Paper Mill Lane Works

Surface and Foul Water Drainage Management Plan

Requirement 18 (1) to (2) & 22 (1) to (2(a))

(Applicable to Work Numbers 50 and 51)

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Revision Summary				
Rev	**Date**	**Prepared by**	**Checked by**	**Approved by**
1	07/09/21	Kay Griffin	Phil Rew-Williamson	Catherine Sibley
2	13/01/22	Kay Griffin	Phil Rew-Williamson	Gareth Mills
3	23/03/22	Kay Griffin	Phil Rew-Williamson	Gareth Mills

Description of Revisions			
Rev	**Page**	**Section**	**Description**
1	ALL	ALL	New Document
2	ALL	ALL	Document amended in accordance with consultee comments: SCC (21/10/21), Environment Agency (14/10/21) and East Suffolk Internal Drainage Board (18/10/21)
3	ALL	ALL	Document amended in accordance with consultee comments: Environment Agency (09/02/22) and East Suffolk Internal Drainage Board (28/02/22)

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1. INTRODUCTION AND SCOPE

1.1. Project Overview

1. East Anglia Three Limited (EATL) was awarded a Development Consent Order (DCO) by the Secretary of State, Department of Business, Energy and Industrial Strategy (DBEIS) on 7 August 2017 for the East Anglia THREE Offshore Windfarm (EA THREE). The DCO granted consent for the development of a 1200MW offshore windfarm and associated infrastructure and is live until 28 August 2022. The DCO has now been subject to three non-material variations:

- In March 2019 EATL submitted a non-material change application to DBEIS to amend the consent to increase the maximum generating capacity from 1,200MW to 1,400MW and to limit the maximum number of gravity base foundations to 100. In June 2019 DBEIS authorised the proposed change application and issued an Amendments Order.
- In July 2020 EATL submitted a second non-material change application to DBEIS to amend the parameters of its offshore substations (reducing the number of these to one) and wind turbines (a decrease in the number of turbines and an increase in their hub height and rotor radius). On 15 April 2021 DBEIS authorised this proposed change application and issued an Amendments Order.
- In August 2021 EATL submitted a third non-material change application to DBEIS to amend the consent to remove the maximum generating capacity of 1,400MW and to amend the parameters of its wind turbines (a decrease in the number of turbines and an increase in their hub height and rotor radius). The application is currently in the consultation phase.

2. The onshore construction works associated with EA THREE will have a capacity of 1400MW and transmission connection of 1320MW. The construction works will be spread across a 37km corridor between the Suffolk coast at Bawdsey and the converter station at Bramford, passing the northern side of Ipswich. As a result of the strategic approach taken, the cables will be pulled through pre-installed ducts laid during the onshore works for East Anglia ONE Offshore Windfarm (EA ONE), thereby substantially reducing the impacts of connecting to the National Grid (NG) at the same location. The infrastructure to be installed for EA THREE, therefore, comprises:

- The landfall site with one associated transition bay location with two transition bays containing the connection between the offshore and onshore cables;
- Two onshore electrical cables (single core);
- Up to 62 jointing bay locations each with up to two jointing bays;
- One onshore converter station, adjacent to the EA ONE Substation;
- Three cables to link the converter station to the National Grid Bramford Substation;
- Up to three onshore fibre optic cables; and
- Landscaping and tree planting around the onshore converter station location.

3. Since the granting of the DCO, the decision has been made that the electrical connection for EA THREE will comprise a high voltage direct current (HVDC) cable rather than a high voltage alternating current cable and, therefore, the type of substation that will be required is a HVDC converter station. The substation will, therefore, be referred to here as a 'converter station' and this amended terminology has been agreed with the relevant authorities on 15 October 2020. It has also been determined that only one converter station will be constructed rather than two and that the converter station will be installed in a single construction phase.

1.2. Purpose and Scope

4. This Surface and Foul Water Drainage Management Plan (SFWDMP) focuses on the procedures for managing the drainage with respect to the Paper Mill Lane Works Stage of the EA THREE construction works. This document has been produced to fulfil DCO Requirement 18 which states:

> **Surface and foul water drainage**
> ***18.-—(****1) No stage of the connection works may commence until for that stage written details of the surface and (if any) foul water drainage system (including means of pollution control) have, after consultation with the relevant drainage authorities, Suffolk County Council and the Environment Agency, been submitted to and approved by the relevant planning authority.*
> *(2) The details agreed in paragraph (1) must accord with the proposals for a surface water and drainage management plan contained in the outline code of construction practice and include a surface water drainage scheme for Work No. 67, which is based on sustainable drainage principles and an assessment of the hydrological and hydrogeological context of the development.*

(3) The surface and foul water drainage system for the relevant stage must be constructed in accordance with the approved details.

5. This document also fulfils part of DCO Requirement 22 which also requires a surface water and drainage management plan:

Code of construction practice
22.- *(1) No stage of the connection works may commence until for that stage a code of construction practice (which must accord with the outline code of construction practice) has been submitted to and approved by the relevant local planning authority, in consultation with the relevant highway authority.*
(2) The code of construction practice must include—
(a) a surface water and drainage management plan;

6. The scope of this document relates to the SFWDMP associated with the construction of the Paper Mill Lane Works. Works in this stage comprise Work No.s 50 and 51, as part of the onshore cable route running from the landfall location at Bawdsey to the Converter Station works located near Bramford, Suffolk (Figure 1 Site Context Plan). SFWDMPs have been produced for each stage of the onshore connection works and are provided under separate cover.

7. The Paper Mill Lane Works will be some of the first works to be undertaken along the cable route. These works have been designated as a stage in their own right to allow the works to commence at this location prior to works commencing along the cable route as a whole (i.e. the main cable works construction phase). The access and Construction Consolidation Site (CCS) will be constructed in Summer 2022 and the jointing bay installation, cable pull through and reinstatement will be undertaken as part of the main cable works construction phase.

8. With respect to Paper Mill Lane Works, it is Mid Suffolk District Council (MSDC) who are the relevant planning authority. However, EATL has acknowledged from an early stage that Suffolk County Council (SCC) (as the Lead Local Flood Authority), the East Suffolk Internal Drainage Board, and the Environment Agency are important consultees in the process for the SFWDMP.

9. The purpose of the document is to describe the basis of the drainage scheme and management of water during construction of the works, in order to meet the following objectives:

- To protect surface and groundwater by ensuring that appropriate measures are in place to prevent contaminants from entering the surrounding environment and in particular pathways that might lead to water receptors. The Project Environmental Management Plan (EA3-LDC-CNS-REP-IBR-000010) also deals with controls for hazardous materials;
- To comply with relevant legislation and good practice in terms of managing surface and foul water abstractions and discharges; and
- To maintain and protect private water supplies during construction.

10. The measures contained herein shall be adhered to by the Principal Contractor and the implementation and compliance will be monitored by the Construction Management Team. These measures will only be revised with the agreement of MSDC.

11. This plan should be read in conjunction with the Code of Construction Practice (CoCP) (EA3-LDC-CNS-REP-IBR-00065) and in particular the following:

- Project Environmental Management Plan (Appendix 10)
- Pollution Prevention and Emergency Incident Response Plan (Appendix 7)
- Flood Plan (Appendix 2)
- Section 14 Protection of Surface and Groundwater and also Section 14.5 Licences.

12. In addition, a Restoration Plan will be prepared to the approval of MSDC in conjunction with SCC as Local Highway Authority, in accordance with Requirement 30 of the DCO. This Plan will set out how land that has been used temporarily for the EA THREE construction works will be reinstated within 12 months of the completion of that stage.

2. ABBREVIATIONS

BDC	Babergh District Council
CBS	Cement Bound Sand
CCS	Construction Consolidation Site
Chapter 8	Guidelines for (Public) Highways signing, lighting and guarding
CoCP	Code of Construction Practice
DBEIS	Department of Business, Energy and Industrial Strategy
DC	Direct Current
DCO	Development Consent Order
DMRB	Design Manual for Roads and Bridges
EA	Environment Agency
EA ONE	East Anglia ONE
EA THREE	East Anglia THREE
EATL	East Anglia THREE Limited
EnvCoW	Environmental Clerk of Works
ES	Environmental Statement
GWD	Groundwater Directive (2006/118/EC, including amendments to Annex II detailed under Directive
HVDC	High voltage direct current
LLFA	Lead Local Flood Authorities
MSDC	Mid Suffolk District Council
MW	Megawatt
NG	National Grid Plc
NPPF	National Planning Policy Framework
PPG	Pollution Prevention Guideline
RPS	Regulatory Position Statement
SCC	Suffolk County Council
SPP	Suffolk SuDS Palette
SuDS	Sustainable Drainage System
WFD	Water Framework Directive (2000/60/EC)

3. CONSTRUCTION DETAILS

3.1. Cable Works – Overview

13. The construction works will be spread across a 37km corridor between the Suffolk coast at Bawdsey and the Converter Station at Bramford, passing the northern side of Ipswich. The cables will be pulled through pre-installed ducts laid during the onshore works for East Anglia ONE. The construction activity within each section along the onshore cable route will be as follows:

- Any minor temporary modifications to the public road network;
- Establish the Construction Consolidation Sites (CCSs);
- Establish accesses to, and temporary haul road to, the jointing bay locations;
- Establish temporary jointing bay compounds;
- Excavate jointing bay pit to locate the existing ducts at each of the compounds;
- Construct jointing bay;
- Transport of cables to site, pull cables through ducts and undertake jointing;
- Topsoil replacement and seeding;
- Remove temporary compounds (jointing bays and CCS); and
- Reinstate all disturbed land and permanent fences and hedges.

14. Some temporary modification of the existing road networks may be required such as localised widening, temporary widening or socketing of street signs and temporary moving of street furniture in order to allow larger vehicles than normal to access the jointing bays. This will be completed prior to the start of the main construction works within relevant sections of the cable corridor route.

15. EATL will require up to seven temporary construction compounds to aid in the construction of the proposed East Anglia THREE project. These have been designated as 'Primary Construction Consolidation Site' (PCCS) and 'Secondary Construction Consolidation Site' (SCCS) depending on their uses. Two PCCS and up to five SCCS will be installed, which will all be temporary and will be removed once construction is complete.

Table 3-1 – Construction Consolidation Site Locations

CCS Type	ID	Address
Secondary	A	Bullen Lane, Bramford, Ipswich, Suffolk IP8
Primary	B	Paper Mill Lane, Claydon, Ipswich, Suffolk IP6 0AP
Secondary	C	Witnesham Road, Ipswich, Suffolk IP6
Secondary	D	Playford Corner, Playford Mount, Ipswich, Suffolk IP6 9DS
Primary	E	Top Street, Martlesham, Suffolk IP12
Secondary	F	Clappits, Woodbridge Road, Newbourne, Woodbridge, Suffolk IP12 4PA
Secondary	G	Park Lane, Ipswich, Suffolk IP10

16. The PCCSs will:

- Form the main point of access onto the linear construction site;
- Provide areas for the storage of materials and equipment;
- House site administration and welfare facilities for the labour resources;
- Form an interchange hub for deliveries of material, equipment and resources; and
- Allow HGVs to park prior to entering the local road network during peak hours.

17. The SCCSs will act as hubs for the delivery of materials, equipment and resources along the route and will enable access to the cable route for construction. They will be of sufficient size to accommodate limited storage of materials, equipment and labour welfare facilities.

18. It is anticipated that 29 jointing bays will be required along the 37km cable route, in addition to a transition bay at the landfall. Each jointing bay will comprise a concrete box 10m long by 3m wide by 1.5m high buried so that the base is 2.5m below ground level. A jointing bay construction compound will be required adjacent to each jointing bay and will have hardstanding areas of up to 900m^2 within the compound which would typically measure 24m x 115m i.e. 2,760m^2.(in accordance with Requirement 12(11) which stipulates that the footprint must not exceed 3,740m^2). The compounds will have hardstanding and accommodate containers, drum trailer movement, parking, and welfare. A typical layout is shown in Figure 2 of the Code of Construction Practice (EA3-LDC-CNS-REP-IBR-000065).

19. Existing accesses and farm tracks will be upgraded and used where possible to access the jointing bay locations. Once these accesses reach the cable corridor, the routes to connect to the jointing bays are referred to as 'haul road'. The length of haul road for the cable route is limited by Requirement 12(12) of the DCO to 18.05km.

20. In addition, the ducts to be used for EA THREE, which were installed during the EA ONE project construction works, will require to be 'proved' to ensure that they are intact and free of debris. This will be undertaken by the use of foam pigs which will be driven under pressure from jointing bay to jointing bay. Each stretch of duct that was installed using Horizontal Direct Drilling (HDD) will, however, require duct-proving excavations at each end of the HDD, to allow the use of different size foam pigs, due to a difference in the diameter of these compared to the ducting installed using open trench techniques.

3.2. Paper Mill Lane Works

21. Paper Mill Lane Works comprise a stage of the onshore connection works and cover Work No.s 50 and 51. The infrastructure within these work no.s comprises:

- The Paper Mill Lane PCCS in Work No. 51;
- Jointing Bay 4 in Work No. 50;

- Two new accesses with the public road (Paper Mill Lane) as follows:
  - Access AP-AF to the east of Paper Mill Lane, to access the PCCS and Jointing Bay 4; and
  - Access AP-AG to the west of Paper Mill Lane to access the ends of the HDD ducts;
- The access track/haul road required to access the PCCS and Jointing Bay 4;
- Two stretches of trackway to reach duct proving excavations at the ends of the HDD ducts in the Work No.s to the east and west of the Paper Mill Lane Works; and
- Turning circle and HGV parking area in Work No 51 to allow HGV movements to be safely coordinated.

22. These works are shown on Figure 1.

23. Paper Mill Lane PCCS and the two accesses from Paper Mill Lane were used as part of the EA ONE construction works and have now been reinstated, other than part of the access to the east which has been partially reinstated, and so will need to be constructed again under the EA THREE DCO. There are no public rights of way within the site.

3.2.1. Accesses AP-AF and AP-AG, Access Track, Haul Road and Trackway (Work No. 50)

24. Paper Mill Lane PCCS and the Jointing Bay will be accessed from Paper Mill Lane using Access AP-AF. This access was used for the EA ONE project and has now been partially reinstated. Planning permission has been granted for the access that remains (Reference DC/20/05669). From Access AP-AF, a new temporary vehicular access track of 180m length and 5.5m width will be used to access the Paper Mill Lane PCCS and also reach the edge of the cable corridor (Work No. 50), where 90m of 5.5m wide haul road will link to the jointing bay. From here, 140m of 5.5m wide trackway will be installed to reach the excavation point on the HDD ducts in Work No. 49. Of this trackway, 90m will be within Work No. 49 and is not part of the Paper Mill Lane Works.

25. An access (Access AP-AG) will also be required on the west side of Paper Mill Lane, along with a 185m length of trackway to reach the proposed HDD duct proving excavation in Work No. 52 during the main cable works. Only 33m of this trackway will be within the Paper Mill Lane Works.

26. No watercourse crossings will be required for the Paper Mill Lane Works.

27. The construction methodologies associated with the access, access track and haul roads are typically as follows:

- Set out the access and track/haul road with the use of Global Positioning Systems (GPS) Real Time Kinematic (RTK) equipment;
- Locate, divert and cap any existing field drains;
- Set out and install drainage features the length of track to be constructed;
- Remove vegetation, then remove and locally store topsoil material over the working width; seeding topsoil if it is to be stored for longer than 6 months;
- Excavate to formation level and store any excess material;
- Under-track drainage will be installed where necessary and in accordance with drainage requirements;
- Place a geotextile onto existing subsoil to improve the bearing capacity of the sub-soil, depending on ground conditions, programme and landowner requirements;
- Place imported stone in accordance with the design to form the track structure; and
- For the trackway, following the setting out of the route using GPS RTK, the trackmatting would be installed directly on the existing ground surface.

3.2.2. Primary Construction Consolidation Site (Work No. 51)

28. The Paper Mill Lane PCCS (CCS B) will be a designated storage and delivery facility and also the main administrative compound for the onshore cable works. The dimensions of the PCCS at Paper Mill Lane will be 90m long by 40m wide covering a surface area of 3,600m^2, this is in accordance with Requirement 12(9)(a) which limits the size of each PCCS to 3,600m^2. The Paper Mill Lane PCCS will also be within the area previously used for the EA ONE PCCS in this location.

29. The construction of the PCCSs involves stripping of topsoil, importing and laying stone for the compound base and installing cabins and welfare facilities. Construction of the Paper Mill Lane PCCS will take approximately 3 weeks and the methodology will be as follows:

- The extent of PCCS will be marked out with the use of GPS RTK equipment;
- Any existing field drains will be located, diverted and capped;

- Drainage features will be set out and installed as required;
- Security fencing will be erected around the perimeter of the PCCS;
- Once vegetation has been removed, topsoil material over the PCCS area will be removed and locally stored and seeded if it is to be stored for longer than 6 months;
- Any excess material will be excavated to formation level and stored; and
- Imported stone will be placed in accordance with the design of the PCCS base structure.

30. An HGV queuing area (195m^2), turning circle (303m^2) and parking up area (447m^2) will also be required adjacent to the PCCS. This will enable a key part of the EA THREE traffic strategy which requires any HGVs arriving via the strategic road network during peak hours to park up at the Primary CCS, as HGVs will only be permitted to enter the local road network during permitted delivery windows (generally 9am-4.30pm (see Table 6-2 of the Traffic Management Plan (EA3 LDC-CNS-REP-IBR-000039)).

31. The Paper Mill Lane PCCS will be constructed first in summer 2022, with the duct proving, jointing bay and cable pull through occurring at a later date (anticipated in 2024). It is intended that the PCCS will provide an early onsite presence for the onshore cable construction works and will be used as a base for mitigation and survey works being undertaken as well as for the construction team to visit site during the later stages of the planning and design process. It will also be used for stakeholder and other site meetings.

32. The Paper Mill Lane PCCS will remain in situ for the duration of the onshore cable works, prior to being restored as described in Section 3.2.4.

3.2.3. Jointing Bay 4 (Work No. 51)

33. The jointing bay will be located within Work No. 50, 150m to the south east of the PCCS at OS Grid Reference 613067, 248933.

34. Once the location of the jointing bay compound has been established (using GPS RTK equipment), creation of the compound will commence with erection of temporary security fencing, removal of topsoil layer and installation of hardstanding areas.

35. The jointing bay will then be excavated to a depth of up to 2.5m with adequate slope batter or shoring on all sides of the excavation to prevent the soil from collapse. The existing ducts will be uncovered and concrete slabs constructed to provide a level working area. Two sump pits will be included to facilitate drainage and dewatering and water will be treated, where necessary, before being discharged. Installation and jointing of the cables will then take place, along with installation of earthing link boxes and fibre optic cable chambers, before the area is back filled with subsoil.

36. The creation of the jointing bay compound and excavation of the jointing bay will each take a week.

3.2.3.1. Cable Installation

37. The electrical transmission cables will be delivered to the CCS, from where they will be transferred to the jointing bay compound when needed. The cable drums will comprise abnormal loads and their delivery will be managed as set out in the Traffic Management Plan (EA3-LDC-ONCS-REP-IBR-000032). Two cable lengths of approximately 1,260m will be required to pull through between each pair of jointing bays. The cable ducts will be proved before the cable is pulled through. Once the cables are received at the jointing bay compound, they will be temporarily stored on the hardstanding area prior to installation in the pre-installed ducts.

38. Installation of the cables into the ducts between Jointing Bay 4 and Jointing Bay 3 (not part of the Paper Mill Lane Works) will begin with a cable pulling system being installed into the bay. A steel bond and winching system with free spinning rollers will be installed along the bottom of the bay. Hydraulic jacks will raise the cable drum off the ground and a winch will be used to pull in cable using a pulling rope. A dynamometer will ensure the maximum pulling tension is not exceeded. Tension on the cable will be reduced using a biodegradable water-based lubricant. This process will be repeated for the second cable being installed in the duct. The cables will then be jointed once 2 cable sections (4 cables) have been installed.

39. It is expected that pulling and jointing operations would take approximately 2.5 weeks, typically spread over a three to four week period, with approximately five workers for each jointing bay. These works will then be repeated to install the cables between Jointing Bays 4 and 5.

3.2.4. Reinstatement

40. Following installation and jointing of the cables, the jointing bay, jointing bay compound, access and haul road will be reinstated with the stored topsoil and subsoil following trenching. If necessary, the subsoil will be 'ripped' prior to placement if compaction had

occurred. Topsoil will be spread in such a way as to ensure that it does not become compacted. The topsoil will then be cultivated and reseeded (if required) and suitable hedgerow species replanted during the first appropriate planting season, in accordance with the Landscape Management Pan (EA3- LDC-ONCS-REP-IBR-000064). Temporary fencing around any new planting would be removed once reinstatement was established.

41. Trackway will be removed following installation of the cables in the adjacent Work No.s.

42. The PCCS will remain in situ for the duration of the cable works and will then be removed and reinstated as outlined above.

4. SITE DETAIL

4.1. Hydrological and Hydrogeological Context

43. Figure 2 provides an overview of the Paper Mill Lane Works site and local water features (based on 1:25,000 scale OS mapping). The area comprises arable land previously used for the construction of the EA ONE CCS, haul road and cable installation works. The ground elevation at Paper Mill Lane Works ranges from approximately 10m to 32m AOD, the gradient of the land sloping from south to north with a sharp incline in the south-central portion of the site rising to form a hill.

44. There are no Main Rivers or other surface water features present on the site. A drainage ditch runs parallel to the northern site boundary. This channel is designated as an Ordinary Watercourse and will receive any surface runoff from the site. This channel flows from east to west before adjoining the River Gipping some 240m west of the site. This minor drainage ditch has a very small upstream catchment and runs dry in summer months. The ditch has sources in Westerfield 4.3km southeast of the site and in Akenham 2.5km northeast of the site, the latter adjoining the former.

45. No land drains were encountered during the EA ONE construction works within the Paper Mill Lane Works area.

46. The River Gipping is the closest Main River designated by the Environment Agency and is situated 240m west of the site. This fluvial feature drains a catchment upstream of the site estimated to be 263.2km^2. There are other surface water features located on the opposite side of the river approximately 420m west of Paper Mill Lane including a series of ponds and lakes housing Suffolk Water Park and a drainage network.

47. The site is underlain by the Newhaven Chalk Formation but this is overlain at the site by superficial deposits of the Lowestoft Formation – Diamicton. In the northernmost portion of the site, river terrace deposits of sand and gravel (undifferentiated) are also present. The till (Lowestoft Formation) is classed as a Secondary Aquifer (undifferentiated), meaning it is likely the characteristics of the deposits vary but are unlikely to be utilised for water consumption on a large scale. River terrace deposits are classed as a Secondary A Aquifer and the Newhaven Chalk is classed as a Principal Aquifer. The site is in a Zone 3 (Total Catchment) Source Protection Zone.

