British Geological Survey

# Heat from Coal Mines schools project

# Secondary education as a pathway for community engagement

Decarbonisation and Resource Management

UK Geoenergy Observatory, Glasgow

Open Report OR/24/043

BRITISH GEOLOGICAL SURVEY

DECARBONISATION AND RESOURCE MANAGEMENT PROGRAMME

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# Foreword

This report is the published product of a collaboration between the British Geological Survey (BGS) and Clyde Gateway.

# Acknowledgements

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We would like to thank Ms L Meechan and Mr L McGowan of Stonelaw and Trinity high schools for engaging with this project and for providing the space for their pupils to get involved in all the activities. Thanks also to the pupils themselves for their enthusiasm and for engaging so fully with the activities.

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# Contents

# Summary

This report describes a piece of work undertaken by British Geological Survey in collaboration with Clyde Gateway and Stonelaw and Trinity high schools in Rutherglen.

# 1 Introduction

Heat from Coal Mines is a collaborative project between the British Geological Survey (BGS), Clyde Gateway (CG) and two secondary schools in Rutherglen – Trinity High School and Stonelaw High School. The project was inspired by discussions with Clyde Gateway in 2021, exploring creative ways to engage communities with BGS's research into the potential for mine water energy in Glasgow. During these discussions we identified that local high school pupils could provide a pathway by which wider engagement with local communities might be achieved. This report describes the positive impact this work has had for both the pupils and the BGS.

The BGS recently launched the UK Geoenergy Observatory at Cuningar Loop (Glasgow Observatory); a research facility which is investigating the potential of mine water energy for heating buildings in Glasgow. The observatory features 12 boreholes drilled into flooded mine workings at depths of 14–199 m. They are designed to increase the understanding of mine water energy, how the water moves around the mine workings during heat abstraction or reinjection periods, and any related changes in the chemical, physical or microbiological properties of the environment underground. The information will assist policy makers, commercial groups and academics in understanding concepts including the size and sustainability of the resource.

Collaboration with the local community has been a key part of the development of the Glasgow Observatory. Throughout construction community consultation events were held, and a community liaison forum was formed to share information and opportunities. A public engagement programme, developed in collaboration with Glasgow Science Centre, produced outreach materials, lesson plans for schools and an interactive exhibition which has toured to 8 different science centres and museums around the country.

Also linked to the Glasgow Observatory's engagement programme was a small-scale public dialogue on the topic of geothermal heat. One of the findings of this dialogue was that participants were interested in considering future energy on a community scale. This contributed to the inspiration for the Heat from Coal Mines project.

This project is focussed on using the BGS Glasgow Observatory as a platform to empower local communities to engage in dialogue and decision-making on how a low carbon future will be achieved in their community and beyond, and to explore the role school pupils might have as a pathway for this community engagement.

The project aims to:

- increase community understanding of geothermal energy
- identify the community's energy hopes, fears, priorities and build trust between researchers and communities
- encourage active community involvement to support community led approach to future 'energy models'/local energy decisions
- increase longer term understanding of the role of geothermal energy in the move to net zero

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# 2 Work programme

## 2.1 INITIAL PLANNING

In order to achieve the project aims, we agreed that initial community engagement during Year 1 of the project would be explored through engagement with pupils at two high schools in close proximity to the Glasgow Observatory - Trinity High School and Stonelaw High School. Teachers at both schools were consulted to discuss how the project could be aligned with the

school curriculum and existing programmes and structures of the schools. In addition, suitable engagement methods and possibilities for accreditation for pupils were explored.

