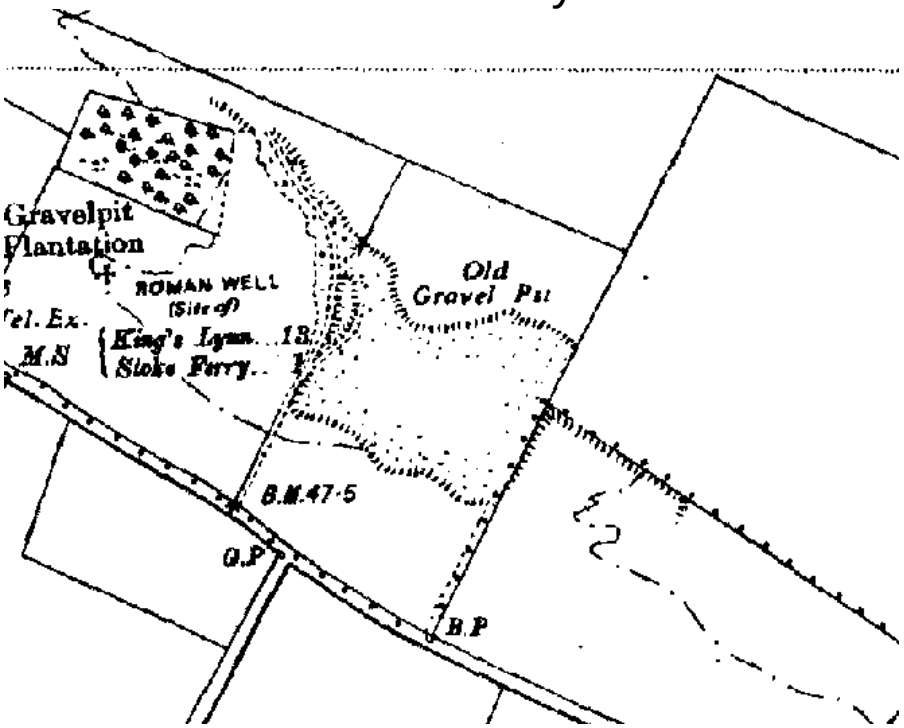
Borough Council of
King's Lynn &
West Norfolk

Contaminated Land Inspection Report

Former Landfills
Lynn Road
Stoke Ferry



April 2023

Reference no. CL022074

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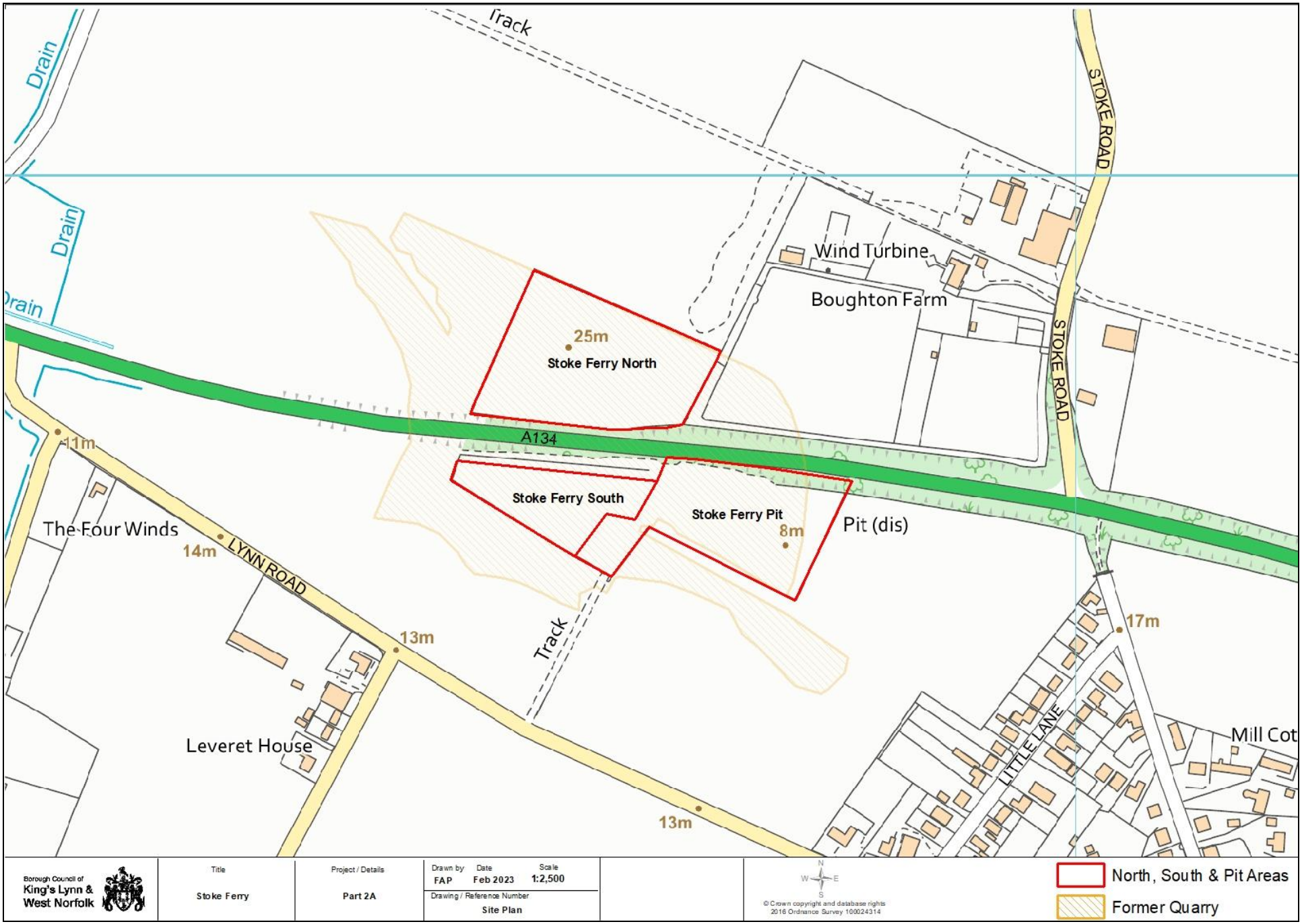
Track
Drain
Drain
Drain
STOKE ROAD
Wind Turbine
Boughton Farm
STOKE ROAD
25m
Stoke Ferry North
A134
11m
Stoke Ferry South
Stoke Ferry Pit
8m
Pit (dis)
The Four Winds
14m
LYNN ROAD
13m
Track
17m
Leveret House
LITTLE LANE
Mill Cot
13m
Borough Council of King's Lynn & West Norfolk
Title
Stoke Ferry
Project / Details
Part 2A
Drawn by FAP
Date Feb 2023
Scale 1:2,500
Drawing / Reference Number
Site Plan
N
W
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S
© Crown copyright and database rights 2016 Ordnance Survey 100024314
North, South & Pit Areas
Former Quarry

Executive Summary

The Borough Council of King's Lynn and West Norfolk (BCKLWN) has a statutory duty to inspect its district for potentially contaminated land under Part 2A of the Environmental Protection Act 1990. The Borough Council's Part 2A inspection strategy has identified The former landfills at Lynn Road, Stoke Ferry (the site) as being of high priority due to the presence of an unmanaged landfill and potentially sensitive receptors. The site has been split into three areas: Stoke Ferry North, Stoke Ferry South and Stoke Ferry Pit (shown on site plan).