48. There are no licensed surface water or groundwater abstractions within the site boundary. There is a licensed borehole abstraction point c.30m north of the site used for spray irrigation and a private abstraction is located c.30m outside the site's southern boundary, adjacent to Mockbeggars Hall. No details of this private abstraction are available, although given the lack of any hydrological features in the vicinity of Mockbeggars Hall, it is assumed that this will be a groundwater abstraction, most likely from the Chalk.. The closest surface water abstraction is held by SCC and is located on the opposite bank of the River Gipping, 300m west of the site.

4.2. Risk of Flooding

49. A Flood Risk Assessment was conducted in 2015 by Royal HaskoningDHV and the findings of this were included in the Environmental Statement (Vol 3 Chapter 21 as Appendix 21.2). Reference was made to the Environment Agency (EA) Flood Zone Map, which was used to identify the flood risk potential along the route of the cable works.

50. The EA Flood Map identifies three categories of Flood Zones, which reflect the risk of an area being affected by flooding from either rivers or the sea, where there are no flood defences. The zones are described as follows:

- Flood Zone 1: land defined as having less than a 1 in 1000 annual probability of flooding from rivers or the sea);
- Flood Zone 2: land having between a 1 in 1000 and a 1 in 100 annual probability of flooding from rivers or between a 1 in 1000 and a 1 in 200 annual probability of flooding from the sea; and

- Flood Zone 3: land having greater than a 1 in 100 annual probability of flooding from rivers or greater than 1 in 200 annual probability from the sea.

51. Based on the EA Flood Zone Map (Figure 21.5 of the ES), the report confirmed that the Paper Mill Lane Works site is located within Flood Zone 1 (i.e. a less than 1 in 1000 year annual probability of flooding from rivers or the sea) and therefore (according to EA criteria) is considered to have a 'Very Low' risk of flooding from these sources. Current UK flood mapping[1] indicates that this remains the case. The site is not in a location that qualifies for Flood Alerts or Flood Warnings from the Environment Agency.

52. Paper Mill Lane (the access route to Paper Mill Lane Works) is, however, partially located in Flood Zones 2 and 3, in two different areas to the north and south. Flooding may therefore impede access to/from the site during periods of high fluvial flow along the River Gipping. Flood Warnings and Flood Alerts from the Environment Agency are available locally. Considering this, a Flood Plan has been created for this site and is included in Appendix 2 of the CoCP (EA3-LDC-CNS-REP-IBR-000065).

5. SURFACE AND FOUL WATER DRAINAGE MANAGEMENT PLAN GOVERNANCE

53. Prior to the commencement of construction, an Environmental Clerk of Works (EnvCoW) will be appointed by the Principal Contractor to manage *inter alia* the implementation of the SFWMDP. Contact details for the EnvCoW will be submitted to stakeholders for their records prior to commencement of construction.

54. The EnvCoW will be responsible for ensuring that effective surface water drainage management measures are in place for each relevant stage of construction and ensure that the relevant contractor also has in place a plan and appropriate means to respond to unforeseen events. This forward planning and implementation is critical to the effective management of surface water during construction and is a key lesson learnt from the construction of the East Anglia ONE project.

55. Prior to commencement of construction, the Principal Contractor will also submit details of their Accreditation (e.g. ISO) and Environmental Policies to the relevant stakeholders along with the following details for each key role relating to this plan:

- Role;
- Contact;
- Company Name and Address;
- Contact number and email; and
- Key responsibilities.

6. RELEVANT STANDARDS AND LEGISLATION

56. The Paper Mill Lane Works drainage strategy has been developed in accordance with the following relevant standards and guidance.

6.1. British Standards / Eurocodes

- BS EN 858-1:2002 Separator Systems for Light Liquids (e.g. Oil & Petrol)
- BS 8582:2013 Code of practice for surface water management for development sites

6.2. Legislation and Planning Policy

- The Water Framework Directive (2000/60/EC) (WFD)
- The Groundwater Directive (2006/118/EC, including amendments to Annex II detailed under Directive 2014/80/EU) (GWD)
- The Floods Directive (2007/60/EC)
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 which transposes the WFD and aspects of the GWD into UK legislation
- The Groundwater (England and Wales) Regulations 2009 which implements in England and Wales Article 6 of the GWD which details measures to prevent or limit inputs of pollutants into groundwater The Flood Risk Regulations 2009 transposes the EU Floods Directive into UK legislation and sets out requirements of the Environment Agency and local authorities in preparing assessments and mapping of flood risk for each river basin district in England and Wales

[1] https://flood-map-for-planning.service.gov.uk/

- Flood and Water Management Act 2010 includes provisions for the management of risk in connection with flooding and sets out requirements for Lead Local Flood Authorities (LLFA) in preparing strategies for local flood risk management
- The Land Drainage Act 1991 and 1994
- The Environment Act 1995
- The Environmental Permitting (England and Wales) Regulations 2016 consolidate and replace the Environmental Permitting (England and Wales) Regulations 2010, which have been amended 15 times to date. The 2010 Regulations are still in force and are the main implementing regulations for the environmental permitting regime
- National Planning Policy Framework (NPPF), July 2021
- Sustainable Drainage Systems - Non-statutory technical standards for sustainable drainage systems, March 2015, Department for Environment, Food and Rural Affairs.
- The Water Abstraction and Impounding (Exemptions) Regulations 2017.

6.3. CIRIA Guidance

- CIRIA C532 Control of Water Pollution from Construction Sites (2001)
- CIRIA C502 Environmental Good Practice on Site (2015)
- CIRIA C753 SuDS Manual (Dec 2015)
- CIRIA C762 Environmental Good Practice on Site (4th Edition 2016)
- CIRIA 648 Control of Water Pollution from Linear Construction Projects – Technical Guidance (2006)
- CIRIA 649 Control of Water Pollution from Linear Construction Projects – Site Guide (2006)
- CIRIA SP156 - Control of water pollution from construction sites - guide to good practice, (2002)

6.4. Local Guidance

- Mid Suffolk District Council Strategic Flood Risk Assessment, Mid Suffolk District Councils, March 2008
- Sustainable Drainage Systems (SuDS) a Local Design Guide, Appendix A to the Suffolk Flood Risk Management Strategy, Suffolk Flood Risk Management Partnership, May 2018
- Suffolk SuDS Palette (SPP) – Guidance, Suffolk County Council

6.5. Design Manual for Roads & Bridges

- Design Manual for Roads & Bridges (DMRB): *CD 529 Design of outfall and culvert details*
- DMRB: CD 522 Drainage of runoff from natural catchments

6.6. Environment Agency Guidance Notes[2]

- Pollution Prevention Guidelines (PPG) General Guide to the Prevention of Water Pollution
- PPG3 Use and Design of Oil Separators in Surface Water Systems
- PPG4 Disposal of Sewage where no Mains Drainage is Available
- PPG5 Works in, or liable to affect Watercourses
- PPG6 Working at construction and demolition sites;
- PPG8 Storage and disposal of used oils;
- PPG20 Dewatering of underground ducts and chambers;
- PPG21 Pollution incident response planning;
- The Environment Agency's approach to groundwater protection (version 1.2 February 2018)
- Pollution Prevention for Business, (DEFRA and Environment Agency) May 2019.

6.7. Regulatory Position Statements

- Treating and using water that contains concrete and silt at construction sites: RPS 235, November 2020
- Temporary dewatering from excavations to surface water, Environment Agency, April 2021.

[2] The Environment Agency no longer provides 'good practice' guidance in the form of PPG and these documents were withdrawn in December 2015. The Environment Agency will be reviewing the validity of the archived documents as part of the government 'smarter guidance' project. While this process is concluded, the archived PPG documents are found at: https://www.gov.uk/government/collections/pollution-prevention-guidance-ppg

7. WATER FRAMEWORK DIRECTIVE

57. It has been agreed with the Environment Agency (14/1021) that a Water Framework Directive (WFD) Assessment is not necessary for the Paper Mill Lane Works due to the mitigation measures outlined in this Surface Water and Drainage Management Plan and also the Code of Construction Practice (EA3-LDC-CNS-REP-IBR-0000+65).

8. SURFACE WATER DRAINAGE STRATEGY

8.1. Introduction

58. The requirement for a SFWDMP is based on the duty to ensure that surface water quality and quantity is managed throughout the construction process to mitigate impacts off site. It will also play a role in protecting the quality of soils on site by preventing loss of composition and nutrients. Surface water runoff is a risk to the quality of all controlled water bodies and a nuisance to adjacent landowners. Surface water flooding can also delay works activities and become a risk to human health.

59. The impacts of the installation of the EA THREE onshore cables as a whole on surface water have been minimised by the strategic decision to install the ducts for the project as part of the EA ONE construction works. The EA THREE cables will, therefore, be pulled through these pre-installed ducts rather than requiring open trenching across the route. The existing ducts are located underground / below riverbed to minimise potential impacts to flood risk receptors. Furthermore, the locations of the jointing bays are at least 10m from watercourses and at a maximum depth of 2.5m and have been designed to avoid the known area of contamination at Tuddenham St Martin (i.e. Work No. 41). There will, therefore, be no excavations or works within this area. The initial routing of the cable corridor was designed to also avoid mineral extraction areas.

60. A CoCP (EA3-LDC-CNS-REP-IBR-000065) has been prepared and agreed with MSDC and SCC and includes best practice measures for the protection of surface waters. A Pollution Prevention and Emergency Incident Response Plan (Appendix 8 to the CoCP) has been prepared and includes a description of the general requirements in place to identify and manage likely sources of pollution from the construction activities. Pollution prevention measures will be implemented in accordance with Environment Agency guidance (see Section 6). Procedures and contingency plans will be put in place at each work site to deal with the clean-up of small spillages and any emergency incidents. Staff will be suitably trained to deal with spillages, including the use of spill kits and other practical measures, to retain any pollution on site. The used spill kits or absorbents will be disposed of off-site at a suitably licenced facility.

61. Detailed evaluation of each section of the works will be undertaken prior to construction works commencing and selection of the most appropriate mitigation measures for each area will be applied. Such evaluation will consider, but not be limited to, extent of work areas, topography of the site, geology and soil conditions, hydrology and surrounding receptors.

62. The construction and environmental management team will call on specialist consultants (i.e. ecologists, hydrologists, ornithologists etc.), as and when necessary, to ensure that construction is being carried out in accordance with the requirements of the Environmental Statement, the Requirements of the DCO, environmental best practice and the approved Method Statements.

63. The workforce will receive “toolbox” talks outlining the aims of the water management strategy and its importance in maintaining a safe working environment and protecting water features along the route.

64. All necessary permits will be obtained by the Principal Contactor prior to commencement of these works. In accordance with the Land Drainage Act 1991 and local byelaws, where required written consent will be sought from the East Suffolk Internal Drainage Board on the final methodology for any temporary or permanent works associated with or any discharge to Ordinary Watercourses within the East Suffolk Internal Drainage District. Written consent from the SCC (the lead Local Flood Authority)) will be obtained for the final methodology for any temporary or permanent works associated with Ordinary Watercourse crossings outside of the East Suffolk Internal Drainage District (pursuant the Land Drainage Act 1991). No such works with respect to ordinary watercourses are, however, currently envisaged for the Paper Mill Lane Works.

8.2. Existing Drainage

65. Existing land drainage systems will be maintained during construction, where possible, and reinstated on completion. Consultation with landowners and occupiers will be undertaken to establish existing drainage arrangements, the location of drains and any other relevant information. Further mitigation will include the use of a specialist, local drainage contractor to undertake surveys to locate drains and create drawings both pre- and post-construction and ensure appropriate reinstatement. Where drains are shallower than

1.5m, temporary culverting or diverting may be employed. Where possible, these will be cut off and capped inside the works area, to prevent silt leaving site and new field drains will be installed on the site boundary. Following construction, field drainage systems and ditches will be fully reinstated where possible in consultation with landowners / occupiers.

66. Where construction operations may impact the wider drainage regime, the work will be undertaken in consultation and agreement with the East Suffolk Internal Drainage Board and/or SCC as relevant. During the construction phase, local drainage will only be interrupted for the shortest possible period and will be reinstated as soon as practicable to minimise any effect on local drainage or soil moisture content.

8.3. Drainage Design

67. Once completed the cable will be a below ground structure and restoration will be undertaken to return the disturbed areas to their greenfield state with all original drainage connections restored. The drainage for the completed works will therefore comply with the Non-Statutory Technical Standards for Sustainable Drainage Systems (SuDS), specifically paragraphs S2[3] and S4[4], and will achieve Greenfield Runoff Rates for all storms. This will thereby ensure that flood risk is not increased (required as per paragraph 163 of the National Planning Policy Framework).

68. The surface water systems to be used during the construction of the onshore cable works will comprise Option 2 in the SCC Construction Surface Water Management Plan Template i.e. install, use and remove a temporary surface water drainage system. Where works are undertaken in proximity to sensitive receptors (watercourses and built development) this construction drainage will also be specified and implemented in line with the Non-Statutory Technical Standards for Sustainable Drainage Systems (SuDS) attenuating flows to the Greenfield Runoff Rates for all event up to the 1 in 100 annual probability storm. Elsewhere (i.e. crossing agricultural fields remote from surface watercourses) construction drainage arrangements will be designed to accommodate and control flows to Greenfield Runoff Rates for all storm up to the 1 in 10 annual probability event. This lower standard reflects both the temporary nature of the works and the minimal consequences of an exceedance event in these areas (i.e. localised ponding in fields).

69. Where appropriate, the principles of SuDS will be applied in order for the surface water discharge from the construction works to mimic natural drainage as far as is practicable. The key principles that influence the planning and design process, therefore, comprise:

- Storing runoff and releasing it slowly (attenuation);
- Allowing water to soak into the ground (infiltration);
- Slowly transporting (conveying) water on the surface;
- Filtering out pollutants; and
- Allowing sediments to settle out by controlling the flow of the water.

70. Prior to undertaking the groundworks for any stage, a Preconstruction Water Management Plan will be developed and implemented to prepare the area of works and to prevent the contamination of both ground and surface water. The Preconstruction Water Management Plan will account for any existing land drainage, hydrological features, ground and surface water. Preconstruction drainage is an essential element in maintaining a suitable working area, reducing the potential for pooling water and preventing contaminated runoff into watercourses.

71. In addition, prior to commencing construction works, a Construction Water Management Plan will be prepared following the SCC Construction Surface Water Management Plan Template and this document will be agreed with MSDC and SCC. This Construction Water Management Plan will be implemented during the construction works and will set out the practical steps required to manage drainage. The catchment area(s) for the CCS, jointing bay and access and the watercourse to which the treated water will thereafter be discharged will be identified.

72. Without appropriate controls, the excavation works could provide alternative routes for surface water runoff to follow within the catchment. Drainage systems to be put in place will be designed to prevent any permanent alterations to existing drainage patterns

[3] For greenfield developments, the peak runoff rate from the development to any highway drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event should never exceed the peak greenfield runoff rate for the same event

[4] Where reasonably practicable, for greenfield development, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event should never exceed the greenfield runoff volume for the same event

and, at the same time, prevent contamination during temporary rerouting of natural runoff, during construction. The techniques used will be designed to discourage any long-term changes to surface and groundwater movements. Existing drainage systems encountered during excavation, along with natural flow paths, will be fully reinstated, wherever practicable, as the route is progressed (see Section 8.2).

73. As part of the enabling works, shallow ditches will be installed in parallel to and downslope of any excavations and soil bunds to intercept surface water run-off from actively worked / disturbed ground or unconsolidated storage areas. Sumps will be used to collect the runoff from where it can be directed, either by pump or gravity (depending on the topography of the working site), to a settlement basin or water treatment facility (e.g. Siltbuster® unit or similar), where suspended solids will be contained and removed, before the runoff is discharged to a watercourse at Greenfield Runoff Rates (see Section 9.1).

74. The Construction Water Management Plan will identify the location of temporary attenuation ponds of sufficient size for sediment to settle out. This water can be retained for use in construction activities requiring a supply of water such as dust suppression, taking into consideration RPS 235 (Treating and using water that contains concrete and silt at construction sites) and the need to ensure capacity is provided within the surface water drainage system to accommodate future rainfall events. The Construction Water Management Plan will also outline the preferred surface water management strategy and identify the actions, timescales and responsibilities of individuals. The Construction Water Management Plan will identify sensitive receptors at risk from water runoff and the mitigation to be installed.

75. Wherever practical, jointing bays will be backfilled with arisings, in the order they were originally present to minimise alterations to the drainage pattern once construction and restoration have been completed. The reinstatement materials placed within the jointing bay's floor and sides will be at least as erosion-resistant as the original bed material but where appropriate may also be formed from a low- permeability material (e.g. a 'clay plug') to ensure that no preferential drainage pathways are created). Existing ditches and field drains in close proximity to the jointing bay site will be maintained and kept free from potential obstruction.

8.4. Dewatering of Jointing Bay Excavations

76. Jointing bays are reasonably large excavations which often go to a depth below that of the ground water level and therefore can require dewatering. Generally water will be removed from the excavation through the use of a standard surface water pump.

77. The Water Abstraction and Impounding (Exemptions) Regulations 2017 state that no more than 50m^3/day is permitted to be dewatered if within 250m of a well used to supply water for lawful use or within 500m of a nature conservation site. If there is no (legal) well/spring/borehole or conservation site nearby then this can be increased to 100m^3/day. Abstraction under the Exemption conditions is to last less than 6 consecutive months. In the large majority of cases jointing bay excavations will be completed within a period of six months and a discharge rate of 100 m^3/d (or 50 m^3/d if within 500m of a conservation site or within 250m of a spring, well or borehole used to supply water) will be more than sufficient to keep the excavation dry. In the event that the excavation needs to be kept open and dry for a longer period, or higher rates of dewatering are required, either a separate permit for the works would be sought or works would be rescheduled for the summer when ground conditions are drier.

78. Where needed, sheet piles may be used to minimise groundwater ingress and/or well points may be installed around the excavation to abstract the water from the ground before it could enter the excavation. The requirement for well points/sheet piles will be identified prior to commencing the works using filtration rate data.

79. Where the quality of the water allows, the extracted water will be pumped via soakaways, settling tanks, sediment basins or mobile treatment facilities to remove sediment, before being discharged, if required, into local ditches or drains via temporary interceptor in line with either an approved permit or exemption for discharge to surface waters. Subject to water volumes and the implementation of sufficient measures to remove any suspended solids for example, small volumes of water may be pumped straight to a soakaway within the works area. This process will be implemented in order to prevent increases in fine sediment supply to the watercourses. Treatment of high pH water (due to the presence of Cement Bound Sand) is considered in Section 9.2.

80. It is recognised that the generators required to power the pumps used to dewater excavation can be a source of noise disturbance to nearby residential properties. Construction noise will be controlled in accordance with Best Practicable Means as set out in the Construction Noise and Vibration Management Scheme (EA3-LDC-CNS-REP-IBR-00012). This requires the use of low impact type generators fitted with lined and sealed acoustic covers.

8.5. Flood and Weather Alert

8.5.1. Flood Alert

81. A Flood Plan has been prepared for the construction works and included as Appendix 2 of the CoCP (EA3-LDC-CNS-REP-IBR-000065). The Principal Contractor will sign up to the Environment Agency's flood warning system and Met Office severe weather warning system. The Flood Plan sets out the actions and responsibilities for three trigger levels and the all clear as shown in Table 8-1. The contact details of the person(s) responsible for each of these actions (Flood Coordinator and Site Manager) will be submitted to stakeholders for their records prior to commencement of construction.

Table 8-1 Flood Evacuation Procedures

Warning Triggers	General Procedures	Specific Actions
Trigger Level 1	General actions include: • Communicate risk to all staff • Make sure you know who is on site • Take basic measures to prepare for flooding • Stay in a safe place with a means of escape. • Be ready should you need to evacuate.	• Place Staff on Green Alert • Check access and availability to, and condition of equipment: closed road signs, torches (check battery life/spares), high visibility jackets for all staff • Allow for handover should shift change occur before the warning is lowered • Check staff registers are complete and available to ensure all staff are accounted for post- evacuation Where trigger relates to rainfall, in addition to the actions above the Principal Contractor will: • Speak to construction teams and request implementation of active measures to reduce the mobilisation fo sediment and other pollutants in storm water runoff. This is likely to take the form of bringing forward basic housekeeping measures such a road sweeping and clearance of intercept ditches. • Reschedule (if reasonably possible and will not make situation worse) all engineering works which are liable to generate turbid runoff. This should include all earthworks. • Review active work programme and associated temporary drainage arrangements and confirm that these are all in place and functional. • Undertake survey of all active storm water drainage arrangements to check for damage, blockages or other problems which could impair their correct function and, in the event that deficiencies are identfied, action urgent remedial works.
Trigger Level 2	• Stay away from high risk areas • Turn off gas, electricity and water supplies if safe to do so. • Put flood protection equipment in place if safe to do so. • Cooperate with the emergency services. • Call 999 if you are in immediate danger. • Evacuate site in an orderly and controlled way.	• Stop active work on the site and communicate change in flood status to all staff. • If reasonably possible within a short timeframe (1hr) remove plant and equipment and relocate to elevated area that is away from potential flooding. • Place staff on Red Alert and begin evacuation of jointing bay compound/CCS (Trigger Fire Alarm) • Operate the emergency electrical shut off switches terminating the electricity supply and all power supplies to construction works

Warning Triggers	General Procedures	Specific Actions
		sites/compounds, but only if safe to do so. • Use allocated evacuation route to facilitate / direct the safe evacuation of all personnel to the agreed refuge location. • Take register to ensure all staff are accounted for. • Contact the Emergency Services and EA to confirm that the work sites are being closed due to the risk of flooding
Trigger Level 3	• Evacuate site as quickly as can be safely achieved. • Account for all personnel • Leave the area	• Immediately start evacuation of jointing bay compound and CCS if not actioned on receipt of the Flood Warning (Trigger Fire Alarm at compounds) • Use allocated evacuation route to facilitate / direct the safe evacuation of all personnel. • Take register to ensure all staff are accounted for • Contact the Emergency Services and EA to confirm that the jointing bay compound and/or CCS is being closed due to the risk of flooding.
All Clear	• Be careful. Flood water may still be around for several days. • If you've been flooded, ring your insurance company as soon as possible.	Where the preceeding event related to rainfall or resulted in flood water entering or passing through the site storm water management systems, the Principal Contractor will: • Undertake a survey of all active storm water drainage arrangements to check for damage, blockages or other problems resulting from the storm / flood. • Remedial works should be urgently undertaken on deficient drainage equipment. • Signficant pollution of any surface waterbody should be reported to the Environment Agency.

