S19-979

Station Road, North Thoresby

Section 19 Flood and Water Management Act 2010

Date Prepared – 07/05/2025

GeoSmart Information Ltd

Table of Contents

Copyright

This document has been prepared pursuant to Section 19 of the Flood and Water Management Act 2010 by GeoSmart Information Ltd for Lincolnshire County Council, in its capacity as Lead Local Flood Authority. The findings, conclusions, and recommendations of this report are based solely on the information available to GeoSmart at the time of preparing the report.

Lincolnshire County Council expressly disclaims responsibility for any errors in or omissions from this report and accepts no responsibility for the accuracy, precision, and / or validity of any third-party data contained therein. Lincolnshire County Council does not accept any liability for the use of this report or its contents by any third party for any purpose other than that for which the same was provided by Lincolnshire County Council.

For further information regarding this report, please contact FloodRisk@lincolnshire.gov.uk

Executive summary

The purpose of this Section 19 (S19) Flood Investigation Report is to identify the cause of flooding which affected the property internally. The report will provide an overview of the problem, identify the flooding mechanisms, identify relevant Risk Management Authorities (RMAs) and stakeholders, and provide a list of recommendations. It is however important to note that this investigation report cannot provide designed or costed solutions and / or enforce those identified RMAs or persons to undertake any of the proposed recommendations.

This report was commissioned to consider internal flooding at three properties along Station Road, North Thoresby (Properties A to C), which occurred as a result of substantial rainfall experienced on 05 and 06 January 2025. The heavy rainfall event involved an area of low pressure crossing South and Central England, which resulted in heavy rainfall throughout the East Midlands. This resulted in several stations across Lincolnshire recording their wettest January day on record (Met Office, 2025).

The evidence gathered within this report, including a Site visit on 10 March 2025, confirms that Properties A to C experienced internal flooding as a result of heavy rainfall on 06 January 2025. Two further properties (D and E) were identified as having experienced external flooding, with flooding beneath the floorboards within an extension and flooding in an associated barn, respectively. Photograph evidence of the flooding has been provided by the residents and is included within Section 3.3.1.

Flooding mechanism

Properties A to C are likely to have experienced internal flooding as a result of surface water accumulation in the area surrounding the properties, which forms a topographic low relative to the adjacent highway and fields to the north. Flood depths may have been exacerbated by a lack of capacity within the highway drainage network.

Relevant RMA

Given that flood waters had a pluvial source, with surface water / highway drainage systems an exacerbating factor, East Lindsey District Council, and Lincolnshire County Council (LCC), in its capacity as Highways Authority and Lead Local Flood Authority (LLFA) are considered to be the relevant RMAs.

Recommendations

LCC, in its capacity as the Highways Authority, should consider inspecting the highway gullies and associated drains on Station Road to confirm their effectiveness, with remedial works or upgrades undertaken as necessary. In addition to the above, East Lindsey District Council and LCC as LLFA should consider undertaking an inspection into the piped surface water drain of unknown ownership to confirm its condition, connectivity, and outfall location. As part of this inspection, the party or parties likely responsible for its maintenance should be determined insofar as is reasonably practicable. Subject to the outcome of this inspection the relevant party or parties should also consider addressing any defect, damage, or misconnections and / or reviewing whether the capacity of the system is in need of improvement having regard to current design standards and considerations.

The residents at Properties A – E should consider incorporating flood resistance and resilience measures (as detailed within Section 5.5) into each property.

The residents of each property should consider jointly preparing and implementing a Flood Action Plan to ensure that they and the Emergency Services can respond to any future flood events effectively. As part of this, the residents of each property should sign up to the MET Office extreme weather warnings.

East Lindsey District Council should, in collaboration with LCC as LLFA, consider undertaking an inspection to confirm whether a drainage ditch is present along the field boundary c. 70 m north. If a drainage ditch is present, maintenance and/or deepening works should be undertaken by the riparian landowner; if absent, consideration should be given to constructing a ditch in this location.

The residents at Properties A and B should consider cleansing the linear drain in their driveway, and the resident at Property C should consider installing a linear drain along their perimeter.

1. Introduction

1.1 Purpose and limitations of this flood investigation report

On Monday 06 January 2025, Lincolnshire County Council (LCC), in its capacity as Lead Local Flood Authority (LLFA) was notified of flooding to:

Table 1 – Properties covered as part of this investigation

Address	Reference	Reported Extent	Confirmed Extent
[redacted], Station Road, North Thoresby, Grimsby, [redacted]	Property A	Internal	Internal
[redacted], Station Road, North Thoresby, Grimsby, [redacted]	Property B	Internal	Internal
[redacted], Station Road, North Thoresby, Grimsby, [redacted]	Property C	Internal	Internal
[redacted], Station Road, North Thoresby, Grimsby, [redacted]	Property D	N/A	External
[redacted], Station Road, North Thoresby, Grimsby, [redacted]	Property E	N/A	External
[redacted], High Street, North Thoresby, Grimsby, [redacted]	Property F	External	N/A

During a site visit in North Thoresby, internal flooding to Properties A to C was confirmed (Table 1). Residents indicated that flooding occurred beneath the floorboards in an extension at Property D and within a barn at Property E, and are therefore deemed to be external incidents of flooding. It should be noted that other properties in the surrounding area experienced external flooding within their front driveways and gardens, although the addresses of these properties are not known.

It should also be noted that flooding was reported at Property F. However, as the reported flooding was deemed to be external, this has not been considered further within this flood investigation.

Having regard to LCC's 'Guiding Principles' for Section 19 flood investigations, it was deemed necessary that a flood investigation report be undertaken pursuant to Section 19 of the Floods and Water Management Act 2010 (as amended).

The purpose of this Section 19 flood investigation report is to:

- Investigate reports of internal flooding to understand and determine the cause of flooding;
- Determine which Risk Management Authorities (RMAs) have relevant flood risk management functions;

- Propose recommendations that may alleviate potential future flooding events or if the affected properties or location should be considered as suitable for a capital project. It is however important to note that this investigation report cannot provide designed or costed solutions and / or enforce those identified RMAs or persons to undertake any of the proposed recommendations.

1.2 Sources of evidence

The information used to inform the conclusions of this S19 report is:

- Site visit, including conversations with residents at properties reported to have internally flooded, and observations of nearby watercourses and drainage assets;
- The results of a survey which LCC made available to residents affected by flooding;
- Review of the Environment Agencies (EA) national scale Flood Map for Planning, national scale Risk of Flooding from Surface Water mapping, and GeoSmart FloodSmart Analytics mapping;
- Publicly available mapping, such as the EA's LiDAR elevation data and British Geological Survey (BGS) geological data;
- River level gauge data covering the storm event;
- Mapping of LCC's known drainage assets;
- Mapping of Anglian Water's surface and foul sewer network (where available); and
- Relevant information provided by RMAs (where available).

Following receipt and assessment of this information, the likely flood mechanism was determined. Where respondents have not provided information regarding the timing and source of flooding, this has been inferred from Site walkovers as well as the available flood mapping and publicly available records.

Given the source of flooding, issues have been identified within the Site area which contributed to the flooding, and recommendations have been made to resolve these issues.

In the case of some Sites, flood mitigation measures have already been implemented following the flood event. Where this has occurred, an indication of whether this would provide satisfactory resolution of the issues has been provided.

Note that much of the data was provided from personal accounts. As such, the completion and accuracy of this information is variable, and in some cases there have been contradictions between nearby residents' accounts.

2. Background information

2.1 Site location

Properties A to E are located on Station Road in the village of North Thoresby (Figure 1). It is situated within the East Lindsey District area of Lincolnshire and is located within the extended area of Lindsey Marsh Drainage Board (DB).

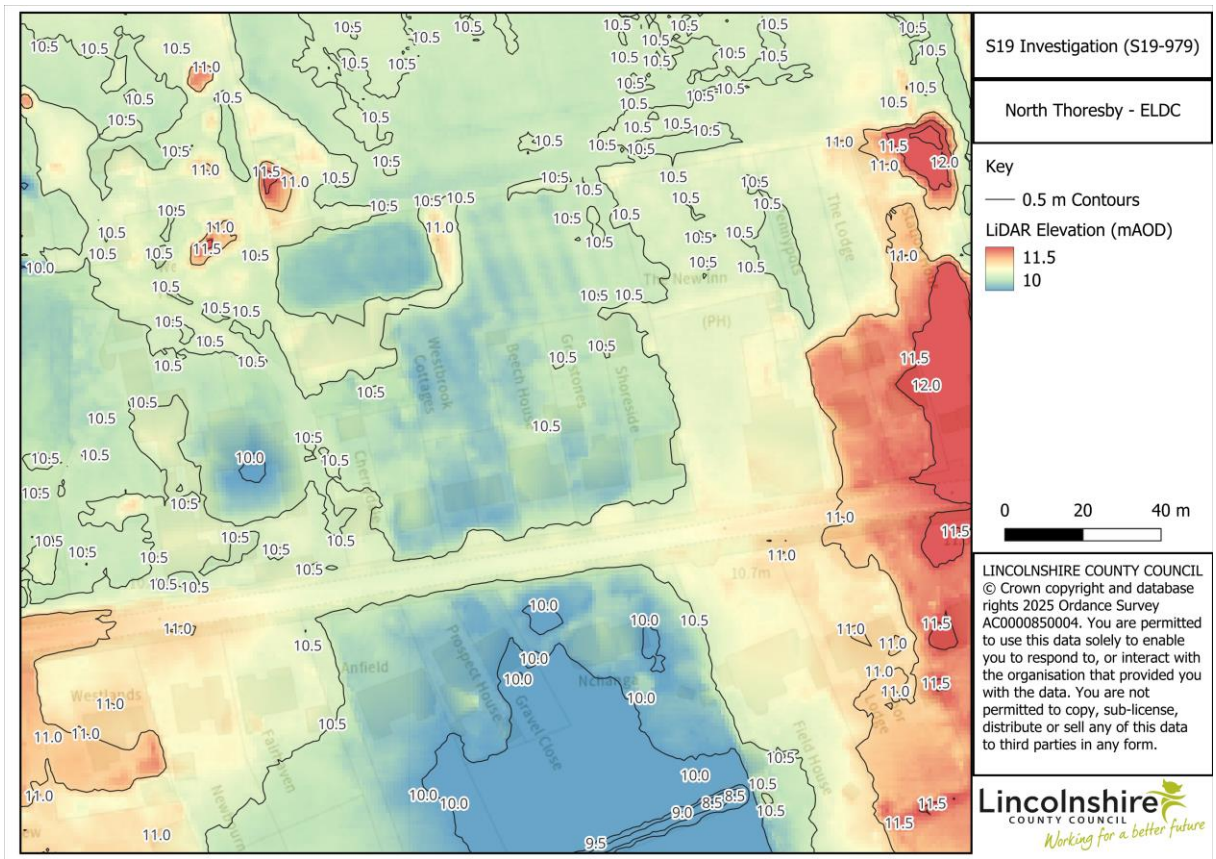
The properties are located in an area of relatively high land, with ground levels in the surrounding area falling in northerly and southerly directions towards respective valley features (Figure 2). On a more local level, the properties are at a slightly lower elevation compared to the surrounding higher ground. Notably, a raised embankment associated with a former railway line is present c. 50 m east of the properties.

