

KENT INTERNATIONAL GATEWAY, MAIDSTONE, KENT

Hydrogeological Impact Assessment

July 2007

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Appendix B	British Geological Survey Map Extract
Appendix C	Groundwater Source Protection Zone Map Extract (Environment Agency)
Appendix D	Licensed Groundwater Abstraction Location Plan (Environment Agency)
Appendix E	DWP Drawings

1 INTRODUCTION

1.1.1 This Hydrogeological Impact Assessment has been produced on behalf of Kent International Gateway Ltd. in support of a proposed rail freight interchange development located off Ashford Road (A20), Maidstone, Kent.

1.1.2 This assessment considers hydrology and hydrogeology associated with the existing site and surrounding area. It assesses the associated potential temporary and permanent risks and impact posed by the proposed development, recommends appropriate mitigation measures and identifies residual risks.

1.1.1 This assessment has been prepared in consultation with the Environment Agency and Southern Water.

1.1.2 This assessment should be read in conjunction with the following supplementary information.

- Flood Risk Assessment (July 2007) – DWP
- Environmental Statement (July 2007) – RPS Planning
- Geotechnical & Ground Contamination Desk Top Assessment (March 2007) – White Young Green Environmental
- Ground Investigation Report (June 2007) - White Young Green Environmental
- Construction Method Statement (July 2007) – White Young Green
- Proposed Development Layout (PRC Dwg No. 6690/FE107 Rev K)

2 SITE DESCRIPTION

- 2.1.1 The site is predominantly greenfield with a gross area of approx. 113ha, located immediately to the east of Maidstone. The site boundary is identified on the OS based location plan included within Appendix A.
- 2.1.2 The site is generally bounded to the north by the M20 motorway, the south by the Ashford Road (A20), to the west by Thurnham Lane and to the east by junction 8 of the M20. The site is crossed by the Ashford to Maidstone railway line, Water Lane, Crismill Road and Musket Lane.
- 2.1.3 The site consists predominantly of undulating open farmland but is also occupied by a small number of residential properties and farm buildings.
- 2.1.4 The existing site is shown on DWP Dwg No. 2005-180A/C7.15/01 Rev C, included within Appendix E.
- 2.1.5 Historical OS mapping, as referred to in the Geotechnical & Contamination Desk Top Assessment, suggests that the site has generally only been used as farm land. The only exceptions to which would appear to be a former garage/petrol station adjacent to the southern boundary in the area of Wood Heath and the former Hollingbourne Gas Works to the south eastern corner of the site. The former garage/petrol station premises still remain and we understand are currently being used temporarily as a car wash business. There is no physical evidence of the former gas works remaining and we understand that the associated tanks were removed in the early 1970s.
- 2.1.6 The site is crossed by three ordinary watercourses, flowing north to south, that are tributaries of the River Len. The most westerly watercourse is known as The Lilk whilst the other two are unnamed.
- 2.1.7 A contoured topographical survey of the site, related to OS Datum, is incorporated into all accompanying drawings.
- 2.1.8 The topographical survey confirms the undulating nature of the site and identifies that it is split into three clearly defined greenfield catchment areas associated with the existing three watercourses that cross the site.
- 2.1.9 The existing site levels currently range from a minimum of approx. 48m to a maximum of 71m AOD. A significant cut and fill earthworks operation will therefore be required to accommodate the proposed development layout.

3 PROPOSED DEVELOPMENT

- 3.1.1 The proposed development layout is indicated on PRC Dwg No. 6690/FE107 Rev K, included within the supplementary information that accompanies this assessment.
- 3.1.2 The proposed development will provide a total gross internal floor area of approx. 374000m², comprising approx. 171000m² of inter modal warehousing, approx. 192000m² of distribution warehousing and approx. 12000m² of office accommodation. In addition, the development will also provide a rail/road freight interchange facility (inter-modal area) of approx. 6.5ha.
- 3.1.3 The development will be served by associated service/loading areas and car parking areas, accessed by an internal road network via two proposed accesses off Ashford Road (A20).
- 3.1.4 With respect to rail access, new reception tracks will be laid to link the existing railway line to the inter-modal area and the inter-modal warehousing.

