provides for a construction period of approximately 33-34 months and will include the following activities:

- Site Establishment
- Site Clearance
- Development of access road and connection to existing highway
- Excavations and installation for drainage and services
- Earthworks, piling and construction of foundations
- Construction of concrete and asphalt surfacing
- Construction of new bridge and access ramp over the Old Fleet Drain
- Erection of steelwork for process buildings
- Installation of process equipment
- Start-up and commissioning activities
- Provision of landscaping and fencing.

10.5.18 The site of the proposed bulking facility will be used as a materials lay-down area and construction compound. As the construction of the EfW building nears completion, the lay-down area will no longer be required and construction of the bulking facility will commence.

Construction Phase

Surface Water Quantity

10.5.19 It is possible that during the construction phase there could be a potential risk of ponding on site and accidental run-off to surface watercourses prior to completion of the operational surface water drainage system. This may cause minor to moderate adverse effects on surface water runoff. The surface water construction mitigation measures are outlined in the Mitigation Section.

Surface Water Quality

10.5.20 There are a number of materials and wastes or by-products which could arise during the construction activities, and which may give rise to water quality effects on the surrounding surface watercourses. These are outlined below:

- Fine materials (e.g. silts and clays);
- Cement;
- Oil and chemicals (from plant machinery and processes); and
- Other wastes such as wood, plastics, sewerage and rubble.

10.5.21 These pollutants may be present as a result of normal site activities, incorrect storage of oils and chemicals and/or accidental spillage. The significance of the potential incident would depend on the nature of the pollution incident, the mitigation measures in place and their effectiveness, and the sensitivity of the receiving watercourse, and therefore could range from minor adverse to substantial adverse. The surface water quality construction mitigation measures are outlined in the Mitigation Section.

10.5.22 Where areas have been previously infilled with PFA, this will be removed from the construction site of the EfW to the adjacent landfill site for use as daily cover or for engineering purposes. This activity is discussed in greater detail in chapter 11.

10.5.23 The EA scoping opinion identifies a six acrea site to the south of the development containing PFA and waste as a potential risk. The possibility that any construction activities might affect the stability of the area or cause a migratory path is discussed in chapter 11.

Operational Phase

Surface Water Quantity

10.5.24 Redevelopment of the site will increase the impermeable area, leading to a consequent increase in the volume and magnitude of surface water runoff discharged to the adjacent watercourses. Should the additional runoff be discharged to the receiving watercourses in an uncontrolled manner i.e. without attenuation, this could increase the risk of flooding within the site and the surrounding areas, resulting in a **minor adverse** to **moderate adverse** effect on the surrounding watercourses. The provision of attenuation storage for excess surface flows within the development as outlined below would reduce the risk of on-site flooding to a **negligible** to **minor adverse** effect.

10.5.25 The attenuation measures proposed include the following:-

- The IBA lagoon to the west of the IBA area is for rainwater and surface run off from the IBA.

- The EfW lagoon east of the EfW incinerator is for the surface water run-off from roads and any overflow from rainwater collected from the roof of the EfW building. (Rainwater is to be collected from the roof and stored in 200m^3 underground tank to be used as process water for the flue gas treatment and top up water for the quench system for IBA. Once the tank is full, excess rainwater will be discharged into this lagoon)

- The IBA and EfW lagoons can also collect contaminated water spillage from the areas of the fly ash collection and chemical loading points.

- The lagoons are all separate facilities but will eventually outfall to the same surface water discharge point to the east of the site. Although there will be mains connection, there should be no need to use potable water in any processing, as it should be possible to extract from the landfill lagoon, which has sufficient capacity all year round.

- The lagoon to the west of the Hazardous Waste Cell is designed to accept runoff from this area, once it has been capped and resurfaced, via a pipe under the road. The lagoon itself occupies 1.6ha, and flows into the Thames 1km to the north via a watercourse

- Raw / towns water connection will be required for the boiler and the fire fighting water tank.