Given the former site use, an assessment of the site has been undertaken to assess the potential for harm to human health, property, ground/surface water and designated environmental receptors under Part 2A EPA 1990.

To gather information of the site's history a desk study and preliminary risk assessment were carried out by the Environmental Quality Team. Records relating to the site history, monitoring and regulatory action are held on the borough council files and also on the Environment Agency public register. These records together with other documentary and site walkover information were used in compiling this written statement.

From the evidence gathered during the desk study of the site history and site walkovers, the following can be stated: The site was historically a gravel pit. Landfilling took place between 1987 and 2006. It is understood that the Stoke Ferry Pit site is not filled. The site's present use is informal amenity land. Stoke Ferry North is not formally capped or landscaped. A restoration plan was approved for the Stoke Ferry Pit in 2016 to a nature conservation based after-use. Stoke Ferry South and Pit are reported to have been completed and restored around 2019, and entered in an aftercare and management period. The North and South sites are not formally managed as ownership was passed to the crown when the company operating the sites went into liquidation

Evidence was noted of hazardous ground gas generation on the northern site, and some potential associated crop damage. Chemical analysis of water from the northern site is reported to indicate the presence of groundwater hazardous substances in leachate from the landfill.

From the contaminated land risk assessment, plausible source pathway receptor linkages were identified at the Stoke Ferry North, South and Pit sites, and a VERY LOW risk from contamination to human health, MODERATE/LOW or VERY LOW risk to property (buildings, crops and livestock), VERY LOW risk to the wider environment, LOW risk was identified to surface water, and MODERATE/LOW risk was identified to groundwater (LOW risk to groundwater at the Stoke Ferry Pit Site).

No evidence was noted of significant pollution of controlled waters or of the significant possibility of such pollution. The Environment Agency have confirmed that they agree with the Authority's assessment of the potential risks to controlled waters from the site, and with the conclusions that have been drawn.

There was no evidence of harm or of a significant possibility of significant harm to the receptors identified in the conceptual site model. As the risk posed to groundwater is moderate, the Stoke Ferry North and Stoke Ferry South sites would be classified as Category 3 as set out in the Statutory Guidance. The Stoke Ferry Pit site would be classified Category 4. Therefore, the site is not considered to be contaminated land under Part 2A of the Environmental Protection Act 1990.

The Part 2A status will be reviewed if conditions change on site or if any reports of harm or pollution are received.

1 Introduction

This report details a review of information and risk summary about land at Lynn Road, Stoke Ferry and provides a conclusion on the risk to human health, property, groundwater and the wider environment.

The Contaminated Land Statutory Guidance (DEFRA, 2012) suggests that where the authority has ceased its inspection and assessment of land as there is little or no evidence to suggest that it is contaminated land the authority should issue a written statement to that effect. This inspection report forms that written statement.

2 Desk Study Information

Location

The site is located on the northern and southern edge of the A143 to the northwest of Stoke Ferry, Norfolk. The site's location is shown in Appendix B. The grid reference for the centre of the site is 569603 300786. The nearest postcode is PE33 9SW.

Previous investigation

Records relating to the site history, monitoring and regulatory action are held on the borough council files and also on the Environment Agency public register. Table 1 below lists the reports used in compiling this written statement.

Table 1 Documents used in this report

Source	Date	Author	Title
NCC	November 2016	Community and Environmental Services, Norfolk County Council	*Norfolk Minerals and Waste Development Framework Monitoring Report 2018-2019*
NCC	February 2015	M Rudd, NCC Environment and Waste Group	*Phase 1 Site Investigation (Draft review)*
NCC	June 2014	M Rudd, NCC	*Appendix B- Site Inspection report*
NCC	2012	Mott MacDonald	*Wereham Landfill Site Hydrogeological Risk Assessment.*
EA public register	14 January 2008	Anna Pearce, Environment Agency	*Letter to Mr White,.*
EA public register	21 January 2008	Kenneth Bush	*Letter to Anna Pearce, EA*
EA Public Register	May 2004	Geo Water	*Landfill gas risk assessment report*
EA Public Register	2001	Severn Trent Services	Report TH/101852/2001
EA public register	December 1989	David Tester	*Letter to Mr Ramsden*

Norfolk County Council's (NCC) closed landfill team conducted a geo-environmental desk study in (Phase 1 Site Investigation, 2015) to improve the borough council's understanding of the site condition. The report is a draft review but the information within the report is used with permission from NCC.

Previous Site Usage and background

The site was historically a gravel pit. Areas in the north and south of the site held waste licenses and were partially filled with waste. The site has been divided for the purposes of this report into three areas based on landfill history and land ownership.:

- Stoke Ferry North
- Stoke Ferry South
- Stoke Ferry Pit

The Site Plan above and Figure 1 below show the three areas, with a boundary showing the former quarry workings.