Ground levels fall towards the properties from Station Road, with Properties A and B estimated to lie c. 0.5 m lower than the adjacent highway. Station Road is noted to fall in both a westerly and easterly direction towards the properties. The fields to the rear of the properties also have ground levels which generally fall in a southerly direction, towards the properties.

According to British Geological Survey geological mapping, the properties are underlain by superficial deposits comprising Devensian Till, which consists of diamicton, and bedrock comprising the Burnham Chalk Formation, which consists of chalk (BGS, 2025).

A pond is located c. 210 m north-west of the properties, understood to be constructed in c. 2020 according to historical aerial imagery.

(Figure 1 – Location of the known affected properties)



(Figure 2 – LiDAR elevation data for the affected area)

2.2 Flood risk overview

2.2.1 National scale flood mapping

According to the EA's Flood Map for Planning Purposes, the properties are located in the EA's fluvial Flood Zone 1, which indicates they are situated on land which has a Low probability of fluvial flooding.

According to the EA's Risk of Flooding from Rivers and the Sea (RoFRS) mapping, the properties have a Very Low risk of fluvial flooding.

According to the national scale Risk of Flooding from Surface Water (RoFSW) mapping (Figure 3), the area surrounding Properties A to E, including the entirety of the dwellings and associated driveways and gardens, are at High risk of surface water flooding in the present day scenario.

The EA's RoFRS and Surface Water Flood Risk mapping uses the following classifications:

- High risk – an area has an annual chance of flooding greater than 3.3%;
- Medium risk – an area has an annual chance of flooding of between 1% and 3.3%;
- Low risk – an area has an annual chance of flooding of between 0.1% and 1%; and
- Very Low risk – an area has an annual chance of flooding less than 0.1%.

It should be noted that the above analysis carries the following disclaimer (EA, 2025):

> *"All information, particularly the likelihood of surface water flooding, is a general indicator of an area's flood risk. As such, it is not suitable for identifying whether an individual property will flood. This service uses computer models to assess an area's long-term flood risk from rivers, the sea, surface water and some groundwater. It does not include flood risk from sources such as blocked drains and burst pipes."*

(Figure 3 – Surface water flooding extent for the properties and surrounding area)

2.2.2 FloodSmart Analytics mapping

GeoSmart's FloodSmart Analytics mapping provides further information regarding the flood risks associated with Property A (Figures 4a to d).

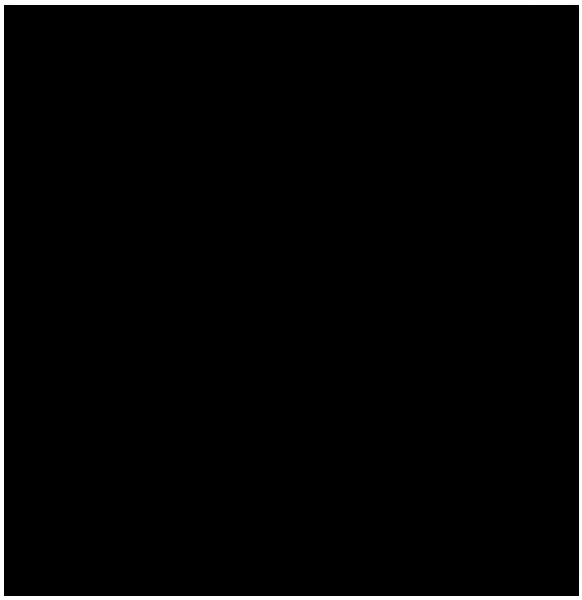
FloodSmart Analytics uses publicly and commercially available flood risk data indicating potential sources of flood risk to a site from fluvial (rivers), tidal (coastal), pluvial (surface run-off) and groundwater sources, including historical information and modelled flood extent.

The FloodSmart Analytics mapping indicates that all the affected properties are at Very Low risk from flooding from rivers and the sea.

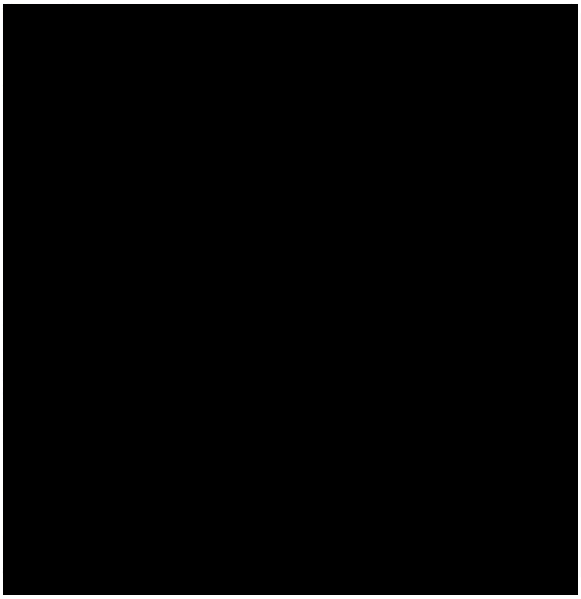
All the affected properties are mapped as having a High risk of surface water flooding. This is anticipated to reflect the properties' location in a topographic low relative to the surrounding area.

Properties A, B and C are partially mapped at High risk of groundwater flooding, which covers the majority of the building footprint and front garden areas. The rear gardens at these properties generally have a Very Low risk of groundwater flooding, although several areas at Low risk are noted.

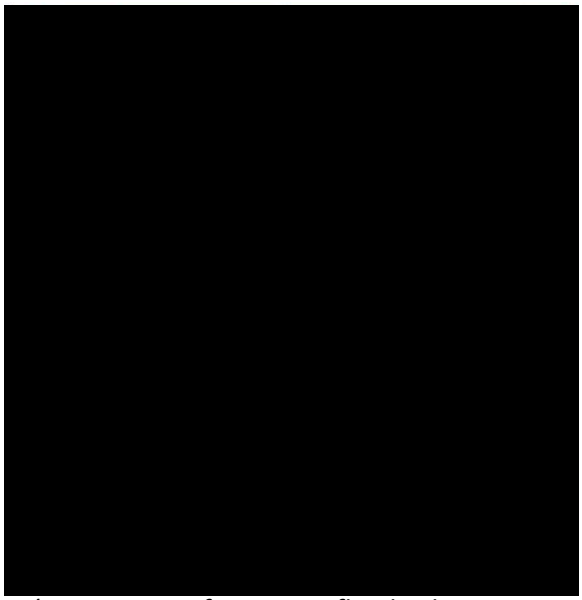
Properties D and E are generally mapped as having a Very Low risk of groundwater flooding. The exception is the eastern boundary of Property D, which contains an area mapped at High risk.



(Figure 4a: Fluvial flood risk mapping according to GeoSmart's FloodSmart Analytics mapping)



(Figure 4b: Tidal flood risk mapping according to GeoSmart's FloodSmart Analytics mapping)



(Figure 4c: Surface water flood risk mapping according to GeoSmart's FloodSmart Analytics mapping)

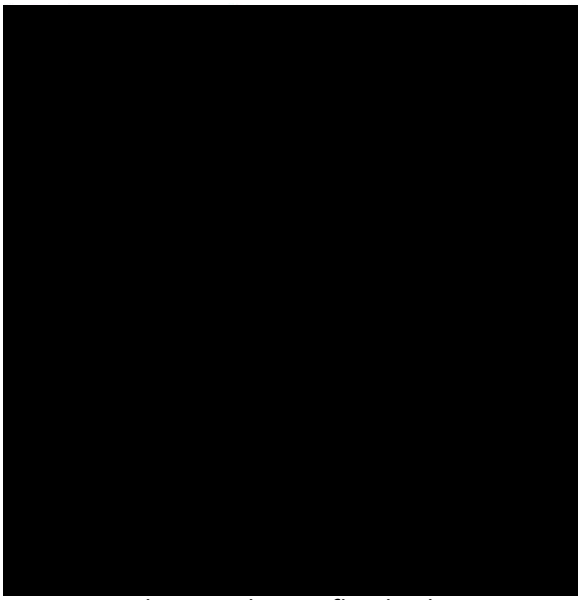


Figure 4d: Groundwater flood risk mapping according to GeoSmart's FloodSmart Analytics mapping)

2.3 Drainage arrangements

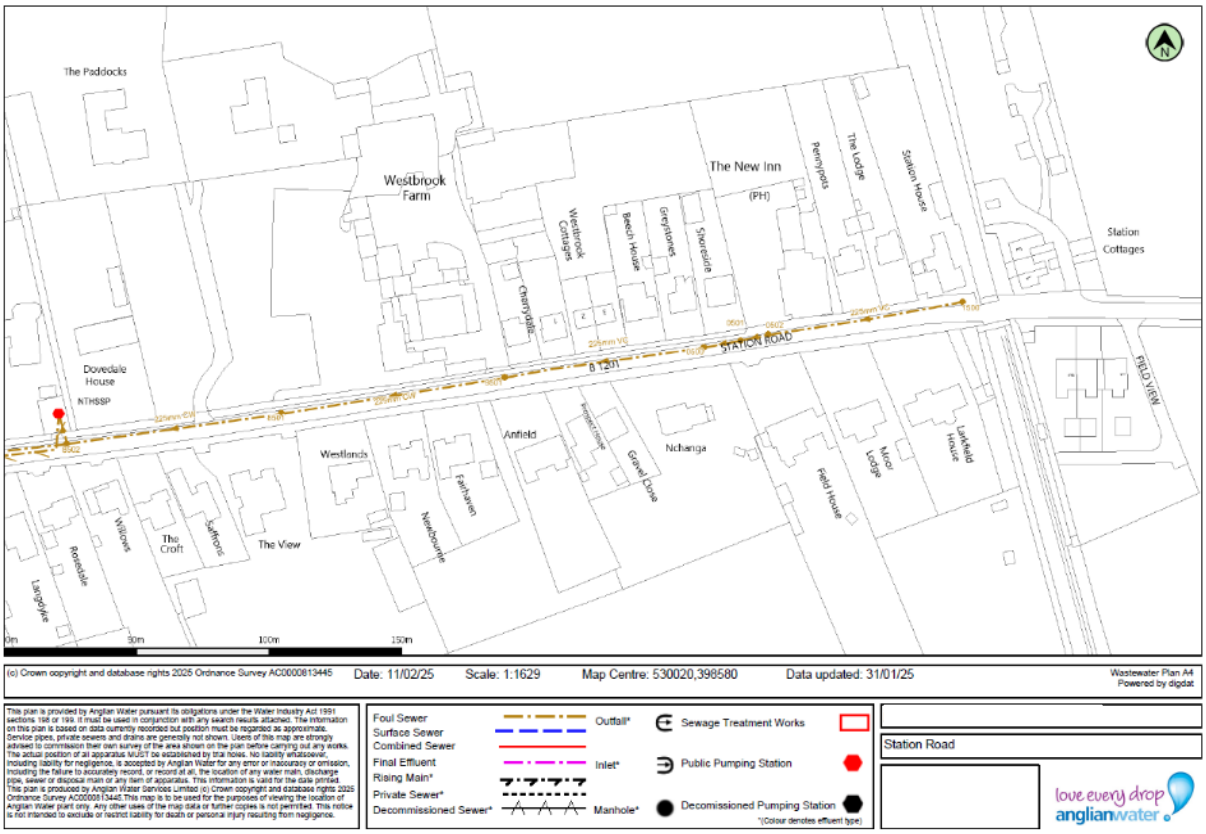
LCC records at time of publication are shown in Figure 5. This indicates that highway gullies are present along Station Road (to the south of the properties), which drain in a westerly direction to the nearest watercourse.

