

BLACK SLUICE

INTERNAL DRAINAGE BOARD



Structures Committee Meeting

Wednesday, 24th March 2021 at 2pm

Virtual Meeting



Black Sluice Internal Drainage Board

Station Road
Swineshead
Boston
Lincolnshire
PE20 3PW

01205 821440

www.blacksluiceidb.gov.uk

mailbox@blacksluiceidb.gov.uk

Our Ref: IW/DPW/B10_1

Your Ref:

Date: 17th March 2021

To all Structures Committee Members

Notice is hereby given that a Meeting of the Structures Committee will be held remotely on Wednesday, 24th March 2021 at 2:00pm at which your attendance is requested.

Due to COVID-19, this meeting will be held remotely in accordance with The Local Authorities and Police and Crime Panels (Coronavirus) (Flexibility of Local Authority and Police and Crime Panel Meetings) (England and Wales) Regulations 2020.

Ian Warsap
Chief Executive

A G E N D A

1. Recording the meeting.
2. Apologies for Absence.
3. Declarations of Interest.
4. To receive and, if correct, sign the Minutes of the Structures Committee Meeting held on the 13th March 2019 **(pages 1 - 11)**
5. Matters arising.
6. To review the Structures Committee Terms of Reference **(pages 12 & 13)**
7. To receive the Minutes of the Board meeting held 26th June 2019 relating to the matters arising of the Structures Committee Minutes of the 13th March 2019 **(page 14)**
8. To receive the minutes of the Executive Committee meeting held on 10th June 2020 relating to the cancelled 2020 Structures Committee meeting **(page 15)**
9. To review the Structures Replacement Policy (No. 09) **(pages 16 - 19)**
10. To receive the Structures Report 2021 including the Replacement Programme **(pages 20 - 30)**
 - (i) Ewerby Pumping Station Technical Note **(pages 31 - 35)**
 - (ii) South Kyme Pumping Station Technical Note **(pages 36 - 39)**
 - (iii) Damford Ground Pumping Station Technical Note **(pages 40 - 43)**
11. Any Other Business.

BLACK SLUICE INTERNAL DRAINAGE BOARD

MINUTES

of the proceedings of a meeting of the Structures Committee

held at the offices of the Board on
13th March 2019 at 2pm

Members

Chairman - * Mr J G Fowler

* Mr W Ash	* Mr V A Barker
* Mr P Holmes	* Mr R Leggott
* Mr P Robinson	* Cllr P Skinner
* Cllr M Cooper	

* Member Present

In attendance: Mr I Warsap (Chief Executive)
Mr P Nicholson (Operations Manager)

1406 APOLOGIES FOR ABSENCE - Agenda Item 1

There were no apologies for absence.

1407 DECLARATIONS OF INTEREST - Agenda Item 2

There were no declarations of interest.

The Chairman welcomed Cllr M Cooper to his first Structures Committee meeting.

1408 MINUTES OF THE LAST STRUCTURES COMMITTEE MEETING - Agenda Item 3

Minutes of the last meeting held on the 21st March 2018, copies of which had been circulated, were considered and it was AGREED that they should be signed as a true record.

1409 MATTERS ARISING - Agenda Item 4

(a) REVIEW OF THE STRUCTURES REPLACEMENT POLICY - Minute 1250

Mr R Leggott questioned if the Lincolnshire County Council had been sent a copy of the Structures Replacement Policy? The Chief Executive responded that it has been sent to the central office, whereby it will also be distributed to all the local highway officers, district councils and borough councils.

(b) ACCESS BY THIRD PARTIES USING PUMPING STATIONS AS CROSSING POINTS - Minute 1251

The Chief Executive gave an update on third parties using pumping stations as crossing points. He explained that all parties involved at all the pumping stations have been contacted and gave the current situation of each pumping station as follows:

Pumping Station	Current situation
Swineshead	Locked gates in place.
Ewerby	Locked galvanised gates to be erected.
Chainbridge	Locked pedestrian gate.
Black Hole Drove	Gates have been removed following the committee's approval. Thanks have been received by the local community and ramblers.
Dyke Fen	Obtaining quotations for galvanised gates.

Therefore, the only pumping station outstanding is Great Hale pumping station, at which heavy agricultural equipment is continuing to cross over. Longstaff and Co. have responded as follows on behalf of the land occupier in relation to Great Hale:

'I have spoken further with my clients who have sort advice from their solicitor. Their solicitor has confirmed that they have an unrestricted right of access to this land and the Black Sluice Drainage Board do not have the right to impose restrictions on this access retrospectively.

My clients have said that they cannot see the purpose in meeting when their legal advice is clear. They went on to say they will respond to any attempts to restrict or impose conditions on their legitimate access to their land with legal action.'

The Board's solicitor has started to look into this and provided the following information:

'On 6 July 1965 the Board granted to the (then) owners of land comprised in Bridge Farm:

- 1. A right of way 20 feet in width*
- 2. At all times and for all purposes*
- 3. With or without vehicles and animals*
- 4. Over that part of the piece of land thereby conveyed as lies between the two broken blue lines on Plan 106/2B*
- 5. (To) enable (the Owner for the time being) to and egress from the land to the South West....*
- 6. (Further) such Right of Way shall be maintained at the Board's expense in a fit state of repair to carry normal farm traffic.'*

The Chief Executive added that the Board's solicitor doesn't feel there is any legal argument from the land tenants point of view, however, he has pointed out that they will have a duty of care in relation to damage to the crossing point and pumping station.

The Board's solicitor is therefore currently preparing a letter to the users of the crossing point regarding a way forward; accepting that they have a right of access but also ensuring that they are aware they have a legal responsibility for the condition of the crossing point and pumping station.

Cllr P Skinner noted that 'normal farm traffic', as referred to in the Board's grant to the owners of Bridge Farm, has advanced from relatively small and light equipment to today's heavy agricultural machinery. Therefore, the design may be inadequate for such heavy traffic. The Chief Executive added that he has questioned the exact definition of 'normal farm traffic' in 1965 with the Board's solicitor.

Mr P Holmes added that the vibrations caused by the heavy machines could be doing unseen damage. Therefore, it may be that future tenants have an accident due to the unseen damage caused by the previous tenant. He felt a structural survey should be completed.

The Chief Executive stated that the Board have been advised to and have implemented a diary system at the pumping station, whereby any employees attending the pumping station can log any third party machinery crossing to build up a log of evidence. The pumping station currently has no CCTV, the possibility of installing it has been discussed but the solicitor felt that it is not required at this time and that the diary log is sufficient. However, it was noted that attendance is infrequent and so monitoring the traffic crossing may be difficult.

Mr P Robinson questioned whether the Board's machinery needs to be able to cross it? The Operations Manager clarified that the Board do use the crossing point, mostly with the teleporter to clear weed away from the weed dump area and occasionally, when required, with the unimog and trailer. It was questioned whether, if a weight restriction was imposed as a result of the structural survey, if it would apply to the Board?

Cllr M Cooper questioned if there is an alternative route? It was noted that there is an alternative but it is a much further distance and over private land.

Mr R Leggott questioned whether the permission was given to the occupier of the land or the land itself? The Chief Executive responded that it is not the same occupier as in 1965 and the norm would be that the permission would have been transferred with the sale of the land. Mr R Leggott further questioned if it could be put in writing that when the land is next transferred the permission to cross is not transferred with it and therefore stopped, drawing a line under it that way?

The Chairman suggested that in the meantime should installation of CCTV and a structural survey be prioritised? Cllr P Skinner further added that an accelerometer could also be fitted to monitor the vibrations. Mr P Holmes felt that if the Board can prove the use of the crossing point through these suggestions then the Board will be able to prove responsibility for any damage caused.

Cllr P Skinner noted that it only states 'access' as opposed to 'unlimited access' and so it could be that the occupier has to request access for a Board employee to attend and let them across.

The Chief Executive stated that the Board want to work with the land occupier and make them understand the damage they could be causing and the consequential damage of collapse.

The Operations Manager added that he feels an intrusive structural survey is required. The Chief Executive added that the Board will move forward with this. The Operations Manager further noted it was constructed as an outfall bay, not as a crossing point.

The Chief Executive concluded that the Board's solicitor will continue to work on this case, with the outcome of the structural survey being relayed to the occupiers once completed. The Chief Executive added that he will continue to give updates at various meetings.

1410 REVIEW OF THE STRUCTURES REPLACEMENT POLICY - Agenda Item 5

The Chief Executive presented the Structures Replacement Policy, of which the Officers have reviewed and feel no amendments are required. Opinions of the committee were invited.

Mr V Barker made reference to paragraph 6.1 – Structures Carrying Highways. He noted that some drainage Boards have recently encountered problems with culverts under the highways. The Chief Executive responded that it is only hearsay, with the Board taking the approach that any culvert under a highway is the responsibility of the adopted authority. Richard Waters, the Engineer for structures at Lincolnshire County Council, has seen the Structures Replacement Policy and not responded with any feedback or comments and so is clearly aware of it.

The Operations Manager also added that when culvert No. 768 at Boston West collapsed in April 2018, Lincolnshire County Council replaced it following the Boards specification.

All AGREED that the policy be RECOMMENDED to the Board for approval.

1411 REVIEW THE STRUCTURES COMMITTEE TERMS OF REFERENCE - Agenda Item 6

The Chief Executive presented the Structures Committee Terms of Reference and invited opinions of the Committee.

Mr J Fowler noted that the committee have the power to 'reconstruct structures as long as the budgets are not exceeded'. He made reference to emergency situations whereby a large sum of money may be required for the work, questioning if the Executive or Works Committees would then be consulted to approve an emergency budget? The Operations Manager noted that if a collapse took place then the first priority is to re-instate the watercourse / remove the blockage, replacement of the culvert would not be immediate. Therefore, the costs would be quite minimal for a start in removing the blockage until discussion on a replacement culvert took place.

All AGREED that the Structures Committee Terms of Reference be RECOMMENDED to the Board for approval.

1412 TO APPROVE THE PROPOSED STRUCTURES REPLACEMENT PROGRAMME - Agenda Item 7

The Operations Manager presented the proposed structures replacement policy.

The original 2018/19 replacement budget of £68,200 has been reviewed. In light of the position of the operations team last year, some of this work wasn't going to be completed and so the decision has been taken to reduce the amount and reallocate that budget into rechargeable general maintenance. There are three culverts now being focused on as follows:

Table 1: Proposed Culvert Replacements 2018/19

No. 1253	Horbling Fen	40m x 0.6m	£9,524 (estimate)
No. 1283	Aslackby Fen	12m x 0.6m	£5,000 (estimate)
No. 755	South Kyme	12m x 0.9m	£7,000 (estimate)

The allocation for each culvert is the total cost for replacement. The Board's need for these culverts is currently being reviewed and analysed in light of the cost of replacement. It could be that a Board contribution is offered for all three.

This decrease in and review of the 2018/19 culvert replacement budget has been reflected in the 2019/20 replacement budget which totals approximately £3000. Generally, the value to the Board for each culvert replacement, over a twenty-year period, is in the region of a £1000 contribution from the Board. The identified culverts are only used once or twice a year which equates to the £1000 over the twenty years.

Table 2: Proposed Culvert Replacements 2019/20

No. 635	Swineshead	15m x 0.6m	Armco	£5,500(estimate)
No. 1795	Kirton	12m x 0.6m	Armco	£5,000(estimate)
No. 2880	Kirton	9m x 0.6m	BAT	£4,500(estimate)

The Operations Manager made reference to culvert No. 2880, noting that 'BAT' stands for Brick-arch tunnel. He continued by explaining that it is not currently 9 metres wide, but for practical use in the future it needs to be a minimum of 9 metres wide and potentially 12 metres wide. If over 12 metres in pipe length is required, then the landowner is approached in respect of a contribution for the extra width. Brick arch tunnels are old and narrow and so replacement of them requires future proofing to ensure that the culvert replacement is fit for purpose.

The lengths shown in the table are the lengths of the pipes, with tapered headwalls. The Boards standard culvert replacement is 12 metres; this will guarantee a 6 metre running width as it covers all drain depths. If the landowner wants more than a 6 metre running width, then the additional cost would be with the landowner. Each location and culvert is unique.

The Chairman made reference to the technical side of the headwalls and questioned if the Operations Manager was still happy with using broken kerb headwalls?

The Operations Manager responded, yes, they are a practical approach which are relatively simple for the Board's workforce to build, specialised skill is not required. The Chief Executive added that they are easily obtainable, easily transportable and relatively economical.

The Chairman referred to some culverts at Wyberton, noting that they have longitudinal cracks all the way along the mortar lines of the broken kerbs. He further made reference to another drainage Board's work using concrete sand bags. He expressed his concern of the longevity of the broken kerb headwall approach in comparison to the concrete filled sand bags. He suggested that a review of some of the broken kerb headwalls that have been completed in the last few years be undertaken and the concrete sand bags may possibly have a longer shelf life?

The Chief Executive added that the Operations Manager attends Engineers Forum's with other Lincolnshire Board's and can introduce this as a topic for discussion.