We agreed that the first set of activities would involve pupils studying geography. From Stonelaw High School a group of 14 pupils from S1 and S2 (age 11-13) participated in the project under guidance from their Geography teacher. From Trinity High School a group of 10 S3 pupils (age 13-14), members of the school's eco club, participated with their club leader who was also a geography teacher. A plan of activities was developed in consultation with the teachers:

- October 2022 – Initiation workshop – Cuningar Loop
  - Introduction to the UK Geoenergy Observatories and Clyde Gateway. Site visit. Overview of project and kick-off.
- January 2023 - Skills session – In schools
  - Session on developing skills for working with others in the community
- April 2023 – Presentation workshop – In schools
  - Session on bringing together research and preparing for presentation.
- June 2023 – Presentation workshop – Cuningar Loop
  - Presentation of project finding to community and decision makers
- August 2023 – Reflection session – In schools
  - Reflect on year 1, lessons learnt and future plans

## 2.2 REVISED TIMETABLE AND PROGRESS

Due to staff changes at the BGS, this timetable had to be delayed by one year. This would enable the project to engage with one cohort of pupils during a full academic year, taking them from the introductory sessions, through skills development, to presentation of findings to a selected audience of community members. Activities therefore started in October 2023 and ran until mid-June 2024. A follow-up review session would be planned for August to give participants to share reflections and feedback (see detail below).

Following the first two workshops described above, ideas for future workshops were planned as follows:

- 1 May 2024 - Skills session – In schools
  - Questionnaire/survey design for data collection and video creation/interviewing
- 30 May 2024 – Data collection and data analysis – Cuningar Loop.
  - Data collection in park and data analysis at Bothy.
- 11 June 2024 – Presentation workshop – Stonelaw
  - Presentation afternoon to local community leaders, parents, local councillors, other interested parties (timing to suit invitees)
- August 2024– Final wrap up/Reflection session – online
  - Lessons learned and future plans

In order to mitigate against competing demands on BGS staff resource and ensure that the relationship with the schools was given priority, Valerie Beattie – a science communication specialist and trained teacher – was brought on board to act as workshop coordinator and facilitator. In consultation with BGS staff, Valerie developed the sessions in May and June and liaised with the schools. This ensured that BGS staff time could be used effectively by providing relevant expertise in geothermal energy, public engagement, survey design and videography.

# 3 Methods

## 3.1 WORKSHOP 1 – INTRODUCTORY SESSION

Due to scheduling conflicts with the teachers, two separate introduction sessions were run out of the Bothy in Cuningar Loop park. Session 1 ran on Monday 23rd October with Lauren Meechan from Stonelaw High School; session 2 ran on Friday 3rd November with Luke McGowan from Trinity High School.

At each session, an overview of the Heat from Coal Mines project was given by the BGS project lead. This included explanation of why the activity was located at Cuningar Loop park, and collection of some data from pupils on their current knowledge of geothermal energy and its local impact on the community. Brief presentations were then given by BGS staff managing the Glasgow Observatory about the activities on site and the history of coal mines in the area. For one of the sessions, Douglas Cameron from Clyde Gateway was present and shared information on the park's regeneration journey.

The pupils were then given a tour of the Observatory to look inside one of the covered boreholes and the heat unit containing monitoring equipment and heat pumps. Once back at the bothy the pupils worked through some activities. The first was a creative activity to write a story/poem/comic panel on the topic of "energy". Excellent engagement was shown by the pupils who came up with lots of varying stories (a lot about wind turbines and Whitelee from Trinity). The pupils stayed focused throughout the activity.

Further sessions included gathering information from pupils on how they would want to collect information from their community on aspects of geoenergy, what questions they would ask, what information they felt the public should have before being informed enough to answer the questions, and what skills they think they might need to complete the research. This session provided valuable information which was used to plan future workshops.

Pupils' ideas for information gathering from the community included online surveys, video interviewing, lectures/public talks, local radio and BBC programmes/documentaries. They felt that they would need to develop skills in questionnaire design, graphic design, cartography, videography and how to talk to people confidently and keep them interested, in order to complete these activities.

## 3.2 WORKSHOP 2 – SKILLS DEVELOPMENT

Due to scheduling conflicts, it was again not possible to bring the two schools together for this workshop so two sessions were held, the first on 1st May 2024 at Stonelaw High School and the second on 7th May 2024 at Trinity High School.