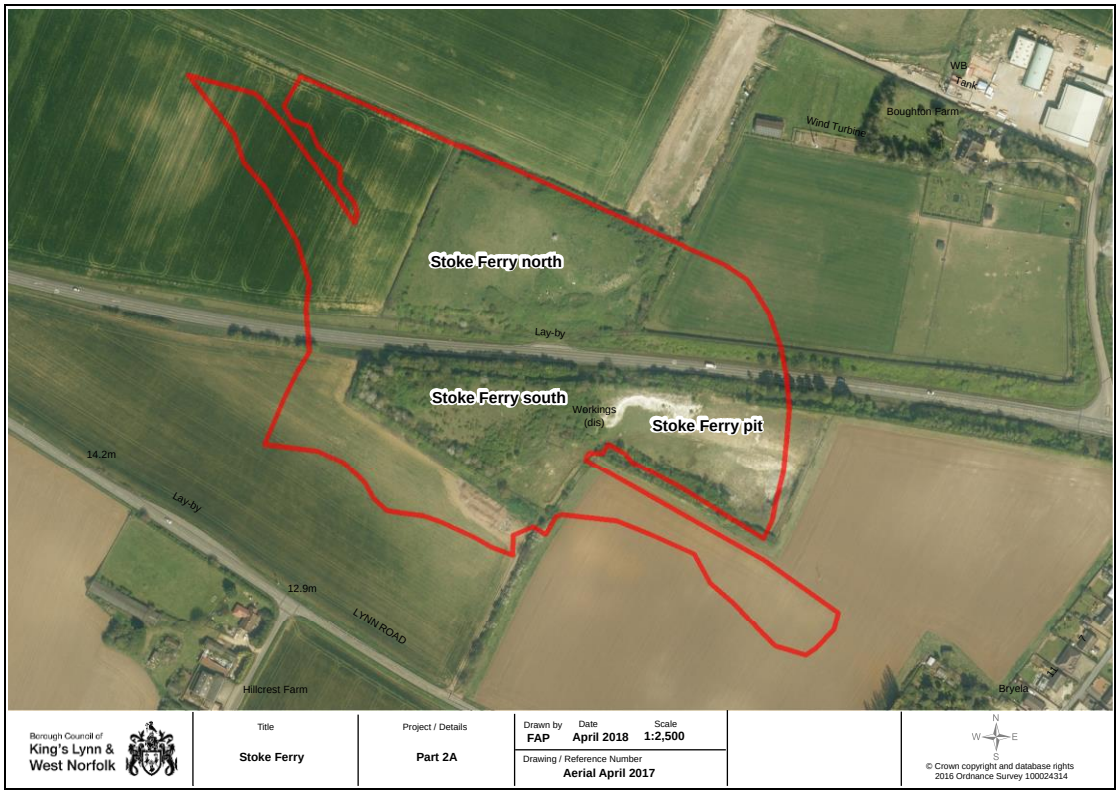

Figure 1: *Aerial photograph*

Stoke Ferry North accepted refuse from 1989-2006. Responsibility for the site lies with the Crown Estate after the liquidation of the operating company, Acacia Wastes Ltd. As Acacia Wastes Ltd was liquidated before full capping and restoration was completed to Environment Agency (EA) standards, the condition the Stoke Ferry North site was left in is uncertain.

Stoke Ferry South, is a similar Crown Estates closed landfill.

Stoke Ferry Pit is an abandoned quarry approximately 100m in diameter which is privately owned, and previously locally known as 'Pearsons'.

Present Site Usage
The sites' present use is vacant land. Recent aerial photography shows the sites with the A134 road passing between the north and south sites.

Photographs of the site are in appendix A.

Norfolk County Council's Norfolk Minerals and Waste Development Framework Monitoring Report 2018-2019 refers to: Pearsons and Formerly Acacia waste, north and south of the A143. The southern site is reported to be completed and restored and now in the aftercare and management period. The approved restoration plan for the Stoke Ferry Pit is for a nature conservation based after-use. The sites appear to be used for informal amenity land, with some storage of material on the Stoke Ferry Pit site.

Ownership
The legal owner of the Stoke Ferry North and South sites was recorded with the Land Registry as Acacia Waste Limited following the sale on 21.04.2006. The borough council were made aware of Stoke Ferry North site in April 2008 as Acacia Waste were being placed in receivership. The Insolvency Service provided an opinion on the land and disclaimed the site and the site license as onerous property. In effect this means that the property that is unsaleable or not easily saleable or might give rise to a continuing liability. Therefore the receivers did not wish to own the land and it passed to the Crown. Further information on ownerless land is available at: https://www.thecrownestate.co.uk/en-gb/resources/faqs/.

As the Stoke Ferry North site waste management licence has been voided, the site is in a state of legal 'limbo' in terms of its environmental management. The north site has been informally managed since 2009 by a neighbouring landowner.

It is understood that Stoke Ferry South, is a similar closed landfill, and was also operated by Acacia Waste Ltd until being passed to the Crown Estates.

Stoke Ferry Pit was owned by Acacia Waste Ltd. In 2000 Acacia Wastes Ltd received a waste disposal licence to dispose of Category A waste and submitted a plan to construct a contained waste disposal site to the EA. The site was sold in 2005. The pit site was marketed in 2022 as amenity land and acquired by a new owner in November 2022.

This report will be made available to the site owners and other interested parties including the Environment Agency, Norfolk County Council and Natural England.

Environmental Setting
The sites are surrounded by agricultural land with the exception of a road cutting for the A134 which was constructed in 1985.

Stoke Ferry North site forms the highest topography in the immediate area at approximately 26mAOD and is in the form of a plateau in the centre with steep sides down to the north, east and west boundaries. To the southern boundary, the gradient is shallower and undulating until close to the boundary where the slope steepens into the A134 road cutting at approximately 12mAOD. There is no evidence that the North site was constructed with basal or side containment of any sort and the only apparent cover material is chalk, an unsuitable capping material. To the northeast of the site are a timber works, small commercial units, and Boughton Farm, consisting of a house and numerous outhouses.

Stoke Ferry South is bordered by the A134 to the northern boundary. The eastern boundary is with the Pit site and to the south is agricultural land. There are residential properties over 150m to the south and south west. There is no evidence of capping material other than chalk, but the site is well vegetated with grass and scrub.

Stoke Ferry Pit is adjacent to the South site. The northern boundary is formed by the A134 and there is agricultural land to the east and south. There are residential properties over 200m to the east and south east.

Geology
The NCC review (Rudd, 2015) summarised the site's geology and hydrogeology. Information in the review and from British Geological Survey forms the basis of the following two sections.

The surficial geology of the area is of Lowestoft Formation diamicton to the north of the site and river terrace sand and gravel deposits to the south; with the boundary between the two units passing through the site. In the vicinity of the River Wissey the superficial geology consists of peat deposits. Near to the site these deposits are 0.5m thick but increase in thickness to up to 10m towards the River Wissey.

The bedrock geology consists of the Grey Chalk Subgroup underlain by the Gault Formation, Carstone, Sandringham Sands and then the Kimmeridge Clay (Table 1.1; BGS). The bedrock all dips gently eastward by about 1 degree, with the western basal boundary of the chalk out cropping approximately 600m southwest of the site. The top of the chalk is likely highly variable due to erosion and there is evidence of a possible buried valley to the south of Stoke Ferry which may have altered the Chalk properties due to increased erosion and enhancement of discontinuities.

Descriptions and recorded geological strata are set out in table 2.

Table 2: Geological strata (from Mott MacDonald 2012 & BGS borehole records)

Age / Formation	Description
Quaternary and Recent (Superficial)	
Lowestoft Till (Boulder Clay)	Grey silts and clays with fluvio-glacial sands and gravels occurring as pockets within the chalky Till.
Cretaceous (Solid)	
Grey Chalk Subgroup (formerly known as the Lower Chalk)	The Zig Zag Chalk Formation comprises firm pale grey to off-white blocky chalk characterised by alternating beds of marls and marly chalks with firm white chalk. The Zig-Zag Chalk is underlain by the West Melbury Marly Chalk formation which consists of interbedded grey clayey chalks and harder white chalk. The two Chalk formations are separated by the Totternhoe Stone, a pale yellow sandy silty chalk with fossils.
Gault	Dark grey shelly clays overlain by pale grey calcareous clays. This formation is understood to be thicker to the south to the site.
Carstone	Iron rich sandstone which becomes clayey to the south.
Sandringham Sands	Glauconitic sands and clays.
Kimmeridge Clay	Calcareous mudstones.

Strata	Range of depth to top of stratum
Grey Chalk Subgroup	0 to 0.61mBGL
Gault clay	0 to 29.7mBGL (-7.7m AOD)
Carstone	33 to 34.9mBGL (-12.9m to -28m AOD)
Extrapolation of these depths, at a dip of one degree, to underneath the site would place the Gault Formation at approximately -45mAOD and the Carstone at -50mAOD (BGS)	

Hydrogeology

The local site hydrogeology is split between the surficial deposits and the underlying bedrock. As the bedrock is so close to the surface however, the surficial deposits are not significant as hydrogeological units. Bedrock hydrogeological units are summarised in Table 3. The lower boundary of the chalk outcrops approximately 600m to the southwest of the site and may produce a spring line along it.