Gullies are noted on the northern side of Station Road, adjacent to Properties C, D and E; further gullies and offlets are noted on the southern side of the highway, opposite Properties A to B and D to E. All gullies and offlets are recorded as having an annual cleansing cycle, with the last inspection occurring on 15 May 2024. Prior to the last cleanse, the silt level was recorded as 'amber'. No defects were noted within the assets immediately adjacent to the properties, although two offlets c. 40 m and 80 m south-west are noted to have defects.

Anglian Water records at the time of publication are shown in Figure 6. This indicates that a public foul sewer is located along the northern side of Station Road, flowing in a westerly direction.

It should be noted that, whilst Anglian Water does not include any public surface water sewers along Station Road, the gullies included within LCC records are noted to connect into a drain which is listed as not under LCC liability. Therefore, a surface water drain can be assumed to be present along Station Road, with the party or parties responsible for its operation not known. This assumption is supported by 25 Inch 1892 – 1914 mapping produced by the Ordinance Survey which denotes the presence of a watercourse adjacent the boundary of the highway and properties.

(Figure 5 - Known drainage assets included within LCC records in the affected area at the time of publication)



(Figure 6 – Known sewer networks assets included within Anglian Water records in the affected area at the time of publication)

Consultants from GeoSmart Information Ltd visited the properties and surrounding area on 10 March 2025. As part of the visit, the drainage network on Station Road was inspected to confirm the presence and condition of the gullies and offlets.

The Site visit confirmed that gullies and offlets are present along Station Road in the same arrangement as included within LCC records. The gullies and offlets generally appeared to be in reasonable condition (beyond occasional silt / debris), although one gully, adjacent to Property D, appeared to be visibly partially blocked (Photograph 7 in Appendix 7.3), which was also reported by a resident.

Linear drains were present at the low point within the driveways at Properties A and B; these appeared to be partially blocked by silt, stones and leaves (Photographs 1 and 2 in Appendix 7.3). Manholes are noted in the west of the driveway at Property A and east of the driveway at Property B; these are not shown on LCC or Anglian Water records. Downpipes were noted on all the properties.

Following the Site visit (where concerns that modifications to nearby ditches and landforms were brought up by the residents of the properties), historical mapping and Google Earth imagery were inspected, alongside the earliest available LiDAR elevation mapping (from 2006), to identify any significant changes to ditches and landforms. However, no appreciable differences to the distribution of ditches and landforms were noted during the study period (since the early 2000s).

A drainage ditch could be located c. 70 m north of the properties, with a modest reduction in ground levels (identified via LiDAR data) noted along this field boundary. However, from the available information this cannot be confirmed.

The planning application for the pond c. 210 m north-west (ref: N/133/01871/19) was also reviewed following concerns raised by the residents of the affected properties. Surface water drainage calculations were submitted as part of the application and indicate that the pond was designed to provide some attenuation of surface water runoff, with any overflows discharged to the adjacent ditch at a controlled rate.

2.4 Previous flood incidents

No previous relevant S19 investigations have been carried out within the vicinity of the properties.

Three enquiries regarding blocked gullies have been made along Station Road within 10 m of the affected properties (refs: 485280, 4112231, and 4139022). Two of these enquiries were made due to ponding of surface water around a property to the south of Station Road in 2018 and 2019, which was attributed to blocked gullies as well as the property's position at a lower elevation than the road. In response to these enquiries, cleansing works for the adjacent gullies were undertaken. It should be noted that no enquiries regarding blocked drainage have been made by the residents at Properties A to E.

According to the EA's Historical Flood Map, no fluvial or tidal flood incidents have previously affected the Site.

The SFRA does not include any information regarding historical flood incidents in North Thoresby (East Lindsey District Council, 2017).

Anecdotally, during the Site visit, the residents at Properties A, B, C and D all indicated that no flooding has previously occurred at the dwellings. The resident at Property C mentioned that there had been one incident of surface water ponding within the rear garden, although internal flooding had not occurred previously. It was not ascertained whether Property E had previously experienced flooding.

3. Flood event

3.1 Conditions prior to the flooding

Prior to the flooding event, rainfall conditions were normal across the wider Lincolnshire area.

During November 2024, the Lincolnshire and Northamptonshire area received an average rainfall of 58 mm (equivalent to 103% of the long term average) which was classified as within normal range.

Normal conditions continued through December 2024. During this month, the Lincolnshire and Northamptonshire area recorded an average rainfall of 67 mm (equivalent to 120% of the long term average). Groundwater levels remained normal or higher following the normal levels of rainfall the Lincolnshire and Northamptonshire area had received. During the month, soil moisture deficits had also decreased, indicating that in general Lincolnshire was slightly wetter than normal for the time of year (EA, 2025).

Following on from this, a south-to-north Atlantic low-pressure system brought significant rainfall across Lincolnshire on 05 and 06 January 2025. Some locations within Lincolnshire received over 50 mm of rain, equivalent to a whole-month's average rainfall over a two-day period. On 05 January, several weather stations recorded their wettest January day on record including Cranwell, (30.8 mm, 111 years of recorded data) and Coningsby (33.2 mm, 60 years of recorded data).

Temperatures overnight on 05 and 06 January 2025 were around 0°C, which meant that in many cases the surface of the ground was frozen and covered with a layer of snow. These factors likely resulted in an increase in runoff rates as rainfall was less able to infiltrate into the ground, causing increased overland flow and subsequent rapid rising of river levels.

Information was requested from the Highways Authority and Anglian Water for inclusion within the investigation; however, other than the previous reports of flooding and outcome of the actions, no further data was received within the timeframe of this report.

3.2 Rainfall and telemetry analysis

The closest rainfall gauge is located at Covenham (ref: E25033), c. 5.4 km south-east of the properties. In the absence of a closer gauge or Radar data, the rainfall data from this gauge has been analysed as part of this investigation (Figure 7).

The rainfall data was made available from DEFRA's Hydrology Data Explorer. Annual chance events were calculated using the FEH22 DDF model. The result of these calculations is summarised within Table 2.

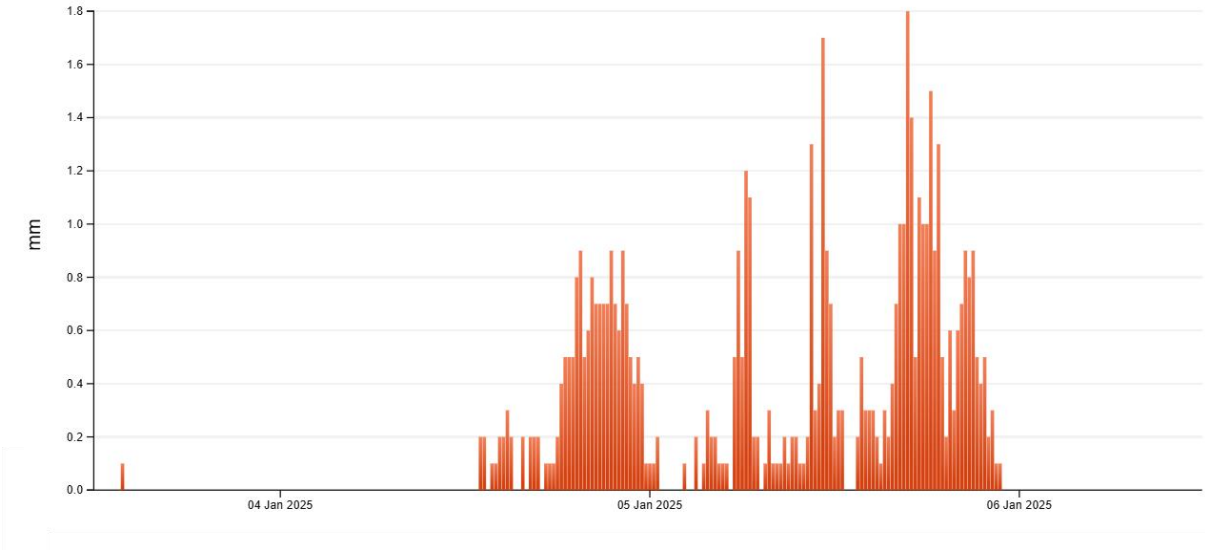
This rainfall data indicates that rainfall first began in the early hours of 05 January 2025 and continued until around 11:00 on 06 January. Rainfall reached a peak intensity at around 18:00 on 05 January, midnight on 05 January and 05:00 on 06 January, with a more modest peak between 08:00 and 10:00 on 05 January.

Analysis of this rainfall data indicates that the rainfall event on 05 and 06 January 2025 was equivalent to a 1 in 7.2 year (13.9% AEP) event within the North Thoresby area.

Note that rainfall intensities and depths vary across an area, and therefore the rainfall data included should be used as an indicative guide only. Additionally, the rainfall data does not fully account for the snowfall and snowmelt experienced across high ground in Lincolnshire.

Table 2 – Summary of available rainfall data for the properties; *Calculated via FEH22 Annual Maximum and Peaks Over Threshold methods

Rainfall duration (hours)	Rainfall depth (mm)	AEP*
34	55	1 in 7.2 (13.9%)



(Figure 7 – Rainfall totals over 15 minute periods at Covenham rain gauge between 04 and 06 January 2025)

3.3 Flooding mechanism(s) and causation

3.3.1 Reported flooding

Consultants from GeoSmart Information Ltd visited the properties and surrounding area on 10 March 2025. During this visit, conversations were held with the residents of the properties to confirm the timing, extent and depth of flooding. Additional information from several residents has been provided via an LCC questionnaire. Photograph evidence of the flooding has been provided by the residents, and a selection of photographs has been included within this section of the report (Figures 8 to 18).

The residents at Properties A to D indicated that flood waters were first noticed within driveways and rear gardens around 06:00 to 07:00 on 06 January 2025. Internal flooding occurred later in the morning / afternoon, with flood waters first noticed within Property A at 11:30 and within Property C at 13:00. In the case of Property D, the accumulation of flood waters beneath the extension was first noticed around 17:00 on 05 January. A specific time for water ingress was not discerned for Property B.

To reduce flood depths, as reported by an affected resident, a local farmer undertook pumping from the manhole in the driveway at Property B throughout the day, with residents reporting the removal of 20,000 l of flood water (Figure 9). Sandbags were used at several properties to prevent flood waters from exceeding the building thresholds, and a form of dam was prepared along the northern boundary of the rear garden at Property D in hopes of reducing surface water flows to the south. The Fire Brigade was reported to have been called and attended at Property C, where it namely remained throughout the event.