Mr P Holmes felt that the concrete filled bags would be more flexible with ground movement.

The Chief Executive noted that his concern with concrete filled bags is that the concrete needs to be mixed correctly to be effective, this has been an operational issue previously.

The Operations Manager added that, previously, all culverts had block headwalls but because of the skill set required to build them and the cost, other alternatives were looked into. The first alternative was the concrete filled bags, however they tend to deteriorate after a few years and don't offer protection to open ended pipes, which were hit with Boards machinery during maintenance. This is why the broken kerb is used.

The Operations Manager added that different options can be looked into and the Chairman will send some photos of the culverts at Wyberton he previously made reference to.

Mr R Leggott added that he has been pleasantly surprised with his culvert headwalls constructed using broken kerbs, adding that it has absorbed movement and is flexible, therefore serving its purpose.

Culvert Surveys Carried Out 2018 – 2019

The Operations Manager noted that there are c1350 culverts remaining that require inspection, over three years, it equated to completing 450 culvert inspections a year. He continued by explaining that the operations team have only managed to inspect 164 culverts in the past year. The Operations Manager explained that there is never an ideal time to inspect culverts, it is either too wet or there is too much vegetation, dedicated resource is required to complete as previously agreed.

It is possible to complete 25+ surveys per day per two-man team. However, until all surveys are completed a management plan can't be formed.

Mr P Holmes suggested that more staff are brought in as a dedicated team to complete the inspections so that the Board can be proactive as opposed to being reactive towards them.

The Operations Manager acknowledged that all the inspections need to be completed as soon as possible in order to create a full picture.

The Chief Executive added that the Board employ external hand roding operatives for a number of weeks during the summer and questioned whether they could be trained to form a couple of teams to inspect the culverts. The Operations Manager responded that it could be done, noting that the most difficult part of the survey is finding the culverts.

Mr W Ash stated that the operatives must be crossing these culverts all the time and questioned if they could do the inspection whilst there for maintenance? The Chief Executive added that it would slow down the operations programme. Mr V Barker suggested that if it was a serious 'red' situation of a culvert then the operative could put it in the tom-tom equipment.

It was established that, currently, the inspections are being conducted by area. Cllr P Skinner questioned if there was an asset register to give the age of the culverts, which could then be used to inspect the oldest culverts first? The Operations Manager responded that there isn't an accurate age list.

The Operations Manager felt that inspecting the culverts by catchment area is the most effective way of completing them, noting that those outstanding in almost completed catchments are due to a reduction in water levels being required.

The Chief Executive noted that the committee could, if they wanted to, request additional funds at the Board meeting to bring in additional staff to complete the culvert inspections.

Mr R Leggott expressed that rather than additional temporary staff completing the inspections on their own, he felt it would be beneficial for them to be grouped with current employees, for the beginning of the process at least. The Chief Executive agreed, stating that the additional staff would be accompanied by current employees for a number of inspections until they were comfortable with the correct process.

Mr P Robinson questioned if there could be a budgetary problem if lots of culverts are found to be in a bad condition? It was felt that all culverts still need to be inspected in order to form a programme.

All AGREED that the officers will calculate a figure for temporary additional staff to be brought in to complete culvert inspections, which will be put to the Board for approval.

Culvert 1684 - Drain 2/37 - Mill Drain, Donington
(For information purposes only)

The Operations Manager made reference to culvert No. 1684 on the Mill Drain at Donington. It is located on a farm track that is accessed off the A52. The Operations Manager has been approached on several occasions about the replacement of this culvert and so the Operations Manager has provided a cost for this multiple times.

Recently, the land owner has asked again for a cost for replacement. Photographs of the culvert were displayed on screen, it being evident that something heavy travels across it which has consequently pushed the top of the headwall out.

The Operations Manager felt that there is some value to the Board, it is across a roadway that is of benefit for the Board's access. The total cost of the replacement of the culvert will be approximately £15,000+, with around a £1000 value contribution from the Board. The practical method of replacement would be to break out the top and fit the pipe between the brick arch.

The Operations Manager clarified that the land owner is aware of the cost and that there may be a contribution from the Board. The last cost given was in July 2017 when the Operations Manager received no further response.

Mr P Holmes suggested, given they have asked for quotes before and not responded, that an end date is put on the quote, for example, the quote will stand for six months only.

Proposed new access culvert - Drain 22/31 - Northgate
(For information purposes only)

The Operations Manager explained that the Board has been asked to consider a new application for a proposed new access culvert. The existing access is off Small Drove, which is quite narrow and therefore not really fit for purpose.

The applicant has applied for an 18 metre culvert (pipe length) to allow wide access due to the road being narrow, therefore making turning in off it difficult. The Operations Manager noted that he would like the culvert a minimum of 5 metres away from the Small Drove access so that the Board still has mechanical access for maintenance. There is a yard entrance the other side of the road and so the aim is to try and position the new culvert opposite the yard entrance to allow more room for turning.

The Operations Manager has had a lengthy discussion with the applicant regarding responsibility and cost, noting that the Board would only offer a small contribution as it would most likely only be crossed on an alternate annual basis. The applicant has been given the quote. The quotation doesn't include for any backfill.

There are two potential options that have been explained to the applicant as follows regarding backfill; generation of soil from the field on site or soil imported at an additional cost. It was suggested that soil from culverts that are hoping to be removed could be used.

Mr V Barker questioned if there were any culverts nearby that could be extended? The Operations Manager responded that there are no existing culverts that could be extended.

Planning permission will also be required in addition to the Boards byelaw consent.

Mr W Ash questioned if the Board should definitely give a small contribution to entitle them to access rights? The Operations Manager noted that it is not always necessary, if they are there and the Board require access then they will be used, whether any contribution has been made to them or not. The Board have permissive rights to do this, the Board only need to be responsible for the culverts that enable the Board to complete its operations.

The applicant has been provided with a specification and knows that even if the work wasn't completed by the Board, it would still have to be constructed to the Boards specification.

It was further noted that Anglian Water have recently started to put in a new culvert along the drain, of which the Board has authorised the application. The Board are hoping to work in conjunction with Anglian Water's traffic management.

Mr P Robinson questioned that if the Board made no contribution and it was merely the land owners responsibility to build the culvert, could access for the Board be refused? Mr W Ash felt that if the applicant paid 100% of the cost on the basis that the Board don't use it and therefore didn't make a contribution, he didn't feel the applicant would be too pleased if the Board then started to use it.

The Operations Manager noted that the existing access could still be used and there are restrictions on the field side with regard to summer maintenance, so the remaining section from the obstruction (barn) would have to be maintained from the road side anyway.

1413 ANY OTHER BUSINESS - Agenda Item 8

(a) RAILWAY CONTRIBUTION

Mr V Barker noted that in 1853, British Rail were paying £50 per mile to put a track on the Forty Foot bank and £50 annual maintenance to the drainage Board, most of which was Environment Agency bank. He further added that Black Sluice IDB have a section of the bank and questioned if the Board could re-introduce a rent / recovery of money? The Chief Executive noted that this had been noted with him before the meeting and so the Board's solicitor is going to look into it.

(b) UNCONSENTED APPARATUS WITHIN THE 9 METRE BYELAW

The Chief Executive introduced this topic, explaining that he wanted to get an idea of the approach the committee want to take in relation to this.

The Chief Executive explained that the 2019 Rating Brochure gives details of a twelve-month amnesty for unconsented irrigation equipment within the 9 metre byelaw distance. The land occupier will then be able to apply for consent to erect a marker post next to the unconsented apparatus to ensure that it is clearly visible.

The Chief Executive invited opinions of the committee, questioning whether the Board should take more of a 'zero tolerance' approach?

It was clarified that the byelaws are as strong and enforceable as the Land Drainage Act 1991 is.

Mr R Leggott felt that a strong attitude needs to be taken, with the rules being laid out clearly. Mr V Barker agreed with this, feeling that the issue is divided into two parts; permanent and temporary obstructions, with it being the temporary apparatus that is causing the problems and so needs addressing differently.

Reference was made to an ongoing case, whereby irrigation equipment was hit, that was not clearly visible. The Farm Manager has argued that it hasn't been hit in the last 20 years, but it maybe that it is a different operator now. Mr W Ash felt that the onus should be on the land occupier to clear the area and make it obviously visible.

The Chief Executive further added that a meeting will be held on Tuesday 14th May at 10:00am, whereby all irrigators or anybody with an interest within the area will be invited to attend the Boards offices to discuss this matter. Notification of this meeting will also be included in the 2019 rating brochure.

Mr P Holmes suggested contacting other local Boards to find out their approach and policies on the matter. He made reference to a neighbouring Board that don't even take responsibility for hitting consented apparatus.

The Chief Executive noted that the twelve-month amnesty period will be to erect a marker post and anything found that is not consented after that period may be removed. The Chairman also added that he would be hesitant in threatening the removal of equipment and suggested wording along the lines of 'In extreme cases, the Board has the right to remove any unconsented equipment...'

The Chief Executive added that following the meeting in May, a policy will be prepared for Board approval.

Mr R Leggott noted that farmers won't always be able to guarantee where the apparatus will be put until the time it needs placing. He suggested the wording 'as soon as practical' rather than asking them to tell the Board within a certain timescale.

It was questioned whether a suitable post had been finalised? The Chief Executive explained that no supplier has been able to provide a suitable post yet. Mr P Holmes added that it might be advisable to purchase a few for review before purchasing and committing to a large quantity.

All AGREED that a firm 'zero-tolerance' attitude be taken by the Officers towards unconsented apparatus within the 9 metre byelaw distance.

There being no further business the meeting closed at 16:08.

BLACK SLUICE INTERNAL DRAINAGE BOARD

STRUCTURES COMMITTEE MEETING - 24TH MARCH 2021

AGENDA ITEM 06

TERMS OF REFERENCE: STRUCTURES COMMITTEE

1. **GENERAL**

The Committee shall have EIGHT members who will be appointed by the Board.

The Chairman shall be elected by the committee at the triennial general meeting of the Board, being the first board meeting following an election.

2. **MEETINGS OF THE COMMITTEE**

The Committee shall meet at least once in every 12-month period and a quorum shall be FOUR members.

No one other than the Committee members shall be entitled to attend Committee Meetings, but any other persons may attend meetings if invited by the Committee.

3. **POWERS OF THE COMMITTEE**

If a Board replacement structure benefit contribution cannot be agreed between the Officers and an Owner/Occupier the Committee will have final determination as highlighted in section 6.6b(i) & 6.9 of The Structures Replacement Policy.

Delegated powers are given to the Chief Executive and the relevant Structures or Works Committee Chairmen to reconstruct structures as long as the budgets are not exceeded and the Owner/Occupier pays a contribution towards the cost in line with the guidelines in the Structures Replacement Policy. In all other cases, the power to determine applications is delegated to the Structures Committee, the appropriate Works Committee or the Executive Committee, unless a Board meeting is more timely.

4. **RESPONSIBILITIES OF THE COMMITTEE**

The responsibilities of the Committee shall include:

- a) To operate within the guidelines of the Structures Replacement Policy.
- b) To determine all other relevant decisions relating to structures and report these to the Board.

5. REPORTING

Minutes of meetings of the Committee shall be presented to the next meeting of the Board.

The Committee shall review its terms of reference after every triennial general meeting and its own effectiveness and recommend any necessary changes to the Board.

REVIEWED BY THE COMMITTEE: 24 MARCH 2021
APPROVED BY THE BOARD:

BLACK SLUICE INTERNAL DRAINAGE BOARD
STRUCTURES COMMITTEE - 24TH MARCH 2021

AGENDA ITEM 07

MATTERS ARISING FROM THE MEETING OF THE BOARD ON 26TH JUNE 2019

Minute 1472 from the meeting of the Board on 26th June 2019 regarding the unconfirmed minutes of the Structures Committee held on 13th March 2019:

(i) STRUCTURES REPLACEMENT PROGRAMME - Minute 1412

The Operations Manager made reference to the previous agreement that an estimated cost for temporary additional staff to complete culvert inspections be presented at this meeting.

He continued that there are approximately 1200 surveys to be completed, at an estimated 15 inspections per day, the estimated cost to the Board would be £37,000. At an estimated 20 inspections per day, the estimated cost to the Board would be £27,000. This is based on purely external staff, with no Black Sluice IDB staff included for the culvert inspections.

Mr P Holmes questioned the difference in cost between Black Sluice IDB workforce completing the inspections and external temporary staff?

The Operations Manager stated that he has based his estimations on £25 per hour. The Finance Manager stated that the average cost per hour for the workforce is £31.

The Operations Manager added that the sooner the inspections are completed; the sooner a management plan of culvert replacements can be produced.

Mr W Ash suggested students may be a way forward employed as a temporary summer job.

All AGREED for additional external staff to be employed to complete the culvert surveys.

(ii) RAILWAY CONTRIBUTION - Minute 1413(a)

Mr V Barker questioned if any further progress had been made? The Chief Executive explained that nobody seems to be in a position to answer and so it may have to come from the Board's solicitor to force a response.

The Structures Chairman moved that these minutes and resolutions contained therein be accepted by the Board. All AGREED.