This workshop was designed as a skills development session, based on the methods pupils had indicated they were interested in using and learning about in the first workshop. The first part of the workshop focused on how to use interviews and questionnaires to gather data effectively, including setting questions and using online survey tools. The second part of the workshop was focused on developing the pupils' skills in filming and editing video interviews. For this section a mini workshop had been created by BGS's in-house videographer, which included a final filming challenge for the pupils to complete.

Through the workshop the pupils developed questions that they would like to ask their local community to create an understanding on their knowledge, interests and concerns in relation to geothermal, other low carbon energy, and decisions around local energy plans. The workshop concluded with the pupils voting on the questions that would make it into their final questionnaire. They uploaded their questionnaires to an online survey tool and created a link to share with potential participants in the community. Each group was set the challenge of creating a poster to publicise their questionnaire after the workshop and to encourage the community to participate.

### 3.3 WORKSHOP 3 – DATA COLLECTION AND ANALYSIS

Workshop 3 brought pupils from both High Schools together for a full day of activities in Cuningar Loop on 30th May 2024. The day started off with some warm-up games to get the pupils ready for the day, followed by a recap of each schools' interview questions and a safety briefing.

The pupils then went out in groups to interview members of the public that were visiting Cuningar Loop that day. Each group had paper copies of their questionnaire to ask members of the public to fill in, and an iPad for filming interviews. They received a good reception from park visitors, all of whom were keen to help.

In the afternoon the pupils returned to the Bothy to edit their video interviews, analyse the data they had collected and investigate emerging themes, under the guidance of Valerie Beattie and Eilidh Dunnet of BGS. They discussed different ways to present their findings and started to put together a presentation for the final workshop. To finish the day, they went out into the park again to put up the posters that they had made to encourage more members of the local community to complete their questionnaires.

### 3.4 WORKSHOP 4 – FINAL PRESENTATION

For this final workshop, held on 11th June 2024, members of the community were invited to attend to hear about the work done by the pupils, the learning they had gained throughout the process and what they had concluded as a result of their data analysis.

The pupils spent the morning doing a final analysis of their data and finishing and practising their presentation for the afternoon.

20 pupils took part in the presentation. Also in attendance were Kyle Walker-Verkuil, BGS Glasgow Observatory site technician, Hazel Napier, BGS Geoscience and Society lead, Fiona McLean, Clyde Gateway project manager, Business and Community Growth, Johann McDougall, Geothermal Programme Manager, Scottish Government, Bob McDonald and Colin Findlay, Rutherglen Heritage.

The workshop was facilitated by Valerie Beattie and started with introductory talks by Fiona McLean, who thanked everyone for coming, Hazel Napier, who explained the origin and subsequent development of the project, and Kyle Walker-Verkuil who described the history of the Glasgow Observatory and mine water technology. Bob McDonald and Colin Findlay spoke about the importance of the coal mining industry in the area.

The pupils then gave a powerpoint presentation outlining their data gathering methods, subsequent data analysis and results of the analysis (see Appendix 1). In total the pupils surveyed over 130 people. Their presentation (Appendix 2) started with an introduction to the project, that was focused on learning how water from abandoned mines can be used to heat buildings and how this heat can play a role in decarbonisation of heat in the future. Through the project, the pupils would seek to answer the following questions: (1) what does the wider community know about geothermal and other low-carbon energy? (2) do people know the benefits and risks, and what are their hopes and fears, about geothermal and low-carbon energy? (3) what would people like to see happen with low-carbon energy in our community in the future? and (4) how can we achieve net-zero carbon emissions? Key trends in the data included:

Of those interviewed,

- Approximately half do not know what geothermal energy is
- Around ¾ did not know that geothermal energy was being researched in their community
- About 83.5% they were happy to some degree that geothermal was being researched in their community, with a small number saying they didn't know.
- Nearly half answered yes, or probably yes, when asked if they would consider switch to a geothermal or low-carbon energy source.
    - Reasons given included the importance of having access to an ethical energy supply and if prices were lower than their current energy supply

    - Barriers included cost and lack of choice of supplier
- When asked about possible benefits, nearly ¾ said that the energy supply would be low-carbon, and that the technology may create skilled jobs
- About half were nervous about the research being done in their community as they were unsure of the risks, in particular what the harm to nature and wildlife might be
- When asked what they felt the future might look like with an increase in use of geothermal energy, more than a third felt it would reduce the cost of energy and nearly half felt that climate change would slow down.