Table 3: Hydrogeological units in the Stoke Ferry North area

Hydrogeological Unit	Aquifer Description	Thickness (m)
Grey Chalk Subgroup	Highly Productive	44
Gault Formation	Aquitard	5
Carstone	Highly Productive	Unknown
Sandringham Sands	Moderately Productive	Unknown
Kimmeridge Clay	Aquitard	Unknown

The Chalk is best described as a dual porosity medium with groundwater flow occurring within both the matrix and through fractures. The matrix of the Chalk is porous but has only low permeability because of the small pore spaces. The Chalk only forms an aquifer because it is fractured. The mixing of fracture groundwater with pore water in the aquifer can have an effect on the water chemistry and the fate of pollutants such as nitrate.

The Carstone is a well jointed, medium to coarse grained sandstone and the Sandringham sands are fine grained sands to grey-green glauconitic sands and sand clays. Both geological units are capable of transmitting fluids rapidly.

The Gault Formation and Kimmeridge Clay have low permeability and result in negligible fluid movement.

Hydrology

The site is located within the River Wissey catchment, a sub-catchment of the River Great Ouse and Fen basin. To the east of the site is the Wissey Valley which contains the River Wissey and multiple large artificial drainage features which drain into the Great Ouse River (Mott MacDonald, 2012).

There are multiple smaller drainage dikes in the surrounding farmland the closest of which being 250m west of the site adjacent to Wretton Road and which extends into the village of Wretton. Towards the River Wissey there is a marked increase in drainage features due to a suspected spring line in the valley. These features are likely to have a significant groundwater input and drain through the village of Stoke Ferry and into the River Wissey. The nearest of these features is a drainage ditch adjacent to Field Lane, 630m south of the site and drainage ditches in Stoke Ferry, 880m southeast. The cut-off channel for the Fens drainage system is 1.7km to the south of the site and receives water from the River Wissey south of Stoke Ferry and possibly groundwater. The site is not in a flood risk area.

There are no known surface water drainage systems on site and no evidence of surface water has been observed on site visits. The site cap, where present, is largely made of chalk and therefore rainwater infiltration is likely high. There is considerable vegetation over most of the site which may help in intercepting some rainwater.

Water abstraction licenses within 2km of the site are listed in table 4 below:

Table 4: EA licensed abstractions

LIC_NO	LH_NAME	PURPOSE	SOURCE OF SUPPLY	POINT_NAME	x	y
6/33/48/*S/0029	BROWN	Agriculture	SURFACE WATER	DRAIN AT WHITTINGTON	570910	299600
6/33/48/*S/0029	BROWN	Agriculture	SURFACE WATER	DRAIN AT WHITTINGTON	570910	300900
6/33/48/*S/0029	BROWN	Agriculture	SURFACE WATER	DRAIN AT WHITTINGTON	570940	300630
6/33/48/*S/0029	BROWN	Agriculture	SURFACE WATER	DRAIN AT WHITTINGTON	571390	299610
6/33/48/*S/0029	BROWN	Agriculture	SURFACE WATER	DRAIN AT WHITTINGTON	571220	300020
6/33/50/*S/0019	ANGLIAN WATER SERVICES	Water Supply	SURFACE WATER	INTAKE NO.2, CUT-OFF CHANNEL AT STOKE FERRY	569800	298700
6/33/56/*G/0271	LANKFER	Agriculture	GROUND WATER	SEEPAGE PIT AT WEREHAM	568600	300800
6/33/56/*G/0273	DEARSLEY	Agriculture	GROUND WATER	SEEPAGE PIT AT WEREHAM	568160	301950
6/33/49/*S/0060	W R CHAPMAN & SON	Agriculture	SURFACE WATER	STRINGSIDE DRAIN, STOKE FERRY	571570	300570
6/33/50/*S/0019	ANGLIAN WATER SERVICES	Water Supply	SURFACE WATER	INTAKE NO. 1, R WISSEY AT STOKE FERRY	570200	298900
6/33/50/*S/0019	ANGLIAN WATER SERVICES	Water Supply	SURFACE WATER	INTAKE NO.2, CUT-OFF CHANNEL AT STOKE FERRY	569800	298700
AN/033/0056/010	RUTTERFORD	Agriculture	GROUND WATER	BOUGHTON FARM BOREHOLE	569951	300951
AN/033/0056/012	ENVIRONMENT AGENCY	Environmental	SURFACE WATER	RIVER WISSEY AT STOKE FERRY	570309	298814
6/33/56/*G/0273	DEARSLEY	Agriculture	GROUND WATER	SEEPAGE PIT AT WEREHAM	568160	301950

The nearest groundwater protection zone is a Zone 1, 4.8km northeast at Fen Wood and the site is situated on a protected principal aquifer, the Chalk. Groundwater flow beneath the site is assumed to be to the south.

Regulated Activities

The Environment Agency regulates 2 Agriculture Ltd (approximately 1km to the south east of the site) under Environmental Permitting Regulations for a treating raw materials for animal feed. There are no Local Authority Pollution Prevention & Control regulated activities in the vicinity of the site.

Stoke Ferry North – Waste Management License NFK/LS/056/0 was issued to Mr AM White by Norfolk County Council in April 1989. The license allowed a maximum of 50 tonnes of waste daily of Builders Waste and Factory Waste (inert) Category A waste only (consisting of topsoils, subsoil, stone, sand, clay, silica, concrete, brickwork, coal, coke, excavated road metal (well weathered), hardcore & mineral processing wastes).

The license was modified in June 1990 to allow 285 tonnes category A waste and 15 tonnes category B waste daily.

The license was further modified in May 1995 by NCC to require registration with the waste regulation authority and installation of landfill gas and groundwater monitoring boreholes and periodic monitoring.

In 2000 Mr A.M. White transferred the waste licence from himself to Acacia Wastes Ltd, of which he was the Managing Director. In March 2001 a waste management license (EA/WML/75020) was issued to Acacia Waste Ltd by the Environment Agency for a Waste Transfer Station. Maximum annual permitted quantities were 800 tonnes of inert wastes, wood, plastics and paper and 3500 tonnes of metal wastes. Implementation of this license created additional requirements for pollution prevention and control. Figure 2 below shows the landfill gas and groundwater monitoring points agreed as part of the site license.