BLACK SLUICE INTERNAL DRAINAGE BOARD
STRUCTURES COMMITTEE - 24TH MARCH 2021
AGENDA ITEM 08
MATTERS ARISING FROM THE MEETING OF THE EXECUTIVE
COMMITTEE ON 10TH JUNE 2020

Minute 1621 from the meeting of the Executive Committee on 10th June 2020 regarding the cancellation of the annual Structures Committee meeting for 2020 due to COVID-19:

The Chairman explained that this item is to cover outstanding matters from committee meetings that have had to be cancelled due to the COVID-19 pandemic restrictions.

(a) **STRUCTURES COMMITTEE**

At the annual Structures Committee, the Structures Replacement Policy is reviewed, with there being no Structures Committee meeting this year, the Chief Executive proposed that the policy continues (no revision) until the next Structures Committee review in 2021.

The Chairman of the Structures Committee felt there was no further additions or amendments that need making, in his opinion, and so RECOMMENDED that the Structures Replacement Policy be kept as it is until the next review of the Structures Committee in 2021.

Black Sluice Internal Drainage Board

Policy No: 9

Structures Replacement Policy

Review Dates:

Board Approved	
Reviewed by the Structures Committee	24 th March 2021

1. PURPOSE

This document sets out the policy of the Black Sluice Internal Drainage Board concerning the repair or replacement of structures where the integrity of the structure deteriorates to such an extent that it is unable to convey the necessary flow in the drainage channel, or if it becomes unsafe for either vehicle or pedestrian traffic to cross the watercourse.

In the first instance, if a structure has deteriorated to such an extent that it is holding up the flow of water, then the obstruction shall be removed by the Board.

2. INTRODUCTION

The structures that will be included in this policy include:

- a) Clear span bridges constructed to take all types of vehicles.
- b) Clear span bridges for pedestrian use only.
- c) Culverts constructed to provide access across the watercourse.
- d) Culverts constructed for the purpose of maintaining the flow in watercourses where there is instability to the banks.

3. BLACK SLUICE POLICY

This policy is concerned with the replacement of existing structures only.

The Board has a separate policy which addresses applications to place new structures in/over watercourses.

4. REASONS FOR THE POLICY

The policy formalises the baseline conditions above and gives written guidelines for more specific instances. The benefits of the policy are:

- Fairness and uniformity in the Owner/Occupier contributing to the cost of reconstructing sub-standard structures.
- The provision of clear guidelines to the Owners/Occupier.
- Powers are delegated giving a more efficient and timely service.

However, this policy is not intended to cover every eventuality and the Board (in formal meeting) may waive the policy and make a determination on the basis of reasonable fairness to all parties.

5. DELEGATED POWERS

Delegated powers are given to the Chief Executive and the relevant Structures or Works Committee Chairmen to reconstruct structures as long as the budgets are not exceeded and the Owner/Occupier pays a contribution towards the cost in line with the guidelines in this policy.

In all other cases, the power to determine applications is delegated to the Structures Committee, the appropriate Works Committee or the Executive Committee, unless a Board meeting is more timely.

6. GUIDELINES

Guidelines are given below on the following types of structures:

- a) Structures carrying Highways maintained by LCC.
- b) Structures used by the Owner/Occupier.
- c) Structures used by both the Board and the Owner/Occupier.
- d) Structures constructed by the Board to allow free drainage of the land.

6.1 Structures Carrying Highways

It is generally the case that all clear span bridges and culverts carrying LCC highways are owned and maintained by LCC. If replacement is required because the structure is substandard then LCC will be responsible for the total cost of the reconstruction.

6.2 Clear Span Foot Bridges

It is generally the case that all clear span footbridges which carry footpaths over Board maintained watercourses are owned and maintained by LCC. If replacement is required because the structure is substandard, then LCC will be responsible for the total cost of the reconstruction.

6.3 Clear Span Access Bridges

These in general provide access for farm machinery to fields or to individual properties. They are mostly constructed in large watercourses.

If refurbishment or replacement is required because the structure is substandard, then the Owner/Occupier will be responsible for the total cost of the reconstruction.

These in general will not be used by Board's machinery to gain access to the opposite side of the watercourse.

However, if a substandard structure is infrequently used by the Board, and the Owner/Occupier of the structure proposes to refurbish or reconstruct the bridge, the Board may offer a contribution in line with clause 6.6 (b) towards the cost of this work.

6.4 Structures owned by the Board and Used for Access by the Owner/Occupier

These structures are required by the Board as well as the landowner to gain access for maintenance of watercourses.

The cost of any reconstruction of substandard structures in this category will be paid for by the Board and the structure will remain as a structure to be maintained by the Board.

6.5 Structure Used by all Parties

- a) These structures are required by the Owner/Occupier to gain access to their land and could be used by the Board for their maintenance activities.
- b) If a structure has been inspected and reported as substandard and in need of reconstruction the landowner will be notified in writing.
 - (i) Provided there is an accepted need for a structure at this location, the Owner/Occupier and Operations Manager will meet. A reconstruction quotation will be offered along with a benefit contribution in relation to the Board's use of the structure as a crossing point.
 - (ii) After the structure has been reconstructed, it will be deemed that the landowner will be responsible for its future maintenance.
 - (iii) If a benefit contribution cannot be agreed the Operations Manager will send all the relevant information to the Structures Committee for further review and determination.
- c) Before any consideration is given to the reconstruction of the structure, the Owner/Occupier should be approached to ascertain if there is a future need for the structure. Consideration should be given to removing two or more accesses into a field and the provision of one in the future.
- d) A culvert shall be constructed with a top width of 6.0 metres. If the Owner/Occupier requests a culvert with a wider top width, then they shall pay for the total extra cost of this work.
- e) After the culvert has been replaced, the Owner/Occupier will be responsible for any future maintenance, or reconstruction of the structure.
- f) If a structure has been constructed in a Board maintained watercourse, and there is clear evidence that the Board has written to the Owner/Occupier confirming the future maintenance arrangements, then the Owner/Occupier shall be totally responsible for the reconstruction of the structure.
- g) If a structure is removed by the Board because it is holding up the flow of water, and has not been replaced by a new structure within a period of five years, then the offer of contribution will no longer be applicable and the Owner/Occupier will be required to pay the full cost of the construction of a new structure at this location.
- h) If the Board undertake a watercourse improvement scheme which includes the reconstruction of a structure, the Board will pay the total cost of the reconstruction, but the Owner/Occupier will be required to be responsible for the future maintenance of the structure.

6.6 Culverts Used for Free Drainage

Examples of these lengths of culverts are:-

- Lengths of watercourse culverted instead of undertaking revetment works.
- Lengths of watercourse culverted to allow disposal of excavated soil.

These are the Board's responsibility, and any reconstruction required will be paid for by the Board. Responsibility for the future maintenance of the asset will remain with the Board.

6.7 Redundant Structures

If the Board agrees with the Owner/Occupier that a structure is redundant, the Board will remove the structure and all backfill material and deposit any suitable materials on fields adjacent to the location of the culvert.

If agreed and required, the Board will dispose of the excavated material at an agreed cost with the Owner/Occupier.

6.8 Further Guidance

If the Owner/Occupier is unhappy about the circumstances of a particular structure designation, then this should be referred to the Structures Committee for final determination.

Contractors may be appointed by the Owner/Occupier to complete the works, the Board will set an invert level on site, offer specification suggestions and inspect the works during the construction phase, a set fee of £250.00 + VAT will be offset against any contribution made by the Board.

Inspection's frequencies to be completed by the Board, adequate notification time to be received from the contractor:

- when excavation to invert level and bases for headwalls is complete.
- when the pipe is laid prior to being backfilled, invert level checked and verified.
- when the headwalls are being constructed.

BLACK SLUICE INTERNAL DRAINAGE BOARD

STRUCUTRES COMMITTEE - 24TH MARCH 2021

AGENDA ITEM 10

STRUCTURES REPORT 2021

1. Information on investigations at Ewerby, South Kyme & Damford

As reported previously during high water levels, water from main river outfalls at 3 of the Board's pumping stations, Ewerby Fen, South Kyme Fen and Damford Grounds is seeping back through the bank, under or through retaining walls at the sites causing unknown damage to the foundation and structure of the pumping station buildings.

A professional survey was commissioned, using Stantec, through consultation with the Environment Agency who have agreed to cover the costs incurred for the inspections, (estimated at c£10,000 including Board's resource) completed in August 2020 and the onsite/targeted trial pit excavations to include a report of findings and remedial recommendations, which commenced in February 2021. Stantec engineers returning to the sites w/c 08.03.21, at the time of this report there is no further information.

Technical notes for inspections completed are included for Ewerby Fen (pages 31 - 35), South Kyme Fen (pages 36 - 39) and Damford Grounds (pages 40 - 43).

Stantec, site investigation information & costs; Ewerby Fen £5,700, South Kyme Fen £9,800 and Damford £6,550, (estimated total to include Board resource c£25,000).

2. Trinity College p/s water seepage from Long Skerth

During the latest events, reports were received, that during high water levels, water has also started to seep through the banks of the main river outfall adjacent to Trinity College P/S, Stantec have been informed and are producing a proposal for this site. Photo shown below:



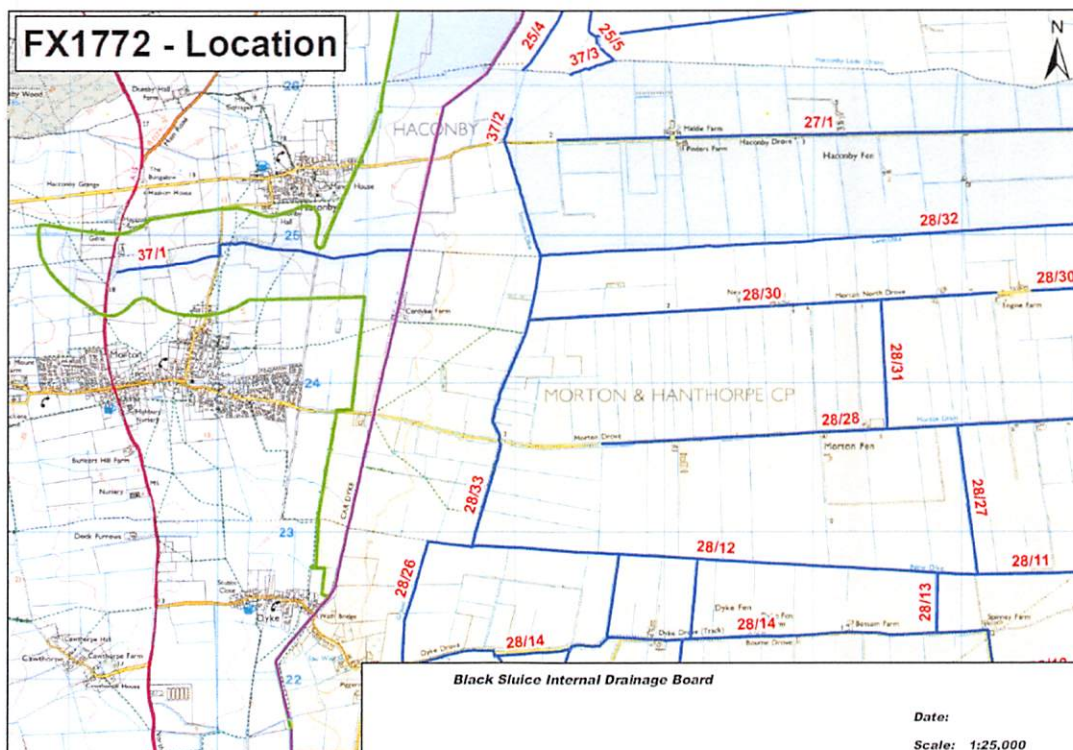
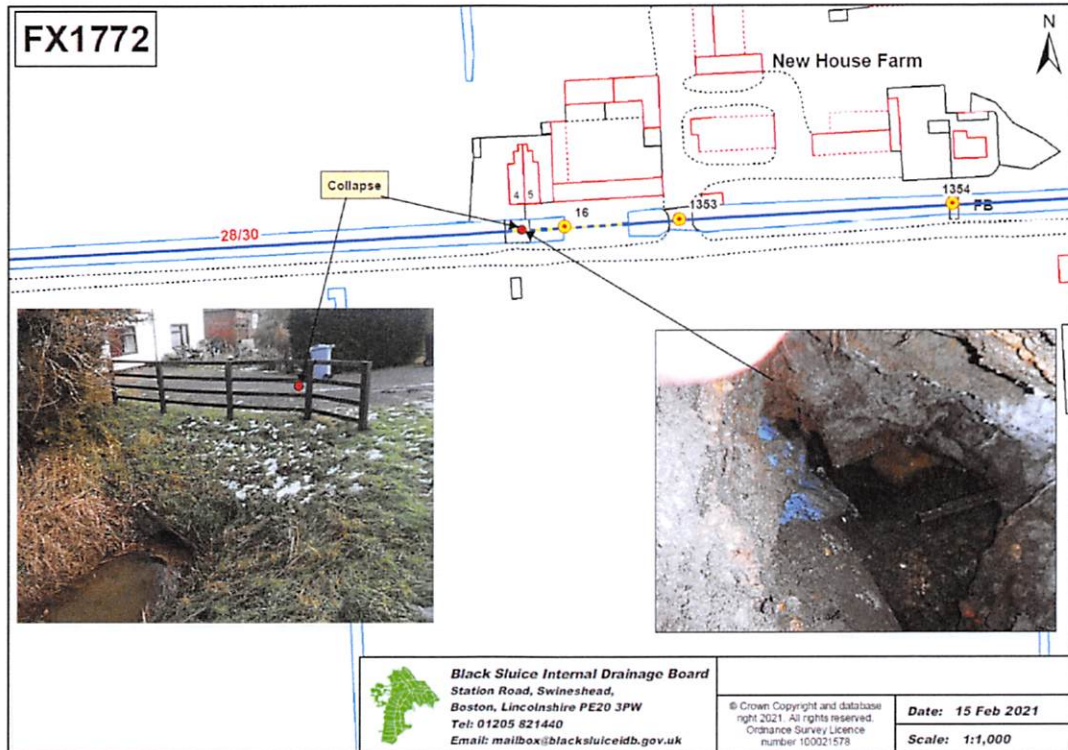
3. Culverts that have been reported as in poor condition

The following culverts are in a poor condition and require removal and replacement.