Surface Water Quality

10.5.26 During the operation of the development, there are a number of potential pollutants, which may give rise to water quality effects on the surrounding surface watercourses. These are outlined below:

- Fine materials (e.g. silts and clays);
- Hydrocarbons;
- Oils and chemicals (from plant machinery and processes); and
- APCR disposal and other process waste/trade waste.

10.5.27 These pollutants may be present as a result of normal operations, traffic, and emergency or accidental spillage. The significance of the potential incident would depend on the nature of the pollution incident, the mitigation measures in place and their effectiveness, and the sensitivity of the receiving watercourse, and therefore could range from **minor to substantial adverse**. With the provision of permanent mitigation measures as outlined below, the range of potential effects would be reduced to **negligible** to **minor adverse**.

Cumulative Effects

10.5.28 Three additional developments have been considered to assess the possibility of cumulative effect form external development. Great Western Park is an approved development which comprises an extension to Didcot. The development relates to the erection of 3200 dwellings to the west of Didcot and the erection of schools, sports and leisure facilities, recreation areas, public greenspace and associated infrastructure. Planning approval was granted in November 2006 (Planning Application ref: HAR/17774/X).

10.5.29 The Proposed Asda Storage and Distribution Centre (Planning application ref: SUT/20330) relates to the relocation of an existing Storage and Distribution Centre to a site which is located 2.3 km to the south west of the proposed site.

10.5.30 The operators of the Didcot Power Station have opted out of the Large Combustion Plants Directive, which means that the Didcot A Coal fired power station is due to reduce its running hours to up to 20,000 hours after 1 January 2008 and to close by 31 December 2015.

10.5.31 All three developments are sufficiently remote from this site that no effect is envisaged.

10.6 Mitigation

10.6.1 This section discusses the mitigation requirements deemed necessary for the protection of the Scheme from effects relating to flood risk, hydrology and water quality.

Surface Water Drainage – Construction Phase

10.6.2 Temporary drainage facilities are to be provided during the construction phase to ensure the controlled discharge of surface water run-off into nearby watercourses, until such time as the permanent drainage strategy is implemented. These temporary drainage facilities will prevent the ponding of surface water within the development site and ensure that the risk of localised flooding is not increased.

10.6.3 Consultation with the EA will be ongoing throughout the construction period to promote "best practise" and to improve proposed mitigation measures.

10.6.4 The provision of temporary drainage facilities and/or early phasing of the operational water quantity works would result in a reduction of the likely effect on water runoff and local water levels to a **minor adverse** to **negligible** effect.

Surface Water Drainage – Operational Phase

10.6.5 The Scheme will contain two principal land drainage networks, surface water and foul water drainage.

10.6.6 The surface water drainage network will serve the hard standing and roof areas of the site and generally convey 'clean' run-off with some potential contaminants such as hydrocarbons and suspended solids. Water quality treatment of this water will be provided via interceptors and/or dry sediment/attenuation basin arrangements incorporating vegetative treatments such as reed beds to assist in water treatment.

10.6.7 In addition, the Flood Risk Assessment has considered the potential effect of the proposed development on surface water runoff rates. Appropriate mitigation measures to attenuate runoff to the Greenfield rate have been calculated.

10.6.8 The attenuation volumes required to restrict the runoff to the 1 in 2 year (50% annual probability) Greenfield runoff rate of 19l/s has been determined to be approximately 24300m^3 assuming no infiltration losses. Of this, 15000 m^3 will be stored in the lagoon in the northern part of the site, and 9300 m^3 will be stored in two lakes in the southern part of the site. The three lakes have a combined surface area of 25900m^2, which results in an increase in depth of 0.94m.