Flood waters reached a depth of c. 200 mm on the ground floor at Property A, with a maximum external flood depth of c. 500 mm within the driveway and rear garden (Figure 8). Flooding did not exceed any door thresholds and was reported to have come through the floor. Flood waters had receded from the building by 09:00 on 07 January (when the resident returned to the property).

The resident at Property B reported a maximum internal flood depth of 220 mm, with up to 300 mm of flooding within the driveway. Flood waters entered the property by exceeding the front door threshold.

The resident at Property C reported that flood waters remained in the dwelling until 23:00 on 06 January. Seepage occurred on the ground floor of the dwelling due to external flood waters exceeding the damp proof course and entering via the walls and floor; flood waters did not exceed the building thresholds, although they were noted to be close. Flood waters reached a maximum external depth of 250 mm, with a depth of c. 100 mm adjacent to the front door (Figures 11, 12 and 15). Flood waters were noted to breach the entrance to the detached garage.

Internal flooding of Properties D and E did not occur. However, the resident at Property D indicated that flood waters were present within the driveway and rear garden, reaching a depth of 150 mm immediately adjacent to the rear extension (Figure 16). The extension at Property D contains a sunken swim spa, which comprises a pool sunk into a void, with floorboards suspended over the top of the void. This extension experienced flooding which rose to within c. 30 mm of the base of the floorboards; a maximum flood depth of 1.2 m beneath the floorboards was reported (Figure 17). Flood waters remained beneath the extension for c. 1-2 days. A sump and pump are located within the cavity associated with the swim spa, which still contained water at the time of the Site visit on 10 March 2025 (Photograph 4 in Appendix 7.3).

Flood depths were reported to reach c. 200 mm in the driveway at Property E. The barn was noted to have flooded due to a surcharging drain, with no flood waters exceeding the threshold.

Property A's power, water supplies and heating were impacted by flooding. Toilets were unable to be flushed at Properties A and C. Electrics within the extension at Property D were damaged due to the flooding.

In general, the residents were able to leave the properties but had to wade through flood waters within the driveway.

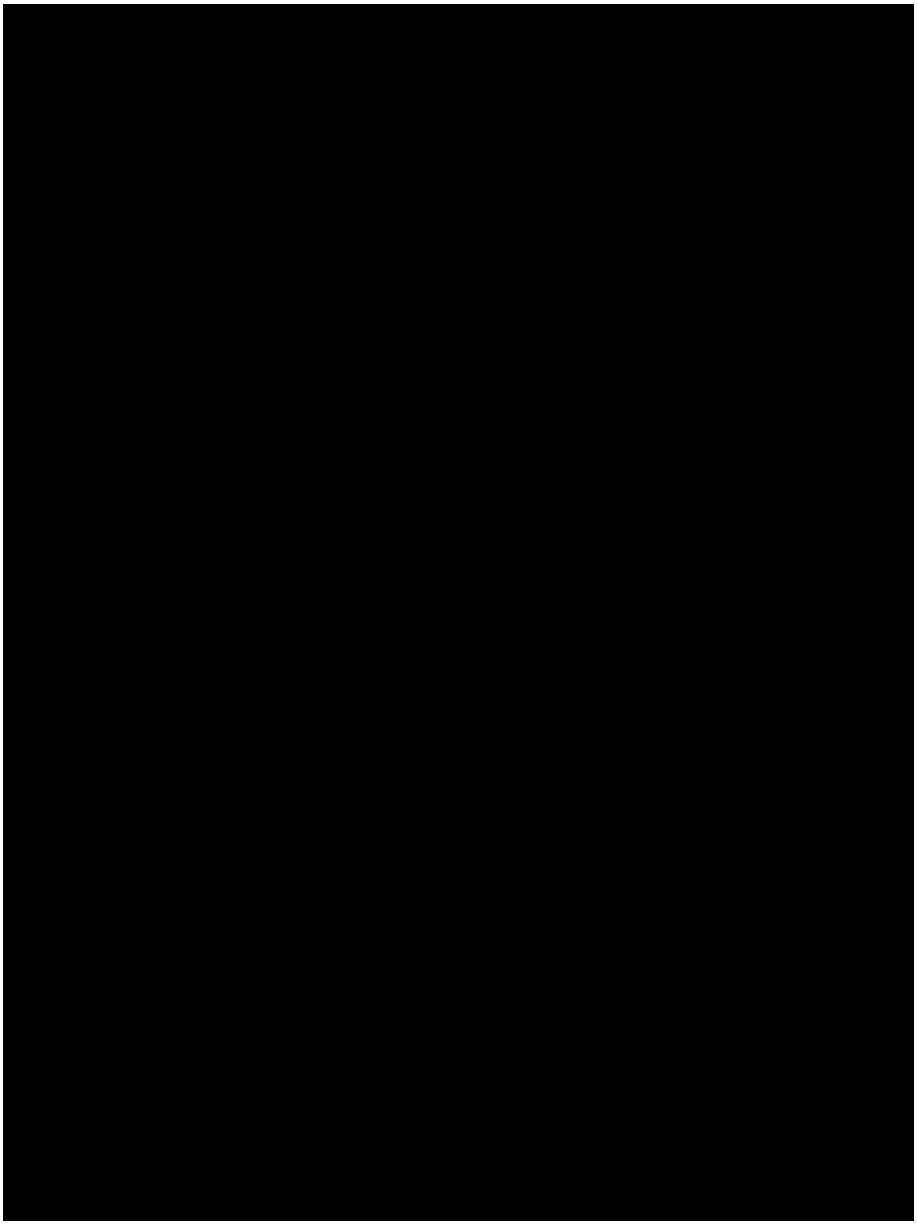
The source of flooding was generally attributed to heavy rainfall. Flood waters were reported to flow towards the properties from the fields to rear, with the general flow direction being

to the east; additional flood waters were sourced from the highway, which forms a raised feature relative to the adjacent properties.

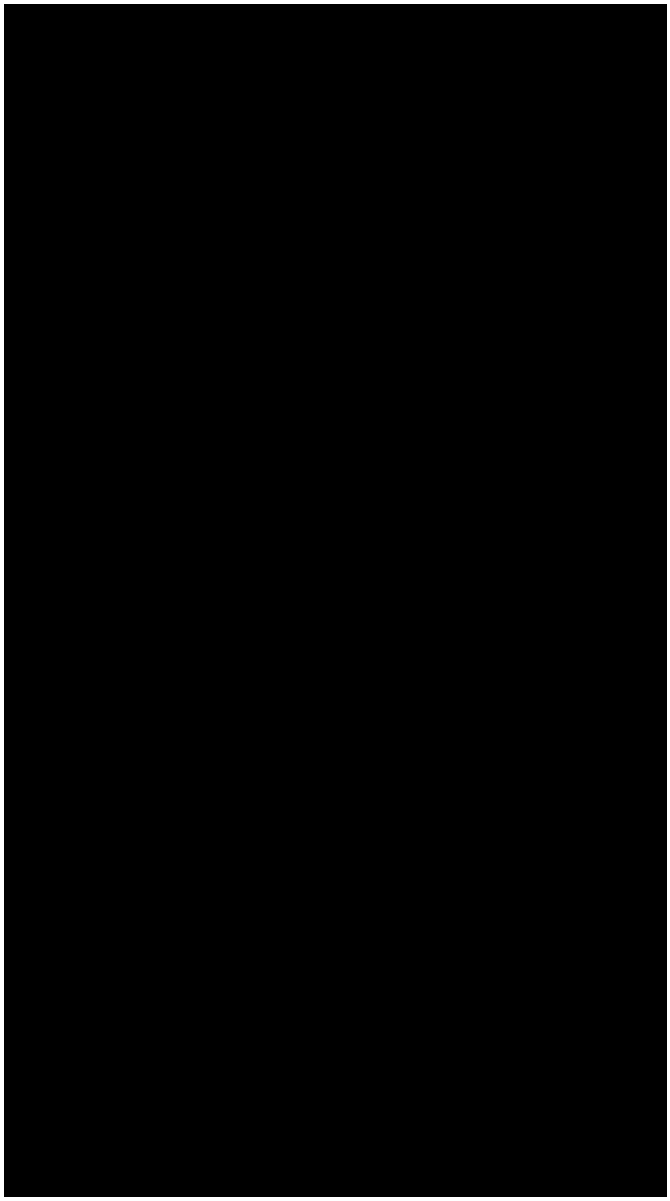
A number of possible exacerbating factors were suggested by residents, including:

- Blocked highway drains;
- Suggested problems with the public sewer network, such as a damaged pipe near the railway. Several residents noted that Anglian Water carried out repairs to the pipe on 07 January, the day after the flood event. *Note: the resident at Property C mentioned that sewage was present within external flood waters in the garden of a dwelling on the southern side of Station Road, although sewerage was not mentioned by any residents whose properties experienced internal flooding*;
- Potential modifications to the fields to the rear of the property, such as clearing of vegetation, removal of mounds, and infilling of dykes;
- Recent property development in the area, such as the construction of new dwellings to the west and east, and extensions and hard standing being constructed at nearby dwellings;
- Construction of a fishing lake c. 200 m north-west of the properties, as well as nearby borehole wells and sumps; and
- Heavy rainfall coinciding with high tide.

The resident of Property C provided additional photographs and videos on 15 April 2025 following a period of rainfall in the early hours of the same day. This indicated that the highway gullies were at capacity and surface water was ponding along the kerb line and flowing along the driveway adjacent to the property (photograph 8). It was noted that the highway gully adjacent to the driveway of Property D was blocked with “rubble”, with flows travelling from this asset to the lower elevation of the adjacent Property C (photograph 9).