Any updates will be provided during the meeting.

(a) Morton Fen - No 16 - FX1772 30m x 900mm Armco

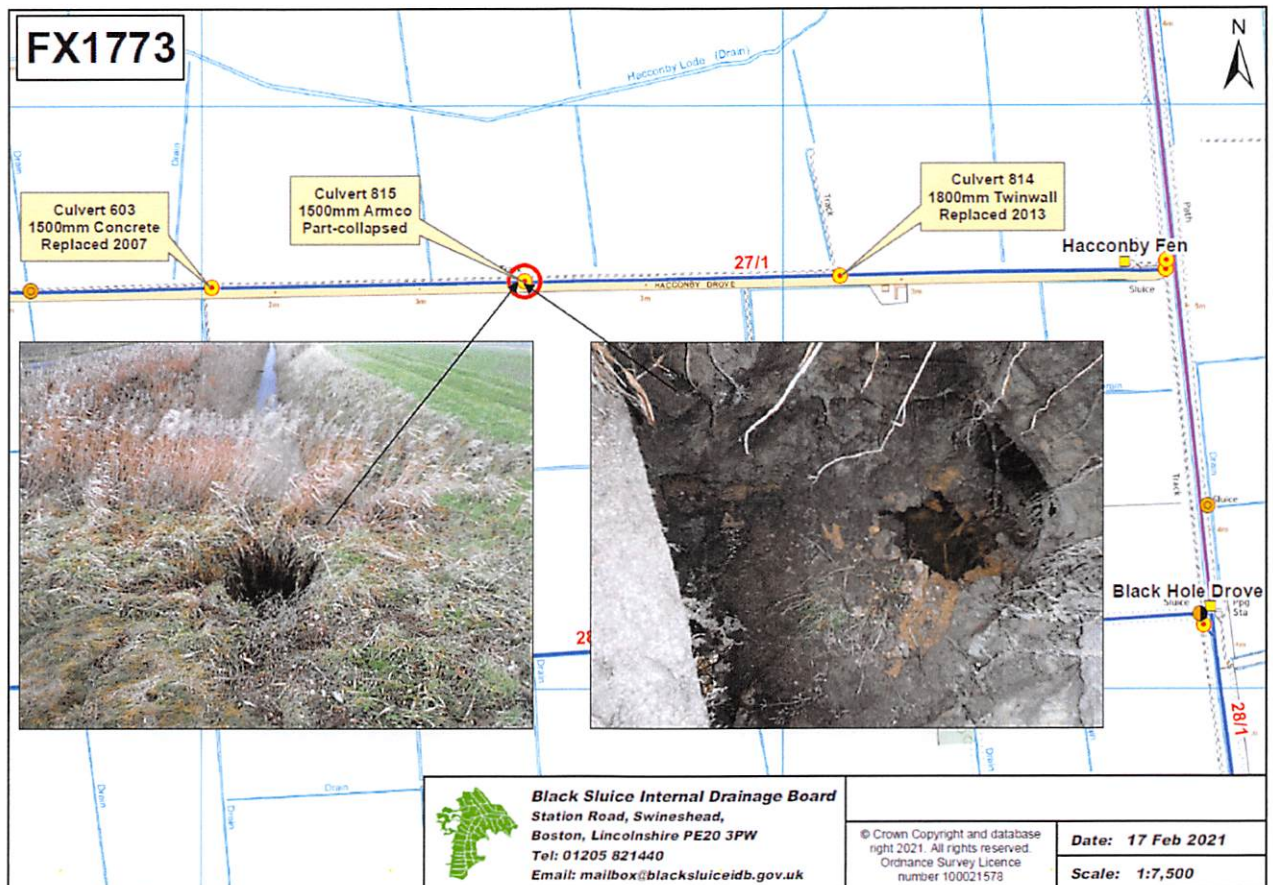
Having been notified of this by the landowner regarding a collapsed culvert in a Board maintained watercourse outside No. 4 Morton North Drove, it was investigated by a Board's officer. Culvert concerned lies across the access to the property and extends approx. 30m east presumed to extend the front garden of the property - collapsed section under driveway causing blockage. The Operations Manager has discussed this with the landowner, options, specification and estimates for repair or replacement to be provided.



(b) Haconby Fen - No 815 - FX1773 - 18m x 1500mm Armco (Field entrance)

The landowner has been notified by letter, informing of the problem and responsibility of ownership. The Operations Manager discussed this with the landowner and advised that the culvert is in very poor condition, and will be removed if the watercourse is blocked. The landowner understands that the watercourse must not become blocked and agrees that the culvert should be removed. However, the landowner questioned the fairness of the Structures Policy, stating that land ownership on the opposite side of the road is cheaper, as access to it does not require the crossing of a Board maintained watercourse.

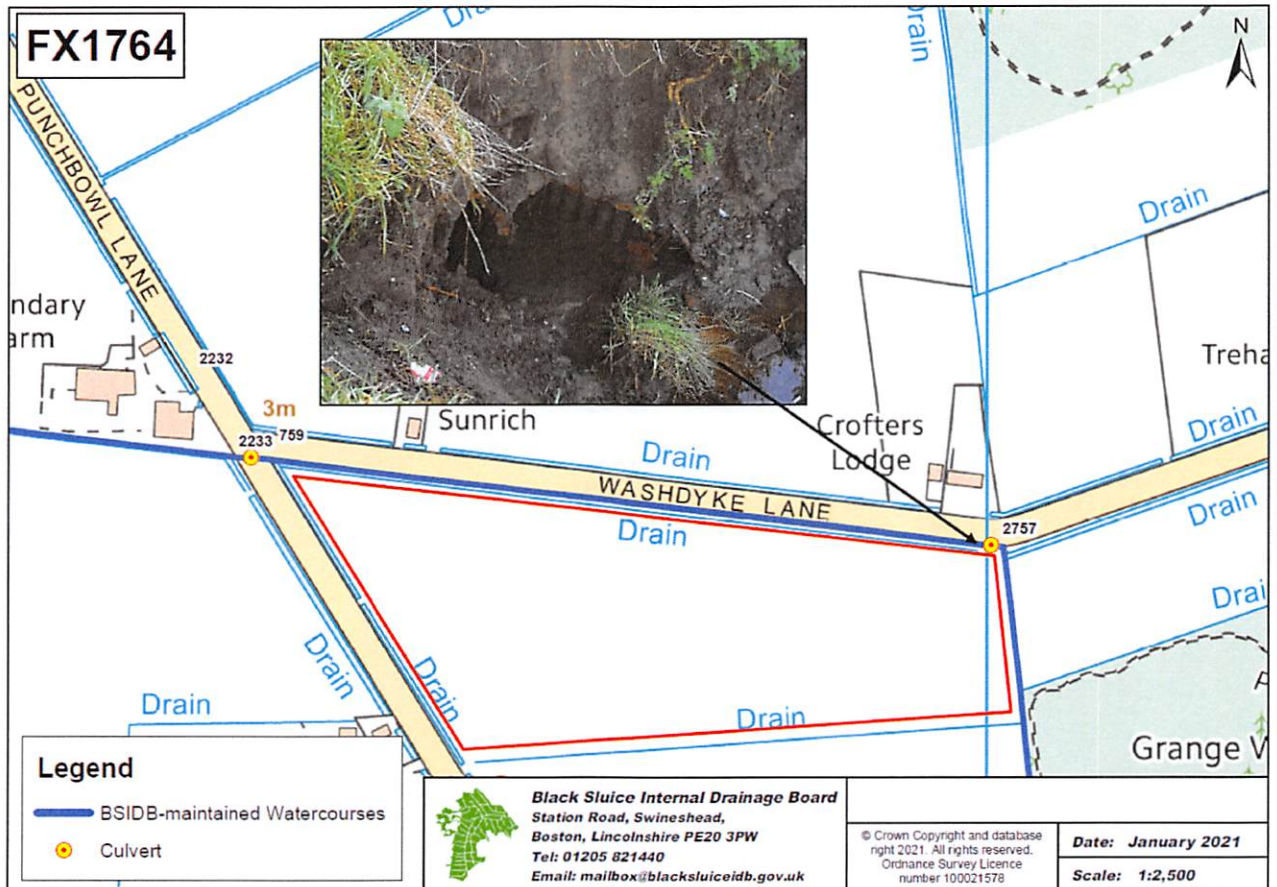
An estimated cost for replacement by the Board has been provided of £18,300.00.



(c) Boston West - No 2757 - FX1764 - 12m x 600mm Armco (Field entrance, close to road)

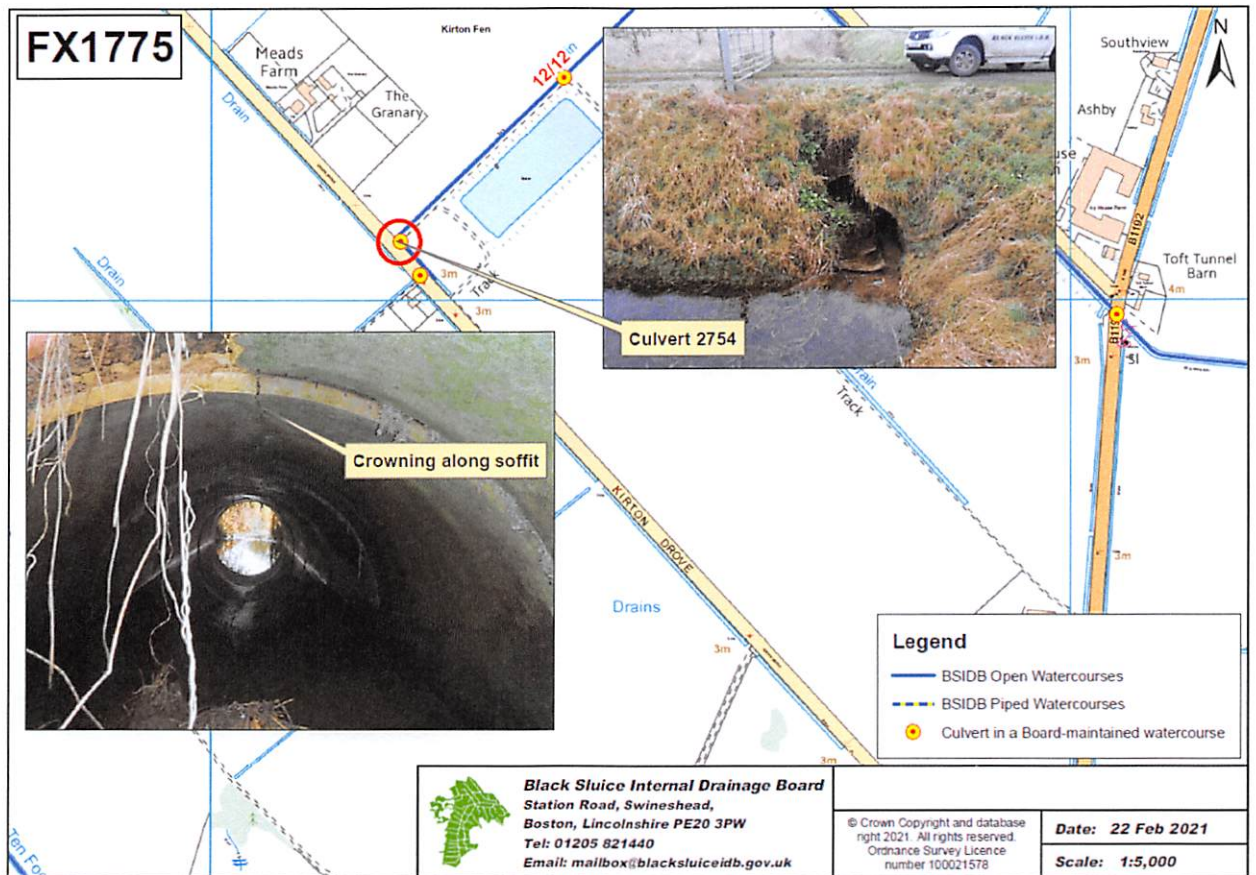
The landowner has been notified by letter, informing of the problem and responsibility of ownership. The Operations Manager discussed this with the landowner and the Board have removed the blockage from the partial failure of the end of the culvert. The advice given to the landowner, that the culvert is in very poor condition, and will be removed if the watercourse is blocked. The landowner does not believe it is his responsibility, will not be paying for a replacement, and has stated that he believes removal could have an effect on the adjacent highway. The land is tenanted and the tenant requires the culvert to be replaced.

