A stylized map of the Buchanan and St Ambrose High School campus. The map is composed of various colored areas: a large light blue area at the top, a teal area in the middle, and a purple area at the bottom. A winding blue line represents a path or road through the campus. The text 'Buchanan and St Ambrose High School Campus Independent Review' is overlaid on the map.

Buchanan and St Ambrose High School Campus Independent Review

August 2019



Scottish Government
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BUCHANAN AND ST AMBROSE HIGH SCHOOL CAMPUS INDEPENDENT REVIEW

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FOREWORD

An independent and impartial review of the evidence of the reported health and safety concerns at St Ambrose and Buchanan High School campus in Coatbridge, was ordered on 12 June by the Deputy First Minister John Swinney.

The review was to examine the history, construction and maintenance of the site. Communities have the right to expect that places of education, will be safe, healthy and supportive and allow children to thrive and achieve to the best of their abilities.

The school communities of Buchanan High and St Ambrose High have a growing reputation in the provision of a high quality academic and supportive community, across a wide range of needs and abilities.

In recent months, concerns have been raised about possible health risks arising from the previous use that the land on which the campus was built. Health concerns have arisen which – to many – are hard to understand and explain. Very visible signs that all is not well have been seen – blue water in the mains water supply in the school.

A cloud has hung over the school communities here in Coatbridge.

The public agencies involved (North Lanarkshire Council and NHS Lanarkshire) have sought to reassure parents, pupils and members of staff and the wider community about the reasons for this anxiety. They have acted throughout with the best interests of parents, members of staff and pupils at the heart of their actions. They have produced information designed to assure and re-assure.

This report sets out our conclusions and recommendations, for consideration by the public bodies responsible.

In the recommendations we make, we have listened to those involved to seek to establish the facts. We recommend further work by North Lanarkshire Council to restore confidence in them and these school sites.

We hope that our findings can help all the communities in Coatbridge to work together towards common goals in the interests of those at the heart of our communities – our children.

EXECUTIVE SUMMARY

Parents and teachers were right to raise concerns. They were entitled to be listened to and heard. They were entitled to expect that North Lanarkshire Council and NHS Lanarkshire officials would take their concerns seriously and address them. We believe that all those officials did so. Unfortunately an atmosphere developed around this school campus in which parents and staff did not feel they were properly listened to and their concerns addressed.

This issue was a long time brewing. Mistrust built over many years. The public meeting on 6 June 2019 was, in some ways, the final straw.

We gathered evidence and, in some cases, sought further evidence from many sources, in order to fully consider the issues giving rise to concern. These were about the history of the site (Chapter 4), health matters (Chapter 5), water quality (Chapter 6), soil quality (Chapter 7), air quality and the methane membrane (Chapter 8), settlement (Chapter 9) and the response of North Lanarkshire Council and NHS Lanarkshire (Chapter 10).

Our detailed findings are set out in those Chapters, leading to our Conclusions (Chapter 11) and Recommendations. We make 5 Recommendations.

For the reasons we set out in Chapter 5 of this Report and from the evidence we have considered, we believe the school and site are safe. We conclude that there is no causal link between the well-documented hazards causing such public concern and any ill-health of those who work or who are taught on this site. In our view, there is no causal link between arsenic and the bladder cancer cases at Buchanan High school.

We have looked at the evidence of what contaminants were on the site historically and the remediation measures associated with the school project. We have assessed the environmental samples taken in July 2019. At all times, a precautionary approach has been taken to risk assessment.

The risk from hazardous contaminants in the soil is very low.

Despite that general conclusion, we have found a localised source sample at pit HP50 with elevated levels of PCB's and advise remediation on a purely precautionary basis so as to restore confidence in the site. If that work is being done by North Lanarkshire Council and independently verified to remove any residual risk or to otherwise render the area safe, we would support the opening of the schools. We believe that can be done quickly by North Lanarkshire Council and that they will do so.

This recommendation is purely as a precautionary measure. It does not mean that we think there is an unacceptable risk on the site.

The water at the campus is safe to drink (as set out in Chapter 6). The blue water found in the past is caused by copper which is not a significant health risk. Copper does not cause cancer.

There is no reason not to open the schools based on the blue water issue. However, the evidence we have seen leads us to recommend certain further precautionary testing of the water over the period ahead by Scottish Water.

An important part of our focus was on the methane gas membrane, installed as a precautionary measure after planning consent was granted. We sought to understand its purpose and the potential risks it was guarding against. We wanted to understand how the public can have confidence that it is safe. Chapter 8 explains this and the related issues concerning air quality and we are satisfied that there is no cause for public concern relating to this membrane nor gases from the site.

In Chapter 4, we have looked at the site history and the planning process. We have looked at the work done to find out what hazards existed on the site and what risks they posed. We consider the work done to be thorough and professional. The choices made by North Lanarkshire Council on relevant advice were all reasonable and appropriate decisions for them to make on the evidence before them.

As set out in Chapter 10, we consider though that there are matters that North Lanarkshire Council and NHS Lanarkshire could have done better and from which they must learn.

We also think that parents and staff - though right to have raised concerns so as to be heard - can be confident that they have now been heard and are now being listened to.

As we encourage North Lanarkshire Council to look ahead and engage and connect with the school communities, we urge parents and staff to do the same. We recommend closer and deeper consultation and better engagement in the management of this site from now on. Working together with shared outcomes and goals in mind, gives an opportunity to put these troubles behind.

CHAPTER ONE - INTRODUCTION

1.1 This report describes the process and findings of an independent review undertaken on behalf of the Deputy First Minister in response to a range of health and safety concerns around Buchanan and St Ambrose High Schools which are co-located on the same site in Coatbridge, Lanarkshire.

Purpose of the review

1.2 On 12 June 2019, the Deputy First Minister, in light of public concerns and with the intention of providing reassurance to parents, pupils and staff at the Buchanan and St Ambrose High School campus in Coatbridge, announced an independent review, with the following scope, agreed in conjunction with North Lanarkshire Council and NHS Lanarkshire:

“The Scottish Government, following consultation with North Lanarkshire Council and NHS Lanarkshire, have asked Paul Cackette, the Scottish Government Chief Planning Reporter, and Dr Margaret Hannah, former Director of Public Health, to undertake an independent and impartial review of the evidence in relation to the reported health and safety concerns at Buchanan and St Ambrose High School campus including the history and construction and maintenance of this site. The primary purpose of the review will be to provide further reassurance to the local community. This will include:

I. As a priority, a review of the public health measures taken and conclusions drawn by NHS Lanarkshire in relation to the health concerns expressed by the school and local communities. The review will address specific health concerns that have been raised including:

- possible exposure to unspecified chemicals resulting from previous land use now at the new school site
- attending the school and acquiring cancer, specifically bladder cancer
- the presence of copper in the drinking water supply
- attendance at the school and the acquisition and impact of elevated blood levels of arsenic

II. Assessing the information provided on public health related concerns raised by parents, pupils, school staff and the local community;

III. Reviewing the risk assessment made and validation of works undertaken across the site to assess whether all activity was carried out in accordance with appropriate Regulations and best practice to mitigate against any risk to public health. This review would be carried out by a party independent of the original works and with input from all other agencies involved.

“On the basis of the assessment of the evidence outlined above, the Review will determine whether additional evidence or action is required in order to provide such further reassurance to the local community.”

“This Review will be independent. This process has the full support of both the North Lanarkshire Council and NHS Lanarkshire who recognise everything possible must be done to address the concerns which have been raised locally.”

1.3 While recognising that it is for the Reviewers to assess exactly how long their work requires, the Deputy First Minister appointed Dr Margaret Hannah, a former Director of Public Health at NHS Fife, and Paul Cackette, Scottish Government Chief Reporter, to report to him, in sufficient time ahead of the planned opening of the campus for the 2019/20 school year, in order to inform decisions by North Lanarkshire Council as local education authority about educational provision at the campus and in particular whether to open on the planned dates. The key dates are 12 August 2019 for teaching staff and 14 August 2019 for pupils.

1.4 St Ambrose High School is a denominational school with a school roll at 2018 of 1312 pupils and 118 staff. Buchanan High School is a non-denominational additional support needs school with a school roll at 2018 of 139 pupils and 47 staff.

1.5 We set out below the steps taken by us by way of initial interaction with parents, pupils, staff and with relevant authorities.

Acknowledgements

1.6 We want to formally record our thanks and appreciation to:

- the headteachers of both schools - Ellen Douglas at St Ambrose and Michael McGinley at Buchanan High – and pay tribute to the quality of educational and support provision given to pupils at both schools, through the outstanding leadership provided by them
- Father Kane, school chaplain at St Ambrose, supported by the Diocese of Motherwell, for their leadership in challenging times for the faith community at St Ambrose
- North Lanarkshire Council and NHS Lanarkshire for their openness and agreement to co-operate fully with our work
- all parents, parent councils, staff and union representatives who we met in the course of our work. We don't underestimate how worrying these times have been, and remain, for those with a close interest in these schools, both in having their children attending and as teaching and other support staff in remaining wholly professional in their determination to provide a school environment of the highest quality possible
- pupils at both schools for their willingness to share their experiences in a mature and clear way, respectful of the views of others
- Claire Donoghue of St Ambrose Parents Steering Group and Lisa McCormick for their determination to work in the best interests of the school and the school communities
- expert contributors, including those we commissioned to undertake work on our behalf, those we sought advice from to help shape our investigations and those who contributed their comments, questions and additional data in response to our seeking new evidence
- local MSPs and MPs in recognition of their role in seeking to bring communities together

1.7 We would add thanks to the Deputy First Minister and others for respecting our independence and giving us the space to carry out our work in the short time we had.

1.8 As we hope is clear, we have concentrated attention on what seems to us to be the issues most of concern to the public or where we felt that deeper analysis was essential. That approach underpinned our decision to call for new or updated testing in certain respects and not in others (set out more fully below). We felt that certain testing was essential to assist us in such analysis and because – where essential – we saw no other way to provide acceptable levels of public assurance and reassurance. As can be seen from our recommendations, testing in July 2019 is in some cases not the end point.

1.9 We would also wish to thank the Review Support team within the Scottish Government for their unstinting professionalism in all that they have done – in difficult times and in sensitive circumstances – to juggle vast numbers of documents and emails and arrange all necessary administrative support for our work. This has been invaluable to us and it would have been simply impossible to have produced this report within the timescale we have without them.

1.10 Our especial thanks go to Clare Morley, Scott Johnston and Graeme Walker, but recognise that many others, too numerous to mention individually, have been vital in their support to us too.

1.11 In recognising that we are not specialist experts in all of the areas of concern and in order to seek to check and validate our findings, we engaged with a number of specialists in a range of disciplines who too have been invaluable in assisting with our work and the giving of their time and efforts and at very short notice. We narrate them in the Annex to this Report. We include in our thanks those supporting them in their organisations.

CHAPTER TWO – BACKGROUND TO THE REVIEW

2.1 The review was co-chaired by Paul Cackette and Dr Margaret Hannah who are experienced in planning issues and public health respectively.

2.2 The team has no previous knowledge of, or involvement in, any of the matters of concern at this site (beyond awareness from what was reported in the media) prior to our appointment and, as Paul Cackette was only appointed as Scottish Government Chief Reporter in August 2016, he had no involvement in any planning matters at the time of the determination of the planning application for the site.

2.3 We should also make clear that in carrying out this review in accordance with our remit and reporting to the Deputy First Minister, matters concerning the ongoing provision of medical services and the addressing of health concerns arising from that remained, and still remain, matters for NHS Lanarkshire. Equally, we referred evidence we were gathering to the relevant agencies for action where in our judgement this was required. Decisions on the provision of educational facilities remained and remain matters for North Lanarkshire Council in accordance with their statutory duties to make provision for school age education.

2.4 The fact that operational matters both during and after we complete our Report remain the responsibility of North Lanarkshire Council and NHS Lanarkshire is important. Our conclusions represent work at a snapshot in time and, as we recognise, is not an end point. The views we reach and recommendations we make need to be addressed in an operational way, with the duty to address them lying with those with local responsibility for ensuring a safe and vibrant school community.

2.5 The independent review team commenced its work on 17 June 2019.

2.6 The underlying principles that we applied in our work were as follows:

- Independence – we recognise that while the aim of this work is to reassure – and we agree that as an aspiration - this will only be possible if evidence supports that
- Openness to hear representations from as many as possible and assess evidence, though that was time limited
- Transparency (through our website and dedicated email, committing that we will publish everything we can)

2.7 It is important to record a number of matters relevant to our work, flowing from these principles that, firstly, the distinction between a review and an inquiry is an important one and is more than semantics.

2.8 We are aware that some with an interest are keen that the circumstances here warrant a full inquiry of some nature. Although the carrying out of a review was partly driven by timings, we should record that we have operated in an inquisitorial manner rather than an adversarial manner, which a full inquiry often entails.

2.9 There can be advantages to a full inquiry, in the right circumstances, but – as we hope is clear from our conclusions – the restoring of trust in the professionalism

and integrity of public officials is a key aspiration for us from our work. This is not a decision for us but we have some doubts that this particular aspiration would be helped by the creating of a potentially adversarial environment of competing theories and hostile cross-examination of them.

2.10 Secondly, we have endeavoured to counter concerns about proceeding by way of a review in a number of ways.

- **Openness** – we established a dedicated website for the Review and established a dedicated email address to which we invited representations of any nature from persons with an interest. While some of what we received to that email address has a wider public interest, our general approach has been not to make such representations publicly available (especially where disclosing personal details or potentially sensitive personal information such as medical matters).
- **Openness** – aside from that, our principal approach has been that all material sent to us by relevant public bodies in response to our request for information should be publicly available. Much of this is publicly available already or can be secured under Freedom of Information legislation, but by hosting this on the Review website (all the key documents which underpin our Report) or making it available through the review team on request, this will allow those with an interest to examine in time the evidence and information provided. Our website contains all the technical information we collated ourselves as part of our Review (being all the key documents which underpin our Report).
- **Openness** – conscious of the potentially difficult position of staff in either school as employees of North Lanarkshire Council, but equally that we in the Review are not in an employment relationship with them, we sought assurances from North Lanarkshire Council that any representations to us from staff would be treated as if they were protected disclosures (under whistleblowing legislation).
- **Transparency and respect** – in acknowledging the scale of the information submitted to us (and our differing skills sets), we each focussed on different aspects of our work. This specifically meant that Dr Hannah did and Paul Cackette did not secure authorisation and access to any personal medical records covered by patient confidentiality. Only Dr Hannah could consider that information and has appropriate training and experience in handling medically confidential materials.

What we did

2.11 There were a number of routes the review team took to provide this further reassurance and they undertook the following tasks:

- obtained relevant background and current evidence from agencies who were involved to review key decisions, ground preparations, building processes, water quality and responses to health concerns.
- invited the public, and in particular, parents, staff, unions and others to write in with their concerns to the review team by email.
- met groups of parents, staff and pupils (including union representatives, parent councils and a parent action group) to hear their concerns directly.

- liaised with staff from North Lanarkshire Council and NHS Lanarkshire to generate a better understanding of their actions and, where relevant, return to them for additional information.
- reviewed information already in the public domain from media, social media and from the public agencies.
- commissioned expert assessments to verify previous testing and provide an up-to-date picture of the situation on the ground.
- consider all these aspects in the round with a group of independent expert advisors to draw out conclusions and recommendations.

Other Concerns

2.12 Entirely understandably, there were placed before us suggestions of other matters to pursue, some of which related to worries about discoloured ground water in the area and concerns about visible materials and equipment that seemed like remnants from a past industrial use.

2.13 It seemed to us that the issues raised related to concerns wider than the current site and we were accordingly unable in the course of our work to address or consider these.

2.14 Where we have had concerns raised with us about relevant issues but outside of the campus site, we have referred them to the appropriate agency to be addressed. Our expectation of course is that such agencies will address them with full rigour, professionalism and respect and we in addition expect that regard will be had to this Report in so doing.

2.15 Echoing what we say above about operational matters remaining principally for the responsible organisations, we would encourage members of the public still concerned to contact environmental health officials if concerned about such matters.

CHAPTER THREE – OVERVIEW OF EVENTS

Timeline of events

3.1 With assistance from North Lanarkshire Council and NHS Lanarkshire, we compiled a timeline of events which we found helpful in contextualising events and is attached to this report. A summary of this timeline around the planning decision, the issues with blue water, the health concerns and public communications is presented here to provide an overview of events.

Summary of events around planning decision

3.2 The new Buchanan and St Ambrose High Schools along with the Townhead Community Centre were built on a brownfield site in Coatbridge, Lanarkshire and opened in November 2012.

3.3 This development was proceeded with following a generally accepted recognition that the previous location of St Ambrose High School was no longer fit for purpose. This led the local education authority North Lanarkshire Council to consider options for an alternative site at which to locate that school and the then Drumpark Additional Support Needs school. A range of options were considered, leading to the identification of the current site as the preferred location.

3.4 This required North Lanarkshire Council to go through a series of processes leading to the building of the schools of which the making, consideration and granting of a planning application and the entering into of a construction contract with Balfour Beatty are of relevance to this Review.

3.5 The planning application was for the erection of a secondary school, additional support needs secondary school, community facilities, playing fields, associated road access and parking site. The site is located at Drumpellier Country Park in the greenbelt. It comprises a 14 hectare site on the north east edge of the park, which extends to approximately 222 hectares. The site is bounded by Townhead Road and housing to the north, the park to the south and west, and a community centre and pavilion to the east on Mosshead Road. The school building is set back from Townhead Road. It covers approximately 20% of the site, with the remaining area comprising six sports pitches, landscaping, roads and car parking.

3.6 Preliminary work was undertaken in 2006 ahead of the planning application and included assessment of the risk of ground and water contamination. The area of ground concerned had at that time been grassed over and was in use as public open space for playing fields, dog walking and the like. However such assessments were matters of particular importance because of its previous use for landfill purposes up until 1972.

3.7 Necessary planning processes (including environmental health assessments, the mitigation work and building design) were gone through and North Lanarkshire Council agreed to grant planning permission, subject to conditions, following a report by officials on 15 April 2010, with permission granted on 9 June 2010.

3.8 The schools were then built by Balfour Beatty and opened to pupils on 5 November 2012.

Summary of events around blue water concerns

3.9 From the written evidence we reviewed, the first report of a problem with blue water was noted on 7 October 2013. There were a number of times subsequently when concerns were raised and samples taken but details of results are unavailable. These problems occurred in 2014, 2015 and 2016 with a recommendation to flush water through the taps until it ran clear. Running water through the taps only provided a temporary solution so the decision was taken to replace pipework in the most affected area of the schools.