(Figure 8 – Flooding in the driveway at Property A, as provided by the property resident; facing north)



(Figure 9 – Flooding in the driveway at Property A showing pumping, as provided by the property resident; facing south-east)

(Figure 10 – Internal flooding within Property A, as provided by the resident)

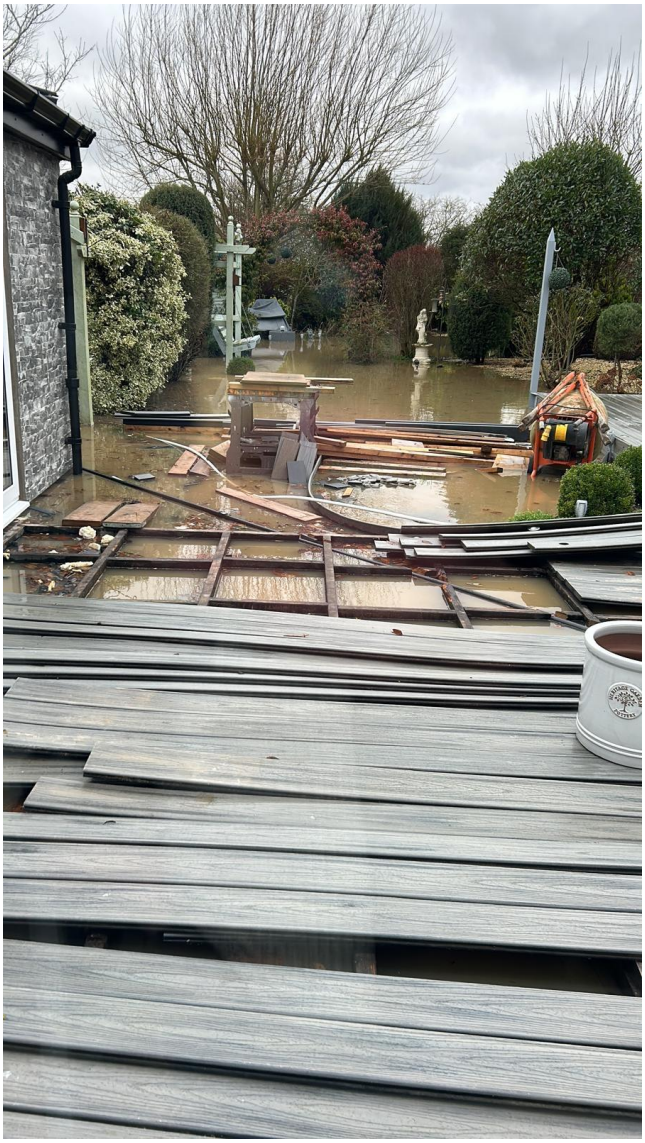
(Figure 11 – Flooding in the rear garden at Property C, as provided by the resident; facing north)

(Figure 12 – Flooding in the front driveway at Property C, as provided by the resident; facing south)

(Figure 13 – Seepage at Property C, as provided by the resident)

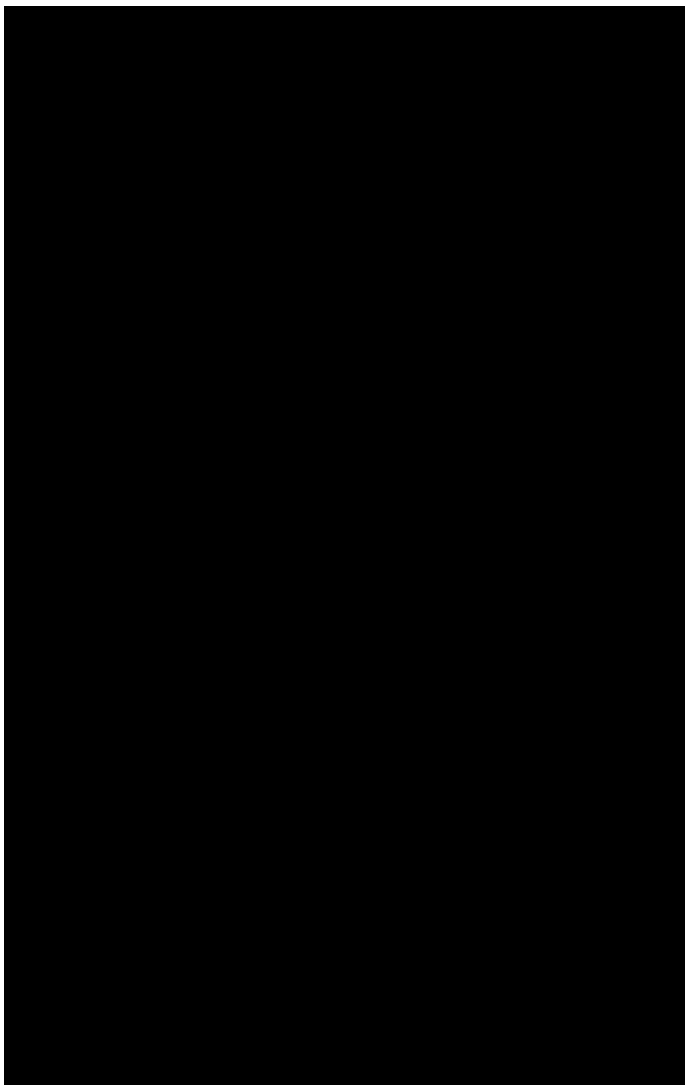
(Figure 14 – Flooding in the driveway at Property C, as provided by the resident; facing north)

(Figure 15 – Flooding in the driveway at Property C, as provided by the resident; facing north-east)



(Figure 16 – Flooding in the rear garden at Property D, as provided by the resident; facing north)

(Figure 17 – Flooding beneath the floorboards in the extension at Property D, as provided with the resident)



(Figure 18 – Flooding in driveway at Property D, as provided by the resident; facing north-east)

3.3.2 Investigation findings and conclusions

From information provided by the residents of the properties and an inspection of the surrounding area, it is likely that the flooding was primarily pluvial in nature, driven by intense rainfall.

The affected properties are located in a topographic low point relative to the surrounding dwellings and land, with ground levels falling towards them from the fields to the north. As a result, surface water from these areas is anticipated to flow in a southerly direction and accumulate at the properties due to them being the natural runoff destination in any rainfall event. The railway line c. 50 m to the east is associated with high ground on both sides, which would likely prevent onward flow in an easterly direction and contribute again to the accumulation at the properties.

Similarly, Station Road, which forms the southern boundary of the affected properties, has higher ground levels than the land associated with the properties and is estimated to be c. 0.5 m higher than Properties A and B. The highway is noted to fall in both directions towards the properties. This likely contributed to the flooding experienced in two ways:

- Given that ground levels fall in a southerly direction, prior to the installation of the highway, surface water flows likely would have continued to flow south. However, the highway now forms a barrier to onward flows, exacerbating the flood depths experienced at the properties.
- Given that the lowest point of Station Road is adjacent to the properties, runoff flowed down the highway towards the properties from both directions before flowing down each driveway and accumulating adjacent to the front of each dwelling (see Figure 19).

The distribution of flood waters during the January flood event is consistent with the EA's surface water flood risk mapping, which indicates a High risk of surface water accumulation at the properties (see Figure 3).

It is considered likely that the highway drainage network along Station Road had insufficient capacity for the rainfall intensity experienced on 06 January 2025, resulting in its exceedance and potentially exacerbating the flood depths at the affected properties. Within photos sent by the resident at Property C, the highway gullies adjacent to Property D were observed to be full on 15 April 2025 following a significantly less intense rainfall event, suggesting that their capacity is low or a potential blockage within the surface water drainage network. It should, however, be noted that surcharging gullies were not reported during the January event.

The capacity of the highway drainage system could be limited by any defect, damage or blockage within the assets maintained by LCC and / or the piped drainage system of unknown ownership into which they discharge. One gully was observed to be partially blocked with silt and plant debris during the visit, although the others appeared to be in reasonable condition. Any blockages could reduce the capacity of the drains and contribute to their exceedance during rainfall events.

It is also noted that the linear drain outside Properties A and B appeared to be blocked with silt and plant debris during the Site visit (Photographs 1 and 2 in Appendix 7.3), which would also have prevented any runoff accumulating in this area from draining away. However, this is assumed to connect into the surface water drainage network, which was likely already at capacity, so it seems less likely that it would have appreciably reduced flood depths.

Flood waters were reported to have entered Property A via the floor, which suggests a possible groundwater contribution to the flooding. However, according to BGS geological mapping, the properties are underlain by Till deposits (BGS, 2025), which are often clay-based and with a low permeability; hence, the potential for groundwater to emerge at the surface may be limited. It is acknowledged that pluvial flood waters could enter the property above the damp proof course or at ground floor level and emerge through the floor.

The list of exacerbating factors suggested by residents has been reviewed, with commentary provided on whether each factor could have impacted the flooding experienced:

- Blocked highway drains. *As discussed above, the capacity of the highway drainage network was likely exceeded during the January flood event, and any blockages or damages within it and / or the receiving drainage network could have reduced this capacity further, exacerbating the flood depths experienced*;
- Suggested problems with the public sewer network, such as a damaged pipe near the railway. *Given that sewerage was not reported by the residents of the internally flooded properties, surcharging of the public foul sewer is considered unlikely to have occurred. Information provided by Anglian Water supports this position and notes that, during the flood event, water testing was undertaken with no traces of ammonia detected.*
- Potential modifications to the fields to the rear of the property, such as clearing of vegetation, removal of mounds, and infilling of dykes. *Whilst some modest clearing of vegetation has been noted in the past five years, this is considered insufficient to have an impact on flooding during the January flood event. No appreciable changes to dykes have been identified*;
- Recent property development in the area, such as the construction of new dwellings to the west and east, and extensions and hard standing being constructed at nearby dwellings. *Whilst modest development has occurred within the vicinity of the properties in last five years, this is considered insufficient to have appreciably contributed to the flooding experienced on 06 January 2025*;
- Construction of a fishing lake c. 200 m north-west of the property, as well as nearby borehole wells and sumps. *Following a review of the planning application associated with the fishing lake, the lake was designed to accommodate sustainable drainage, including attenuation for surface water during extreme rainfall events. This, paired with its distance from the properties, likely would prevent it from having any impact on the January flood event. The nearby sump is considered most likely to have reduced flood depths, rather than increasing them, due to providing some attenuation of flood waters during the event*; and
- Heavy rainfall coinciding with high tide. *North Thoresby occupies high ground compared to the nearby Fens, at a significantly higher elevation than sea level. Tidal locking is therefore considered unlikely to have an appreciable impact on flooding at the internally flooded properties.*

A diagram of the inferred flood extent and possible flood mechanisms is included within Figure 19. Note that the flood extent outside of Properties A to D could not be confirmed, although flooding is also anticipated to extend into the land to the north of the properties.

(Figure 19 – Inferred flood extent and mechanism at the properties)

4. Risk management authorities

In relation to this flood event, the following RMAs have relevant flood risk management functions:

- East Lindsey District Council
- Highways Authority (Lincolnshire County Council)
- Lead Local Flood Authority (Lincolnshire County Council)

A record as to whether the above RMAs have exercised or are proposing to exercise those functions in response to the flood shall be monitored through the existing Joint Lincolnshire Flood Risk and Water Management Partnership.

The property owners also have a responsibility with regards to the resilience and resistance measures implemented at each property.

For the avoidance of doubt, the ordering of the above relevant RMAs is alphabetical and as such is not necessarily reflective of the number of relevant flood risk management functions associated with each RMA in this instance.

5. Recommendations for consideration

Based on the findings of this investigation, the following recommendations for consideration by the relevant parties have been made. For the avoidance of doubt, the order of these recommendations is listed alphabetically.

5.1 Confirmation of effectiveness of surface water drainage network

Given that the gullies on Station Road adjacent to the properties appear to be full following periods of low intensity rainfall, consideration should be given to inspecting the highway drainage to ensure that it is effectively operating. This could involve a visual inspection alongside a CCTV survey if deemed necessary.

Following the inspection of the highway drainage assets, remedial work should be considered to address any defect, damage or misconnection. Upgrades may also be required to increase the capacity within the network, having regard to current design standards, capacity of the receiving drainage network, and legislative requirements.