# 4 Key learnings, recommendations

Throughout the project, all the pupils at both high schools showed keen interest in the geothermal research BGS is undertaking in their local area and showed high levels of engagement throughout the project. BGS staff were impressed with the way the pupils embraced the challenge set for them, and the skills they developed as a result. This was thanks to a number of factors including a willingness by teachers at both schools to align the work with the school curriculum and enable their pupils to engage fully in the various workshops, willingness of BGS staff to get involved in the different workshop events, including sharing of their skills and knowledge with their pupils, and latterly, the support of a consistent point of contact, Valerie Beattie, who had the relevant expertise and enthusiasm to run the final three workshops.

Whilst the results from the project were interesting and provided good learning for the pupils, BGS staff remarked that these findings would also be of real value to BGS's ongoing public engagement activities related to the research being done at Cuningar Loop. They requested access to the materials and data collected by the pupils which would provide invaluable learning for future public engagement efforts.

This project was not without its challenges. BGS staff change in 2022-2023 meant the project was delayed. The delay was then extended still further to ensure that the start of the project coincided with the start of an academic year in 2023. This ensured that the project would involve a single cohort of pupils that would grow in knowledge and skills throughout the year. During autumn of 2023, further changes in the BGS public engagement team meant that there was a delay between the first and subsequent workshops. However, this did enable the team to schedule the follow-up workshops in the summer term during a quieter period in the school year, once the more senior pupils were on study leave. This freed up some of the teachers' time enabling them to provide more support and guidance to the pupils involved in the project. It proved challenging to schedule the groups from both schools to come together for joint activities as securing out-of-class time was difficult within the busy school timetables. Other challenges included ensuring enough BGS staff with the right experience and skills were made available to get involved in the various activities, and careful allocation of resources to ensure the project could be delivered within the timeframe. Support from Fiona McLean at Clyde Gateway was invaluable in ensuring a relationship was maintained with the schools, providing a constant point of contact with the teachers from each school, and the necessary contract variations were issued quickly so that the project could progress within the agreed timeline.

Availability of funding to be able to provide transport for the pupils from their schools to Cuningar Loop was a great benefit to this project. The teachers both commented that it would not have been possible for them to pay for this transport from their own funding and their opportunities to take pupils out of school were very limited. Enabling the pupils to get out of their schools and tour the Glasgow Observatory, learn about Cuningar Loop and take part in activities in the bothy was greatly appreciated by both the teachers and the pupils.

## 4.1 PUPIL FEEDBACK

Feedback was collected from the pupils at the end of the workshop series. This feedback is organised by workshop session.

### 4.1.1 Workshop session 1 – Site visit to the UK Geoenergy Observatory Glasgow

When asked how enjoyable they found the visit, nearly 85% of the pupils said they found it either very enjoyable or quite enjoyable. When asked how interesting they found this session, 92.5% said they found it very interesting or quite interesting, with only 7.5% saying they found it neither interesting or uninteresting.

### 4.1.2 Skills workshop (writing survey questions and interview techniques)

The pupils were able to increase their general knowledge of geothermal energy. They learned about good practice in writing survey questions and when time allowed, briefly discussed the concept of bias. They increased their digital literacy and written literacy by practising writing their own online survey questions. They were able to put into practice their knowledge about open-ended questioning, and increase their confidence in public speaking by practising their interview questions with each other.

80% said they found the session enjoyable, and 70% found it interesting, and a small proportion of the pupils found the session less enjoyable and interesting. This is perhaps due to the challenging and wordy nature of the “Writing Survey Questions” section.