3.10 However, the problem persisted. Further reports of concerns around discolouration of the water are noted in 2018 and further steps were taken to improve the plumbing in the building and provide an alternative source of drinking water. The issue was escalated to senior management in North Lanarkshire Council who ordered the replacement of the copper pipes in the school to eradicate the problem. Alternative sources of drinking water were supplied to the schools and a decision made to replace 1800 metres of internal pipework in the schools which, apart from the mains pipe supply in the schools, was completed over the Christmas holidays. Samples subsequent to pipe replacement were reported within tolerance levels in January 2019 and were therefore compliant with drinking water standards.

Summary of events around health concerns

3.11 In November 2018, NHS Lanarkshire public health department received an email from a GP about a patient with bladder cancer. The patient reported that four other members of staff in their school had bladder cancer and they had concern this might be linked to the “blue water” which had been a problem for some years. NHS Lanarkshire public health department led an investigation into possible health risks associated with the campus in several phases – first to confirm reports of blue tinge to water and determine cause, any associated health risk, and went on to assess copper in drinking water as a possible cause of the cancer (it was found not to be carcinogenic), then to investigate the cases with the possibility there might be another reason for the cluster. Their conclusion was the cluster was “what could be deemed the norm in a cross section of the population of a similar demographic to that of the school teaching population”.

3.12 In March 2019, NHS Lanarkshire were asked for advice from a local GP regarding a pupil at Buchanan High School who was being investigated for sight loss and had a single positive test for arsenic in his urine. There was a concern this could be linked with the school. An in-depth investigation of this pupil and another, from St Ambrose, found no link between these test results and a health risk from attending the school.

Summary of public communications

3.13 North Lanarkshire Council wrote to parents and staff in November 2018 summarising the situation regarding blue water.¹ In December 2018, concerns about “blue water” at the school were first published in the media. In February 2019, results of water sampling tests undertaken in November 2018 which revealed copper levels to be higher than permitted levels in two areas in the school were published in the media.

3.14 In May 2019, the Council issued a question and answer booklet to parents and staff providing more information.² Public concern grew with publication of a media story which claimed a link between the apparent cancer cluster and the school and in the same article raised the concern from the mother of the pupil with sight loss about his positive test for arsenic. The newspaper raised a question whether this was also linked with the school.

3.15 MSPs in the local area were closely involved too in developing events, reflecting local concerns. The issue was raised in the Scottish Parliament. Some saw a wider read across to other developments that may or may not have been helpful. We come back to the role of local elected representatives in providing leadership in assisting the resolution of issues of contention at paragraphs 10.15 to 10.27.

3.16 Alarmed by these developments, local politicians began asking further questions of the public agencies and government. A public meeting was arranged for 6 June 2019 when representatives from North Lanarkshire Council and NHS Lanarkshire were present to explain their investigations and how they drew their conclusions that the school was considered safe. Later that month, a leaflet summarising this information was prepared and distributed to parents, pupils and staff and was posted on North Lanarkshire Council's website.³ Letters were sent to GPs and other clinicians in Lanarkshire and the Greater Glasgow and Clyde areas⁴ summarising the situation and recommending they assessed patients with links to the school in the usual way, referring for further investigation if clinically indicated.

Summary of concerns raised through the review process

3.17 In addition to the timeline of events described above, the review undertook more evidence gathering through emails, meetings and further testing, guided by expert advice. In this overview, we summarise the main issues which were raised with us.

Email responses

3.18 As of 2 August 2019, the review team had received 443 emails from members of the public. 118 (26%) of responses were fully supportive of the review being undertaken and/or expressed appreciation for the schools and how they had handled the issue. The remaining responses expressed a range of concerns and worry for the school and the future education and health of their children, or for staff. This concern was revealed by 210 (47%) responses requesting tests for pupils and staff, for the site or for both. 60 (13%) emails were received from people conveying specific health concerns or who had lots of questions regarding their concerns over the safety of pupils and staff at the school - these concerns were received mainly parental concerns about their children's health, most commonly headaches, fatigue, nausea and nosebleeds. 18 (4%) emails were from staff members who emailed to provide background information, raise questions and describe how the situation had affected them. 15 (3%) emails were from parents who had either removed their child from the school or who wanted the school closed with immediate effect until the review was complete and reassured that the school site was safe. 13 (3%) emails indicated support for how well the school and council had handled the situation and expressed a view that the school was safe. The remaining 9 (2%) emails were a

mixture of replies to the public from review team and emails from the public looking for specific answers to their questions regarding the review.

3.19 More detailed responses were also received from teachers' unions,^{5,6} Professor Andrew Watterson of Stirling University⁷ and Ian Tasker at Scottish Hazards.⁸ These provided well-structured and detailed information on staff concerns, useful questions which we used to shape the investigations we undertook and a survey of pupils' symptoms which described a very similar pattern of health concerns as those we received through emails, providing us with confidence that our evidence gathering whilst not formalised research was sufficiently open to capture the main issues.

3.20 The automated email response⁹ included a note that any health issues should be followed up in the usual way, through local GPs. The list of health complaints raised by individuals in their emails was anonymised, tabulated and sent to NHS Lanarkshire and Health Protection Scotland for comment.

Face to face meetings

3.21 Face to face meetings took place in Coatbridge on 25 June and 27 June with around 50 parents, staff, unions and pupils from the two schools. These were held in confidence in order to allow attendees to be frank with us about their feelings, with notes taken for the review team but no formal minutes. On each day, we held an open drop-in session for those not attending other sessions.

3.22 We found these meetings to be immensely useful in deepening our understanding of the concerns, but also of the genuineness and the depth both of concern and support from a wide range of members of the community for the schools. It helped us gain a much better understanding of the ethos, culture, achievements and pride in these two school communities.

3.23 We were especially impressed by the eloquence, maturity, honesty and passion of the pupils who we met. They are a credit to the school communities concerned.

3.24 We realise that we could not speak to everyone and hear every voice. But we heard very different insights into, and very different perspectives of, the challenges facing the schools. We are satisfied that what we heard was fairly representative of the feelings of the community. It was important that we did so.

3.25 Many of the concerns were similar across the groups of people we met and can be summarised as follows:

- The blue water issue has been going on for a long time and despite reassurances from North Lanarkshire Council is still not properly sorted.
- Information put out by North Lanarkshire Council and NHS whilst helpful for many, raised more questions than answers for others.
- Media stories have been aggravating people's anxieties.
- Social media stories go unchallenged because some people who raised questions felt silenced.
- Many parents and staff were unaware the school was built on an old landfill site.

- There were reports that the methane gas alarm had been triggered but no evacuation of the building took place and indeed it seemed that there were no arrangements to do so.
- Settlement of the ground on the site has been noticeable and worrying. There are areas where the tarmac is cracking and doorways are needing repair because of bulging and caving of the earth underneath. There was concern this movement of the ground could release noxious substances and cause damage to the gas membrane.
- Bad odours emitting from certain areas of the school were reported.
- Water from some taps reported to have “black bits”.
- Class numbers declined rapidly at St Ambrose High School as the situation ran on and Buchanan High School closed 9 days early because of staff action. This had a significant emotional impact on pupils and staff and was a concern for parents because they could see how this was affecting their children’s education.
- Many parents, pupils and staff had mixed feelings about continuing to attend school when so many classmates were absent. Going through a picket line when staff were on strike felt particularly stressful.
- People wanted their schools re-opened but only if it was safe to do so.
- Many were not reassured by the information given to them and were particularly upset that the representative of North Lanarkshire Council reported at the public meeting that they had first been informed of the problem with blue water in 2017, when it had been much earlier than this.
- The situation around the blue water had dragged on for far too long.
- Parents want their children tested to provide reassurance they have not been exposed to harmful substances. They were angry and frustrated because they were being told that GPs were refusing to test on the instructions of NHS Lanarkshire.
- There was a worry expressed about the future for the two schools and the Townhead Community Centre which is also located on the site and for people’s longer term health from ingesting the water over years.
- Parents of younger children about to enter high school were wondering what school uniform to buy.
- Some asked what contingency plans were in place if the schools remained shut and wanted to know how they were going to be kept informed over the summer holidays.

3.26 Many of these concerns concurred with emails received by the review team which encouraged us to feel we had captured the main issues to address in our further investigations. A few provided further specific details about the location of bad odours, water supplies and ground issues which provided more detail to the testing and investigations which were subsequently undertaken. The overwhelming impression we were left with after these meetings was the feeling of heartache and stress for some parents, pupils, staff and the wider community generated by fear, uncertainty and, for some, a distrust in the explanations they were being given.

CHAPTER FOUR – HISTORY OF SITE DEVELOPMENT

4.1 This chapter provides an overview of the previous use of the site, options which were discussed for the new school buildings, the site risk assessment, the planning application, remediation steps and key decisions which led to the schools and community centre being built on this particular site.

Site history

4.2 The known history of the site is important. Although it was suggested to us that its use for landfill purposes pre-dated 1945, the general consensus reflected in the papers seen by us on the site history is as follows.

“This summary of the site history has been compiled using the available Ground Investigation Reports (URS, 2006; 2008). According to this information, the site remained in use as rough pasture in a mining area with a railway crossing the north of the site and the eastern site boundary and coal pits to the northeast and southeast of the site until the 1890s when the railway in the north was dismantled and a mineral railway was constructed across the southern area of the site.

“By 1912 a reservoir was present to the southeast of the site boundary and 2No. tanks were located northeast of the site. Residential developments were constructed to the north of the site by the 1930s and the railway was dismantled.

“The site was then used as a landfill from 1945-1972. Information obtained from North Lanarkshire Council indicate that Townhead Landfill received an estimated half million tonnes of domestic refuse from Coatbridge and 77,000 gallons of wet sewage and unspecified residue from Gartsherrie Steel Works were disposed of annually for an unknown period of time. By the 1990s the site was in use as playing fields following remodelling and has remained so up to the present day. No further details are available regarding the capping of the landfill and development of the playing fields.” (Ramboll Report Ground Contamination Risk Assessment Report February 2010, Section 2.2¹⁰).

4.3 On our website is a reference site plan of former landfill use compared to the school site.

Site Selection

4.4 As early as May 2006 it had been recognised that the then sites of St Ambrose High School and Drumpark Special Needs School were no longer fit for purpose and the rebuilding was authorised by North Lanarkshire Council in November 2006.

4.5 In consequence, three options were developed, of which the site ultimately built upon was identified along with one at Blair Road and the possibility of remaining on a pre-existing site.

4.6 These were consulted on and were subject to a Planning and Access Statement and the matter of which option to pursue was presented to the Learning

and Leisure Services Committee of North Lanarkshire Council pursuant to that consultation on 17 December 2007.¹¹

4.7 The report to that committee summarised the representations for and against the Townhead Road site, setting out a strong – though by no means universal - support for that site.

4.8 The site had some drawbacks, flagged up in the report, including a petition raising issues about:

- the safety of the site, given that it was previously a landfill site and uncertainties about the underground conditions
- the loss of the community playing fields and open space
- the safety of Townhead Road because of heavy traffic
- the relocation of the community centre

4.9 Equally though there were advantages to the Townhead site over other alternatives, including, as the then head teacher at St Ambrose (and a range of others including pupils and the parent council) noted, educational and safety advantages.

4.10 Noting strong local representations against, officials recommended the Townhead site, saying:

“The recommendation of Learning and Leisure Services is that the new St Ambrose High School/Drumpellier Additional Support Needs secondary campus should be located on the Townhead Road site on the basis that it best meets the educational requirements. It is also considered that the concerns expressed about the site are either not justified or can be addressed.”

4.11 The committee agreed the recommendation on 18 December 2007.

4.12 Based on the information provided in relation to site selection, we note the consultation and factors taken into account and conclude that the selection of the Townhead Road site was within the range of options reasonably available and open to North Lanarkshire Council at that time.

Site Risk Assessment

4.13 In consequence of that decision, when North Lanarkshire Council were considering utilisation of the site as an option for the school campus, it was known that the site had a former use as landfill and work, which had been started before, was further commissioned to ascertain whether contaminated material was present and if so, to manage risks associated with it.

4.14 This looked at risks of methane gas presence and other matters of ground and water contamination.

4.15 For ground contamination, this comprised work (with associated reports) by Ramboll, URS, WSP and Balfour Beatty in a period from November 2006 to 2009.

4.16 For the reasons set out below, we separate out findings from these same reports concerning ground gas from soil and water contaminants.

4.17 We have considered the history of this work and key themes from the reports commissioned.

Preliminary Risk Assessment

4.18 A desk study was undertaken by URS in 2005 and an interim and then final report based on site investigation was produced by URS in November 2006¹² setting out their conclusion that the risks to human health were low. This work was peer reviewed by WSP (in letter of 17 November 2008¹³) and the Environmental Services Department of North Lanarkshire Council. On the latter, we noted North Lanarkshire Council were content with the work done by WSP (report of 18 November 2008¹⁴).

Ground Water Risk Assessment

4.19 For ground water contamination, this comprised work (with testing data) by Ramboll, based on their Risk Assessment of the Water Environment¹⁵ produced on behalf of Balfour Beatty in September 2010.

4.20 That report looked at geology, hydrogeology and hydrology; made a groundwater risk assessment; and tested for elevated levels of metals, phenols, polycyclic aromatic hydrocarbons, ammonia and manganese.

4.21 In all those respects, the conclusions were that risks to human health were either very low or low. The main risks were in relation to the underlying aquifer from elevated levels of ammonia and manganese.

4.22 In those regards, the report notes as follows:

“Elevated concentrations of ammonia and manganese are reported across the site within the shallow groundwater, which are considered to be a result of the reduction of nitrate within the landfill material, industrial activities in the surrounding area and the peat, which is considered likely to be creating a naturally reducing environment on site causing liberation of manganese and ammonia into solution. Elevated concentrations of ammonia and manganese are also reported within the deeper aquifer and are considered to be a result of general hydrogeological conditions in the surrounding area and former mining activities.

“Risks to the underlying aquifer from ammonia and manganese concentrations recorded in the deep groundwater on site are considered MODERATE. However, the risk is attributable to natural processes and former mining activities occurring on site and in the surrounding area as detailed. Therefore the risks to the underlying aquifer from site derived ammonia and manganese is considered to be LOW when the general quality of the deep groundwater in the vicinity of the site is also considered.”

4.23 The report sets out in detail the work done and how the risks were assessed and at paragraph 8.1 concluded-

“Following the assessment of significant pollution, key pollutant linkages are considered to be:

- Elevated concentrations of ammonia and manganese across the site within the shallow groundwater, which are considered to be a result of the reduction of nitrate within the landfill material, industrial activities in the surrounding area and the peat, which is considered likely to be creating a naturally reducing environment on site causing liberation of manganese and ammonia into solution; and
- Elevated concentrations of ammonia and manganese across the site within the deeper aquifer are considered to be a result of general hydrogeological conditions in the surrounding area and former mining activities.

The elevated concentrations of ammonia and manganese in the bedrock aquifer across the site are considered to be a result of natural processes and former mining activities on site. The risks to the bedrock aquifer from site derived ammonia and manganese are therefore considered to be low. These contaminants are therefore not considered to represent significant risk to the Water Environment in light of the proposed development.”

4.24 Further analysis was recommended within certain specific areas of proposed soakaways.

4.25 SEPA in their letter of 18 January 2010 (which should read 2011)¹⁶ questioned Ramboll’s conclusion of regional contamination and the conclusion of low risk from ammonia and Manganese. On that basis they recommended that “A qualitative risk assessment should be used to demonstrate that the sources of contamination on site do not result in significant pollution of the water environment at an appropriate pollution assessment point. Failing this we would recommend that some form of remedial action is taken”.

4.26 In their letter of 15 August 2011¹⁷, SEPA noted the risk of contaminant leaching and migration by groundwater flow through and recommended ongoing monitoring of groundwater requirements and contaminant concentrations.

4.27 On 11 October, SEPA referenced uncertainty whether the contaminant contribution from existing landfill might result in significant pollution. That issue was addressed in the Ramboll Additional Risk Assessment of the Water Environment Report¹⁸ of 19 February 2014.

4.28 SEPA and North Lanarkshire Council have confirmed to us that these further recommendations were acted upon and we have no reason to doubt that this was done. In the time available, we have not been able to identify documentary evidence establishing the response to the points at paragraphs 4.25 and 4.26 for the record. We can imply these issues were resolved in a way that was satisfactory by the absence of enforcement steps by SEPA (see their letter of January 2011). In any

event, these issues were not about remedial work in terms of planning condition 17. We do not make a recommendation in this regard.

Human Health Risk Assessment

4.29 URS were appointed by Balfour Beatty to carry out a geo-environmental report in October 2008. A review of this report and the subsequent Ground Contamination Risk Assessment Report produced by Ramboll UK for Balfour Beatty, was undertaken by WSP on behalf of North Lanarkshire Council in 2009, during which a number of concerns were raised in their letter of 14 December 2009¹⁹ including potential risks to human health from benzo-a-pyrene, benzo-a-anthracene and nickel identified as potential contaminants of concern. Additional investigation works were therefore designed by Ramboll UK and undertaken by Geotechnics Ltd.

Generic Qualitative Risk Assessment

4.30 In October 2009, a full Generic Qualitative Risk Assessment (GQRA) was undertaken for the proposed St Ambrose School by Ramboll UK for Balfour Beatty (November, 2009)²⁰.

4.31 The aims of the GQRA produced in February 2010²¹ (paragraph 1.2) were “to assess further the potential risks to human health from benzo-a-pyrene, benzo-a-anthracene and nickel identified as potential contaminants of concern and to provide recommendations regarding the suitability of the site for the proposed school development with respect to these three contaminants. In addition recommendations will be provided regarding the suitability of material to be reused on site during site re-profiling works.”

4.32 The GQRA set out in considerable detail the model, risks, pathways and relevant groups of people likely to be on site (with receptor exposure characteristics. It identified potential pollutants giving rise to low or moderate risks to human health. Some of these derived from elevated concentrations of lead and nickel which were identified in localised areas of landfill and topsoil material on site. The risks arose as these materials were at depths proposed to be excavated as part of the cut and fill works.

4.33 They recommended that a suitably qualified environmental consultant went on site during the enabling works to ensure that should any areas of apparent contamination be exposed, the material was excavated, stockpiled separately onsite and subjected to validation testing in order to ensure the material was suitable for use. Allowances were also recommended for the removal, treatment and disposal of shallow groundwater should de-watering be required during excavation.

4.34 An Environmental Specification Report was recommended to ensure the Contractor was undertaking all enabling works in accordance with the recommendations made in this report. A Validation Report was also required to demonstrate that the enabling works were carried out according to the Environmental Specification.