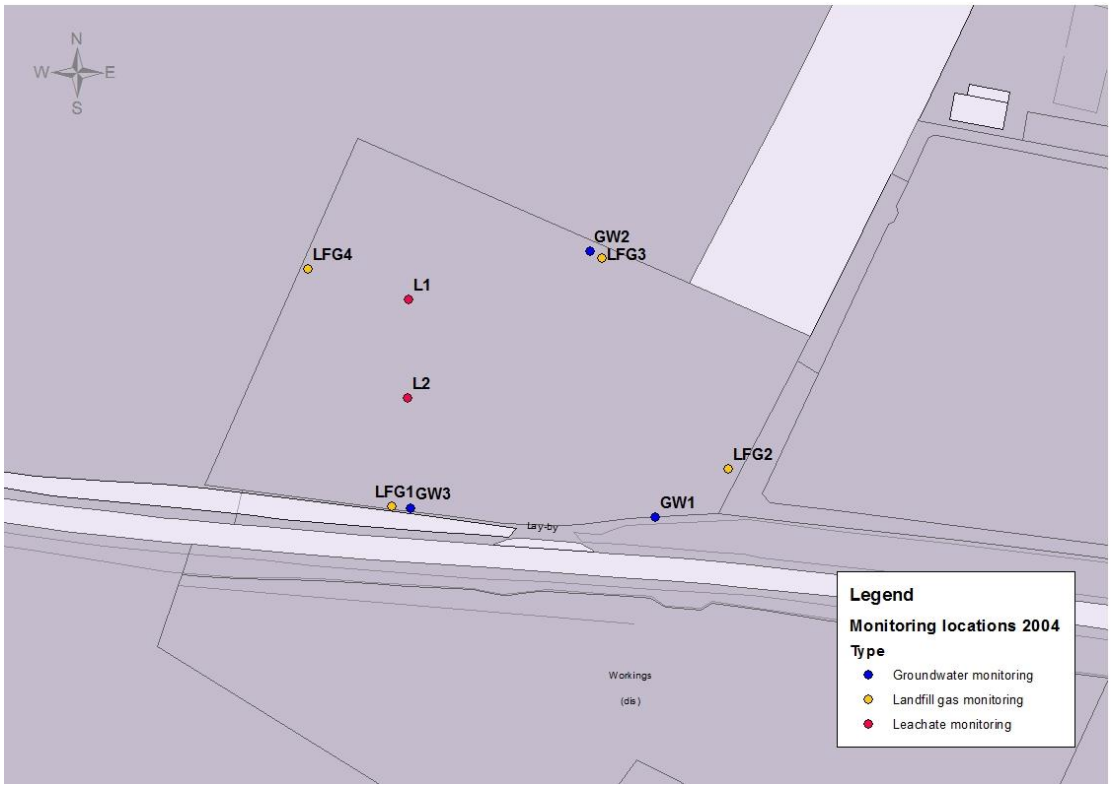

Figure 2: *Stoke Ferry North site layout (adapted from Landfill gas risk assessment report, Geo Water, 2004)*

From 1993 to 2007 the EA were in contact with the site over the running of the site, need for increased monitoring, steep gradients, use of chalk as a capping material and licence breaches in the form of unregulated tipping of Category C 'liquid' waste and out of hours working. The site stopped accepting waste in February 2006 having accepted approximately 184,800 $m^{3.}$ This may be an underestimate due to the failure to complete final restoration works on site and evidence of overfilling. In 2007 the EA rejected a capping and restoration plan proposed by Acacia Waste Ltd principally due to final cap gradients being steeper then permitted. By January 2008 there had been no agreement on the capping and restoration plan between the EA and Acacia Wastes Ltd, obliging the EA to threaten legal action due to the delay between site closure and commencing restoration (Pearce, 2008). Acacia Waste's Solicitors announced that Acacia Wastes Ltd was in the process of winding up, had ceased trading and had no assets (Bush, 2008). Due to this, the site passed to the Crown.

Stoke Ferry South - Waste Management License NFK/LS/053/0 was issued to Mr AM White by Norfolk County Council in February 1987. The license allowed deposit of 100 tonnes daily of building & demolition wastes, rubble & hardcore, excavated material, subsoil & topsoil. The EA has minimal records concerning Stoke Ferry South. Records indicate no evidence of containment engineering or post-closure restoration and the public record contains multiple accusations of breach of waste management licence relating to waste types being accepted and accepting waste out of licensed hours. Local residents also reported leachate and gas smell, particularly after rain when surface

water collected on site. It is unclear if the waste management license was surrendered.

Stoke Ferry Pit – Waste Management License NFK/LS/082/0 was issued to Mr A M White by Norfolk County Council in August 1995. The license allowed a maximum of 500 tonnes annually of category 1 waste (consisting of topsoils, subsoil, stone, sand, clay, silica, concrete, brickwork, coal, coke, excavated road metal (well weathered), hardcore. Land Registry information indicates that the site was sold in 2005. Sales information from 2022[1] indicates that the pit was a former borrow pit for soil extraction in connection with adjoining bypass and that the land was originally intended for landfill and recycling however was 'never used for that purpose'.

MAGIC (Natural England hosted) website records

SSSI's near to the site consist of Boughton Fen, 2.1km northeast and Wretton Canal (part of the Cut-off channel), 1.7km south. The site is designated as SSSI Impact Risk Zones (to assess planning applications for likely impacts on SSSIs/SACs/SPAs & Ramsar sites). Location in a SSSI IRZ means that Natural England should be consulted on development proposals for potentially polluting developments.

The site is designated as being within a Nitrate Vulnerable Zone. These are areas which are designated as being at risk from agricultural nitrate pollution and where operators must follow specific rules when using nitrogen fertiliser or storing organic manure. The site is also a Drinking Water Protected Area (Surface Water) within Anglia Water's area due to the potential impact on the cut-off channel.

The site is within an area where lapwings are designated as a priority species for countryside stewardship targeting. This means that should countryside stewardship status funds be sought, land management options and capital works that meet the specific needs of lapwings would be prioritised.

Historical Maps

Norfolk County Council E-map Explorer

Enclosure Map 1800 – 1850 – no map data available

Tithe map circa 1840 – the land is depicted as fields with a small wood in the south east. Turnpike Road is shown to the south in the position of the current Lynn Road and Boughton Road is shown the east.

Ordnance Survey 1st Ed. 1879-1886 – Two elongated gravel pits are shown in the south east and north west of the site. Gravel Pit Plantation, a wooded area is shown adjacent to the east of the site.

Historical Maps on file at the Borough Council of King's Lynn and West Norfolk

Historical maps are presented in Appendix B and summarised below.