Some of the S1 pupils found the “Writing Survey Questions” part of this workshop a bit tricky, although they were able to complete the activities with adult assistance. It was very helpful to have 3 adults in the room with 14 pupils at Stonelaw; this was an appropriate adult:child ratio for the level of ability in this group. The “Writing Survey Questions” Workshop could be suitable for S1 all the way up to S6 level and needs to be tailored accordingly, as the pupils could learn in increasing levels of detail about different types of sample, question design and bias.

### 4.1.3 Workshop session 3 – Surveying the public

The pupils were able to practise approaching and talking politely and professionally with members of the public, which required courage and confidence. They answered questions from the public about geothermal energy, describing where the GeoObservatory was and what it was for, putting their knowledge of geothermal energy into practice. When working with their results, they practised the literacy skill of summarising by identifying the dominant response to the question and then mentioning other answers.

This was a very enjoyable and interesting session for the pupils and the favourite of the four, with only one respondent reporting back that they didn’t find it interesting.

This session ran well. If there was more time in the future, the pupils could survey different samples of the public, e.g. questioning people in a main urban street near to the park, surveying nearby residents door-to-door, etc. This session could be run as a paperless session, using devices with data roaming capacity, e.g. their own devices or enabled BGS devices. Access to hired laptops in the Bothy ensured the session ran smoothly and that the pupils could use what little amount of time that they had constructively.

### 4.1.4 Workshop session 4 – Presenting to the public

The pupils had experience with working collaboratively in their groups to prepare their presentation slides, and experienced receiving feedback on their work. They practised their public speaking skills during the presentation. They received very enthusiastic positive feedback from the attending audience members. They were able to more fully understand the wider context of the project and the importance of the research following comments and questions from the audience. They were able to meet professionals from the geothermal energy community which would’ve been inspiring and informative in terms of considering careers in this area.

This session performed well for the pupils, with ¾ finding it an interesting and enjoyable experience. The feedback of the remaining ¼ of the young people shows that they weren't particularly engaged by the session.

There would have been a better attendance of guests had the session date been organised more in advance. Unfortunately, the teachers were not very timely with their email responses throughout the project, and so this was a large factor affecting the notice that we could give guests. Everyone invited responded enthusiastically; those not able to attend expressed their support for the project and wished to be kept informed of future events.

### 4.2 TEACHER FEEDBACK

Positive feedback was received from teachers at both Stonelaw and Trinity high schools. The project was described as extremely valuable with no significant cost to teachers in terms of time and logistics. The project kept the pupils focused on activities specific to their local area, they learned valuable skills, including presentation skills and organisational skills, and gained confidence as a result of the workshops they participated in. The project also increased the pupils' awareness of renewable and geothermal energy and associated job opportunities.

Highlights included the third workshop where pupils were able to interact with the public; pupils had the confidence to talk to members of the public of all ages, taking part in the final presentation of their work, and working alongside pupils from a neighbouring hjgh school. It was noted that it would have been valuable to open up the final presentation to a wider audience to include parents, MSPs, community members etc to allow for more interaction.

# 5 Future work

#### 5.1.1 Interest from schools

Both schools indicated that they would be keen to continue the relationship that they had developed with the BGS and Clyde Gateway in future years and explore further the topic of energy in their community.

In the initial meeting with schools there were several different avenues that were explored as suitable ways to collaborate that would be complementary to their teaching schedule. This included integration into the S1 Geography curriculum on climate change (perhaps as a study topic with fieldtrip), a project with National 4/Higher pupils studying Engineering Science, whole school projects under the leadership of school captains and in-depth studies with Advanced Higher Geography pupils. There were also discussions on integrating with Developing the Young Workforce activities within each school and looking at opportunities for accreditation similar to 'Climate Ready Classrooms' from Keep Scotland Beautiful.

In discussing the feedback with teachers at both schools at the end of year one (section 4.2 above), both teachers confirmed that a year two of the project would be of value and that it would be beneficial if both schools could continue to work together. Suggestions included continuing to work with the 'eco club' and involvement of senior leadership pupils, connecting more with organisations such as Rutherglen Heritage which would provide links to previous coal mining in the area, and with other local stakeholders and employers providing links to green skills and green jobs. Widening pupil engagement within the community and exposing them to a wider group of local actors and stakeholders would also provide relevance and links to a wider set of school subjects including History (coal mining), Science/Physics (geothermal energy), Geography, Manufacturing and Design (trades related to green skills).