4.35 The works recommended to be completed to achieve the aims of the GQRA were:

- Develop site specific conceptual model for the proposed school
- Complete detailed risk assessment modelling for risks to human health from contaminants identified in the GQRA report and provide site specific assessment criteria for the contaminants of concern
- Review site data using the site specific assessment criteria to determine suitability of material for proposed site development
- Provide recommendations regarding suitability of the site for its proposed use and recommendations for material management during site works

4.36 Paragraph 5.2 of that report sets out conclusions.

Site Specific Risk Assessment

4.37 Under reference to the reasonable worst case exposure model has calculated site specific assessment criteria (SSAC) as detailed in Table 4.14 of the report, Balfour Beatty (stating there “None of the representative site concentrations or identified hotspot concentrations exceed the SSAC. Based on the available data it is therefore considered unlikely that the material at the St Ambrose site will pose a significant risk to human health if the site is developed as a school as per current proposals”) conclude:

“None of the representative site concentrations of benzo(a)pyrene, benzo(a)anthracene or hotspot concentrations of nickel from the St. Ambrose site exceed these SSAC. This suggests that, based on the assumptions made in the development of the conceptual site model and existing chemical data reported; the St. Ambrose site would be suitable for use as a school with community facilities to be used by the general public within the context of the scenarios modelled. The SSAC developed are considered suitable for all uses and areas of the site thus there will be no specific material management precautions required with regards to benzo(a)pyrene, benzo(a)anthracene or nickel.

“However, the recommendations made in the Generic Qualitative Risk Assessment (RUK, 2010) should also be adhered to in order to ensure any residual risks to human health are mitigated. These recommendations include:

1. Limited remediation (e.g. excavation and disposal of localised areas of elevated inorganic contaminants should further validation testing prove these materials are unsuitable for reuse);
2. Incorporation of specific design measures (e.g. gas protection measures to mitigate risks posed by ground gases); and
3. Risk management during development (e.g. development of an environmental specification and a watching brief during development to validate conformance to the environmental specification).”

4.38 These conclusions formed the basis of advice considered by officials as part of consideration of the planning application.

Reflections of Review on Site Risk Assessment

4.39 We consider that the detailed and careful steps taken in assessing the risks of ground contamination (and related work concerning risks of water contamination) were reasonable, appropriate and proportionate to the risks arising at the relevant time. They represent a suitably precautionary approach, mindful of the intended use of the site.

4.40 The work was peer reviewed in an appropriate manner.

4.41 This was done both by WSP (in letter of 12 November 2008) and through the work of the Environmental Services Department of North Lanarkshire Council. On the latter, we noted North Lanarkshire Council were content with the work done by WSP (report of 18 November 2008).

Planning application

4.42 An application for planning permission was made which sought permission for the erection of a joint community-use school campus on land at Drumpellier Country Park, off Townhead Road, Coatbridge (Planning Consent 09/00818/FUL).

4.43 A report to the North Lanarkshire Council Planning Committee was submitted on 26 March 2010²², setting out a range of matters.

4.44 It described the site and the context of the application. It set out a list of objectors and responses to consultation on the application and narrated the existence of a range of additional supportive material prepared by North Lanarkshire Council. We note that a decision was made by North Lanarkshire Council that this application was not one to which the Environmental Impact (EIA) Regulations applied and so it concluded that no EIA was required (letter dated 23 July 2009²³).

4.45 Under a section headed site history, it stated:

“There is no planning history relevant to this application. It is noted that the site was utilised for landfill from 1945 – 1972.”

4.46 It noted a range of consultations with statutory bodies including SEPA where it noted:

“SEPA have no objection to the application. Comments are given in respect to drainage and a condition is required to ensure appropriate drainage systems are utilised. As SUDS [sustainable drainage systems] are to be used, the condition is also required to ensure adequate protection is afforded to the local water environment (including ground water and watercourses). The same applies for any stabilisation works and contamination issues. General comment is given in respect to flood risk information.”

4.47 It noted a range of heads of objection to the application including:
“k) Concerns over site contamination and former landfill.”

4.48 Paragraph 9.8 of the report addressed the history of previous use as landfill, saying:

“Policy CU/1 (Safety Restraint Areas) reflects the site’s former use as a landfill site. This aims to ensure that any development is safeguarded from landfill gas. Detailed site investigations have been submitted and assessed as part of the application. Following on-going investigation into this matter and general site investigation requirements it has been concluded that there are no landfill gas or site contamination implications that would prevent planning permission from being approved. Subject to conditions to ensure appropriate remediation and mitigation, both Protective Services and SEPA have no objection to the application. Conditions are therefore recommended ensuring that all these matters may be finalised.”

4.49 After setting out a range of material planning considerations, the report at paragraph 9.20 in a section addresses objections stated regarding past landfill usage. The key objections were:

“k) The proposed site is unsuitable as it is heavily contaminated, generates methane gas and is on the site of a former landfill. The reports carried out are not conclusive to demonstrate that the site can be safeguarded from contamination both in respect to the final use and due to construction and remediation works for contaminated material. Concern is expressed regarding the potential impact on human health (residents and future users of the site), ground water and nearby lochs. A recent High Court ruling concerning Corby Borough Council is cited.

l) The cost of remediation will render the school undeliverable.

m) There are mineshafts on the site. The costs of site remediation are such that the final facility will be negatively impacted, become third rate and contrary to the aims of best value.”

4.50 By way of comment North Lanarkshire Council stated: “Refer to paragraph 9.8. The cost of remediation is not material to planning assessment of the wider proposals.”

4.51 This current review notes the recommendation that to address these points, appropriate conditions would be required namely:

“16. That BEFORE any works of any description start on the application site, unless otherwise agreed in writing with the Planning Authority, a consolidated site investigation report shall be submitted to and for the approval of the said Authority. The investigation must be carried out in accordance with current best practice advice, such as BS 10175: 'The Investigation of Potentially Contaminated Sites' or CLR 11. The report must include a site specific risk assessment of all relevant pollution linkages and a conceptual site model. Depending on the results of the investigation, a detailed Remediation Strategy may be required.

Reason: To ensure the suitability of the site for the proposed development.

17. That any remediation works identified by the site investigation report requires in term of condition 16 shall be carried out to the satisfaction of the Planning Authority. A certificate (signed by a Chartered Environmental Engineer) shall be submitted to the Planning Authority, prior to the completion of the development, confirming that any remedial works have been carried out in accordance with the terms of the Remediation Strategy.

Reason: To ensure the suitability of the site for the proposed development.”

4.52 The report concluded:

“In conclusion and drawing all these factors together, it is considered that despite being located in the Green Belt and on protected space (forming part of the wider Drumpellier Country Park) and therefore being technically contrary to the Local Plan, in this instance there are material considerations that merit a departure from policy. The proposal can be justified in terms of a specific locational need, continues and improves upon existing sports provision currently within the site and has significant community benefits due to the quality of the school and dual community use. It is also considered that this can be achieved without undue adverse impact on the Green Belt, the wider Country Park or surrounding residential area. As such it is recommended that planning permission be approved subject to conditions. It is noted that as this application is significantly contrary to the Development Plan and the Council has an interest, it must be notified to Scottish Ministers. It is also noted that a request for a site visit and hearing has been received.”

4.53 That report and recommendation to grant planning permission, subject to conditions, was agreed on 15 April 2010.

4.54 After that report and as narrated in its conclusion, the application was notified to Ministers on 11 May 2010 and was considered by Scottish Ministers for call-in and determination by them. However, Ministers did not do so and referred the matter back to North Lanarkshire Council to decide.

4.55 The reason the application was notified to Ministers was because North Lanarkshire Council had an interest in the proposal and because it was considered to be significantly contrary to the development plan.

4.56 An assessment was made by Scottish Government officials that primarily looked at whether North Lanarkshire Council’s decision to grant planning permission for the school had potentially been influenced by a conflict of interest.

4.57 They were satisfied that North Lanarkshire Council had given due consideration to all material factors and that the council’s interests as applicant and landowner had not influenced the decision to grant consent. As a result, on 9 June 2010, Ministers cleared the application back to North Lanarkshire Council to determine.

4.58 We note that although the application wasn't notified to Ministers for environmental reasons in 2010, the Scottish Government assessment report²⁴ acknowledged that the site's former use as a landfill site had been assessed by North Lanarkshire Council who concluded that following detailed site investigations 'there are no landfill gas or site contamination implications that would prevent planning permission from being approved'. The assessment report also acknowledges that SEPA had not objected to the application.

4.59 As noted above, North Lanarkshire Council finally granted planning permission on 9 June 2010.

4.60 The planning consent was amended through an application in 2011 for an alternative junction off Townhead Road for the vehicle access into the development site. The planning consent included a roundabout junction off Townhead Road for vehicular access into the development site. The amendment proposal would require an alteration to the sports pitch layout. This was subsequently granted on the imposition of the same remedial conditions on contamination as the main campus consent.

4.61 No contrary agreement relating to works starting was made and subject to condition 16 being complied with (see below), construction was able to commence.

Remediation steps in implementation of conditions 16 and 17

4.62 In September 2012, Ramboll produced an Environmental and Remediation Evaluation Report,²⁵ setting out in detail at section 4 the steps taken by them in this regard in fulfilment of the remediation requirements as part of the planning consent.

4.63 Reference is made to paragraph 4.4:

"Given the previous use of the site as a landfill, there was the potential to encounter localised pockets of contaminated material during the earthworks. A strategy was put into place in the environmental specification in order to manage potential risks associated with this material, should it be encountered.

"The only potentially contaminated material encountered during the earthworks was areas of asbestos containing materials. Further details regarding this material are provided in Section 4.6 below.

"Following the Ground Contamination Risk Assessment Report and Detailed Qualitative Risk Assessment Report (Ramboll, 2010) a number of hotspots of lead were encountered in the area of the pitches, north of the site, one hotspot of lead was encountered beneath the building footprint and in supplementary investigation as part of the site works one hotspot of lead was also encountered in the area of car parking north of the building (as illustrated on drawing 7764/E/010).

"In the Environmental Specification Report (Ramboll, 2010) recommendations were made to ensure that during excavation works in these areas, additional

testing should be undertaken to ensure the material is suitable for reuse on site.”

4.64 The report concluded that:

“Based on the information provided to Ramboll, it is considered that the mitigation measures proposed in the Risk Management Strategy as part of the Ground Contamination Risk Assessment Report (Ramboll, 2010) and Environmental Specification (Ramboll, 2010) have been adequately complied with in regards to mitigation of potential risks to Human Health.

The Conceptual Site Model (CSM) for Human Health has been updated following the Development to illustrate that the site does not present any residual significant risks to Human Health.”

4.65 WSP further peer reviewed the work concerned in terms of their letter of 6 December 2012.²⁶

4.66 That further review noted the range of steps taken to address the identified lead hotspots and areas of asbestos containing materials, in order to eliminate any residual significant risk to human health. That included use of additional topsoil and removal of the ground material in the vicinity of asbestos sheeting. It noted that 9,330kg of contaminated material was indicated as having been removed from the site.

4.67 Subject to relatively minor comments, WSP concluded that the information provided was generally reasonable and “appear to have provided a reasonable level of mitigation relative to potential gas and human health risks at the site”. Those minor points were closed off, as set out in detail in the WSP Peer Review Follow-Up.²⁷

Reflections on Planning Processes by Review

4.68 Having reviewed the planning processes undertaken by North Lanarkshire Council, we are satisfied that they were thorough and rigorous and set out a range of planning options and decisions that were reasonable for elected members of North Lanarkshire Council to consider and take as the local planning authority.

4.69 It was drawn to our attention that concerns about the former use for landfill had been mentioned as raised at the time of the planning application.

4.70 We find that this is correct. It was right and proper that objectors and others had raised concerns of this nature.

4.71 However, as seems clear from the extensive remedial work commissioned and imposed as a condition, it was clear that North Lanarkshire Council were aware of the site history and took reasonable professional and scientific advice to address concerns in a proportionate and responsible way.

4.72 The report by officials dealt with concerns on past use in a brief way, but from our consideration of the objections drawing attention to past use, we have been unable to identify any concerns which were based on any specific matters other than general – though understandable – anxiety.

4.73 Nothing done or decided appears to us to have been in contravention of Planning Advice Note 33²⁸ or of the Scottish Government’s extensive guidance on contaminated land issued in 2006²⁹ (even though the land was not on the Contaminated Land Register).

4.74 As it is mentioned in the Committee Report (as cited by objectors), we should comment on the decision of the High Court of the case of Claimants appearing on the Register of the Corby Group Litigation and Corby District Council [[2009] EWHC 1944]³⁰.

4.75 Our first comment is that general references to that case are not the same as identifying a specific cause for concern at the current site.

4.76 Secondly, it seems to us that the case and circumstances at Corby are wholly different and of a different order of magnitude from the current site. We consider this to have been adequately clear at the time of the decision in 2010, but is undoubtedly correct, in our view, when read with the conclusions about extent of contamination and level of health risk set out in this Report.

4.77 It seems to us reasonable for North Lanarkshire Council to have recognised the importance of the concerns as noted in the Committee Report – as they did in correspondence – but relied on the professional expert advice received by them.

4.78 As it was raised with us, we comment on the role of SEPA. Though North Lanarkshire Council is the statutory authority and primary regulator for contaminated land, SEPA’s specialist contaminated land unit continued to provide support, advice and assistance to North Lanarkshire Council’s Contaminated Land Officer regarding assessing pollution of the water environment and to the standards of remediation required to protect the water environment from historical contamination sources.

4.79 We do this as we have had our attention drawn to the letter from SEPA of 15 February 2010,³¹ in which a range of detailed questions are posed, in particular in its conclusion about the adequacy of qualitative risk assessments for contaminated sources.

4.80 SEPA had written on 11 September 2009³² confirming they had no objection in principle. That letter recognised their interest in land contamination at paragraph 5.1 in pollution of the water environment arising from any land contamination at the site. Paragraph 5.1 indicated the desirability that “any investigation and remediation works should be at least sufficient to ensure that the site conditions, once developed, would not constitute contaminated land under Part IIA of the Environmental Protection Act 1990”.

4.81 Their letter of 15 February 2010 – as can be seen above – was issued at around the time that such work was being done and was responded to by Ramboll

on 5 March. The report to the Planning Committee of 26 March 2010 (see above) indicates that by then SEPA had no objections.

4.82 It seems to us entirely appropriate for SEPA to test the matters in their letter of 15 February but note that they were content to confirm the absence of objection, at least in principle, by the time that Report was issued (see their letter of 22 February 2010³³). It seems to us that this is an entirely appropriate approach, mindful that appropriate conditions were proposed. SEPA have confirmed that it was satisfied that North Lanarkshire Council, through the land-use planning system, was taking adequate steps as planning authority in respect of environmental aspects of the development. There were planning conditions in relation to protection of the water environment, where SEPA was a statutory consultee.

4.83 We are conscious that engagement with SEPA continued after the granting of permission on a range of matters relevant to their functions, up to 2013.

4.84 As noted above SEPA in January 2011 and August 2011 raised questions about the basis on which the qualitative risk assessment should be used to demonstrate that the sources of contamination on site do not result in significant pollution and noted the risk of contaminant leaching and migration by groundwater flow through and recommended ongoing monitoring of groundwater requirements and contaminant concentrations.

4.85 Although, in the time available, we have not been able to identify all the documentary evidence, we found no evidence to suggest that North Lanarkshire Council had side-lined or inappropriately disregarded views of SEPA or had breached their own planning conditions on these issues.

4.86 We should add, in relation to the decision of North Lanarkshire Council not to treat this application as one requiring an EIA, that this seems to be a reasonable conclusion. The proposed development was not one triggering a mandatory EIA and we recognise that EIAs, in their nature, assess future use not past. It would not normally be expected at a school campus proposal would trigger the need for an EIA. In addition, it is not clear that carrying out an EIA would have led to a different outcome on matters relevant to this Report.

Conclusions

4.87 In summary, we conclude North Lanarkshire Council were aware of the site history and took reasonable professional and scientific advice to address concerns in a proportionate and responsible way. It was known and understood by all concerned – officials and elected members – that this was a brownfield site being brought into productive use.

4.88 The detailed and careful steps taken in assessing the risks of ground contamination (and related work concerning risks of water contamination) were reasonable, appropriate and proportionate to the risks arising at the relevant time. They represent a suitably precautionary approach, mindful of the intended use of the site and that the work was peer reviewed in an appropriate manner.

CHAPTER FIVE - HEALTH ISSUES

5.1 Specific health concerns known about at the time of the review being commissioned were possible links with attending the school and acquiring cancer, specifically bladder cancer and/or the acquisition and impact of elevated blood levels of arsenic, specifically blindness. The issue of blue water is touched on in this section and dealt with in more detail later in Chapter 6.

5.2 Emails, calls and face-to-face meetings undertaken as part of this review also raised health concerns and will be dealt with in this section.

Investigation of a possible link between attending the school and acquiring cancer, specifically bladder cancer

5.3 On 14 November 2018, NHS Lanarkshire were first notified by a local GP of a patient who was diagnosed with bladder cancer reporting that four of their colleagues had also got this cancer within the previous few years. The patient had noted problems with blue water and wondered if there may be a link.

5.4 The public health department investigated the issue of blue water and discovered from North Lanarkshire Council that the issue was due to corrosion in the pipework leading to a build-up of copper in the water. Scottish Water were aware of the situation. The public health team undertook a review of the potential health effects of copper and found “no carcinogenic properties or indeed any significant health effects”.

5.5 Having established there was no link between blue water and the case of bladder cancer, the public health team notified the patient and sought cooperation for further investigation of the possible cluster.

5.6 This process of investigation is in line with standard practice which takes a stepped approach to investigating public concerns about possible health risks.³⁴ The public health team began at stage 1a: A belief that ill health exists in the community and that this is linked to exposure to an environmental agent(s) and the potential source of exposure is identified (e.g. from a specific factory or installation).

5.7 In this case, the potential source of exposure was blue water and this was rejected by finding robust evidence that copper is not carcinogenic.

5.8 In the guidance, there follows a stage 1b. This is as in stage 1a except no specific environmental source is under suspicion. The public health team continued in their investigations with an open mind to assess whether there may be still be a link between these cases of cancer and the school where they worked. Consideration was given to involving North Lanarkshire occupational health services, but given the expertise available within the public health team, the work was undertaken in-house. They collaborated with Health Protection Scotland and a University of Glasgow epidemiologist to investigate further, undertaking a literature review, investigations of the health concerns in more detail with the patients themselves and a review of existing epidemiological data.

5.9 The literature review explored possible links between cancer and landfill sites, latency periods for bladder cancer, occupational sources of bladder cancer and more general papers on investigating cancer clusters.