A contribution may be beneficial and offered towards the replacement of this culvert:
£1,000 estimate.



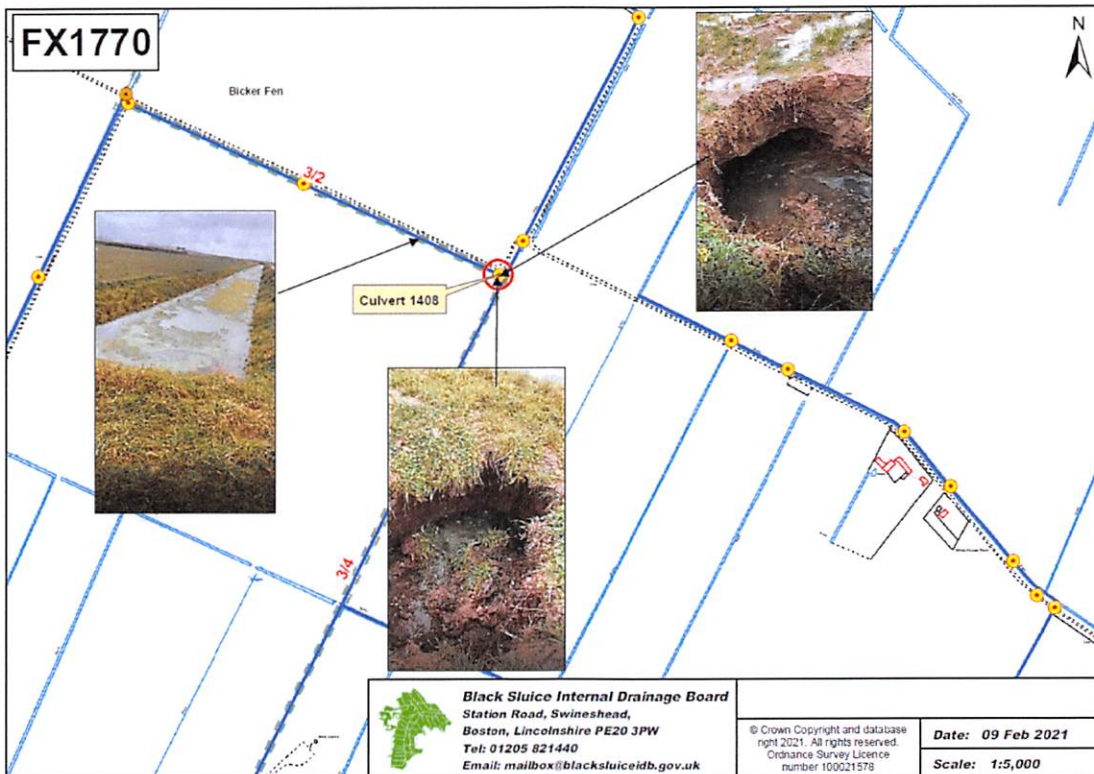
(d) Holland Fen - No 2754 - FX1775 - 8m x 900mm Concrete Ogee (Field entrance)

The landowner notified the Board of the failure of the end of this culvert, stating that damage was caused by the Board's Plant. On inspection the end pipe of the culvert had collapsed into the watercourse, and photographs taken looking into the inside of the pipe show that all of the pipes are cracked along the soffit.



(e) Bicker Fen - No 1408 - FX1770 - 12m x 900mm Armco (Field entrance)

This culvert having collapsed and blocking the watercourse, has been removed by the Board. The Operations Manager has discussed with the landowner about potential replacement.



(f) Bicker Fen - No 1469 - FX1769 - 18m x 1200mm Armco (Farm track Field entrance)

This culvert has partially collapsed, the blockage removed by the Board. The Operations Manager has discussed with the landowner about potential replacement. Culvert No's 1408 & 1469 are owned by same landowner.

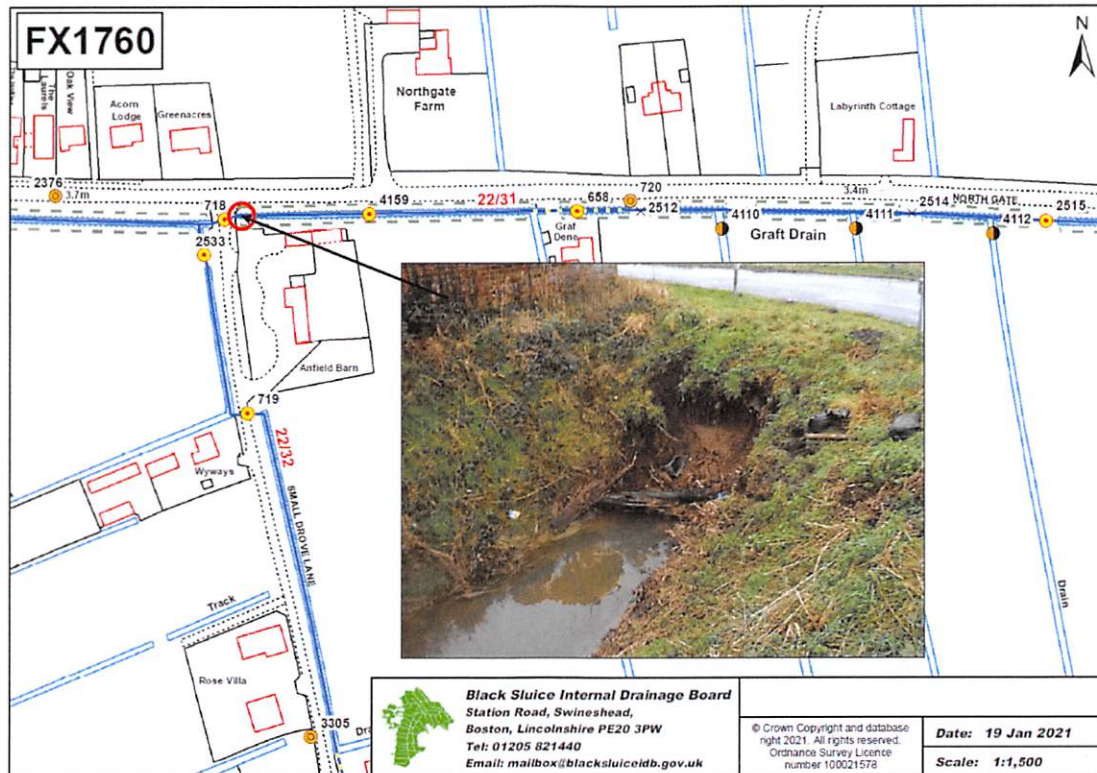
A contribution may be beneficial and offered towards the replacement of this culvert: £1,000 estimate.



(g) Small Drove - No 718 - FX1760 - 18m x 900mm Armco

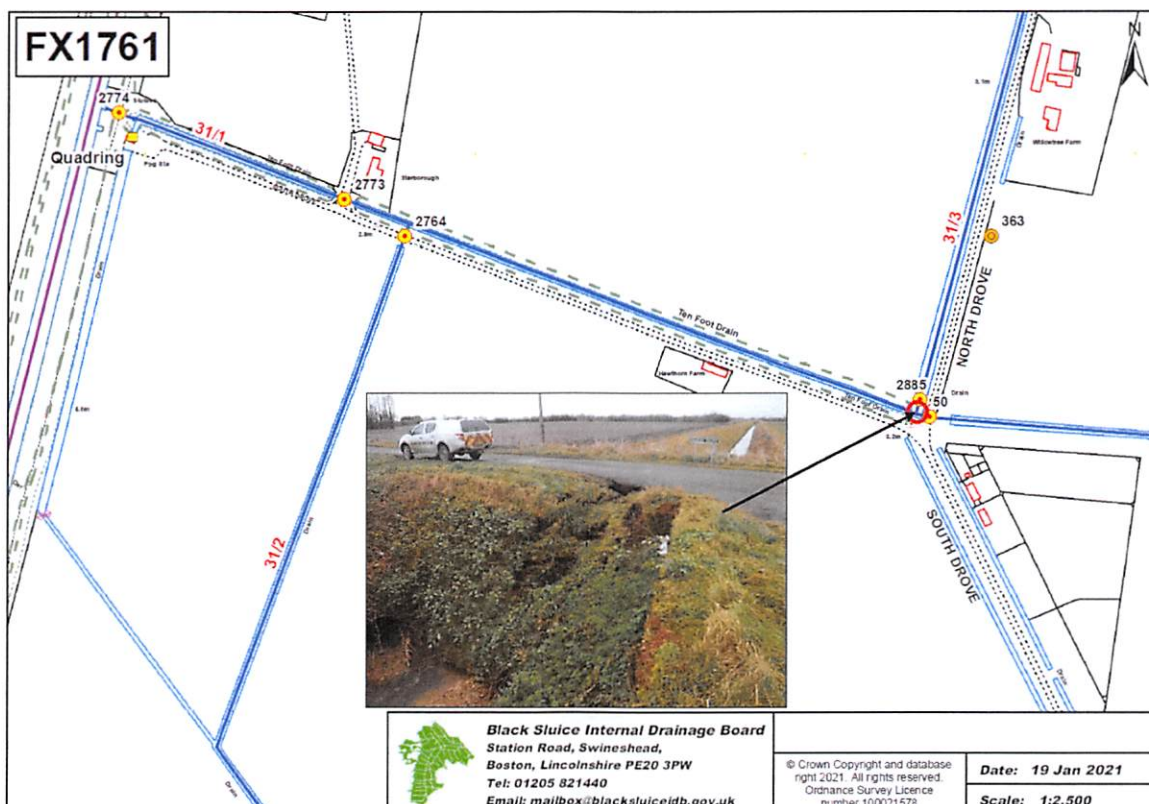
This culvert has partially collapsed as the structure of the pipe has failed.

It is a culvert under a highway, LCC have been informed and have completed a temporary repair due to the urgency. With a replacement to be placed on programme and are aware of the implications of any restriction of watercourse flows.



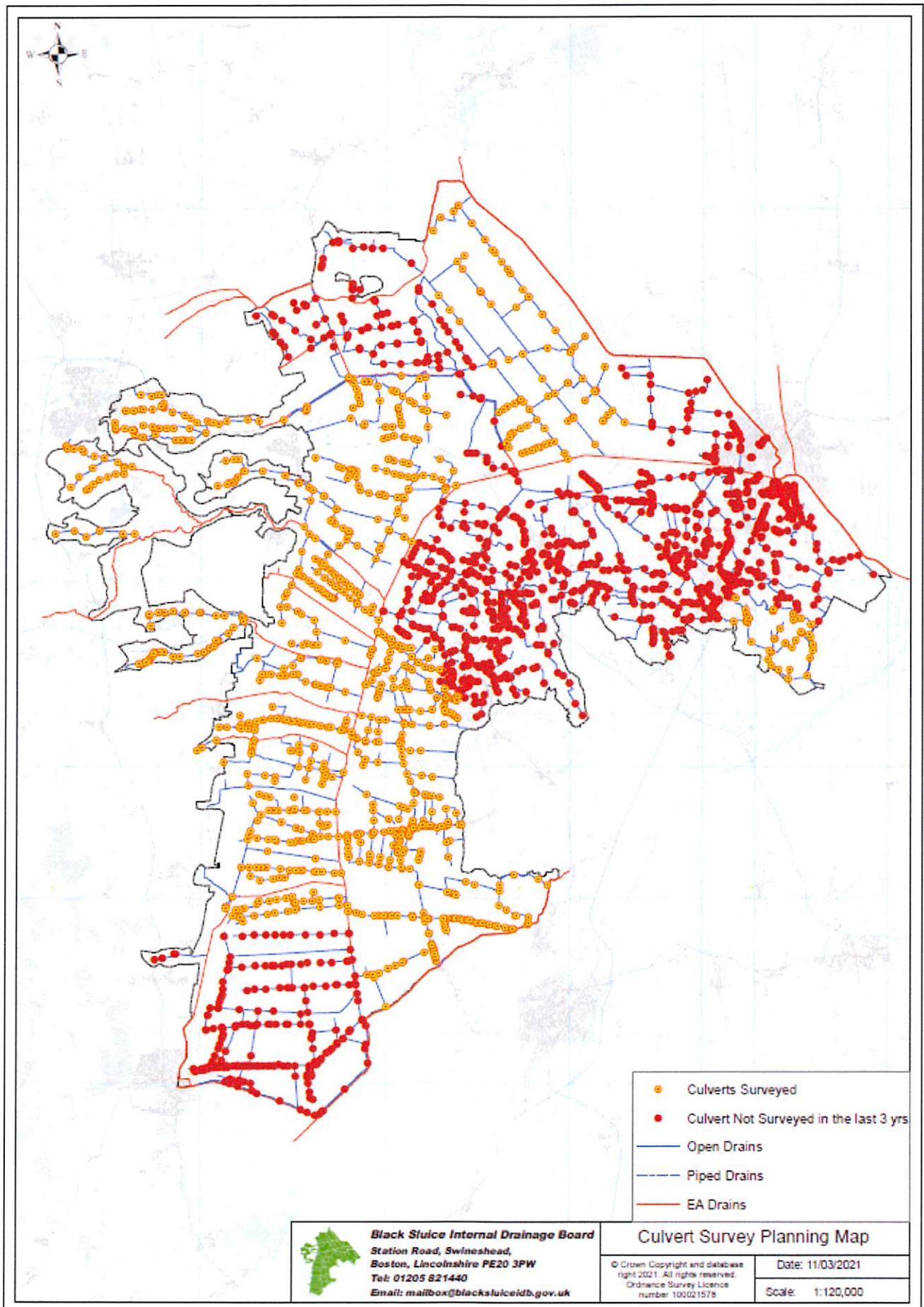
(h) Quadring Fen – No 50 – FX1761 - 18m x 1200mm Armco

Notified that the headwall of this culvert had failed. Site visit and photos taken. Culvert under road LCC notified. Some remedial headwall repair works completed by LCC, due to the urgency, and concern of road collapse. Ongoing discussion with LCC on these works.