10.6.9 The foul water network will consist of process water, trade waste and foul water. Key effluent streams for the site will consist of waste water from boiler blow down, process water discharges from the gas cleaning system and the bottom ash storage areas and small drains from steam pipe drains, air compressors and other small discharges. These will be collected and combined with sewage from the office area. The combined streams will be discharged directly to the sewer, subject to trade discharge consent from Thames Water. Any contaminated effluent that is intercepted will be tankered from site. Firewater that may also be contaminated by process activities will be directed to a local storage tank and will also be tankered off site.

10.6.10 All storage areas and fuel oils will be bunded to reduce the potential effects on water quality.

Surface Water Quality

10.6.11 The potential effects identified in relation to surface water quality are applicable to most construction sites. The Code of Construction Practice (CoCP) will be applied across the development to mitigate for potential adverse effects on surface water quality, which may arise from the construction works. It is common practise for the local planning authority to impose planning conditions requiring a detailed CoCP to be submitted for approval prior to any development occurring on the site.

10.6.12 The CoCP will draw on the CIRIA document "Control of Water Pollution from Construction Sites" and the Environment Agency document on "Sustainable Drainage Systems". The following specific mitigation measures for the protection of surface water during construction and remediation activities will be included within the CoCP prepared for the site:

- Management of construction works so as to comply with the necessary standards and consent conditions as identified by the EA, and the Vale of White Horse District Council (LDC)
- A briefing highlighting the importance of water quality, the location of watercourses, and pollution prevention will be included within the site induction;
- Any significant water run-off from the site during the construction phase will need to be filtered to remove suspended solids prior to discharge to the local watercourses;
- Areas with prevalent run-off will be identified and drainage actively managed, e.g. through bunding and/or temporary drainage;
- Any water features, such as the potential sediment/attenuation basins will allow for the storage of water on site and the opportunity for filtration and sedimentation prior to the discharge to controlled waters. The drainage network will include an interceptor system to remove potential contaminants. In this way pollution incidents such as oil releases, will be contained within the water features as required by the Environment Agency;
- Consent will be required from the Environment Agency for the discharge of site drainage to any watercourse. Consultation with the Environment Agency will be undertaken regarding each specific consent;
- Areas at risk of spillage, such as vehicle maintenance areas, and hazardous substance stores (including fuel oils and chemicals) will be bunded and carefully sited to minimise the risk of hazardous substances entering the drainage system or the local watercourses. Additionally the bunded areas should have impermeable bases to limit the potential for migration of contaminants into groundwater following any leakage/spillage;
- Movement of vehicles and earthworks will not take place near to the water features;
- Works using concrete will be carefully controlled and concrete wagons will be washed out in a safe area;
- Excavated material will be placed in such a way as to avoid any disturbance of areas near to the banks of watercourses and any spillage into the watercourses;
- All plant machinery and vehicles will be maintained in a good condition;
- Drainage works will be constructed to prevent surface water being effected during earthwork operations. No discharge to surface watercourses will occur without permission from the Environment Agency; and
- Wheel washers and dust suppression measures will be used to prevent the migration of pollutants.

10.6.13 An emergency response plan to be followed in the event of a pollution incident would be developed in consultation with the EA. The plan would include the provision of appropriate emergency response equipment on-site and staff training in emergency procedures. The provision

of temporary water quality facilities and/or early phasing of the operational water quality works and the provision of an early response plan would result in a reduction of the likely effect on water quality to a **minor adverse** to **moderate adverse** effect.

Monitoring/Management Strategies

10.6.14 This section includes details of the management plans that will be required to ensure implementation and delivery of the recommended mitigation measures and to monitor the environmental effect of the project.

Construction Phase

- Water quality monitoring. This should be carried out throughout the construction phase to ensure no discharge of pollutants or increase in suspended sediments occurs. The site drainage systems should be monitored downstream of any petrol interceptors to ensure they are removing all potential contaminants and suspended sediments.