9. MITIGATION MEASURES

82. The most common pollutants present in water from a construction site are:

- Sediment (as suspended solids).
- Concrete and cementitious products.
- Hydrocarbons, such as fuel oils and lubricants.
- Pollutants arising from mobilisation of existing contaminated land or groundwater.
- Organic waste (sewage and effluent from welfare facilities).

9.1. Sediment

83. Contamination of surface water runoff is the highest potential risk of pollution during the construction works at Paper Mil Lane. The main source of contamination of the surface water runoff will be sediment. Sediment includes all suspended solids mobilised by the exposure of stored and stripped area of soils to rainfall and are picked up as the surface or groundwater on site flows through, or over, the soil. The impact of excessive amounts of suspended material in a receiving watercourse can have a significant negative impact on the ecology of the stream, smothering the natural fauna and flora.

84. The construction work will be designed to minimise the production of runoff containing elevated levels of suspended solids. The design for achieving this will be refined depending on the local requirements.

85. The measures used for minimising the generation of sediment laden runoff will include a combination of the following measures, with the precise solution varying depending upon the nature and location of the works:-

- On-site retention of sediment will be maximised by routing all drainage through the site drainage systems. Additionally, where required, soil bunds will be created along the edge of the working area to contain any overland flow paths and prevent sediment from being washed outside the working area.
- Containment of heavily silt laden water as near as possible to the source (e.g. silt fencing along toe of soil storage piles or other affected points, addition of filter bags on pump outlets). Additional silt fences will be included in parts of the working area that are in proximity to surface drainage channels to manage water flow and encourage silt settlement.
- Diversion of clean water away from working areas to reduce volumes of dirty water generation. Where significant surface flows are considered possible this will involve the installation of drainage ditches (to divert flows around construction) upgradient of the soil storage areas, running parallel to the trenches and bunds to intercept water that otherwise may flow either into work areas from off-site.
- Appropriate silt traps would be proactively installed where their use is deemed effective to minimise sediment build up within basins or ditches.
- Temporary haul road/access tracks constructed with clean road stone material preventing excessive ground damage from vehicles. Haul road/access tracks to have drainage ditches on either side and also under-track drainage, where necessary and in accordance with the drainage requirements.
- Avoidance of excessive vehicle or plant tracking directly over topsoil stripped areas and the setting of vehicular speeds to minimise soil dispersal. Use of trackmat, or similar, where temporary off road access is required for excavator or other plant.
- Soil stored locally to excavation to minimise handling and exposure. Soil to be bunded and sealed when stored for prolonged periods in order to shed rainfall and reduce silt laden runoff.
- Covering or seeding of stored topsoil bunds at first opportunity, to reduce surface erosion.
- Strips of undisturbed vegetation will be retained on the edge of the working area where possible.
- Once the topsoil strip has occurred, the construction material will be installed as soon as possible to reduce the area and duration of the exposure to rainfall scour and also ensure the existing drainage patterns are interrupted for the shortest duration possible.
- CCS will generally comprise a permeable crushed stone or aggregate surface laid on a geotextile membrane which will allow direct infiltration of rainfall run-off at the same time as trapping and filtering any sediment and contaminates. Where hard surfacing is considered for utilisation in potentially high risk areas of the construction compound, positive surface water collection systems for the management of rainfall-run-off to prevent the pollution of ground water will be considered where appropriate.
- Early consideration will be given to the types of activities undertaken and materials stored in the laydown area. Any high pollution risk areas will be considered at the outset of the strategy and activities and storage of material in these areas would be restricted.
- All excavated soils will be stored at least 10m from the top of the bank of any watercourse and any potentially contaminated soil will be stored on an impermeable surface and covered to reduce leachate generation and potential migration to surface waters. Procedures for dealing with unexpected contaminated materials are included in Section 11 of the CoCP (EA3-LDC-CNS-REP-IBR-000061).
- Traffic movement would be restricted to minimise the potential for surface disturbance.
- Where systems require a discharge, these will be subject to consultation and in accordance with Environment Agency requirements. Waste silts and sludges will be removed in accordance with Duty of Care requirements.
- The minimisation of excavation volumes and disturbance to the surrounding areas, together with the replacement and reseeding, as required, of any soils inadvertently disturbed during excavations in general accordance with their original structure and location.

- The length of time excavations are kept open will be minimised to reduce the requirement for dewatering; any localised dewatering will have appropriate treatment and disposal applied before being discharged.
- The CCS access will have a wheel wash facility installed to prevent construction vehicles and plant carrying mud off site onto public roads. This will be a closed loop facility with self-contained water and silt collection systems. Collected silts/sludge will be regularly removed and the water topped up to retain function of the wheel wash. Its use, operation and maintenance will be monitored on site. Regular road-sweeping on the highway will also be undertaken to prevent sediment being washed into nearby watercourses.

86. Ideally the programming of the works will be timed to limit exposure of the subsoil to the most inclement weather, reducing excessive erosion and the generation of suspended solids in the runoff. It will not however be possible to prevent this impact at all times, so appropriate mitigation measures will be in place, as and where appropriate to manage any resultant runoff generated.

87. When removing and working with topsoil or otherwise undertaking major earthworks some disturbance of sediment and generation of sediment laden runoff is inevitable even given the implementation of the control measures outlined above. The exposed subsoil is liable to both surface erosion and erosion via existing land drains, which can lead to silt contaminated water drainage/run-off entering local watercourses.

88. To manage this any potential for the generation of silt laden runoff will be identified and measures put in place to capture and hold these flows upstream of local discharge points. Suitable pollution control measures will then be put in place to ensure all captured flows are treated to a level that can be considered as uncontaminated prior to discharge. If necessary this will involve the use of a Siltbuster® or similar water treatment units. Areas for holding and controlling storm flows will be designed to both assist in the removal of sediment through settlement and in holding and attenuating any excess runoff from compacted ground or areas where vegetation has been removed. Discharge rates from these construction areas will therefore be limited to Greenfield Runoff Rates.

89. To establish the best method of treatment for any particular location, local characteristics including the topography, geology and drainage pathways through the area will be reviewed. Based on this one or a combination of the following options will be employed:

- Pumped to run across flat grassland (grass swathe), discharge to soakaway or an infiltration basin.
- Pumped or drained to an adequately sized settlement lagoon or tank.
- Pass through a silt trap or filtration system.
- Installation of specialist treatment equipment, such as an interceptor or solids separator (e.g. Siltbuster® unit).
- Pumped into a tanker for disposal at a licenced facility or by holding and transferring water to disposal via any of the treatment methods identified above.

9.2. Concrete and Cementitious Products

90. Cement, concrete and grouts are highly alkaline and corrosive and can cause serious pollution to the ground and watercourses. Concrete and cementitious products will, therefore, be prevented from entering the water at source. The construction works will require the delivery of ready mixed concrete for use, for example for use in the jointing bay. Cement polluted water will be generated from concrete washout, concreting operations and any cement grouting. The extent and location of the treatment facilities to be provided will depend on the frequency and volume of washout and the availability on site.

91. Concrete and cement mixing and washing areas will be situated at least 10m away from the nearest watercourse. These will incorporate settlement and recirculation systems to allow water to be re-used. All washing out of equipment will be undertaken in a contained area.

92. Where a suitable sewer exists, and subject to an appropriate trade effluent consent from the sewerage undertaker, any excess water contaminated with cement would be treated and discharged to sewer. The treatment provided will remove suspended solids in the effluent, using lined settlement basins, enclosed skips or proprietary treatment equipment (Siltbuster® or similar) and will include pH adjustment to an acceptable range. In accordance with, Regulatory Position Statement 235, water that contains concrete will not be discharged to a watercourse or soakaway, even after treatment. If no suitable sewer exists such excess water would be tankered from the site for treatment and disposal at an appropriately licenced facility. Any accumulated solid cement wastes would be removed, in accordance with the Contractor's waste Duty of Care and the requirements of the Site Waste Management Plan (included as Appendix 6 of the CoCP), if necessary, to an appropriately licenced facility for disposal.

93. Dry mix concrete will not be laid in saturated conditions to minimise the potential for leaching of alkaline water. If required in saturated areas the excavation will be dewatered for a sufficient time to lay and set all concrete. Wet mix pouring will be subject to rigorous controls (shuttering, stand offs, bunding etc) to prevent discharge of cementitious material into drainage features and watercourses. Where practicable and design allows, the Principal Contractor may utilise a pre cast solution during construction to mitigate any of the concerns with pouring wet concrete.

94. Cement bound sand (CBS) was installed directly around the underground cable ducts and jointing bays during the EA ONE works. Groundwater may travel along the CBS, with potential ingress into the cable ducts. Water from the ducts/CBS may then discharge into the jointing bays during excavation and this is likely to continue throughout the period of time that the jointing bays remain open. When water comes in contact with CBS, the pH can rise to pH 12 or greater because of the release of alkaline hydroxide (OH^-) ions and this water will therefore require treatment before discharge. This water will be treated (Siltbuster® or similar) on site before disposal or will be removed to an appropriately licenced offsite treatment facility.

95. Discharge of treated concrete wash water and also treated water from jointing bay excavations may require an Environmental Permit from the Environment Agency.

9.3. Fuel Oils and Lubricants

96. Fuel oils, lubricants and other chemicals will be prevented from entering any drain or watercourse on site. There will always be the potential for a small amount of loss of fuel oils, and lubricants on a construction site from the use of plant and equipment and the storage and refuelling locations. However, with the proper management procedures in place, this risk will be minimised and effectively controlled, using best practice.

97. Each task undertaken on site will be subject to the approval of a detailed method statement and risk assessment, which will help to minimise any unacceptable risk of the loss of this type of material. An integral part of the risk assessment also requires the contractor to describe how they will prevent spillage or loss (e.g. refuelling procedures, storage and handling arrangements, and maintenance of plant) and how they will deal with an unexpected loss or spillage and confirm they have the knowledge and capability to do so. The prevention of loss or containment and removal of spilt or lost oil products will include one or more of the following;

- Oil, water and silt separators will be used where applicable on construction compound surface water management systems just prior to any outfall from site, to remove oils and fuels accidentally spilled/accumulated during construction. These will be maintained in accordance with the manufacturer's instructions to ensure they remain efficient. This level of capture and treatment will be applicable to main refuelling areas in the CCS where bulk storage will be contained.
- All fuels, oils, lubricants and other chemicals will be stored in an impermeable bund with at least 110% of the stored capacity. Any facilities installed shall be in accordance with the Control of Pollution (Oil Storage) (England) Regulations 2001. Facilities storing hazardous materials will be locked and made secure when not in use. Damaged containers will be removed from site. A register of fuel volumes stored on each site will be maintained.
- All refuelling will take place in a dedicated impermeable area, using a bunded bowser.
- Fuel storage and refuelling will be a minimum of 30m from watercourses.
- Use of oil-absorbent materials to absorb and remove small quantities of oil and provide ready access to the same oil-absorbent materials for use in emergency spillage clean-up.
- Use of drip trays or plant "nappy" pads under plant and equipment when static and during refuelling.
- Safe storage and handling procedures.
- Regular inspection and maintenance procedure for plant and equipment and storage facilities. All oil/fuel bunds should be monitored on a daily basis to ensure that any rainwater that has collected is removed.
- Any contaminated rainwater in the bunds may need to be removed as hazardous waste.
- Removal and suitable licenced disposal of ground accidentally contaminated.
- Biodegradable oils will be used where possible.

9.4. Contaminated Land

98. Excavations through ground in locations that have been subject to previous contamination can result in pollutants, including total and soluble heavy metals, being transferred to the surface water and groundwater. This water can subsequently collect in open excavations during construction and, in some situations, this can present a problem for the discharge of this type of water offsite. Section 11 of the CoCP (EA3-LDC-CNS-REP-IBR-000065) summarises the approach to the encountering of unknown contaminated land.

9.5. Sewage and Organic Waste

99. Whilst it is preferable for sewage generated by site welfare units to be disposed of to a foul sewer, there are currently no foul sewers available at the Paper Mill Line Works site. Sewage and other foul water from welfare and accommodation units will therefore be discharged to sealed tanks. From these tanks it will be routinely collected by tanker, for disposal at a licenced facility by a suitably licensed and registered waste carrier in accordance with Duty of Care requirements, with details and records maintained in accordance with the Site Waste Management Plan (Appendix 6 of the CoCP (EA3-LDC-CNS-REP-IBR-00028).

10. DISPOSAL OPTIONS AND TEMPORARY OUTFALLS

100. An Environmental Permit is usually required to discharge liquid or waste water (poisonous, noxious or polluting matter, waste matter, or trade or sewage effluent) into surface water, e.g. rivers, streams, estuaries. However, for the temporary discharge of uncontaminated water comprised of runoff from construction activities and excavations to surface water (e.g. pumping clean water out of excavations) a permit is not required, provided the discharge is made in full compliance with the Environment Agency's Regulatory Position Statement (RPS). Under the following circumstances, the Environment Agency considers such a discharge to be low risk and have therefore issued a RPS to provide the appropriate level of control.

101. The RPS guidance 'Temporary dewatering from excavations to surface water, April 2021' covers the discharge of uncontaminated water from excavations and is applicable; provided the discharge complies with all of the following conditions, the discharge must:

- Be temporary and last less than 3 consecutive months (applicable to any one location).
- Be made to a surface water (river, stream or to the sea).
- Not pollute surface water or adversely affect aquatic life, or designated sites or species.
- Not result in the spread of non-native invasive species, parasites or disease.
- Not cause flooding from surface water.
- Not cause erosion of the banks or bed of surface water.
- Not contain any chemical dosing agents or treated or untreated concrete / cementitious washout water.
- Have a method statement that outlines the task and minimises the risk of pollution.

102. There are restrictions to this exemption that will be adhered to when deciding locations that are suitable for discharge from the onshore construction works.

103. No discharge must be located within, or less than 500m upstream of:

- Sites of Special Scientific Interest (SSSI);
- Special Areas of Conservation (SAC);
- Special Protection Areas (SPA);
- Sites in process to become SACs or SPAs ('candidate SACs', 'possible SACs', 'potential SPAs' and 'sites of community importance (SCIs);
- Internationally designated Ramsar sites;
- Other nature conservation sites, (e.g. ancient woodlands, Local and National Nature Reserves); or
- Local wildlife sites (i.e. sites with high local value for wildlife.

104. The RPS guidance 'Treating and using water that contains concrete and silt at construction sites: RPS 235' also includes criteria with respect to storing and treating water containing concrete or silt , including the following prohibitions:

- Storage of more than 30m^3 of water containing concrete or silt at any time in any single location on the construction site
- Carrying out of activities associated with treating or using water that contains concrete or silt within 10m of any watercourse
- Carrying out of activities associated with treating or using water that contains concrete or silt within less than 50m of:
    - SSSIs
    - SACs
    - SPAs
    - candidate SACs, possible SACs, potential SPAs and sites of community importance
    - Ramsar sites
    - other nature conservation sites, such as ancient woodlands and local and national nature reserves

- local wildlife sites
- Use of any water that contains concrete to suppress dust
- Use of more water than necessary to suppress dust
- Use of treated waste water to suppress dust within a groundwater source protection zone, or within 50m of a private drinking water supply
- Use of water from excavations at sites contaminated by oil, metals, hydrocarbons, solvents, pesticides or other polluting substances.

105. A review of the Natural England Magic Map webpage indicates that there are no water dependent ecological sites within a 500m radius of the site. There are two ecological sites within a 2km radius of the site, as detailed below in Appendix 1. Neither of these sites are considered likely to be hydraulically connected to the site.

106. Environmental briefings will be provided all contractors, as part of the site induction and training process. Any particularly important or sensitive sites will be highlighted in pre-construction briefings and tool box talks that will be delivered to those involved in the works.

11. ABSTRACTIONS AND PRIVATE WATER SUPPLIES

107. Figure 3 shows the locations of all current abstraction licences, domestic abstractions and protected rights within 250m of the Paper Mill Lane Works.

11.1. Abstractions

108. No abstraction of water will be undertaken for consumptive use, either for potable use or for use during site activities, such as concrete batching or washing. Potentially in some situations, dewatering of excavations, may require permitting. Where these abstractions are temporary (less than 6 months) a permit would be sought if the maximum daily abstraction volume is likely to exceeded 100m^3 (or 50m^3 in locations less than 500m from a designated nature conservation site, or 250m or less from a spring, well or borehole used to supply water). Where these abstractions are not temporary (greater than 6 months) a permit would be sought if the maximum daily abstraction volume is likely to exceed 20m^3. The Principal Contractor will be responsible for obtaining from the Environment Agency any permits and for monitoring and recording associated abstraction rates or other license requirements to demonstrate compliance.

109. Where required however, surface water run-off will be retained for use. This will only occur where runoff from the land is stored isolated from inland waters (i.e. streams, ditches, lakes etc) and groundwater and which can therefore be classified as harvested rainwater under the definition within the Environment Agency's 'Rainwater harvesting: Regulatory Position Statement'. Such usage would not require an abstraction licence.

110. In the event that abstracted water is required for potable supply, this will be undertaken in consultation with the Environmental Protection Team of MSDC to facilitate compliance with the Private Water Supplies Regulations 2016.

111. All existing abstractions will continue to be identified prior to construction, and the protection of any potentially affected water supplies will be maintained during construction works. Standard mitigation, where required, will include the development and application of risk management measures, pre and post-construction monitoring surveys of any particularly sensitive water supply (in liaison with the Local Authorities), and the preparation of alternative contingency supply arrangements.

11.2. Protection of Private Water Supplies

112. There are no licensed or private surface water or groundwater abstractions within the site boundary. There is a licensed borehole abstraction point c.30m north of the site and a private abstraction is located c.30m outside the site's southern boundary, adjacent to Mockbeggars Hall. No details of this private abstraction are available, although given the lack of any hydrological features in the vicinity of Mockbeggars Hall, it is assumed that this will be a groundwater abstraction, most likely from the Chalk.

113. A Hydrogeological Risk Assessment has been prepared and is included as Appendix 1. The assessment indicates that as the works involve only shallow excavations, well above the regional groundwater table, the potential impact on groundwater levels and flow is negligible. The works will be undertaken in accordance with relevant mitigation which will have been agreed with the Environment Agency, SCC and MSDC and with appropriate best practice, which will ensure that there is no adverse impact on groundwater quality and in turn no impact on surface water quality.

114. Baseline water quality sampling will be undertaken with the permission of the landowners and following consultation with MSDC. Sampling may be undertaken throughout the works to ensure no negative impacts occur. Sampling results will be provided to MSDC subject to landowner permission.

115. Landowners or users of private water supplies or abstractions will be provided with a suitable point of contact through the establishment of a Communications Protocol, should they experience any problems with their Private Water Supply. All complaints will be investigated thoroughly, following the Project Community and Public Relations Procedure. Regular progress updates will be provided to inform residents when works are likely to be undertaken in their Private Water Supply catchment area.

116. An Emergency Plan shall be put in place to ensure prompt response to any complaint of perceived impact on private water supplies, including monitoring of the water supply in question and the immediate cessation of associated water-sensitive construction activities. IIn the unlikely event that construction works lead to the temporary deterioration of a Private Water Supply, an alternative temporary supply of water will be provided (e.g. water tankered to property and/or provision of temporary drinking water storage tanks). Damaged filters will be replaced in the unlikely event that a Private Water Supply becomes contaminated with sediments.

117. Mitigation and environmental controls will be put in place, as discussed in previous sections, to apply construction best practices and to follow the Environment Agency water pollution control guidelines to protect all aspects of water quality.

118. A Pollution Prevention and Emergency Incident Response Plan (Appendix 7 of the CoCP) will be in place to ensure there will be a prompt and effective response to any complaint that may have a perceived impact on any identified private water supplies, including the immediate cessation of associated water-sensitive construction activities.

119. During the construction phase, measures will be adopted by the Principal Contractor to prevent suspended silts from being carried into existing watercourses. These measures will be based on construction best practice and guidance provided by the Environment Agency and the Construction Industry Research and Information Association (CIRIA) (as set out in Section 9.1).

12. MONITORING AND REPORTING

12.1. Monitoring

120. The implementation and application of the appropriate mitigation measures for the protection of surface or ground water quality, described above, will be monitored by the EnvCoW, throughout the construction phase. If any non-conformity with any of the mitigation measures is identified, it will be recorded during inspection or a site audit and appropriate remedial actions will be implemented. A record of inspections of mitigation measures and any required maintenance will be maintained. Monitoring to include, but not be limited to, noting evidence of silt ingress, bank condition, and pH monitoring.

121. Site location and water sensitivity will be taken into account when determining the appropriate level and frequency of any sampling. Regular site inspections and in field water quality monitoring and assessment will however be undertaken throughout the construction period. The contractor carrying out the construction activities will be responsible for the management and control of all surface water and any other water arising from the activity. Visual checks on water quality will be the most frequent to determine any localised impacts, or to highlight any potential for water quality risks. Inspection findings and site check analysis will be recorded and reported back through construction site management.

12.2. Reporting

122. A baseline water quality report was prepared for the ES, using the data collected in the baseline water quality monitoring programme. This provides details of any contamination concentrations recorded and will be used to describe the “background pollution levels” for the various locations. The results were compared to the most relevant Environmental Quality Standards appropriate and to assess the status according to the Water Framework Directive.

123. Any apparent environmental deterioration observed will be highlighted through ongoing checks and monitoring of water quality. In the event of a pollution incident or suspected deterioration, the incident will be immediately reported to the Environment Agency’s 24/7 incident hotline and also MSDC. Relevant monitoring points will be sampled to determine any impacts, in particular any relative to baseline data. A report detailing the findings will be prepared for any incident and recommendations provided for further monitoring and / or requisite mitigation measures.

124. All information recovered during the monitoring process will be collated and a routine assessment made regarding any impact to be reported on the surface and groundwater of the construction activities.

12.3. Personnel

125. All personnel taking samples or analysing and reporting water quality in the field will be suitably qualified. All laboratory analysis will be carried out using a suitably accredited laboratory including written analysis.