4 GEOLOGY

- 4.1.1 An extract of the British Geological Survey mapping for the site and surrounding area is included within Appendix B. The site boundary has been overlaid for ease of reference.
- 4.1.2 In general terms the site is underlain by Gault Clay (Gault Formation) which overlays Folkestone Beds (Lower Greensand Formation). Both Gault Clay and Folkestone Beds are of Lower Cretaceous age.
- 4.1.3 Gault Clay is a formation of stiff dark blue or blue grey clay deposited in a calm and relatively deep marine environment during the Lower Cretaceous age, approx. 100 million years ago. It becomes silty or sandy at its interface with the underlying Folkestone Beds.
- 4.1.4 The northern section of the site, generally to the north of the railway line, is directly underlain by the Gault Clay. The Gault Clay is noted on the British Geological Survey mapping to vary in thickness between 58 – 69m.
- 4.1.5 The Folkestone Beds form the upper limit of the Lower Greensand Formation and are described as consisting predominantly of loosely consolidated fine/medium grained quartz sands of pale grey or yellow colouring. The Folkestone Beds are also noted to include larger masses or rocks of hard sandstone or carstone.
- 4.1.6 The southern section of the site, generally to the south of the railway line, is directly underlain by Folkestone Beds. Folkestone Beds are noted to vary in thickness between 46 – 55m.

5 EXISTING/PROPOSED HYDROLOGY

5.1 General

5.1.1 As previously stated, the site is crossed by three existing ordinary watercourses. The watercourses flow north to south and are tributaries of the River Len, located approx. 800m to the south of the site.

5.1.2 The full extent of the watercourses and their associated catchments are the subject of a forthcoming catchment study.

5.1.3 For the purposes of this assessment the watercourses have been labelled W1, W2 and W3 as shown on DWP Dwg No. 2005-180A/C7.15/01 Rev C.

5.1.4 The proposed watercourse accommodation works are described in the following paragraphs and are indicated on DWP Dwg Nos. 2005-180A/C7.15/03 Rev E & 04 Rev E, included within Appendix E.

5.1.5 It is noted that there are three small existing ponds indicated within the site boundary. These ponds are identified on DWP Dwg No. 2005-180A/C7.15/01 Rev C. The purpose of these ponds is unknown at present but will be investigated prior to any works commencing on site.

5.2 Watercourse W1 (The Lilik)

5.2.1 Watercourse W1 runs parallel with and to the west of Water Lane for a length of approx. 405m within the site boundary. The route through the site is generally unrestricted, only being piped/culverted to accommodate occasional field accesses.

5.2.2 Immediately upstream of the site boundary, the route of watercourse W1 runs through open fields before being culverted beneath the M20 motorway embankment. To the south of the site, the watercourse is culverted beneath Ashford Road before running through back gardens of residential property.

5.2.3 In order to accommodate the proposed development layout, it will be necessary to divert the route of Watercourse W1 within the site boundary. Based on the current layout proposals the length of the route within the site boundary will increase to approx. 435m. It will also be necessary to culvert the watercourse in one location the north to facilitate a vehicular access to the westernmost area of the development. All existing piped/culverted restrictions will be removed.

5.3 Watercourse W2

5.3.1 Watercourse W2 runs through the central section of the site for a length of approx. 430m within the site boundary. The route through the site is culverted beneath the existing railway line, together within several other areas to accommodate field and property vehicular accesses.

5.3.2 Immediately upstream of the site boundary, the route of watercourse W2 runs through open fields before being culverted beneath the M20 motorway embankment. To the south of the site, the watercourse is culverted beneath Ashford Road and then runs through generally open fields before its confluence with Watercourse W1 to the south.

5.3.3 In order to accommodate the proposed development layout, it will be necessary to divert the route of Watercourse W2 within the site boundary. Based on current proposals the length of the route within the site boundary will increase to approx. 455m.

5.3.4 In order to accommodate the proposed inter-modal area and a proposed vehicular access it will be necessary to culvert the extent of the route between the existing motorway and railway line culverts, a distance of approx. 180m. Any other existing piped/culverted restrictions will be removed.

5.4 Watercourse W3

5.4.1 Watercourse W3 runs through the eastern section of the site for a length of approx. 360m within the site boundary. The route through the site is generally unrestricted, only being piped/culverted to accommodate occasional field accesses.

5.4.2 Immediately upstream of the site boundary, the route of watercourse W1 runs through open fields before being culverted beneath the M20 motorway embankment. To the south of the site, the watercourse is culverted beneath Ashford Road before running through open fields to the south.

5.4.3 In order to accommodate the proposed development it will be necessary to culvert the watercourse in one location to facilitate a vehicular access to the easternmost area of the development. All existing piped/culverted restrictions will be removed.