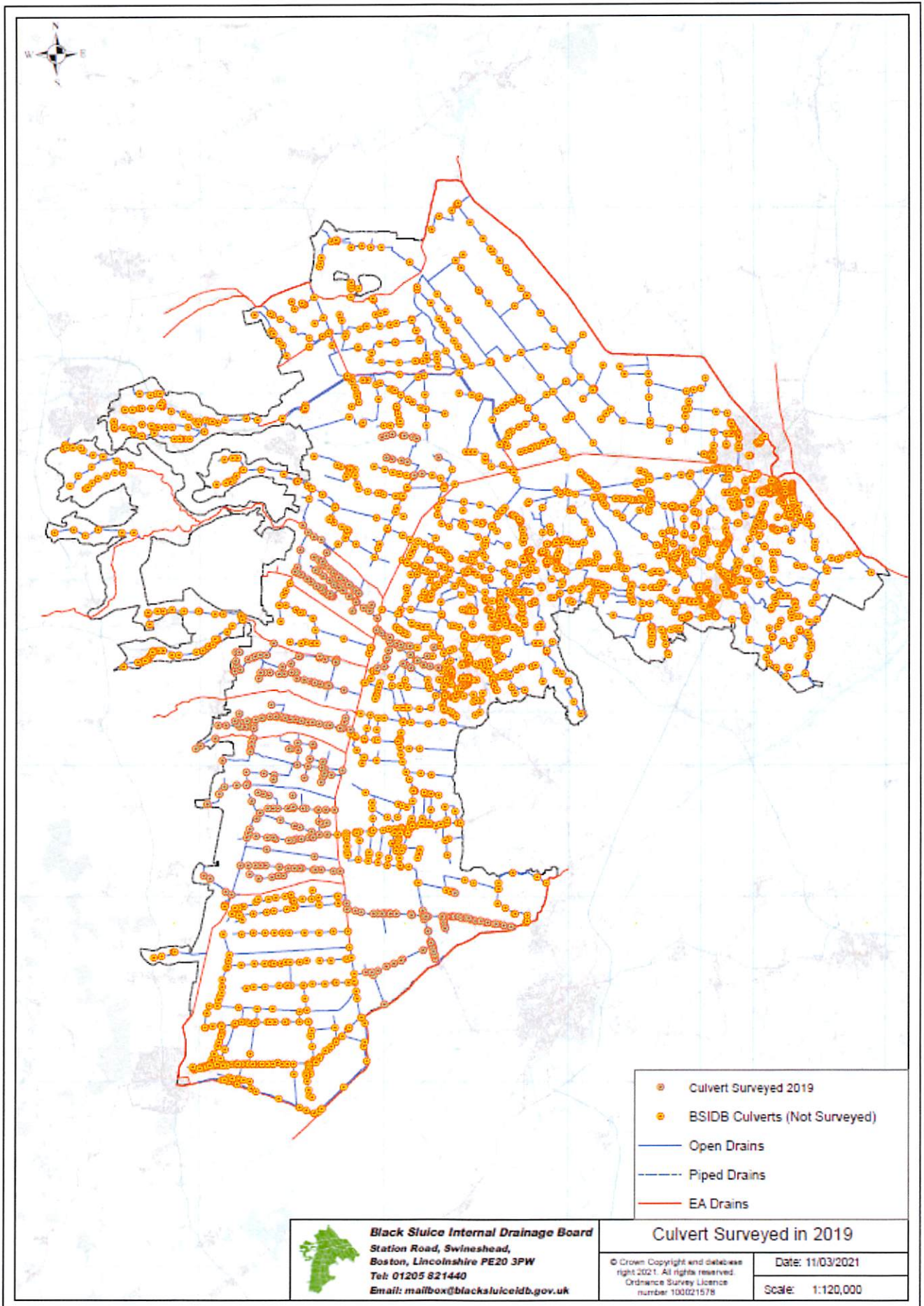


4. Culvert Surveys

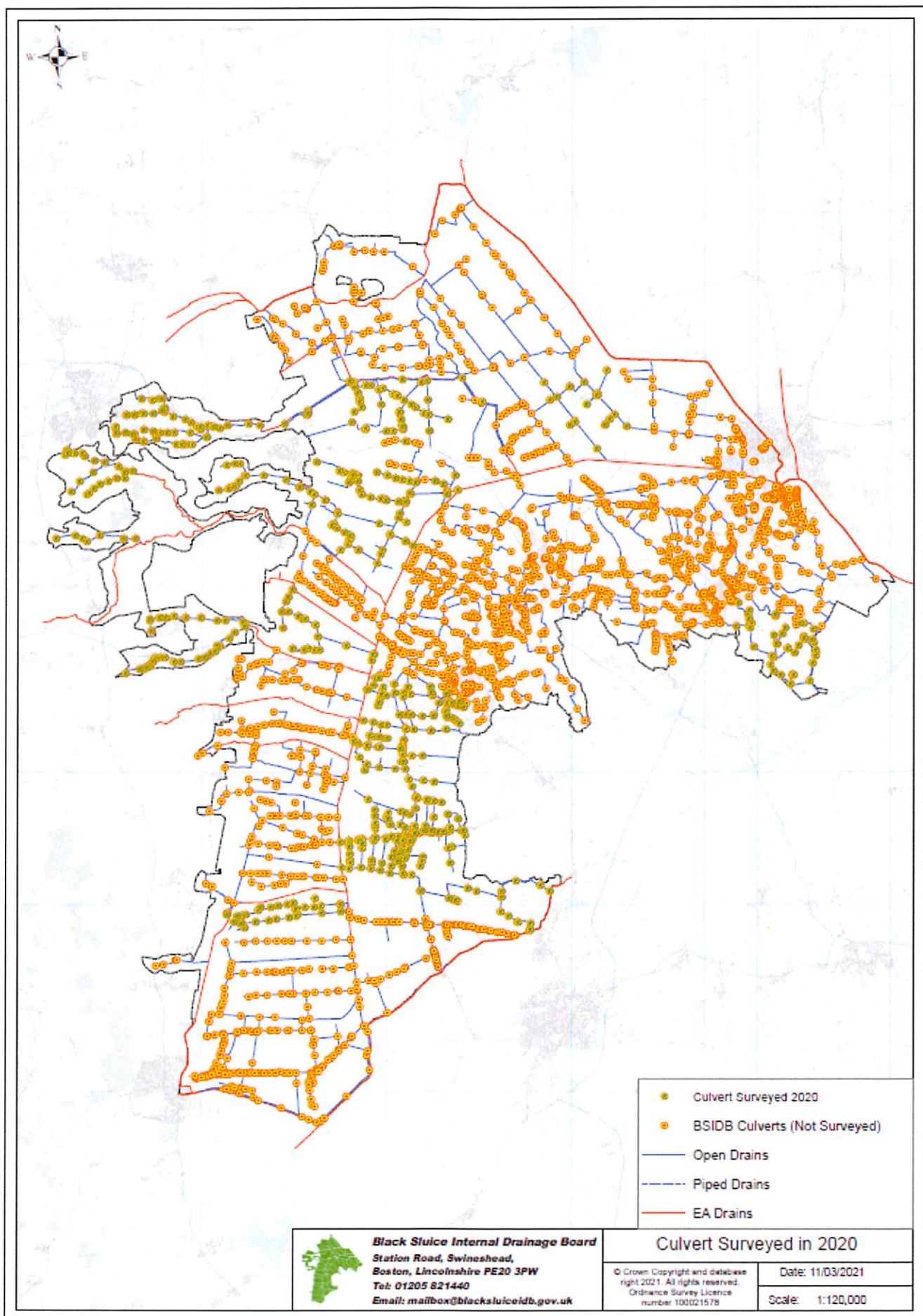
(a) Culvert Survey Planning Map



(b) Culverts surveyed in 2019 = 201



(c) Culverts surveyed in 2020 = 172



5. Structures Replacement Programme 2021/22

Proposed replacement/contribution towards for 2021/22, none of these completed in 2020/21:

No. 635	Swineshead	15m x 0.6m	Armco	£1k max contribution
No. 1795	Kirton	12m x 0.6m	Armco	£1k max contribution
No. 2880	Kirton	9m x 0.6m	BAT	Potential to give this up

TECHNICAL NOTE

Job Name: Black Sluice
Job No: 48702
Note No: TN001
Date: 25/9/2020
Prepared By: C Radbone/ J Camp
Reviewed By: O Belson/ L Truslove
Subject: **EWERBY PUMPING STATION SITE VISIT REPORT**

1. Introduction

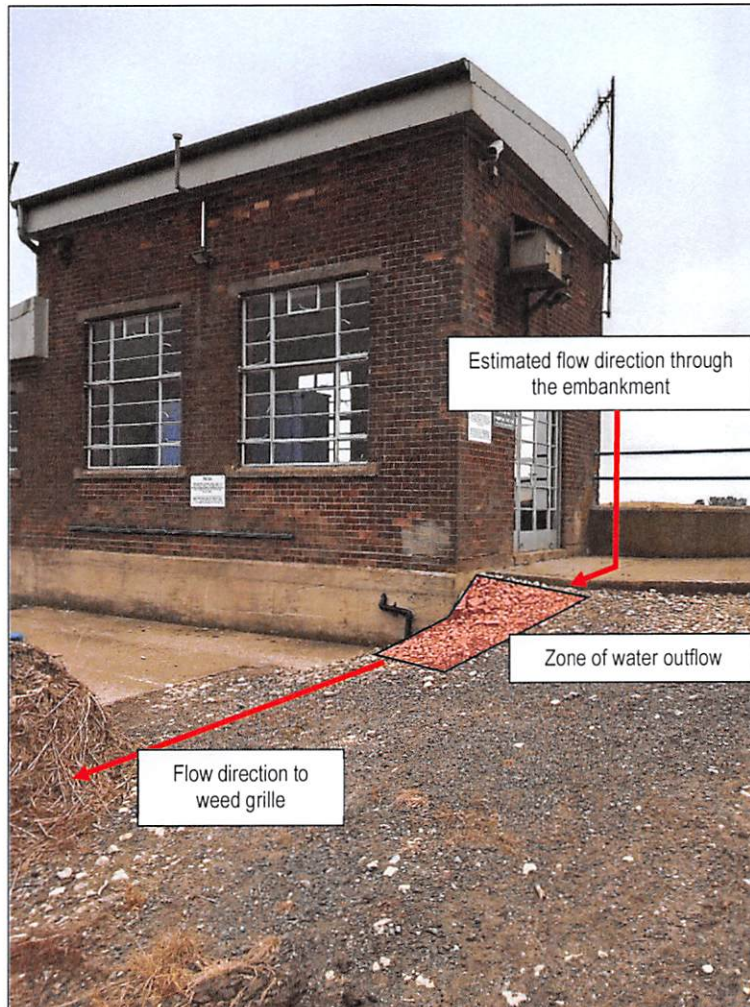
- 1.1 The purpose of this Technical Note is to summarise the observations made during a site visit carried out on the 13th August 2020 to Ewerby Pumping Station, Lincolnshire. The site visit was undertaken by a Stantec engineer who was accompanied by a Black Sluice Internal Drainage Board (IDB) engineer. The weather conditions during the visit were overcast and dry.
- 1.2 The pumping station is located approximately 2km southwest of South Kyme, Lincolnshire at approximate national grid reference TF 15954 48362 (515954E, 348362N) (post code PE6 9PB). The pumping station connects the Midfodder Dike with Car Dyke to ensure water levels can be controlled across Lincolnshire. The pumping station is situated at the head of the Midfodder Dike and at the toe of an embankment comprising the northern bank of Car Dyke.