13. REFERENCES

BGS Geology Viewer, accessed at: https://mapapps.bgs.ac.uk/geologyofbritain/home.html

CIRIA, 2001, *C532 Control of Water Pollution from Construction Sites*, London: CIRIA

CIRIA, 2002, *SP156 - Control of water pollution from construction sites - guide to good practice*

CIRIA, 2006, *C648 Control of Water Pollution from Linear Construction Projects – Technical Guidance*

CIRIA, 2006, *C649 Control of Water Pollution from Linear Construction Projects – Site Guide*

CIRIA, 2015, *C741D Environmental Good Practice on Site (fourth edition)*, London: CIRIA

CIRIA, 2015, *C753 SuDs Manual*, London: CIRIA

CIRIA, 2016, C762 Environmental Good Practice on Site pocket book (4th Edition), London: CIRIA

Council of the European Union, 2000, *The Water Framework Directive 2000/60/EC*. Available at: https://eur-lex.europa.eu/ [accessed 17/12/2020]

Council of the European Union, 2006, *The Groundwater Directive 2006/118/EC*. Available at: https://eur-lex.europa.eu/ [accessed 17/12/2020]

Council of the European Union, 2007, *The Floods Directive (2007/60/EC,* Available at: https://eur-lex.europa.eu/ [accessed 17/12/2020]

Department for Environment, Food and Rural Affairs (Defra), 2015, Sustainable Drainage Systems - Non-statutory technical standards for sustainable drainage systems

Defra and Environment Agency, *Pollution Prevention for Business*, May 2019 https://www.gov.uk/guidance/pollution-prevention-for-businesses

DEFRA Magic Mapping Application, accessed at: https://magic.defra.gov.uk/MagicMap.aspx

Environment Agency, 2001, *Pollution Prevention Guidelines 1: General Guide to the Prevention of Water Pollution (withdrawn),* Bristol, Environment Agency.

Environment Agency, 2006a, *Pollution Prevention Guidelines 3: Use and Design of Oil Separators in Surface Water Systems (withdrawn),* Available at: https://www.gov.uk/government/publications/choosing-and-using-oil-separators-ppg3-prevent-pollution [accessed 17/12/2020]

Environment Agency, 2006b, *Pollution Prevention Guidelines 4: Treatment and disposal of sewage where no foul sewer is available (withdrawn),* Available at: https://www.gov.uk/government/publications/sewage-treatment-and-disposal-where-there-is-no-foul-sewer-ppg4 [accessed 17/12/2020]

Environment Agency 2007, *Pollution Prevention Guidelines 5: Works in, or liable to affect Watercourses (withdrawn),* Available at: https://www.gov.uk/government/publications/works-in-near-or-over-watercourses-ppg5-prevent-pollution [accessed 17/12/2020]

Environment Agency, 2020, *Treating and using water that contains concrete and silt at construction sites RPS 235, Available at: https://www.gov.uk/government/publications/treating-and-using-water-that-contains-concrete-and-silt-at-construction-sites-rps-235 [accessed 17/12/2020]*

Environment Agency 2018a, updated 2020, *Temporary dewatering from excavations to surface water, Available at: https://www.gov.uk/government/publications/temporary-dewatering-from-excavations-to-surface-water [accessed 17/12/2020]*

Environment Agency, 2018b, *The Environment Agency's approach to groundwater protection (Version 1.2)*, Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/692989/Envirnment-Agency-approach-to-groundwater-protection.pdf [accessed 17/12/2020]

Flood Estimation Handbook Service. Accessed at: https://fehweb.ceh.ac.uk/GB/map

Highways England, 2020, *Design Manual for Roads and Bridges, CD 529 Design of outfall and culvert details (formerly HA 107/04), Revision 1, Available at: https://www.standardsforhighways.co.uk/prod/attachments/a7bfb30c-d084-4b28-b8d7-39dc4d14f5c0?inline=true [accessed 17/12/2020]*

Highways England, 2020, *Design Manual for Roads and Bridges, CD 522 Drainage of runoff from natural catchments (formerly HA 106/04), Revision 0, Available at: https://www.standardsforhighways.co.uk/prod/attachments/09c28187-371e-4180-8373-939f48607c01?inline=true [accessed 17/12/2020]*

Mid Suffolk District Council, 2008, *Strategic Flood Risk Assessment*. Available at: https://www.midsuffolk.gov.uk/assets/Strategic-Planning/Mid-Suffolk-SFRA/MidSuffolkSFRAFinal.pdf [accessed 17/12/2020]

Ministry of Housing, Communities and Local Government, *NPFF - National Planning Policy Framework,* 2021, Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2 [accessed 28/10/2020]

Suffolk County Council, 2018, *Suffolk Flood Risk Management Strategy, Appendix A: Sustainable Drainage Systems (SuDS) a Local Design Guide,* Available at: www.greensuffolk.org/assets/Greenest-County/Water--Coast/Suffolk-Flood-Partnership/2018-Strategy-Documents/2018-10-01-SFRMS-SuDS-Guidance-Appendix-A-.pdf [accessed 17/12/2020]

Suffolk County Council, undated, *Suffolk SuDS Palette (SPP) – Guidance*, Available at: https://www.suffolk.gov.uk/assets/Roads-and-transport/Flooding-and-drainage/Suffolk-Suds-Palette-002.pdf [accessed 17/12/2020]

Scott Wilson on behalf of Suffolk Coastal District Council (now ESC), 2008, *Suffolk Coastal and Waveney District, Strategic Flood Risk Assessment, Main Report*, February 2008

Scott Wilson on behalf of Suffolk Coastal District Council (now ESC), 2009, *Suffolk Coastal and Waveney District Strategic Flood Risk Assessment, Appendix B – Suffolk Coastal District Council Report* January 2009

Suffolk County Council, 2018, Template for Construction Surface Water Management Plans, August 2018 https://www.suffolk.gov.uk/roads-and-transport/flooding-and-drainage/guidance-on-development-and-flood-risk/construction-surface-water-management-plan/

The British Standards Institution, 2017, amended 2019, *BS 752:2017 Design of Drainage and Sewer Systems outside Buildings*, London, BSI.

The British Standards Institution, 2002, *BS EN 858-1:2002 Separator Systems for Light Liquids (e.g. Oil & Petrol),* London, BSI.

The British Standards Institution, 2000, *BS EN 12056-3:2000 Gravity Drainage Systems Inside Buildings,* London, BSI.

The Environment Act 1995 c.25. Available at: https://www.legislation.gov.uk/ukpga/1995/25/contents [accessed 17/12/2020]

The Environmental Permitting (England and Wales) Regulations 2016 (SI 2016/1154). Available at: https://www.legislation.gov.uk/uksi/2016/1154/contents/made [accessed 17/12/2020]

The Flood and Water Management Act 2010. Available at: https://www.legislation.gov.uk/ukpga/2010/29/contents [accessed 17/12/2020]

The Groundwater (England and Wales) Regulations 2009 (SI 2009/2902). Available at: https://www.legislation.gov.uk/uksi/2009/2902/contents/made [accessed 17/12/2020]

The Land Drainage Act 1991 c25. Available at: https://www.legislation.gov.uk/ukpga/1991/59/contents [accessed 17/12/2020]

The Land Drainage Act 1994 c. 59. Available at: https://www.legislation.gov.uk/ukpga/1994/25/contents [accessed 17/12/2020]

The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (SI 2017/407). Available at: https://www.legislation.gov.uk/uksi/2017/407/contents/made [accessed 17/12/2020]

APPENDIX 1 PAPER MILL LANE HYDROGEOLOGICAL RISK ASSESSMENT

Paper Mill Lane Works

Hydrogeological Risk Assessment

(Appendix 1 of the Surface and Foul Water Drainage Management Plan)

(Applicable to Work Numbers 39 and 40)

Revision Summary				
Rev	**Date**	**Prepared by**	**Checked by**	**Approved by**
1	12/01/22	Stephen Muggeridge	Phil Rew-Williamson	Gareth Mills
2	19/04/22	Kay Griffin	Phil Rew-Williamson	Gareth Mills

Description of Revisions			
Rev	**Page**	**Section**	**Description**
1	ALL	ALL	New document
2	ALL	ALL	Amendment of Commencement Works‘ to Works Minor changes to site layouts‘

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FIGURES

1. INTRODUCTION AND SCOPE

1.1. Development History

1. East Anglia Three Limited (EATL) was awarded a Development Consent Order (DCO) by the Secretary of State, Department of Business, Energy and Industrial Strategy (DBEIS) on 7 August 2017 for the East Anglia THREE Offshore Windfarm (EA THREE). The DCO granted consent for the development of a 1,200MW offshore windfarm and associated infrastructure and is live until 28 August 2022. The DCO has now been subject to three non-material variations:

- In March 2019 EATL submitted a non-material change application to DBEIS to amend the consent to increase the maximum generating capacity from 1,200MW to 1,400MW and to limit the maximum number of gravity base foundations to 100. In June 2019 DBEIS authorised the proposed change application and issued an Amendments Order.
- In July 2020 EATL submitted a second non-material change application to DBEIS to amend the parameters of its offshore substations (reducing the number of these to one) and wind turbines (a decrease in the number of turbines and an increase in their hub height and rotor radius). On 15 April 2021 DBEIS authorised this proposed change application and issued an Amendments Order.
- In August 2021 EATL submitted a third non-material change application to DBEIS to amend the consent to remove the maximum generating capacity of 1,400MW and to amend the parameters of its wind turbines (a decrease in the number of turbines and an increase in their hub height and rotor radius). The application is currently in the consultation phase.

2. The onshore construction works associated with EA THREE will have a capacity of 1,400MW and transmission connection of 1,320MW. The construction works will be spread across a 37km corridor between the Suffolk coast at Bawdsey and the converter station at Bramford, passing the northern side of Ipswich. As a result of the strategic approach taken, the cables will be pulled through pre-installed ducts laid during the onshore works for East Anglia ONE Offshore Windfarm (EA ONE), thereby substantially reducing the impacts of connecting to the National Grid (NG) at the same location. The infrastructure to be installed for EA THREE, therefore, comprises:

- The landfall site with one associated transition bay location with two transition bays containing the connection between the offshore and onshore cables;
- Two onshore electrical cables (single core);
- Up to 62 jointing bay locations each with up to two jointing bays;
- One onshore converter station, adjacent to the EA ONE Substation;
- Three cables to link the converter station to the National Grid Bramford Substation;
- Up to three onshore fibre optic cables; and
- Landscaping and tree planting around the onshore converter station location.

1.2. Project Overview

3. SLR Consulting Ltd (SLR) has been appointed by East Anglia Three Limited (EATL) to provide a Hydrogeological Risk Assessment (HRA) for the Paper Mill Lane Works for the EA THREE onshore construction works. The works in this stage comprise Work Numbers 50 and 51.

4. The Environment Agency (EA) have requested that an HRA is undertaken wherever there is a potential receptor which could be impacted by the development, they have not provided specific guidance, however draft pre-commencement requirements for EA ONE North and EA TWO Offshore Windfarms have requested that an HRA is completed prior to commencement of any construction activity:

- *That could cause changes to aquifer flow or affect water quality within 500m of any groundwater dependent habitats within ecological sites;*
- *That require excavations below 1m within 250m of boreholes or springs;*
- *Within 250m of a groundwater abstraction*

5. An initial scoping exercise has therefore been completed based on these same search radii on the Paper Mill Lane site, as presented on Figures 4 and 5. These present the locations of all ecological sites, groundwater abstractions and groundwater source protection zones within a 500m radius of the site. The figures indicate that the site is located within groundwater Source Protection Zone 3 (Total Catchment) and there are both private and licensed groundwater abstractions within 250m of the site.

6. As shown on the plan in Appendix 1 and set out in Section 3 of the Surface and Foul Water Drainage Management Plan, the infrastructure within the Paper Mill Lane Works will comprise:

- Paper Mill Lane Primary Construction Consolidation Site (PCCS);
- Jointing Bay 4;
- Access on the eastern side of the public road (Paper Mill Lane) and the access track/haul road required to access the PCCS and jointing bay and additional trackway to access an HDD excavation pit in Work No 49; and
- Access on the western side of Paper Mill Lane and the trackway required to access an HDD excavation pit in Work No. 52.

1.3. Purpose and Scope

7. This Hydrogeological Risk Assessment has been prepared as an appendix to the Surface and Foul Water Drainage Management Plan for Paper Mill Lane Works and includes a desktop review of the site's baseline geology, hydrogeology and hydrology in order to develop a conceptual site model (CSM). This CSM is then used to assess the potential impact of the works on identified hydrogeological or hydrological receptors and to outline any mitigation which will be required to ensure the works do not adversely impact identified receptors.

2. ABBREVIATIONS

BEIS	Business, Energy and Industrial Strategy
BGS	British Geological Survey
CEMP	Contractor Environmental Management Plan
CSM	Conceptual Site Model
DCO	Development Consent Order
Defra	Department for Environment, Food and Rural Affairs
EA	Environment Agency
EA THREE	East Anglia Three Offshore Windfarm
EATL	East Anglia Three Limited
GPP	Guidance for Pollution Prevention
HRA	Hydrogeological Risk Assessment
HIA	Hydrogeological Impact Assessment
MSDC	Mid Suffolk District Council
NG	National Grid
NGR	National Grid Reference
PPG	Pollution Prevention Guidance
PCCS	Paper Mill Lane Primary Construction Consolidation Site
SCC	Suffolk County Council
SPZ	Groundwater Source Protection Zone

3. METHODOLOGY

8. This HRA has been developed in accordance with relevant EA guidance on completion of groundwater risk assessments[1] and Hydrogeological Impact Appraisals (HIA)[2] and includes the following stages:

- Section 5 provides a baseline assessment of the site. This includes a summary of the site geology and hydrogeology including information on ground conditions, groundwater levels and flows, groundwater quality and the location of potential receptors which could be impacted as a result of construction activities at the site. Finally, a CSM of the current hydrogeological regime is provided.
- Section 6 provides an assessment of the potential impact that the works could have upon the identified receptors and regional hydrogeology and hydrology. Appropriate mitigation measures are outlined where required.
- Section 7 provides a summary of the overall impact that the works could have upon the local hydrogeology and any identified receptors.

9. A qualitative risk assessment methodology has been used to assess the potential significance of impact associated with the development works. Two factors are considered using this approach: the sensitivity of the receiving environment and the magnitude of any potential impact. This approach provides a mechanism for identifying where additional mitigation measures are potentially required to reduce the risk to groundwater or surface water receptors.

4. SOURCES OF INFORMATION

10. The following sources of information have been consulted to characterise the geology, hydrogeology and hydrology of the area within and surrounding the site:

- British Geological Survey (BGS) online maps (https://www.bgs.ac.uk/map-viewers/geoindex-onshore/) for details of geology and borehole logs;
- Hydrogeological map of Southern East Anglia, sourced from the BGS website (https://largeimages.bgs.ac.uk/iip/hydromaps.html?id=southern-east-anglia.jp2);
- National Soils Resource Institute Website for details on soils (https://www.landis.org.uk/soilscapes/);
- Defra Magic Map Website (https://magic.defra.gov.uk/) for details on groundwater classifications, source protection zones and groundwater and surface water dependent designated ecological sites;
- Groundwater and surface water quality and status as presented in the EA catchment planning datasets (https://environment.data.gov.uk/catchment-planning/); and
- Details of the site layout, proposed development, and other site details provided by the client.

5. CONCEPTUAL SITE MODEL

11. The geological and hydrogeological regime of the Paper Mill Lane site and the surrounding area is considered under the following headings: location and topography; geological setting; and hydrogeological setting, all of which have been used to develop a CSM.

5.1. Location and Topography

12. The site, centred on (NGR) TM 13025 48919, is located adjacent to the A14 road, c.350 metres south of Claydon. Paper Mill Lane runs through the western part of the site.

13. The area comprises arable land previously used for the construction of the EA ONE PCCS, haul road and cable installation works. The ground elevation at Paper Mill Lane Works ranges from approximately 10m to 32m AOD, the gradient of the land sloping upwards from south to north with a sharp incline in the south-central portion of the site rising to form a small hill.

14. The proposed layout of the works is provided as Appendix 01.

[1] Available from Groundwater risk assessment for your environmental permit - GOV.UK (www.gov.uk) [Accessed November 2021]
[2] Environment Agency (April 2007) *Hydrogeological Impact Appraisal for Dewatering Abstractions*, Science Report – SC040020/SR1

5.2. Geology

5.2.1. Soil, Superficial Deposits and Bedrock Geology

15. The Cranfield Soilscapes online soil map viewer indicates that the soils across the site consist of freely draining, slightly acidic, loamy soils.

16. BGS historic borehole logs, as presented in Appendix 02, indicate that topsoil in the area is typically in the region of half a metre thick.

5.2.2. Superficial Geology

17. A geological map showing the regional superficial geology as plotted on the BGS online mapping service Geoindex Onshore is provided as Figure 1. This includes the locations of nearby BGS boreholes used to analyse ground conditions and locations of licensed and private abstractions.

18. The BGS Geoindex indicates that superficial deposits in the local area are variable and can be split into three areas: across much of the south and west of the site superficial deposits are absent, with bedrock at or close to surface; the eastern portion of the site is underlain by Diamicton of the Lowestoft formation; and a thin band along the northern boundary comprises River Terrace deposits.

19. The Lowestoft Formation forms an extensive sheet of chalky till, together with outwash sands and gravels, silts and clays which extends across a significant distance north, and east of the site but is absent beneath the River Gipping and its floodplain. Diamicton is unsorted to poorly sorted sediment containing particles ranging in size, suspended in a matrix of mud or sand. BGS mapping indicates these Diamicton deposits are limited in extent laterally, separated from the laterally extensive Diamicton deposit further east by an area void of superficial deposits.

20. The River Terrace Deposits consist of Sand and Gravel. These deposits generally follow the route of the River Gipping from north to south, with Alluvial deposits (predominantly composed of clay and silt) in direct proximity to the River Gipping but not present at the site itself.

21. The Diamicton is regionally overlain by sands and gravels of the Kesgrave and Lowestoft Formations. These consist of sporadic pockets of deposits and include pockets of deposit in the south-east corner of the site and to the south.

22. Historic borehole logs compiled from the BGS Geoindex website indicate that sand and gravel deposits in the local area, where present, are generally of limited thickness, varying from c.1.5 to 7.5m in thickness and averaging around 3.5-4m.

5.2.3. Bedrock Geology

23. BGS Geoindex indicates that the site is Underlain by Chalk of the Newhaven and Culver Chalk formations respectively. These are typically described as *'soft to medium hard, smooth white chalks with numerous marl seams and flint bands, including abundant Zoophycos flints'*. The Newhaven Chalk is typically 45m to 75m in thickness with the underlying Culver Chalk between 65m to 75m in thickness. Nearby BGS logs have proven the Chalk to be at least 50m thick locally.

24. The Chalk deposits extend for numerous kilometres west and north of the site.

25. To the south and south-east of the site, the Chalk is overlain by the Thanet Formation and Lambeth Group (undifferentiated) consisting of Clays, Silts and Sands which are in turn overlain by Thames Group deposits described as *'Silty clay/mudstone, sandy silts and sandy clayey silts'*. The Thames Group deposits dominate the bedrock geology eastwards of the site.

26. Historic BGS logs (see Appendix 02) indicate that within the local vicinity Chalk deposits are typically first encountered at a depth of c.5m. Overburden and drift deposits thin out eastwards and Chalk is first encountered as close as 1.2m from the surface several hundreds of metres east of the site. Chalk is found at deeper depths immediately south of the site (up to 8.5m) where it is overlain by sand and gravel deposits.

27. Bedrock geology, based on BGS Geoindex mapping, is provided in map format in Figure 2.

5.3. Hydrogeology

5.3.1. Recharge Mechanisms

28. The Met Office climate summary (1991 – 2010) for Wattisham (52.123, 0.961), located c.10km west of the site, indicates that the average annual rainfall for the site is 614mm.

29. Climate averages for Wattisham are provided below in Table 5-1.

Table 5-1 Met Office Climate Averages for Wattisham (1991 – 2010)

Month	Max. Temp. (°C)	Min. Temp. (°C)	Rainfall (mm)	Days of Rainfall ≥ 1mm
January	6.57	1.01	49.19	11.22
February	6.84	0.82	40.65	9.47
March	9.82	2.55	44.35	10.4
April	12.71	4.11	41.1	9.33
May	16.16	7.17	50.94	8.73
June	19.11	9.89	52.59	9.1
July	21.86	12.16	50.1	8.73
August	21.81	12.17	56.23	8.43
September	18.57	10.2	51.88	8.83
October	14.24	7.48	64.82	10.07
November	9.73	3.87	59.93	10.87
December	6.86	1.56	51.95	10.61
Annual	13.73	6.11	613.73	115.79

30. Recharge regionally will be variable depending upon the localised superficial geology. Where Diamicton is present across the eastern portion of the site, recharge will potentially be limited by the often-clayey nature of the deposits, however in the west of the site where Chalk is present close to surface, recharge will be relatively high.

5.3.2. Aquifer Characteristics and Groundwater Vulnerability

31. The aquifer characteristics and EA aquifer designation of the strata within the immediate vicinity of the works are summarised in Table 5-2.

Table 5-2 Aquifer Designations

Deposit Type	Age	Formation	Aquifer Designation
Superficial	Quaternary	Lowestoft Formation (Diamicton)	Secondary (Undifferentiated)
		River Terrace Deposits	Secondary A
		Lowestoft Formation	
Bedrock	Cretaceous	Newhaven Chalk	Principal
		Culver Chalk	
		Thanet Formation and Lambeth Group	Secondary A

32. The various classifications are described by the EA as follows:

- Principal Aquifer: *layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.*

- Secondary A Aquifer: *permeable layers that can support local water supplies, and may form an important source of base flow to rivers.*
- Secondary B Aquifer: *lower permeability layers that may store and yield limited amounts of groundwater through characteristics like thin fissures and opening or eroded layers.*
- Secondary (undifferentiated): *where it is not possible to apply either a Secondary A or B definition because of the variable characteristics of the rock type. These have only a minor value.*
- Unproductive Strata: *strata that are largely unable to provide usable water supplies and are unlikely to have surface water and wetlands ecosystems dependent on them.*

33. As outlined above the site is entirely underlain by the Newhaven and Culver Chalk which is classified as a principal aquifer and is considered to be a significant aquifer which provides both significant abstractions for potable water but also significant baseflow to watercourses.

34. Diamicton covers approximately half the development site. These deposits will potentially be variable with some groundwater flow possible within sand and gravel horizons, however the typically clayey nature of the deposits make it unlikely that the deposits will provide significant groundwater supply or baseflow to watercourses.

35. There is a very small area of Lowestoft Formation sands and gravels overlying the Diamicton in the south-east of the site. These can potentially be water bearing, however given the very limited extent is considered highly unlikely that these would provide a usable resource other than localised perched groundwater, it is also noted that no works are proposed within this area.

36. The River Terrace Deposits along the northern edge of the site will potentially be high permeability, given the freely draining nature of these deposits and groundwater present in these deposits is likely to be in continuity with the underlying Chalk.