[1] https://www.crusowilkin.co.uk/properties/15532803/sales
Cruso & Wilkin web page accessed November 2022

1891 – 1912: Gravel Pit Plantation and the gravel pit in the north west of the site are still present. The gravel pit in the south east of the site is no longer shown.
1904 – 1939: no data
1919 – 1943: The gravel pit is denoted as 'Old Gravel Pit' and the extent is larger than on previous map editions. The site of a Roman Well is marked approximately 150m to the west of the site. Gravel Pit Plantation is still shown. The 50' contour line is shown passing through the site.
1945 – 1970: The centre of the site is depicted as a rectangular pit (disused) of an area of 3.54ha. The rectangular area does not include the previous north eastern elongated quarry area. The surrounding area is fields. Some development has taken place of single houses, and Hillcrest Farm to the south of Lynn Road. Additional houses and a garage are shown the east of the site at Lynn Road and Little Lane. One drainage feature is visible in the field to the west of the site. Gravel Pit Plantation is no longer shown.
1970 – 1996: no data

Aerial Photographs
Aerial photographs are presented in Appendix B and summarised below.
1945 – 1946 MOD Aerial Photograph – the surrounding area appears as a patchwork of arable fields. Some excavation is visible in the centre of the site but appears not to be active as there are limited bare rock faces and grass and shrubs are visible. The trees of Gravel Pit Plantation are visible.
1999: The buildings of Stoke Ferry Timber and Boughton Farm are visible approximately 400m and 380m respectively to the north east. The surrounding fields are mostly ploughed. The A143 has been constructed through the centre of the site and a large rectangular parking area directly to the north of the site. The parking contains a number of HGVs. The Stoke Ferry south site appears to be rough grassland. Some activity is taking place on the Stoke Ferry north and Stoke Ferry Pit areas.
The Stoke Ferry North site appears to have a main entrance from the A143 with a building situated near to the entrance. The remainder of the site is formed of light coloured, potentially cleared and levelled ground and some areas of mixed texture and colour that may represent fill materials. A number of open topped containers are arranged (potentially for sorting waste?) in the centre of the site.
The Stoke Ferry Pit site contains some areas of light cream coloured open ground. There are a number of containers on the site, a shed type building and one depression with some unknown materials in.
2006-09: The majority of the area surrounding the site is as shown on the previous aerial photograph. The crops in the surrounding fields are green and appear healthy. The Stoke Ferry North site is mainly vegetated with a small area of light coloured open ground in the eastern side. The entrance from the A143 is The Stoke Ferry South site is covered fairly evenly with vegetation. Stoke ferry Pit site is largely cleared and consists of open, light coloured ground. Three open containers and the shed building are visible. The shed appears to be abandoned and has a hole in the (potentially asbestos cement) roof.
2017: The adjoining fields are planted with arable crops

Planning History & Norfolk County Council records

There are numerous records on the Norfolk County Council (NCC) planning webpage for the site. These are summarised in Appendix E.

NCC were responsible for granting the original planning permission for the northern and southern landfill sites.

NCC were monitoring the northern site's operation. At the time that Acacia Waste left the northern site, the NCC planning officers were in discussion with both the EA and the site owner to try to agree how the site was to be restored. However, at present as the land has been disclaimed there isn't anyone for NCC to take enforcement action against in respect of the northern site. The restoration scheme was not implemented and neither the Environment Agency nor Norfolk County Council have 'signed off' a restoration scheme.

Ground gas monitoring data from a site inspection in November 2008 conducted by W.A.S. Ltd (using the GA2000 gas analyser) on behalf of the Environment Agency is summarised in table 5.1 below:

Table 5:1 Stoke Ferry North Landfill gas sampling 2008

Desc	No.	CH4 %	CO2 %	O2%	Bal%	Comments
Groundwater	GW1					No head/cover
Groundwater	GW2					Inaccessible
Groundwater	GW3					Functional
Leachate & gas well	L1	52	35	0	12.6	H2S 1ppm
Leachate & gas well	L2	32.4	21.9	0	45.7	H2S 1ppm
Gas borehole	LFG1	0	2.8	17.9	79.2	
Gas borehole	LFG2	0	1.7	18.7	79.5	
Gas borehole	LFG3					Inaccessible
Gas borehole	LFG4	28	20	0	51.8	
Noticeable odours of landfill gas noted along northern flank						

A restoration plan was approved for the Stoke Ferry Pit in 2016 to a nature conservation based after-use. Minimal intervention was proposed during the five year aftercare period to allow establishment of plants.

The NCC Norfolk Minerals and Waste Development Framework Monitoring Report 2018-2019 refers to Pearsons and Formerly Acacia waste, north and south of the A143: 'The northern site has settled over a number of years since landfilling was completed, and is less intrusive in the surrounding landscape. Grass cutting takes place on a regular basis. The southern site has been completed and restored recently following pressure by the County Council to see a timely resolution. The site has now entered the five year aftercare and management period.' (Subsequent NCC Waste Development Framework monitoring reports do not list individual sites).

The site has been discussed informally with the planning team at Norfolk County Council and no further action is expected unless a new planning application is made for any of the Stoke Ferry sites. The closed landfill team's most recent review of the site concludes that any sampling data from the current groundwater monitoring network is only an indication of any groundwater contamination present and the network would be deemed unsuitable by current standards. Similarly, any sampling data from the landfill gas wells is only an indication of any gas composition and migration present and the network would also be deemed unsuitable.

Leachate analysis data is reported by Severn Trent Services in 2001 (Severn Trent Service, 2001; Appendix C) and summarised in tables 5.2 and 5.3 below.

Table 5:2 : Leachate L1 positive results in 2001

Substance	**Units**	**Value**	**Water Framework Directive: Hazardous (H) or Non-hazardous (NH)[2]**
Ammonical Nitrogen, as N	mg/l	4.4	NH
Flouride, as F	mg/l	0.2	NH
Boron, Total as B	mg/l	0.4	NH
Bromoxynil	µg/l	3.01	H
2,3,6 trichlorobenzoic acid	µg/l	0.07	N/A
Mecoprop	µg/l	2.5	NH
MCPA	µg/l	9.91	H
Dichlorprop	µg/l	0.36	H
Ioxynil	µg/l	2.16	H
Uranium	µg/l	0.08	NH

Table 5:3: Leachate L2 positive results in 2001

Substance	**Units**	**Value**	**Hazardous (H) or Non- hazardous (NH)**
Ammonical Nitrogen, as N	mg/l	8.4	NH
Flouride, as F	mg/l	0.2	NH
Boron, Total as B	mg/l	0.3	NH
Mecoprop	µg/l	2.77	NH
Dichlorprop	µg/l	0.21	H
Telluitium	µg/l	0.4	NH
Uranium	µg/l	0.05	NH

[2] Groundwater hazardous substances standards | wfd uktag

3 Site Visits and Walkover

Stoke Ferry North - The northern site has been visited on a number of occasions by the borough council, the Environment Agency and Norfolk County Council. Photographs are presented in Appendix A.

June 2008, F Pollard & D Robson BCKLWN: The site cover was around 80% vegetation. The uppermost areas were covered with chalk. Several areas contained visible waste materials where cover material was not complete. Photographs 1-4 show the site at the time of this visit.

March 2009, F Pollard BCKLWN, S Hindmarsh & Emma Smith Environment Agency, Mark Potter NCC planning enforcement: The visit was made following the winding up of Acacia Waste. The neighbouring landowner had mown areas of the site and the general appearance was improved. Photographs 5-6 show the site. As the site's license was disclaimed with the land, the EA were unable to enforce standards of restoration, however some general advice was given.

August 2009, F Pollard BCKLWN: Access was gained from the adjacent fields to the east where the neighbouring landowner had created a new access route. The areas of land adjacent to the site were checked where accessible and there were no signs of crop distress or vegetation dieback at the time of this visit. The neighbouring landowner stated that he had moved some of the soil and chalk stockpiles and reprofiled some slopes. The new entrance had been created using excavated material. Some of the material had been screened and crushed as a base for a new building elsewhere with topsoil arisings to be used to cover waste material near to the landfill entrance.