Operational Phase

- Drainage maintenance plan – This plan is applicable throughout the lifetime of the development, for the drainage within the site, and any connections to the surface water, or foul sewer and trade waste networks;
- Emergency spillage management plan. This plan is applicable throughout the lifetime of the development, and should include emergency measures. This plan applies to the site on a regional basis; and
- Water quality monitoring strategy – Ongoing water quality monitoring should be undertaken throughout the lifetime of the development.

10.7 Residual Effect

10.7.1 The residual effects associated with Hydrology, Flooding and Water Quality represent those effects that have not been assessed and mitigated against as part of the development.

Surface Water

10.7.2 The residual effect from surface water flooding following the implementation of the SUDS measures proposed in the FRA, assuming appropriate maintenance and management of the system, can be considered **negligible.**

Surface Water Quality

10.7.3 The maintenance and management of the surface water quality and emergency spill containment system will be essential in preventing water quality and pollution incidences in the receiving watercourse. Assuming appropriate maintenance and management of the system, the residual effect from surface water quality and emergency spill containment system would be considered as **minor adverse** to **negligible**.

Summary

10.7.4 Residual effects, their magnitude and significance are summarised in the table below.

Table 10.4: Summary of Residual Effects

Phase	Effect	Effect Type	Magnitude	Significance
Operation	Surface Water Runoff Maintenance	Adverse	Short Term	Negligible / Minor
Operation	Surface Water Quality Maintenance	Adverse	Short Term	Negligible / Minor
Operation	Surface Water Quality Emergency Spill	Adverse	Short Term	Minor / Severe

Conclusions

Summary of Effects

10.7.5 It is not anticipated that the construction, operation or de-commissioning of the proposed development would result in any adverse effects in terms of hydrology. Surface water run-off from the development will be attenuated in the IBA lagoon to the west of the IBA area, which is designated for rainwater and surface run off from the IBA, and in the EfW lagoon east of the EfW incinerator, which is designated for surface water run-off from roads and any overflow from rainwater collected from the roof of the EfW building. These lagoons are separate facilities but will eventually outfall to the same surface water discharge point to the east of the site.

10.7.6 It has been identified that the assessment area has a number of hydrological receiving environments. The construction of the proposed EfW incinerator would involve many activities which have the potential to affect these receiving environments. These activities have been identified and an assessment of their potential effect made. Mitigation measures to be adopted during the construction, operation and de-commissioning phases have been detailed. A Pollution Prevention Plan would be produced and implemented on site under the instruction of the Project Manager and all site personal and contractors would be instructed in its use. An Incident Response Plan would also be drawn up detailing the procedure to be undertaken if a spillage was to occur on site. These plans would be reviewed and updated to ensure that they are relevant and specific enough to be most effective.