5.3.3. Groundwater Levels and Flow

37. An extract from the 1981 Hydrogeological map of Southern East Anglia, sourced from the BGS website, and presented as Figure 3 indicates the potentiometric surface of groundwater within the Chalk underlying the site is typically between 5 and 10mAOD, with groundwater flow in a predominantly south-easterly direction and being influenced by the valley of the River Gipping, suggesting groundwater is in continuity with this river.

38. Groundwater levels within historic BGS boreholes are consistent with the above hydrogeological mapping, with groundwater encountered within the Chalk typically measured at between 5 and 10mAOD within the immediate proximity of the site.

39. As outlined in Section 5.1, ground elevations at the site range between c.15mAOD in the north to 35mAOD in the south, indicating an unsaturated zone of potentially less than 5m along the northern boundary of the site to more than 25m in the south.

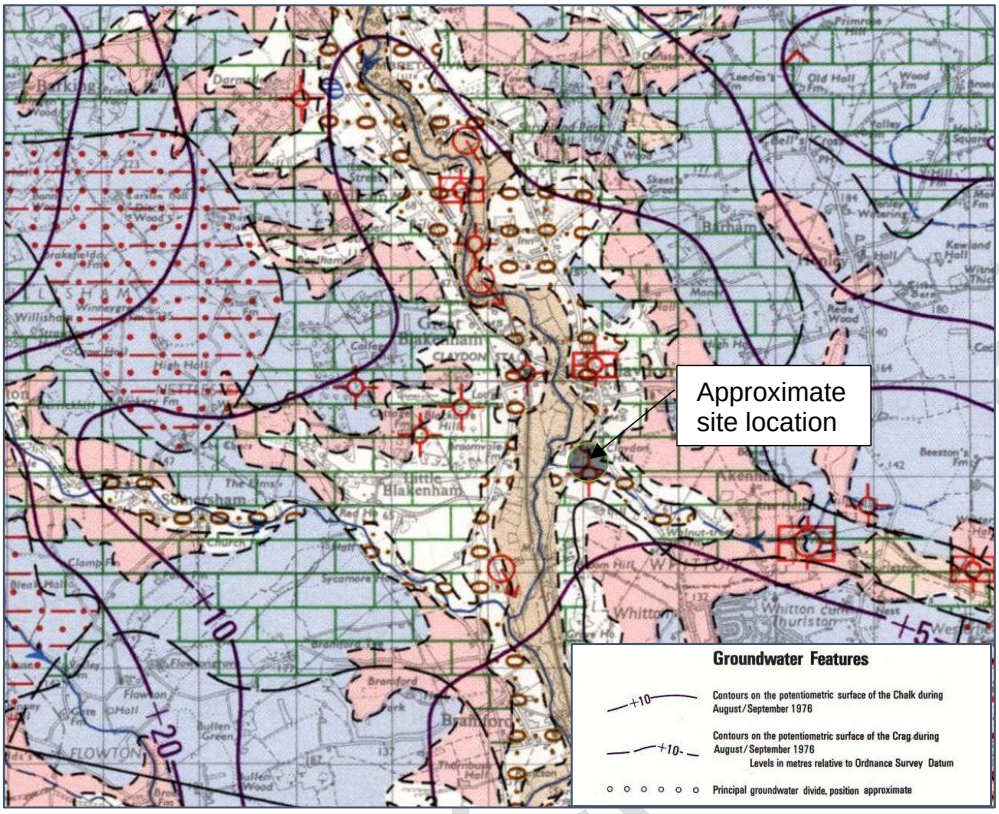


Figure 3 Extract from Regional Hydrogeological Mapping

40. Due to the disconnected nature of drift deposits underlying the site any perched groundwater within superficial drift deposits is unlikely to be in hydraulic continuity with any larger regional drift deposit aquifers or the underlying Chalk aquifer.

5.3.4. Groundwater Abstractions and Source Protection Zones

41. Defra's Magic Map website indicates the site is wholly within Zone III of a Groundwater Source Protection Zone (SPZ) which extends across the extent of the Chalk aquifer. The SPZs along with licensed and private abstractions are included on Figure 4.

42. Two separate SPZ Zone II are located c.1.2km southwest and c.0.45km east of the site. Zone I of the SPZ eastwards of the site is located at a distance of c.1.35km. Zone I of the Bramford SPZ, which likely predominately utilises Newhaven Chalk deposits, is located c.1.5km southwest from the site. There is likely a degree of hydraulic connection at both these SPZs with Chalk underlying the site.

43. Groundwater SPZ are designated as follows:

- Inner – Zone I
- Outer – Zone II
- Total catchment – Zone 3

44. There are no licensed or private surface water or groundwater abstractions within the site boundary. There is a licensed borehole abstraction point c.30m north of the site and a private abstraction is located c.30m outside the site's southern boundary, adjacent to Mockbeggars Hall. No details of this private abstraction are available, although given the lack of any hydrological features in the vicinity of Mockbeggars Hall, it is assumed that this will be a groundwater abstraction, most likely from the Chalk.

45. The closest surface water abstraction is held by SCC and is located on the opposite bank of the River Gipping, 300m west of the site.

46. Details of the licensed abstraction 30m north of the site are provided below as Table 5-3.

Table 5-3 Licensed Abstraction Details

License No.	Holder	Use	Max Daily Quantity	Max Annual Quantity	Source Type and Unit
7/35/08/*G/0178	Blakenham Farms	Spray Irrigation - Direct	1,473m^3	127,000m^3	Groundwater from Chalk

5.3.5. Groundwater Quality

47. With reference to EA catchment planning and assessments, the site is located within the Waveney and East Suffolk Chalk & Crag Water Body. This catchment is 1455km^2 in area.

48. The most recent assessment[3] in 2019 determined that the catchment has 'poor overall status' due to a 'poor' overall quality and quantity status. A list of individual parameters of recent Waveney and East Suffolk Chalk & Crag Water Body classification criteria is presented in Appendix 03. Pollution from poor livestock management is indicated as a source of contaminants.

5.3.6. Hydrology

49. The site is located within the catchment of the River Gipping, an EA main river situated approximately 240m west of the site at its closest. The watercourse flows in a predominantly southerly direction as it passes the site. The river and its tributaries drain a catchment upstream of the site estimated to be 263.2km^2. As outlined in section 5.3.3, this watercourse is considered to be in continuity with the regional Chalk groundwater which provides baseflow to the river.

50. There are no surface water features present within the site boundary. A drainage ditch runs parallel to and outside of the northern site boundary, this is designated as an Ordinary Watercourse and will receive any surface runoff from the site. This channel flows from east to west before discharging to the River Gipping some 240m northwest of the site. This minor drainage ditch has a relatively small upstream catchment and runs dry in summer months, as outlined in the baseline Flood Risk and Geology report. Given that the watercourse is in excess of 5m above the regional groundwater levels in the Chalk this watercourse is not considered to be in continuity with regional groundwater.

51. The ditch on the northern site boundary has sources in Westerfield, 4.3km southeast of the site and in Akenham, 2.5km northeast of the site, the latter adjoining the former. From Westerfield the ditch flows west, discharging to the River Gipping, 240m northwest of the site boundary. There is also a wider drain network present to the west of the River Gipping; many of these were reinstated/installed as part of the EA ONE works.

52. There are other surface water features located on the opposite, western side of the river approximately 420m west of Paper Mill Lane including a series of ponds and lakes housing Suffolk Water Park, these will have formed within former sand and gravel quarry voids and, based on the ground elevations, are potentially also in hydraulic continuity with the regional groundwater.

5.3.7. Surface Water Quality

53. With reference to EA catchment planning and assessments, the site is located within the Gipping (d/s Stowmarket) Water Body catchment. This catchment is 97.2km^2 in area, relates to a river water body and extends between Stowmarket and Ipswich. The catchment has a heavily modified hydromorphological designation.

54. The most recent assessment in 2019 determined that the catchment has 'poor status' related to a poor ecological status but also a chemical status of "Fail". A list of individual parameters of recent Gipping (d/s Stowmarket) Water Body classification criteria is presented in Appendix 04. The priority hazardous substances of Mercury, Perfluorooctane Sulphonate and Polybrominated Diphenyl Ethers were recorded as failures with respect to 2019 water quality assessments. A range of specific pollutants were also recorded

[3] Environment Agency (n.d.) *Catchment Data Explorer*. [online] Available at: https://environment.data.gov.uk/catchment-planning/ [Accessed 23 Nov. 2021].

as 'High': Chlorothalonil; Chromium (VI); Copper; Iron; Pendimethalin; and Zinc. Physico-Chemical quality was assessed as 'Moderate' overall, with Acid Neutralising Capacity, Ammonia and pH recorded as 'High' and Dissolved Oxygen and Phosphate as 'Poor'.

5.3.8. Water-Dependent Ecological Sites

55. A review of the Natural England Magic Map webpage indicates that there are no water dependent ecological sites within a 500m radius of the site. There are two ecological sites within a 2km radius of the site, as detailed below in Table 5-4 and as shown on Figure 5. Neither of these sites are considered likely to be hydraulically connected to the development site.

Table 5-4 Summary of Water-Dependent Ecological Sites within a 2km Radius

Site Name	Designation	Reason for Designation	Distance from Site Boundary	In Hydraulic Connection?
Bramford Meadows	Local Nature Reserve	Low lying river grassland and scrub in a linear strip along the River Gipping. The meadows are crossed by wet ditches and the old course of the river.	1.55km S	No
Little Blakenham Pit	Site of Special Scientific Interest	Calcareous Grassland and Inland Rock	1.85km W	No

5.4. Conceptual Site Model

56. The assessment of the baseline conditions of the site indicates that the site is underlain by an extensive Chalk aquifer. The Chalk is overlain by isolated pockets of Diamicton and River Terrace Deposits however as these are not extensive and are located above the elevation of the regional Chalk aquifer these are not considered to be groundwater receptors. Groundwater in the Chalk is the primary receptor, specifically the identified private and licensed abstractions located within 250m of the site.

57. Available groundwater level data indicate an unsaturated zone beneath the site ranging from c.5m along the northern boundary to in excess of 25m in the south.

58. There are no Main Rivers or other surface water features present on the site. A drainage ditch runs parallel to and outside of the northern site boundary. This channel is designated as an Ordinary Watercourse and will receive any surface runoff from the site. This channel flows from east to west before joining the River Gipping some 240m west of the site. This minor drainage ditch has a very small upstream catchment and runs dry in summer months. This is not considered to be in continuity with groundwater.

59. Water quality assessments indicates that the surrounding groundwater and surface water quality is poor.

60. There are no licensed surface water or groundwater abstractions within the site boundary, however within a 250m radius of the site there is one licensed groundwater abstraction and one private abstraction likely to be from groundwater, both of which are considered to be potential receptors for any groundwater impact from the development.

61. Whilst there are two ecological sites within a 2km radius of the site neither are considered to be in hydraulic continuity with the site.

6. HYDROGEOLOGICAL & HYDROLOGICAL IMPACT ASSESSMENT

6.1. Proposed Development

62. Paper Mill Lane Works comprise a stage of the onshore connection works and cover Work Nos. 50 and 51. The infrastructure comprises:

- Paper Mill Lane Primary Construction Consolidation Site (PCCS);
- Jointing Bay 4;
- Access on the eastern side of the public road (Paper Mill Lane) and the access track/haul road required to access the CCS and jointing bay and additional trackway to access an HDD excavation pit in Work No. 49; and
- Access on the western side of Paper Mill Lane and the trackway required to access an HDD excavation pit in Work No. 52.

63. Works are shown in plan view in Appendix 1. Paper Mill Lane PCCS and the access to the west have now been reinstated. The access to the east has been partially reinstated.

64. The deepest excavation would be 2.5m at the jointing bay location. At the PCCS only topsoil will be stripped so that hardstanding can be put down. Topsoil will be stripped for the access track and haul road but not the trackway.

65. Excavations that will be made at the HDD exits for duct proving are proposed to be less than 1.5m.

6.2. Assessment of Impact

66. The potential impact of the Paper Mill Lane Works on groundwater and surface water receptors are outlined below using qualitative risk assessment methodology based on the sensitivity of the receptor and likelihood of impact occurring. Impacts assessed as moderate or high are considered to require further mitigation.

6.2.1. Potential Effects

67. Without appropriate design and controls, construction of the works has the potential to impair local hydrology (water quality) and hydrogeology (groundwater levels, flow and quality), such as:

- The use of machinery and the movement of soils has the potential to generate suspended solids in run-off and/or introduce oils or hydrocarbons to the water environment;
- Existing groundwater flow paths could be disturbed or altered, impacting on nearby groundwater abstractions.

Standard construction techniques and best practices are to be used to avoid or reduce these potential impacts. Details are given in the following section.

6.2.2. Embedded Mitigation

68. Best practice construction techniques and procedures that have been developed through a series of management plans for approval by the EA, MSDC and SCC, in accordance with the requirements of the DCO. These include:

- Paper Mill Lane Works Surface Water and Drainage Management Plan (EA3-LDC-CNS-REP-IBR-000034)
- Paper Mill Lane Works Code of Construction Practice (EA3-LDC-CNS-REP-IBR-000065) including:
  - Pollution Prevention and Emergency Incident Response Plan; and
  - Project Environmental Management Plan.

69. The construction works will also be undertaken in accordance with good practice guidance within the following documents:

- CIRIA SP156 Control of Water Pollution from Construction Sites - Guide to Good Practice, 2002;

- CIRIA C502 Environmental Good Practice on Site C741, CIRIA 2015;

70. The Pollution Prevention Guidelines (PPGs) (which are progressively being replaced with Guidance for Pollution Prevention (GPPs)) provide environmental good practice for the whole of the UK and relevant PPGs/GPPs will be followed, including:

- GPP01: Understanding your environmental responsibilities – good environmental practices (Oct 2020)
- GPP02: Above Ground Oil Storage Tanks (Jan 2018);
- GPP04: Treatment and Disposal of wastewater where there is no connection to the public sewer (Nov 2017);
- PPG6: Working at construction and demolition sites (2012);
- GPP08: Safe storage and disposal of used oils (July 2017);
- GPP13: Vehicle Washing and Cleansing (April 2017);
- PPG18: Managing fire water and major spillages (June 2000);
- GPP21: Pollution incident response planning (June 2021);
- GPP22: Dealing with Spills (Oct 2018).

6.2.3. Impact upon Groundwater Levels and Flow Regimes

71. There will be no excavations deeper than 2.5m and the PCCS will not require any excavation other than site levelling and removal of topsoil. Given that the depth to groundwater is estimated at between 5m and 25m there is unlikely to be a requirement for dewatering and the works will not affect groundwater flow paths. In the event that shallow perched groundwater is encountered within the excavations, these will be dewatered and discharged back to ground, following treatment if necessary. The potential impact of the works on groundwater levels and flows is therefore assessed as ***'negligible'.***

6.2.4. Impact upon Surface Water Flow Regime

72. It is considered that the works will not alter the wider surface water drainage regime and as the works will not impact groundwater levels or flow there will also be no impact on surface water flows. The potential impact on surface water flow is therefore assessed as **'negligible'**.

6.2.5. Impact on Groundwater Quality

73. The construction works at the site will inevitably give rise to suspended solids which if not managed could pollute surface waters and groundwaters. The construction works will also involve the use of mobile plant which could give rise to fuel spills which could potentially contaminate surface waters and groundwaters.

74. The PCCS and jointing bay construction will be undertaken in accordance with the management plans outlined in Section 6.2.2 which provide details of how construction will be completed in an environmentally safe manner and minimise the potential for spillages.

75. Best practice techniques will be incorporated within the management procedures for construction activities onsite in order to protect the water environment from pollution incidents. Key mitigation measures, as set out in the management plans, can be summarised as follows:

- during operation there will be heavy machinery required onsite and, as a result, it is appropriate to adopt best working practices and measures to protect the water environment, including those set out in the EA's Guidance for Pollution Prevention (GPP1);
- in accordance with GPP2 all above ground onsite fuel and chemical storage will be bunded;
- an emergency spill response kit will be maintained onsite;
- a vehicle management system will be put in place wherever necessary to reduce the potential conflicts between vehicles and thereby reduce the risk of collision;
- a speed limit will be imposed on site to reduce the likelihood and significance of any collisions;
- in accordance with GPP5 the amount of time stripped ground and soil stockpiles being exposed will be minimised and vegetation will only be removed from the area that needs to be exposed in the near future.
- plant and wheel washing will be carried out in a designated area of hard standing at least 10 metres from any watercourse or surface water drain or rock outcrop (hard rock at surface).

76. Given the embedded mitigation in place, the potential risk during construction to groundwater quality and subsequently surface water quality of any down-stream watercourses in hydraulic continuity with the Chalk is assessed as **'negligible'** to **'low'**.

77. This potential risk assessment applies also to the outer (Zone II) and inner (Zone I) Groundwater Source Protection Zones eastwards and southwest of the site.

78. No additional mitigation beyond that outlined above is considered necessary.

6.2.6. Impact upon Ecological Sites

79. As outlined within Section 5.3.8, there are not considered to be any designated ecological sites which could be considered a potential receptor.

7. CONCLUSION

80. A hydrogeological and hydrological impact assessment has been undertaken to assess the potential impact upon the local hydrogeological and hydrological regime of the proposed Paper Mill Lane Works.

81. The assessment has identified two groundwater abstractions within 250m radius of the site which will act as potential receptors for any adverse impact from the works. Both of these abstract groundwater from the regional Chalk aquifer which is considered the primary receptor. There is the potential that perched water is present in isolated superficial deposits, but this is unlikely to be of sufficient volume to comprise a receptor.

82. The ordinary watercourse immediately to the north of the site is not considered to be groundwater dependent, although the River Gipping is likely to be in hydraulic continuity with the Chalk. The River Gipping is therefore considered a secondary receptor from any adverse impact on groundwater levels or quality. There are no water dependent ecological sites within a 2km radius of the site.

83. An assessment of the potential impact of the works on groundwater levels, groundwater quality, surface water flows and surface water quality has been undertaken. The assessment indicates that as the works involve only shallow excavations, well above the regional groundwater table, the potential impact on groundwater levels and flow is negligible. The works will be undertaken in accordance with relevant management plans which will have been agreed with the EA, SCC and MSDC and with appropriate best practice, this embedded mitigation will ensure that there is no adverse impact on groundwater quality and in turn no impact on surface water quality.

8. REFERENCES

British Geological Survey. (n.d.) *GeoIndex (onshore)*. [online] Available at: https://www.bgs.ac.uk/map-viewers/Geoindex-onshore/ [Accessed 23 Nov. 2021].

CIRIA (2002) *Control of Water Pollution from Construction Sites: Guide to Good Practice*.

CIRIA (2015) *Environmental Good Practice on Site C741.*

Department of Environment, Food and Rural Affairs (n.d.) *MAGIC Map*. [online] Available at: https://magic.defra.gov.uk/ [Accessed 23 Nov. 2021].

Environment Agency (2007) *Hydrogeological impact appraisal for dewatering abstractions.* [online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/291080/scho0407bmae-e-e.pdf [Accessed 23 Nov. 2021].

Environment Agency (n.d.) *Catchment Data Explorer*. [online] Available at: https://environment.data.gov.uk/catchment-planning/ [Accessed 23 Nov. 2021].

Environment Agency (n.d.) *Water Resources: Help for License Trading - ArcGIS Web Application*. [online] Available at: https://www.arcgis.com/apps/webappviewer/index.html?id=c9176c299b734cff9a6deffcf7f40a4e [Accessed 23 Nov. 2021].

Institute of Geological Sciences. (1981*) Hydrogeological map of Southern East Anglia*. [online] Available at: https://largeimages.bgs.ac.uk/iip/hydromaps.html?id=southern-east-anglia.jp2/ [Accessed 23 Nov. 2021].

Met Office (n.d) *UK Climate Averages*. [online] Available at: https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages [Accessed 23 Nov. 2021].

National Soil Resources Institute. Cranfield University (n.d.) *Soilscapes Soil Types Viewer* [online] Available at: https://www.landis.org.uk/soilscapes/ [Accessed 23 Nov. 2021].

NetRegs (n.d.) *Guidance for Pollution Prevention (GPPs).* [online] Available at: https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/guidance-for-pollution-prevention-gpps-full-list/ [Accessed 23 Nov. 021].

UK Government (Last updated 2 May 2019) *Pollution prevention for businesses.* [online] GOV.UK. Available at: https://www.gov.uk/guidance/pollution-prevention-for-businesses/ [Accessed 23 Nov. 2021].

UK Government (Last updated 3 April 2018) *Groundwater risk assessment for your environmental permit*. [online] Available at: https://www.gov.uk/guidance/groundwater-risk-assessment-for-your-environmental-permit [Accessed 23 Nov. 2021].

UK Government National Archives (n.d.) *Pollution prevention advice and guidance (PPG*) [online] Available at: https://webarchive.nationalarchives.gov.uk/ukgwa/20140328090931/http://www.environment-agency.gov.uk/business/topics/pollution/39083.aspx [Accessed 23 Nov. 2021].

APPENDIX 1 INDICATIVE LAYOUT

613000

249000

Paper Mill Lane PCCS

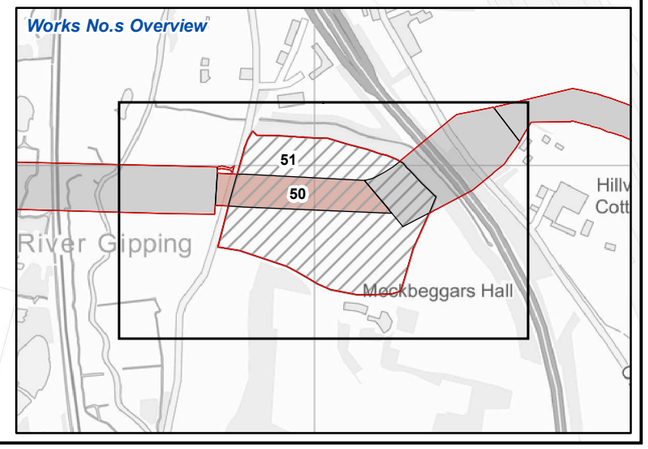
Acess AP-AF

Access AP-AG

Jointing Bay 4

A14

OLD IPSWICH ROAD



Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

EA THREE DCO Corridor
Primary Construction Consolidation Site
Jointing Bay Compound
Top Soil
HGV Turning, Cleaning and Washing
Trackway
Access Track
Haul Road
EA THREE Existing Cable Ducts
EA ONE Existing Cable Ducts

Works No.s
50
51

GoBe consultants

Rev	Date	By	Comment
B	05/04/2022	PW	Second Issue
A	31/03/2022	JRS	First Issue

Original A3 Plot Scale 1:2,500

0 50 100 Metres

Paper Mill Lane Works Stage

Site Context Plan

Drg No	05356.00006.12.0021.1 Site Context Plan
Rev	2
Date	05/04/2022
Layout	N/A

Document Path: P:\05356 - GoBe Consultants Ltd\00006 East Anglia Three\Tech\GIS\Dwgs\Wking\EA3\Onshore Substation\ONCS and Commencement Master\5356.00006.12.0021.1 Works Site Context.mxd

APPENDIX 2 HISTORIC BGS BOREHOLE LOGS

BGS BOREHOLE REFERENCE: TM14NW62

Easting: 613080
Northing: 249080
Date: -
Length: 15.00m

BOREHOLE RECORD

Chainage TM14NW/62
Offset 1308·4·908
Cut/fill 1" 207

BOREHOLE Y255A

Sheet 1 of 2

GL. 10.2m AOD.