6 HYDROGEOLOGY

6.1 General

6.1.1 As previously stated, the majority of the site to south of the railway line is directly underlain by Folkestone Beds which is a highly sensitive major aquifer. As such, the soils are classified as being of immediate leaching potential and possibly able to transmit a wide range of pollutants.

6.1.2 Again, as previously stated, the majority of the site to the north of the railway line is directly underlain by Gault Clay. As the Gault Clay is a non-aquifer, it clearly affords significant protection in these areas against the migration of any contaminants to the underlying Folkestone Beds.

6.2 Groundwater Vulnerability

6.2.1 Based on the prevailing geology and hydrogeology, a significant proportion of the site lies within an Environment Agency Source Protection Zone (SPZ) 3. As would be expected, the SPZ boundary generally concurs with the area that is directly underlain by Folkestone Beds.

6.2.2 An extract of the Environment Agency Source Protection Zone map is included within Appendix C.

6.3 Licensed Abstractions

6.3.1 There are four Environment Agency licensed abstraction points located within 500m of the site boundary, three of which are licensed to Mid Kent Water for public/potable water supply. The other is licensed to the Great Danes Hotel for impounding.

6.3.2 An Environment Agency Groundwater Abstraction Point location plan is included within Appendix D.

6.3.3 At the time of writing, we have no information from the Local Authority with regard to the location of any unlicensed abstraction points.

6.4 Groundwater Protection

6.4.1 Given the general groundwater vulnerability associated with the site and surrounding area, it is essential that the proposed development and associated construction operations do not derogate existing resources in terms of both quality and quantity.

6.4.2 In general terms, the protection of existing resources will be achieved by adhering to the appropriate Environment Agency's Pollution Prevention Guidance (PPG) notes. Specific impacts/risks and mitigation applicable to this site and the development proposals are covered in more detail within Section 7 of this assessment.

7 IMPACT ASSESSMENT & MITIGATION

7.1 General

7.1.1 The potential impacts/risk to groundwater sources associated with the proposals have been divided into those associated with the accommodation works, construction works and the overall operation of the proposed development.

7.2 Accommodation Works

7.2.1 The extensive cut and fill earthworks operation required to accommodate the development proposals potentially poses a risk to groundwater recharge. The site is directly underlain by two main strata of widely differing permeability. Notwithstanding the fact that it is proposed to cover a significant proportion of the site with impermeable area, due consideration should be given to the relative permeability of all remaining areas to ensure groundwater levels are maintained. The Construction Method Statement details the proposed cut and fill methodology.

7.2.2 A comprehensive groundwater monitoring regime will be agreed with the Environment Agency to monitor levels before, during and after the earthworks operations and the overall construction period.

7.2.3 Concerns in respect of groundwater recharge have also been expressed by the Environment Agency in relation to the proposed significant culverting of Watercourse W2. The forthcoming flow monitoring and catchment studies of the watercourses will provide a better understanding of potential effects. It should be noted that as the length of watercourse to be culverted appears to lie in an area underlain by Gault Clay, recharge concerns in this respect may not be realised.

7.2.4 Whilst the site is predominantly greenfield and does not have a particularly developed history, the Geotechnical and Ground Contamination Desk Top Assessment does identify some potentially hazardous previous uses that may lead to contamination hotspots.

7.2.5 Historic uses that may have lead to contamination include a former petrol filling station along the southern boundary, a former gas works to the south eastern corner of the site, works associated with the construction of the railway line and the general use of pesticides associated with long term agricultural practices.

7.2.6 A detailed assessment of the potential risks to, and impact on, groundwater quality will be provided by the forthcoming comprehensive ground investigation study that will include intrusive surveys and sampling. Any appropriate remediation and mitigation measures can then be determined as necessary.

7.2.7 The flood risk issues associated with the proposed watercourse culverting have been considered within the Flood Risk Assessment.

7.3 Construction Works

7.3.1 Potential impact and risks associated with the pollution of groundwater in respect to the construction operations are considered to be fairly generic with no extraordinary risks being identified at this stage. All construction activities will need to comply with the relevant Environment Agency Pollution Prevention Guidance Notes.

7.3.2 A summary of the key risks to groundwater quality, together with appropriate mitigation measures, are identified below.