5.10 The findings from this literature review can be summarised as:

- There is no clear link between landfill sites and bladder cancer. The most relevant paper was from 2002 by Jarup et al³⁵ in the British Journal of Cancer which demonstrated no excess risk of cancers of the bladder in populations living within 2km of almost 10,000 UK landfill sites. The results were similar if analyses were restricted to landfill sites licensed to carry special (hazardous) waste.
- There is a long latency period for developing bladder cancer in studies which have examined this for high risk occupations. Even when the risk of bladder cancer is known to be high, studies provide mean and median periods of latency from exposure to disease of between 15 and 40 years.
- It is highly unusual for a reported cluster of cancer cases to be directly related to an environmental hazard.

5.11 To investigate the health concerns in more detail, a consultant member of the team contacted the original patient with bladder cancer to seek consent to access their medical records. The consultant also requested that the patient relayed a message to colleagues reported to have cancer to get in touch with public health. Three out of the four colleagues did so and consented to have their medical records accessed. They each completed a questionnaire and were subsequently interviewed by a Consultant in Public Health Medicine.

5.12 Of the four members of staff interviewed, three were confirmed to have bladder cancer. The fourth had a different kind of cancer. The cases of bladder cancer were diagnosed between 2015 and 2018. To protect medical confidentiality, it is not possible to go into more details of these interviews in this report. However, the investigation found nothing from the responses provided by the patients which would point to a common exposure to an environmental hazard on the site of the school as the cause of their cancer.

5.13 In June, after these interviews were completed, the fifth member of staff got in touch with the public health department and was interviewed in the same way as the previous four. This person did not have bladder cancer so the underlying conclusions remain unchanged. There were no other responses in the interview which pointed to an environmental hazard at the school causing the patient's cancer.

5.14 The third part of the investigation was a review of existing epidemiological data. This showed that cancer of the bladder is the ninth most common cancer in Scotland with 80-100 cases a year expected in a population the size of Lanarkshire. The strongest risk factors for this type of cancer are exposure to tobacco smoke and age. A small proportion of bladder cancers are associated with specific exposures within certain industries and occupations. Teaching is not considered one of these industries or occupations.

5.15 At this point in the investigation, the public health team set up a Problem Assessment Group meeting (17 April 2019) to discuss the findings with experts from Health Protection Scotland and Glasgow University. They concluded that the cases identified equated to “what could be deemed the norm in a cross section of the population of a similar demographic to the school teaching population”. Having reached this conclusion on the basis of the evidence they reviewed and the systematic approach taken, they concluded no further investigation was warranted (i.e. moving to Stages 2, 3 or 4 in the guidance was not indicated). As such, the Health and Safety Executive was not required to be involved.

5.16 The Consultant in Public Health Medicine who interviewed the patients with cancer sent each of them a letter on 1st May 2019 to explain these conclusions and invited them to contact the department of Public Health if they had any queries.

Reflections on Investigation into cancer clusters

5.17 The UK and Ireland Cancer Registries have published a useful factsheet³⁶ on cancer clusters which was used as one of many sources of guidance by the investigating public health team. It states:

“A cancer cluster occurs when more cases (of the same type or similar types) of cancer than expected are diagnosed in a group of people, geographic area and/or period of time.

“When someone is diagnosed with cancer many people ask “what caused it?” This is especially true if several people they know are affected. Although great progress has been made over recent years into researching cancer risk factors and developing successful treatments, the question “what caused it?” remains very difficult to answer precisely.

“Cancer is a complex disease with many different causes, and the reasons why it affects some people and not others are still poorly understood. Health professionals and researchers do not want to dismiss people’s concerns about cancer clusters but at the same time may be genuinely unable to provide the answers.

“Although most cancer clusters occur by chance, it is not uncommon for people to be concerned that cancer clusters are caused by exposure to a cancer-causing agent in the environment. But real clusters that are proven to be associated with an environmental or occupational carcinogen are extremely rare.

“Even if there are more people with one type of cancer in a community than might be expected, this does not necessarily mean that they were all caused by a cancer-causing agent in the environment.”

5.18 The factsheet uses the example of a “sharpshooter” who fires bullets into the side of a barn and then draws the bullseye around the cluster of shots which look closest together. In the same way, we tend to notice cases first (“bullet holes” and then the fact they are located in the same place (a single school). It goes onto say:

“It is very important to ask questions such as: “If there is something affecting this street, what other neighbouring areas would it also affect?” and “What is the smallest population that should be studied?””

5.19 A further useful contribution this factsheet provides is considering how a random way of spreading dots on a page can end up generating what look like clusters. The underlying pattern is random but putting gridlines around the dots gives them the appearance of clusters. The factsheet notes:

“Even with a very rare disease, there is always a possibility that, just by coincidence, somewhere, sometime, several cases will arise in people who live near one another. This makes it very difficult to distinguish between clusters of diseases that have a common cause and clusters that are due to chance alone.”

Conclusion of the Review about investigation into an apparent cancer cluster

5.20 We conclude that the GP was right to raise the concern when a cluster of cancer cases occurred at Buchanan High and for the public health team to investigate if this was linked to copper in the water supply or an unknown environmental exposure at the school. However, reviewing the evidence set out above, we see no causal link between these three cases of bladder cancer and attending the school. The remaining two members of staff had two different kinds of cancer and no plausible explanation could link all of these together with the school. Bladder cancer is not very rare. There is a real possibility that it can appear as a cluster due to chance alone and once plausible exposures were eliminated, it was reasonable to come to this conclusion.

Attending the school and the acquisition and impact of elevated blood levels of arsenic

5.21 On 8 March 2019, NHS Lanarkshire public health team received a call from a GP asking for advice about a patient who was being investigated for sight loss and had a single positive test for arsenic in his urine (the remit for this review says blood, but the result came from urine). The patient was a first year pupil at Buchanan High School and his mother was concerned that the finding of arsenic in his urine might be due to the school and the cause of her child’s blindness.

5.22 On 30 April, the public health team received a second call about a pupil at St Ambrose High School who had been found to have a single positive test for arsenic in their urine.

5.23 For confidentiality reasons, it is not possible to describe the details around the investigations of these two individuals. The public health team took advice from the National Poisons Service and undertook a structured response to these concerns seeking views of senior clinicians and investigating possible sources of exposure. There is nothing to suggest the children tested positive for arsenic as a consequence of attending school or that these positive tests relate to clinical symptoms.

5.24 By way of further explanation, there are many sources of arsenic which can lead to a positive urine arsenic test: seafood, vegetables, rice, including rice milk and

water from non-mains supplies. The National Poisons Service recommend repeating the test as dietary sources of arsenic may lead to elevated results. Furthermore, if chronic exposure to arsenic or any other heavy metals is being considered as a possible diagnosis, this should be investigated by a specialist and not undertaken by GPs as interpretation of results is difficult. Testing is recommended only if there are symptoms to suggest exposure or there is an identified source of exposure to inorganic arsenic. Sight loss is a rare complication of prolonged or repeated arsenic exposure over many years and could not explain these symptoms in a first year pupil who has had a few weeks of possible exposure to a possible source at a new school. Furthermore there is an alternative clinical explanation for the blindness.

5.25 Some of the worries expressed by parents, pupils and staff may have been generated through the fact that arsenic is carcinogenic and can cause bladder cancer. Hearing about arsenic and bladder cancer at the school in the same media report sounds alarming. Putting this alongside problems with the “blue water”, might imply there is a link. However, arsenic was not detected at elevated levels in the water supply on the school campus. The supply comes from the mains and feeds all the local community around the school campus as well. Later in this report we detail results of soil sampling which show no significant levels of arsenic on the site.

Conclusion of the Review about the investigation into an apparent link between arsenic and blindness

5.26 We conclude that the parent concerned was right to raise a question about the source of arsenic and whether it was the cause of her son’s blindness. We can also say, NHS Lanarkshire’s investigation was thorough and conclusive. There is no causal link between arsenic and the sight loss or other health conditions reported to them in pupils at the two schools. Nor is there a causal link between arsenic exposure and the bladder cancer cases at Buchanan High school.

5.27 These conclusions are important because the public health department had no grounds to investigate further possible exposures in the wider population. There were no specific health conditions to investigate or environmental toxins to test for. They wrote to GPs with their conclusions and advised them not to test proactively but to continue with normal clinical practice: “If you do receive a request to undertake testing, please treat and investigate the patient as you would for any other patient based on their symptoms and signs.”

5.28 A pathway flowchart was provided by the Public Health department for GPs to follow and clinicians were given relevant information and advice to assist clinical decision making. The flowchart enabled further assessment of patients based on clinical presentation. NHS Lanarkshire gave contact details to GPs to allow patients who required additional information to contact Public Health. In the majority of cases the pathway was sufficient to alleviate concerns.

Other health concerns raised through emails to the Review Team

5.29 Out of the emails received by the review team (as at 2 August), there were specific health concerns for 65 pupils and ex-pupils (less than 4% of the total school rolls). There were also concerns from six members of staff and ex-staff which cannot be reported on in detail for confidentiality reasons. The dominant profile for symptoms in pupils and ex-pupils were: headaches, fatigue, stomach cramps, nosebleeds and a small number of other complaints.

5.30 These concerns were very similar to those reported to Scottish Hazards (referenced in paragraph 3.19 above) in the on-line survey to parents that they undertook. Of 220 responses to a question in relation to the symptoms present, most parents responding reported multiple symptoms as outlined in the following table.

Summary of Symptoms from Scottish Hazards Survey

Symptoms	No of responses	percentage of responses
Headaches	192	89
Stomach Cramps	152	50
Nausea	130	48
Abnormal Fatigue	126	46
Joint Pain	81	39
Nose bleeds	57	32
Blurred vision	52	23
Hair loss	19	14

5.31 As with this survey, the emails received from parents to the review group were not drawn from the whole school population and some reported on symptoms in ex-pupils. The review team took the view that the symptoms needed assessing for a possible pattern which was compatible with exposure to an environmental hazard. The symptom profile from the emails received were anonymised and put into table form for NHS Lanarkshire's public health team and Health Protection Scotland to review. The public health team discussed these concerns with a group of experienced local paediatricians who considered the symptom profile to be "neither unusual nor excessive".

5.32 A more detailed analysis comparing this symptom profile with community-based surveys of secondary school aged children was carried out for the Review by Health Protection Scotland.³⁷ The table below sets out a summary of their findings.

“Table 2: Ranking of symptoms reported in community based surveys compared to symptoms reported at Coatbridge Schools.

	Symptom	A. Community symptom surveys – symptom prevalence range	B. Community symptom surveys – average symptom ranking	C. Coatbridge Schools – symptom ranking	D. Difference in rankings between community surveys and school reports (B-C)
		Range of prevalence rates (%) quoted in studies.	Frequency of symptoms – average ranking.	Ranking	Rank in (B) less Rank in (C) (- means lower; + means higher).
1	Headaches	8.1 – 41.1	1	1	0
2	Fatigue	4.5 – 36.2	2	2	0
3	Joint Pain	3.9 – 23.5	=3	=9	-6
4	Skin Problems	2.8 – 26.0	=3	=8	-5
5	Sore Throats	2.5 – 35.8	4	=10	-6
6	Impaired Vision	(one survey only) 7.5	=5	6	-1
7	Stomach Cramps	2.5 – 11.6	=5	3	+2
8	Dizziness	0.9 – 6.5	6	7	-1
9	Nausea	0.8 – 17.8	7	5	+2
10	Diarrhoea	1.3 – 9.5	8	=9	-1
11	Vomiting	3.0 – 4.5	9	=8	+1
12	Hair Loss	(one survey only) 1.0	10	=10	0
13	Nosebleeds	(one survey only) 0.6	11	4	+7

5.33 Health Protection Scotland conclude:

“Based on the range of symptoms identified, their lack of specificity and the variation in the frequency of reporting in community based surveys, HPS is of the opinion that it is not possible to identify a sufficiently distinctive pattern of symptoms that could be considered consistent with exposure to any specific chemical.

“The symptoms reported are typical of those commonly reported in the general community and, with the exception of nosebleeds and stomach cramps, are consistent with commonly experienced symptoms in a general

population. The symptoms reported do not therefore appear to constitute a distinct clinical syndrome as such.”

5.34 Furthermore:

“Other explanations for the symptoms reported cannot be excluded, including that the type of symptoms and frequency are consistent with the variation in range of symptoms likely to be experienced in such an age group normally and that a number of the symptoms could be associated with sub-optimal indoor air quality at the school site rather than due to extrinsic chemical exposure.”

5.35 The report also comments on the value of human testing as follows:

“On that basis there is insufficient evidence to justify further investigation of school site users to detect exposure to specific chemicals using biological testing. Testing of blood, urine or other biological samples, for evidence of exposure to one or more specific chemicals, is therefore not recommended by HPS.”

Reflections on other health concerns

5.36 Interest is growing in the impact of sub-optimal indoor air quality in secondary schools. Current UK standards permit temperatures up to 32°C, but comfort is greater between 20°C and 25°C. A literature review from 2014 suggests cognitive performance is better at 20°C to 22°C.³⁸

5.37 Furthermore there is evidence for nosebleeds to be more common in young people experiencing low levels of humidity.

5.38 Another possible impact on indoor air quality is the concentration of carbon dioxide. Good ventilation with outdoor air is needed to keep carbon dioxide levels to a comfortable level. Low ventilation rates and raised levels of carbon dioxide are common in schools.

5.39 The English Education & Skills Funding Agency sets out guidelines,³⁹ which are also used as the industry standard in Scotland, on maximum CO₂ levels and minimum ventilation rates to ensure adequate indoor air quality in classrooms.

5.40 The recommended ventilation performance standards for naturally ventilated classrooms can be summarised as follows:

- Average indoor CO₂ levels during a typical teaching day shall not exceed 1500 ppm, and average ventilation rates shall be above 5 L/s-p (Litres per second per person).
- At any occupied time the occupants should be able to reduce the concentration of CO₂ to 1000 ppm, and ventilation rates above 8 L/s-p shall be easily achieved by the occupants.
- Minimum ventilation rates shall not fall below 3 L/s-p. A standard is set for CO₂ levels not to exceed 2000 ppm for more than 20 minutes at a time.

Sickness absence records – pupils

5.41 North Lanarkshire Council provided figures for school absence rates from both Buchanan and St Ambrose High Schools. Pupil absences are recorded twice a day to account for children who are sent home during the morning. Until the first week of June 2019, when the public meeting took place which alarmed a large number of parents, both schools had school attendance for pupils of 90% over the last three years. These levels of attendance are above the average for other high schools and other special needs schools in Lanarkshire (88% for both types of school). From the first week of June (noting that pupils who are leaving school after the summer term finish term early) attendances fell and by the third week were 45% for St Ambrose and 78% for Buchanan. This was a reflection of the level of concern and anxiety that was developing in the school community.

Sickness absence records – staff

5.42 Staff absences from 2015/16 showed no noticeable trend for St Ambrose staff. This averaged 42.3 hours per absence recorded which compares favourably with St Andrews High School in Coatbridge which is of a similar type and size and had an average rate of 47.3 hours per absence recorded. In Buchanan High School, the average hours per absence over this timeframe was 84.5 compared to 60.1 in Glencryan School in Cumbernauld, which is of a similar type and size. This higher level probably reflects the amount of long-term sickness absence in individual members of staff at the school known to have had cancer.

5.43 These findings around sickness absence provide further reassurance about the health concerns which have been raised because both Buchanan and St Ambrose High Schools share the same site.

Possible long-term health effects

5.44 Discussions with a number of people, including MSPs, raised further questions about long-term effects of drinking the blue water and whether there were other possible exposure risks from a school built on a former landfill site. These concerns led the review team to undertake further investigations, commissioning outside agencies and independent consultants to provide an up-to-date risk assessment around the safety of the site. The results of these further investigations are reported later. It is important to say there are no significant long-term health impacts from ingesting copper. It is not carcinogenic and there have not been any reported cases in the research literature of birth defects as a result of exposure.

Conclusions of the Review about further health concerns

5.45 On the basis of these investigations, we conclude additional case finding was not required by NHS Lanarkshire and agree with the advice given to GPs to continue to treat and investigate patients from the schools as they would for any other patient based on their symptoms and signs.

5.46 Further air testing, if taken forward (over and above the air testing which has been carried out in relation to soil testing and gas membrane assessment and is described in chapters 7 and 8), should focus on indoor air quality and require assessment of temperature, humidity and carbon dioxide levels when the school is in use by pupils and staff.

CHAPTER SIX – WATER QUALITY

6.1 According to the information available, concerns of “blue” water coming out of taps in the school were first raised in October 2013.

6.2 The history of these issues and response can be summarised as follows.

6.3 Balfour Beatty took samples on 7 Oct 2013. We do not have sight of those results, but the maintenance record reported “no issues with samples”. That situation is recorded as “closed off” on 23 October 2013.

6.4 After the concerns raised on 22 October 2014, samples were taken on 12 November 2014 but we were unable to identify the results from the material submitted. The focus of attention at this time was the Home Economics department in Buchanan High School. Later reports of blue water on 26 November 2014 and 15 May 2015 focused on the cold water storage tank. On 7 October 2015, facilities staff on site were instructed to “run water until clear in line with water regulators guidance”.

6.5 Further reports of blue water were received on 1 December 2015 and the cold water storage tank was again cleaned and chlorinated along with relevant pipework. The problem didn’t go away and on 28 November 2016, the decision was made to trace and replace the pipework in the Home Economics area of Buchanan High School.

6.6 On 19 April 2017 following continuing concerns, work was begun to replace supply pipework to the Home Economics area. This was completed on 23 February 2018. There is a report from Scottish Water that they visited the school on 5th May 2017 and took samples at that time which were given a “pass”. No further details were available to the review team.

6.7 On 29 March 2018, reports of “black water” were noted in the Medical Room at Buchanan High School and a contractor tasked to investigate. The contractor reported that high temperatures in Buchanan High School cold water supply was increasing the likelihood of corrosion in the pipes and explained the observed “black bits”. Weekly flushing of taps, re-sampling and replacing copper pipework or treat with biocide were recommendations. Instructions to facilities staff to run water through taps until clear were given again.

6.8 Following further reports of discolouration in the water on 16 October 2018, further steps were taken to “Install filters at various locations and trace/identify pipework. Alter pipework to supply toilets from mains, clean & chlorinate cold water storage tank, chemically clean pipework”. On the same day, the Maintenance Team requested sampling of the water. This was undertaken but results which came back on 13 November did not include assessment of copper levels. On 19 November 2018, the Maintenance Team requested Environmental Protection services to take chemical and bacteriological samples of the water.