DRILLING			SAMPLES		STRATA			
Rate	Casing	Water	Depth	Type	Key	Depth	Level	Description
4.8.1969.	200mm dia.							
						0.7	9.5	FILL – (hardcore)
			0.9–1.4	U(36)				FILL – (chalk)
			1.7	D		1.8	8.4	
			2.0–2.5	U(14)				Soft grey/black PEAT silty towards base.
	2.4	▽	2.7	D				
			2.9	W		2.9	7.3	
			3.0–3.5	C(15)B				Medium dense grey brown fine to coarse SAND and GRAVEL.
			4.6–5.1	C(12)B				
			5.3–5.8	S(4)D		5.2	5.0	
			6.4	D				White fissured friable rock CHALK with some putty chalk matrix.
			6.8 – 7.3	U(10)				
			7.9	D				
			8.4–8.9	S(7)D				Continued from 9.0m.

O/H Open hole rotary drilling
R[ ] Rotary core size
(%) Rotary core (recovery)
D Disturbed soil sample
B Bulk soil sample
W Groundwater sample

▽ Ground water first encountered
U( ) 4 in. dia. undisturbed sample (blows/penetration
Ø Sample not recovered
S( ) Standard Penetration test (blows/foot)
C( ) Cone penetration test (blows/foot)

EASTERN R. C. U. | NEEDHAM MARKET BY-PASS | S/1100

BOREHOLE RECORD

Chainage TM 14 NW/62
Offset
Cut/fill

BOREHOLE Y 205A

Sheet 2 of 2

DRILLING			SAMPLES		STRATA			
Rate	Casing	Water	Depth	Type	Key	Depth	Level	Description
			9.4	D				Continued from 9.0m.
			9.9–10.4	U(13)				
			11.0	D				
			11.4–11.9	S(9)D				White fissured friable rock CHALK with some putty chalk matrix.
			12.5	D				
			12.9–13.4	U(17)				
			14.0	D				
			14.5 – 15.0	S(11)D				
15.0	15.0	9.7				15.0	4.8	END OF BOREHOLE.

O/H Open hole rotary drilling
R/ " Rotary core size
(%) Rotary core (recovery)
D Disturbed soil sample
B Bulk soil sample
W Groundwater sample

▽ Ground water first encountered
U( ) 4 in. dia. undisturbed sample (blows/penetration
N Sample not recovered
S( ) Standard Penetration test (blows/foot)
C( ) Cone penetration test (blows/foot)

EASTERN R. C. U.

NEEDHAM MARKET BY-PASS

S/1100

BGS BOREHOLE REFERENCE: TM14NW107

Easting: 612860
Northing: 249080
Date: -
Length: 1.50m

Site Investigation at Stowmarket Job 3211

Type of equipment J.C.B.

Diameter of hole

LOG OF BOREHOLE No. 555

TM 14 NW/107
1286 4903
L 207

LEFT: SCALE	DAILY PROGRESS	DEPTH TO WATER	DEPTH OF CASING	SAMPLING DATA: DEPTH FROM	SAMPLING DATA: DEPTH TO	SAMPLING DATA: No.	SAMPLING DATA: TYPE	LEGEND	CHANGE OF STRATA: DEPTH	CHANGE OF STRATA: REDUCED LEVEL	DESCRIPTION OF STRATA
		m	m	m	m				m	m	GROUND LEVEL: 9.88m. O.D.
	11.11.71.				0.15	1	D				TOPSOIL. Dark brown friable sandy CLAY.
					0.50	2	D		0.30	9.58	Brown friable sandy CLAY.
1 m									1.00	8.88	
					1.20	3	D				Dark brown very sandy CLAY with rust patches and a trace of fine flint gravel.
	11.11.71								1.50	8.38	
2 m											End of Trial Pit.
3 m											
4 m											
5 m											
6 m											
7 m											
8 m											
9 m											
10 m											
11 m											
12 m											
13 m											

Key

▨	sampling depth, soils
U4	4 in. dia. undisturbed sample (102 mm)
U3	3 in. dia. undisturbed sample (73 mm)
D	disturbed jar sample
B	disturbed bulk sample
W	water sample
SP ( )	standard penetration test
CP ( )	cone penetration test
(25)	number of blows e.g. 25
•	no recovery
▮ 80	core drilling, 80% recovery
RQD	rock quality designation

Notes

BOREHOLE 555

NUTTALL GEOTECHNICAL SERVICES LTD.

Job 3211

Revised April 71

BGS BOREHOLE REFERENCE: TM14NW130

Easting: 613130
Northing: 248660
Date: 1933
Length: 53.34m

TM 14 NW/130
1313 · 4866

207/201 Mockbeggar's Hall, Claydon

29 88

Surface +98. Lining tubes: 81 × 5 in from surface. R.W.L. +31. P.W.L. +31.
Yield 500 g.p.h. (test). *Smith, F., Oct. 1933.*
Electric pump. *1941.*

Boulder Clay	16	16	4·88
Sand and Gravel	12	28	8·54
UCk	147	175	53·35

	Soil	2.	2.	0·61 m
	Dirty Sand	2.	4.	1·22
Boulder clay Glacial Gravel	Clay Stone	12.	16.	4·88
	Gravel	12	28	8·54
Chalk.	Dirty chalk	40	68	20·73
	White chalk	107	175.	53·35

Answ
7-11-41.

agreed
AA.

207/201 Mockbeggar's Hall, Claydon TM 14/180

TM 1313 4867

Surface +98. Lining tubes: 81 x 5 in from surface. R.W.L. +31. P.W.L. +31.
Yield 500 g.p.h. (test). *Smith, F., Oct. 1933.*
Electric pump. *1941.*

Boulder Clay	...	...	16	16
Sand and Gravel	...	...	12	28
UCk	...	...	147	175

	Soil	2.	2.
	Dirty Sand	2.	4.
Boulder clay Glacial Gravel	Clay Stone	12.	16.
	Gravel	12	28
Chalk.	Dirty chalk	40	68
	White chalk	107	175.

AWW
+11-41.

agreed
RA.

RECORD OF WELL (SHAFT OR BORE)

TM14/180

207

At Mockbeggars Hall

Town or Village Clopton County Suffolk Six-inch quarter sheet 66 SW

Exact site ... in parish of ... (A rough sketch-map or a tracing from a map is very desirable)

Level of ground surface above sea-level (O.D.) 98 ft. If well starts below ground surface, state how far ... ft.

Shaft ... ft., diameter ... ft. Bore 98 ft. Diameter of bore: at top ... ins.; at bottom ... ins.

Details of permanent lining tubes (internal diameters preferred) 8" ϕ x 5" 3" borehole pump (on test)

Water struck at depths of (feet) ...

Rest-level of water ~~below~~ above top of well 67 feet. Suction at ... feet. Yield on ... hours' / days' test 500 gallons per hr (with pump of capacity ... g.p.h.); depressing water level to 67 (sic) feet below top. Time of recovery ... hrs. Amount normally pumped daily ... g.p.h. for ... hours.

Quality (attach copy of analysis if available) ...

Sunk by F. Smith & Son for Mr. H. Warner & Son Date of well Oct 1933

Information from Do

(For Survey use only). GEOLOGICAL CLASSIFICATION.	NATURE OF STRATA (and any additional remarks).	THICKNESS Feet.	THICKNESS Inches.	DEPTH Feet.	DEPTH Inches.
	Soil	2		2	
	Dirty Sand	2		4	
Boulder Clay	Clay stone	12		16	
Glacial Gravel	Gravel	12		28	
Chalk	Dirty chalk	40		68	
	White chalk	107		175	
AWW / XII.41	Electric power - good supply				
agreed RR.	Visited visited on 6inch map by AWW 14.X.41				
	Electric pump in use, for large house and small farm. Inaccessible for measurements. Visited RCD 22.6.60				
	DATA Bank				

BGS BOREHOLE REFERENCE: TM14NW147

Easting: 612920
Northing: 248300
Date: 1950
Length: 45.72m

TM14/147

207/692 Picketts Row Cottages, Bramford

TM 1293 4828

Surface +125. Shaft 20; rest bore. Lining tubes: 105½ x 4½ in. R.W.L. +37. P.W.L. +37. Suction +29. Yield 500 g.p.h. (8 h. test). Electric pump. *Warner, Dec. 1950.*

Pleist. Drift)	...	...	20	20
UCk)				
UCk	...	...	130	150

Pleist Drift. { Dug well (bottom in hard dry chalk.) 20 20

Chalk. .. 130 150

RA

(For Survey use only) Geological Classification	2 NATURE OF STRATA If measurements start below ground surface, state how far ...	Thickness		Depth	
		Feet ...	Inches ...	Feet	Inches
Plio Dyr uck	Dug well (Bottom in hard dry chalk)	20	0	20	0
	Chalk	130	0	150	0
RA					

DATA Bank

BGS BOREHOLE REFERENCE: TM14NW254

Easting: 613020
Northing: 249090
Date: 1973
Length: 45.72m

RECORD OF WELL

For Institute use only Licence No. 35/8/9/178
N.15.118...
TM 14 NW/254

207/863

At ....CHANTON.....
MOCKBEGGARS HALL FARM.....
Town or Village ..IPSWICH.....
County ...SUFFOLK.....

EXACT SITE OF WELL

Six-inch National Grid sheet and reference ..TM..1302..HAGA.....14.NW.....
For ..C/O..STRUTT..&..PARKER.....
State whether owner, tenant, builder, contractor, consultant, etc.:.....
Address (if different from above) .MOCKBEGGARS..HALL..FARMS,.....
..11,..TUSSELL...STREET,...IPSWICH,..SUFFOLK.....
Level of ground surface above sea level (O.D.).....ft (.....m)

*DELETE AS NECESSARY

If well top is not at ground level state how far above:* below: .....ft (.....m)
SHAFT.....ft (.....m); diameter.....ft (.. ....m);
HEADINGS (please attach details—dimensions and directions)
BORE...150.....ft (.....m); diameter: at top.....10.....in (.....mm);
at bottom.....in (.....mm)
Full details of permanent lining tubes (position, length, inner and outer diameters, plain slotted etc.):
.....LINING..TUBES..5'0"....
.....
.....
.....

TEST CONDITIONS

Water struck at depths of .....ft (.....m) below well top
Rest level of water..25...ft (.....m) above* below well top. Suction at..... ft (.....m)
Yield on.....hours'* days' test pumping at.....galls per ..... (..... l/s) with
depression to.....ft (.....m) below well top. Recovery to rest level in ..... mins* hours
Capacity of pump.....g.p.h. (.....l/s)
Date of measurements.....

NORMAL CONDITIONS

DESCRIPTION OF PERMANENT PUMPING EQUIPMENT:
Make and/or type ..... Motive power.....
Capacity.....galls (.....m³) per hour. Suction at ..... ft (.....m)
below well top. Amount pumped.....galls (.....m³) per day. Estimated
consumption .....galls (.....m³) per week
Well made by .H..WARNER..&..SON...LTD..... Date of sinking.SEPT...1973.....

ADDITIONAL NOTES ANALYSIS (please attach copy if available)

LOG OF STRATA OVERLEAF

AQUIFER – CHALK
B.H. IRRIGATION

Received from .....
.....
.....
Date 13/7/81
Observation well.....
Recorder .....
ER log .....
Site marked on
1" map .....O.....
6" map—Grid Sheet..O.....
(see symbol)
Copies: FA & SE
.....
Date .....

INSTITUTE OF GEOLOGICAL SCIENCES
HYDROGEOLOGY UNIT
EXHIBITION ROAD
LONDON SW7 2DE

IGS 2494 10 000 7/79

TM 14 NW/25

For Institute use only

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA. *If measurements start below ground surface, state how far.*	THICKNESS Feet	Inches	Metres	DEPTH Feet	Inches	Metres
Drift	T.O.P. SOIL	1	0		1	0	
	SAND AND GRAVEL	24	0		25	0	
Upper Chalk	CHALK	125	0		150	0	

RDL
20.10.81

H. WARNER & SON LTD.,
3, FOUNDATION ST.,
IPSWICH, IP4 1DN.
TEL: IPSWICH 53702.

25th September, 1973.

Report on Borehole at Hockleyfarm Hall Farm, Claydon.

Diameter of Borehole	10"
Depth " "	150'0"
" " Lining Tubes	51'0"
Rest water Level	25'0"

Strata

	Thickness	Depths
Top Soil	1'0"	1'0"
Sand and Gravel	24'0"	25'0"
Chalk	125'0"	150'0"

Pumping Test

An 8 hour pumping test was carried out on the Borehole at the pumping rate of 12,000 g.p.h. during which time a pumping water level of 47'0" from surface level was maintained when pumping stopped the water recovered to the rest water level of 25'0" in 10 minutes.

p.p. H. WARNER & SON LTD.

BGS BOREHOLE REFERENCE: TM14NW299

Easting: 613230
Northing: 249025
Date: -
Length: 3.00m

ENGINEER:	PROJECT IPSWICH BY-PASS - WESTERN SECTION.	GROUND LEVEL 11.91 m O.D.	HOLE NO. 102
LOGGED BY: MGB/LRD S.C.C. LABORATORY FIELDWORK BY: AA/JA " " LAB. TESTING BY: LAB. " "	EXCAVATION METHODS PERCUSSION BORING - DANDO 150. 150mm. DIA. CASED TO 3.0 M. 150mm. DIA. UNCASED 3.0 - 3.5 M.	COORDINATES 16230 E 24025 N DATES 17/5/79	SHEET 1 OF 1 FIGURE A

Date/Time at Depth	Depth of Casing	Depth to Water*	Piez.	Description of Strata	Strata: Leg	Reduced Level	Depth	Graphical Representation	Sampling/In situ testing: Depths	Type	No.	Blows	V / D / ROD	Lab. Testing: -425 %	W %	PL %	LL %	γ Mg/m³	C_u kN/m²	Additional Tests and Notes
17/5/79	150mm Ø					11.91	0		0											TM14NW 299 13230-49025
				TOPSOIL.		11.41	0.5													
				Medium dense orange-brown clayey medium-fine SAND with GRAVEL.					0.6	B	1									
									0.7	D	1				6.3					
									1.0	C										PSD,
									1.45	B D	2	N=19			7.2					
									2.0	C										WATER ADDED TO BOREHOLE FROM 2.0 METRES APPROX. (15 LITRES APPROX.).
									2.45	B	3	N=14								
11.00 17/5/79	3.00	3.00 ▼		(TERRACE GRAVEL).					3.0	W	4									pH, SW.
11.30 17/5/79	3.00	2.10							3.0	C	5	N=11								
17/5/79	3.00	3.50				8.41	3.5		3.45											BOREHOLE COMPLETE AT 3.5 METRES.
									4											
									5											
									6											
									7											
									8											
									9											
									10											

* WATER ▽ First water strike ▼ Subsequent water strikes

PIEZOMETER Upper seal / Response length / Lower seal

SAMPLE AND TEST KEY: D Small disturbed sample; B Bulk disturbed sample; W Water sample; U Undisturbed sample; P Piston sample; R Rotary core; Rec recovery to scale; V Insitu vane test; S Standard penetration test; C Cone penetration test; K Permeability test; I Insitu density test

Blows N = N value 26/150, blows for 150mm drive after seating 26*, blows for part or whole of seating drive only (26) Undisturbed sample blow count

V Vane strength kN/m² Natural / Remould

Cr Core recovery % ROD Rock quality designation -425 Sample % passing 425µm sieve

DEPTH All depths, levels and thicknesses in metres

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Director
Eastern Road Construction Unit,
59/63 Goldington Road, Bedford.

FIG. A | SHEET 1 OF 1 | HOLE NO. 102

BGS BOREHOLE REFERENCE: TM14NW300

Easting: 613300
Northing: 248960
Date: -
Length: 6.00m

ENGINEER:	PROJECT IPSWICH BY-PASS - WESTERN SECTION.	GROUND LEVEL 12.27 m O.D.	HOLE NO. 103
LOGGED BY: MGB/LRD S.C.C LABORATORY	EXCAVATION METHODS PERCUSSION BORING - DANDO 150.	COORDINATES 16300 E 23960 N	SHEET 1 OF 1
FIELDWORK BY: AA/JA " "	150mm. DIA. CASED TO 4.5 M. 150mm. DIA UNCASED 4.5 - 6.0 M.	DATES 16/5/79 - 17/5/79	FIGURE A
LAB. TESTING BY: LAB. " "			

Date/Time at Depth	Depth of Casing	Depth to Water*	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation	Sampling/in situ testing: Depths	Type	No.	Blows	V / ROD	Lab. Testing: <425 %	W %	PL %	LL %	γ Mg/m³	C_u kN/m²	Additional Tests and Notes
16/5/79	150mm ϕ					12.27	0		0											
				TOPSOIL.		11.97	0.3		0.4	B	1									
				Medium dense orange-brown clayey medium fine SAND with GRAVEL.					0.5	D	1				4.5					
				(TERRACE GRAVEL).					1.0-1.45	C B D	2	N=23			3.5					
						10.27	2.0		2.1	D	3									
				Medium soft brown-white structureless CHALK with hard lumps of intact chalk partings of brown silty CLAY and orange SILT and some flint. (GRADE VI).					2.0-2.45	S	3	N=11								
									2.7	D	4									
									3.0-3.45	U	5	(20)			29			1.98		BOREHOLE SHOWING WPT FROM 3.5 METRES.
									3.7	D	6									
				(UPPER CHALK).					4.2	D	7									
									4.0-4.45	S	7	N=8								
									4.7	D	8									
									5.0-5.45	S	9	N=7								
16/5/79	4.50	WET ▼							5.3	D	9									W10 TAKEN AT 3.1 m. AFTER BOREHOLE COMPLETE.
17/5/79	4.50	3.10								W	10									
17/5/79	4.50	6.00				6.27	6.0													BOREHOLE COMPLETE AT 6.0 METRES.

TM14NW 300
13300-48960

* WATER ▼ First water strike ▽ Subsequent water strikes

PIEZOMETER: Upper seal / Response length / Lower seal

SAMPLE AND TEST KEY: D Small disturbed sample; B Bulk disturbed sample; W Water sample; U Undisturbed sample; P Piston sample; R Rotary core recovery to scale; V Insitu vane test; S Standard penetration test; C Cone penetration test; K Permeability test; I Insitu density test

Blows N = N value 26/150, blows for 150mm drive after seating 26", blows for part or whole of seating drive only (26) Undisturbed sample blow count

V Vane strength kN/m² Natural / Remould

Cr Core recovery % ROD Rock quality designation <425 Sample % passing 425μm sieve

DEPTH All depths, levels and thicknesses in metres

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Eastern Road Construction Unit,
59/63 Goldington Road, Bedford.

FIG. A | SHEET 1 OF 1 | HOLE NO. 103

BGS BOREHOLE REFERENCE: TM14NW301

Easting: 613375
Northing: 248890
Date: -
Length: 6.00m

ENGINEER:	**PROJECT** IPSWICH BY-PASS - WESTERN SECTION.	**GROUND LEVEL** 11.98 m O.D.	**HOLE NO.** 104
LOGGED BY: MGB/LRD S.C.C. LABORATORY FIELDWORK BY: AA/JA " " LAB. TESTING BY: LAB. " "	**EXCAVATION METHODS** PERCUSSION BORING - DANDO 150 150 mm. DIA. CASED TO 5.0 m., 150 mm. DIA. UNCASED 5.0 - 5.5 m.	**COORDINATES** 16375 E 23890 N **DATES** 15/5/79 - 16/5/79	**SHEET** 1 OF 1 **FIGURE** A

Date/Time at Depth	Depth of Casing	Depth to Water*	Piez.	Description of Strata	Leg	Reduced Level	Depth	Graphical Representation	Depths	Type	No.	Blows	V / Cr / RQD	<425 %	W %	PL %	LL %	γ Mg/m³	C_u kN/m²
15/5/79	150mm			TOPSOIL.		11.98	0		0										
				Medium dense orange-brown clayey medium-fine SAND with GRAVEL.		11.43	0.55		0.6	D	1				7.4				
									0.7	B	1								
									1										
									1.0-	C									
									1.45	B	2	N=19			6.0				
										D									
				(TERRACE GRAVEL).					2										
						9.98	2.0		2.0-	C									
				Medium dense orange clayey medium-fine SAND with some GRAVEL and pockets of brown sandy CLAY.					2.45	B	3	N=23			11				
15/5/79	2.00	DRY								D									
16/5/79	2.00	DRY							3										
									3.0-	S									
				(TERRACE GRAVEL).					3.45	B	4	N=19							
						8.48	3.5			D									
				Medium soft-soft brown-white structureless CHALK with numerous partings of brown silty CLAY.					3.6	D	5								
						7.98	4.0		4										
				Medium soft-soft brown-white structureless CHALK with hard lumps of intact chalk and partings of brown SILT. (GRADE VI).					4.0-	U	6	(20)			29			2.02	
									4.45	D	6								
									4.5	D	7								
									4.7										
									5										
									5.0-	S									
				(UPPER CHALK).					5.45	D	8	N=8							
16/5/79	5.00	WET▼				6.48	5.5		6										
									7										
									8										
									9										
									10										

Additional Tests and Notes

TM14NW 301
13375-48890

BOREHOLE SHOWING WET FROM 4.5 METRES.

BOREHOLE COMPLETE AT 5.0 METRES, NO MEASURABLE WATER.