2. Background

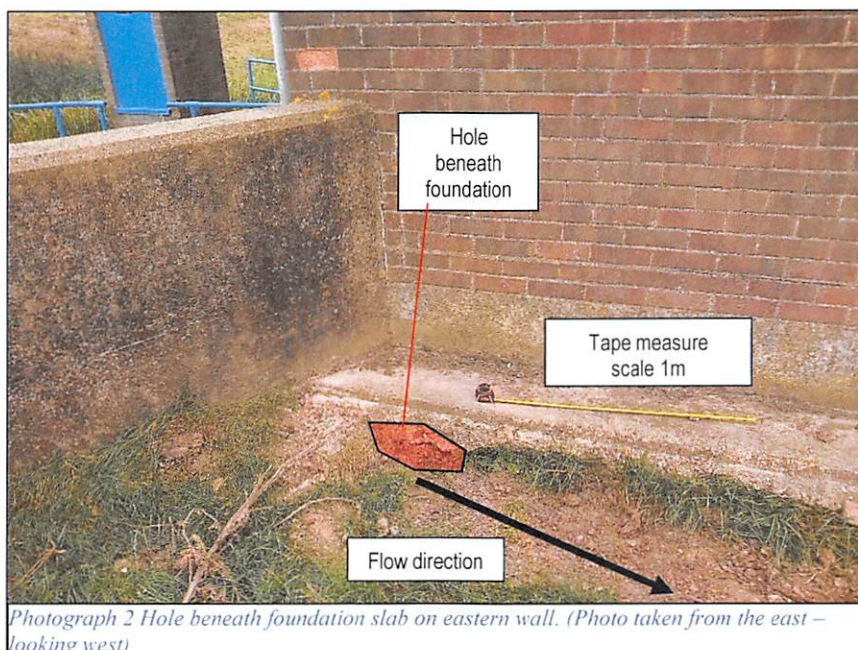
- 2.1 The site visit was carried out in response to reports from the IDB of water seepage beneath the retaining walls and through the foundations of the pumping house at times of record high water levels within the waterway and drainage canals during the extreme wet weather of February 2020.

3. Site Observations & Embankment Details

- 3.1 The site was accessed via a farm access off the road between Ewerby Thorpe and Howell. The approach to the site was 3.2km long and sufficiently wide to allow for 4x4 vehicular access with a small car parking area (approx. 160m²) located immediately north of the pumping station.
- 3.2 During the site visit, it was noted that soil that forms the embankment had apparently experienced shrink-swell processes that have caused the soil to part away from the wall and the sheet piling beneath.
- 3.3 According to the Black Sluice IDB engineer, during the high-water event in February, the site at Ewerby was noted as experiencing seepage beneath the retaining wall adjacent to the pumping house on both sides. As shown on Photograph 1, the location of the area that experienced seepage can be seen through the area of gravel fill adjacent to the floor slab.
- 3.4 On the eastern side of the pumping house, the IDB engineer highlighted that water also seeped beneath the retaining wall and beneath the concrete foundation slab highlighted in Photograph 2.

TECHNICAL NOTE


Photograph 1 Approximate seepage beneath the pumping station towards weed grille (photo taken from the north – looking south)



Photograph 2 Hole beneath foundation slab on eastern wall. (Photo taken from the east – looking west)

TECHNICAL NOTE

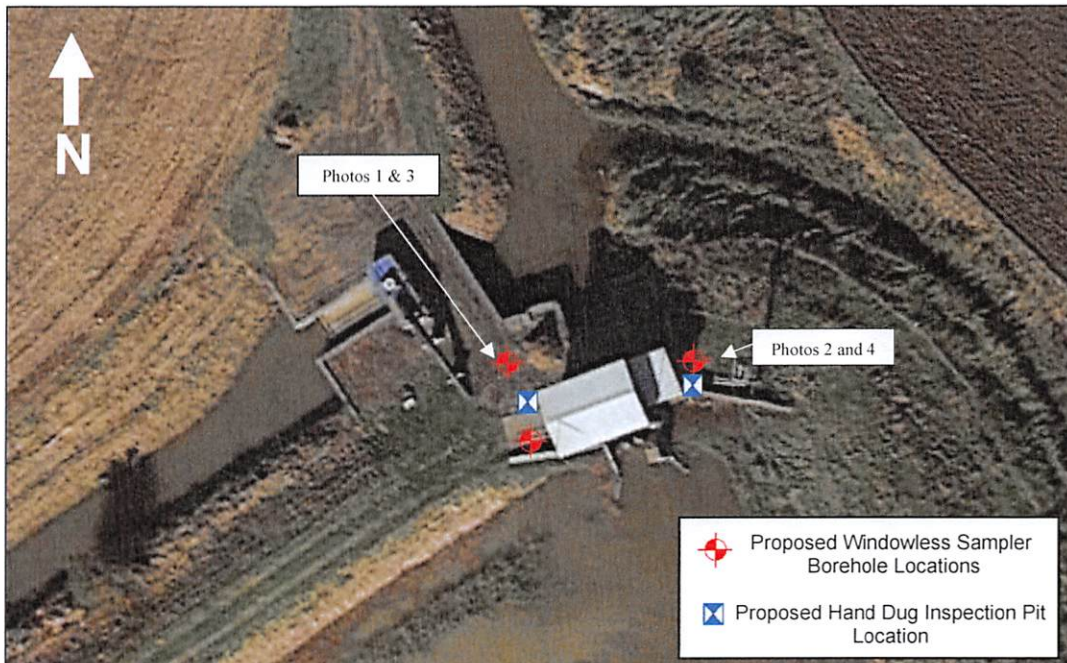
4. Recommendations for Ground Investigations

- 4.1 Based on the observations and records from the site visit on the 13th of August, the following site investigation is recommended in order to determine the causes of the embankment failure and the potential remedial options.
- 4.2 It is recommended that a site investigation comprising the sinking of three small diameter windowless sampler boreholes on the crest of the bund and adjacent to the western and eastern walls of the pumping house. Hand excavated pits are recommended at the points of water egress from the beneath the slab on the western side of the pumping station and adjacent to the pumping station and wall on the western side. Photographs 3 to 5, below, show the provisional locations.



Photograph 2 Proposed exploratory hole locations- western side.

TECHNICAL NOTE



Photograph 5 Proposed investigation location plan

- 4.3 These boreholes will allow recovery of soil cores to analyse the composition of the embankment and the soil structure to help identify the potential reason for the failure/seepage through the it. The pits will allow description of the soil beneath the foundation and will check for the presence of voids.
- 4.4 If required, in situ geotechnical tests such as Standard Penetration Tests (SPTs) can be carried out within the boreholes to provide numerical data on the soil's cohesiveness and strength.

TECHNICAL NOTE

- 4.5** Groundwater monitoring piezometers should be installed within the three borehole locations to determine the phreatic surface within the embankment for subsequent geotechnical analysis.

- 4.6** Following the completion of the site investigation, better understanding of the potential causes of the ground movements should be determined together with an option appraisal for potential remedial solutions. The findings will be presented in a technical note. Detailed design can then be undertaken once the most cost-effective solution has been selected following consultation with a contractor as part of an Early Contractor Involvement.

TECHNICAL NOTE

Job Name: Black Sluice

Job No: 48702

Note No: TN003

Date: 25/09/2020

Prepared By: C Radbone

Reviewed By: Oliver Belson/ L Truslove

Subject: SOUTH KYME PUMPING STATION – RECORD OF SITE VISIT

1. Introduction

- 1.1 The purpose of this Technical Note is to summarise the observations made during a site visit carried out on the 13th August 2020 to South Kyme Pumping Station, Lincolnshire. The site visit was undertaken by a Stantec engineer who was accompanied by an engineer from the Black Sluice Internal Drainage Board (IDB). The weather conditions during the visit were overcast and dry.
- 1.2 The pumping station is located approximately 2km southeast of South Kyme, Lincolnshire at approximate national grid reference TF 20747 46902 (520747E, 346902N), approximate post code LN4 4AJ. The pumping station connects Holland Dike (low level) with the Head Dike (high level) water bodies. The pumping station is situated at the head of the Holland Dike and at the toe of the embankment comprising the northern bank of the Head Dike.

2. Background

- 2.1 The site visit was carried out in response to reports from the IDB of water seepage and settlement of the embankment at times of record high water levels within the Head Dike during the extreme wet weather of February 2020.

3. Site Observations & Embankment Details

- 3.1 The site was accessed via a farmhouse access road from Clay Bank (B1395) heading eastwards. The approach to the site was sufficiently wide to allow for 4x4 vehicular access with a small car parking area (approx. 170m²) located to the northwest of the pumping station.
- 3.2 During the site visit, the following observations were recorded (relevant photos are included after the text of this note):
 - Settlement of the embankment had resulted in the opening of cracks and voids along the contact between the concrete retaining wall and the pumping station, Photograph 1.
 - To the east of the pumping station, the retaining wall appears to have shifted from its original position and cracks have subsequently been filled with expanding foam as a temporary measure, shown in photograph 4. It is noted to have a lateral displacement of approximately 200mm (to the south) and a vertical (downward) displacement of approximately 100mm.
 - The south eastern corner of the pumping station building showed a void beneath its concrete foundation, indicating potential settlement of the underlying ground, shown in photograph 5.

Additional observations were made by the IDB engineer during February 2020 and are detailed below:

- According to the IDB engineer, during the high-water event of February 2020, water was observed seeping through the retaining wall to the west of the pumping station. This was

TECHNICAL NOTE

temporarily fixed with expanding foam, as shown on photograph 2. The water was noted to be running along the west wall of the pumping station. A void was also observed in this location, beneath the foundation slab and the reduced ground level (photograph 3)

- In February 2020, water under artesian pressure was observed in the weed grille cable duct on the north side of the pumping station.
- In February 2020, water flow from both the retaining wall and area of settlement around the foundation slab resulted in erosion of the ground beneath the concrete slab and steps that lead to the pumping station building entrance on the eastern side (photograph 6)

3.3 Due to the scale of the damage to the concrete wall and foundations movements caused by the events in February 2020, structural engineering advice is recommended in the assessment of the pumping station and the potential remedial options.

4. Recommendations for Ground Investigations

4.1 Based on the observations and records from the site visit on the 13th of August 2020, the following site investigation is recommended in order to determine the causes of the embankment/retaining wall movements and the potential remedial options.

4.2 It is recommended that a site investigation comprising the sinking of three small diameter windowless sampler boreholes, a cable percussion borehole and two hand dug inspection pits is completed at the site. The cable percussive borehole should be completed to a depth of 20m. These boreholes will allow for the study and comparison of soil profiles. The deeper borehole will allow for preliminary design of permanent or temporary sheet piles, should they be considered as part of a remedial option. The hand dug inspection pits are intended to inspect the soils and the construction of the upper building foundations and slabs and retaining all foundations and to check for voids beneath them.

4.3 If required, further geotechnical tests such as Standard Penetration Tests (SPTs) can be carried out within the boreholes to provide numerical data on the soil's cohesiveness and strength.

4.4 Groundwater monitoring piezometers should be installed within three of the borehole locations, including the cable percussive borehole to determine the phreatic surface within the embankment for subsequent geotechnical analysis.

4.5 Following the completion of the site investigation, better understanding of the potential causes of the ground movements should be determined together with an option appraisal for potential remedial solutions. The findings will be presented in a technical note. Detailed design can then be undertaken once the most cost-effective solution has been selected following consultation with a contractor as part of an Early Contractor Involvement.