July 2014, M Rudd, NCC closed landfills team: A walkover was carried out as part of the NCC review of information. M Rudd reported that leachate boreholes L1 & 2, groundwater boreholes GW1, GW3 and landfill monitoring point LFG4 were found. Displacement of gun barrel casing around boreholes displayed significant slumping or subsidence of the waste slopes (photograph 7). At the time of the visit the northern half of the site appeared to have had some restoration work carried out on it although the slope gradients were steep and the capping material was chalk, an unsuitable capping material (photograph 8). The southern half of the site had no apparent restoration work carried out, had an undulating surface, steep slope gradients (photograph 9) and waste visible at the surface. Evidence of household waste was also noted as was potential effects of landfill gas migration on nearby crops (photograph 10).

August 2018, F Pollard, BCKLWN & D Rankin, NCC: Access to the site was gained via the entrance formed in the eastern boundary of the site (photograph 11). Some of the monitoring boreholes were located and monitored for gas where possible. An 'observatory' with power supply had been erected on the topmost plateau (photograph 12). Borehole GW3 was located beneath thick cover but was not accessible (photograph 13). Monitoring location LFG was located (photograph 14) and no methane

detected. Monitoring location L1 was located (photograph 15) with the tap open on the installation, up to 35% methane was detected within the well. L2 was located and found to be intact with the tap closed, up to 25% methane detected at the base of L2, sludge and some liquid were noted. The site was of a generally tidy appearance. Vegetation on the landfill appeared healthy (photograph 16). A surface survey was carried out with a FID and ambient methane levels were noted to be at background levels.

Stoke Ferry North – 12 December 2022**.** F Pollard, A Wheeler, L Skeels BCKLWN. The Stoke Ferry Timber land (old haulage yard) on the north east of the site is now securely fenced. A temporary cabin type structure has been placed on this land close to the northern boundary of the landfill. No major changes were noted to this land. The field edge alongside this land is bunded with soil. The arable land to the north of the landfill is planted with a winter grass type crop with bare soil along the field margin (photograph 18). There was no obvious sign of any vegetative distress in the crop on the arable field as has been observed on previous visits. However, the soil was unplanted nearest to the landfill. A new hedge, presumed hawthorn, has been planted along the field boundary in protective tubes. No significant vigorous growth was noted but this may have only been planted recently. The new hedge boundary could be a good indicator of plant health at the boundary of the landfill for future monitoring.
Access to the landfill site was gained via adjacent fields and the entrance formed in the eastern boundary where a neighbouring landowner has created an access route (photograph 19). The neighbouring field to the east contained alpacas. There is a path which is reasonably accessible, which appears to have been mown in summer, and follows the line seen on aerial photos. Vegetation on the landfill appeared healthy consisting of grass & annual weeds, with shrubs and brambles growing on the margins, and waste materials appeared sporadically at the surface (photographs 20-22, 25 & 28). There was also evidence of animal activity identified (photographs 21-23) including a large burrow (potentially a badger set) in the bank, with fragments of soil and plastic present in the excavated soil. Beehives are located on the lower plateau (photograph 24). The western side is formed of rough grassland, which had the appearance of being uneven and poorly drained (photograph 27).
L1 & L2 leachate boreholes were located and inspected. Both boreholes were noted to have seized taps and the caps were easily removed. In L2 (Photograph 26), a strong odour of landfill gas was noted. It was noted that the observatory was in a poor state of repair (photograph 29). In the north west of the site there was an occasional odour of landfill gas in ambient air.

Stoke Ferry South – 12 December 2022. Access was gained to the restored landfill via the southern boundary of the site, although there is no clear access route or path. The site is well vegetated with established semi-mature trees and shrubs. (Photographs 32-35). There is evidence of the planting (plastic tubes) and some trees appear to be several years old. A disused game bird feeder was noted (photograph 34). There were some areas of waste visible at the surface consisting of plastic, brick and concrete and some corrugated metal sheet (Photograph 36-41). Some stones may have been placed at the landfill margin from the adjacent arable field. Evidence of potential garden

waste was also noted in the presence of garden plants (Photograph 38). The southern bank of the northern site is visible across the road cutting (photograph 42).
No evidence was noted of migration of landfill gas or significant harm or damage from waste or soil contamination.

Stoke Ferry South Pit – 12 December 2022. The site was fenced with a locked gate. The site appeared to be being levelled close to the entrance, with chalky material that may be site won. There were a number of vehicles parked on the site entrance and some materials being stored. (Photographs 30 & 31). At the track entrance there was a for sale sign for the amenity land.

26 January 2023 (photographs 43-56). A site visit was made with the current site owner. The site consists of an unfilled quarry in the eastern area with steep banks rising to the eastern and northern boundary (photographs 43-45 and 52-55). A monitoring borehole was noted (photograph 43) on the eastern boundary.
The current owners have moved some of the site won chalk fill to level the site close the south eastern boundary with the Stoke Ferry South site (photographs 46-50). Some pens have been created to house domesticated animals (photograph 51 & 53). There was some limited storage of material noted and the site was reported to be used for occasional vehicle parking. Some recently imported waste was noted, but on a small scale and mostly associated with clearance of the site and packaging from the foodstuffs brought onto site for the animals (photograph 52-54). Some waste was visible, exposed in the bank of adjacent landfill. The waste appeared to be building or demolition waste such as rubble and plastic (photograph 56).
No evidence was noted of migration of landfill gas or significant harm or damage from waste or soil contamination in the southern sites.

Location of Receptors

Humans
There are houses within 200m to the north, north east, south, and east. Neighbouring land is generally arable fields, worked predominantly with machinery so dermal contact with soil is limited. The sites appear to be infrequently used for informal outdoor recreation and with limited access to site soils. Access to the north and south landfill sites is restricted by access over private land and by overgrown vegetation. The pit site is privately owed and fenced so is only easily accessible by the site owners.

Property
There are houses within 200m of the site and also industrial and commercial units 250m to the north. The sites are surrounded by agricultural land in arable use. Livestock (alpacas) are grazed on neighbouring land.

Environment
There are no relevant types of receptor as set out in Table 1 of the statutory guidance within 1km of the site.

Controlled Water - Groundwater & Surface water
No evidence of watercourses on or near to the site. The chalk is a highly productive aquifer, however the site is not within a source protection zone for drinking water.

4 Contaminated Land Risk Assessment

The Council has used a process adapted from CIRIA C552 (Contaminated Land Risk Assessment, a guide to good practice) to produce the conceptual site model and estimate the risks to defined receptors. This involves the consideration of the probability, nature and extent of exposure and the severity and extent of the effects of the contamination hazard should exposure occur. Further explanation is provided in Appendix C.

The sites consist of two landfills and one unfilled pit. The landfills were licensed to accept Category A waste (building & demolition wastes, rubble & hardcore, excavated material, subsoil & topsoil) and Category B waste (wood, paper, cardboard, metals, cork, leather, glass and ceramics, plastics, slag, boiler scale and building/demolition waste). It is alleged that the landfills accepted other wastes outside of the license.