6.9 Results from these samples were received on 23 November and were found to have higher than quality standards of copper. No other anomalies were detected. Alternative sources of drinking water supplied to the school on 26th November 2018. On the 28 November, the maintenance manager decided to replace 1800 meters of internal pipework in the school.

6.10 On 3 December 2018, daily sampling of water was commenced but we have been unable to find the results of these tests. The following day, Scottish Water became involved. They reported on 5 December⁴⁰ that no bye-laws had been breached and recommended replacement of internal pipework which had already been initiated by the maintenance manager.

Summary of results taken by Scottish Water December 2018

Sample Date	Sink at snack bar	Room G036	Room G024	Room 099C	PCV (standard)
10/12/18					
Copper mg/Cu/l	0.042	2.348	0.041	13.523	<2 mg/Cu/l
Total Bacterial Count at 37 degrees Celsius	0	0	0	0	0
Total Bacterial Count at 22 degrees Celsius	0	0	0	0	0
Total coliforms	0	0	0	0	0
E.coli	0	0	0	0	0

6.11 Over the Christmas holidays, the new pipework was installed, flushed and re-sampled throughout the school with the exception of its internal main supply pipe which was planned for replacement in the summer holidays when there was more time for this highly disruptive task to be completed. Samples subsequent to pipe replacement were reported within tolerance levels on 18 January 2019.

6.12 An extract of results from the various water samples undertaken on behalf of North Lanarkshire Council is presented in the table below, reporting on copper and bacterial levels.

6.13 Given the health concern raised about arsenic described earlier in this report, these levels are also reported but, like all other chemical measures, were within acceptable limits.

Summary of relevant water sampling results undertaken by North Lanarkshire Council

Sample Date	Home Economics (Buchanan)	School Kitchen (shared between schools)	Staff Room (St Ambrose)	Water Cooler (close to entry point of mains supply)	PCV (standard)
19/11/18					
Copper mg/Cu/l	7.489	3.68	0.111	0.034	<2
Arsenic Micrograms/As/l	<0.9	<0.9	<0.9	n/a	<10
21/11/18					
Total Bacterial Count at 37 degrees Celsius	0	>300	>300	66	0
Total Bacterial Count at 22 degrees Celsius	0	4	35	50	0
Total coliforms	0	0	0	0	0
E.coli	0	0	0	0	0
13/12/18					
Copper	0.061	0.013	n/a	n/a	<2
Arsenic	<0.9	<0.9	n/a	n/a	<10
8/1/19					
Total Bacterial Count @37 degrees	n/a	n/a	0	n/a	0
Total Bacterial Count @22 degrees	n/a	n/a	1	n/a	0
Total coliforms	n/a	n/a	0	n/a	0
E.coli	n/a	n/a	0	n/a	0
22/2/19					
Copper	0.015	0.011	0.013	n/a	<2
Arsenic	n/a	n/a	n/a	n/a	<10

n/a = not available

Risks from copper and comments on results

6.14 We should set out the background in relation to risks from copper to humans.

6.15 The WHO guidelines on drinking water for copper (Fourth Edition)⁴¹ states (page 224/225):

“Copper

Copper in a drinking-water supply usually arises from the corrosive action of water leaching copper from copper pipes in buildings. High levels of dissolved oxygen have been shown to accelerate copper corrosion in some cases. Concentrations can vary significantly with the period of time the water has been standing in contact with the pipes; for example, first-draw water would be expected to have a higher copper concentration than a fully flushed sample. High concentrations can interfere with the intended domestic uses of the water. Staining of sanitary ware and laundry may occur at copper concentrations above 1 mg/l. At levels above 5 mg/l, copper also imparts a colour and an undesirable bitter taste to water. Although copper can give rise to taste, it should be acceptable at the health-based guideline value of 2 mg/l.”

6.16 The guidance also has a chemical fact sheet on Copper (page 340/341) which provides the basis of the guideline value of 2.0mg/Cu/l. This is the standard which is used in Scotland as reported in the HPS report Suggested Health Risk Action Values May 2019. It is worth noting that to assess health risks, total daily doses need to be taken into account. A concentration of 2.0mg/L means a whole litre of water needs to be ingested to take in 2.0mg of copper.

6.17 Drawing this into the current circumstances on site, a level of <2.0mg/Cu/l is recommended to avoid gastric irritation. Prior to replacing the pipework, there were levels higher than this and given the fact there were reports of blue water for many years, there was a risk that people would feel sick and possibly vomit if they drank significant quantities of this water. Copper is a powerful emetic so high levels in drinking water usually result in vomiting. The review team has not received reports of vomiting after ingestion of water at the school. Higher concentrations of copper also produces a metallic taste making it less palatable to drink which means the total intake is likely to be low. As mentioned in the health section of this report, copper does not have any long-term health problems. It is not carcinogenic, nor has it been reported to cause problems for pregnancy.

6.18 The low levels of copper in the water cooler sample which is taken from a point close to the mains supply suggests the problem of copper in the water is related to internal plumbing and not an external source. There is no evidence of seepage from ground water into the water supply in the school. The mains pipe was iron clad to eliminate this risk.

6.19 Levels of arsenic were reported low in all samples where it was tested and regarded as within safety limits. Arsenic cannot be regarded as a health risk from the water supply in the school.

6.20 Total bacterial counts (TBC) in drinking water should be below 100/ml. Samples taken on 21st November in school kitchen and staff room at St Ambrose had levels above this. There were no coliforms or E.coli reported in these samples which means these bacteria were *not* likely to be derived from faecal contamination.

WHO and the International Water Association reports that there is “no direct relationship between HPC (aka TBC) values in ingested water and human health effects in the population at large”. It was likely to be a local contamination in the taps as the cold water temperature had been reported elevated on many occasions in maintenance reports we reviewed. After replacement of pipework, bacterial contamination was eliminated from the staff room. Results from other areas are not available. We were referred to technical data on bacterial counts set out in Health Protection Scotland information on Additional information on the Colony Count.⁴²

Cause of blue water at the schools

6.21 Following the removal of copper pipes from Buchanan and St Ambrose schools, there were inspections of their surfaces which showed the build-up of blue-green copper salt deposits. In April 2019, a consultant report⁴³ provided further explanations into the cause of this build-up. When exposed to fresh, running water, new copper pipes form a protective layer of dull red-brown cuprous oxide which prevents the build-up of other copper salts when the water lies stagnant (and the oxygen levels in it fall). In the absence of this layer of cuprous oxide, copper reacts with water in different ways to produce blue-green salts. This build-up can be friable (easily crumbled) and generate “bits” as observed in reports of concerns. Best practice guidance for new buildings which use copper pipes is to flush water regularly in the first few weeks of their installation to build up the layer of cuprous oxide which is necessary to prevent other salts forming between copper and stagnant water.

6.22 The provision of water suitable for drinking and other typical uses in buildings where people live and work comes through piping designed to exclude contamination of the water by contaminants in the ground through which the pipes pass. In the case of these schools, water pipes were protected by wrapped ductile iron, as previously suggested be done in site preparation work. The time for this review does not allow us to explore other options for piping in a new school.

6.23 That said, given public concern, we considered carefully whether containments from the surrounding site could have penetrated the water supply to the school. We discount that risk for three reasons. Firstly, the water supply comes from the nearest mains public supply and there is no suggestion that blue water comes from or is present in the mains supply prior to reaching the school or is present in houses in the vicinity of the school. Secondly, as the testing shows, the incoming pipe to the school (close to the water cooler) had satisfactory levels of copper, removing this as a possibility. Thirdly, as the fuller results from chemical analysis shows, the only elevated compound from the taps in the school was copper.

Further Actions by North Lanarkshire Council to address the blue water issue

6.24 The steps taken to identify and address the problems are the provision of free-standing water coolers, further sampling and work to replace the water mains supply within the school over the Summer holiday period 2019 and this work is scheduled to be completed in time for term starting on 12 August. Completion will mean that full replacement of all original water supply pipes will have occurred.

Validation of water quality – review sampling

6.25 In line with our remit to provide further reassurance to the public, we considered that it was appropriate and necessary to ask Scottish Water (SW) to go on site and carry out testing in a range of ways of water for the presence of risk indicators before we reported.

6.26 SW did so on 8 July and summarised their findings (which are to be understood as relating only to the context of the narrated failings), as follows:-

- The water being provided to the site meets all of the drinking water standards
- Where Scottish Water samples aligned with North Lanarkshire Council (2 points) there is good correlation between these results and the most recent ones taken by the Council and the water meets drinking water quality standards for both first draw and flushed conditions.
- The *first draw* samples for Buchanan Science room G 051, Buchanan Art room G 036, Buchanan Room G 099A and St Ambrose Science 8 Room 2 065 show elevated levels of Nickel, Zinc, Iron and Lead (for the St Ambrose Sample). The Nickel results from the two Buchanan HS class rooms (G036 and 099A) were in excess of the PCV [Prescribed Concentration or Value] as was the Iron from St Ambrose (Room 2 065) class room. *Once flushed* the analysis show that all samples from these points were compliant with drinking water quality standards. This does however indicate that the local plumbing apparatus – taps etc. should be investigated for these points.
- There was one sample - Buchanan Science room G 051 – where flushing resulted in the water appearance becoming “slightly hazy” and in fact the turbidity [haziness] test for this sample did fail at 4.5 NTU – the only other parameter which was slightly elevated from this sample was Copper at 1.7 mg/l. Scottish Water were keen to know how this classroom is supplied and what the wider pipework within the building is made of or if there is a tank in the system – it maybe that there is residual material sitting in the pipework somewhere that needs to be flushed out.
- With regards to other metals such as Arsenic, Cadmium and Chromium, SW did not find anything of concern in any of the samples they took and analysed, with the results being well within the respective drinking water quality standards.

Summary of Scottish Water Sample results taken 8 July 2019

Buchanan HS	SNACK BAR	HOME ECONOMICS ROOM G 024	SCIENCE ROOM G 051	ART ROOM G 036	ROOM G 099A	PCV (standard)
8/7/19						
First flush samples						
Copper mg/Cu/l	0.034	0.034	0.679	0.099	0.038	<2
Arsenic Micrograms/As/l	0.2	0.2	0.2	<0.2	0.2	<10
Flushed samples						
Copper mg/Cu/l	0.018	0.022	1.682	0.113	0.017	<2
Arsenic Micrograms/As/l	0.2	<0.2	<0.2	0.2	0.2	<10
St Ambrose HS	SCIENCE 8 ROOM 2 065	SCIENCE 9 ROOM 2 064	ROOM 1 033 HE 2	MUSIC BASE ROOM G 148	Only 4 samples	
8/7/19						
First flush samples						
Copper mg/Cu/l	0.261	0.09	0.055	0.02	-	<2
Arsenic Micrograms/As/l	0.2	0.3	0.2	0.2	-	<10
Flushed samples						
Copper mg/Cu/l	0.088	0.018	0.084	0.01	-	<2
Arsenic Micrograms/As/l	0.2	0.2	0.2	0.2	-	<10

Summary of other findings from Scottish Water samples taken 8 July 2019

Buchanan HS	SNACK BAR	HOME ECONOMICS ROOM G 024	SCIENCE ROOM G 051	ART ROOM G 036	ROOM G 099A	PCV (standard)
8/7/19						
First flush samples						
Nickel Micrograms/Ni/l	1.2	0.2	9.1	40.3	175.4	70 (WHO guideline)
Zinc Micrograms/Zn/l	43	9	375	569	599	n/a
Flushed samples						
Nickel Micrograms/Ni/l	0.2	0.2	0.5	0.4	0.4	70 (WHO)
Zinc Micrograms/Zn/l	3	3	28	4	7	
St Ambrose HS	SCIENCE 8 ROOM 2 065	SCIENCE 9 ROOM 2 064	ROOM 1 033 HE 2	MUSIC BASE ROOM G 148	Only 4 samples	
8/7/19						
First flush samples						
Iron Micrograms/Fe/l	295	51	49	44	-	200
Lead	8.1	0.9	<0.2	1	-	10 (soon to be 5)
Flushed samples						
Iron Micrograms/Fe/l	38	34	30	37	-	200
Lead	0.4	<0.2	<0.2	<0.2	-	10 (soon to be 5)

Validation of water quality – view of the Drinking Water Quality Regulator

6.27 Scottish Water undertook the water testing, as the appropriate body with responsibility and expertise under relevant legislation to carry out this work. SW are accredited for drinking water sampling and testing.

6.28 The Scottish Drinking Water Quality Regulator has supervised and checked the work of SW in the recent testing commissioned by the Review and is broadly satisfied that the work carried out by SW has been done to a standard and quality sufficient to give public assurance and confidence in the outcome of such testing.

6.29 The summary of her views is set out in her letter of 31 July 2019.⁴⁴

6.30 In that letter, she concludes:

“I recommend that Scottish Water carries out an investigation of pipework arrangements at the campus in conjunction with North Lanarkshire Council, in particular to assess the reason for the sample results from Buchanan Room G051 and that additional samples for metals in first draw and flushed samples are also taken. This will then allow Scottish Water to advise North Lanarkshire Council on any further action that may be necessary to ensure that the water supplies meet the required drinking water quality standards. The Regulations place a duty on Scottish Water to investigate sample failures in these circumstances and provide advice to the building owner of steps they need to take.”

6.31 On receipt of accredited test results of samples taken by Scottish Water on 8 July, the review team asked Scottish Water and North Lanarkshire Council to work together to make a more detailed assessment, including wider sampling beyond the areas initially requested, to provide further reassurance of the water quality in the school. Scottish Water met with North Lanarkshire Council representatives at Buchanan and St Ambrose High Schools on 30 July, reviewed building plumbing drawings and discussed work completed on the internal mains water system and the ongoing work on the boosted cold water system. In addition several sink taps were inspected and confirmation of fittings compliance with the Water Regulations Advisory Scheme (WRAS) or equivalent was requested. A further sampling and analysis plan has been devised and will be carried out on areas within the school that are connected to the mains water system, in the week commencing 5 August. As at the finalisation of our Report, we do not have the outcomes of this work, but make recommendations that we consider are sufficiently flexible to provide the safe provision of potable water.

Conclusions

6.32 We conclude that staff were right to raise concerns about copper in the drinking water supply and these were not addressed seriously or quickly enough by North Lanarkshire Council. Fortunately, that work has identified no significant health impacts either short or long term from drinking the water. Replacement of pipes and following Scottish Water’s advice subsequent to their recent sampling should address the problem on a permanent basis.

Recommendation

6.33 In light of the conclusions in this Report concerning water (a) having regard to the comments of the DWQR concerning the sample results from Buchanan Room G051 (b) because of the work not yet completed and verified to replace the main water supply pipe within the school (c) because of the need for public confidence in the water supply, we consider that further water sampling should be undertaken to confirm that the water supply is and remains compliant with drinking water quality standards and give confidence in the potable water being used by pupils and staff within the school in accordance with Scottish Water requirements.

6.34 Work by SW continues and we consider that this should be done in a way consistent with the places and contaminants sampled for over the Summer break and consistent with the SW methodology and the advice from the DWQR in terms of her letter of 31 July 2019 and should be done in three phases-

- within 14 days of the replacement of the main pipe within the campus (or within 14 days of today, if later);
- by the return to school after the October 2019 break; and
- by the start of term in January 2020.

6.35 Consistent with standard procedures, Scottish Water will refer matters to the DWQR if required by the DWQR in accordance with standard procedures where results are positive.

Steps taken by North Lanarkshire Council to address concerns about water quality

6.36 We are conscious of how easy it is, with hindsight, to be critical of responses to events which are only fully understood later and when the seriousness of events is clear. Not all concerns requiring the attention of a local authority take the turn that events at this campus did.

6.37 We say that specifically in this context because of criticism from some that North Lanarkshire Council sought to hid or underplay the presence of water contamination when first noted and/or that early steps to local staff on how to address concerns were inadequate.

6.38 Taking a suitably precautionary approach to human health, North Lanarkshire Council, when first being alerted to these concerns took measured and proportionate steps such as cleaning pipework and instructing the flushing of taps to clear the blue discolouration.

6.39 However, if in doubt and a situation is not resolving satisfactorily, a low threshold for involving others with expertise is to be encouraged. For example, earlier communication with North Lanarkshire Council Environmental Protection would have led to more active management of the situation and through them, Scottish Water and NHS Lanarkshire public health could have been alerted earlier to assess any potential health risks.

6.40 It appears to us that North Lanarkshire Council did take these matters seriously enough to prompt sampling work in November 2014.

6.41 However, given the regularly recurring reports of blue colouring (albeit in what was described as isolated areas) over a period throughout 2015 and less frequently but regularly until October 2018, it does seem surprising (a) that no further testing was done and (b) that there appeared to be little sense of urgency or awareness that these recurring events could impact and were impacting on confidence in the safety of the water supply on the campus.

6.42 By 2015 the campus had been operating for some time and we consider it reasonable to say that there should have been earlier sight of the problem by others beyond the local maintenance team. There may of course be problems in a new building, but after two or three years, the building is no longer new. We consider that flushing was not working. It should in our view have been clear that something else was needed to be done or considered. We are surprised that there was no apparent recognition that it is not or should not be common for a new building to continue to have this kind of problem.

6.43 Events accelerated in October 2018 with a range of reports of blue water, leading to further chemical water and bacterial water testing in November 2018.

6.44 The consultant's report in April 2019 (see paragraph 6.21 above) is useful as it sheds significant of light on the problem and should in our view have been sought much earlier.

6.45 We haven't found it easy to fully see and understand the historical timelines on these concerns and the steps considered and taken, to reach definitive views on whether different steps might have been more appropriate. Precise information about testing results between 2014 and 2018 (done by the then service provider to North Lanarkshire Council) is not easily ascertained. This is not to say that there was a problem and we are not certain whether such testing was in connection with concerns or was on a more routine basis. However, this gives rise to two observations – that this uncertainty ran the risk of fuelling public concerns about the situation and, more speculatively, could have had the effect of under-mining the ability of North Lanarkshire Council officials to satisfy questions on the detail at the public meeting on 6 June. Certainly there was confusion that evening between the date Environmental Protection Services were made aware of the problem and the duration of concerns of staff in the schools.

6.46 The lack of clarity on the audit trail and the limited appreciation of the potential impact on confidence in the school and its water safety seems to us to have spilled across to communications with unions – both NASUWT and the EIS. We comment on that relationship in Chapter 10 and in this context observe (without commenting on the merits) that water concerns in relation to a possible cancer link were first raised by NASUWT on 26 September 2018 yet by 4 February 2019 they were emailing North Lanarkshire Council regarding their disappointment of not being kept up to date with councils investigations into staff members' concerns.