TECHNICAL NOTE



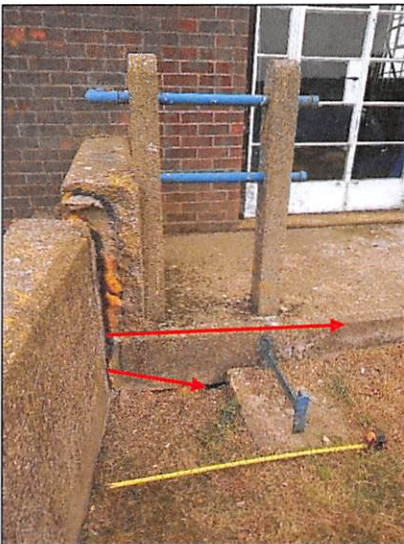
Photograph 1 - Cracking parallel to the concrete retaining/wing wall. Indicating settlement of the soils to the south (right of photo) of the wall. Taken from the west side of the pumping station, looking east



Photograph 2 Cracking between the pumping station building and the retaining/wing wall. Expanding foam used as a temporary measure to infill the crack



Photograph 3 Exposed and displaced foundation slab beneath the pumping station building, indicating settlement of the underlying soils




Photograph 4 Displaced retaining/wing wall and settlement beneath concrete slab. Photograph from the eastern side of the pumping station looking westwards



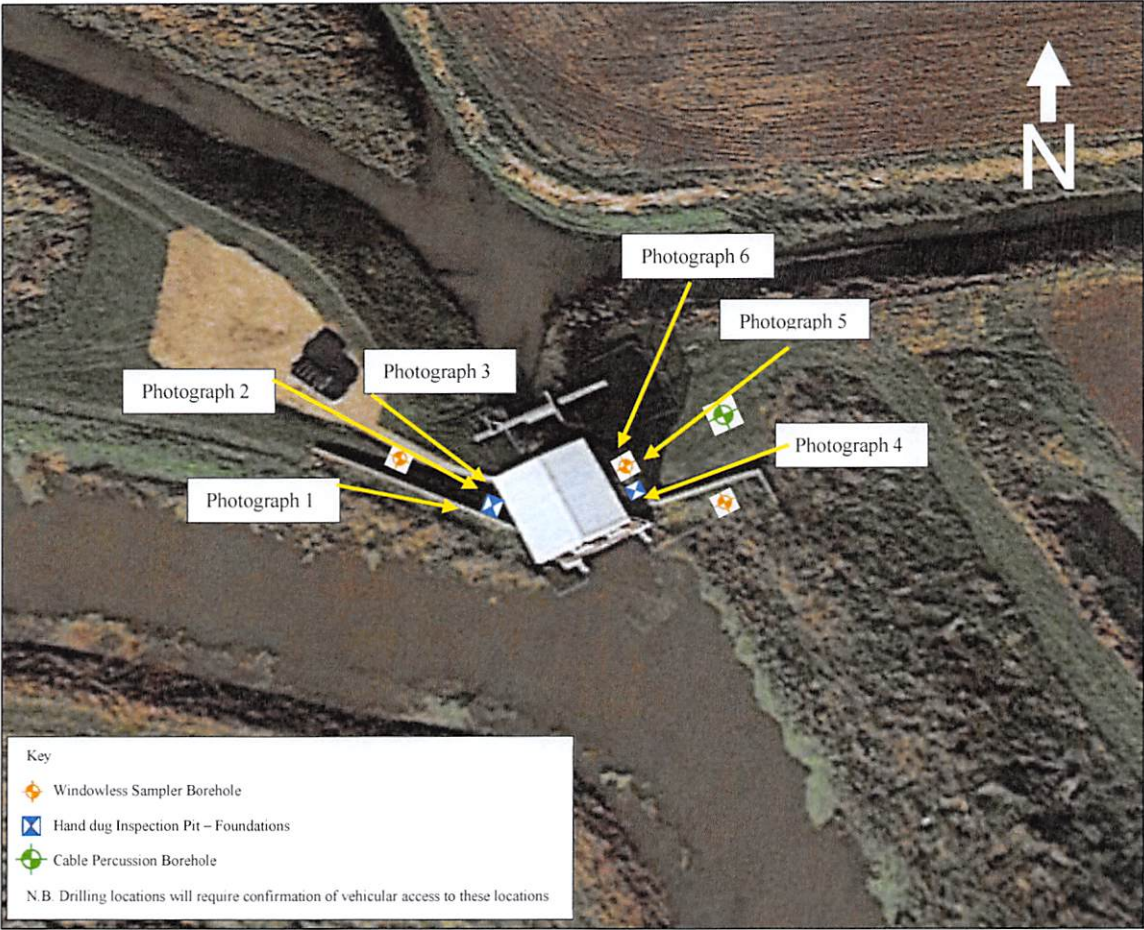
Photograph 5 Settlement of soils beneath the pumping station building foundation



Photograph 6 Settlement of the soils beneath the stairway leading into the pumping station building. Photograph taken from the eastern side of the building looking westwards

Direction of water flow: 

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Aerial Photograph (GoogleEarth) showing approximate locations of record photographs and proposed investigation locations.

TECHNICAL NOTE

Job Name: Black Sluice
Job No: 48702
Note No: TN002
Date: 08/09/2020
Prepared By: C Radbone
Reviewed By: L Truslove
Subject: DAMFORD PUMPING STATION - RECORD OF SITE VISIT

1. Introduction

- 1.1 The purpose of this Technical Note is to summarise the observations made during a site visit carried out on the 13th August 2020 to Damford Pumping Station, Lincolnshire. The site visit was undertaken by a Stantec engineer who was accompanied by a Black Sluice Internal Drainage Board (IDB) engineer. The weather conditions during the visit were overcast and dry.
- 1.2 The pumping station is located approximately 2km northeast of South Kyme, Lincolnshire at approximate national grid reference TF 19382 50680 (519382E, 350680N, approximate postcode LN4 4AT). The pumping station connects the Kyme Eau Waterway with the Damford Drain to ensure water levels can be controlled across Lincolnshire. The pumping station is situated at the head of the Damford Drain and at the toe of an embankment comprising the western bank of the Kyme Waterway.

2. Background

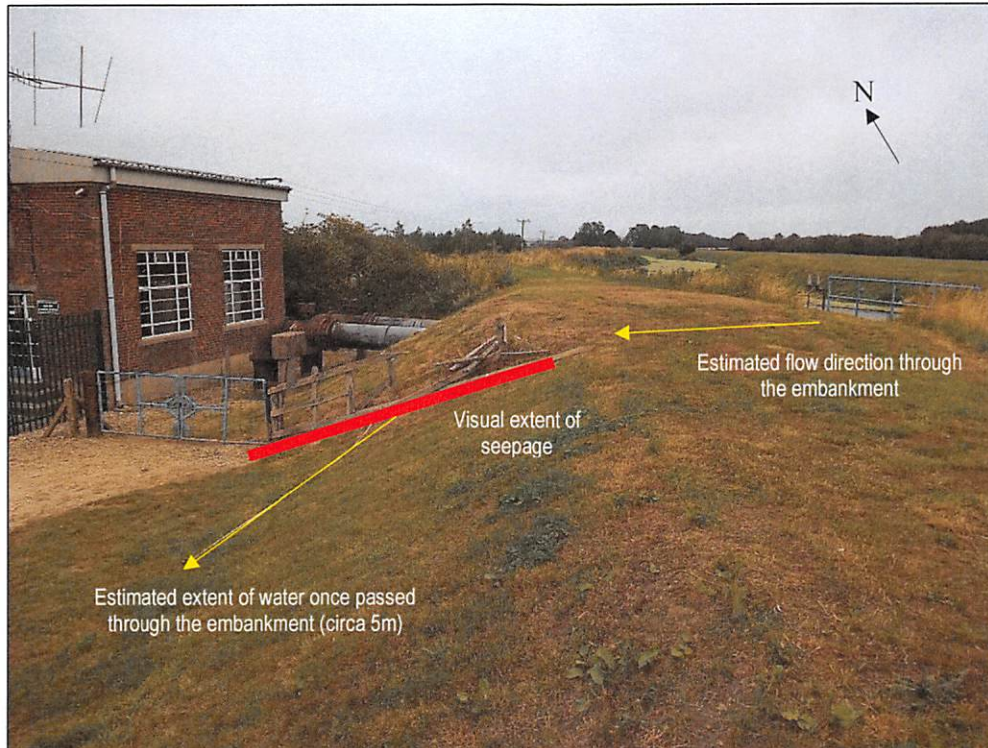
- 2.1 The site visit was carried out in response to reports from the IDB of water seepage through the embankment at times of record high water levels within the waterway and drainage canals during the extreme wet weather of February 2020.

3. Site Observations & Embankment Details

- 3.1 The site is accessed via Skinners Lane, leading to a farm access and past chicken farm barns. The approach to the site was sufficiently wide to allow for 4x4 vehicular access with a small car parking area (approx. 140m²) located immediately south of the pumping station. Vehicular access could also be gained to the crest of the embankment (circa 5m wide) via a small track.
- 3.2 During the site visit, the embankment, which stands approximately 3m above the pumping station floor level, was not noted to be exhibiting any signs of structural distress with no signs of tension cracks, slumping or other signs of degradation. An ageing wooden post and rail fence was noted to be in disrepair, running perpendicular to the embankment, however the fence dilapidation is not considered to be associated with the seepages because the posts appeared to be in their original position.
- 3.3 The embankment side slope was estimated to be around 20-30 degrees (increasing in grade from the toe) and the crest of the embankment to be around 5m across. As indicated above, during the high-water event in February, seepage through the embankment was observed by the IDB. The location of the affected area is identified in Photograph 1 below.
- 3.4 According to the IDB engineer, during the high-water event in February, the site at Damford was not noted as experiencing seepage through the bund adjacent to the main pipework. The approximate extent of the seepage is along the base of the fence line, with the water running in an approximate northeast – southwest orientation (red line on photograph 1). The IDB

TECHNICAL NOTE

engineer indicated the extent of the water once it had passed through the embankment and this is depicted on Photograph 1 (approximately 5m from the embankment toe).



Photograph 1- Approximate zone of seepage – (taken from the toe of the embankment, south of the pumping station, looking north-eastwards along its alignment)

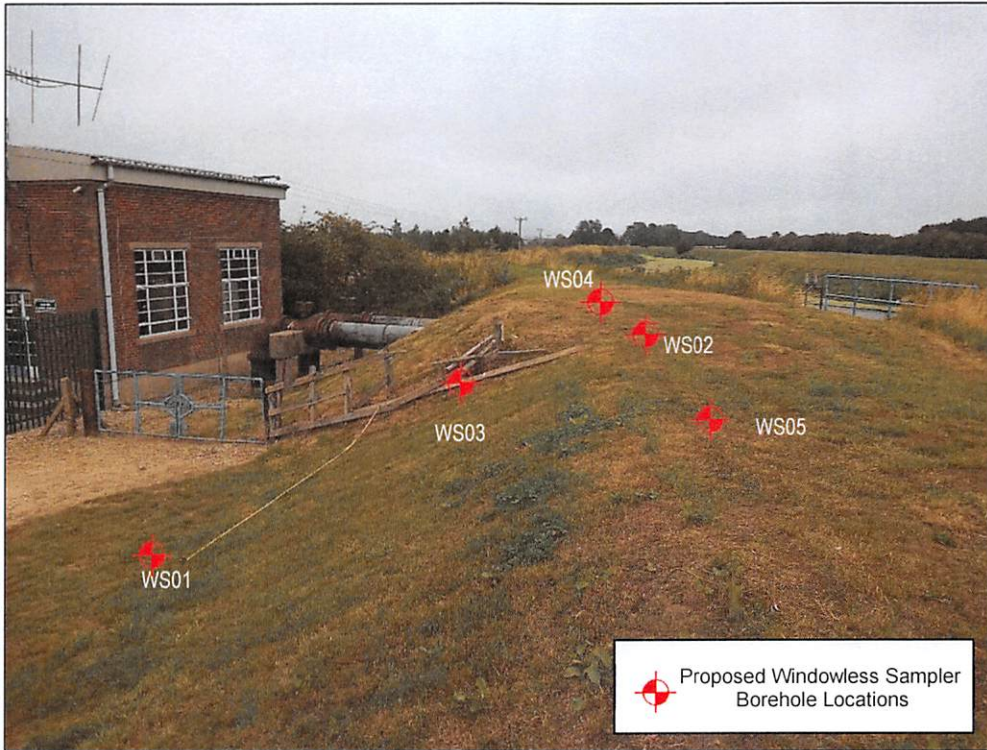
- 3.5 It is worth noting that during the time of the high-water event and during the site visit, the following observations were recorded:
- No visible damage or issues associated with the pumping house or its structure.
 - No visible seepage around the pipework connecting the Kyme Eau with the Damford Drain via the pumping station (visible in photograph 1).
 - No visible seepage was noted in the soil bund north of the wooden post and rail fence.

4. Recommendations for Ground Investigations

- 4.1 Based on the observations and records from the site visit on the 13th of August, the following site investigation is recommended in order to record the ground conditions within and beneath the embankment to inform potential remedial options.
- 4.2 An investigation comprising the sinking of five small diameter windowless sampler boreholes is recommended at the site. The boreholes should be completed from the crest of the bund, both within and away from the area of seepage. Further boreholes should also be completed at the toe of the embankment, both within and away from the failed area. This will allow for the comparison of soil profiles within and outside of the observed seepage. Photograph 2, below, shows the proposed locations of the boreholes.
- 4.3 These boreholes will recover soil cores of 1m length which will allow description of the soil and laboratory analysis of the composition of the embankment and the soil structure to help identify the potential reason for the seepage.

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- 4.4 If required, further in-situ geotechnical tests such as Standard Penetration Tests (SPTs) can be carried out within the boreholes to provide numerical data on the soil's cohesion and strength.
- 4.5 Groundwater monitoring piezometers will be installed within three of the boreholes to determine the phreatic surface within the embankment for subsequent geotechnical analysis.



Photograph 2 - Proposed exploratory hole locations

TECHNICAL NOTE



Photograph 3 - Proposed exploratory hole locations

- 4.6 Following the completion of the site investigation, the potential cause of the seepage should become clearer and should allow an options appraisal of potential remedial solutions to be undertaken. The findings will be presented in a technical note.
- 4.7 Detailed design can then be undertaken once the most cost-effective solution has been selected following consultation with a contractor as part of an Early Contractor Involvement.