* WATER ▽ First water strike ▼ Subsequent water strikes

PIEZOMETER: Upper seal, Response length, Lower seal

SAMPLE AND TEST KEY: D Small disturbed sample; B Bulk disturbed sample; W Water sample; U Undisturbed sample; P Piston sample; R Rotary core recovery to scale; V Insitu vane test; S Standard penetration test; C Cone penetration test; K Permeability test; I Insitu density test

Blows: N = N value 26/150, blows for 150mm drive after seating 26*, blows for part or whole of seating drive only (26) Undisturbed sample blow count

V Vane strength kN/m² Natural / Remould

Cr Core recovery %; RQD Rock quality designation; <425 Sample % passing 425µm sieve

DEPTH All depths, levels and thicknesses in metres

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Eastern Road Construction Unit,
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FIG. A | SHEET 1 OF 1 | HOLE NO. 104

BGS BOREHOLE REFERENCE: TM14NW302

Easting: 613520
Northing: 248800
Date: -
Length: 15.00m

ENGINEER:	PROJECT IPSWICH BY-PASS - WESTERN SECTION.	GROUND LEVEL 14.44 m O.D.	HOLE NO. 105S
LOGGED BY: MGB/LJD S.C.C. LABORATORY	EXCAVATION METHODS PERCUSSION BORING - DANDO 150.	COORDINATES 16405 E 23800 N	SHEET 1 OF 2
FIELDWORK BY: AA/JA " "	150mm. DIA. CASED TO 14.5 M. 150mm. DIA. UNCASED 14.5 - 15.0 M.	DATES 14/5/79 - 15/5/79	FIGURE A
LAB. TESTING BY: LAB. " "			

Date/Time at Depth	Depth of Casing	Depth to Water*	Piez.	Description of Strata	Strata: Leg	Reduced Level	Depth	Graphical Representation	Depths	Sampling/in situ testing: Type	No.	Blows	V / RQD	Lab. Testing: <425 %	W %	PL %	LL %	γ Mg/m³	C_u kN/m²	Additional Tests and Notes
14/5/79	150mm					14.44	0		0											TM14NW 302 13520-48800
				TOPSOIL.		14.04	0.4													
				Medium dense orange clayey silty GRAVEL and SAND with some chalk fragments.					0.5	B	1									
									0.7	D	1				4.2					
									1.1 (1)	B	2									
									1.0 - 1.45	C / D	2	N=23			3.7					PSD,
				(TERRACE GRAVEL).					2.1 (2)	D	3				8.5					
									2.0 - 2.45	C / B	3	N=23								
						11.84	2.6		2.7	D	4				3.1					pH, SS,
				Firm brown inorganic silty CLAY with chalk fragments and some gravel.		11.44	3.0		3.0 (3)	S										
				Medium soft white structureless CHALK with hard lumps of intact chalk and partings of brown silty CLAY and yellow SILT. (GRADE VI).					3.45	D	5	N=10			25					
									3.7	D	6									
									4.0 - 4.45 (4)	U	7	(30)								
									4.5	D	7									
									4.7	D	8									
									5.1 (5)	D	9				32					
									5.0 - 5.45	S	9	N=9								
				- becoming soft from 6.0 metres approx.					6.0 (6)	D	10									
									6.5 - 6.95	U	11	(35)								
14/5/79	6.00	DRY							7.0 (7)	D	11									
15/5/79	6.00	WET							7.5	D	12									
				(UPPER CHALK).																
									8.0 (8)	S										
									8.45	D	13	N=10			34					
11.30 15/5/79	12.50	8.80 ▼																		
11.50 15/5/79	12.50	8.70							9.0 (9)	D	14									
									9.5	D	15									
									9.5 - 9.95	S	15	N=11			33					
									10											

BOREHOLE SHOWING WET OVERNIGHT. 14 - 15/5/79. NO MEASURABLE WATER.

TIME	DEPTH TO WATER
11.30	8.80
11.35	8.80
11.40	8.70
11.50	8.70
12.00	8.70

* WATER ▼ First water strike ▽ Subsequent water strikes

PIEZOMETER: Upper seal / Response length / Lower seal

SAMPLE AND TEST KEY: D Small disturbed sample; B Bulk disturbed sample; W Water sample; U Undisturbed sample; P Piston sample; R Rotary core (recovery to scale); V Insitu vane test; S Standard penetration test; C Cone penetration test; K Permeability test; I Insitu density test

Blows: N = N value 26/150, blows for 150mm drive after seating 26*, blows for part or whole of seating drive only (26) Undisturbed sample blow count

V Vane strength kN/m² Natural Remould

Cr Core recovery % RQD Rock quality designation <425 Sample % passing 425μm sieve

DEPTH All depths, levels and thicknesses in metres

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Eastern Road Construction Unit,
58/63 Goldington Road, Bedford.

FIG. A | SHEET 1 OF 2 | HOLE NO. 105S

ENGINEER:	PROJECT IPSWICH BY-PASS - WESTERN SECTION.	GROUND LEVEL 14.44 m O.D.	HOLE NO. 105S
LOGGED BY: MGB/IJRD S.C.C. LABORATORY FIELDWORK BY: AA/JA " " LAB. TESTING BY: LAB. " "	EXCAVATION METHODS PERCUSSION BORING - DANDO 150. 150mm. DIA. CASED TO 14.5 M. 150mm. DIA. UNCASED 14.5 - 15.0 M.	COORDINATES 16405 E 23800 N DATES 14/5/79 - 15/5/79	SHEET 2 OF 2 FIGURE A

Date/Time at Depth	Depth of Casing	Depth to Water*	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation	Sampling/in situ testing: Depths	Type	No.	Blows	V / ROD	Lab. Testing: 425 %	W %	PL %	LL %	γ Mg/m³	C_u kN/m²	Additional Tests and Notes
				Soft white structureless CHALK with hard lumps of intact chalk. (GRADE VI).		14.44	10.0		10											TM14NW 302
									10.5	D	16									
				- becoming medium firm from 11.0 metres approx.					11.0	S	17	N=19			31					
									11.45	D										
				- medium soft from 12.0 - 13.0 metres approx.					12.0	D	18									
									12.5	D	19									
									12.5	S	19	N=7								pH, SW,
									12.95	W	20									
				(UPPER CHALK).					13.7	D	21									
									14.5	S	22	N=15								
									14.95	D										
15/5/79	14.50	8.20				-0.56	15.0		15											BOREHOLE COMPLETE AT 15.0 METRES.

* WATER ▼ First water strike ▽ Subsequent water strikes

PIEZOMETER Upper seal / Response length / Lower seal

SAMPLE AND TEST KEY: D Small disturbed sample; B Bulk disturbed sample; W Water sample; U Undisturbed sample; P Piston sample; R Rotary core recovery to scale; V Insitu vane test; S Standard penetration test; C Cone penetration test; K Permeability test; I Insitu density test

Blows N = N value 26/150, blows for 150mm drive after seating 75*, blows for part or whole of seating drive only (26) Undisturbed sample blow count

V Vane strength kN/m² Natural / Remould

Cr Core recovery % ROD Rockquality designation 425 Sample % passing 425μm sieve

DEPTH All depths, levels and thicknesses in metres

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Eastern Road Construction Unit,
59/63 Goldington Road, Bedford.

FIG. A | SHEET 2 OF 2 | HOLE NO. 105S

BGS BOREHOLE REFERENCE: TM14NW303

Easting: 613520
Northing: 248745
Date: -
Length: 15.00m

ENGINEER:	PROJECT IPSWICH BY-PASS - WESTERN SECTION.	GROUND LEVEL 14.37 m O.D.	HOLE NO. 106S
LOGGED BY: MGD/LRD S.C.C. LABORATORY	EXCAVATION METHODS PERCUSSION BORING - DANDO 150.	COORDINATES 16520 E 23745 N	SHEET 1 OF 2
FIELDWORK BY: AA/JA " "	150mm. DIA. CASED TO 14.5 M. 150mm. DIA. UNCASED 14.5 - 15.0 M.	DATES 26/4/79 - 10/5/79	FIGURE A
LAB. TESTING BY: LAB. " "			

Date/Time at Depth	Depth of Casing	Depth to Water*	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation	Sampling/in situ testing: Depths	Type	No.	Blows	V / Cr / ROD	Lab. Testing: <425 %	W %	PL %	LL %	γ Mg/m³	C_u kN/m²	Additional Tests and Notes
26/4/79	150mm ϕ					14.37	0		0											
				TOPSOIL.		13.87	0.5													
26/4/79	0.80	DRY		Medium dense brown clayey medium-fine SAND with GRAVEL and pockets of brown sandy CLAY. - containing chalk fragments with depth.					0.6	D	1				0.5					
4/5/79	0.80	DRY							0.8	B	2									
									1.0											
									1.45	C	3	N=24								
						12.87	1.5		1.6	D	3									pH, SS,
				Stiff brown inorganic silty sandy CLAY with some chalk fragments and gravel.					2											
4/5/79	2.00	DRY							2.0											
9/5/79	2.00	DRY							2.45	U	4	(100)		65	15	11	23	2.19	113	T,
									2.5	D	4									
						11.87	2.5		2.6	B	5									
				Medium dense orange clayey GRAVEL and SAND with some chalk fragments.					3											
									3.1	B	6									PSD,
				- less CLAY and more GRAVEL with depth. (TERRACE GRAVEL).					3.0	C	6	N=38								
									3.45											
									4											
									4.1	D	7									
						9.87	4.5		4.0	C	7	N=25								
									4.45											
				Soft brown-white structureless CHALK with hard lumps of intact chalk and partings of orange SILT. (GRADE VI). (UPPER CHALK).					4.6	D	8				28					
									5											
									5.0	U	9	(45)								C, SG,
									5.45											
									5.5	D	9									
									6											
									6.0	D	10									
									6.5	D	11				32					
									6.4	S	11	N=13								
									6.85											
									7											
									7.1	D	12									
18.15 9/5/79	7.70	7.20																		
18.30 9/5/79	7.70	7.50																		
									8											
									8.1	D	13									
									8.0	S	13	N=57								
									8.45											
									8.7	D	14									
									9											
									9.4	S	15	N=9								
									9.85											
									9.5	D	15									
15.00 9/5/79	9.00	6.50							9.6	W	16									pH, SW
15.30 9/5/79	9.00	6.40							10											

TM14NW 303
13520-48745

STANDARD PENETRATION TEST HIT LARGE FLINT BETWEEN 8.0 - 8.45 METRES.

* WATER ▽ First water strike ▽ Subsequent water strikes

PIEZOMETER: Upper seal; Response length; Lower seal

SAMPLE AND TEST KEY: D Small disturbed sample; B Bulk disturbed sample; W Water sample; U Undisturbed sample; P Piston sample; R Rotary core recovery to scale; V Insitu vane test; S Standard penetration test; C Cone penetration test; K Permeability test; I Insitu density test

Blows: N = N value 26/150, blows for 150mm drive after seating 26*, blows for part or whole of seating drive only (26) Undisturbed sample blow count

V Vane strength kN/m² Natural / Remould; Cr Core recovery %; ROD Rock quality designation; <425 Sample % passing 425μm sieve

DEPTH All depths, levels and thicknesses in metres

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Director
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FIG. A | SHEET 1 OF 2 | HOLE NO. 106S

ENGINEER:	**PROJECT** IPSWICH BY-PASS - WESTERN SECTION.	**GROUND LEVEL** 14.37 m O.D.	**HOLE NO.** 106S
LOGGED BY: MGH/LRD S.C.C. LABORATORY	**EXCAVATION METHODS** PERCUSSION BORING - DANDO 150.	**COORDINATES** 16520 E 23745 N	**SHEET** 2 OF 2
FIELDWORK BY: AA/JA " "	150mm. DIA. CASED TO 14.5 M. 150mm. DIA. UNCASED 14.5 - 15.0 M.	**DATES** 26/4/79 - 10/5/79	**FIGURE** A
LAB. TESTING BY: LAB. " "			

Date/Time at Depth	Depth of Casing	Depth to Water*	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth
1100 9/5/79	10.50	8.00		Soft brown white structureless CHALK with hard lumps of intact chalk and partings of orange SILT. (GRADE VI).		4.37	10.0
10/5/79 0730	10.50	7.40					
				(UPPER CHALK).			
10/5/79	14.50	9.00				-0.63	15.0

Graphical Representation

Sampling/In situ testing: Depths	Type	No.	Blows	V / RQD
10.2	D	17		
11.1	D	18		
11.0-11.45	S	18	N=12	
12.0	D	19		
12.6	D	20		
12.5-12.95	S	20	N=30	
14.0	D	21		
14.5	D	22		
14.5-14.95	S	22	N=40	

Lab. Testing	-425 %	W %	PL %	LL %	γ Mg/m³	C_u kN/m²

Additional Tests and Notes

TM14NW 303

BOREHOLE COMPLETE AT 15.0 METRES.

*WATER ▽ First water strike ▼ Subsequent water strikes

PIEZOMETER Upper seal / Response length / Lower seal

SAMPLE AND TEST KEY: D Small disturbed sample; B Bulk disturbed sample; W Water sample; U Undisturbed sample; P Piston sample; R Rotary core recovery to scale; V Insitu vane test; S Standard penetration test; C Cone penetration test; K Permeability test; I Insitu density test

Blows: N = N value 26/150, blows for 150mm drive after seating 26*, blows for part or whole of seating drive only (26) Undisturbed sample blow count

V Vane strength kN/m² Natural / Remould

Cr Core recovery % RQD Rock quality designation <425 Sample % passing 425μm sieve

DEPTH All depths, levels and thicknesses in metres

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FIG. A | SHEET 2 OF 2 | HOLE NO. 106S

BGS BOREHOLE REFERENCE: TM14NW304

Easting: 613455
Northing: 248710
Date: -
Length: 15.00m

ENGINEER:	**PROJECT** IPSWICH BY-PASS - WESTERN SECTION.	**GROUND LEVEL** 18.65 m O.D.	**HOLE NO.** 107S
LOGGED BY: MGB/LRD S.C.C. LABORATORY **FIELDWORK BY:** AA/JA " " **LAB. TESTING BY:** LAB. " "	**EXCAVATION METHODS** PERCUSSION BORING - DANDO 150. 150 mm. DIA. CASED TO 14.5 m., 150 mm. DIA UNCASED 14.5 - 15.0 m.	**COORDINATES** 16455 E 23710 N **DATES** 10/5/79 - 11/5/79	**SHEET** 1 OF 2 **FIGURE** A

Date/Time at Depth	Depth of Casing	Depth to Water*	Piez.	Description of Strata	Strata Leg	Strata Reduced Level	Strata Depth	Graphical Representation	Depths	Sampling/In situ testing Type	No.	Blows	V / RQD	Lab. Testing <425 %	W %	PL %	LL %	γ Mg/m³	C_u kN/m²	Additional Tests and Notes
10/5/79	150mm Ø					18.65	0		0											TM14NW 304 1345-4871O
				TOPSOIL.		18.25	0.4													
				Medium dense orange clayey medium-fine SAND with GRAVEL.					0.5 0.7	B D	1 1				7.6					
				(TERRACE GRAVEL).					1.1 1.0-1.45	D C B	2 2	N=19			7.3					
						16.65	2.0		2.1	D	3				12					
				Firm orange/brown very sandy CLAY with GRAVEL.		16.35	2.3		2.0-2.45	C	3	N=13								
				Firm brown inorganic silty CLAY with chalk fragments & partings of orange SILT.		15.95	2.7		2.4 2.8	D D	4 5				12 5.6					
				Medium dense orange clayey SAND and GRAVEL with chalk fragments.		15.35	3.3		3.0 3.45 3.4	C D	6 6	N=15								
				Medium soft-soft white structureless CHALK with hard lumps of intact chalk and partings of orange SILT. (GRADE VI).					4.2 4.0-4.45 4.7	D S D	7 7 8	N=8								
10/5/79	4.00	DRY							5.0											
11/5/79	4.00	DRY		- becoming blocky and rubbly with partings of orange SILT and brown CLAY from 5.0 metres approx. (GRADE IV).					5.45 5.5	U D	9 9	(20)								
				- becoming yellow/white with depth.					6.0 6.5 6.5-6.95	D D S	10 11 11	N=8								
									7 7.5	D	12									
				(UPPER CHALK).					8.0-8.45 8.5	U D	13 13	(15)								
									9.0 9.5 9.5-9.95	D D S	14 15 15	N=6								
									10											

* WATER ▽ First water strike ▼ Subsequent water strikes

PIEZOMETER Upper seal / Response length / Lower seal

SAMPLE AND TEST KEY: D Small disturbed sample; B Bulk disturbed sample; W Water sample; U Undisturbed sample; P Piston sample; R Rotary core; I recovery to scale; V Insitu vane test; S Standard penetration test; C Cone penetration test; K Permeability test; I Insitu density test

Blows: N = N value 26/150, blows for 150mm drive after seating 26*, blows for part or whole of seating drive only (26) Undisturbed sample blow count

V Vane strength kN/m² Natural / Remould

Cr Core recovery %; RQD Rock quality designation; <425 Sample % passing 425µm sieve

DEPTH All depths, levels and thicknesses in metres

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FIG. A | SHEET 1 OF 2 | HOLE NO. 107S

ENGINEER:	PROJECT IPSWICH BY-PASS - WESTERN SECTION.	GROUND LEVEL 18.65 m O.D.	HOLE NO. 1075
LOGGED BY: MGB/LRD S.C.C. LABORATORY FIELDWORK BY: AA/JA " " LAB. TESTING BY: LAB. " "	EXCAVATION METHODS PERCUSSION BORING - DANDO 150. 150 mm. DIA. CASED TO 14.5 m., 150 mm. DIA. UNCASED 14.5 - 15.0 m.	COORDINATES 16455 E 23710 N DATES 10/5/79 - 11/5/79	SHEET 2 OF 2 FIGURE A

Date/Time at Depth	Depth of Casing	Depth to Water*	Piez.	Description of Strata	Strata: Leg	Reduced Level	Depth	Graphical Representation	Sampling/in situ testing: Depths	Type	No.	Blows	V / RQD	Lab. Testing: <425 %	W %	PL %	LL %	γ Mg/m³	C_u kN/m²	Additional Tests and Notes
						18.65	10.0		10											TM14NW 304
				Medium soft yellow/white blocky and rubbly CHALK with partings of orange SILT and brown CLAY. (GRADE IV).					10.5	D	16									
									11											BOREHOLE WET FROM 11.0 METRES APPROX.
									11.0-11.45	U	17	(15)								
				- becoming soft from 12.0 metres approx.					12											
									12.0	D	18									
									12.6	D	19									
									12.5-12.95	S	19	N=16								
				(UPPER CHALK).					13											
									13.5	D	20									
									14											TIME / DEPTH TO WATER 14.00 14.50 14.05 13.90 14.10 12.80 14.20 12.70 14.30 12.50
14.00 11/5/79	14.50	14.50 w							14.6	D	21									
14.30 11/5/79	14.50	12.50							14.5-14.95	S	22	N=12								
11/5/79	14.50	12.50				3.65	15.0		14.95	D										BOREHOLE COMPLETE AT 15.0 METRES.
									15											
									16											
									17											
									18											
									19											
									20											

* WATER ▼ First water strike ▽ Subsequent water strikes

PIEZOMETER Upper seal / Response length / Lower seal

SAMPLE AND TEST KEY: D Small disturbed sample; B Bulk disturbed sample; W Water sample; U Undisturbed sample; P Piston sample; R Rotary core recovery in scale; V Insitu vane test; S Standard penetration test; C Cone penetration test; K Permeability test; I Insitu density test

Blows N = N value 26/150, blows for 150mm drive after seating 26*, blows for part or whole of seating drive only (26) Undisturbed sample blow count

V Vane strength kN/m² Natural / Remould

C: Core recovery % RQD Rock quality designation <425 Sample % passing 425μm sieve

DEPTH All depths, levels and thicknesses in metres

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FIG. A | SHEET 2 OF 2 | HOLE NO. 1075

BGS BOREHOLE REFERENCE: TM14NW305

Easting: 613545
Northing: 248640
Date: -
Length: 12.00m

ENGINEER:	PROJECT IPSWICH BY-PASS - WESTERN SECTION.	GROUND LEVEL 19.22 m O.D.	HOLE NO. 108
LOGGED BY: HGB/LRD S.C.C. LABORATORY FIELDWORK BY: AA/JA " " LAB. TESTING BY: LAB. " "	EXCAVATION METHODS PERCUSSION BORING - DANDO 150. 150mm. DIA. CASED TO 12.0 M. 150mm. DIA. UNCASED 12.0 - 12.5 M.	COORDINATES 16545 E 23640 N DATES 17/5/79 - 21/5/79	SHEET 1 OF 2 FIGURE A

Date/Time at Depth	Depth of Casing	Depth to Water*	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation	Sampling/in situ testing: Depths	Type	No.	Blows	V / RQD	Lab. Testing: <425 %	W %	PL %	LL %	γ Mg/m³	C_u kN/m²	Additional Tests and Notes
17/5/79	3.0m ϕ			TOPSOIL.		19.22	0		0											TM14NW 305 13545-48640
						19.02	0.2		0.3	D	1									
				Stiff brown inorganic silty CLAY with chalk fragments, partings of orange SILT and SAND and some gravel. (BOULDER CLAY).		18.02	1.2		1.0-1.45	U	2	(80)			24			2.15	487	T, C, SG,
									1.5	D	2									
				Firm white blocky and rubbly CHALK with partings of orange SILT. (iron stained). (GRADE IV).					1.7	D	3									
									2.0	D	4									
				- containing SAND and GRAVEL from 2.0 - 3.0 metres approx.					2.0-2.45	S B	5	N=31								
									3.0-3.45	U	6	(35)			30			1.95		
				(UPPER CHALK).					3.5	D	6									
17/5/79	3.70	DRY							3.7	D	7									
18/5/79	3.70	DRY				15.22	4.0		4.2	D	8									
				Medium soft white structureless CHALK with partings of yellow SILT (GRADE VI) and some blocky and rubbly CHALK (GRADE IV).					4.0-4.45	S	8	N=6								
									4.7	D	9									
									5.0-5.45	U	10	(20)			34			1.91		
									5.5	D	10									
									5.7	D	11									
				- becoming very soft from 6.0 metres approx.					6.0-6.45	S D	12	N=1								
									7.0	D	13									
									7.4-7.85	U	14	(32)			33			1.88		
									8.5	D	15									
				- becoming medium soft from 9.0 metres approx.					9.0-9.45	S D	16	N=4								
				(UPPER CHALK).					10.0	D	17									

* WATER 1. First water strike 2. Subsequent water strikes

PIEZOMETER: Upper seal; Response length; Lower seal

SAMPLE AND TEST KEY: D Small disturbed sample; B Bulk disturbed sample; W Water sample; U Undisturbed sample; P Piston sample; R Rotary core recovery to scale; V Insitu vane test; S Standard penetration test; C Cone penetration test; K Permeability test; I Insitu density test

Blows: N = N value 26/150, blows for 150mm drive after seating 25*, blows for part or whole of seating drive only (26) Undisturbed sample blow count

V Vane strength kN/m² (Natural / Remould)

Cr Core recovery %; RQD Rock quality designation; <425 Sample % passing 425μm sieve

DEPTH All depths, levels and thicknesses in metres

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FIG. A | SHEET 1 OF 2 | HOLE NO. 108

ENGINEER:	PROJECT IPSWICH BY-PASS - WESTERN SECTION.	GROUND LEVEL 19.22 m O.D.	HOLE NO. 108
LOGGED BY: HGD/LRD S.C.C. LABORATORY FIELDWORK BY: AA/JA " " LAB. TESTING BY: LAB. " "	EXCAVATION METHODS PERCUSSION BORING - DANDO 150. 150mm. DIA. CASED TO 12.0 M. 150mm. DIA. UNCASED 12.0 - 12.5 M.	COORDINATES 16545 E 23640 N DATES 17/5/79 - 21/5/79	SHEET 2 OF 2 FIGURE A

Date/Time at Depth	Depth of Casing	Depth to Water*	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation	Sampling/In situ testing: Depths	Type	No.	Blows	V / Cr / RQD	Lab. Testing: -425 %	W %	PL %	LL %	γ Mg/m³	C_u kN/m²	Additional Tests and Notes
				Medium soft white structureless CHALK with partings of yellow SILT (GRADE VI) and some blocky and rubbly CHALK, (GRADE IV).		9.22	10.0		10											TM14NW 305
									10.5-10.95	U	18	(30)								
									11											
									11.0	D	18									
									11.5	D	19									
				(UPPER CHALK).					12											
21/5/79	12.00	WET							12.0-12.45	S D	20	N=8								
						6.72	12.5													BOREHOLE COMPLETE AT 12.5 METRES, NO MEASURABLE WATER.
									13											
									14											
									15											
									16											
									17											
									18											
									19											
									20											

* WATER ▼ First water strike ▽ Subsequent water strikes

PIEZOMETER Upper seal / Response length / Lower seal

SAMPLE AND TEST KEY: D Small disturbed sample; B Bulk disturbed sample; W Water sample; U Undisturbed sample; P Piston sample; R Rotary core; recovery to scale; V Insitu vane test; S Standard penetration test; C Cone penetration test; K Permeability test; I Insitu density test

Blows: N = N value 26/150, blows for 150mm drive after seating 26*, blows for part or whole of seating drive only (26) Undisturbed sample blow count

V Vane strength kN/m² Natural Remould; Cr Core recovery %; RQD Rock quality designation; -.425 Sample % passing 425μm sieve

DEPTH All depths, levels and thicknesses in metres

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FIG. A | SHEET 2 OF 2 | HOLE NO. 108

BGS BOREHOLE REFERENCE: TM14NW512

Easting: 613200
Northing: 248700
Date: 1973
Length: 45.72m

WATER RESOURCES BOARD

WELL RECORD

SHEET 1

W.R.B. REF. No. TM 14/12 A

R.A. LICENCE No.