#### 5.1.2 Expansion beyond schools

In the initial project development, collaborating with school pupils was seen as having two main advantages: pupils have the potential to provide a valuable link to other community members, through family and friends; and engaging with this group provides additional learning and skill

development opportunities within the community. The vision was to empower community members of school age to gain the opportunity to influence decision makers and take ownership of possible future initiatives that would help the community move towards a more sustainable future.

Specifically, the project's aims were to:

- increase community understanding of the role geothermal energy
- identify the community's energy hopes, fears, priorities and build trust between researchers and communities
- encourage active community involvement to support community led approach to future 'energy models'/local energy decisions
- increase longer term understanding of the role of geothermal energy in the move to net zero

During early discussions with the teachers, an aspect of the project that had been particularly appealing to them was its cross-disciplinary nature and the links to sustainability. The following areas were identified by them as having particular relevance to their subject areas:

- *Links to local mining history*. This project would provide an opportunity for students to consider their local industrial history, particularly the legacy of past reliance on fossil fuels and a discussion around the impact of this legacy, and how their industrial past could be reframed through the reuse and repurposing of old mining infrastructure in support of a greener, more sustainable energy future
- *Increased understanding of energy systems*. This project would support dialogue and therefore increase understanding of how shallow geothermal energy solutions sit within the wider, and complex, energy system; its place in a cleaner energy production system alongside other existing and new sustainable energy technologies.
- *The creation of an energy manifesto* as a tangible output which could be presented to local policy and decision makers. Creation of such a manifesto would enable students to take some ownership of community energy related proposals and engagement processes with an emphasis on planning for future energy scenarios. Presenting this to policy and decision makers would not only enable students to understand the policy decision making process, but also develop specific writing and presentation skills.

A second year of the project could focus on expanding these topics in greater depth, and particularly, support pupils in developing wider engagement with communities located close to the Glasgow Observatory. A third year could see expansion of pupils' engagement with local policy and decision makers and the development of an energy manifesto created and presented by the same school pupils as they move through the school.

# 6 Summary

This project faced a number of challenges, as described above and summarised in Appendix 1. It faced delays due to BGS staff availability and scheduling challenges with the schools. Despite these challenges, feedback from teachers, pupils and BGS staff suggest this was an enriching experience for all concerned. Of particular note is the enthusiasm with which the pupils threw themselves into the various challenges, the learning they demonstrated during their final presentation, their engagement with the subject matter and commitment to messaging around sustainable future energy use and links to climate change. It is heartening to see such engagement in pupils who will play a large part in how communities shape their future energy use. In addition to this, the pupils' analysis of the data they collected provides valuable insights into local community knowledge and attitudes to locally supplied geothermal energy. This complements and informs existing engagement activities undertaken by the BGS and provides deeper insights into the issues and challenges communities foresee in the future.

We recommend that future activities expand pupil learning, support wider community engagement through friends and family, and develop dialogue with local community representatives, policy and decision makers through development of the *energy manifesto*. All these recommendations for follow-on activities will be dependent on available funding and availability of suitably qualified BGS staff to support these activities in collaboration with Clyde Gateway.