6.47 We accept that, on each occasion tested, the results were (a) consistent and (b) such as indicated no cause for public health concerns, but the unwillingness of North Lanarkshire Council to proactively undertake basic water testing in order to assure and re-assure parents, pupils and staff that the water was and is safe is disappointing and suggests a failure to appreciate the impact that the uncertainty about the safety of water supply was having on staff, pupils and parents. It is well known that there is no eating or drinking in science laboratories in schools. A precautionary approach would have considered similar instructions in other parts of the school or labelling certain taps not for drinking.

6.48 In addition we had some concerns about the form of communications to the public. Although there was good quality written information provided, we consider it was issued later than it should have been. North Lanarkshire Council failed in our view to recognise early enough that, face-to-face meetings could have helped identify those who are most concerned and provide them with answers to their questions (including unions who had raised their concerns some months before a meeting was held with North Lanarkshire Council). We comment on communications in more detail in Chapter 10.

6.49 On more minor points about the information provided in the North Lanarkshire Council leaflet, referencing flushing seems to us to add little, since flushing was already failing to deal with the blue water problem. In addition, on reporting on water sampling from December 2018, there was no acknowledgement in respect of what the results looked like previously.

CHAPTER SEVEN – SOIL QUALITY

7.1 Chapter 4 sets out the history of examining the site for contaminants at the time when the site was being identified as an option and through the planning process and beyond. This started with a Human Health Risk Assessment in 2008 which identified a number of concerns, a Generic Quantitative Risk Assessment in 2009 to assess these risks in more detail and a Site Specific Risk Assessment which determined the risks from the point of view of its use as a secondary school. These reports as we reviewed in Chapter 4 of this report were considered by officials as part of the planning application.

7.2 Given ten years have passed since these assessments were completed and public concerns have risen hugely in recent months, we took the view that a more up-to-date assessment of soil quality was needed on the site.

7.3 We stress that this was a precautionary approach with the aim being to consider risks from contaminants that may be present in soil to human health based on the current use of the site as a secondary school.

7.4 For background, in the UK land contamination is assessed using a risk-based approach taking account of the magnitude (severity of the hazard) and likelihood (probability) of occurrence. A 'receptor' is something that could be adversely affected by contamination (e.g. people, an ecological system, property or a water body). A 'pathway' is a route or means by which a receptor is or could be exposed to or affected by a contaminant. A 'contaminant source' is a hazard but it can only pose a risk to a receptor where a pathway is present. A risk can therefore only be released where a contaminant source, pathway and receptor are all in place, referred to as a 'pollutant linkage'.

7.5 We initially obtained independent expert advice from Fife Council Environmental Protection Team who reviewed the previous site investigation and site-specific risk assessment documents, recommendations for remediation works and validation of the works.

7.6 On the basis of this advice, we instructed an independent environmental consultancy, RSK Environment Ltd., on 16 July to carry out rigorous, independent soil testing on the school campus.⁴⁵ The aim was to assess the current presence of any contamination by determining the concentration of a wide range of chemicals in the soil within areas of grass cover across the site. Samples were not needed from underneath the school buildings, car park areas or underneath the synthetic playing fields because the surfaces themselves form barriers to any potential exposure to the soils beneath. The buildings, car parks and playing fields exclude pathways to the surface.

7.7 A total of fifty trial-pits were excavated across the site, to depths varying between 0.3m and 0.6m. Up to 74 soil samples were examined and scheduled for tests on a wide range of contaminants of potential concern. For completeness, sampling and testing of soils from raised beds and a polytunnel used for growing

fruits and vegetables was also carried out at the same time. Attached to this Report is a map showing the locations of sampling by RSK.

7.8 In addition, as public concern about unconfirmed radioactive sources within the historic landfill had been reported to the review team, radiological monitoring was undertaken to test the soil arisings from the trial-pits and within the Buchanan High School Science/Technical corridor. All radiological monitoring results were within background ranges for radioactivity providing evidence that radioactive sources are not present in shallow soils or in this area of the building.

7.9 The trial-pits revealed that the grassed areas on site are underlain by topsoil and 'made ground', consistent with the development history of the site. The made ground was a sandy soil but contained various materials such as ash, brick and concrete pieces, glass fragments and concrete. Other items such plastic wrappers, bottles, clothing and shoes were encountered occasionally. The soils from the trial-pits were examined carefully and there was little visual evidence of contamination such as staining of soils or presence of volatiles (odours/ headspace testing).

7.10 The soil samples obtained from the trial-pits and raised beds were analysed for a very comprehensive range of chemicals at a specialist environmental laboratory. The testing was selected taking into account the possible contaminants associated with the site history and those found in previous investigations. It was also extended to identify whether other substances could be present taking account of possible uncertainties and the nature of this review. The chemical analysis covered over 150 different compounds, including heavy metals, hydrocarbons, asbestos, volatile organic compounds (VOCs), pesticides and dioxins.

7.11 Potential chronic (long-term exposure) risks have been assessed to current site users from exposure to contaminants, where present, in the soils tested. The laboratory testing data has been assessed by RSK in accordance with technical guidance published by authoritative bodies, such as Defra and the Environment Agency, and accepted by regulatory authorities in Scotland. 'Generic Assessment Criteria' (GAC) are values for concentrations of contaminants in soils that have been developed to be protective of human health based on a series of assumptions about the characteristics and behaviour of sources, pathways and receptors for a particular land use.

7.12 In this case, the GAC were selected based on a 'typical' secondary school land use, where the most sensitive receptor is identified in guidance as a girl 11-16 years old. The pathways considered are direct skin contact with soils, ingestion of soil and dust generated from soils, and breathing in any dust or vapours generated from the soils being tested. These GAC also allow assessment of potential risks, and are protective of adults who work on the site for many years and on a daily basis. It does not cover risks for maintenance workers who may need to dig up soils whose potential for exposure to soils is greater but mitigated by good working practices. In addition, ingestion via consumption of fruit and vegetables has been considered for the samples taken from the raised beds only, leading to use of a different set of GAC.

7.13 The laboratory test data is compared against the GAC values to assess the level of risk. Where the soil concentrations are below the GAC, the risk is considered not to be realised and no further assessment is required. Where the soil concentrations are above the GAC, this does not necessarily mean that a risk is realised; either more detailed (site-specific) risk assessment or remediation works may be carried out on precautionary basis.

7.14 RSK's full results will be published shortly, once the risk assessment and reporting process has been completed. The key findings to date are summarised below:

Contaminant	Detected in soils by laboratory?	Above Secondary School GAC?	Comments
Lead	√	Above GAC in 1 of 74 samples. Weighted average value below GAC.	Concentrations not of concern and risk assessed as low.
Beryllium	√	Above GAC in 9 of 74 samples. Weighted average value below GAC.	Concentrations not of concern and risk assessed as low.
Arsenic	√	No	
Other heavy metals including cadmium, mercury, copper and nickel	√	No	Concentrations not of concern and risk assessed as low.
Hexavalent chromium	X	No	Not detected on site.
Petroleum hydrocarbons including polycyclic aromatic hydrocarbons (PAHs)	√	No	Concentrations not of concern and risk assessed as low.
BTEX compounds – benzene, toluene, ethylbenzene, xylenes	X	No	Not detected on site.
Other VOCs including chlorinated solvents	√	No	No evidence for presence in shallow soils based on field observations and test data. Concentrations not of concern and risk assessed as low.
Polychlorinated biphenyls (PCBs)	√ - one sample only	Yes PCBs above detection limit reported in 1 of 32 samples tested. The location of PCBs was in trial-pit HP50 only. Further testing of neighbouring trial-pits has been carried out and these have been reported as below detection for total PCBs. A single PCB compound was found at the detection limit in two other samples.	Localised impact that needs further evaluation.
Dioxin and furan compounds	√	No	
Asbestos	√ - 8 of 74 samples	Yes for 2 samples.	Samples were taken from depths (>0.45m) where disturbance by secondary school users is unlikely. Well maintained grass cover limits the potential for contact with underlying soils. Risk assessed as low.

7.15 In conclusion, the concentrations measured in soils, with the exception of PCBs at one location, are not of concern and represent a low risk to site users, including pupils, teachers and visitors.

7.16 The test results for the soil samples from the raised beds shows that the concentrations of contaminants are not above GAC and accordingly we consider that no further assessment is required.

Conclusion by Review Team

7.17 The testing and analysis described above has been informed by expert advice, been undertaken in a thorough and systematic way, and has covered a wide range of potential contaminants. The laboratories used are all accredited and the risk assessment (GAC) is set at a precautionary level.

7.18 The work has identified one sample pit located in the south east part of the site (HP50) which been found to contain higher than expected concentrations of PCBs (polychlorinated biphenyls). On a strictly precautionary basis, remediation is advised following further delineation.

7.19 The location of HP50 is on the periphery of the site and can be isolated from site users whilst remediation is undertaken.

Recommendation

7.20 We would be supportive of a decision of North Lanarkshire Council as Education Authority to open the schools, on the basis that North Lanarkshire Council are undertaking (and commencing with a view to completion as soon as possible) full and independently verified remediation of area designated HP50, entailing the removal of the contaminants present there or otherwise render the area safe from the risks from those contaminants.



CHAPTER EIGHT - AIR QUALITY AND GAS METHANE MEMBRANE

Installation of the gas membrane

8.1 In carrying out our review, it quickly became clear to us that we needed to separate out our consideration of the installation of the gas protective methane membrane and its consequences from other parts of our Report. This was (a) because there were very specific public concerns associated with the membrane, its purpose and its safety, and (b) because this was the only ongoing precautionary measure undertaken under the planning consent to address concerns.

8.2 The concerns raised with us related to lack of clarity on its purpose, the ongoing integrity of the membrane, risks of methane exposure, any impacts from the settlement of the building on the methane and worries about a sensor having been triggered (and what that meant for confidence and safety).

Purpose of the installation of the gas membrane

8.3 We set out in Chapter 4 the history of site investigation and should record that a gases risk assessment was as integral a part of that as every other risk assessment aspect. We refer to the relevant sections of Chapter 4 for fuller more general background to that work.

8.4 There were a number of reasons why a gas membrane was installed at the school as part of the conditions for it being built.

8.5 The following extracts from reports produced at that time explain this and set out the consideration given to this issue.

Gases Risk Assessment

8.6 The Ramboll Report of January 2010 described the ground conditions as follows:

“the geology underlying the site is understood to comprise Made Ground including topsoil overlying probable landfill material up to a maximum depth of 8.45mbgl. No significant capping layer is present above the probable landfill material. Underlying the Made Ground are superficial deposits of peat, glaciolacustrine clay, silt and sand and glacial till to a maximum depth of 23.2mbgl. These superficial deposits overlie the solid geology of the Middle Coal Measures, reported at depths between 7.40mbgl and 23.20mbgl and comprise sandstone and mudstone with occasional bands of coal. The site is underlain by several coal seams, some of which have been historically mined by shallow workings. In addition, mine shafts have been identified in and St. Ambrose Ground Contamination Risk Assessment Report”

and said:

“4No. ground gas monitoring visits were undertaken as part of the initial investigation (URS, 2006) between August and October 2006. Maximum concentrations of 12.6% carbon dioxide, 4.0% methane and a maximum flow rate of 2.5l/hr was recorded during these monitoring visits.

3.4.2 An additional 4No. rounds of monitoring were undertaken following the URS investigation (2008) during August 2008 and maximum concentrations of 30.2% carbon dioxide, 68.7% methane and a negligible flow rate were recorded during these monitoring visits. However, these results were deemed invalid due to the negligible flow rates reported.

3.4.3 An additional 12No. rounds of monitoring were carried out between November 2008 and April 2009. Maximum concentrations of 32.2% carbon dioxide, 75.4% methane and a maximum flow rate of 10.9l/hr were recorded during these monitoring visits.

3.4.4 Following the Geotechnics Ltd. Investigation in October 2009 a number of additional boreholes were drilled and installed. 4No. ground gas monitoring rounds were completed from these boreholes between October to November 2009. Maximum concentrations of 43.3% carbon dioxide, 69.0% methane and a maximum flow rate of 16.2l/hr were recorded during these monitoring visits.

3.4.5 Based on current guidance (CIRIA C665; BS8485), the worst case results from all available data would classify the site as Characteristic Situation 4.”

8.7 Reference is made to paragraph 28 of the Report we commissioned (see below) as to the meaning of Characteristic Situation 4. Such a situation represents a ground gas regime as “moderate to high risk” and is typified by a gas regime from mine workings and closed landfills of typically greater than 25 years of age. This is a reasonable approach, though as below we note that a lower assessment would have been sufficient.

Construction

8.8 At the construction phase, it can be seen from the Balfour Beatty Framework Agreement Gateway 3 submission⁴⁶ (page 35), as follows-

“1.3.13 Ground Gas Protection

“The following recommendations are made in order to reduce risks to human health from identified ground gas impacts assuming Characteristic Situation 4:

1. Reinforced concrete cast in situ floor slab (suspended, non-suspended or raft) or beam and block or pre-cast concrete slab;
2. All joints and penetrations sealed; and
3. Proprietary gas resistant membrane and passively ventilated underfloor subspace or positively pressurised underfloor sub-space, oversite capping or blinding and in ground venting layer (in accordance with CIRIA C665/BS8485).

“Ramboll have consulted with a leading contractor in the design and installation of ground gas protection systems. Based on the maximum concentrations of methane and carbon dioxide and the maximum flow rate recorded on site a high performance passively ventilated system has been designed. This will be revisited once the further ground gas monitoring results are made available.”

Installation

8.9 By their letter of 11 October 2012, the installers (Landline) confirmed that they were signing off the installation of the gas monitoring system at the school, saying “The basic active gas monitoring system on this project is now fully operational and the building is fully protected from ground gas ingress by the whole system incorporated in the project”.

Validation of work

8.10 As noted in other respects, the remediation work was peer reviewed by WSP, instructed for that purpose. The letter from WSP on their Report Review of 6 December 2012 said:

“Gas Protection Measures

- A classification of Characteristic Situation 4 was reported to be considered as appropriate for the site based on reported concentrations of ground gas during previous site investigations and Landline Containment Solutions (LCS) were contracted to design and install the protection system for the high school building.
- The specification detail for this is noted to include a 1.0mm HDPE gas barrier membrane and 25mm geocomposite void former attached to ground level venting outlets and a system of extraction fans as part of the LCS ‘Basic Active’ Gas Monitoring System. This system is also indicated to include a network of underfloor sensors, which sample the air beneath the building on a regular basis. Should these sensors detect elevated ground gas, an active fan system is switched on to introduce more air into the space beneath the building and dilute the concentrations of gas beneath it.
- Detail drawings illustrating the system installed are provided by way of appendix, which also highlight the presence of a reinforced concrete slab.
- LCS installed the system and CQA certificates and photographs prepared/taken by them are provided by way of appendix to detail inspection sign off. Ramboll also report that while they were not present full-time during the installation, checks were made during their watching brief visits to ensure all penetrations and joints had been appropriately sealed and that the installation work was being undertaken by qualified LCS engineers.”

Expert assessment of the membrane

8.11 Mindful of the issues causing concern which we too do not have the expertise to understand, we asked specialist experts in this field the following questions:

- Can you help us understand in general terms the purpose, specification and public safety security features of methane membranes used for purposes such as those in the present case?
- When would it typically be installed?
- Why would it typically be installed?
- Please provide installation details
- Can you explain the site context and the gas protection design?
- Can you comment on building settlement concerns expressed to the Review that inter-act with points raised about the methane membrane?

8.12 Those specialists (Dr Geoff Card and David Mason) provided us with their report⁴⁷ on 5 August 2019 and we refer to that Report for its full terms.

8.13 Inevitably that Report is of a technical nature, but we draw out three aspects.

8.14 Firstly, at paragraph 34 of the Report, it states that “the gas protection measures ...are more than adequate for the gas regime identified at the school campus” and concluded that, while it was prudent to proceed on the basis of Characteristic Situation 4, a lower assessment would have been sufficient.

8.15 It concludes at paragraph 48 that “the ground gas protection system has been designed for a higher gas regime, [Characteristic Situation 4]. I consider that this is overly conservative for the gas regime and nature of the development. I consider that the gas protection as designed, specified and installed is more than adequate to resist ground gas migration into the building(s) and adversely affect indoor air quality”.

8.16 Secondly, on the matter of sensors, paragraphs 38 to 41 of the Report states that-

“38. In addition to the gas membrane and concrete slab an active gas venting system has also been specified to remove and ground gas beneath the ground slab. The active ventilation system has a gas detection and fan control system for methane and carbon dioxide. Commissioning records have been provided and are dated 16th March 2012 to 8th March 2012. The manual for the system states that ‘maintenance of this system is essential to ensure reliable operation. The system utilises mechanical components that run continuously, and these require overhaul on an annual basis and inspection every six months. Maintenance should only be carried out by a trained technician.

“39. I have not received evidence of any service records after the initial calibration. I understand the monitoring system alarm has been activated on occasions. The alarm does not mean that hazardous gas concentrations have

been detected beneath the ground slab. In my experience the alarm to the ventilation system has been triggered when:

- a) a concentration of ground gas reaches a percentage of the lower explosive limit for methane which is 5% methane in air. It is normal to set the alarm criteria at <1% methane in air, i.e. at least 1/20th of the lower explosive limit; or
- b) a gas monitoring sensor in the ventilation system is not working and needs servicing or requires replacement.

“40. Methane and carbon dioxide readings have been provided to me from late 2012 which show a peak methane concentration of 0.43% and a peak carbon dioxide concentration of 3% in the active ventilation system. These concentrations confirm non-hazardous gas concentrations detected beneath the ground slab.

“41. In order to assess the ongoing effectiveness of the gas protection measures it would be useful to obtain the current data relating to the gas concentrations recorded within the void as well as indoor air quality monitoring at various points throughout the school building including confined spaces such as cupboards”.

8.17 Thirdly, on the implications of potential settlement (see Chapter 9), the Report says:

“42. In theory, any differential settlement between building components such as the foundations to the school buildings and the ground slab will affect the risk of membrane failure. In my experience such failures have occurred to the gas membrane where excessive differential ground settlement has occurred causing the floor slab to settle relative to the deep foundations which have remained fixed.

“43. For the Buchanan and Ambrose school buildings it appears from review of the architect’s drawings that the buildings are supported on piled foundations. The piles will have been designed and constructed to transfer building loads to competent natural ground beneath any Made Ground or Fill and zone of potential significant ground settlement.