1. WELL IDENTITY

NATIONAL GRID REFERENCE TM 132 487

Well at Mockbeggars Hall Farm

I.G.S. REF. No.

RIVER AUTHORITY

Town Clayden, Ipswich

HYDROMETRIC AREA

County

SUB-CATCHMENT

Owner of well

Well made by H. Warner & Son. Date of sinking September 1973

Information from Land & Water Management Ltd. Date received August 1975

2. WELL DESCRIPTION

Level of ground surface ..... m. If well top is not at above* ..... m.

above sea level (O.D.) ..... ft. ground level how far below ..... ft.

Shaft ..... m. / ..... ft. deep; Diameter at top ..... mm. / ..... in.; at bottom ..... mm. / ..... in.

Bore 150 ft. deep; Diameter at top 10 in.; at bottom 10 in.

Details of headings

DETAILS OF PERMANENT LINING TUBES

Length Plain ..... m. / ..... ft.; Diam. ..... mm. / ..... in.; Length Slotted ..... m. / ..... ft.; Diam. ..... mm. / ..... in.; Top ..... m. / at ft. above* ~~below~~ surface

Length Plain ..... m. / ..... ft.; Diam. ..... mm. / ..... in.; Length Slotted ..... m. / ..... ft.; Diam. ..... mm. / ..... in.; Top ..... m. / ..... ft. above* ~~below~~ surface

Length Plain ..... m. / ..... ft.; Diam. ..... mm. / ..... in.; Length Slotted ..... m. / ..... ft.; Diam. ..... mm. / ..... in.; Top ..... m. / ..... ft. above* ~~below~~ surface

Details of well screen

DETAILS OF REST WATER LEVELS DURING CONSTRUCTION

Water struck at depths of ..... below well top

Rest level of water ..... m. / ..... ft. above* ~~below~~ ~~O.D.*~~ well top when bore ..... m. / ..... ft. deep. Date

Rest level of water ..... m. / ..... ft. above* ~~below~~ ~~O.D.*~~ well top when bore ..... m. / ..... ft. deep. Date

Rest level of water on completion of bore 25 ft. above* ~~below~~ ~~O.D.*~~ well top when bore 150 ft. deep. Date September 1975

Method of drilling

Brief details of well development e.g. acid treatment etc.

* delete as applicable

(18127/1)

5. STRATA

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS	DEPTH	DEPTH	
		METRES	METRES	FEET	IN
Topsoil				1	-
Glacial	Sand and gravel			24	-
U. Chalk	Chalk			150	-

APPENDIX 3 WAVENEY AND EAST SUFFOLK CHALK & CRAG WATER BODY CLASSIFICATION CRITERIA

Waveney and East Suffolk Chalk & Crag Water Body: Poor overall status
Water Body ID GB40501G400600
Classifications

Classification Item	2013	2014	2015	2016	2019
Overall Water Body	Poor	Poor	Poor	Poor	Poor
Quantitative	Poor	Poor	Poor	Poor	Poor
Quantitative Status element	Poor	Poor	Poor	Poor	Poor
Quantitative Dependent Surface Water Body Status	Good	Good	Good	Good	Poor
Quantitative GWDTEs test	Good	Good	Good	Good	Good
Quantitative Saline Intrusion	Good	Good	Good	Good	Good
Quantitative Water Balance	Poor	Poor	Poor	Poor	Good
Chemical (GW)	Poor	Poor	Poor	Poor	Poor
Chemical Status element	Poor	Poor	Poor	Poor	Poor
Chemical Dependent Surface Water Body Status	Good	Good	Good	Good	Good
Chemical Drinking Water Protected Area	Poor	Poor	Poor	Poor	Poor
Chemical GWDTEs test	Good	Good	Good	Good	Good
Chemical Saline Intrusion	Good	Good	Good	Good	Good
General Chemical Test	Poor	Poor	Poor	Poor	Poor
Supporting elements (Groundwater)					
Prevent and Limit Objective	Active				Active
Trend Assessment	Upward trend	Upward trend	Upward trend	Upward trend	Upward trend

APPENDIX 4 GIPPING (D-S STOWMARKET) WATER BODY CLASSIFICATION CRITERIA

Gipping (d/s Stowmarket) Water Body: Poor ecological status
Water Body ID GB105035046280
Classifications

Classification Item	2013	2014	2015	2016	2019
Ecological	**Moderate**	**Moderate**	**Moderate**	**Moderate**	**Poor**
Biological quality elements	**Good**	**Good**	**Moderate**	**Moderate**	**Poor**
Fish	**Good**	**High**	**High**	**High**	**High**
Invertebrates	**Good**	**Good**	**High**	**High**	**Good**
Macrophytes and Phytobenthos Combined		**High**	**Moderate**	**Moderate**	**Poor**
Physico-chemical quality elements	**Moderate**	**Moderate**	**Moderate**	**Moderate**	**Moderate**
Acid Neutralising Capacity		**High**	**High**	**High**	**High**
Ammonia (Phys-Chem)	**High**	**High**	**High**	**High**	**High**
Biochemical Oxygen Demand (BOD)	**High**	**High**	**High**	**High**	
Dissolved oxygen	**Moderate**	**Good**	**Good**	**Good**	**Poor**
Phosphate	**Moderate**	**Moderate**	**Moderate**	**Moderate**	**Poor**
Temperature	**High**	**High**	**High**	**High**	**Good**
pH	**High**	**High**	**High**	**High**	**High**
Hydromorphological Supporting Elements	**Supports good**	**Supports good**	**Supports good**	**Supports good**	**Supports good**
Hydrological Regime	**Does not support good**	**Does not support good**	**Does not support good**	**Does not support good**	**Does not support good**
Supporting elements (Surface Water)	**Moderate**	**Moderate**	**Moderate**	**Moderate**	**Moderate**
Mitigation Measures Assessment	**Moderate or less**	**Moderate or less**	**Moderate or less**	**Moderate or less**	**Moderate or less**
Specific pollutants	**High**	**High**	**High**	**High**	**High**
Chlorothalonil					**High**
Chromium (VI)					**High**
Copper	**High**	**High**	**High**	**High**	**High**
Iron					**High**
Pendimethalin					**High**
Triclosan	**High**	**High**			
Zinc	**High**	**High**	**High**	**High**	**High**
Other Substances					
1-1-1-trichloroethane	**High**				
Chemical	**Good**	**Good**	**Good**	**Good**	**Fail**
Priority hazardous substances	**Good**	**Good**	**Good**	**Good**	**Fail**
Benzo(a)pyrene					**Good**
Cadmium and Its Compounds	**Good**	**Good**	**Good**	**Good**	**Good**
Di(2-ethylhexyl)phthalate (Priority hazardous)	**Good**	**Good**	**Good**	**Good**	**Good**
Dioxins and dioxin-like compounds					**Good**
Endosulfan	**Good**	**Good**	**Good**		
Heptachlor and cis-Heptachlor epoxide					**Good**

Gipping (d/s Stowmarket) Water Body: Poor ecological status
Water Body ID GB105035046280
Classifications

Classification Item	2013	2014	2015	2016	2019
Hexabromocyclododecane (HBCDD)					**Good**
Hexachlorobenzene					**Good**
Hexachlorobutadiene					**Good**
Hexachlorocyclohexane	**Good**	**Good**	**Good**	**Good**	**Good**
Mercury and Its Compounds			**Good**	**Good**	**Fail**
Nonylphenol	**Good**	**Good**	**Good**	**Good**	**Good**
Perfluorooctane sulphonate (PFOS)					**Fail**
Polybrominated diphenyl ethers (PBDE)					**Fail**
Quinoxyfen					**Good**
Tributyltin Compounds	**Good**	**Good**			
Trifluralin (Priority hazardous)	**Good**	**Good**	**Good**	**Good**	**Good**
Priority substances	**Good**	**Good**	**Good**	**Good**	**Good**
1,2-dichloroethane	**Good**	**Good**	**Good**	**Good**	**Good**
Aclonifen					**Good**
Alachlor					**Good**
Bifenox					**Good**
Cybutryne (Irgarol®)					**Good**
Cypermethrin (Priority hazardous)					**Good**
Dichlorvos (Priority)					**Good**
Fluoranthene					**Good**
Lead and Its Compounds	**Good**	**Good**	**Good**	**Good**	**Good**
Nickel and Its Compounds	**Good**	**Good**	**Good**	**Good**	**Good**
Trichloromethane	**Good**	**Good**	**Good**	**Good**	**Good**
Other Pollutants	**Good**	**Good**	**Good**	**Good**	**Good**
Aldrin, Dieldrin, Endrin & Isodrin	**Good**	**Good**	**Good**	**Good**	**Good**
Carbon Tetrachloride	**Good**	**Good**	**Good**	**Good**	**Good**
Trichloroethylene	**Good**	**Good**	**Good**	**Good**	**Good**
para - para DDT	**Good**	**Good**	**Good**	**Good**	**Good**

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Paper Mill Lane PCCS
Access AP-AG
Acess AP-AF
Jointing Bay 4

TM14NW107 TM14NW254 TM14NW62 TM14NW299 TM14NW300 TM14NW301 TM14NW302 TM14NW303 TM14NW512 TM14NW304 TM14NW130 TM14NW305 TM14NW147

B 1113 BRAMFORD ROAD PAPER MILL LANE A14 LIMEKILN CL ORCHARD CLOSE THE BEECHES NEWELL MS OLD IPSWICH ROAD OLD NORWICH ROAD LORAINE WAY Track Path (um) Path

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

EA THREE DCO Corridor
Primary Construction Consolidation Site
Jointing Bay Compound
HGV Turning, Cleaning and Washing
Trackway
Access Track
Haul Road
Top Soil
EA THREE Existing Cable Ducts
Historic BGS Geological Logs

Superficial Geology
Alluvium - Clay and Silt
Kesgrave Catchment Subgrouo - Sand and Gravel
Lowestoft Formation - Diamiction
Lowestoft Formation - Sand and Gravel
River Terrace Deposits (Undifferentiated) - Sand and Gravel

GoBe consultants

Rev	Date	By	Comment
B	14/04/2022	PW	Second Issue
A	13/01/2022	JRS	First Issue

Original A3 Plot Scale 1:7,500

0 150 300 Metres

Paper Mill Lane Works Stage

Figure 1: Superficial Geology

Drg No	05356.00006.12.0019.1 Superficial Geology
Rev	2
Date	14/04/2022
Layout	N/A

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Paper Mill Lane PCCS

Access AP-AG

Acess AP-AF

Jointing Bay 4

TM14NW107 TM14NW254 TM14NW62 TM14NW299 TM14NW300 TM14NW301 TM14NW302 TM14NW303 TM14NW304 TM14NW305 TM14NW512 TM14NW130 TM14NW147

B 1113 BRAMFORD ROAD LORAINE WAY PAPER MILL LANE A14 OLD IPSWICH ROAD OLD NORWICH ROAD NEWELL THE BEECHES CLOSE LIMEKILN CL ORCHARD

Track Path (um) Posts MS Tk

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

EA THREE DCO Corridor
Primary Construction Consolidation Site
Jointing Bay Compound
HGV Turning, Cleaning and Washing
Trackway
Access Track
Haul Road
Top Soil
EA THREE Existing Cable Ducts
Historic BGS Geological Logs

Bedrock Geology

Red Crag Formation - Sand (Quaternary)
Thames Group - Clay, Silt And Sand (Paleogene)
Culver Chalk Formation - Chalk (Cretaceous)
Newhaven Chalk Formation - Chalk (Cretaceous)

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Rev	Date	By	Comment
B	14/04/2022	PW	Second Issue
A	13/01/2022	JRS	First Issue

Original A3 Plot Scale 1:7,500

0 150 300 Metres

Paper Mill Lane Works Stage

Figure 2: Bedrock Geology

Drg No	05356.00006.12.0018.1 Bedrock Geology
Rev	2
Date	14/04/2022
Layout	N/A

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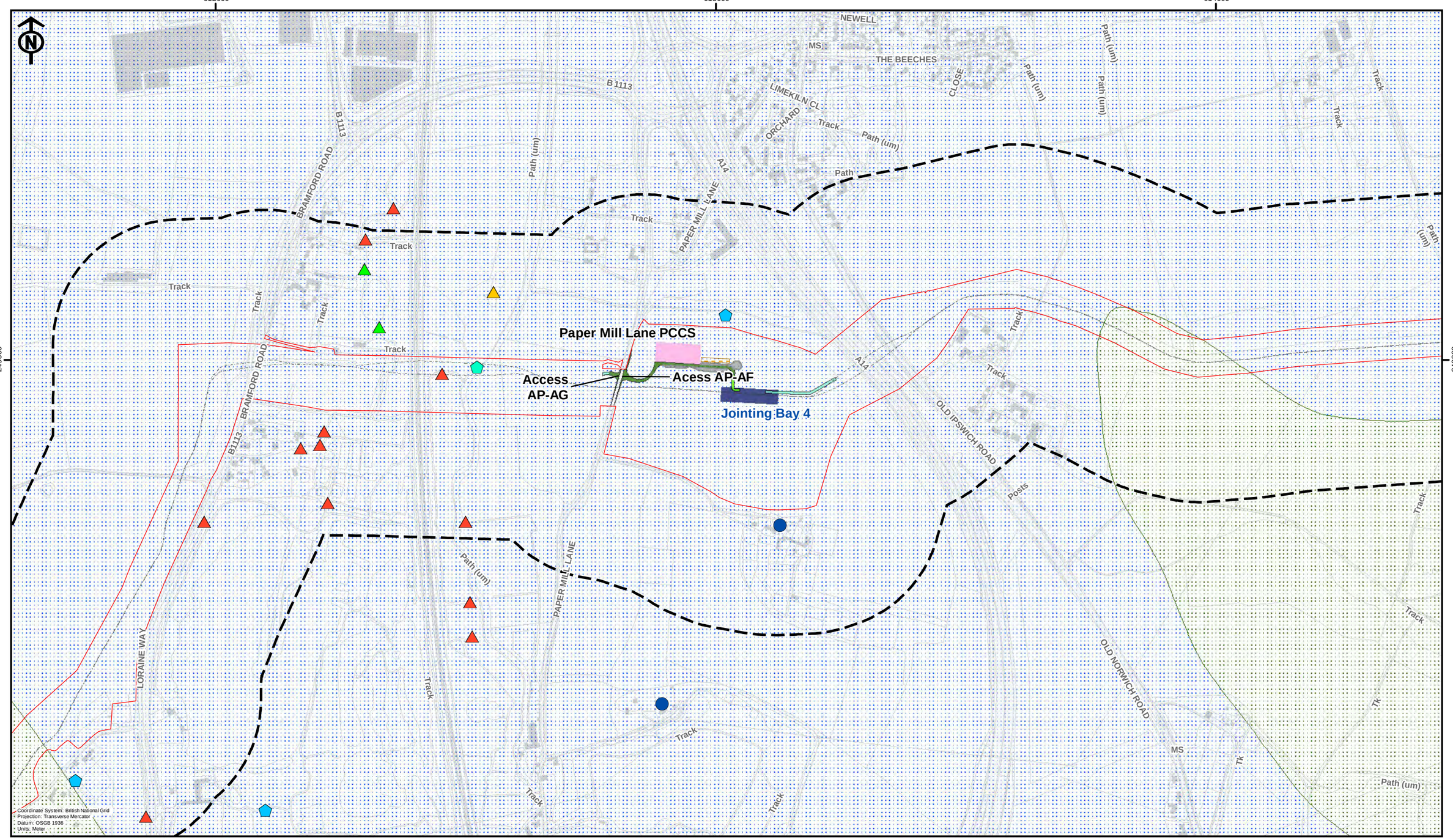

EA THREE DCO Corridor

Primary Construction Consolidation Site

Jointing Bay Compound

HGV Turning, Cleaning and Washing

Trackway

Access Track

Haul Road

EA THREE Existing Cable Ducts

Top Soil

Commencement Works Area 250m Buffer

Private Abstractions

Licensed Ground Water Abstractions

Licensed Surface Water Abstractions

Springs

Water Issue (Potential Spring)

Drain (Potential Spring)

Depression Subject to Groundwater Inflow

Source Protection Zones

Zone II - Outer Protection Zone

Zone III - Total Catchment

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Rev	Date	By	Comment
B	14/04/2022	PW	Second Issue
A	13/01/2022	PW	First Issue

Original A3 Plot Scale 1:7,500

0 150 300 Metres

Paper Mill Lane Works Stage

Figure 4: Location of all Current Abstraction Licences, Private Abstractions and Source Protection Zones

Drg No	05356.00006.12.0009.1 SPZ and Abstractions
Rev	2
Date	14/04/2022
Layout	N/A

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Paper Mill Lane PCCS

Access AP-AG

Acess AP-AF

Jointing Bay 4

B 1113 BRAMFORD ROAD Track Path (um) A14 PAPER MILL LANE NEWELL MS THE BEECHES CLOSE LIMEKILN CL ORCHARD Path OLD IPSWICH ROAD Posts LORAINE WAY OLD NORWICH ROAD Tk

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

EA THREE DCO Corridor
Primary Construction Consolidation Site
Jointing Bay Compound
HGV Turning, Cleaning and Washing
Trackway
Access Track
Haul Road
Top Soil
EA THREE Existing Cable Ducts
Commencement Works Area 500m Buffer

Note: There are no Ecological Sites within the displayed area

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Rev	Date	By	Comment
B	14/04/2022	PW	Second Issue
A	13/01/2022	PW	First Issue

Original A3 Plot Scale 1:7,500

0 150 300 Metres

Paper Mill Lane Works Stage

Figure 5: Ecological Sites

Drg No	05356.00006.12.0012.1 Ecological Sites
Rev	2
Date	14/04/2022
Layout	N/A

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Paper Mill Lane PCCS

Acess AP-AF

Access AP-AG

Jointing Bay 4

A14

OLD IPSWICH ROAD

Works No.s Overview

51

50

River Gipping

Meckbeggars Hall

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

EA THREE DCO Corridor
Primary Construction Consolidation Site
Jointing Bay Compound
Top Soil
HGV Turning, Cleaning and Washing
Trackway
Access Track
Haul Road
EA THREE Existing Cable Ducts
EA ONE Existing Cable Ducts

Works No.s
50
51

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Rev	Date	By	Comment
B	05/04/2022	PW	Second Issue
A	31/03/2022	JRS	First Issue

Original A3 Plot Scale 1:2,500

0 50 100 Metres

Paper Mill Lane Works Stage

Figure 1: Site Context Plan

Drg No	05356.00006.12.0021.1 Site Context Plan
Rev	2
Date	05/04/2022
Layout	N/A

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Paper Mill Lane PCCS

Access AP-AG

Acess AP-AF

Jointing Bay 4

NEWELL

THE BEECHES

CLOSE

LIMEKILN CL

ORCHARD

PAPER MILL LANE

BRAMFORD ROAD

B 1113

A14

OLD IPSWICH ROAD

OLD NORWICH ROAD

LORAINE WAY

Track

Path (um)

Path

Posts

MS

Tk

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

EA THREE DCO Corridor

Primary Construction Consolidation Site

Jointing Bay Compound

HGV Turning, Cleaning and Washing

Trackway

Access Track

Haul Road

EA THREE Existing Cable Ducts

Commencement Works Area 250m Buffer

Top Soil

Private Abstractions

Licensed Surface Water Abstractions

Spring

Depression Subject to Groundwater Inflow

Drain ((Potential Spring)

Water Issue (Potential Spring)

Source Protection Zones

Zone II - Outer Protection Zone

Zone III - Total Catchment

Surface Water Area

Statutory Main River

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Rev	Date	By	Comment
B	19/04/2022	PW	Second Issue
A	11/01/2022	PW	First Issue

Original A3 Plot Scale 1:7,500

0 150 300 Metres

Paper Mill Lane Works Stage

Figure 2: Hydrological and Hydrogeological Features

Drg No	05356.00006.12.00063.1 SPZ and Abstractions
Rev	2
Date	19/04/2022
Layout	N/A

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