Memorandum

HIGH PEAK BOROUGH COUNCIL

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Environmental Health – Planning Consultation

Date:	26 May 2016	**My Ref:**	HPK20160276
Dealt with by:	Matthew Rhodes	**Tel:**	01298 28400 Ext (82)4457
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APPLICATION NUMBER: **HPK/2016/0276**

LOCATION: 1 2 Buckingham Hotel Burlington Road Buxton Derbyshire SK17 9AS Buxton

PROPOSED DEVELOPMENT: Demolition of the Buckingham Hotel and erection of a new hotel comprising 110 rooms, ancillary facilities and sub-ground parking

VALIDATION DATE: 13 May 2016

RECOMMENDATION

Without further information being provided as set out above to demonstrate that satisfactory mitigating measures may be taken in relation to excavation and dewatering to protect and conserve the thermal springs the environmental health service objects to the application.

Comments

Buxton Thermal Springs

Thermal springs are rare in Britain. The Buxton thermal springs have been known to have been used since Roman times and have a long history of use as a mineral water and spa. They consist of a series of springs that discharge at up to 27.5 degrees C through Carboniferous Limestone in the vicinity of The Crescent in Buxton. The location of the springs suggests that the thermal water is capped beneath Namurian strata[1] (shales and sandstones) that exist to the north of The Crescent, with the thermal water emerging at the ground surface at the feather edge of the Namurian strata. The water is unpolluted and has unique chemical properties that distinguish it from the non-thermal groundwater that is also present in the Carboniferous Limestone. It has been shown that the thermal springs originate from the percolation of rainfall into a network of micro-fractures in the Carboniferous Limestone to reach a depth greater than 900 m. The heated water then returns rapidly to the surface probably following faults in the limestone strata.

The thermal water is bottled as Buxton Water, one of the best known mineral water brands in UK. The Crescent buildings are being regenerated as a Spa Hotel using the thermal water for treatments, and are expected to lead to increased tourism and income generation for the town. Water quality or flow impacts to the Buxton Thermal Spring could be irreparable and cause significant economic damage to the town of Buxton.

Although the thermal water has a greater hydraulic head than the cold groundwater system through which it emerges, there is a delicate balance within the limestone aquifer and therefore a need to avoid changes in hydraulic pressure that could affect this balance or changes in loading on the thermal water that might cause breakthrough of thermal water through the feather edge of the Namurian strata. The construction works associated with creating an excavation also have the potential to cause contamination of the aquifers in the vicinity of the thermal springs with unknown implications for the thermal water system. Any boreholes into the Carboniferous Limestone in the vicinity of The Crescent could create interconnections within the non-thermal aquifer that could result in changes in groundwater flow, which could have a knock-on impact on the flows and heads in the thermal system that could have a serious detrimental effect by diverting thermal water flow away from these springs. Any abstraction from such a borehole would further increase this risk.

The Buckingham Hotel lies outside the Environment Agency Source Protection Zone for Buxton thermal springs but lies within a recently defined special protection area for the Buxton Thermal Springs as set out in a document recently commissioned by the Council for the purposes of ensuring that protection zones for the thermal spring reflects current understanding of the mechanism through which the thermal spring arises. The relevant documents are attached. Within this area it is important that special consideration is given to the potential for disruption to the thermal springs.

Relevant Observations on the Planning Application

The planning documents available on 20 June 2016 have been reviewed, with the following observations:

The main issues that arise from this planning application – with regard to protection of the thermal springs are:

1. **Excavation.** The application includes the construction of a 3 storey basement that will penetrate up to 9.2m below ground level (to 292.3-290.5mAOD). One or more additional site investigation boreholes will be required and there may be the need to use ground anchors or tension piles to prevent hydrostatic uplift should the dead weight of the new building be insufficient to overcome uplift.

   The thickness of strata above the Carboniferous Limestone, at the location of Buckingham Hotel, is estimated by us to be around 75m (based upon off-site projection of geological information from elsewhere) and by *WJ Groundwater* to be 74-100m, although there is uncertainty over this value. Even given this possible thickness of overlying strata –there is a

[1] Namurian strata include Bowland Shale and Millstone Grit

risk that unknown faulting may mean that the overlying strata is thinner than expected. There are therefore outstanding risks that:

a. New site investigation boreholes or other intrusive works (e.g. tension piles) may penetrate the Carboniferous Limestone and affect the balance of thermal and non-thermal groundwater flow.

b. The excavation and depressurisation to construct the basement may reduce the loading on the Carboniferous Limestone such that the work might cause the breakthrough of artesian/thermal water at the site.

2. **Dewatering**. Although the Bowland Shale underlying the site can be expected to typically have a low permeability, there do appear to be interbedded limestones, and *H&H Building Solutions Ltd* note that a trial pit excavated to 1.2m depth in the current basement of the hotel encountered significant water ingress. *WL Groundwater* also report groundwater in the superficial soils and weathered strata. No permeability measurements have been reported that would allow inflows to the excavation to be estimated. The basement dig level at 290.5 - 292.3mAOD is at a similar elevation to the natural driving head of the thermal springs which is calculated to be around 289.5 – 293.3mAOD.

   a. There are no permeability data and drawdown calculations to estimate the amount of groundwater to be dewatered from the excavation, the effect of this abstraction on the nearby R Wye (located to the south of the development) and nearby groundwater and on the Carboniferous Limestone and the effect of depressurisation on adjacent structures, - although *WJ Groundwater* recommend additional investigations and the possible use of a perimeter cut-off to reduce inflows to a 'modest' level. Whilst by far the most significant effects of dewatering are likely to be on the area immediately surrounding the hotel, the absence of these calculations prevents the possible effect on the thermal springs from being potentially dismissed.[2]

   b. The route for disposal of abstracted dewatering water should be identified to demonstrate that, whilst the water arising from dewatering may not be heavily contaminated, there are no risks of pollution of groundwater or surface water.