In addition to the above, the inspection of the piped surface water drain of unknown ownership should also be undertaken to confirm its condition, connectivity, and outfall location. As part of this inspection, the party or parties likely responsible for its maintenance should be determined insofar as is reasonably practicable. Subject to the outcome of this inspection the relevant party or parties should also consider addressing any defect, damage, or misconnections and / or reviewing whether the capacity of the system is in need of improvement having regard to current design standards and considerations.

The responsibility for inspecting the highway drainage network would fall to LCC, in its capacity as the Highways Authority. Given that the highway drains may connect into a culverted watercourse, East Lindsey District Council and LCC as LLFA are deemed to have the relevant permissive powers at the time of writing.

5.2 Flood resilience measures

Flood resistance and resilience measures may be considered for the properties.

Consideration could be given to the use of a flood barrier or door at the building thresholds for Properties A and B.

Potential resilience measures include:

- Replacing ground floor carpets with hard flooring;
- Installing uPVC skirting boards;
- Raising furniture and appliance on the ground floor of each dwelling on plinths;
- Chemical waterproofing of the walls around the perimeter of each dwelling;
- Installing non return valves on air bricks and utility pipework; and
- Storing valuable items above ground level.

The responsibility for the implementation of flood resilience measures would fall to the residents of the property, with support from the LLFA, where appropriate.

5.3 Implementation of a Flood Action Plan

Given the high potential for surface water flooding to occur at the properties during future storm events, it is recommended that a Flood Action Plan is implemented for the affected properties on Station Road. This plan should detail the actions that should be taken by the property owners in the event of a flood to assist in the organisation of an emergency response and minimise the impacts on property and possessions.

As part of this, the residents of each property should sign up to the MET Office extreme weather warnings. Weather warnings are issued when the weather is deemed to have a potential impact on people categorised as: Yellow (consideration of taking steps to minimise impacts), Amber (change plans to protect persons and property) and Red (take direct action to keep yourself and others safe). Appropriate actions should be taken, subject to the severity of the warning.

The responsibility of the implementation of a Flood Action Plan would fall to residents of the property, with support from the Emergency Response team at LCC as appropriate.

5.4 Inspection of drainage ditch to the north

A possible drainage ditch has been identified c. 70 m north of the properties. Should this ditch be present, it could intercept and divert surface water flows away from the properties.

Therefore, consideration should be given to conducting an inspection along the field boundary to the north to confirm the presence or absence of a drainage ditch in this area. Should the drainage ditch be present, its condition, capacity and connectivity should be confirmed to determine whether it would provide any attenuation of surface water flows from the fields to the north. As part of this, maintenance and/or deepening works should be carried out if considered necessary.

Should a drainage ditch be absent, consideration could be given to implementing one along this boundary.

The responsibility for confirming the presence or absence of the drainage ditch would fall to East Lindsey District Council (who are anticipated to have responsibility for overseeing the management of drainage ditches outside of the IDB boundary in North Thoresby), alongside LCC as LLFA where deemed as necessary. The riparian landowner would have responsibility for any maintenance works for drainage ditches on their land.

5.5 Maintenance of linear drains

Given the linear drain within the driveways at Properties A and B appeared to be blocked during the Site visit, consideration should be given by the property owners to the drains being

cleansed and jet washed to improve their effectiveness during future storms. Following this, regular maintenance of the linear drain should occur. Alternatively, the drain could be replaced by a more effective or more easily maintained linear drain.

Consideration could also be given to implementing a linear drain along the building perimeter at Property C.

However, it should be noted that the capacity of the surface water drainage network (into which these features are likely to drain) appears to be limited. Therefore, without potential remediation to the capacity of this network, the suggested linear drains may result in a minimal decrease in flood depths.

The responsibility for implementing linear drains would fall to the residents of each property.

6. References

Anglian Water (2025). Known sewer network records.

BGS (2025). GeoIndex Onshore. Accessed from: https://mapapps2.bgs.ac.uk/geoindex/home.html on 17/04/2025.

CEH (2025). Online FEH web service Depth/duration/frequency modelling using the FEH 2022 models. Accessed from: https://fehweb.ceh.ac.uk/ on 17/04/2025.

DEFRA (2025). Hydrology Data Explorer. Accessed from: environment.data.gov.uk/hydrology/explore on 17/04/2025.

East Lindsey District Council (2017). Strategic Flood Risk Assessment. Accessed from: https://www.e-lindsey.gov.uk/article/6200/Strategic-Flood-Risk-Assessment on 17/04/2025.

Environment Agency [EA] (2025). MagicMap. Accessed from: https://magic.defra.gov.uk/MagicMap.html on 17/04/2025.

Environment Agency [EA] (2025). Flood map for planning. Accessed from: https://flood-map-for-planning.service.gov.uk/ on 17/04/2025.

Environment Agency [EA] (2025). Long term flood risk assessment for locations in England. Accessed from: https://www.gov.uk/check-long-term-flood-risk on 17/04/2025.

Environment Agency [EA] (2024). Lincolnshire and Northamptonshire water situation report, November 2024. Accessed from: https://webarchive.nationalarchives.gov.uk/ukgwa/*/https://www.gov.uk/government/publications/water-situation-local-area-reports on 17/04/2025.

Environment Agency [EA] (2024). Lincolnshire and Northamptonshire water situation report, December 2024. Accessed from: https://webarchive.nationalarchives.gov.uk/ukgwa/*/https://www.gov.uk/government/publications/water-situation-local-area-reports on 17/04/2025.

Environment Agency [EA] (2025). Lincolnshire and Northamptonshire water situation report, January 2025. Accessed from: https://webarchive.nationalarchives.gov.uk/ukgwa/*/https://www.gov.uk/government/publications/water-situation-local-area-reports on 17/04/2025.

GeoSmart (2025). FloodSmart Analytics.

LiDAR Survey Open Data (2025). Accessed from: https://environment.data.gov.uk/survey on 17/04/2025.

Lincolnshire County Council (2025). Drainage asset records.

Lincolnshire County Council (2025). Records of previous flooding (reports of previous flood incidents and S19 investigation report summaries).

Met Office (2025). Heavy rain, strong winds and snow, New Year 2024-2025. Accessed from: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2025/2025_01_wind_rain_snow.pdf on 17/04/2025.

7. Appendices

7.1 Definitions

Coastal / tidal flooding – Flooding which occurs due to extreme coastal conditions. May occur due to high tide levels, surges and wave action.

Culvert – Where a watercourse flows through a pipe, often underground.

External flooding – Flooding affecting spaces outdoors. Includes flooding in highways, open land, gardens and driveways.

Flap valve – Hinged valve placed on a pipe outlet into a river. Stays open during normal flow but closes when it is submerged, to prevent flow from backing up the pipe.

Foul sewer – Sewer which carries wastewater (e.g. from toilets, sinks, showers and kitchen appliances) to a sewage works for treatment.

Groundwater flooding – Flooding which occurs when sub-surface water emerges from the ground at the surface or into Made Ground and structures. Occurs due to persistent rainfall that recharges aquifers until they are full; or may be as a result of high river levels, or tides, driving water through near-surface deposits.

Gully – Drainage pit covered by an open metal grate, located at the edge of a road. Drains rainwater from the road into either the surface water sewer or into nearby watercourses.

HYRAD – Real-time radar display system for weather.

Internal Drainage Boards – A public authority that managed water levels within an Internal Drainage District.

Internal flooding – Flooding which affected the living/business space inside of a building.

Lead Local Flood Authority - County councils and unitary authorities which lead in managing local sources of flood risk (i.e. flooding from surface water, groundwater and ordinary watercourses)

LiDAR – A remote sensing technique that allows ground elevation to be determined over a regional area.

Main river - A watercourse shown as such on the main river map for England and includes any structure or appliance for controlling or regulating the flow of water into, or out of, the channel which –

a) Is a structure or appliance situated in the channel or in any part of the banks of the channel; and
b) Is not a structure or appliance vested in or controlled by an internal drainage board.

The Environment Agency has permissive powers to maintain and carry out improvements on main rivers, to manage flood risk.

Ordinary Watercourse - A watercourse that does not form part of a main river. Lead local flood authorities, district councils, and internal drainage boards can carry out flood risk management work on ordinary watercourses.

Public sewer – Sewers owned and maintained by a Sewerage Company (e.g. Anglian Water). Are usually located in roads or public open spaces by may run through private gardens.

Riparian owner – The owner of land that is next to a watercourse or has a watercourse running through or beneath it.

River (fluvial) flooding – Flooding that occurs during times of heavy rainfall or snow melt when watercourses' capacity can be exceeded, over topping the banks and flood defences.

Soil moisture deficit – The difference between the amount of water actually present in the soil and the amount of water which the soil can hold.

Surface water (pluvial) flooding – Flooding which occurs when intense rainfall exceeds the infiltration capacity of the ground and overwhelms the drainage systems.

Surface water sewer – Sewer which carries rainwater directly to a watercourse.

Telemetry – Instruments used to monitor the level of water in a watercourse.

Weir – A small dam structure built across a watercourse to raise the water level or to divert flow.

7.2 Authorities with flood risk management functions

The following Risk Management Authorities (RMA) have flood risk management functions within Lincolnshire:

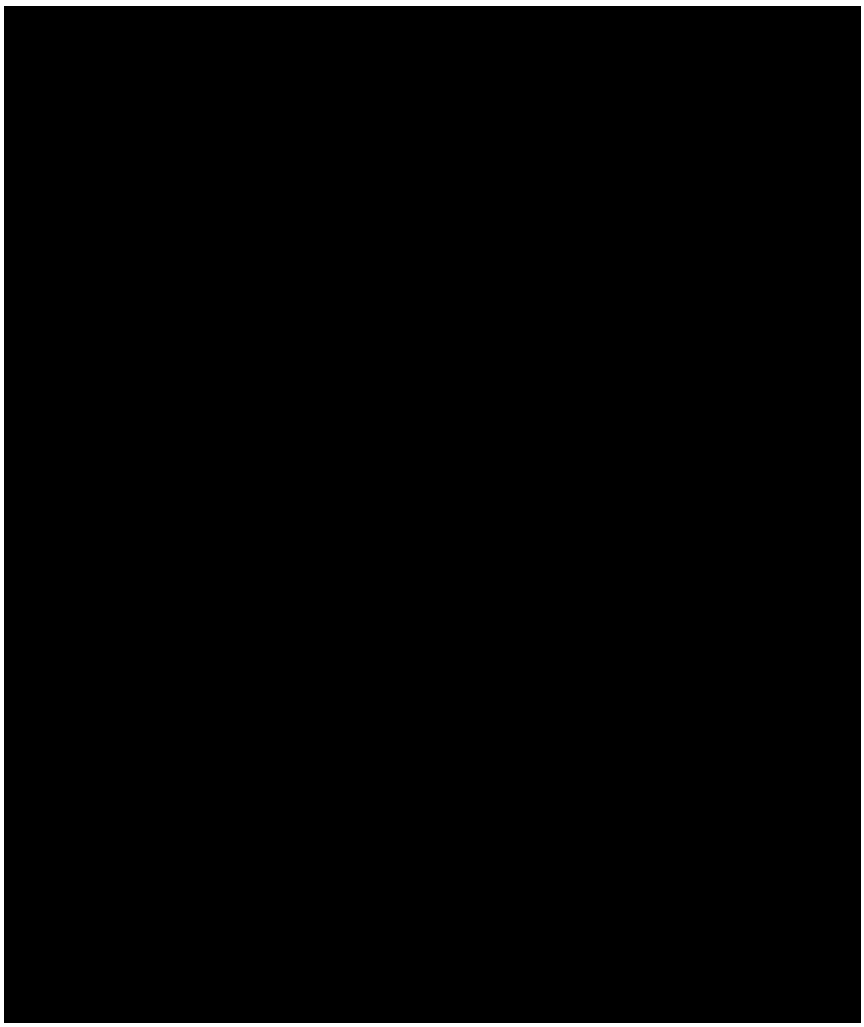
- **Lead Local Flood Authority (LLFA): Lincolnshire County Council** - Responsible for coordinating the mitigation of risk of flooding from surface water, groundwater and ordinary watercourses (non-main rivers). The LLFA is also responsible for developing, maintaining and applying a strategy for local flood risk management in its area and for maintaining a register of flood risk assets. The LLFA also has a statutory duty to investigate significant flood events to the extent it considers necessary.
- **Environment Agency** - Tasked with the protection and conservation of the water environment in England, the natural beauty of rivers and wetlands and the wildlife that lives there. Its responsibilities include: water quality and resources; fisheries; conservation and ecology; and operational responsibility for managing the risk of flooding from main rivers (usually large streams and rivers), reservoirs, estuaries and the sea. Flood risk management work can include: constructing and maintaining 'assets' (such as flood banks or pumping stations) and works to main rivers to manage water levels and make sure flood water can flow freely; operating flood risk management assets during a flood; dredging the river; and issuing flood warnings. The Environment Agency can also do work to prevent environmental damage to watercourses, or to restore conditions where damage has already been done.
- **Internal Drainage Boards** (IDBs) - Independent public bodies, established in areas of special drainage need, known as drainage districts. The IDB is responsible for the supervision of land drainage, water level management and flood risk management works and regulation of ordinary watercourses within its Drainage District. IDBs play an important role in the areas they cover (approximately 10% of England at present), working in partnership with other authorities to actively manage and reduce the risk of flooding.
- **Highways Authority: Lincolnshire County Council** - Responsible for maintaining the highway drainage system to an acceptable standard and ensuring that road projects do not increase flood risk.
- **Water and Sewage Company: Anglian Water** - Responsible for the provision of wastewater collection and treatment systems, including for managing the risks of flooding from surface water and foul or combined public sewer systems providing drainage from buildings and yards.
- **District Councils** - including borough and city councils, have powers to carry out works to manage flood risk from ordinary watercourses (outside the internal drainage district of Internal Drainage Boards) and the sea. They are also planning authorities, responsible for developing a local plan, which must have regard to national planning policy and work with Lead Local Flood Authorities and others to ensure decisions on development in their area effectively manage the risks from flooding. Additionally, those District Councils that are next to the sea are also designated coast protection authorities. This role includes leading on coastal erosion risk management activities, leading and supporting coastal groups, and leading the production of shoreline management plans.

In addition to the above, the other parties that may have responsibilities include:

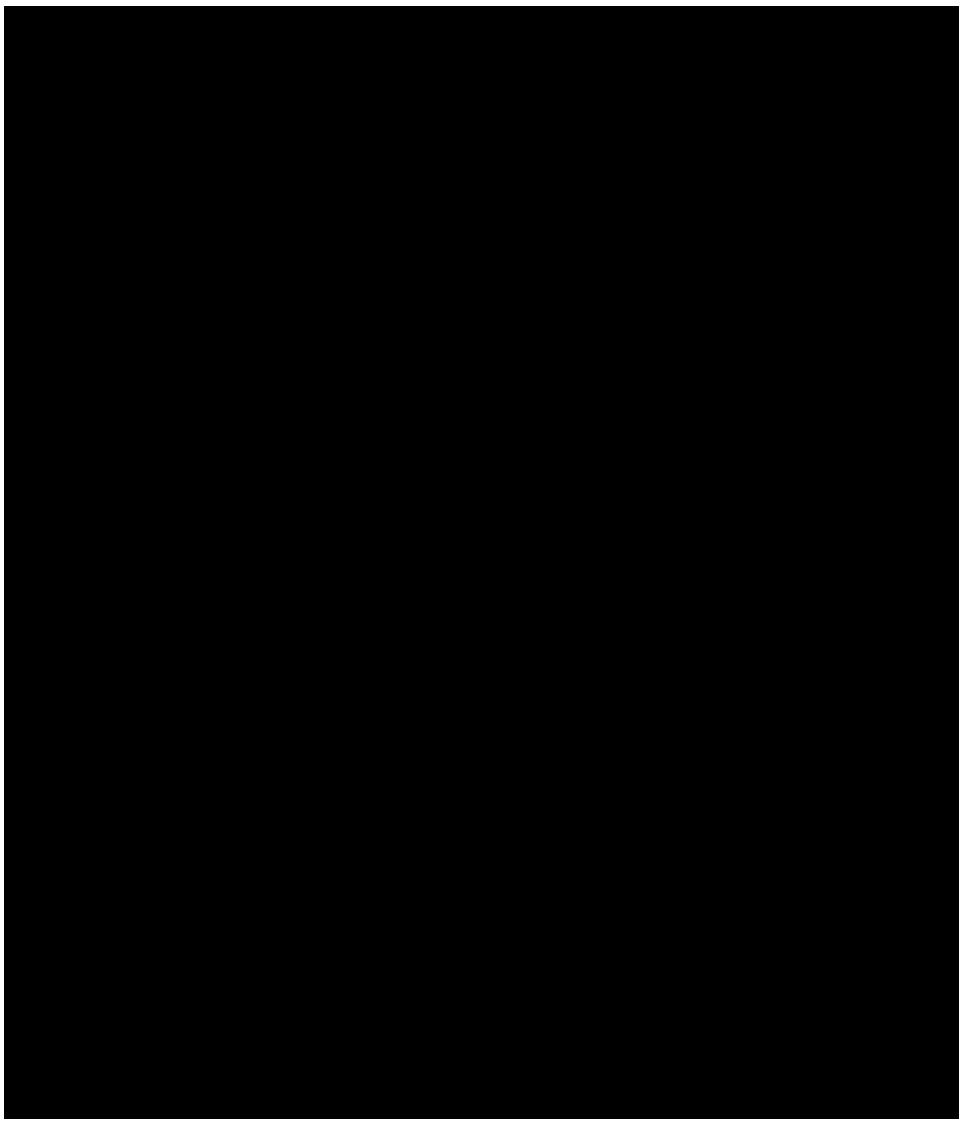
- **Riparian Landowners** - Riparian landowners who own land or property crossed by or next to a river, stream or ditch (including where this runs through a pipe or culvert) have rights and responsibilities over the management of the land including: a responsibility to let water flow through the land without any obstruction, pollution or diversion which affects the rights of others; keeping banks clear of anything that could cause an obstruction and increase flood risk; maintaining the bed and banks of the watercourse; and keeping structures clear of debris.
- **Residents, Businesses and Property Owners** - Should find out about any flood risk in their area, sign up for the Environment Agency's free flood warnings and make a written plan of how they will respond to a flood situation. Business owners should also make a flood plan for their business. There are measures that can be taken to reduce the amount of damage caused by flooding and properties at risk should be insured. Local residents can find out if their property is at risk, prepare for flooding, get help during a flood and get help after a flood.

7.3 Photographs from Site visit

A selection of photographs taken during the Site visit on 10 March 2025 have been provided below.

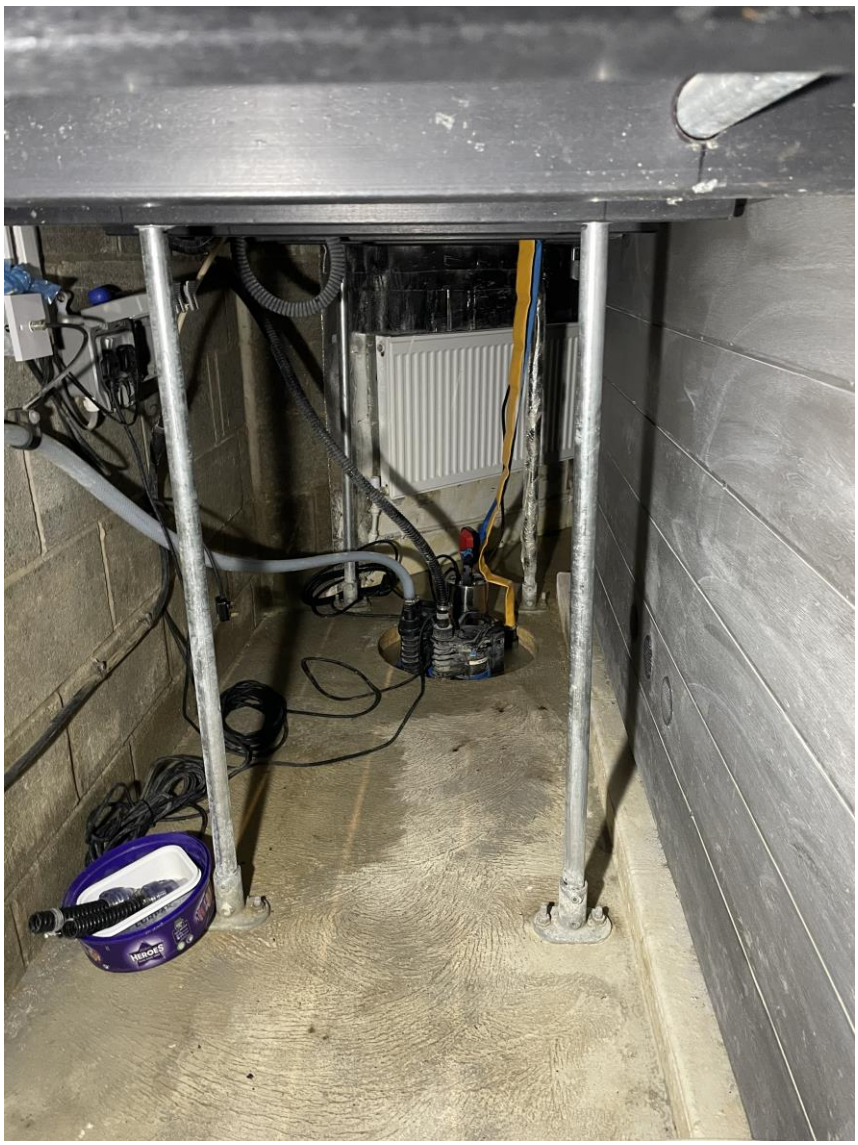


(Photograph 1 – Driveway and front of Property A. Linear drains are noted in the low point of the driveway; facing east)