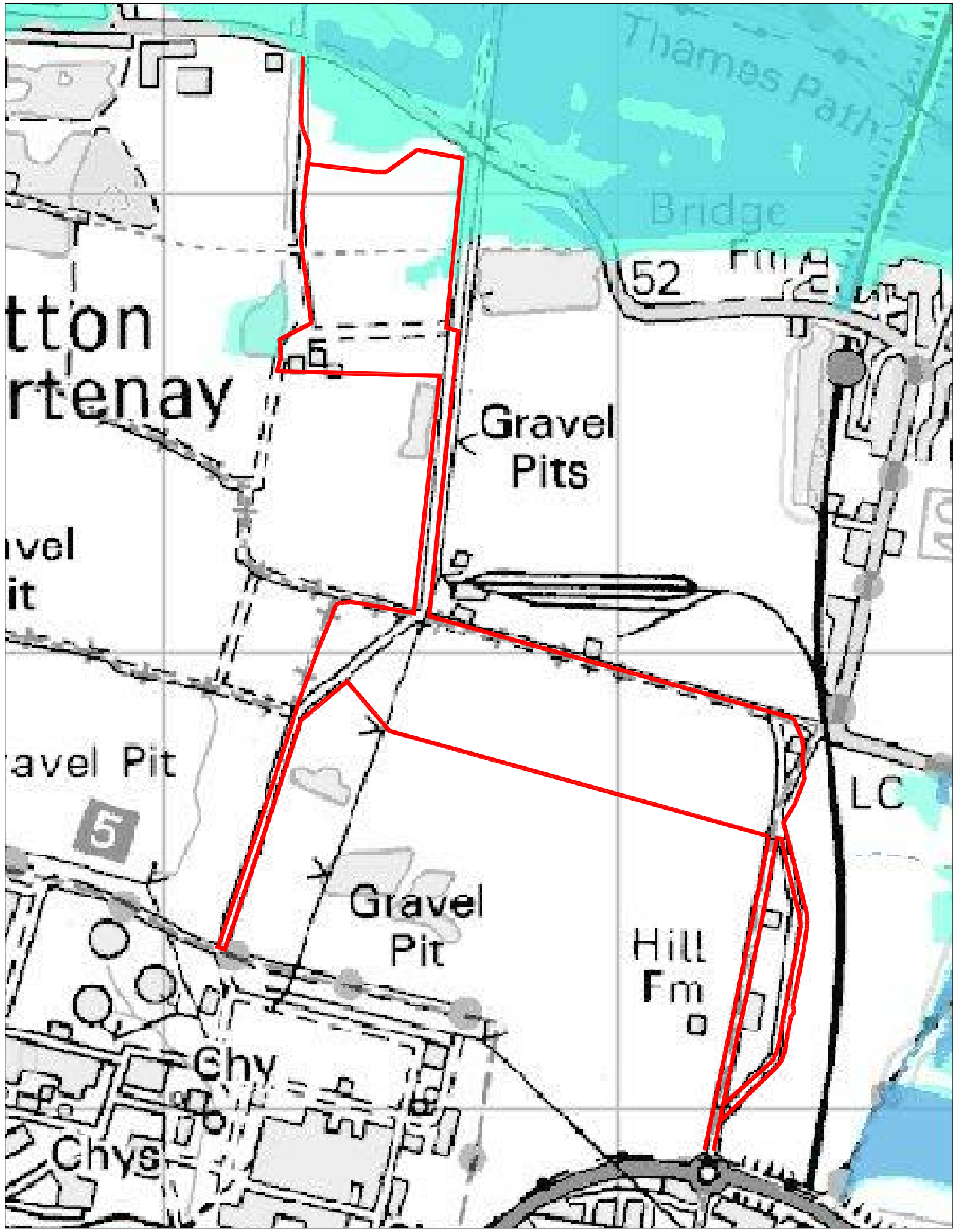
10.7.7 Liaison would be carried out with the Environment Agency to ensure on-going agreement on mitigation measures proposed.

Statement of Significance

10.7.8 In conclusion, following adoption of the proposed mitigation measures the development has been assessed as having the potential to result in adverse effects of a minor significance or lower. Only effects of medium significance or greater are considered significant in terms of the EIA Regulations, and therefore, with mitigation, the potential affects on hydrology are not considered to be significant.

10.8 References

1. Planning Policy Statement 25: Development and Flood Risk. 2006
2. Land Drainage Act 1991. HMSO
3. Water Resources Act 1991. HMSO
4. Control of Water Pollution from Construction Sites. CIRIA 2001.
5. Sustainable Drainage Systems – A Guide for Developers. Environment Agency
6. Landmark Envirocheck Report, Reference 24004370_1_1, 11th January 2008



Key

- Site Boundary
- Flood Zone 1
- Flood Zone 2
- Flood Zone 3

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PROJECT
Sutton Courtenay

TITLE
EA Flood Map

SCALE	DRAWN BY
1:10 000 @ A3	MM
DATE	CHECKED
April 08	PM

CAD FILE
T:/Geo-environmental Projects/DLE1101/CAD/Figure10.1

PROJECT NUMBER	DRAWING NUMBER	REV
DLE1101	FIG 10.1	

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