“44. The ground slab is designed as a suspended slab such that if the ground settlement occurs, for whatever reason, the slab will remain fully supported by the piled foundations and will not deflect or crack. If there is significant ground settlement beneath the slab there is the possibility that the gas membrane will also drop resulting in a void being produced between the membrane and the underside of the slab. For a small degree of settlement, typically up to 100mm, the membrane will stretch and accommodate the movement. For settlements of greater magnitude there is the possibility that the membrane will tear along joints or at fixed points where it is held up by the slab and/or foundation. If this occurs, then ground gas could migrate to the underside of the slab. The integrity of the membrane and concrete slab to resist ground gas can [sic] be tested by carrying out a smoke or gas tracer test as set I describe in paragraph 23 of this report.

“45. It has been claimed that parts of the school hardstanding areas are “bubbling upwards” and that this could be a sign of an accumulation of gas under pressure forcing the overlying ground and hardstanding to rise. In my opinion this is not as a result of ground gas accumulating under pressure. This is because the gas monitoring records to date show no evidence of high gas pressures in the boreholes. I consider that these apparent “bubbles” are probably the results of localised settlement in the surrounding Made Ground creating the impression of a localised area of rising ground at its centre.”

8.18 In light of the comments set out at paragraphs 41 and 44 of the Report and because of the points we make at paragraph 8.20, it had seemed to us in discussion with the commissioned experts that in order to be fully satisfied in these respects, it would be prudent for them to carry out certain gas as referenced at paragraph 23 of the Report. This would assist in giving confidence about the ongoing integrity of the design.

8.19 David Mason arranged for tests for methane and CO₂ via the gas monitor and hydrocarbons via the PID to be carried out on 26 July 2019 and the results were set out in an email from his firm of 5 August 2019 saying (by the tester):

“I attended St Ambrose High school on the morning of July 26th, and met Eric Hislop and the Head Teacher. I had with me a MiniRae Lite photoionisation detector (PID), a Gas Data GFM 430 portable gas monitor, as well as and MEP gas monitoring technician to allow each of us to operate the two pieces of equipment independently. Gas monitoring was undertaken continuously during the visit, as Eric Hislop took us on a tour of the building. Particular attention was given to smaller rooms such a cleaning cupboards, individual bathrooms and storage cupboards, as well as rooms with multiple service penetrations such as larger bathrooms, and changing rooms (with shower facilities/drains).

“We were on site for approximately one hour, a while photographic record of the visit was taken and can be provided upon request.

“Throughout the visit the PID monitor registered 0 ppm and did not waiver throughout the visit, similarly the gas monitor failed to detect any methane during the whole of the visit.

“A maximum concentration of 0.2% carbon dioxide was noted in the changing rooms in the eastern most and south eastern most changing room facilities. The concentration of carbon dioxide in this area was observed to fluctuate between 0% and 0.2% and was not the result of any direct observation (the sweeping of a drain or confined area) rather the 0.2% readings were noted in more open parts of the changing room area.”

8.20 In the time available, there are two matters that we have not been able to complete consideration of. These are in relation to being satisfied that the periodic testing results since installation are satisfactory and to be fully satisfied as to the integrity of the membrane. We were unable to obtain recent recordings of the methane membrane in operation. Our independent experts considered the

membrane was not a requirement to manage the risk of gases entering the building (a characteristic situation 2 rather than 4) and we undertook precautionary testing in the building to rule out the risk of methane, other hydrocarbons or carbon dioxide.

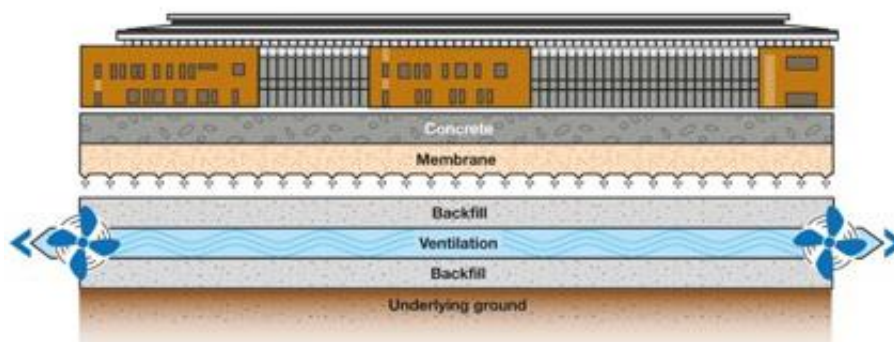
8.21 The test results at paragraph 8.19 satisfy us as to ongoing current safety, but we consider it important that more detailed material is made public about the records of previous periodic testing. Associated with the work of the Site Recovery Group, we recommend that this be done as soon as possible. We believe that this would be helpful for reassurance on the site if there were more up-to-date information from methane membrane monitoring to be made available.

Reflection

8.20 The review team are content that the gas membrane was put in place on a precautionary basis to lower the risk of possible inhalation of gases by site users. It is worth pointing out the gas membrane was recommended as one of three precautionary measures to protect site users. The others were an underground ventilation system and a concrete slab on which the school was built. What the gas membrane adds is an active process of ejecting gas via extractor fans should the concentration of gas (methane and carbon dioxide) reach a certain level. This concentration level is set many times lower than what would constitute a health risk.

8.21 For the system to operate, a network of sensors sample the air above ground level (beneath the concrete slab) on a regular basis. Should these sensors detect elevated ground gas, an active fan system is switched on to introduce more air into the space beneath the ground and the concrete slab and dilute the concentrations of gas beneath it. The ventilation vents beneath the membrane release this air/gas mixture into the atmosphere at a distance from the building.

8.22 There are sensors in the membrane to detect gases – methane and carbon dioxide. These sensors transmit data for monitoring purposes to a recording device to demonstrate the frequency with which the ventilation system has been activated. As part of this system, there is an alarm to signal if a sensor becomes activated when it detects ground gas to initiate active ventilation or because it is faulty. This is not the same as a fire alarm which indicates immediate evacuation is required. The membrane itself continues to function if the alarm goes off and this can be demonstrated by its output in terms of the monitoring record. A graphic illustration of the concept of the membrane is provided below.



Air Testing

8.25 As it is relevant to this Chapter, we should at this point address the calls made on us to require testing of the air both outside the buildings and within.

8.26 We had this in mind when we initiated soil and water testing but needed the expert advice we were commissioning to guide us further. Equally in relation to the methane membrane, we were conscious that issues concerning methane might suggest that air testing might be valuable. Subject to our recommendation to provide future reassurance and to paragraph 8.29 below, we consider that the work in that regard is sufficient without further air testing.

8.27 Air testing requires a logical approach – where to look and what to look for. To begin with, our soil testing included an assessment of volatile organic compounds (VOCs) which could have been a gaseous hazard on the site. As chapter 7 reports, there were no significant levels of VOCs found at ground level from the sampling pits.

8.28 Following the review of the methane membrane a simple test of air in small spaces in the schools provided an assurance that no methane or other hydrocarbons were an issue.

8.29 This left only one aspect of indoor air quality to assess, which could only be of value when it was being used by pupils and staff – namely temperature, humidity and concentrations of carbon dioxide. As we report in Chapter 5 on health concerns, this is an area worth investigating further.

Conclusion

8.35 While we are generally assured in respect of the gas membrane installed as a precautionary measure on construction, we are conscious both of the information unable to be considered in time and the proposals we make at Chapter 10 concerning Site Recovery.

8.36 Continued confidence in the methane membrane is essential. While, as at the date of this Report, we consider that parents and staff can have a high level of confidence in it, it would seem remiss not to include the taking of appropriate steps to monitor its continued effectiveness over the period ahead.

8.37 We therefore (a) recommend that more detailed material is made public about the records of previous periodic testing as soon as possible and (b) include the methane membrane and ongoing assurance as to its integrity as an element of the work of the proposed Site Recovery Group.

CHAPTER NINE – SETTLEMENT ISSUES ON THE SITE

9.1 In our meetings with parents, staff, pupils and unions, a range of concerns were raised about the state of the school buildings themselves and specifically in relation to settlement of parts of the building and evidence from playground areas of damage to the integrity of the ground surface.

9.2 The suggestions made to us were mixed – some referencing settlement and others raising concerns about bubbling of playground surfacing.

9.3 Most of the concerns regarding the impact of the construction of buildings on site were of a very general nature. They tended to relate to surprise that a building so new should require such levels of remedial work (and, it was claimed, of a repeat nature over successive summer holiday periods), concern that problems with the building were contributing to unpleasant odours in certain parts of the building, concern that providing the school through PFI initiatives (as was asserted) would inevitably lead to corners being cut in a range of ways and general disagreement in principle to the use of PFI contracts.

9.4 We should record our understanding that the project was not in fact a PFI but fully funded by North Lanarkshire Council. Further, there has been no suggestion that North Lanarkshire Council and Balfour Beatty are engaged in any kind of dispute with each other on matters relating to settlement arising from the construction contract entered into between them.

9.5 We comment elsewhere on the testing of the inside of the building but have not been able to establish a basis for considering that issues with construction could have contributed to concerns about unpleasant odours. From our understanding of the design of the building, it would not be the case that, even if the building were sinking, that was potentially putting pressure on and causing drains to break (resulting in unpleasant odours).

9.6 Although more to do with building design than settlement, issues of odours raised with us may be related to ventilation systems in the building. See paragraphs 5.46, 8.29 and 10.31 (bullet 4) and Recommendation 5(b).

9.7 In the time available, we have not been able to consider whether the amount of remedial work relating to settlement of the school site ought to be a matter of concern or is untypical of comparable sets of circumstances. Nor has it been possible to establish whether the school building is sinking. We can say that North Lanarkshire Council has not suggested to us that it is nor that they have made any concerns known to us about the level or quality of workmanship at this site. Independent surveyors report commissioned by the Council shows that the building has not moved or sunk, and recommended works in landscaped and paved areas where settlement has occurred were programmed for the summer break in advance of the review and have been completed.

9.8 Mindful of the remit of this review, we therefore focussed on two concerns expressly put to us which are associated with matters of the settlement of the building.

9.9 Firstly, was a suggestion that if the building on the campus is showing evidence of sinking to any significant extent, might that be creating a risk to the integrity of the methane membrane installed as a precautionary measure when the campus was built? In effect whether any such downward pressure gave rise to increased risk.

9.10 Secondly, was a suggestion that in certain playground areas, the ground was bubbling upwards and so a question was asked about whether such upward pressure was or could be caused by the methane membrane filling and pushing up through the unbuilt upon playground areas.

9.11 These questions are considered in paragraphs 8.17 to 8.19 above.

CHAPTER TEN – EFFECTIVENESS OF NORTH LANARKSHIRE COUNCIL AND NHS LANARKSHIRE RESPONSES

Review of activity

10.1 North Lanarkshire Council submitted a timeline of events relating to media enquiries, communications with unions, information issued to parents and staff and meetings around the situation at the schools between 14 November 2018 and 5 July 2019. During this time, over 100 events are recorded demonstrating the intense activity the situation was creating for their communications staff, and managers in education and environmental protection services.

10.2 The public meeting on 6 June 2019 was a turning point for relationships with the schools' communities, with public officials unprepared for the level of aggression towards them. Accordingly, being called "a liar", "a disgrace to the medical profession" could not be dealt with appropriately. The majority of media enquiries to North Lanarkshire Council followed this meeting.

10.3 After this same public meeting, Scottish Government communications team were also involved in responding to queries. Between 8 June and 27 June they record six different media enquiries. This reflects the level to which the situation on the ground had become of wider media interest and was posing a considerable burden on local officials to manage.

10.4 In response to the public concerns following the public meeting on 6 June, NHS Lanarkshire provided GPs with a phone number for patients to call if they had further queries about the issues that were causing concern and needed more time with someone to discuss them. As of 25 June 2019, the public health team had received 66 calls from people with links to the schools. Putting this in context, this equates to less than 4% of past and present site users.

10.5 Although issues arose well before 2018, we make a number of observations on the effectiveness of the North Lanarkshire Council response and confidence in North Lanarkshire Council and NHS Lanarkshire.

10.6 The public are entitled to expect that such agencies provide an appropriate response to issues of the safety and health of those working and being taught at the campus. We recognise that communication by public authorities with all concerned is a key part of the necessary response to public concerns of the nature of those arising here. We recognise that there exists a lack of confidence and loss of confidence in North Lanarkshire Council and NHS Lanarkshire.

10.7 Restoring such confidence over the period ahead will be an essential component of a Recovery Plan, requiring those bodies to set out what steps they intend to take to do so.

10.8 We should firstly say that in our view that in some respects this loss of confidence and certain criticisms have been unfair on the public bodies and their officials, in the passion that this issue has caused.

10.9 This is unfair, in a number of ways since:

- as recognised above, this is a virtually unique set of circumstances where there are no guidelines to address understandable fears and concerns in a social media driven world unknown until very recent times.
- the “rules of engagement” do not apply equally to social media commentators and public bodies alike. We give a specific example below to illustrate this but one of the bigger issues is the constraint that properly applies to public bodies on issues such as medical patient confidentiality. That very obviously is a central issue here, but NHS Lanarkshire cannot counter social media speculation about health concerns about individuals without risking breaching such rules. Into the vacuum created, comments on social media will occupy the space. Although, North Lanarkshire Council promoted Facebook posts and use of video.
- it seems clear to us that public officials have behaved professionally throughout and worked tirelessly to seek to address and resolve the issues arising here. They too – beyond question – placed the health and safety of those using the campus at the heart of what they did. As we note in this Report, the health responses have been fully appropriate in light of the information presented to the public health department. We should record the professionalism displayed by those officials, but recognise that these are not textbook circumstances.
- tied with that, we have been struck by the extent to which officials at North Lanarkshire Council and NHS Lanarkshire have been criticised for commenting, not commenting, commenting too soon, commenting too late, saying too much or not saying enough. Any perceived inaccuracy or failing was seized upon by some as evidence of conspiracy, complacency, cover up, incompetence, arrogance, lack of empathy.
- Some have said that they were not trying hard enough to find the cause (having ruled out the presence of unacceptable levels of toxic contaminants) but we question how fair is that, in light of what we say in Chapter 7.
- on the inequality of expectations, the criticism of Mrs Douglas’s article in the Sunday Herald felt to us unfair on the basis that everyone else is free to comment on social media but if she comments defending actions taken to support the school, she finds herself criticised and misquoted.
- some parents made the understandable point that – whether because they were new to the area or had children attending following placing requests – the fact that the site was on a former landfill site was unexpected and unpleasant news to them. We see that point and understand that feeling (which we seek to address in our recommendations) but it feels an unreasonable suggestion that North Lanarkshire Council should have highlighted to every prospective parent the history concerned. We think that doing so runs the risk of being the opposite of reassuring.

10.10 That said, we consider that:

- North Lanarkshire Council were both too slow and too defensive in their response, especially on blue water, allowing foreseeable problems of confidence to arise. As we set out in Chapter 6, these should have been recognised and escalated earlier.

- circumstances here give rise to questions or indeed a dilemma for public authorities in their strategic approach to maintaining public confidence, in the communications strategy and in how they work towards a recovery plan.
- North Lanarkshire Council were faced with a set of issues that individually did not breach standards but collectively generated huge public concern. There may be wider lessons from this situation on appropriate inter-agency responses.
- more locally at this site, a degree of disconnect and disengagement from parents, staff and unions has arisen and there is a sense of lack of willingness to engage with fully effective site management.
- NHS Lanarkshire failed to maintain and secure public confidence in the advice to GPs for heavy metal testing. We heard very consistently about perceptions that GPs had been ordered not to test patients. This was not so, based on what was published by them, but such mis-perceptions were not successfully countered. Accordingly, we question whether NHS Lanarkshire could have been more proactive to reassure parents.

Review of Relationship between North Lanarkshire Council and unions

10.11 In addition, we were acutely conscious of the backdrop in our work of the longstanding relationship between North Lanarkshire Council and unions representing teaching and other staff at both schools. We note a particular but important issue at paragraph 6.46 in early 2019 but equally accept that in the period after that a high level of engagement occurred with the EIS, SSTA and NASUWT.

10.12 We met in the course of our Review with representatives both of NASUWT and the EIS.

10.13 We are aware of the decision made by NASUWT to ballot and call strike action at Buchanan High shortly before the end of term and that similar balloting took place amongst NASUWT staff at St Ambrose. We were present on site when the decision was made to close Buchanan High early and saw with our own eyes how difficult and sensitive a matter that was for all involved.

10.14 This is a complex issue and we recognise the importance of relations with a range of unions, not just those we met. We are very clear that we make no comment or judgement of either side involved in that industrial action. We recognise that relationships between employers and unions representing the interests of their staff can sometimes get difficult.

10.15 We were concerned that no members of staff – union members or otherwise – would feel inhibited from contributing to our Review for any concern about the implications for their job.

10.16 For that reason, we wrote to North Lanarkshire Council on 27 June⁴⁸ seeking assurances that any such contributions made in good faith would enjoy no detriment protection, as if made under whistleblowing protection (copying that letter to relevant unions).

10.18 We wrote as it had seemed to us that there may have been a reluctance from some to come forward with their concerns. This was encountered by the public health team when they sought to interview members of staff with cancer at Buchanan High School. Only after the public meeting and with the encouragement of their union, did the fifth member of staff contact the public health team at NHS Lanarkshire. We are though assured from North Lanarkshire Council's reply of 5 August⁴⁹ on the steps taken by them to ensure no negative implications would arise for any members of staff engaging with the Review

10.19 We note two other matters concerning the relationship between unions and North Lanarkshire Council:

- The difficulties in communications on the blue water concerns (noted at paragraph 6.46)
- An issue regarding the claimed discontinuation of the North Lanarkshire Council Health and Safety Committee following an internal re-organisation where the EIS called for its re-instatement, which North Lanarkshire Council – when put to them – North Lanarkshire Council advised that not to be the case.

Reflections from Review

10.20 In reviewing the escalation in media interest which grew as worries about the site increased and more questions were being asked of North Lanarkshire Council and NHS Lanarkshire, we considered a number of reports on good practice in relation to risk communication with the public around the issues identified at the schools in particular around cancer clusters and contaminated land.

10.21 The SNIFFER guidance is clear with regards to contaminated land issues that public meetings are not helpful.⁵⁰ Far better is to provide small groups of people to engage with experts in places of their choosing. The review team took this approach in designing the face-to-face meetings we had with parents, pupils and staff. Our aim was to enable people to air their concerns in ways they felt safe.

10.22 A paper in the American Journal of Public Health submitted to us from HPS describes the importance of acknowledging the human dimension in cancer cluster investigations.⁵¹ The authors encourage public health professionals to embrace a two-way communication with community members and value them as important resources for the investigation.