- *Storage of fuel, oil and chemicals.* An appropriately sited storage area with an impermeable base should be provided. The storage area should also be bunded and secure.
- *Deliveries.* All deliveries of fuel, oil and other hazardous materials should be supervised by appropriate personnel to ensure storage tanks/areas do not become overfilled and to guard against any spillages.
- *Vehicle Washdown.* Appropriate facilities should be provided for the washdown of vehicles and plant. Associated run off should not to be disposed of to ground or watercourses.
- *Foul drainage.* No foul sewerage will drain to new drainage pipes until they are connected to the appropriate permanent outfall. All temporary foul drainage will therefore need to be connected to a temporary system incorporating full retention storage/septic tank with appropriate emptying arrangements.
- *Emergencies.* Appropriate spill management plans will be required, detailing the procedures and materials that will be used to deal with any such event.

7.3.3 A comprehensive method statement and risk assessment in respect of all construction activities will be prepared prior to construction works commencing on site, in accordance with Health and Safety requirements.

7.4 Operational

7.4.1 The potential impact and risks associated with groundwater quality and recharge identified in respect of the operation of this development will generally be related the proposed foul and surface water drainage systems.

- 7.4.2 The foul drainage strategy currently promoted will include the provision of three on site pumping stations and an associated network of gravity/pumped sewers. Whilst no extraordinary risks associated with the proposed foul strategy have been identified, there remains the inherent risk to groundwater associated with any foul drainage network, such as sewer blockages and pumping station failure. All proposed pumping stations will be adopted by Southern Water and therefore monitored for failure by remote telemetry systems. The proposed pumped/gravity foul drainage network will be either adopted and maintained by Southern Water or maintained by the development estate management company.
- 7.4.3 The proposed surface water drainage strategy includes restricted discharges to all three of the existing watercourses that cross the site. All such discharges will require the consent of the Environment Agency under the Land Drainage Act 1990.
- 7.4.4 The proposed development will result in significant impermeable areas. The proposed surface water strategy also relies heavily on the use of Sustainable Surface Water Drainage Systems (SUDS). The techniques selected for each area should therefore be sympathetic to both groundwater quality and recharge. The likely SUDS techniques to be used are referred to within the Flood Risk Assessment
- 7.4.5 Pollution control measures should be included within the surface water drainage design, appropriate for dealing with run off from the various impermeable areas. Only uncontaminated roof water will be permitted directly to ground. Surface water run off from the proposed highways and parking areas will be required to pass through trapped gullies as a minimum. Run off from the service yard areas will also need to pass through oil/petrol interceptors.
- 7.4.6 With respect to the proposed inter-modal area, it is currently proposed that a combination of permeable and impermeable surface will be used. An impermeable surface will be used for the trafficked areas. Surface water run off from these areas will pass through trapped gullies and petrol/oil interceptors. A permeable surface will be used for container storage areas. To guard against any pollution risks associated with this area, it is proposed that the permeable construction should be lined with percolated surface water being collected by a land drainage network, passing through a petrol/oil interceptor. It should be noted that a significant proportion of the inter-modal area will be underlain by Gault Clay will therefore provide additional protection against the potential migration of pollutants.

8 RESIDUAL RISKS

8.1 General

8.1.1 An estate management company will be responsible for the running and maintenance of all non adopted areas of the development. An emergency plan will be agreed to deal with any pollutions incidents.

8.2 Foul Drainage System

8.2.1 As previously stated, it is intended that the key installations associated with the foul drainage network will be adopted by Southern Water. This includes the proposed pumping stations and main gravity/pumped foul sewer network. Once adopted, the pumping stations' operation will be monitored by remote telemetry.

8.2.2 During the construction period, temporary foul drainage arrangements and appropriate maintenance regimes will be agreed with the Environment Agency.

8.2.3 Between first occupation and the adoption of the foul drainage system, an appropriate maintenance regime will be agreed between the estate management company, Southern Water and the Environment Agency.

8.3 Surface Water Drainage System

8.3.1 The extent of the surface water drainage network that will be offered for adoption is currently unknown. With the exception of those serving the proposed adoptable highway network, it is highly unlikely that any of the proposed SUDS installations will be adopted.

8.3.2 An appropriate maintenance regime in this respect will therefore need to be agreed with the estate management company and the Environment Agency to ensure that all non-adoptable SUDS installations operate efficiently and to their design capacity.

APPENDICES

APPENDIX A

APPENDIX B

APPENDIX C

APPENDIX D

APPENDIX E