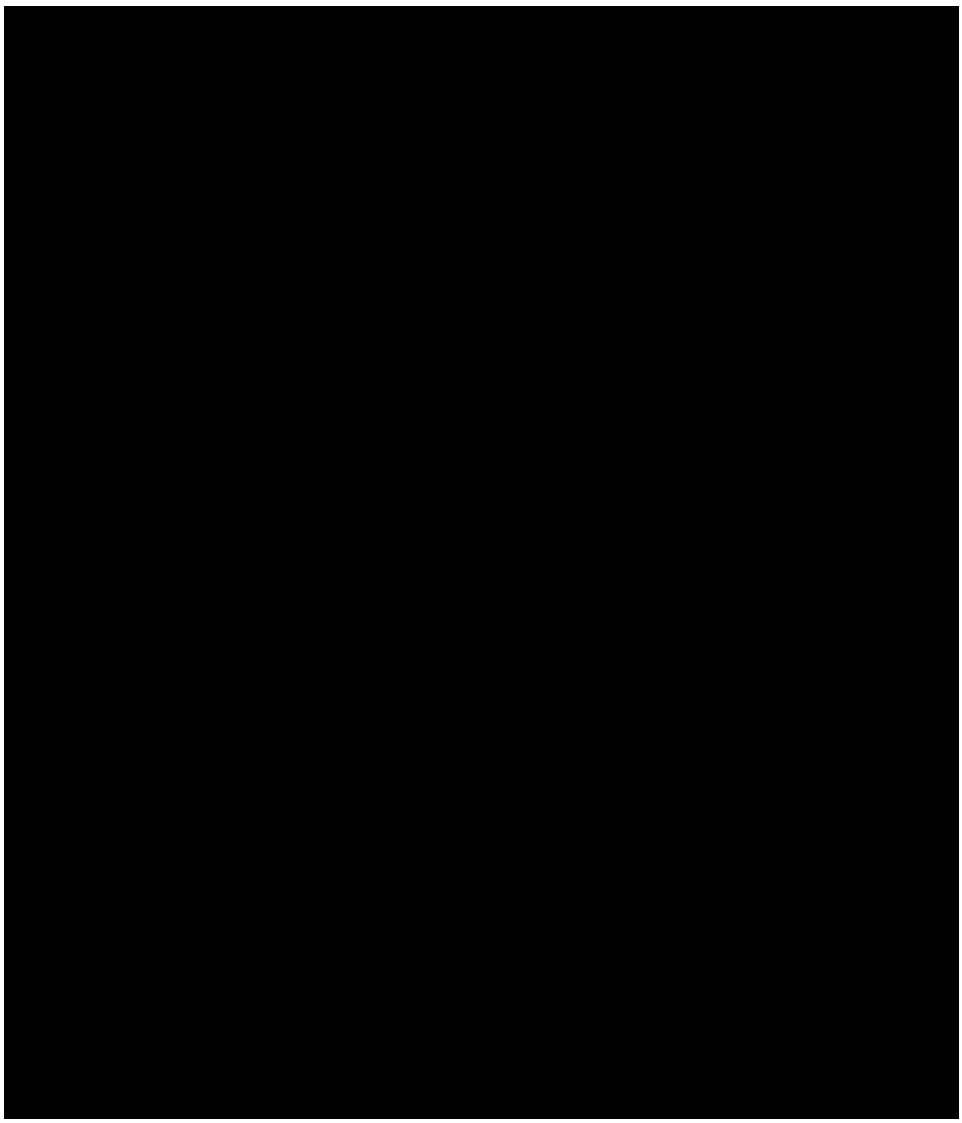


(Photograph 2 – Driveway and front of Property B. The presence of linear drains is noted within the driveway; facing north-east)

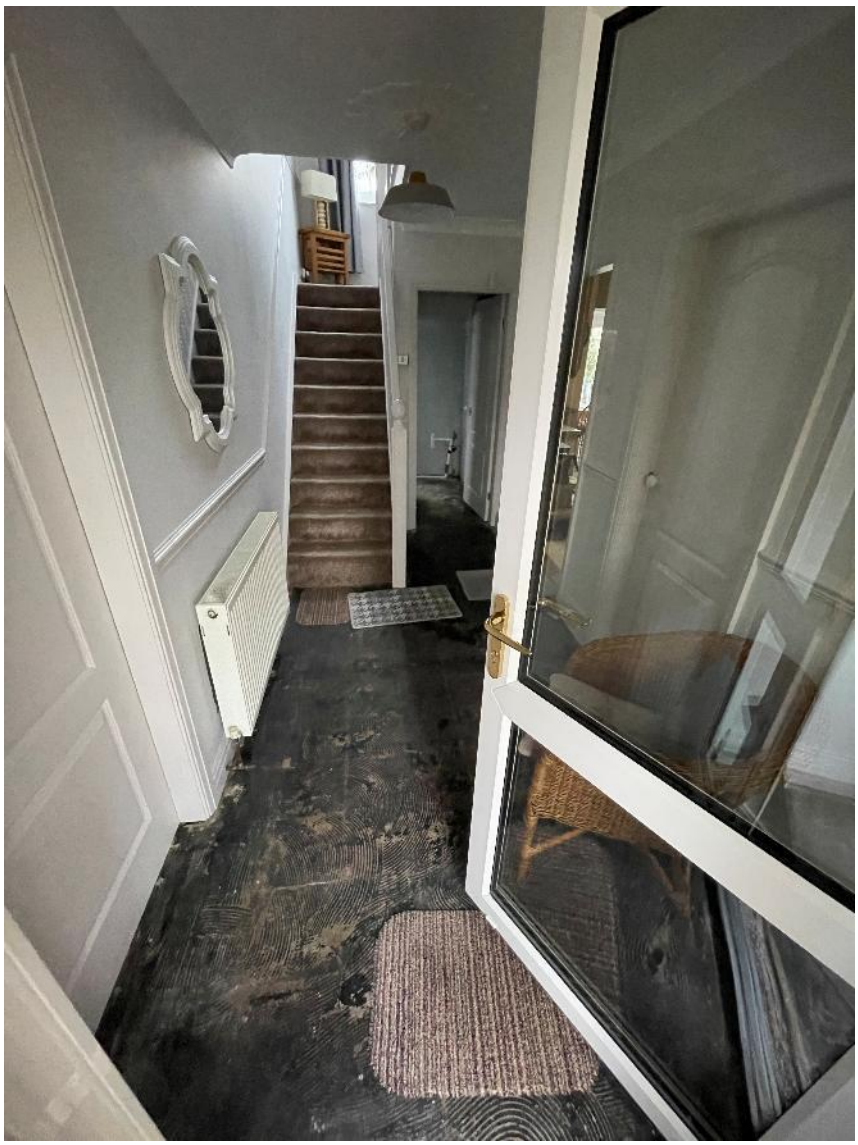
(Photograph 3 – Station Road, as viewed from a point to the west of the properties; facing east)



(Photograph 4 – Sump and pump beneath the swim spa at Property D, which still contained water at the time of the Site visit)

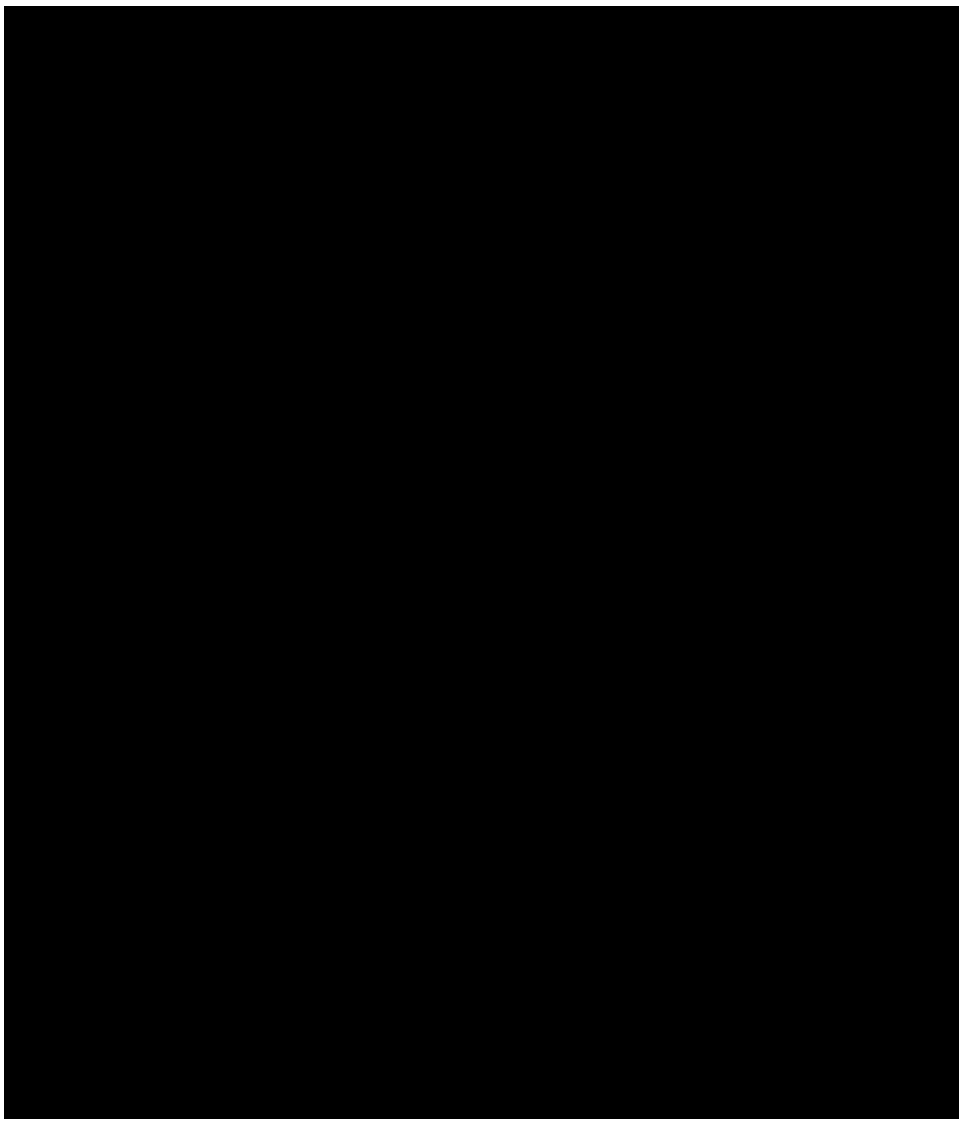


(Photograph 5 – Driveway at Property C; facing north-east)



(Photograph 6 – Flood damage at Property C)

(Photograph 7 – Gully outside Property D, which appeared to be partially blocked with silt and plant debris)



(Photograph 8 – Surface water ponding at the driveway entrance to Property C, adjacent to the gully which appeared to be partially blocked with silt and plant debris)

(Photograph 9 – Gully outside Property D at full capacity during 15th of April, indicating potential blockage)

7.4 LCC questionnaire responses

The following responses to the LCC questionnaire have been provided by the residents of the properties. These responses have been used to establish the extent, depth and cause of flooding on 06 January 2025:

- SRS000343 (Property A)
- SRS000342 (Property C)
- SRS000346 (Property D)