3. **Water Supply and Waste Water Disposal**. It is assumed that the development will use mains water and there is no intention to abstract groundwater and hotel waste water will be disposed of to mains sewer.

   Any abstraction of groundwater, particularly from the Carboniferous Limestone, may affect the delicate balance between the thermal groundwater system and the non-thermal groundwater. Changes to this balance have the potential to affect the flows from individual springs within the thermal system. Confirmation that there is no plan to abstract groundwater for water supply should be given by the developer.

   On-site waste water disposal would not be appropriate as it may pose a risk to the quality of the thermal water.

4. **Pollution**. The effect of any potentially polluting activities on the thermal springs and other adjacent groundwater and R Wye.

   Whilst the development is north of R Wye, and therefore the river is at greater risk of contamination than the thermal springs, it is important that the developer considers

   a. The contractors working practices, the risks of spillage of hazardous substances such as oils and lubricants and appropriate mitigation measures.

   b. Appropriate approaches for the off-site cleaning of heavy plant and disposal of waste materials.

   c. The avoidance of features such as SUDS, as at this location an infiltration system could encourage the migration of contaminants to groundwater.

[2] Environment Agency are likely to require the developer to obtain a Transfer Licence for the abstraction of the water associated with dewatering if the abstraction is >20m^3/d

5. **Hydroponics**

   There is contradictory information about whether a pilot hydroponics development is part of the proposal. If it does remain in the proposal, we would like further information about its water supply, water disposal and waste arisings, in order to take a view on any potential risks.

Request for Additional Information

We request additional information from the developer, in order to determine whether appropriate measures will be taken to protect the thermal springs, during construction of the new hotel and during its subsequent operation.

To help the developer to prepare this information, we enclose copies of draft Codes of Practice (CoP) for drilling and shallow excavations in the vicinity of the Buxton thermal springs. In each case these CoP set out a 3 stage process to be adopted:

1. Provision of the additional **information** requested
2. A **risk assessment** that considers how the development may cause damage to the Buxton Thermal Springs
3. Appropriate **mitigating actions** that will be taken to overcome these risks, including monitoring of groundwater levels, flows and temperature.

Whilst the Buckingham Hotel falls outside the area defined for the CoP for Shallow Excavations, the principles remain valid for the large excavation described in this planning application.

Excavation

Information

Further information is required to clarify the full depth of excavation, including the foundations/lift pits etc. Information is also required on the location and depth of any further boreholes, other excavations, and other intrusive activities such as tension piles, that will be needed as part of the demolition or construction.

Risk Assessment

Having fully understood the extent of excavations/drilling/dewatering – a calculation should be made of the extent of depressurisation of the Namurian Shale during excavations/construction and with the new development in place, to make sure that there is a sufficient factor of safety to prevent breakthrough of thermal water and/or artesian water from the underlying limestone. A sensible worst case thickness of Namurian Shale should be assumed along with assuming that the thermal water has a piezometric head higher than the elevation that it emerges at the Natural Baths. A natural driving head of 289.5 – 293.3mAOD would be appropriate.

Mitigating Actions

If it is shown that there is a risk that there could be an insufficient factor of safety to prevent breakthrough of thermal and/or artesian water from the underlying Carboniferous Limestone, an approach will need to be proposed to overcome this risk.

WJ Groundwater identify monitoring and mitigation that should be applied to any drilling activities on site. Further measures are identified in the appropriate CoP (attached).

Environmental health service should be re-consulted once the information and risk assessment relating to excavation is received.

Dewatering

Information

Permeability information should be provided, along with the intended approach to minimise the effects of dewatering.

The route for the appropriate disposal of dewatering water should be identified.

Risk Assessment

The developer should provide calculations of the possible effects of dewatering on Buxton thermal springs and R Wye. It is likely that re-assurance will also be sought with regard to the possible effect of the dewatering on adjacent structures.

Mitigating Actions

A risk that the dewatering will affect the thermal groundwater head at the Natural Baths will not be acceptable and mitigating measures would be required to avoid the influence of dewatering propagating off-site.

Environmental health service should be re-consulted once the information and risk assessment relating to dewatering is received.

Water Supply and Waste Water

Information

The developer should clarify the source(s) of water to be used at the development and confirm that there is no intention to abstract groundwater for water supply. If it is the intention to abstract groundwater then environmental health service should be re-consulted.

The developer should confirm that all hotel waste water will be disposed of to mains sewer.

Pollution

Mitigating Actions

The developer should prepare those parts of a Construction Environmental Management Plan that will provide re-assurance that there will be careful management of potentially pollution activities. This should include:

a. Appropriate measures to avoid spillage of hazardous substances such as oils and lubricants.

b. Appropriate approaches for the off-site cleaning of heavy plant and disposal of waste materials.

c. The avoidance of features such as SUDS, as at this location an infiltration system could encourage the migration of contaminants to groundwater.

Conclusion

Without further information being provided as set out above to demonstrate that satisfactory mitigating measures may be taken in relation to excavation and dewatering to protect and conserve the thermal springs the environmental health service objects to the application.

I draw your attention to the following HPBC information documents:

- HPK20160276 - C475 Code of Practice Excavations Draft to HPBC v2
- HPK20160276 - C476 Code of Practice Drilling Draft to HPBC v2

Regards,

Matthew Rhodes

EHO (Pollution Specialist)