Assessment of probability of a contamination event
From the information gathered it is considered that there is the potential for a source of contamination to be present on the north and south sites. The potential source is waste material.

Human health, property
People and property are recorded within 250m of the site. People are infrequently present on the sites and there is no evidence of activity with a high level of exposure to site soils or waste materials. There is some evidence of short-term harm or pollution to crops, particularly the assumed effects of landfill gas on nearby arable land. There is no evidence of short-term or long-term harm to buildings or livestock.

The probability of a contamination event affecting human health is UNLIKELY.
The probability of a contamination event affecting property in the form of buildings or livestock is UNLIKELY.
The probability of a contamination event affecting property in the form of crops is LIKELY.

Environment
In considering environmental receptors, the statutory guidance states that the authority should only regard certain receptors (described in Table 1 of the Statutory Guidance) as being relevant for the purposes of Part 2A. Harm to an ecological system outside that description should not be considered to be significant harm. The site and surrounding area do not contain any of the receptors stipulated in Table 1 of the Statutory Guidance. These receptors are not considered further.

Controlled water - Groundwater
Stoke Ferry North, South
The chalk is classified as a highly productive aquifer but the site is not within a source protection zone for drinking water. A Hydrogeological Risk Assessment (HRA) was conducted in 2004, but made projections assuming that capping and restoration would be completed. The site cap, where present, is largely made of chalk and water infiltration is likely high. There is considerable vegetation over most of the site which may help in intercepting some rainwater. The site is not lined, and waste was deposited onto the chalk. The probability of a contamination event to groundwater is assessed as LOW LIKELIHOOD as although it is possible a pollution event could occur, it is not certain even in the long term and it is less likely in the short term.
Stoke Ferry Pit
The quarry site appears to be unfilled. The probability of a contamination event to groundwater is assessed as UNLIKELY.

Controlled water - Surface water
There are no known surface water drainage systems on site and no evidence of surface water has been observed on site visits.
The probability of a contamination event to surface water is therefore assessed as UNLIKELY.

Assessment of Hazard
From the information gathered it is considered that there is the potential for a source of contamination to be present on the North and South site. The potential source is waste material which could contain a range of contaminants, some of which may be present in leachate, gas and vapours. Landfill gas has been detected in boreholes and ambient air. The Stoke Ferry Pit site does not appear to have been filled, some waste was visible in the boundary with the Stoke Ferry South site, but no further significant sources of contamination have been identified in this location.

Human Health
Stoke Ferry North, South and Pit
There is minimal waste present at the site surface. The majority of the site is well vegetated. The site is not easily accessed by the public and used rarely for informal recreation with minimal contact with soil. Health effects to human health can be easily prevented by means such as hand washing. The hazard is assessed as LOW.

Property
Stoke Ferry North and South and Pit
Harm, should it occur to crops, produce, livestock, owned or domesticated animals and buildings is not expected to be significant as defined in the statutory guidance. In the case of suspected crop damage from methane generated by the North site, the damage is less than 20% of the yield by area. The hazard is assessed as LOW.

Controlled Water - Groundwater
Stoke Ferry North and South

Concentrations of groundwater hazardous substances have been detected in leachate samples. Therefore, the hazard is assessed as MEDIUM.
Stoke Ferry Pit
There is no evidence of a significant source of hazardous substances as the quarry is unfilled. Therefore the hazard is assessed as LOW

Controlled Water - Surface water
Stoke Ferry North and South and Pit. There is no evidence of migration of hazardous substances within leachate to surface waters. Therefore the hazard is assessed as LOW

Conceptual site model
The conceptual site model (Table 3) shows the sources, pathways and receptors identified and the subsequent risk classification.

Table 3: Conceptual site model

Source	Pathway	Receptor	Probability	Hazard	Risk
Heavy metals, polyaromatic hydrocarbons, petroleum hydrocarbons, pesticides, asbestos containing materials within the landfill Landfill gas	Direct contact, ingestion, dust inhalation, plant uptake & consumption of wild fruit and crops	Humans (adults and children)	Unlikely	Low	Very Low
	Direct contact	Property (buildings)	Unlikely	Low	Very Low
	Direct contact	Property (livestock)	Unlikely	Low	Very Low
	Direct contact	Property (crops)	Likely	Low	Moderate /Low
	Direct contact	Environment*	Unlikely	Low	Very Low
	Direct contact	Controlled water surface water	Unlikely	Low	Low
	North & South Sites Direct contact	Controlled water groundwater	Low Likelihood	Med	Moderate /Low
	Pit Site Direct contact	Controlled water groundwater	Unlikely	Low	Low

Moderate/Low risk - It is possible that harm could arise to a designated receptor from an identified hazard. However, if any harm were to occur it is more likely that harm would be relatively mild.
Low risk - It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.
Very low risk - There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is unlikely to be severe.
*Ecological systems as set out in Table 1 of the contaminated land statutory guidance

5 Outcome of Preliminary Risk Assessment

Conclusion

Plausible source pathway receptor linkages were identified at the Stoke Ferry North, South and Pit sites, and a VERY LOW risk from contamination to human health, MODERATE/LOW or VERY LOW risk to property (buildings, crops and livestock), VERY LOW risk to the wider environment, LOW risk was identified to surface water, and MODERATE/LOW risk was identified to groundwater (LOW risk to groundwater for the Stoke Ferry Pit Site).

There was no evidence of harm or of a significant possibility of significant harm to the receptors identified in the conceptual site model. As the risk posed to groundwater is moderate/low, the Stoke Ferry North and Stoke Ferry South sites would be classified as Category 3 as set out in the Statutory Guidance. The Stoke Ferry Pit site would be classified Category 4.(Appendix D contains the categorisations from the Statutory Guidance).

No evidence was noted of significant pollution of controlled waters or of the significant possibility of such pollution. The Environment Agency have confirmed that they agree with the Authority's assessment of the potential risks to controlled waters from the site, and with the conclusions that have been drawn.

Part 2A status

Statutory Guidance states that 'If the authority considers there is little reason to consider that the land might pose an unacceptable risk, inspection activities should stop at that point.' In such cases the authority should issue a written statement to that effect. This report forms that written statement.

On the basis of its assessment, the authority has concluded that the land does not meet the definition of contaminated land under Part 2A and is not considered contaminated land.

Further Action

This assessment is based on the site's current use and is valid providing no changes are made to the soil or vegetation cover material, to surface water conditions, to the site's use, or if the Environment Agency indicate that the site is a source of significant water pollution.

No further assessment of the Stoke Ferry Pit site is considered necessary under Part 2A unless additional information is discovered or if changes are made to the site.

The Part 2A status of the landfilled orphan sites, Stoke Ferry North and Stoke Ferry South will be kept under review as there is no entity responsible for managing the sites. The Part 2A status will be reviewed if conditions change on site or if any reports of harm or pollution are received.

Appendices

Appendix A: Site Photographs

Appendix B: Drawings

Appendix C: Previous reports

Appendix D: Risk Assessment Methodology

Appendix E: Norfolk County Council planning records