10.23 The combination of the events clearly created huge alarm for parents, pupils and staff in the two schools affected. There has been wider anxiety throughout the local community and beyond. Quite understandably, these fears generate lots of questions that need answers. This has placed a heavy load on public officials particularly in the light of the uniquely complex and sensitive nature of the situation:

- Two high schools including one for children with additional support needs
- A former landfill site
- Social media
- Mainstream media with a close interest
- Distrust in North Lanarkshire Council
- Historical opposition to the locating of the school at the site in 2012

- Seven years after its opening, fewer parents and staff aware of its history
- Blue water concerns lasting years
- Settlement of the building

10.24 Recognising this situation was getting out of hand could at the very least have generated a call for a Problem Assessment Group for the various parties to come together to assess where they could provide answers quickly and reliably to address concerns. If actions taken by this group were not meeting the demands of the situation, it is possible to step up an Incident Team in relation to a public health risk if “high media interest” is expected. There appears not to have been consideration of stepping up these responses when handling the situation on the ground.

10.25 Using these mechanisms of response would have helped the agencies to consider and communicate contingency arrangements in a timely fashion and begin to plan for recovery sooner than has been the case.

10.26 These reflections cause us to consider how, going forward, confidence can be restored and how in a participative way, the local – and indeed – wider community with a vital interest in the school can be engaged, connected, listened to and can influence future site management. The aim of this would be to give confidence in the next steps by North Lanarkshire Council and minimise the risk of relations deteriorating and risking a repeat of recent experiences.

10.27 We consider that there is a role here both for North Lanarkshire Council and those who have been so vocal thus far in raising concerns. We think they were right to do so but the point has now in our view been reached where those people have been listened to. The opportunity now exists for them to influence.

10.28 We consider therefore, tied with other essential steps in relation the presence of PCBs in pit HP50 and the continued work needed on water quality, that in conjunction and consultation with parent councils, unions, staff based on the campus across Buchanan, St Ambrose and Townhead Community Centre, North Lanarkshire Council establish a fully participative Site Recovery Group chaired by an independent expert designed to further that goal.

This Group should include and create:

- a commitment to publish an annual assessment of relevant site monitoring reports (water, internal and external maintenance and the monitoring of the integrity of the gas methane membrane)
- a commitment to the preparation of annual assessment relevant site monitoring reports
- an open channel for concerns to be raised by any stakeholder regarding the well-being of those on the campus

10.29 We would envisage it comprising a range of members from representatives from parent councils, staff (including community centre), unions, pupils, parent groups, community councillors, local faith leaders, as well as public officials.

10.30 The precise remit, size and method of operation of such a group is not for us, not least because of the key influencing role in its establishment for parent councils, unions and staff and pupils based on the campus.

10.31 Nevertheless, we tentatively suggest that the following could be worthy of consideration-

- We see a potential role not just for parents and staff but respected external experts with credibility participating in central roles in the Group;
- Reflecting the constructive role looking forward, we consider that local MSPs having an interest can play an important role;
- That this Group could consider arrangements to signpost people to where they can find answers to their questions – such as public health phone number for health issues, maintenance team for faults they see at the school, occupational health phone number for staff to make appointments;
- If taken forward (see paragraphs 5.36 to 5.40, and paragraph 8.29), undertake temperature, humidity and carbon dioxide monitoring when the school is re-opened to assess indoor air quality;
- Inclusion of provision of whether and how the Group would be brought to an end, at the appropriate time;
- That the Group should have a direct line into North Lanarkshire Council Health and Safety Committee to raise any issues they feel relevant.

CHAPTER ELEVEN – CONCLUSIONS

11.1 The conclusions we draw are largely unique to this situation and caution should be taken in making generalisations from them. We have published today, with some provisos, to inform decisions by North Lanarkshire Council as Education Authority on whether these two schools should open in light of the findings we make from our investigation of the facts in this Review.

We conclude

11.2 Parents and staff were right to raise concerns. They were entitled to be listened to and heard. They were entitled to expect that North Lanarkshire Council and NHS Lanarkshire officials would take their concerns seriously and address them.

11.3 North Lanarkshire Council were aware of the site history and took reasonable professional and scientific advice to address concerns in a proportionate and responsible way. It was known and understood by all concerned – officials and elected members – that this was a brownfield site being brought into productive use.

11.4 The detailed and careful steps taken in assessing the risks of ground water contamination (and related work concerning risks of water contamination) were reasonable, appropriate and proportionate to the risks arising at the relevant time. They represent a suitably precautionary approach, mindful of the intended use of the site and the work was peer reviewed in an appropriate manner.

11.5 The GP was right to raise the concern when a cluster of cancer cases occurred at Buchanan High and for the public health team to investigate if this was linked to copper in the water supply or an unknown environmental exposure at the school.

11.6 Reviewing the evidence summarised in our report, we see no causal link between these three cases of bladder cancer and attending the school. The remaining two members of staff had two different kinds of cancer and no plausible explanation could link all of these together with the school. Furthermore, there is no causal link between arsenic and the bladder cancer cases at Buchanan High school.

11.7 It was right to raise a query about the source of arsenic and whether it was the cause of a pupil's blindness. In response, NHS Lanarkshire's investigation was thorough and conclusive. We agree with them there is no causal link between arsenic and the sight loss or other health conditions reported at the two schools.

11.8 It was important for people to raise their health concerns with the Independent review team. The symptom profile was very similar to that submitted in the report by Scottish Hazards. We agree with the analysis undertaken by Health Protection Scotland on behalf of the Review and conclude that this pattern of symptoms are not consistent with exposure to any specific chemical nor constitute a distinct clinical syndrome.

11.9 On the basis of these investigations, we conclude additional case finding was not required by NHS Lanarkshire and we agree with the advice given to GPs to continue to treat and investigate patients from the schools as they would for any other patient based on their symptoms and signs.

11.10 The risk from hazardous contaminants in the soil is very low. We reached that view informed by expert advice, undertaken in a thorough and systematic way and has covered a wide range of potential contaminants. The laboratories used are all accredited and the risk assessment set at a precautionary level.

11.11 As there are no pathways from under the school building, car park areas and synthetic playing fields, no risks arise in respect of materials beneath the school, car parks or synthetic playing fields (and we deal with methane below).

11.12 In other parts of the campus soft landscaped, we consider the risk of contamination very low, based on a precautionary approach taken at the time of construction and in our sampling in July 2019.

11.13 Despite that general conclusion, we have found a localised source sample at pit HP50 with elevated levels of PCB's and advise remediation on a purely precautionary basis. These are highly localised as evidenced by the absence of contaminants in neighbouring sites. We recommend remediation (or otherwise work required to render the area safe) as a matter of urgency, so as to restore confidence.

11.14 With this work under way and residual issues being satisfactorily managed, in our view the school and site are safe.

11.15 Our Recommendation 1 reflects these concerns.

11.16 We conclude that staff were right to raise concerns about copper in the drinking water supply and these were not addressed seriously or quickly enough by North Lanarkshire Council. Fortunately, we have identified no significant health impacts either short or long term from drinking the water and the replacement of pipes and following Scottish Water's advice subsequent to their recent sampling should address the problem on a permanent basis.

11.17 Our Recommendations 2 and 3 reflect the responses to those concerns.

11.18 While we are generally assured in respect of the gas membrane installed as a precautionary measure on construction, we are conscious of the importance in making public more detailed material about the records of previous periodic testing and of the proposals we make at Chapter 10 concerning Site Recovery.

11.19 Therefore, we recommend that North Lanarkshire Council make publicly available as soon as possible the periodic testing results for the membrane since its installation.

11.20 Continued confidence in the methane membrane is essential. While, as at the date of this Report, we consider that parents and staff can have a high level of confidence in it, it would seem remiss not to include the taking of appropriate steps to monitor its continued effectiveness over the period ahead. We therefore include the methane membrane and ongoing assurance as to its integrity as an element of the Site Recovery Group's work.

11.21 Our Recommendation 4 reflects these concerns.

11.22 We have concluded, in light of the explanation concerning methane and because of other findings, that no wholesale air testing is essential. However, we have made findings about the sub-optimal indoor air quality apparently resulting from poor circulation of fresh air. We make no recommendations in that regard, but for the reasons we set out consider this an appropriate issue for possible taking forward in the work of the Site Recovery Group.

11.23 Although we wholly understand and welcome the raising of concerns by parents, staff and MSPs, we also recognise that, having properly done so, a counter risk arises. This is the risk that in raising public awareness, it can at times also sow fear and alarm particularly if health issues exist with other causes. We have seen this in some of the emails to us, linking health concerns automatically with the site, right or wrong.

11.24 We do not criticise parents and staff for raising legitimate worries, but conclude that now is the time that those whose felt unheard before can be confident that they have now been heard. Now is the time to engage and connect with what we suggest at paragraph 10.28.

11.25 We conclude in Chapter 10 that the response of North Lanarkshire Council was too slow, too defensive and too disconnected from the school communities.

11.26 We conclude that there are matters that North Lanarkshire Council and NHS Lanarkshire could have done better and from which they must learn.

11.27 We encourage North Lanarkshire Council to look ahead to engage and connect better with the school communities. We recommend closer and deeper consultation and better engagement in the management of this site from now on. We believe that this can represent an important step in restoring confidence in North Lanarkshire Council.

11.28 This is reflected in our Recommendation 5.

11.29 If North Lanarkshire Council and NHS Lanarkshire (for their interest) accept the conclusions above and the recommendations we make, we would support the opening of the schools.

11.30 As we note, that is not the end point for the addressing of the concerns raised. Our recommendations provide a way forward, in the medium to long term.

11.31 In the immediate period ahead, North Lanarkshire Council need to consider how to ensure the safe and supported steps essential to allow that to be done. That is an immediate responsibility. We recognise that parents and staff all have different views and levels of confidence in North Lanarkshire Council, but North Lanarkshire Council remain the Education Authority with duties to provide education. They must reach out in a flexible way to those affected to recognise those different views but assist them to ensure attendance.

11.32 Working together with shared outcomes and goals in mind, in our view gives an opportunity to put these troubles behind.

CHAPTER TWELVE – RECOMMENDATIONS

1. We would be supportive of a decision of North Lanarkshire Council as Education Authority to open the schools, on the basis that North Lanarkshire Council are undertaking (and commencing with a view to completion as soon as possible) full and independently verified remediation of area designated HP50, entailing the removal of the contaminants present there or otherwise render the area safe from the risks from those contaminants.

2. In light of the conclusions in this Report concerning water, because of the work not yet completed to replace the mains water supply pipe within the school and because of the need for public confidence in the water supply, we would be supportive of the decision of North Lanarkshire Council as Education Authority to open the schools on 12 August 2019 on the basis of that further water sampling shall be undertaken to confirm that the water supply is and remains compliant with drinking water quality standards and give confidence in the potable water being used by pupils and staff within the school in accordance with Scottish Water requirements (read with the advice from the Drinking Water Quality Regulator for Scotland), consistent with the places and contaminants sampled for and consistent with their methodology:

- I. within 14 days of the completion of the replacement of the main pipe within the campus (or within 14 days of today, if later);
- II. by the return to school after the October 2019 break; and
- III. by the start of term in January 2020.

3. In the event that water sampling results are positive, we recommend that Scottish Water will refer matters to the Drinking Water Quality Regulator for Scotland (if required by her) in accordance with and consistent with standard procedures.

4. In light of the conclusions in this Report about the methane membrane and the importance of making public more detailed material about the records of previous periodic testing, we recommend that North Lanarkshire Council make publicly available as soon as possible the periodic testing results for the membrane since its installation.

5. In light of the conclusions in this Report concerning the ongoing relationship with parents, unions and staff, we would be supportive of the decision of North Lanarkshire Council as Education Authority to open the schools on 12 August 2019, on the basis of North Lanarkshire Council agreeing to the taking of the following steps:

a) North Lanarkshire Council shall, as early as possible and in conjunction and consultation with parent councils (and others representative of parents), independent experts, unions and staff based on the campus across Buchanan High School, St Ambrose High School and Townhead Community Centre, establish a fully participative Site Recovery Group for the campus involving all key stakeholders to support future confidence in the site.

North Lanarkshire Council through this Group shall adopt a plan including, as a minimum:

- I. a commitment to ongoing monitoring in relevant respects such as water, internal and external maintenance and monitoring of the integrity of the gas methane membrane.
- II. a commitment to the preparation of relevant site monitoring reports and publication of an annual assessment which is shared with stakeholders.
- III. a commitment to take responsive action in consequence of this annual assessment if required in conjunction with the Site Recovery Group
- IV. an open channel for concerns to be raised by any stakeholder regarding the well-being of those on the campus.

b) Once established, the Site Recovery Group should explore further the need to assess and manage in-door air quality in relation to temperature, humidity and concentrations of carbon dioxide when the site is in use.

ANNEX

PERSONS FROM WHOM PROFESSIONAL ADVICE WAS SOUGHT BY REVIEWERS

The Reviewers are immensely grateful to all who contributed to the preparation of this Report and would wish to record the contributions – over and above public officials with responsibilities in the geographical area of North Lanarkshire Council – of the following:

- Peter Brown - Scottish Water
- Dr Geoff Card – Consultant (gas membrane specialist)
- Murray Dobson, SEPA
- Dr Tom Henman - Director of RSK (engineering and environmental consultancy)
- Dr Jackie Hyland, Consultant in Public Health Medicine, NHS Tayside
- David Mason – Consultant (gas membrane specialist)
- Donald Payne - Fife Council (providing external validation of the work of RSK)
- Sue Petch - Drinking Water Quality Regulator for Scotland
- Dr Colin Ramsay – Health Protection Scotland
- Dr Andrew Riley – Senior Medical Officer, Scottish Government
- Ian Tasker – Scottish Hazards
- Linda Turner - Fife Council (providing external validation of the work of RSK)
- Professor Andrew Watterson - Faculty of Health Sciences and Sport, Stirling University

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- ¹ North Lanarkshire Council letter regarding blue water, November 2018
 - ² North Lanarkshire Council Question and Answer Booklet, May 2019
 - ³ North Lanarkshire Council Leaflet, June 2019
 - ⁴ NHS Lanarkshire letter to GPs and clinicians, June 2019
 - ⁵ Submission from the Educational Institute of Scotland (EIS), July 2019
 - ⁶ Submission from NASUWT, July 2019
 - ⁷ Submission from Professor Andrew Watterson, Stirling University, July 2019
 - ⁸ Submission from Ian Tasker, Scottish Hazards, June 2019
 - ⁹ Review team example automatic email acknowledgement
 - ¹⁰ Ramboll Ground Contamination Risk Assessment Report, February 2010
 - ¹¹ North Lanarkshire Council Learning and Leisure Services Committee papers, 17 December 2007
 - ¹² URS Final Preliminary Ground Investigation Report, November 2006
 - ¹³ WSP Ground Investigation Report Review, 17 November 2008
 - ¹⁴ North Lanarkshire Council Report, 18 November 2008
 - ¹⁵ Ramboll Risk Assessment of the Water Environment, September 2010
 - ¹⁶ SEPA letter to North Lanarkshire Council, 18 January 2011
 - ¹⁷ SEPA letter to North Lanarkshire Council, 15 August 2011
 - ¹⁸ Ramboll Additional Risk Assessment of the Water Environment Summary, February 2014
 - ¹⁹ WSP Review of Ground Contamination Risk Assessment Report, December 2009
 - ²⁰ Ramboll Ground Contamination Risk Assessment Report, November 2009
 - ²¹ Ramboll Updated Ground Contamination Risk Assessment Report, February 2010
 - ²² North Lanarkshire Council Planning and Committee Report, 26 March 2010
 - ²³ North Lanarkshire Council Planning letter regarding Environmental Impact Assessment, July 2009
 - ²⁴ Scottish Government planning notification to North Lanarkshire Council, June 2010 and March 2012
 - ²⁵ Ramboll Environmental & Remediation Validation Report, September 2012
 - ²⁶ WSP Review of Environmental & Remediation Validation Report, December 2012
 - ²⁷ WSP Peer Review Follow-up, June 2018
 - ²⁸ Planning Advice Note PAN 33, Development of Contaminated Land
 - ²⁹ Environmental Protection Act 1990: Part IIA Contaminated Land - Statutory Guidance: Edition 2, May 2006
 - ³⁰ High Court Decision Corby Group Litigation, Re [2009] EWHC 1944 (TCC), 29 July 2009
 - ³¹ SEPA letter regarding advice on significant pollution of the water environment, 15 February 2010
 - ³² SEPA letter regarding planning application: C/09/00818/FUL, 11 September 2009
 - ³³ SEPA letter regarding advice on significant pollution of the water environment, 22 February 2010
 - ³⁴ Dealing With Assertions Of Human Health Risks Or Effects From Environmental Exposures: A Systematic Approach
 - ³⁵ Jarup L et al, Cancer risks in populations living near landfill sites in Great Britain, British Journal of Cancer, 86(11): 1732-6, 2002 Jun 05
 - ³⁶ UKIACR Cancer Cluster Factsheet June 2017
 - ³⁷ HPS Report Coatbridge schools Review
 - ³⁸ Chatzidiakou L, Mumovic D, Dockrell J, The Effects of Thermal Conditions and Indoor Air Quality on Health, Comfort and Cognitive Performance of Students, UCL Institute for Environmental Design and Engineering, October 2014
 - ³⁹ BB 101: Ventilation, thermal comfort and indoor air quality 2018
 - ⁴⁰ Scottish Water communications regarding sampling and compliance with Byelaws, December 2018
 - ⁴¹ World Health Organization Guidelines for Drinking-water Quality (Fourth Edition)
 - ⁴² Health Protection Scotland Short-Term Health Risk Action Values For Drinking-Water In Scotland (SHRAVs)
 - ⁴³ North Lanarkshire Council consultant report on blue water at the site, April 2019
 - ⁴⁴ Drinking Water Quality Regulator letter, 31 July 2019
 - ⁴⁵ Proposal for a geo-environmental site investigation by RSK: Buchanan and St Ambrose schools, Coatbridge, 16 July 2019
 - ⁴⁶ Balfour Beatty, 21 Framework Agreement Gateway 3 submission
 - ⁴⁷ Technical Report on Gas Membrane, 5 August 2019
 - ⁴⁸ Letter from Review to North Lanarkshire Council, 27 June 2019
 - ⁴⁹ Letter from North Lanarkshire Council to Review, 5 August 2019

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- ⁵⁰ SNIFFER risk communication booklet: Communicating understanding of contaminated land risks
- ⁵¹ Simpson BW, Truant P, Resnick B, Stop and Listen to the People: An Enhanced Approach to Cancer Cluster Investigations, *Am J Public Health*. 2014;104:1204–1208



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