# Appendix 1 Lessons Learned

| Activity | Challenge | Benefit | Learning | Future |
|---|---|---|---|---|
| **School consultation and engagement** | Timely engagement with schools sometimes challenging due to workload of teachers. | Early consultation valuable in assessing how best to align with school curriculum and relevant age groups | Facilitation of engagement by Clyde Gateway supported this engagement due to positive existing relationship | Any future engagement will build on this existing relationship to continue the positive connection between with project team and teachers |
| **Alignment with pupil age and stage** | There was a temptation to try and involve full year groups in this project. Decision made to keep the numbers of pupils manageable for the first year. | Worked with teachers to ensure maximum benefit. Identified ages 11-13 and 13-14 from Geography cohort and eco-club | It was useful to trial an activity with a smaller cohort of pupils and link activities to curriculum and potential accreditation | Future activities to be offered to same cohort of pupils to develop their knowledge and skills. However, need to explore expanding the numbers to maximise opportunity for future community engagement |
| **Maintaining contact with teachers and timing of sessions** | Due to pressures of school timetable, it was sometimes difficult to maintain regular contact with teachers. This introduced delays to the scheduled work and challenges aligning with the academic timetable | Delays to the schedule had unintended benefits. The last 3 sessions were held within 6 weeks and enabled momentum and motivation of pupils to be maintained. These sessions were able to occur during exam leave; a quieter time for the teachers | Timing of sessions is key to ensure success for pupils and minimum disruption for teachers. | Maintain early contact with teachers to support positive and planning of future engagement and activities. |
| **Scheduling sessions with two schools** | It was challenging to organise combined sessions for workshops 1 and 2 due to scheduling conflicts between schools. This required two separate sessions to be run | Running separate sessions meant that the size of each group was manageable, and pupils were able to interact directly with BGS staff. Pupil engagement during these | Whilst combining efforts across both schools introduces efficiencies, running two sessions can work well for the schools and | Try to plan combined sessions but include a backup plan for separate sessions where this can work well. |

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| | for each workshop. This required increased commitment from BGS experts | separate sessions was very positive | reduces admin efforts to coordinate two schools. | |
| **Co-development of workshop programme** | Time was taken to ensure pupils could take some ownership of the programme. Planning for subsequent workshops had to wait until the first workshop was complete | Engaging pupils in how they would like to see the programme develop and what skills they would like to develop increased positive engagement across both schools | Engaging early and giving sense of ownership to pupils increases the likely level of engagement | Ensure future programmes include early engagement with pupils to encourage ownership of activities. |
| **Skills development** | This activity required involvement of BGS experts. This was hard to schedule around other work commitments | Involving pupils in decision making around how they developed and used their skills resulted in increased ownership and engagement in the activities | Engaging early and giving sense of ownership to pupils increases the likely level of engagement | Trust pupils to make decisions about how they would like to define their work programme |
| **Challenge setting for pupils** | Presenting the pupils with meaningful challenges took effort and required input from BGS experts | Stretching pupils to meet new challenges e.g. creating posters to publicise their work, kept them engaged and interested. | Seeing that pupils were engaged and take ownership for their work may have increased the level of community interest and engagement during outdoor data collection in the park. | Future work should embrace pupils desire to be challenged and demonstrate ownership of their work within their local community |
| **BGS project leadership** | The project experienced a number of BGS staff changes which led to delays in the project programme | The project was able to take time to reflect and build a relationship with the schools. An external consultant with science comms and teaching expertise joined the project to lead activities and provide continuity | It would have been useful to develop a succession plan should the same issues with staffing occur again. | Develop a succession plan which might include engagement of external provider to help ensure continuity of work and enable BGS experts to concentrate on their own specialisms |

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| **Final presentation - timing** | Due to the tight six-week schedule for the final 3 workshops, it was difficult to invite a large audience to attend the final workshop at short notice | Timing of the final workshop in June meant that pupils and teachers had more space to plan the presentation – this was a period of exam leave and therefore a quieter time for the school | Having a longer lead in time for the final presentation would have enabled more external parties to attend. Although the external audience attending was low, the engagement between the audience and pupils was very positive and encouraging. | Plan ahead for future events that involve external parties to increase take up and participation. |
| **Transport to and from Cuningar loop** | Organising transport for the pupils was logistically challenging and came at a cost to the project | Enabling the pupils to visit Cuningar Loop through use of project funds was seen as a real positive by teachers | Ensure adequate allocation of resources to transport costs and refreshment is a real positive and will encourage participation in the future. | Include transport costs etc in future project plans. |

# Appendix 2 Pupil presentation

BGS - HFCM Project - Session 4 - PUPIL P